

OPEN FILE

HIGHHAT RIVER COAL PROPERTY

N.E. BRITISH COLUMBIA

1982 GEOLOGICAL REPORT

B.C. COAL LICENCES 7338-73451 INCLUSIVE
OWNED BY SHELL CANADA RESOURCES LTD.
OPERATED BY GROWS NEST RESOURCES LTD.

LOCATED IN THE PEACE RIVER LAND DISTRICT

NTS 93 P/5

LATITUDE 55°24' NORTH
LONGITUDE 121°50' WEST

CONFIDENTIAL

BY A. WHITE
APRIL, 1983



Crows Nest Resources

Eau Claire Place, 525 - 3rd Avenue S.W., Calgary, Alberta (403) 232-4355
P.O. Box 2699, Station M, Calgary, Alberta T2P 2M7 Telex 03-822505 **LIMITED**

OPEN FILE

May 10, 1983

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

Gentlemen:

Enclosed please find our report on the Highhat River Project.

This report has been prepared by Mr. A. White who worked on the property with Mr. R.D. Gilchrist (staff geologist) during the summer of 1982 and has subsequently taken over supervision of the project.

Mr. White has been employed by Crows Nest Resources Ltd. as a geologist since 1980. He graduated with a B.Sc. (honours) in geology from the University of Waterloo in 1977. Between graduation and joining Crows Nest Resources in 1980, Mr. White worked as a geologist on a number of mineral exploration programs in Northern Ontario, the Northwest Territories and British Columbia.

In my opinion Mr. White is fully qualified to carry his duties in the preparation of this report on work performed during the 1982 field season.

**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

Yours truly,

H.G. Rushton, P. Geol.
Vice-President, Development

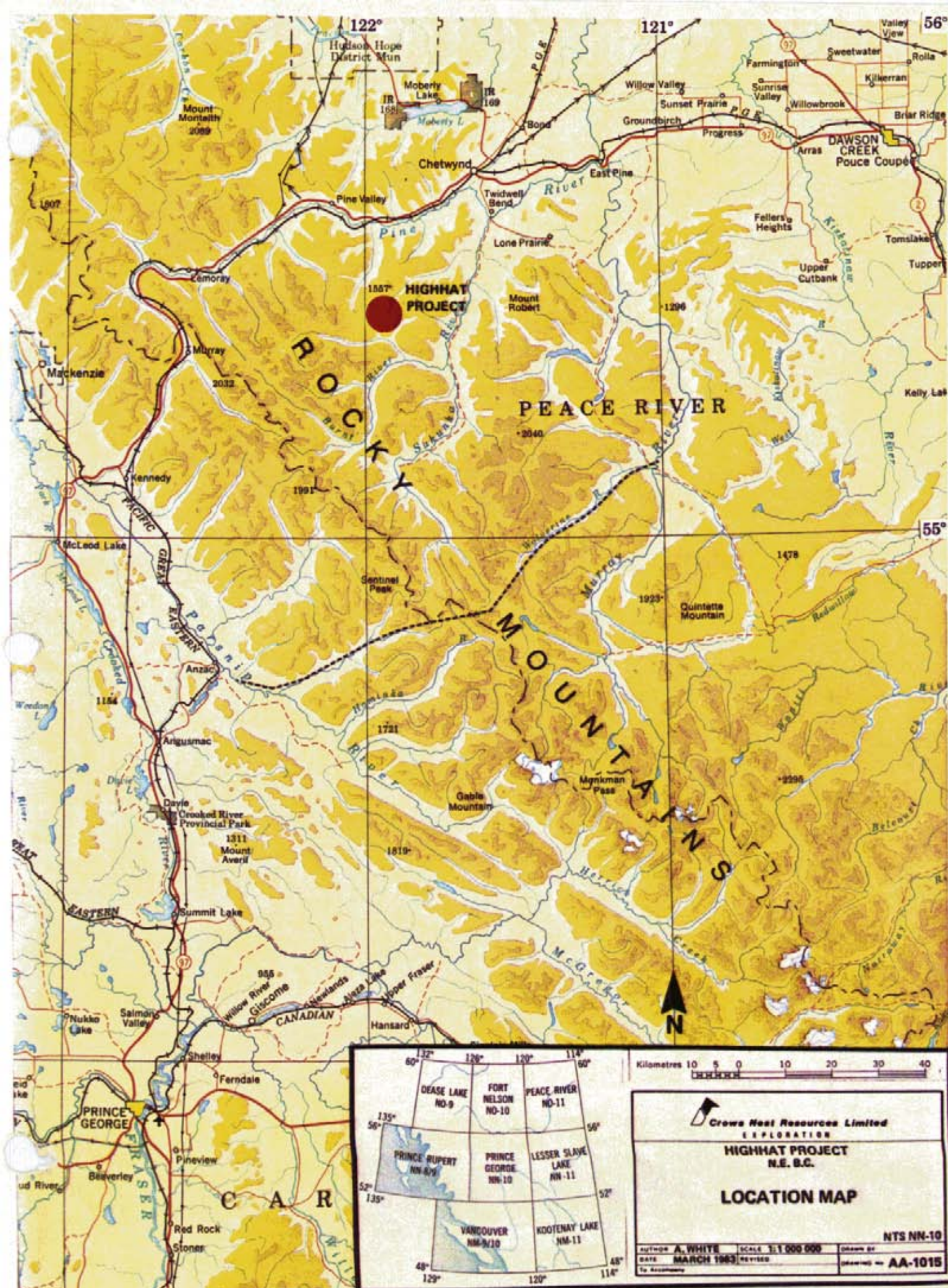
Enclosure

1-1/a.27

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537

CONFIDENTIAL



1557' **HIGHHAT PROJECT**

Kilometres 10 5 0 10 20 30 40

Crows Nest Resources Limited
EXPLORATION

HIGHHAT PROJECT
N.E. B.C.

LOCATION MAP

NTS NN-10

BY: A. WHITE	SCALE: 1:1 000 000	DRAWN BY:
DATE: MARCH 1983	REVISED:	CHECKED BY: AA-1015
To accompany		

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	3	Geologic Compilation Maps (2 sheets)	1:10,000 Following Text
	4	Geologic Base Maps (3 sheets)	1:5,000 Following Text
	5	Winkie Hole 82-1 geophysical logs core description symbolic log	As shown Following Text
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	7	Winkie Hole 82-2 core log	Following Text

LIST OF APPENDICES

APPENDIX I Hand Trench Descriptions and Profiles

1/FVd.2

1.0 INTRODUCTION

1.1 Location

The Highhat River property is situated in the Peace River Land District of Northeastern British Columbia, 35 kilometers southwest of Chetwynd at the headwaters of the Highhat River (Enclosure 2). The 14 licences comprising the property cover an area of 4,116 hectares.

Highhat Mountain is six kilometers to the east of the property and Hasler Creek is three kilometers to the northwest.

The property can be located on the northwest corner of N.T.S. map sheet 93 P/5W (Burnt River) (Enclosure 2) in the area bounded by the following longitudes and latitudes:

south: 55°20'

north: 55°29'

east: 121°49'30"

west: 122°00'00"

1.2 Physiography

The Highhat River Property lies within the broad foothills belt of the Front Range of the Rocky Mountains. The topographic relief is rugged but not extreme, with elevations varying between 1,000 meters and 1,568 meters at Mt. Linklater. A approximately one third of the property is between 1300 and 1400 meters.

Three drainage systems dominate the topography. Both the Mink Creek drainage in the south and the Highhat River drainage in the middle eventually flow into the Sukunka River. The northern part of the property drains north into Hasler Creek and eventually into the Pine River.

All of the property is below tree line with spruce being the dominant tree species. At least part of the property appears to support merchantable timber. Alders grow as underbush and in clearings and swampy areas. Devils Club is scattered along stream gullies.

1.3 Access

As of 1982 there were no roads or trails permitting vehicular access to the property. The closest road is the Hasler Creek road which comes within two kilometers of the extreme northwest corner of the licence area.

A helicopter was used to access the property during the 1982 exploration program. Landing sites are scarce on the property so a Hughes 500D helicopter was used, as its short rotar span and extra power allowed landing in sites too small for larger or less powerful helicopters. The available helicopter landing sites are marked on the geology maps (Enclosure 4).

For future road access to the property there are two possible routes deserving of more study. One is from the Hasler Creek road and the other is along the Highhat River from a pipeline service road which crosses the river five kilometers east of the property. The latter route appears to be the better of the two as road building conditions encountered would be less severe than in the north, and access would be gained to the middle of the property as opposed to the northwest corner.

1.4 Coal Land Tenure

The property is composed of 14 B.C. coal licences (7338-7351 inclusive) covering 4,116 hectares, issued to Shell Canada Resources Ltd. in February 1982 (Enclosure 2). Crows Nest Resources Ltd. is the operator. The Coal Land Tenure statement (Page 4) summarizes the current land status.

The property covers a part of Pan Ocean Oil Ltd.'s former Pine Pass Property which was acquired in 1972 and dropped in 1981. During that time, Great West Steel and Norcen Energy Resources, also worked on the property under option from Pan Ocean. Both parties have relinquished their options.

Previous work on the area under licence to Shell was limited due to poor access and poorly understood geology. Earlier work consisted of a few geologic traverses along the main streams in 1974 and 1978 and two helicopter supported drill holes (79-4, 79-5). In addition three holes were drilled in close proximity to the current property boundaries (75-7, 79-2, 79-3).

1.5 Work Performed in 1982

During July and August 1982 the following work was carried out.

- (a) Geological Mapping and prospecting at a scale of 1:10,000 covering an area of 3822 hectares on all licences except 7350.
- (b) Hand trenching: 23 trenches totalling 50 meters in length on all licences except 7349 and 7350.

B.C. COAL LICENCES
TENURE STANDING

PROJECT: HIGHHAT RIVER

YEAR: 1982-1983

DATE: May, 1983

GROUP NO.	LICENCE		AREA TOTAL/HA	ACQ/ADM		RENTALS		ANNIVERSARY DATE	WORK REQUIREMENT				TOTAL EXPLORATION			REMARKS
	NO.	LEGAL DESCRIPTION		YEAR	FEES	ANNUAL	TOTAL NEXT ANN.		EXPIRED	CURRENT	LIC. TERM	EXC. CREDIT	YEAR	AMOUNT	CASH IN LIEU	
	14	NTS 93-P-5	4116	1982	140	20,580	41,160	February 19	-	30,870	End of 1st	21.26/HA	1982	118,386		
	7338	L/1, 2, 11, 12	294													
	7339	L/3, 4, 13, 14	294													
	7340	L/21, 22, 31, 32	294													
	7341	L/23, 24, 33, 34	294													
	7342	L/25, 26, 35, 36	294													
	7343	L/43, 44, 53, 54	294													
	7344	L/45, 46, 55, 56	294													
	7345	L/47, 48, 57	294													
	7346	L/49, 50, 58, 60	294													
	7347	L/65, 66, 75, 76	294													
	7348	L/67, 68, 77	294													
	7349	L/69, 70, 79, 80	294													
	7350	K/7, 8, 17, 18	294													
	7351	K/9, 10, 19, 20	294													

- (c) Drilling: three continuous core (diamond) holes totalling 100 meters were drilled using a 'Winkie' drill, on B.C. coal licences 7340 and 7351. Gamma, Neutron-Neutron, Long Spaced Density, Short Spaced Density and Caliper logs were run in two of the three holes; the third hole caved before the logs could be run.

2.0 EXPLORATION PROGRAM

2.1 Geologic Mapping

During the 1982 exploration program geologic mapping was carried out on all of the licences comprising the property except B.C. coal licence 7350. An area of approximately 3850 hectares was covered.

The mapping program had three main objectives;

- (a) to prospect for a thick seam similar to the 18 meter seam found on Brameda's Burnt River property immediately south of the Highhat River licences.
- (b) to record enough structural data to allow an analysis of the complex structure in the area
- (c) to search for marker horizons which could be used in interpreting the structure.

It was felt that the number one objective, to find a thick coal seam, was most important. If a thick seam could be found then the complex structure might enhance the open pit mining potential by either structurally thickening the seam in the fold axes or by keeping it near surface by folding and thereby reducing the overburden ratio.

As well as mapping any outcrops found, traverse teams comprised of a geologist and a labourer, dug holes approximately a half meter deep every few meters along their traverse. All streams and seismic lines were traversed in this manner using 1:10,000 topographic maps and airphotos for control. Coal seams which could not be exposed easily were hand trenched later. Enclosure 3 is a 1:10,000

compilation map in two sheets. Enclosure 4 contains a 1:5,000 Geology map in three sheets with all of the field data recorded.

The objectives of the mapping program have not been fully realized. Although many more outcrops and coal occurrences were found than had previously been reported:

- (a) no thick seams were discovered
- (b) the structure is still mostly a matter of conjecture
- (c) no marker beds or horizons were found that could aid in correlation on the property.

Twenty three hand trenches totalling 50 meters were dug to expose coal seams. Twenty of these were sampled for analysis. Trench profiles and descriptions are enclosed in this report in Appendix 1. The thickest seam trenched was 4.2 meters of coaly shale in Trench #Jr 08/20/82 sample #HH82-6. The lack of outcrop did not allow seam tracing or correlation.

During the stream traverses, scattered outcrops were found. From information gathered from these limited exposures, it appears there are at least three anticline/syncline sets on the property. Their inferred positions are shown on the geology map.

None of the outcrops had any distinctive features which could be used as stratigraphic markers. The Gething Formation, at least in this area, appears to be a relatively monotonous sequence of fine grained sandstones, mudstones, siltstones and coal. It would appear from the number of coal occurrences found however, that the property contains a

majority of the more coaly upper Gething section. The Gething-Moosebar contact located on the east side is the only significant stratigraphic marker on the property.

2.2 Drilling Program

During the month of August, 1982 three continuous core (diamond) holes were drilled using a 'Winkie drill'. This drill can be broken-down into sizes easily packable by one man. It was chosen for this job on the basis of:

- (a) the 1 1/8" (AX) hole drilled is large enough to allow downhole geophysical logging.
- (b) low mobilization and demobilization costs from this property which is only accessible by helicopter.
- (c) the drill causes minimal surface disturbance therefore lessening the environmental impact and the reclamation required.
- (d) no new drill pads needed to be cut as the drill can be set up in a minimum of space.

The holes were planned to intersect coal seams, partially exposed in hand trenches, within the 50 meter practical depth capacity of the drill. The purpose of the holes was to provide complete intersections of the coal seams and to provide unoxidized coal samples for analysis.

The holes were located as accurately as possible using airphotos and a 1:10,000 topographic map. They were not surveyed.

A helicopter transportable unit was used to geophysically log the holes. Holes 82-1 and 82-1A were logged at 1:100 scale with Gamma, Neutron/Neutron, Long Spaced Density and Caliper tools and through the coal seams at 1:10 scale with the Gamma, Long Space Density, Short Space Density and Caliper tools. In drill hole 82-2 the drillers pulled the casing and the hole caved before being geophysically logged.

The core descriptions, geophysical logs, graphic logs and core logs are included in Enclosures 5, 6 & 7.

Table 2-2A below is a summary of the drill hole data.

TABLE 2-2A

DRILL HOLE SUMMARY

Hole #	Northing*	Easting*	Elevation*	Azimuth	Inclination	T.D.	Geophysical Logs				
							GAM	NEUT	LSD	BRD	CAL
82-1	6,144,870	570,430	1437	215°	60°	25.5 m	x	x	x	x	x
82-1A	6,144,840	570,410	1428	215°	60°	41.02 m	x	x	x	x	x
82-2	6,142,830	571,360	1112	050°	60°	33.2 m			Nil		

* Note: Locations are not surveyed; approximate only.

2.3 Coal Quality

Twenty four coal samples taken from the Highhat Property were analyzed for coal quality. Twenty one of the samples (HH 82-1 to HH 82-11 and HH 82-15 to HH 82-24 inclusive) were taken from hand trenches. These samples were analyzed for moisture and ash only, on the raw coal and on the float fraction (1.60 specific gravity).

A proximate analysis plus sulphur, B.T.U. and F.S.I., on the raw coal and on the 1.60 float was performed on three samples obtained from drilling. The analyses sheets are included in this report.

The analyses of the drill hole samples indicates this coal to be at the high end of the low volatile bituminous rank with low F.S.I. and high B.T.U. content.

COAL ANALYSES SHEETS IN
SEPERATE CONFIDENTIAL FOLDER

3.0 CONCLUSIONS

- The property contains coal bearing Gething Formation strata.
- Although several previously unrecorded coal seams were discovered, a thick seam similar to the 18 meter seam on Brameda's property to the south was not found.
- The possibility still exists that such a seam may exist on the property but be covered by overburden.
- Three anticline/syncline pairs are inferred from scattered outcrops found along streams and seismic lines.
- The limited outcrop information does not allow a detailed analysis of the structure. It is still not known whether or not the structure is too complex for open pit mining.
- Indications are that the coal is at the high end of the low volatile bituminous rank.

ITEMIZED COST STATEMENT



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

APPLICATION TO EXTEND TERM OF LICENCE

I, LESLIE GRAMANTIK agent for SHELL CANADA RESOURCES LIMITED
(Name) (Name)
P.O. BOX 100 CALGARY
(Address) (Address)
ALBERTA T2P 2M7

Valid FMC No. 257-6777

hereby apply to the Minister to extend the term of Coal Licence(s) No(s). 7338 - 7351
14 LICENCES, 4116 HECTARES

for a further period of one year.

2. Property name HIGHHAT RIVER, PEACE RIVER LAND DISTRICT

3. I am allowing the following Coal Licence(s) No(s). to forfeit NA

4. I have performed, or caused to be performed, during the period FEBRUARY 20, 1982 to
MAY 19, 1983, work to the value of at least \$ 118,386

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

CATEGORY OF WORK

CATEGORY OF WORK	Licence(s) No(s).	Apportioned Cost
Geological Mapping	7338 - 7349	44,682
Surveys: Geophysical		
Geochemical		
Other		
Road construction		
Surface work	7338-7349, 7351	17,376
Underground work		
Drilling	7340 & 7351	30,662
Logging, sampling, and testing	7340 & 7351	9,911
Reclamation		
Other work (specify)		
Off-property costs		15,755

5. I wish to apply \$ 118,386 of this value of work on Coal Licence(s) No(s). 7338 to 7351

6. I wish to pay cash in lieu of work in the amount of \$ NA on Coal Licence(s) No(s).

7. The work performed on the location(s) is detailed in the attached report entitled HIGHHAT RIVER
PROSPECT, 1982. GEOLOGICAL REPORT.

03/05/83
(Date)

(Signature)

ASSISTANT LANDMAN
(Position)

GEOLOGICAL MAPPING

Yes No

Area (Hectares) 3822 Scale 1:10,000 Duration 93 MAN-DAYS
Reconnaissance
Detail: Surface
Underground
Other* (specify)
Total Cost \$ 44,682

GEOPHYSICAL/GEOCHEMICAL SURVEYS

Yes No

Method
Grid
Topographic
Other* (specify)
Total Cost \$

ROAD CONSTRUCTION

Yes No

Length Width
On Licence(s) No.(s)
Access to
Total Cost \$

SURFACE WORK

Yes No

Length Width Depth Cost
Trenching (hand) 50 M 1 M 0.5 M
Seam Tracing
Crosscutting
Other* (specify)
Total Cost \$ 17,376

UNDERGROUND WORK

Yes No

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

DRILLING

Yes No

Hole Size No. of Holes Total Metres Cost
Core: Diamond AX 3 100
Wireline
Rotary: Conventional
Reverse circulation
Other* (specify)
Contractor TECK CORPORATION
Where is the core stored?
Total Cost \$ 30,662

LOGGING, SAMPLING, AND TESTING

Yes No

Lithology: Drill samples Core samples Bulk samples
Logs: Gamma-neutron Density
Other* (specify) CALIPER
Testing: Proximate analysis FSI Washability
Carbonization Petrographic Plasticity
Other* (specify)
Total Cost \$ 9,911

RECLAMATION

Yes No

Details
Total Cost \$

OTHER WORK (Specify details)

Yes No

.....
Total Cost \$

OFF-PROPERTY COSTS

Yes No

Details REPORT PREPARATION & REPRODUCTION COST
Total Cost \$ 15,755

Total Expenditures \$ 118,386

M. J. [Signature]
(Date)

[Signature]
(Signature)

MANAGER ACCOUNTING - CNRL
(Position)

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

5.0 BIBLIOGRAPHY

- | | |
|-------------------------|---|
| Dyson, Paul
1973 | Pine Pass Coal Project, Northeast British Columbia (Phase I), B.C.M.M.P.R., Open File |
| 1975 | Pine Pass Coal Project, Northeast British Columbia (1974-1975), B.C.M.M.P.R., Open File |
| 1977 | Pine Pass Coal Project, Northeast British Columbia (1976-1977), B.C.M.M.P.R., Open File |
| Newson, A.C.
1980 | Pine Pass Coal Project, 1979, Northeast British Columbia, B.C.M.M.P.R., Open File |
| 1980 | Pine Pass Coal Project, 1980, Northeast British Columbia, B.C.M.M.P.R., Open File |
| Pringle, D.W.
(1968) | Report on Pine Pass Coal Co. Ltd. for Koporok Mines Ltd. B.C.M.M.P.R., Open File |

P/C

#H: 82-1

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA 1982

Trenching Program, Outcrop Description

Sample Number: H.H. 82-1

Field Number: JR 08/18/82/ TR.#1

Lab Number:

Area: North Hill, North Seismic Line

Location: 6,146,095 N., 564,875 E.

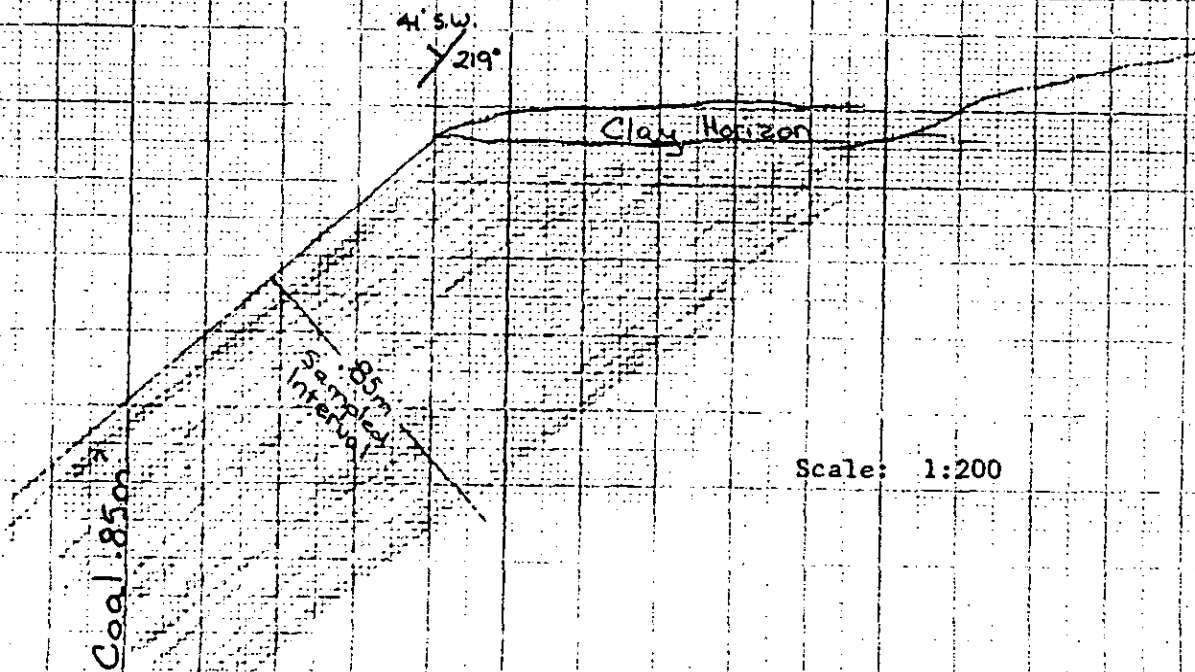
Trench Described by: J.Ryley

Date: August 18, 1982

Description: Roof- 219°, 41° S.W. - Suspect faulting
 Coal- Thickness uncertain, footwall not obtained as could not dig deeper.
 Generally good quality, shale near base.
 Footwall- footwall eroded

Thickness: 85cm

Sample Thickness: 85cm



HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA 1982

Trenching Program, Outcrop Description

Sample Number: H.H. 82-2

Field Number: JR 08/18/82 Tr#2

Lab Number:

Location: 6,146,185 N., 564,790 E.

Area: North Seismic Line

Trench Described by: J.Ryley

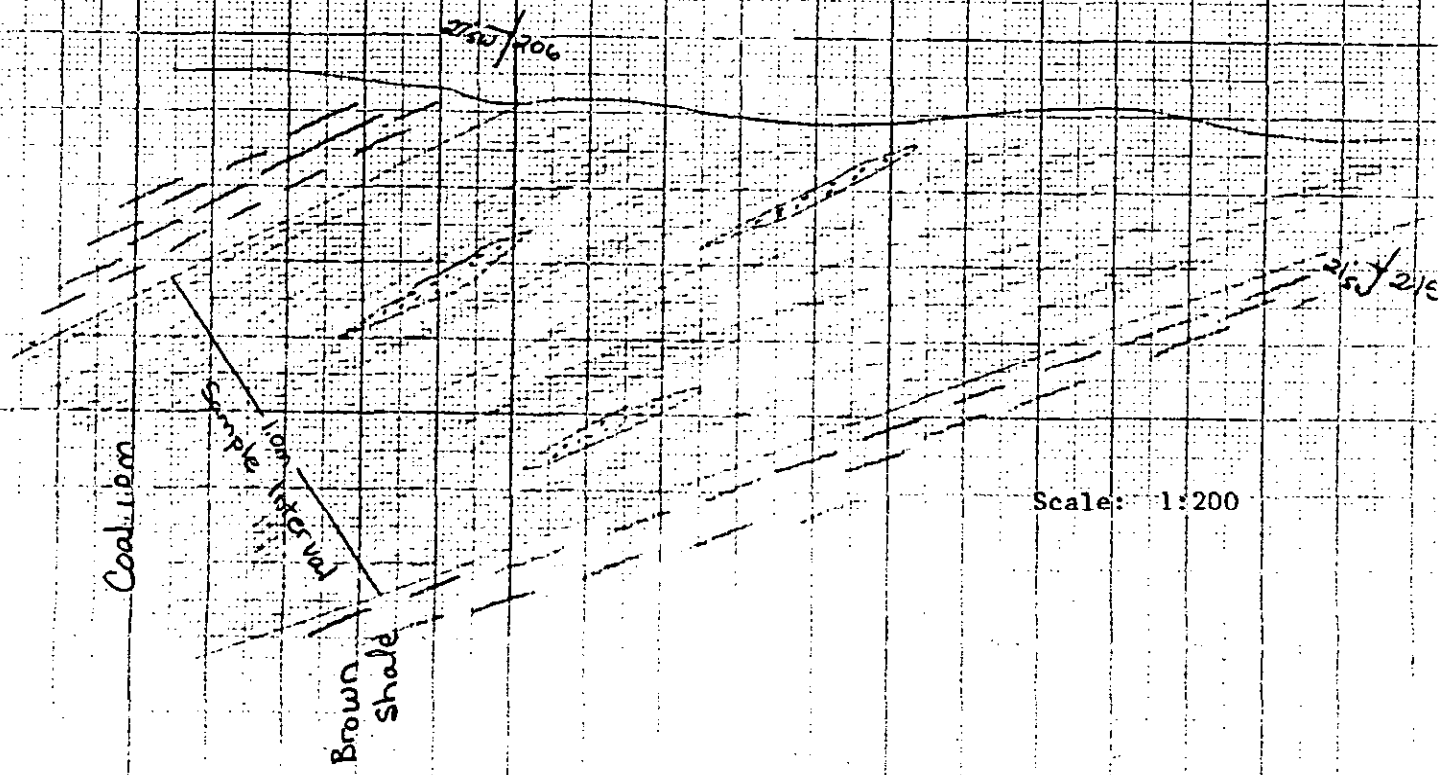
Date: August 18, 1982

Description: Roof-206°, 27° S.W.
 Coal- 1m of clean coal
 Floor- 215°, 21° S.W.
 Roof and floor are mudstone, dark brown,
 coal contains occasional laminae of oxidized s.s.

True Thickness: 1.0m

Sample Thickness: 1.0m

Br. shale



Scale: 1:200

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

Trenching Program, Outcrop Description

Sample Number: H.H. 82-3

Field Number: JR 08/18/82 TR#3

Lab Number:

Location: 6,146,635 N., 565,505 E.

Area: North Seismic Line, North Hill

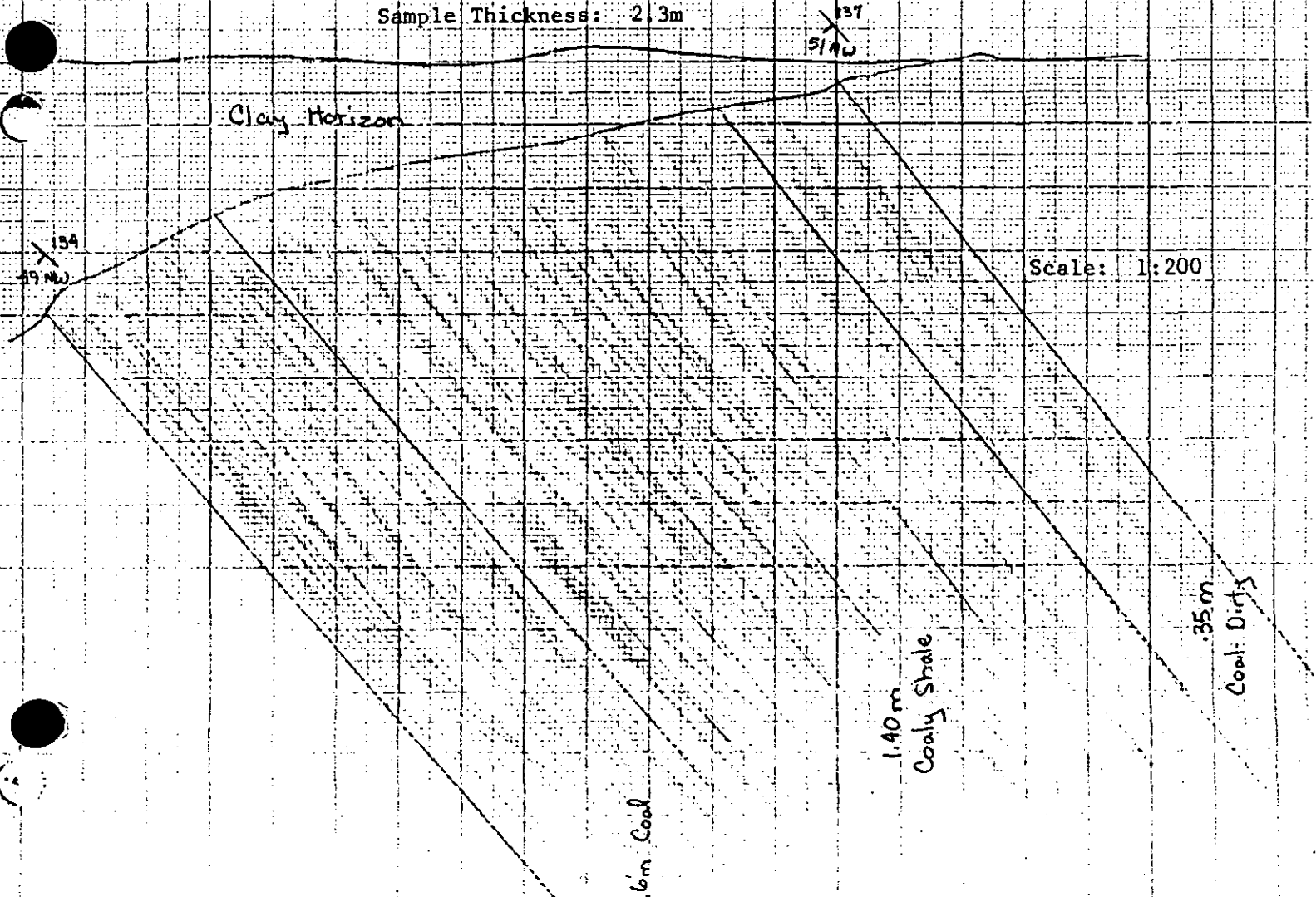
Trench Described by: J.Ryley

Date: August 18, 1982

Description: Roof-137°, 51° N.W.
Coal-first 60cm of good coal, the rest of
the trench to second bit of coal is coaly shale
Floor-134°, 49° N.W.

True Thickness: 2.35m

Sample Thickness: 2.3m



HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

Trenching Program, Outcrop Description

Trench and Sample Number: H.H. 82-4

Field Number: Trench #2, August 19, 1982

Lab Number:

Location: 6,146,640 N., 565,520 E.

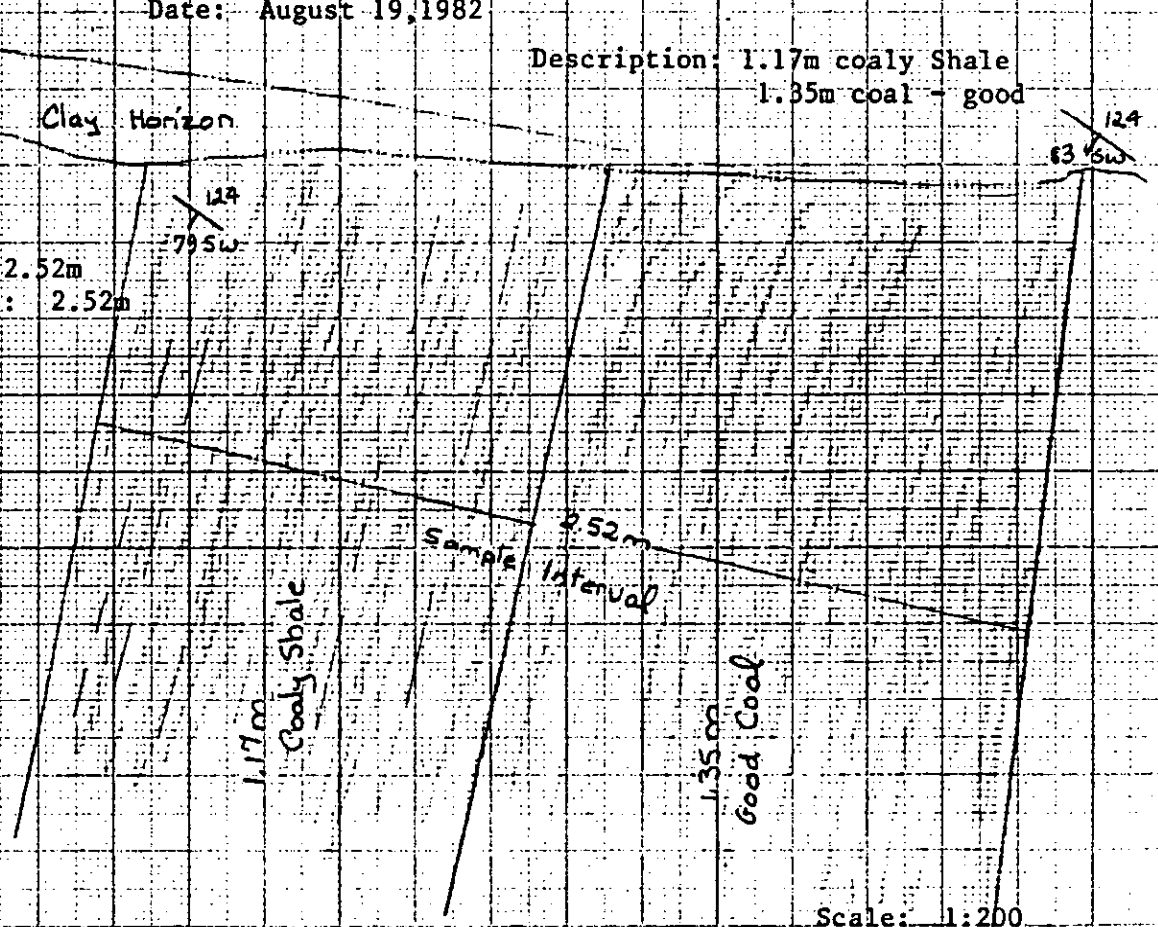
Area: North Seismic Line, North Hill

Trench Described by: J. Ryley

Date: August 19, 1982

Description: 1.17m coaly Shale
1.35m coal - good

True Thickness: 2.52m
Sample Thickness: 2.52m



Scale: 1:200

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

Trenching Program, Outcrop Description

Sample & Trench Number: H.H. 82-5

Field Number: JR 08/19/82 Tr#4

Lab Number:

Location: 26,146,640 N., 565,475 E.

Area: North Seismic Line, North Hill

Trench Described by: J.Ryley

Date: August 19, 1982

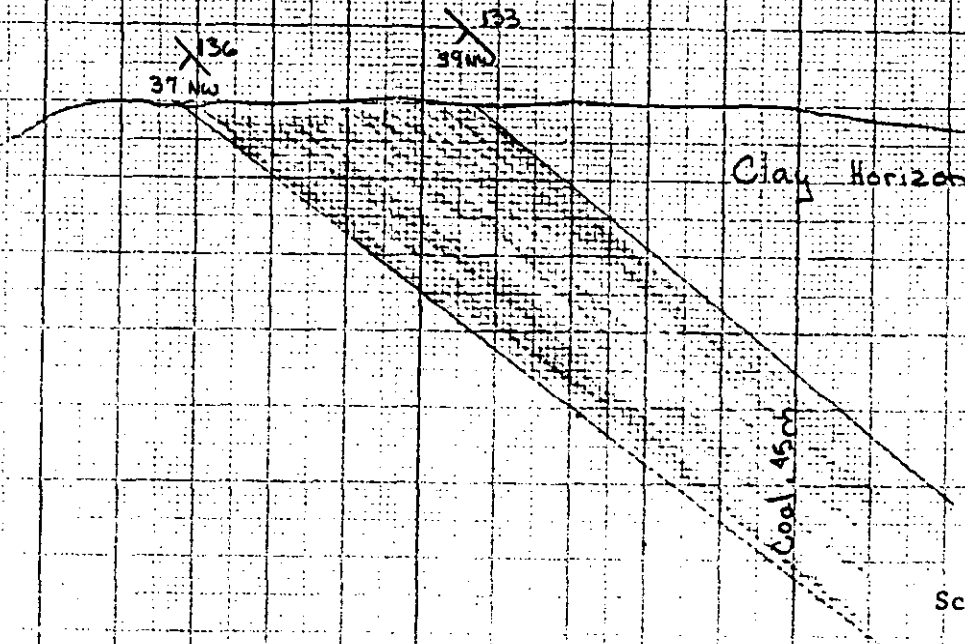
Description: Roof-133°, 39°N.W.

Coal- is of small thickness, good quality
dip consistent throughout

Floor-136°, 37°N.W.

True Thickness: .45m

Sample Thickness: .45m



Scale: 1:200

P/C

H.H. 82-6

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

Trenching Program, Outcrop Description

Trench & Sample Number: H.H. 82-6

Field Number: JR 08/20/82 TR#5

Lab Number:

Description: Roof-138°, 40°N.W

Location: 6,146,560 N., 565,420 E.

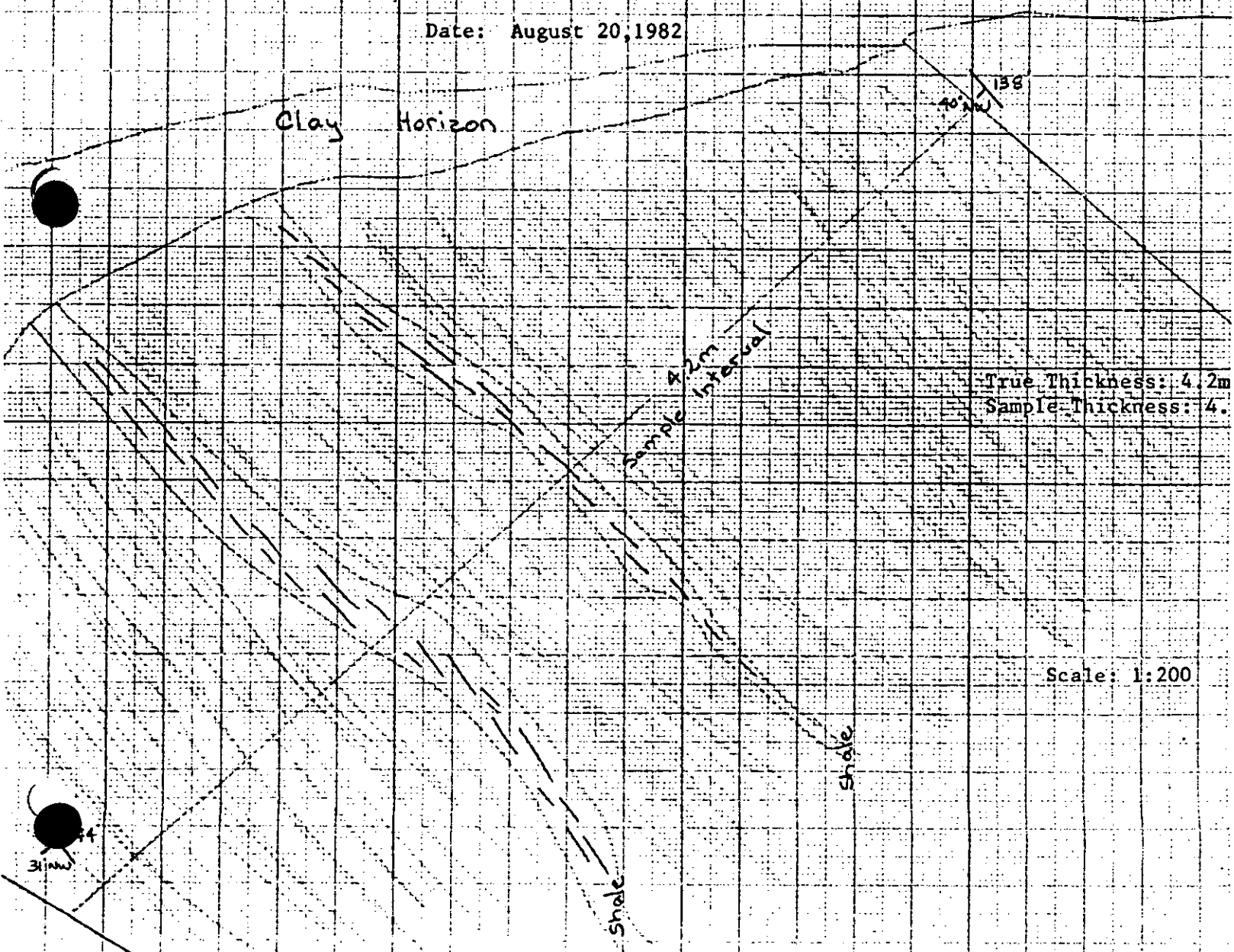
Very little good coal
approx. 80% coaly shale

Area: North Seismic Line, North Hill

Floor-144°, 31°N.W.

Trench Described by: J.Ryley

Date: August 20, 1982



31°N.W

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA 1982

Trenching Program, Outcrop Description

Trench & Sample Number: H.H. 82-7

Field Number: JR 08/20/82 TR#6

Lab Number:

Location: 6,146,360 N., 565,185 E.

Area: North Seismic Line, North Hill

Trench Described by: J.Ryley

Date: August 20, 1982

Description: Roof-unsure o
dip
Coal- This coal is quite
clean, few shale band
Floor- 139°, 30°S.W.

True Thickness: 3.9m
Sample Thickness: 3.9m

Roof - overburden
Dip - undetermined

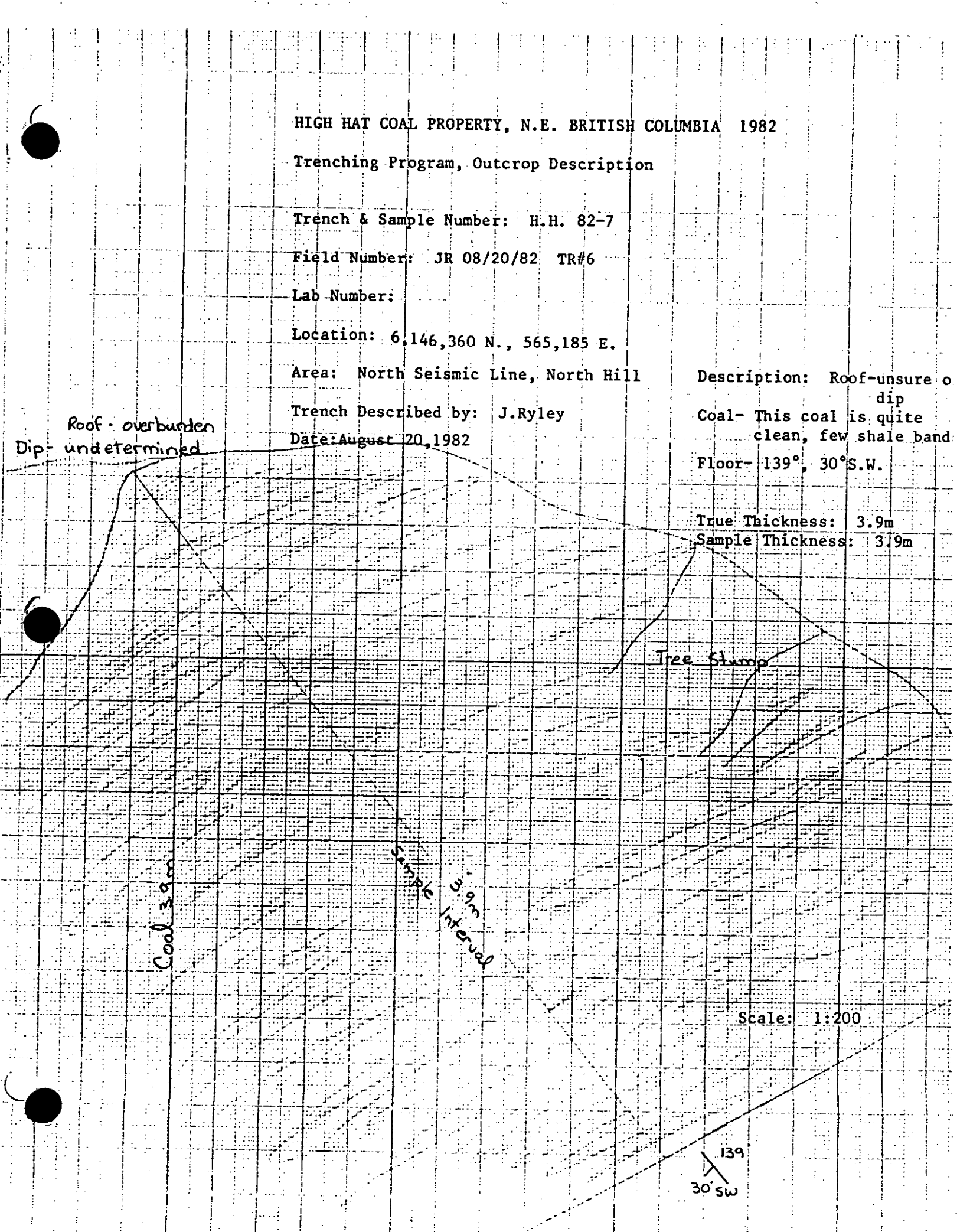
Tree Stump

Coal 3.9m

Sample Interval
3.9m

Scale: 1:200

139
30°SW



HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

Trenching Program, Outcrop Description

Trench & Sample Number: H.H. 82-8

Field Number: JR 08/21/82 TR#8

Lab Number:

Location: 6,145,945 N., 564,905 E.

Area: North Seismic Line, North Hill

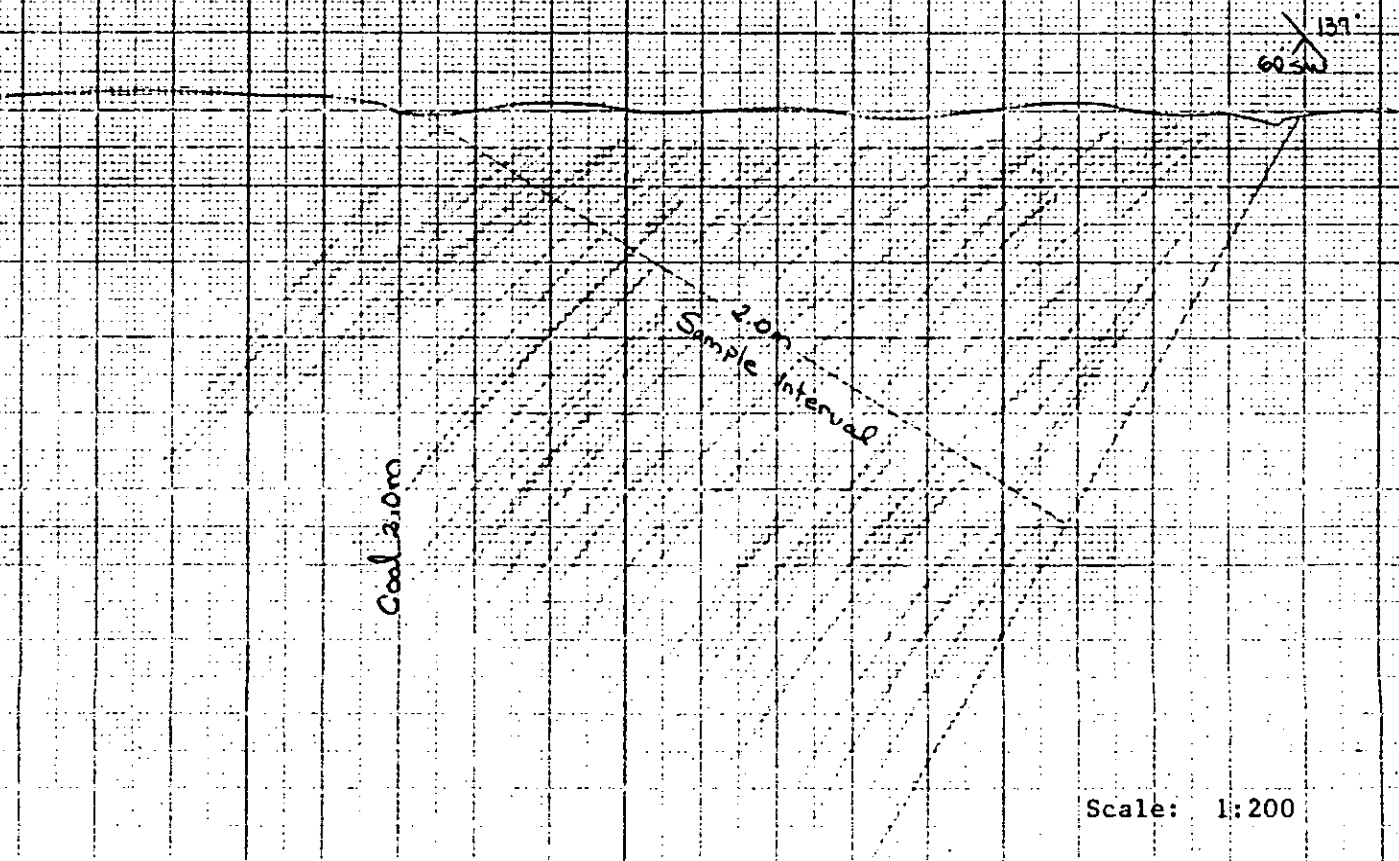
Trench Described by: J.Ryley

Date: August 21, 1982

Description: Roof- uncertain, due to erosion
Coal- good coal, quite clean trench
Floor- $137^{\circ}, 60^{\circ}\text{S.W.}$

True Thickness: 2.0m

Sample Thickness: 2.0m



Scale: 1:200

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

Trenching Program, Outcrop Description

Trench & Sample Number: H.H. 82-17

Field Number: LR-7, August 17, 1982

Lab Number:

Location: 6,145,445-N, 567,645-E.

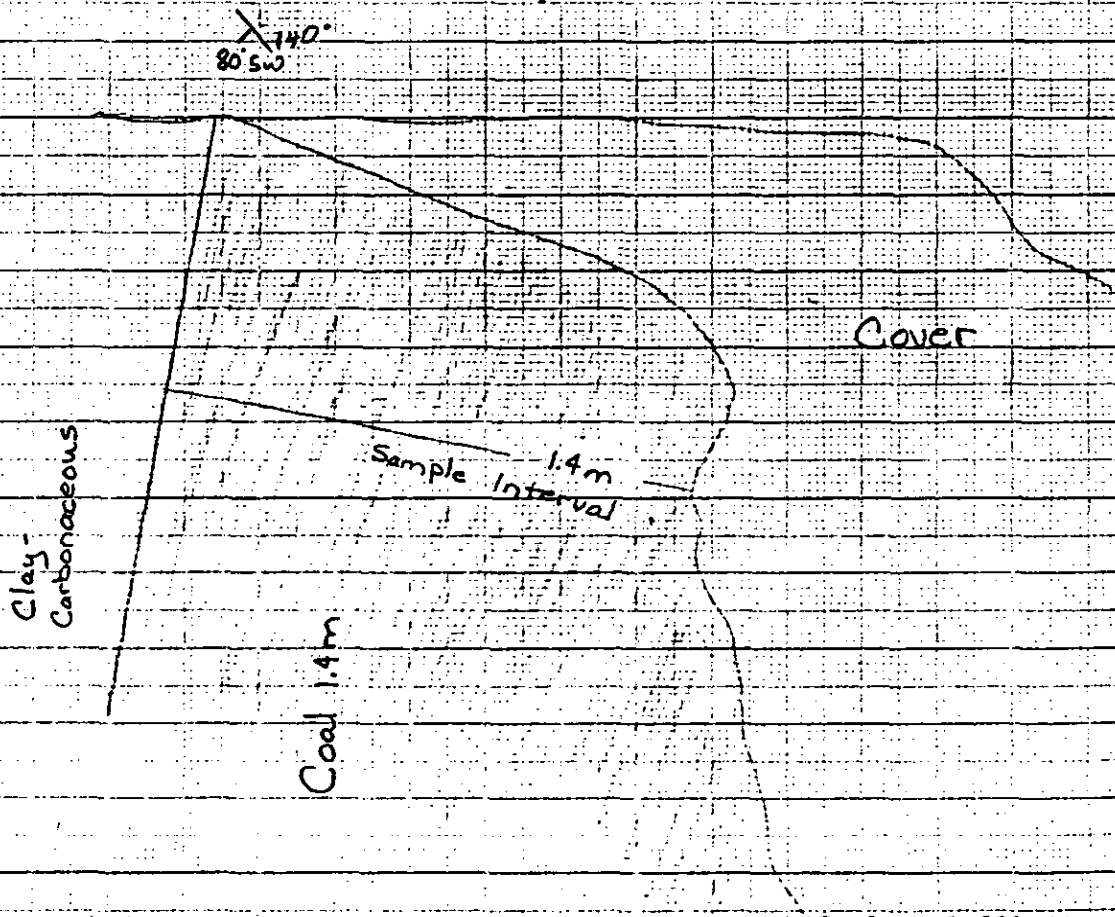
Area: Middle Seismic Line, Middle Fork

Trench Described by: L. Rushlow

Date: August 17, 1982

Description: Coal, good clean powder coal, some organic material, Digging into coal, coal has a distinct yellow stain resembling carnatite.
Roof contact is a gradual grading from brown clay and carbonaceous into the coal seam.
Abundant moss cover.

True Thickness: 1.4m Sample Thickness: 1.4m



Scale: 1:200

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA 1982

Trenching Program, Outcrop Description

Trench & Sample Number: H.H. 82-18

Field Number: LR-8, August 18, 1982

Lab Number:

Location: 6,145,845 N, 566,880 E.

Area: Middle Hill

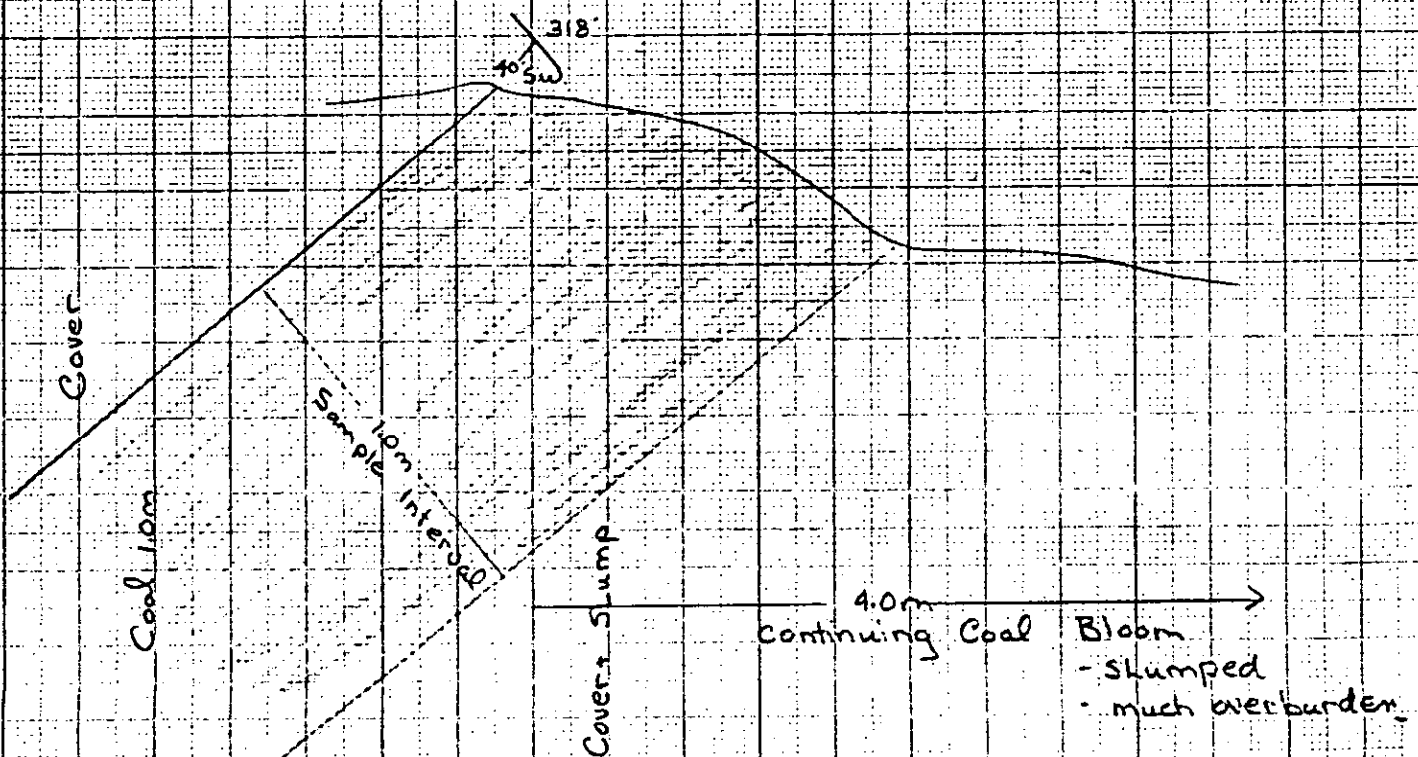
Trench Described by: L.Rushlow

Date: August 18, 1982

Description: Coal, powder coal, 10% organic material, quite dirty with broken shale.
Over a length of 4m, there is coal bloom, again quite dirty, and evidence of slumping

True Thickness: 1.0m

Sample Thickness: 1.0m



P/C

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA 1982

Trenching Program, Outcrop Description

Trench & Sample Number: H.H. 82-19

Field Number: LR-9, August 19, 1982

Lab Number:

Location: 6,145,772 N., 566,150 E.

Area: North Fork

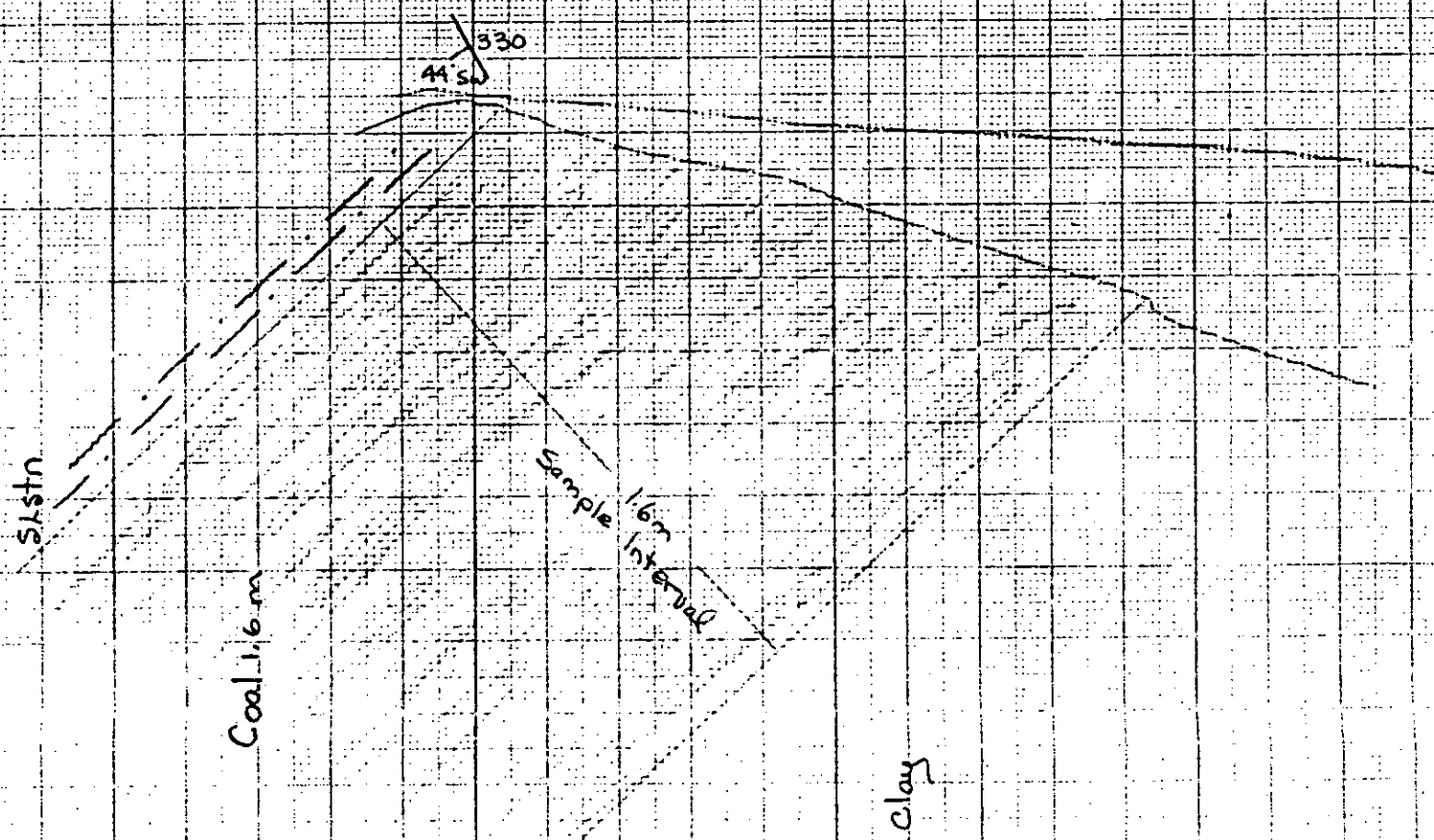
Trench Described by: L. Rushlow

Date: August 19, 1982

Description: coal, powdercoal, dull and bright sections. interbedded with shaley bands, good contact with a fine grain siltstone, abundant moss cover.

True Thickness: 1.6m

Sample Thickness: 1.6m



HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982.

Trenching Program, Outcrop Description

Trench & Sample Number: H.H. 82-20

Field Number: LR-15, August, 26, 1982

Lab Number:

Location: 6,144,868 N., 567,520 E.

Area: Middle Hill Ridge between middle seismic and middle fork.

Trench Described by: L. Rushlow

Date: August, 26, 1982

Description: Roof- siltstone
Coal- is dirty, shaley, powder, rusty carbonaceous sandstone bands.

Floor- brown shale, clay

True Thickness: 3.2m, Sample Thickness: 3.2m

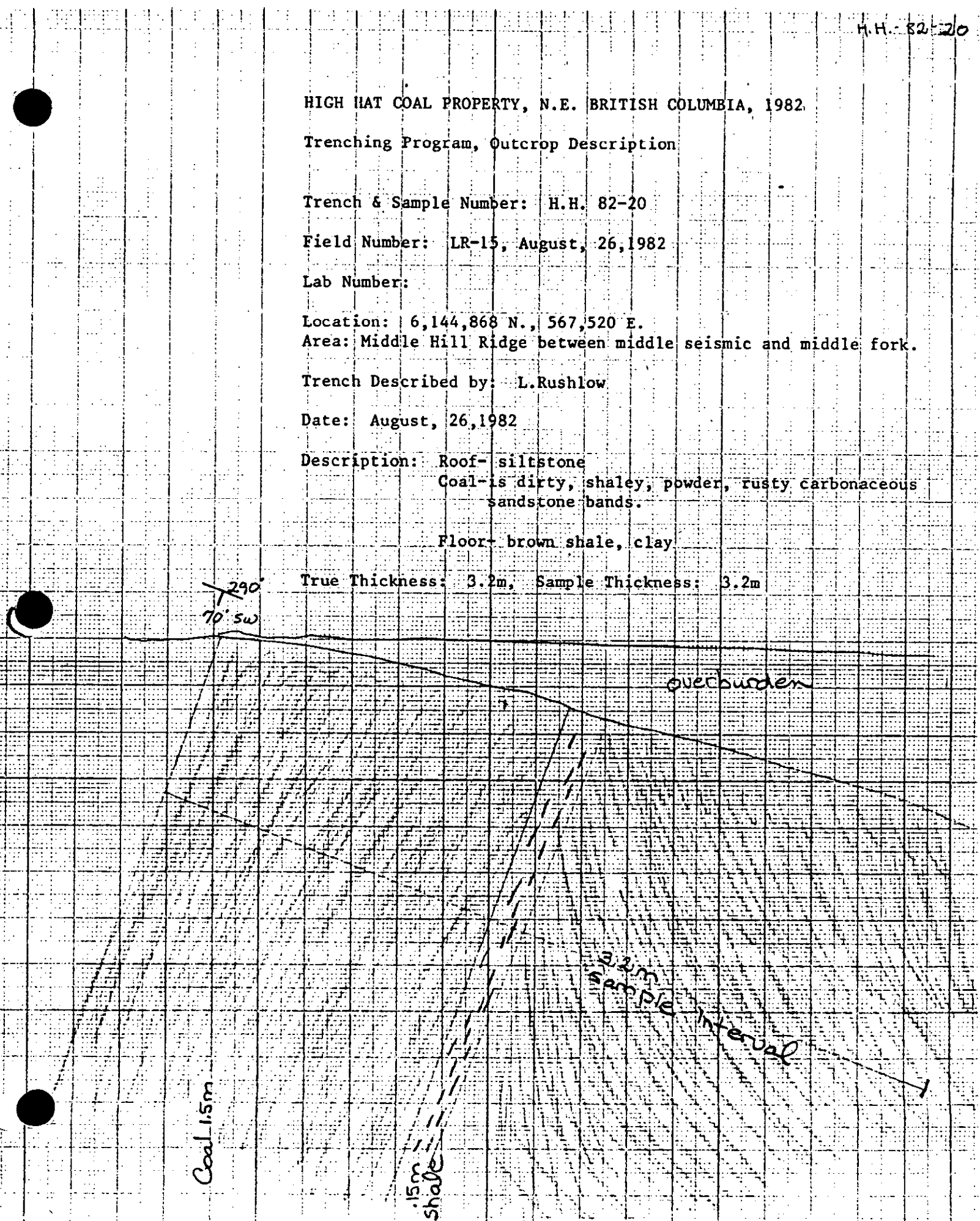
290°
70° SW

overburden

Coal 1.5m

.15m shale

3.2m
SAMPLE
Interval



HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

Trenching Program, Outcrop Description

Trench & Sample Number: H.H. 82-21

Field Number: LR -16, TR#3

Lab Number:

Location: 6,144,870 N., 567,480 E.

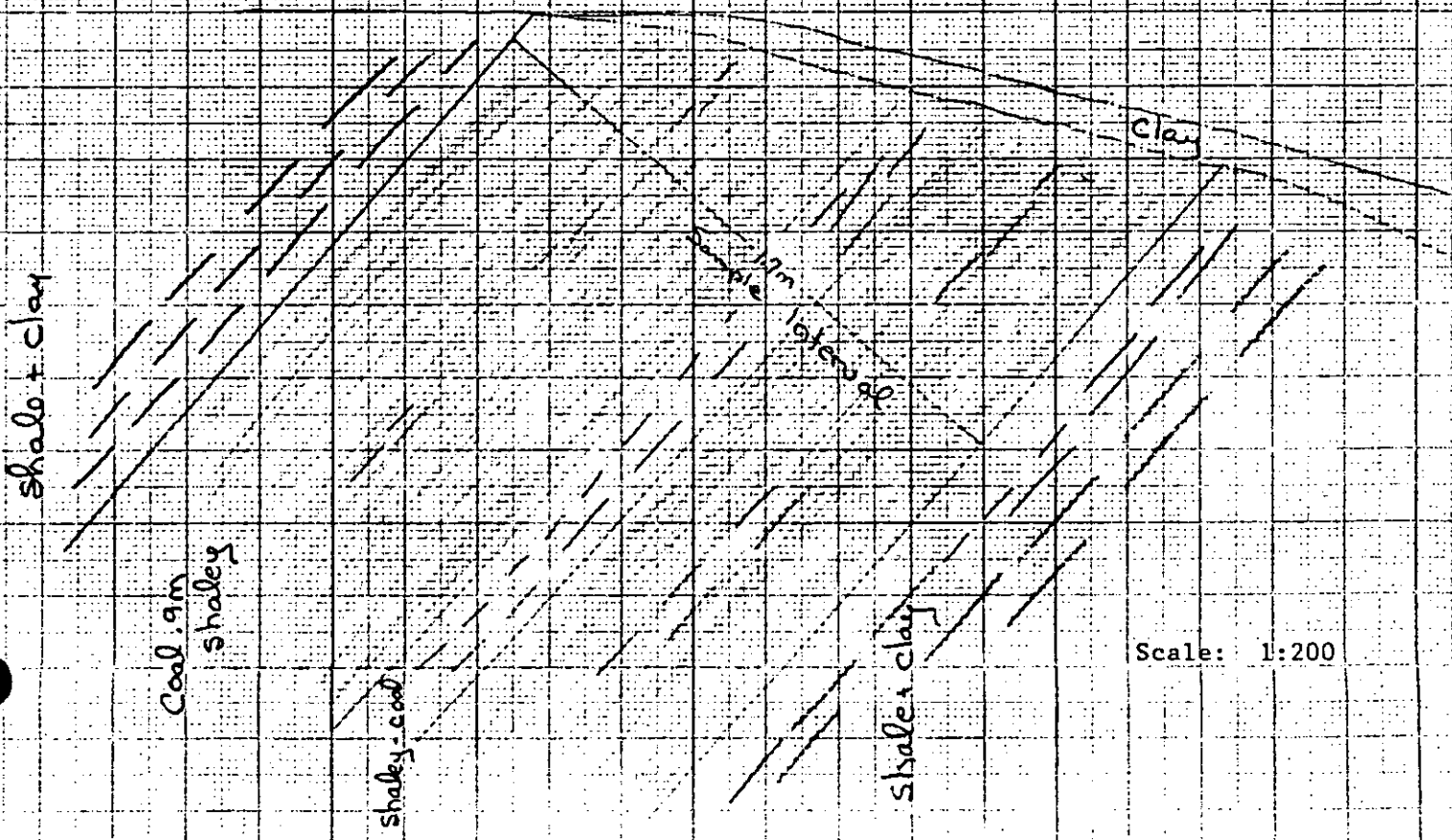
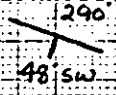
Area: Middle Hill Ridge between middle seismic and middle fork

Trench Described by: L.Rushlow

Date: August 26, 1982

Description: Roof- shale and clay
Coal- trench is very dirty with many shaley bands.
powder dull coal.
Floor- shale with clay

True Thickness: 1.7m
Sample Thickness: 1.7m



Scale: 1:200

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA 1982

Trenching Program, Outcrop Description

Trench & Sample Number: H.H. 82-22

Field Number: LR-17, TR#5

Lab Number:

Location: 6,144,835 N., 567,435 E.

Area: Middle Hill Ridge, between middle seismic and middle fork

Trench Described by: L.Rushlow

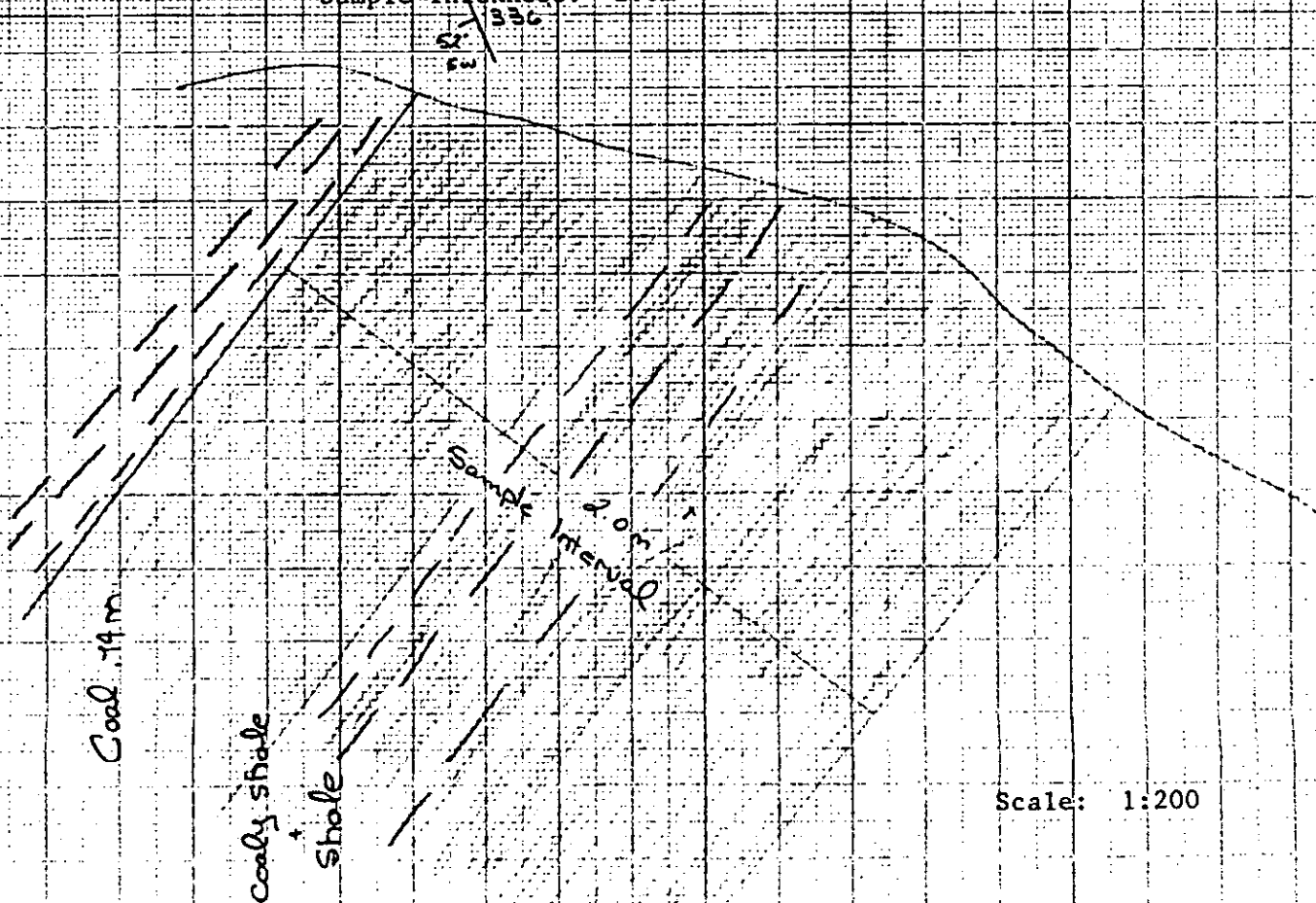
Date: August 26, 1982

Description: Roof- brown shale
Coal- shaley coal changing to good coal,
powder and some hard zones, .8m of
of clean coal, with cleating visible

Floor- overburden

True Thickness 2.0m

Sample Thickness: 2.0m



Scale: 1:200

P/C

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA 1982

Trenching Program, Outcrop Description

Trench & Sample Number: H.H. 82-23

Field Number: LR-18, TR#6

Lab Number:

Location: 6,144,825 N., 567,415 E.

Area: Middle Hill Ridge between middle seismic and middle fork

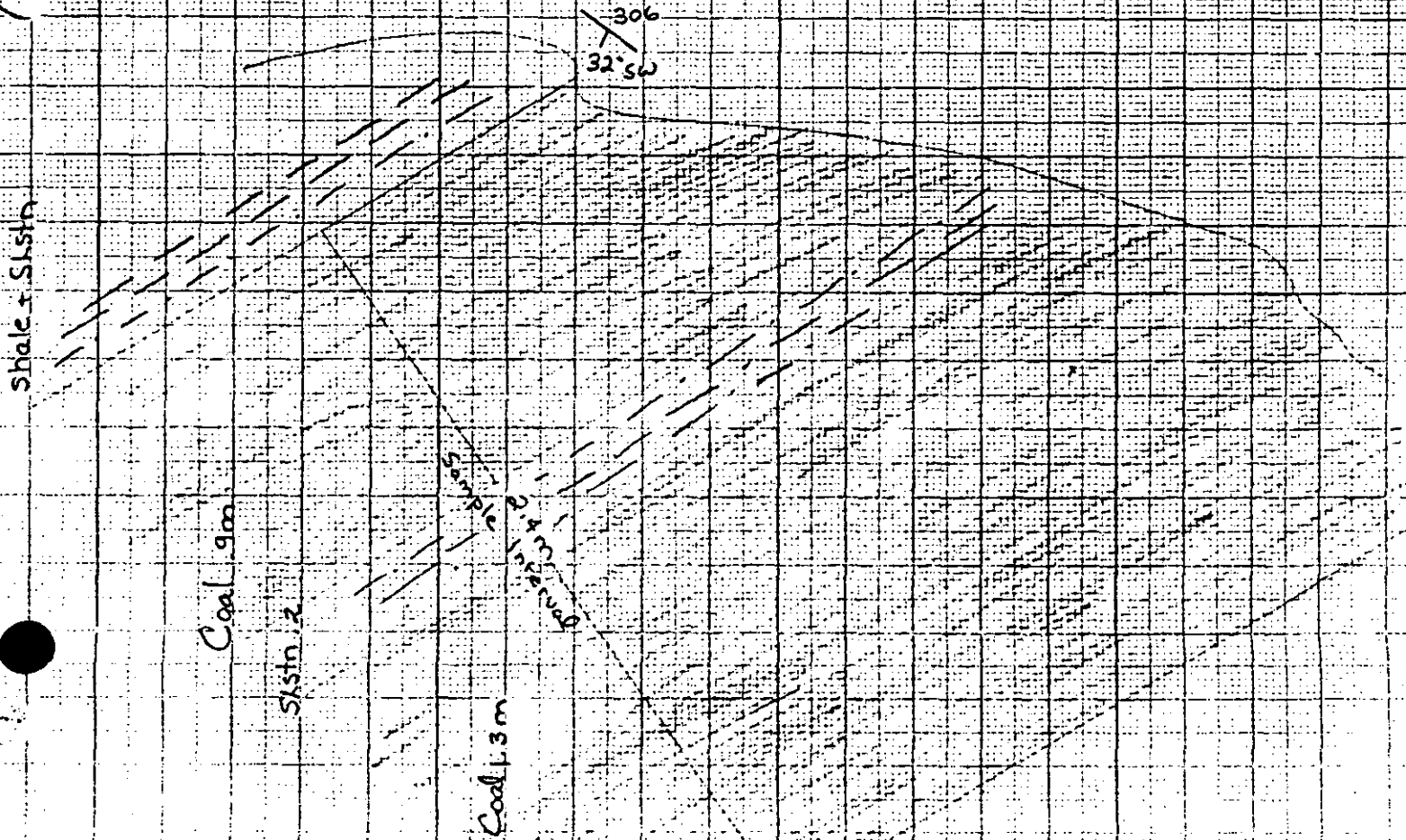
Trench Described by: L.Rushlow

Date: August 26, 1982

Description: Roof-brown shaley siltstone
Coal- dull powder, shaley appearance,
.2m siltstone, coaly
1.1m of clean coal, powder dull, black streak

True Thickness: 2.4m

Sample Thickness: 2.4m



HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA 1982

Trenching Program, Outcrop Description

Trench & Sample Number: H.H. 82-24

Field Number: LR-19, TR#7

Lab Number:

Location: 6,144,805 N., 567,400 E.

Area: Middle Hill Ridge Between middle Seismic Line & middle fork

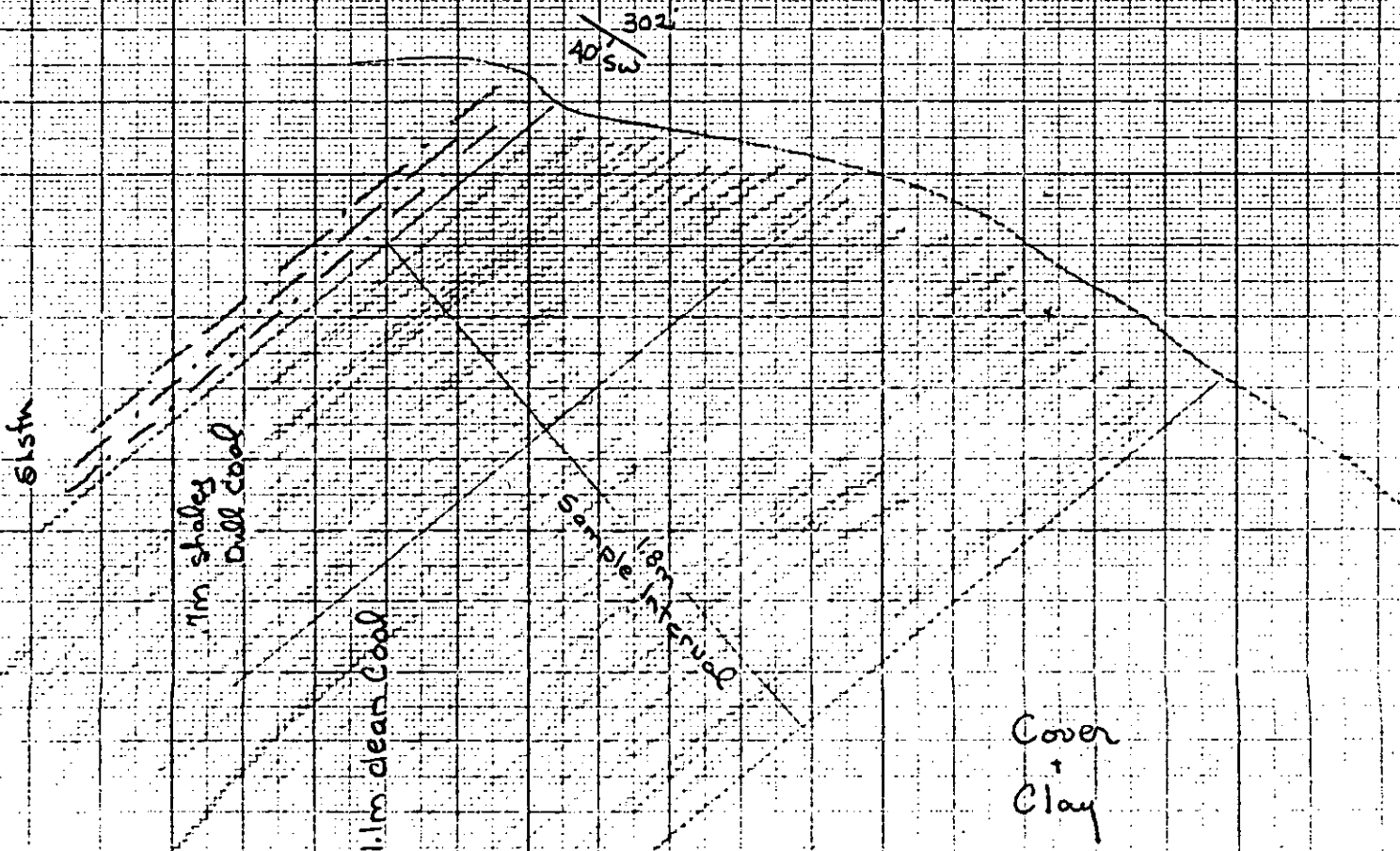
Trench Described by: L.Rushlow

Date: August 26, 1982

Description: Roof-sheared brown mudstone
Coal-shaley dull coal powder.
small stringer of iron stain
1.1m of clean coal, powder, dull

True Thickness: 1.8m

Sample Thickness: 1.8m



HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

Trenching Program, Outcrop Description

Trench & Sample Number: H.H.-82-25

Field Number: Trench Number 2, August 8, 1982

Lab Number: NO SAMPLE TAKEN

Location: 6,146,665 N., 569,025 E.

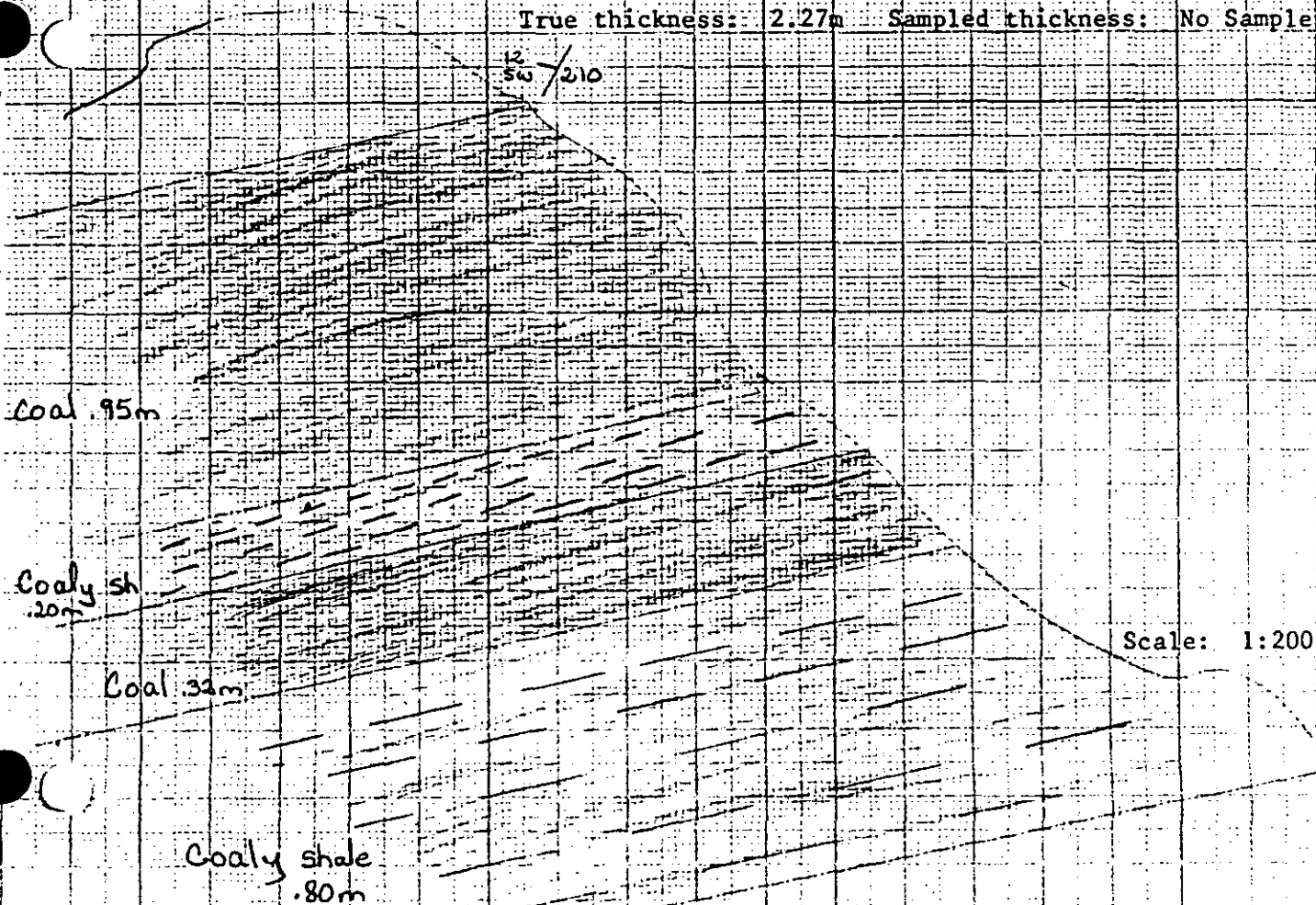
Area:

Trench Described by: J.Ryley

Date: August 8, 1982

Description: 1st band is 95cm of coal
20cm of coaly shale
2nd band is coal 32cm
coaly shale 80cm

True thickness: 2.27m Sampled thickness: No Sample taken



HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA

Trenching Program, Outcrop Description

Trench and Sample Number: H.H. 82-26

Field Number: Trench #4. August 8, 1982

Lab Number: NO SAMPLE TAKEN

Location: 6,140,740 N., 568,908 E.

Area:

Trench Described by: J. Ryley

Date: August 8, 1982

Description: Two sections of coal, upper section appears to be bloom, bottom section is shaly coal, quite dirty dip direction is opposite, possible small anticline between this trench and trench #3

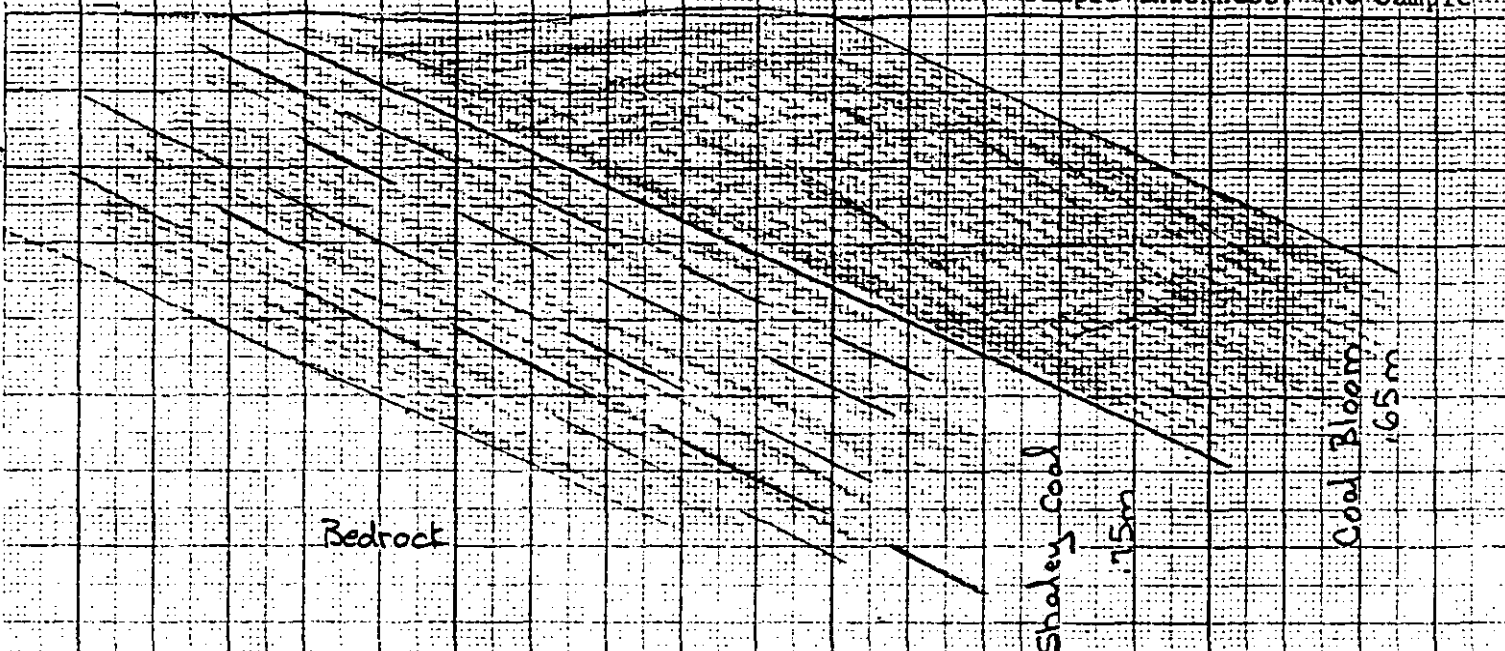
Upper Section 65cm

Lower Section 75cm

24
203

True Thickness: 1.40m

Sample Thickness: No Sample



Scale: 1:200

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

Trenching Program, Outcrop Description

Trench and Sample Number: H.H. 82-27

Field Number: Trench#1, August 9, 1982

Lab Number: NO SAMPLE TAKEN

Location: 6,144,800N., 567,460E.

Area:

Trench Described by: J.Ryley

Date: August 9, 1982

Description: Coaly shale with minor bands of
good coal

True Thickness: 1.8m

Sample Thickness: No Sample taken

Dip: 265°, 38° N.W.

~~**No Profile done~~

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA

Trenching Program, Outcrop Description

Trench and Sample Number: H.H. 82-28

Field Number: Trench#2, August 11, 1982

Lab Number: NO SAMPLE TAKEN

Location: ?

Area: Middle Hill Ridge between middle seismic and
middle fork

Trench Described by: J. Ryley

Date: August 11, 1982

Description: Coal is of good quality.

273° 40 N.W.

True Thickness: 3.4m

Sample Thickness: No Sample taken

No Profile done

P/C

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

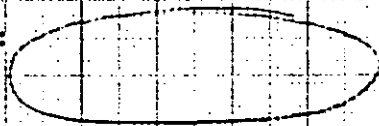
Trenching Program, Outcrop Description

Trench and Sample Number: H.H. 82-29

Field Number: Trench #3, August 12, 1982

Lab Number: NO SAMPLE TAKEN

Location:



Area:

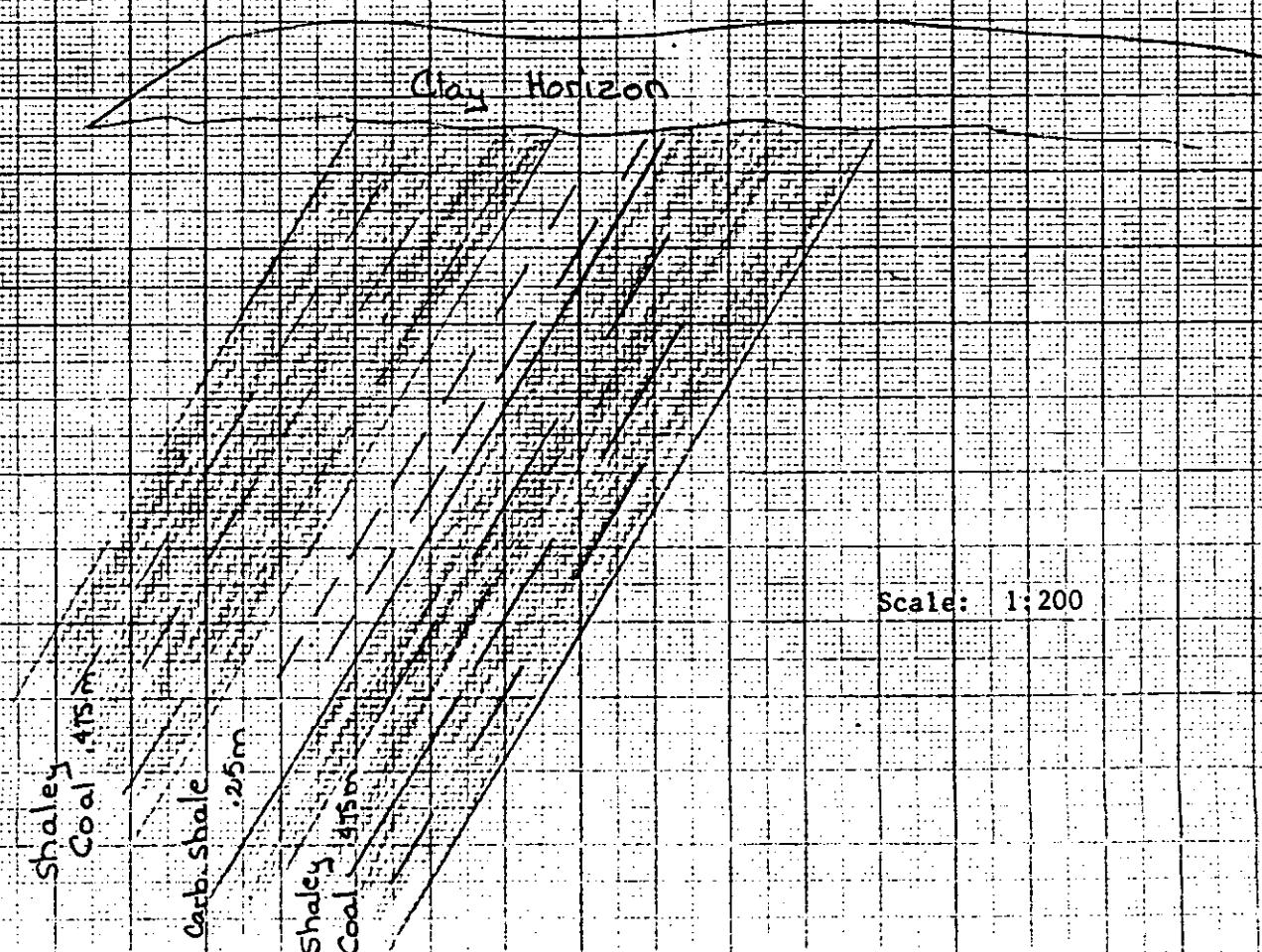
Trench Described by: J. Ryley

Date: August 12, 1982

Description: Mainly coaly shale with 25cm band of carb. shale.
286°, 59° S.W.

True Thickness: 1.2m

Sample Thickness: NO SAMPLE TAKEN



Scale: 1:200

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

Trenching Program, Outcrop Description

Trench and Sample Number: H.H. 82-30

Field Number: Trench #4, August 12, 1982

Lab Number: NO SAMPLE TAKEN

Location:

Area:

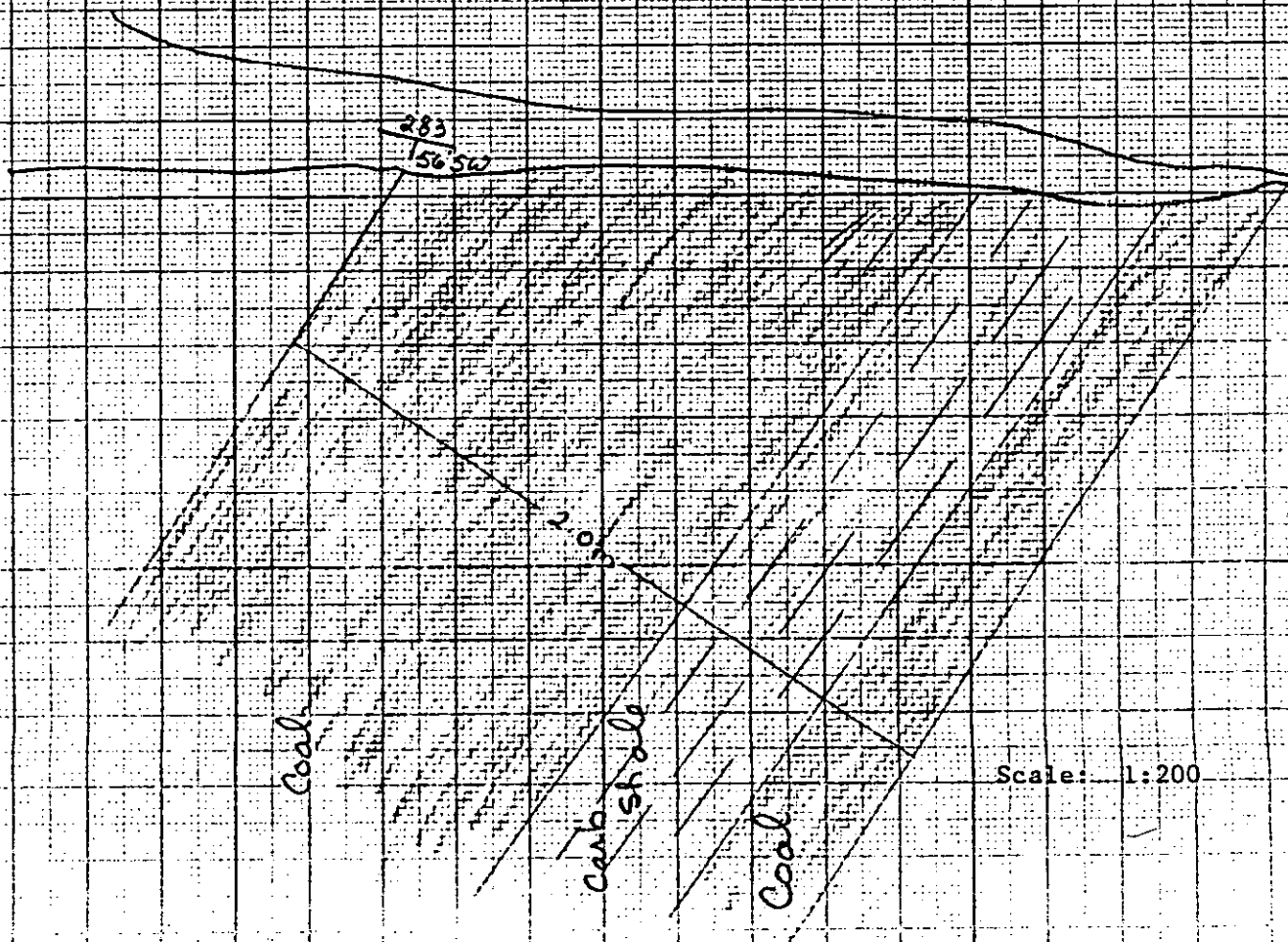
Trench Described by: J.Ryley

Date: August 12, 1982

Description: Generally good coal with occasional carb shale bands intermittent throughout section.

True Thickness: 2m

Sample Thickness: No Sample Taken



HIGH-HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

Trenching Program, Outcrop Description

Trench and Sample Number: H.H. 82-31

Field Number: Trench #5, August 15, 1982

Lab Number: NO SAMPLE TAKEN

Location:

Area:

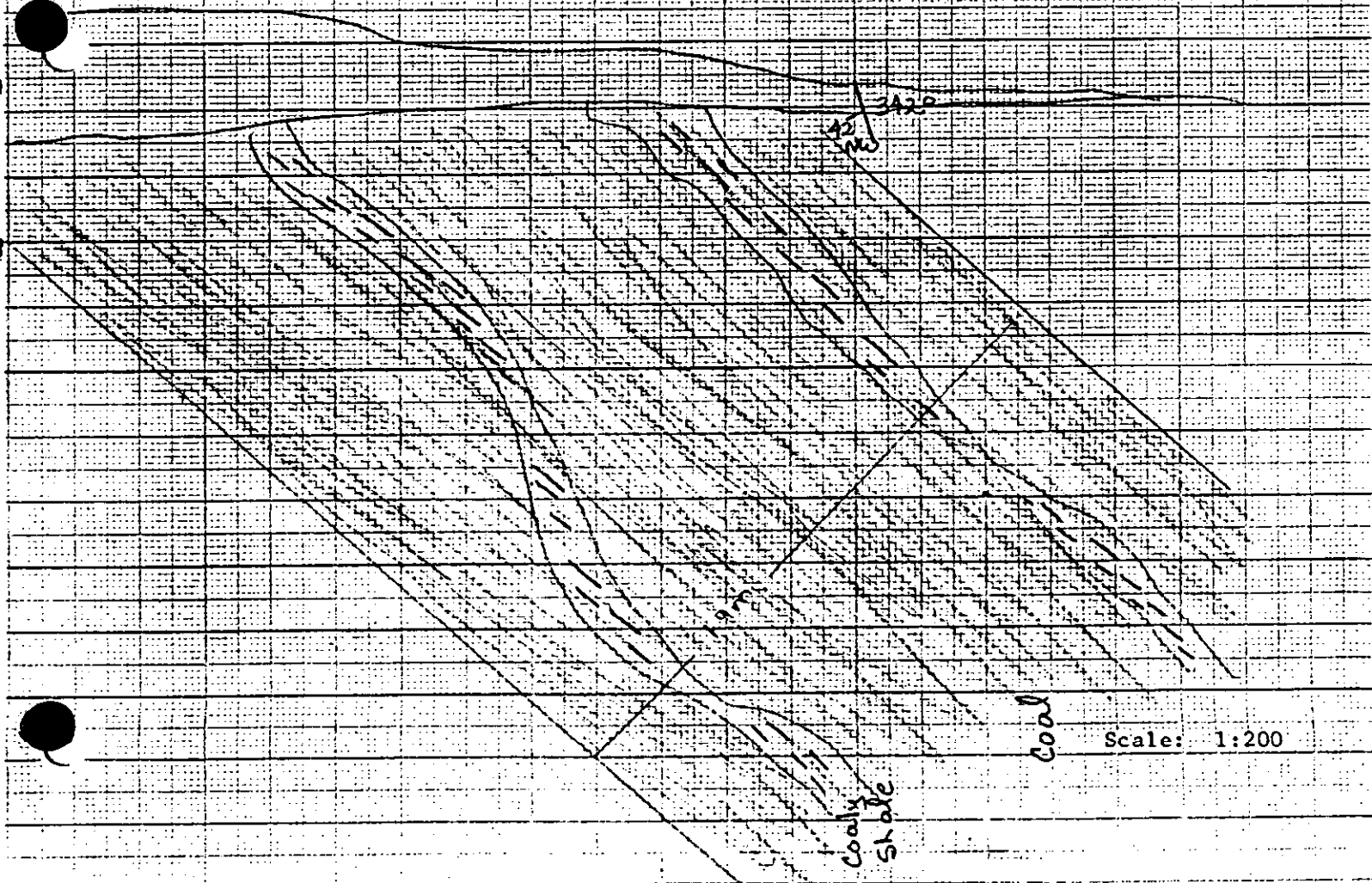
Trench Described by: J. Ryley

Date: August 15, 1982

Description: Generally clean coal with occasional coaly shale bands.
342°, 42° N.W.

True Thickness: 1.90 m

Sample Thickness: No Sample Taken



Scale: 1:200

HIGH HAT COAL PROPERTY, N.E. BRITISH COLUMBIA, 1982

Trenching Program, Outcrop Description

Trench & Sample Number: H.H. 82-32

Field Number: Trench #6, August 15, 1982

Lab Number: NO SAMPLE TAKEN

Location:

Area:

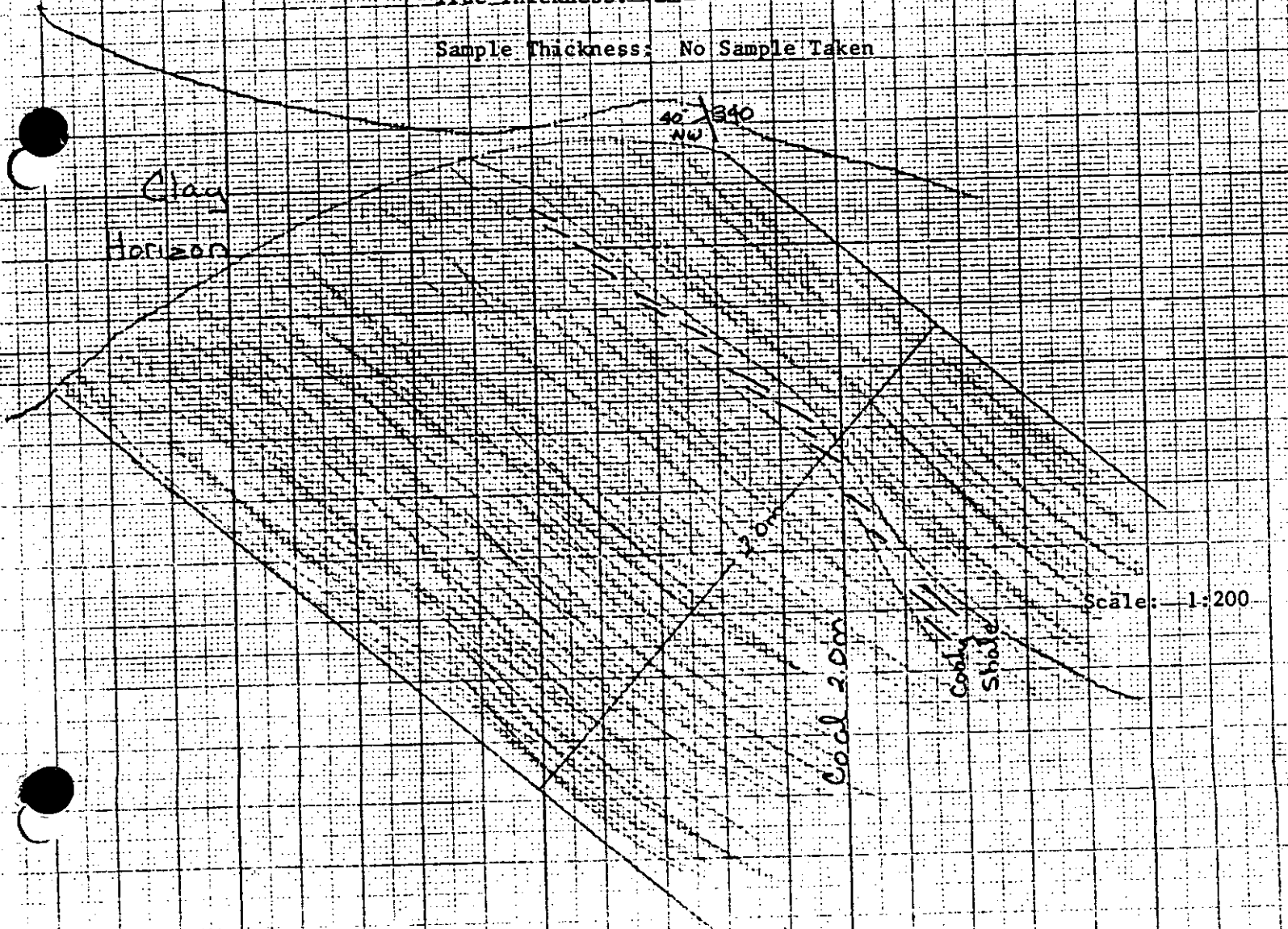
Trench Described by: J.Ryley

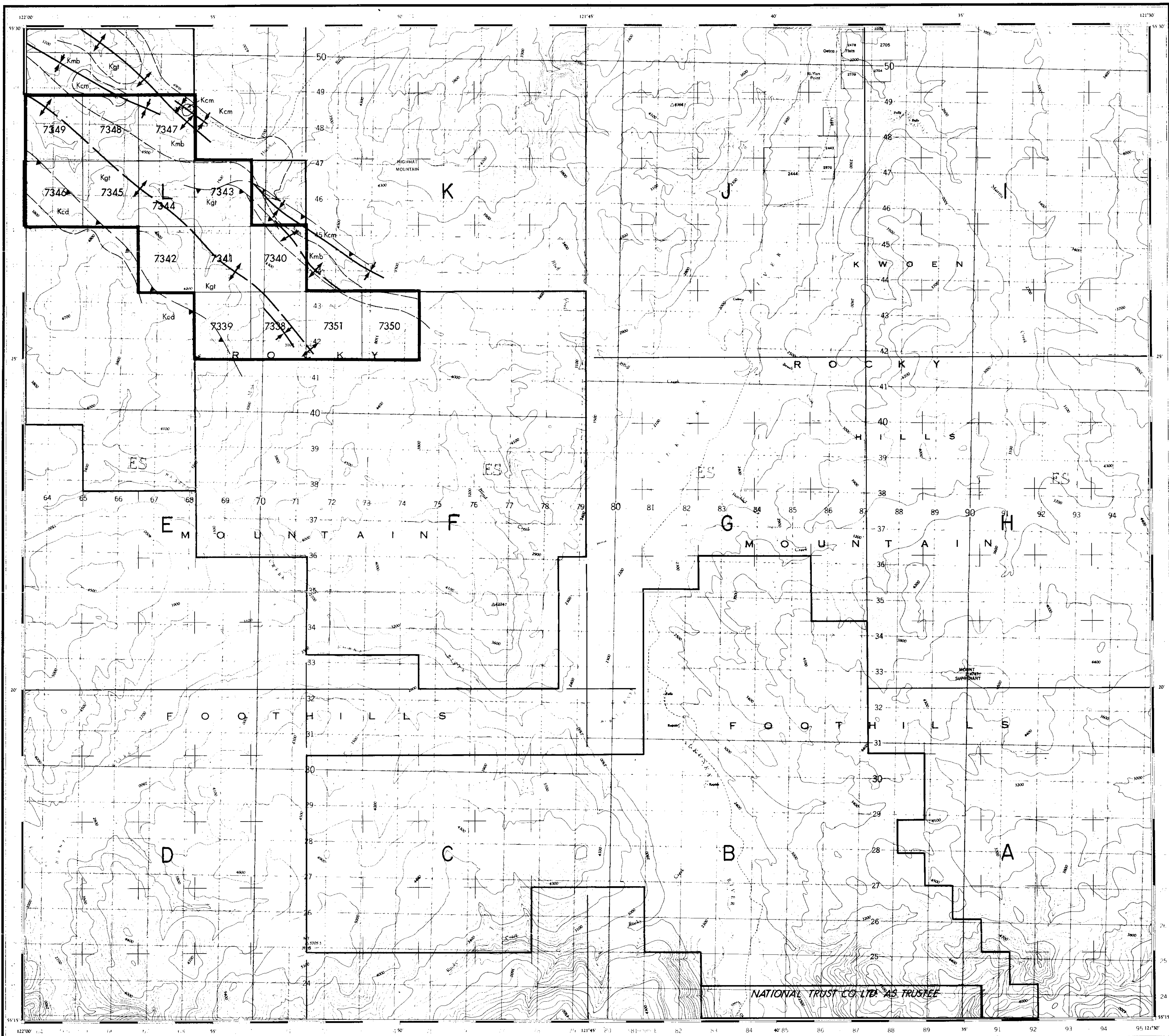
Date: August 15, 1982

Description: Coal, clean with one 5cm coaly shale band.
340°, 40° N.W.

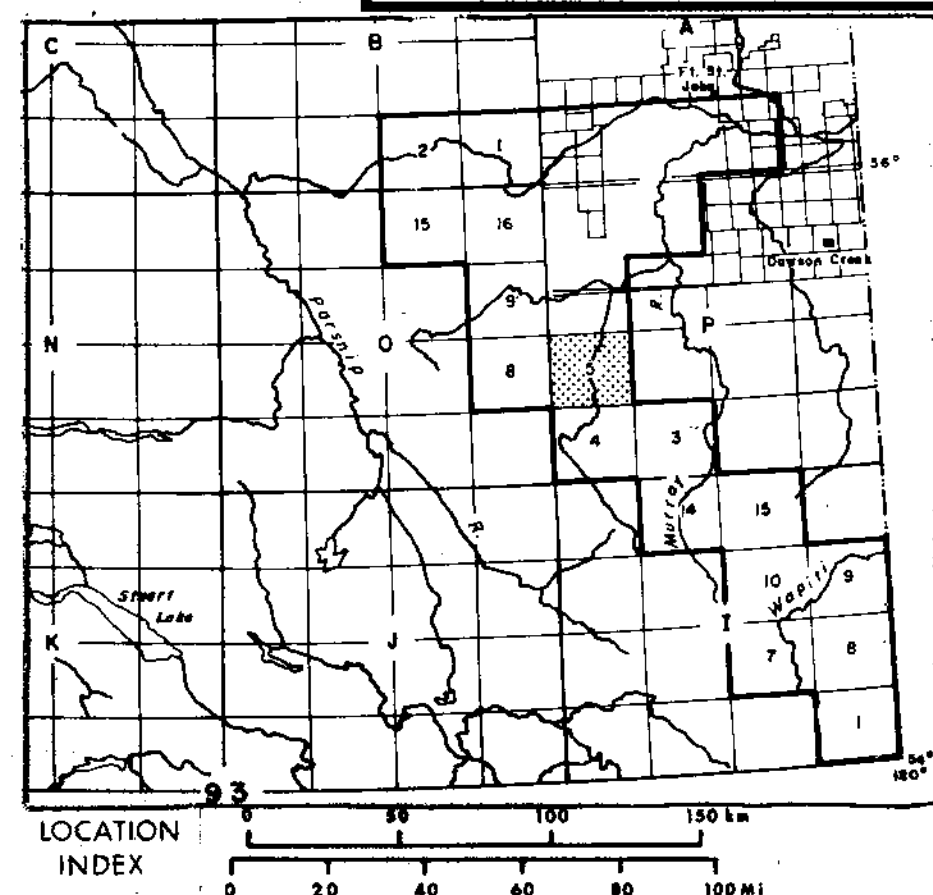
True Thickness: 2m

Sample Thickness: No Sample Taken





181.13
181.17
181.21
181.25
181.28
181.32
181.36
181.40
181.43
181.47
181.50
181.54
181.58
181.62
181.66
181.70
181.73
181.77
181.81
181.85
181.89
181.93
181.96
182.00
182.04
182.08
182.11
182.15
182.19
182.23



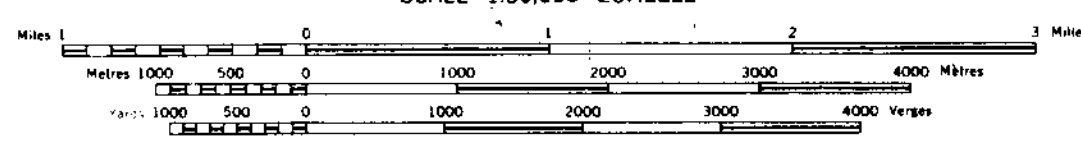
LEGEND

- CRETACEOUS
- [Kcm] Compton Fm.
 - [Kmb] Moosehar Fm.
 - [Kgt] Gething Fm.
 - [Kcd] Cadomin Fm.
- ANTICLINE
 SYNCLINE
 THRUST FAULT
 FORMATION CONTACT

BURNT RIVER

PEACE RIVER DISTRICT
BRITISH COLUMBIA

SCALE 1:50,000 ÉCHELLE



CONTOUR INTERVAL 100 FEET
Elevations in Feet above Mean Sea Level
Transverse Mercator Projection
North American Datum 1927
MAGNETIC DECLINATION 26°39' EAST
AT CENTRE OF MAP 1965
Annual change decreasing 4.2'

ÉQUIDISTANCE DES COURBES 100 PIEDS
Élevations en pieds au-dessus du niveau moyen de la mer
Projection Transverse de Mercator
Réseau géodésique nord-américain année 1927
DÉCLINAISON MAGNÉTIQUE AU CENTRE
DE LA FEUILLE EN 1965: 26°39' EST
Variation annuelle décroissante 4.2'

TABLIÉAU D'ASSEMBLAGE DU SYSTÈME NATIONAL DE RÉFÉRENCE CARTOGRAPHIQUE

93P/5W	93P/5E	93P/5N
93P/5W	93P/5E	93P/5N
93P/5W	93P/5E	93P/5N

INDEX TO ADJOINING MAPS OF THE NATIONAL TOPographic SYSTEM
93P/5

PR-Highhat River B2(2)A (*)

Crows Nest Resources Limited
EXPLORATION

BURNT RIVER
NORTHEASTERN B.C.
PEACE RIVER LAND DISTRICT

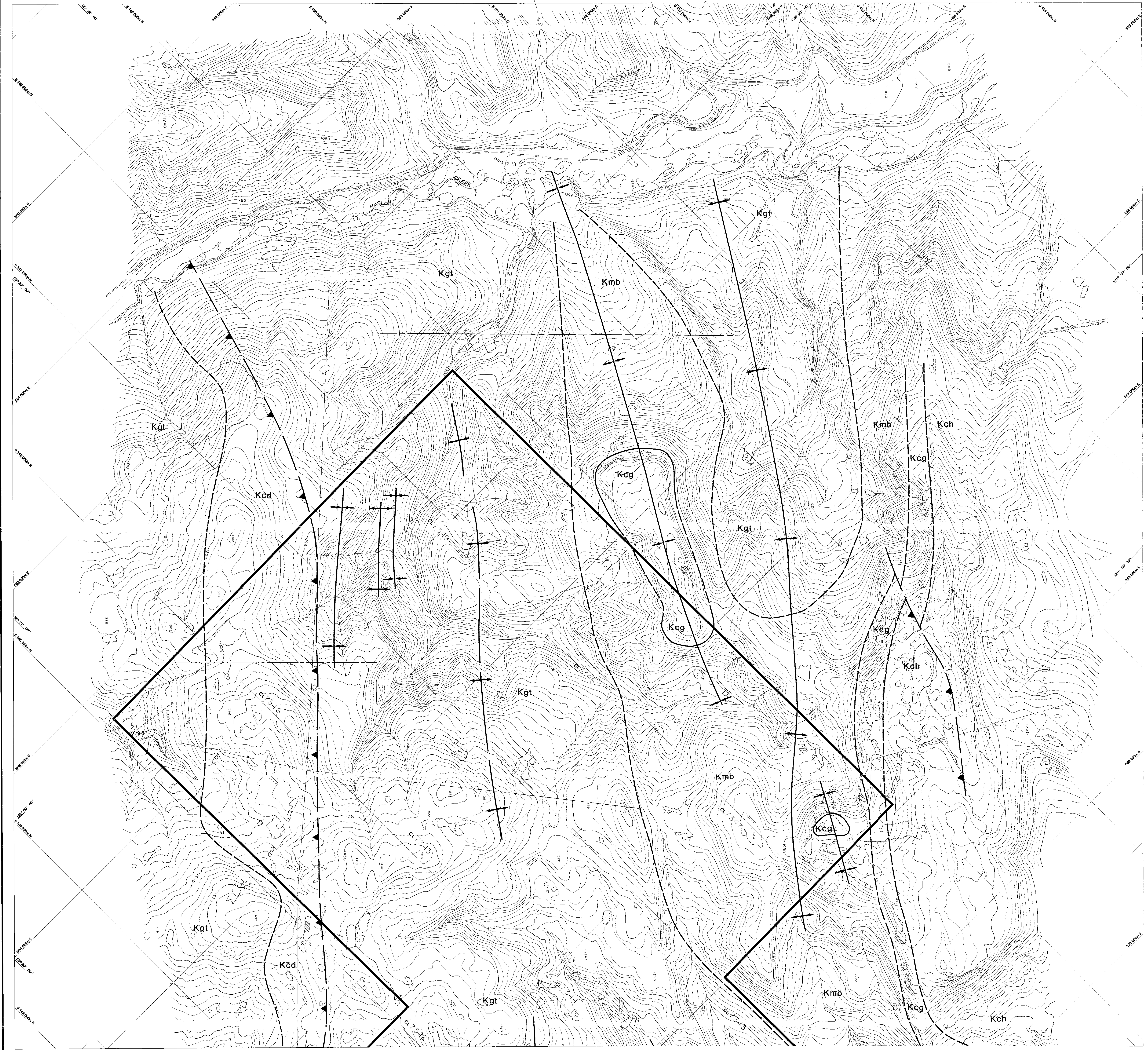
GEOLOGIC COMPILATION MAP

HIGHHAT RIVER COAL PROSPECT

AUTHOR: A. WHITE	SCALE: 1:50,000	ENCLOSURE No: 2
DATE: MARCH 1983	REVISED:	DRAWING No: HH5U01
To Accompany		

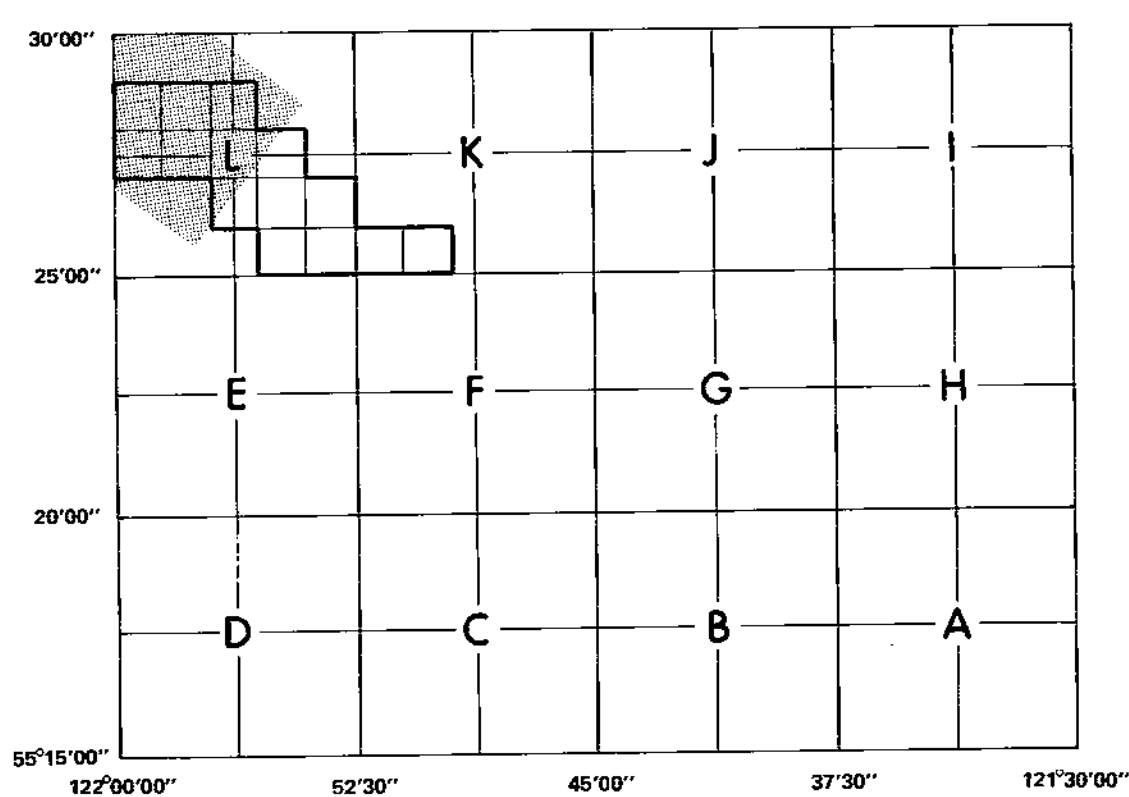
NTS 93P/5

537



MAP INDEX

93P/5

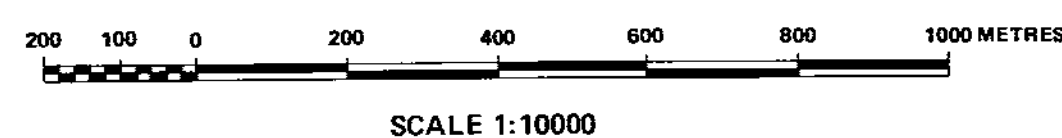


LEGEND

Table with 2 columns: Symbol and Description. Includes MAIN ROAD, SECONDARY ROAD, BRIDGE, CULVERT, TRACK OR TRAIL, LOT LINE, SPOT HEIGHT, CONTOUR, DEPRESSION, RIVER, INTERMITTENT STREAM, LAKE, SWAMP, SAND, SLIDE, TREES.

GEOLOGICAL LEGEND

Table with 2 columns: Symbol and Description. Includes LOWER CRETACEOUS (Kcm, Kcb, Kch, Kcg, Kmb, Kgt, Kcd), THRUST FAULT, ANTICLINE, SYNCLINE, GEOLOGIC CONTACT, CNRL LICENCE BOUNDARY, COAL LICENCE BOUNDARY.



Scale 1:10000
Contour Interval: 10 metres
Date of Photography: 1968
Compilation: 1980 Cartography: 1982

SURVEY NOTE: Control taken from existing NTS map 93P/5, UTM Zone 10

Prepared by: Aero Geomatics

537 PR. Highgate River B2(2*)A (*)

Crows Nest Resources Limited EXPLORATION

HIGHGATE PROJECT N.E. BRITISH COLUMBIA

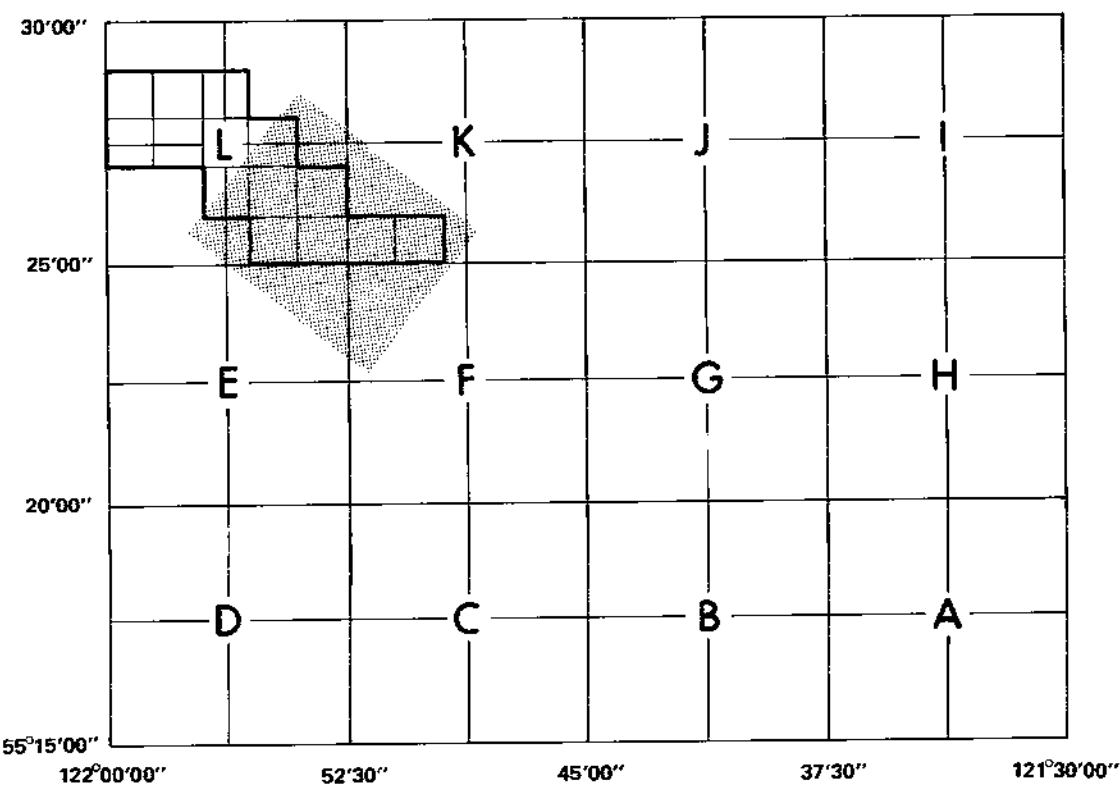
GEOLOGICAL MAP (SHEET 1 OF 2)

Metadata table with columns: N.T.S.-93P/5, AUTHOR: A. WHITE, DATE: FEB 1983, To Accompany, SCALE: 1:10,000, REVISED:, DRAWN BY: R.G.P., U.T.M. ZONE 10, DRAWING No: HH3U01



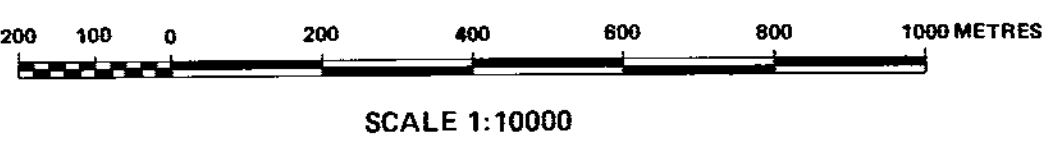
MAP INDEX

93P/5



LEGEND

- | | | | |
|-----------------|-------|---------------------|-------|
| MAIN ROAD | ===== | RIVER | ~~~~~ |
| SECONDARY ROAD | ===== | INTERMITTENT STREAM | ~~~~~ |
| BRIDGE, CULVERT | ===== | LAKE | ~~~~~ |
| TRACK OR TRAIL | ----- | SWAMP | ~~~~~ |
| LOT LINE | ----- | SAND | ~~~~~ |
| CUT LINE | ----- | SLIDE | ~~~~~ |
| SPOT HEIGHT | 602.2 | TREES | ~~~~~ |
| CONTOURS | 1000 | | |
| DEPRESSION | 1000 | | |



SCALE 1:10000
 Contour Interval : 10 metres
 Date of Photography : 1968
 Compilation : 1980 Cartography : 1982

SURVEY NOTE : Control taken from existing
 NTS map 93P/5 UTM Zone 10

Prepared by : Aero Geometrics

GEOLOGICAL LEGEND

- LOWER CRETACEOUS
- [Kcm] Compton Formation
 - [Kcb] Boulder Creek Mbr.
 - [Kch] Hulcross Mbr.
 - [Kcg] Gates Mbr.
 - [Kmb] Moosebar Formation
 - [Kgt] Gething Formation
 - [Kcd] Cadomin Formation
- THRUST FAULT
- ANTICLINE, SYNCLINE
- GEOLOGIC CONTACT
- CNRL LICENCE BOUNDARY
- COAL LICENCE BOUNDARY

537

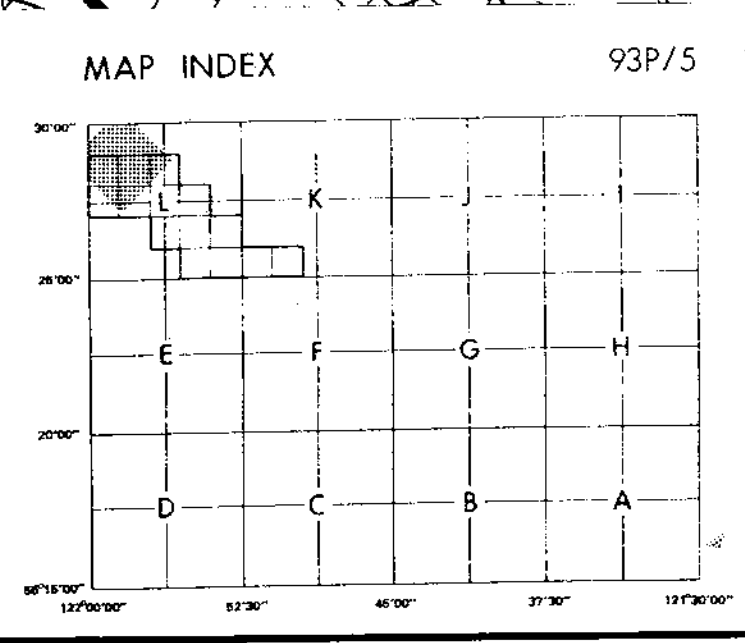
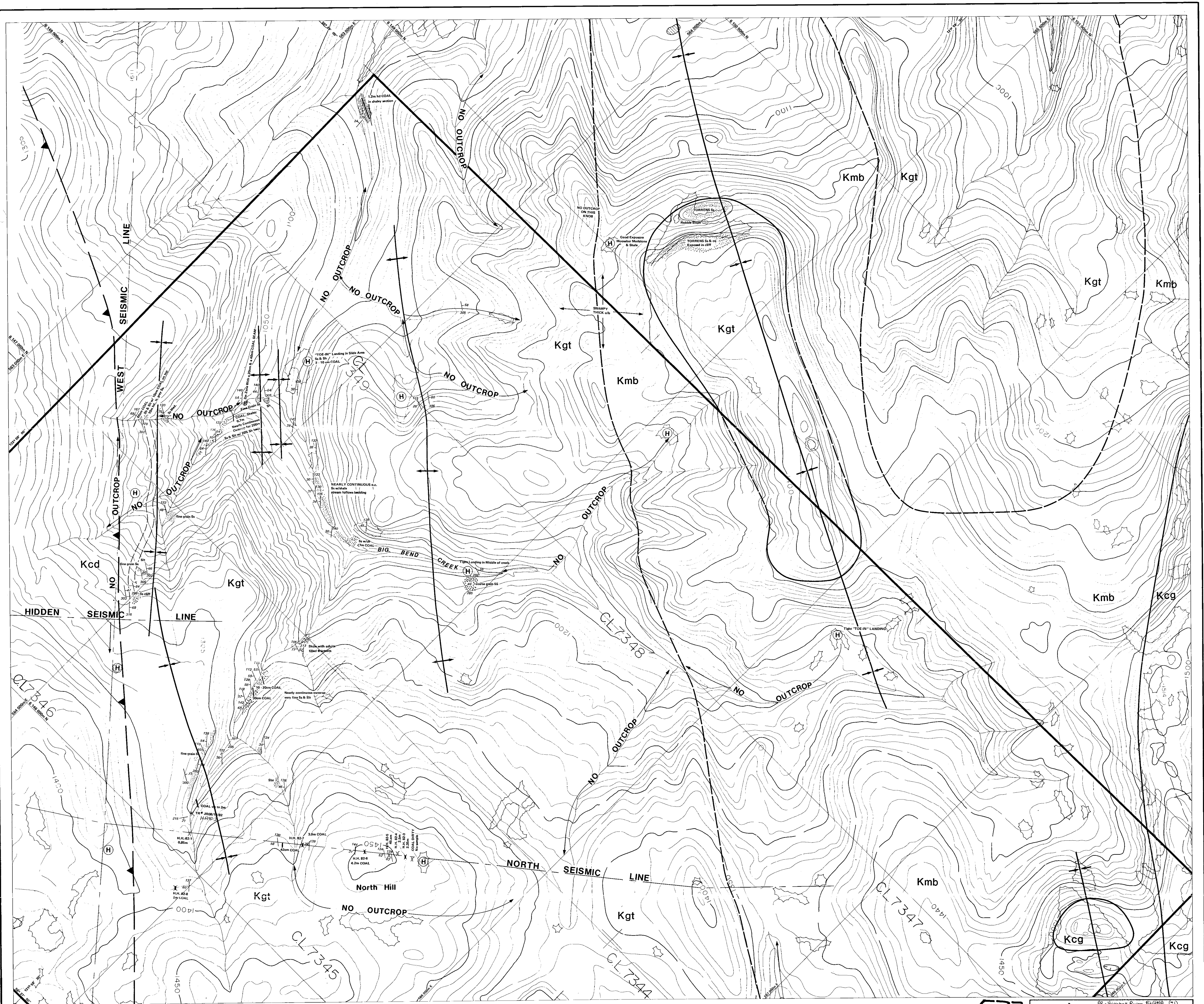
PR Highhat River B2 (27)A (*)

Crows Nest Resources Limited
 EXPLORATION

HIGHHAT PROJECT
 N.E. BRITISH COLUMBIA

GEOLOGICAL MAP
 (SHEET 2 OF 2)

N.T.S. - 93P/5		SCALE: 1:10 000		DRAWN BY: R.G.P.	
AUTHOR: A. WHITE		DATE: FEB 1983		DRAWING No: HH3U02	
To Accompany		REVISED:		U.T.M. ZONE 10	



SURVEY NOTE:
 Control taken from existing
 NTS map 93P/5, UTM Zone 10
 Prepared by: Aero Geometrics

LEGEND

	MAIN ROAD		RIVER
	SECONDARY ROAD		INTERMITTENT STREAM
	ROUGH CULVERT		LAKE
	TRACK OF TRAIL		SWAMP
	BUILDING		SAND
	FENCE		SLOPE
	LOT LINE		DRILL HOLE
	CUT LINE		HORIZONTAL CONTROL
	SPOT HEIGHT CONTOURS		VERTICAL CONTROL
	DEPRESSION		HORIZONTAL VERTICAL CONTROL

SCALE: 1:5000
 Contour Interval: 10 metres
 Date of Photography: 1968
 Compilation: 1980 Cartography: 1982

GEOLOGICAL LEGEND

	Comoxion Formation		SANDSTONE OUTCROP
	Boulder Creek Mbr.		SHALE OUTCROP
	Hulros Mbr.		CONGLOMERATE OUTCROP
	Gates Mbr.		THRUST FAULT
	Moosebar Formation		ANTICLINE, SYNCLINE
	Gething Formation		GEOLOGIC CONTACT
	Cadomin Formation		

	HAND TRENCH
	DRILL HOLE: vertical, inclined
	HELICOPTER LANDING SITE
	CNRL LICENCE BOUNDARY
	COAL LICENCE BOUNDARY

537

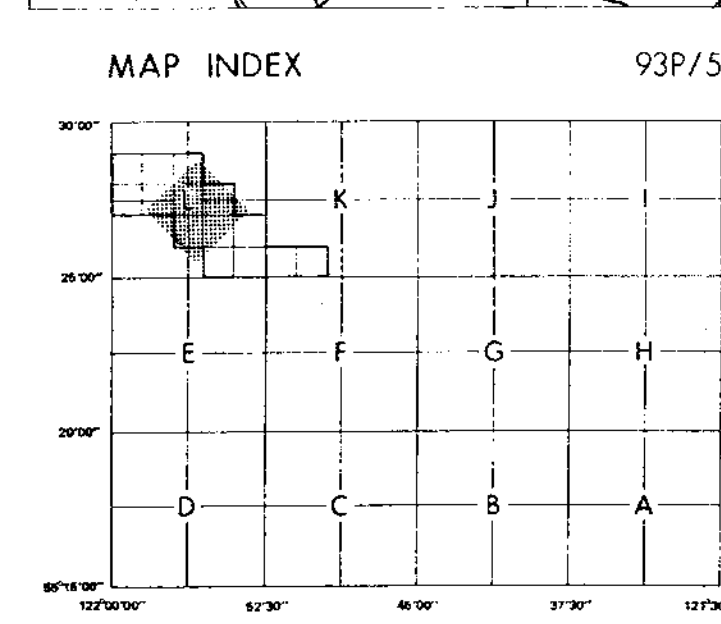
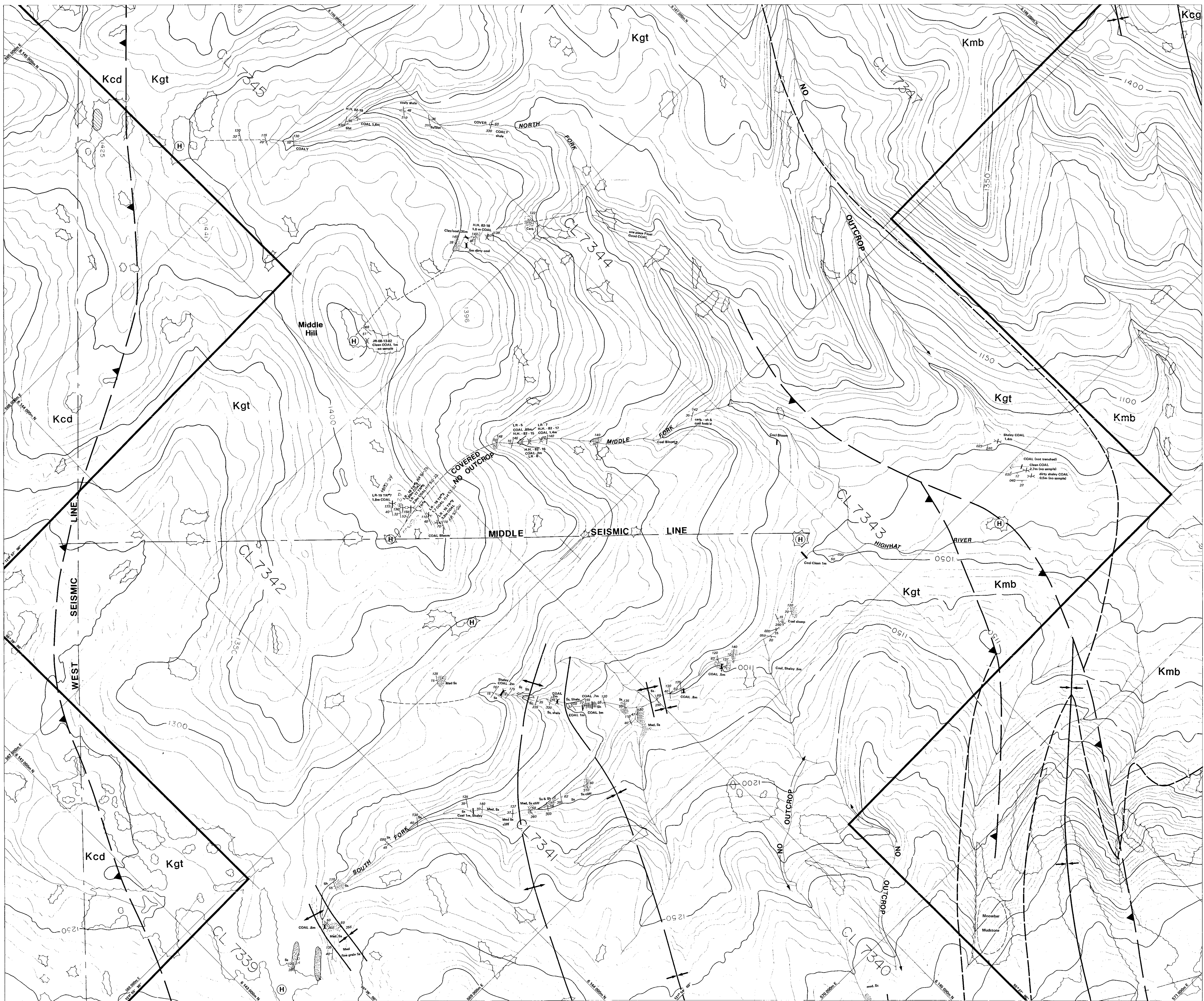
PR - Highhat River Basin (C1)

Crows Nest Resources Limited
EXPLORATION

HIGHHAT PROJECT
N.E. BRITISH COLUMBIA

GEOLOGICAL MAP

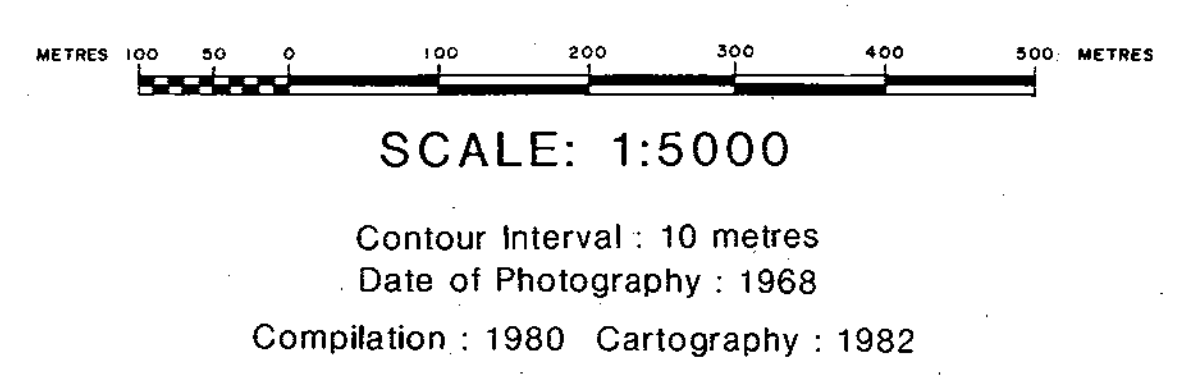
NTS - 93P/5	SCALE: 1:5000	UTM. ZONE 10
AUTHOR: A. WHITE	DATE: 83-03	REVISOR: P.F.B.
DATE: 83-03	REVISOR: P.F.B.	DRAWING NO: HH2U01



SURVEY NOTE:
Control taken from existing
NTS map 93P/5 UTM Zone 10
Prepared by: Aero Geomatics

LEGEND

MAIN ROAD	RIVER
SECONDARY ROAD	INTERMITTENT STREAM
BRIDGE, CULVERT	LAKE
TRACK or TRAIL	SWAMP
BUILDING	SAND
POLE	SLIDE
FENCE	PILE
LOT LINE	DRILL HOLE
CUT LINE	HORIZONTAL CONTROL
SHOT POINT	VERTICAL CONTROL
CONTOURS	HORIZONTAL, VERTICAL CONTROL
DEPRESSION	



LOWER CRETACEOUS

Kcm	Comoxion Formation
Kcb	Boulder Creek Mbr.
Kch	Hulcross Mbr.
Kcg	Gates Mbr.
Kmb	Moosebar Formation
Kgd	Gething Formation
Kcd	Cadomin Formation

GEOLOGICAL LEGEND

[Symbol]	SANDSTONE OUTCROP
[Symbol]	SHALE OUTCROP
[Symbol]	CONGLOMERATE OUTCROP
[Symbol]	THRUST FAULT
[Symbol]	ANTICLINE, SYNCLINE
[Symbol]	GEOLOGIC CONTACT

[Symbol]	HAND TRENCH
[Symbol]	DRILL HOLE: vertical, inclined
[Symbol]	HELICOPTER LANDING SITE
[Symbol]	CNRL LICENCE BOUNDARY
[Symbol]	COAL LICENCE BOUNDARY

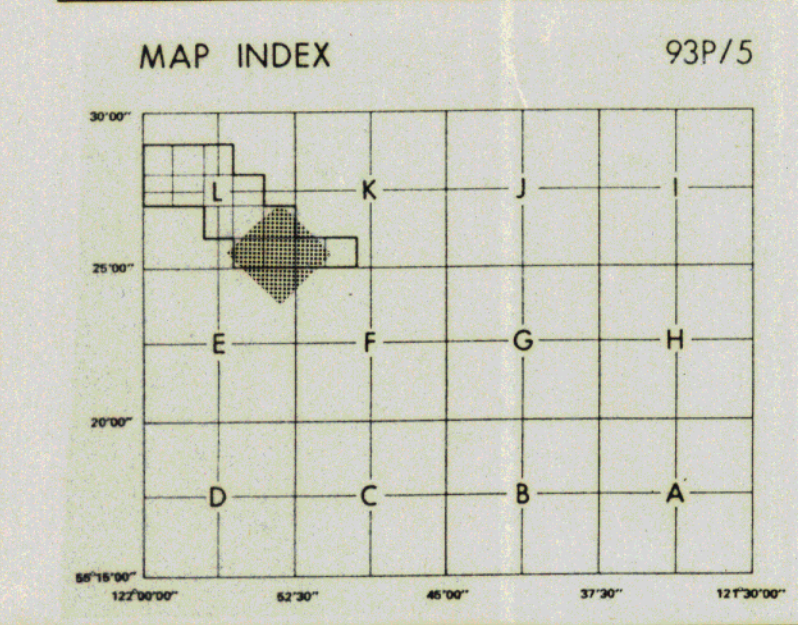
537

PR. Highhat River Basin (A*) R (x1)

Crows Nest Resources Limited
EXPLORATION
HIGHHAT PROJECT
N.E. BRITISH COLUMBIA

GEOLOGICAL MAP

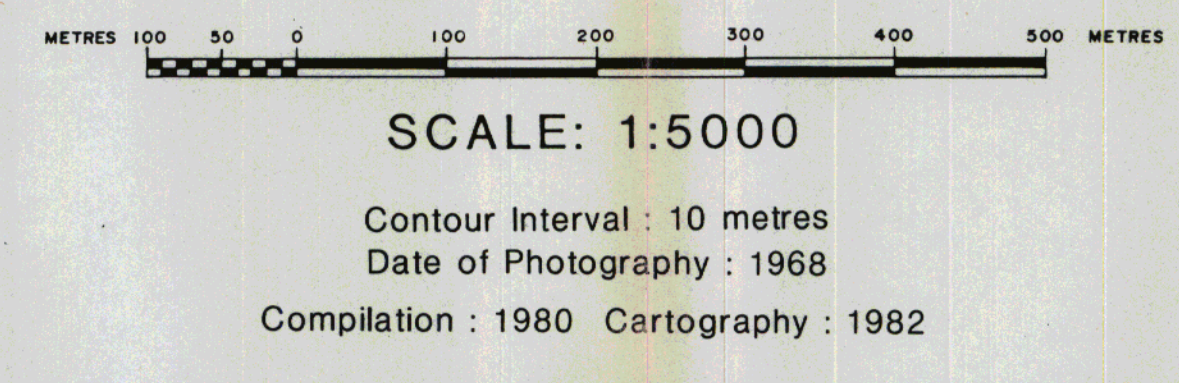
NTS - 93P/5 U.T.M. ZONE 10
AUTHOR: A. WHITE SCALE: 1:5000 DRAWN BY: P. Z.A.
DATE: 83-03 REVISED: DRAWING NO: HH2U02
To Accompany



SURVEY NOTE:
Control taken from existing NTS map 93P/5 UTM Zone 10
Prepared by: Aero Geometrics

LEGEND

MAIN ROAD	RIVER
SECONDARY ROAD	INTERMITTENT STREAM
BRIDGE, CULVERT	LAKE
TRACK or TRAIL	SWAMP
BUILDING	SAND
POLE	SLOPE
FENCE	TREES
LOT LINE	DRILL HOLE
OUTLINE	HORIZONTAL CONTROL
SPOT HEIGHT	VERTICAL CONTROL
CONTOURS	HORIZONTAL VERTICAL CONTROL
DEPRESSION	



GEOLOGICAL LEGEND

LOWER CRETACEOUS	SANDSTONE OUTCROP	HAND TRENCH
[Kcm] Comoxion Formation	[Pattern] SHALE OUTCROP	[Symbol] DRILL HOLE: vertical, inclined
[Kcb] Boulder Creek Mbr.	[Pattern] CONGLOMERATE OUTCROP	[Symbol] HELICOPTER LANDING SITE
[Kch] Hulcross Mbr.	[Symbol] THRUST FAULT	[Symbol] CNRL LICENCE BOUNDARY
[Kcg] Gates Mbr.	[Symbol] ANTICLINE, SYNCLINE	[Symbol] COAL LICENCE BOUNDARY
[Kmb] Moosebar Formation	[Symbol] GEOLOGIC CONTACT	
[Kgt] Getting Formation		
[Kcd] Cadomin Formation		

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[Symbol] HAND TRENCH	[Symbol] DRILL HOLE: vertical, inclined
[Symbol] HELICOPTER LANDING SITE	[Symbol] CNRL LICENCE BOUNDARY
[Symbol] COAL LICENCE BOUNDARY	

Crows Nest Resources Limited
E X P L O R A T I O N
HIGHWAY PROJECT
N.E. BRITISH COLUMBIA

GEOLOGICAL MAP

NTS-93P/5
AUTHOR: A. WHITE
DATE: 83-03

SCALE: 1:5000
REVISED:

UTM. ZONE 10
DRAWN BY: F.F.B.
DRAWING NO: HH2U03

537

HIGHHAT PROSPECT - N.E. B.C.

Winkie Drill Hole #82-1

U.T.M. Zone 10 6,144,870 North)
-570,430 East > approximate only
1,437 m Elevation) not surveyed

Az 215°
Incl 60°
T.D. 25.5 m

Geophysical Logs
GAM-LSD-CAL
GAM-Neut/Neut
GAM-LSD-CAL (Detail)
GAM-BRD (Detail)

Sample #HH 82-13 19.96-24.3 m (4.34 m apparent thickness)



PR. Highhat River 82 (3) A * (1)

BOREHOLE **82-1**

CLIENT _____

AREA Highhat River

COUNTRY Sierra Leone

DATE LOGGED _____

DEPTH SCALE _____ OF _____ LOGS

BOREHOLE DATA REFER TO LOG _____

OPERATION DATA REFER TO LOG _____

EQUIPMENT AND RECORDING DATA

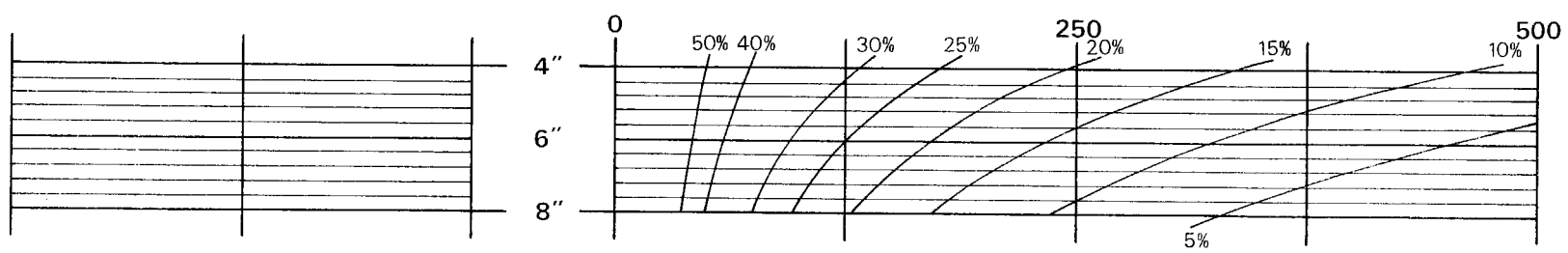
LOG	TAPING	RECORD	DIRECT	REPLAY	SPEED	T.C.	PANEL	CAL

REMARKS

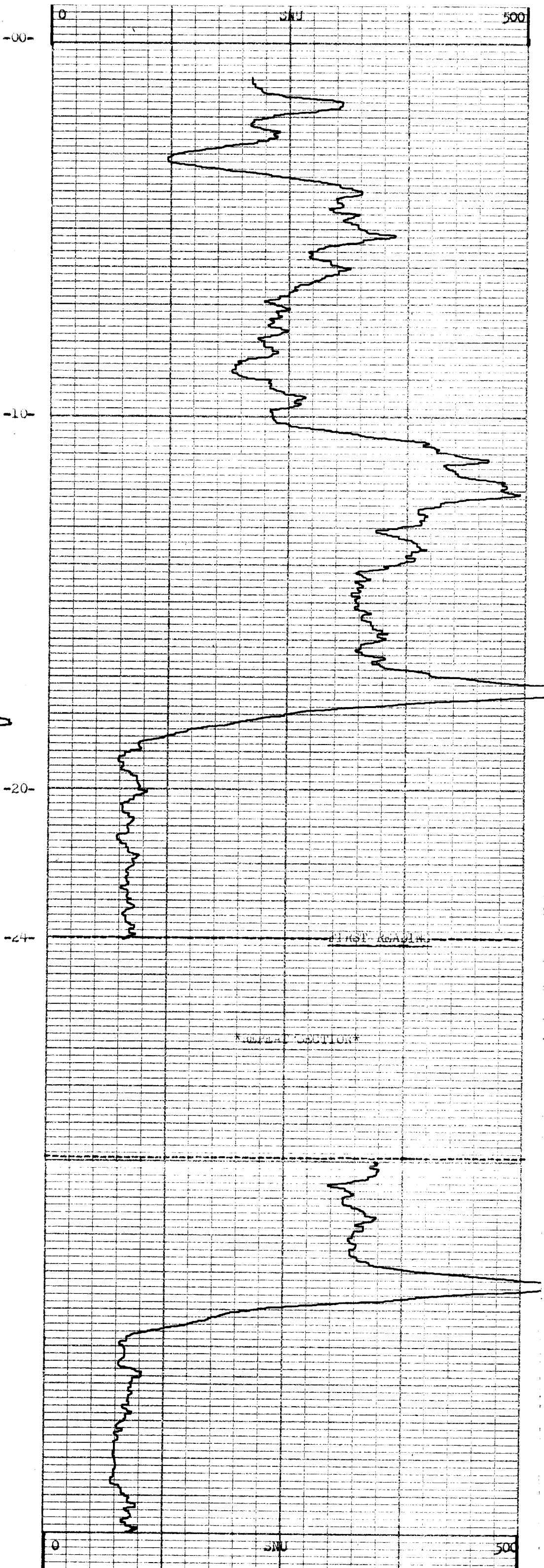
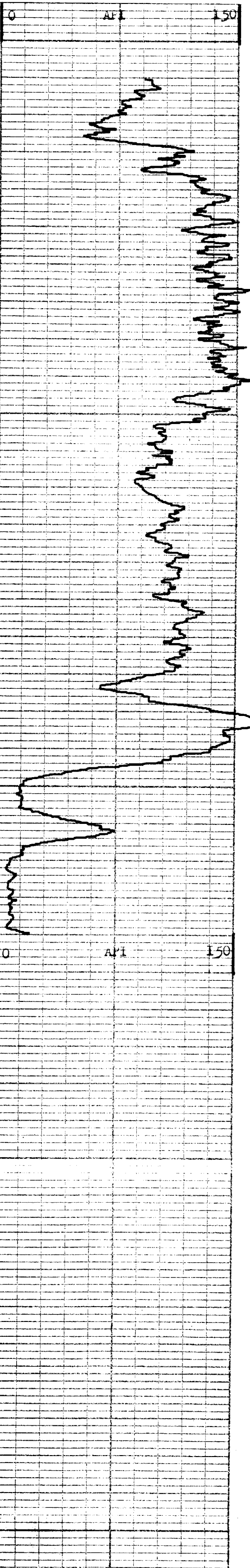
537

DEPTH	LOG

SANDSTONE POROSITY



MY (2) A58451 R



DEPTH	API

BOREHOLE 82-1

CLIENT Highhat River

AREA Highhat River

COUNTRY Sierra Leone



MY A58452R



Gamma ray & neutron-neutron logs
with lithology symbols

BOREHOLE 82-1

CLIENT Crown West Resources Ltd.

AREA High Hat

COUNTRY Canada

DATE LOGGED Aug. 20/82

OF LOGS

BOREHOLE DATA REFER TO LOG

OPERATION DATA REFER TO LOG

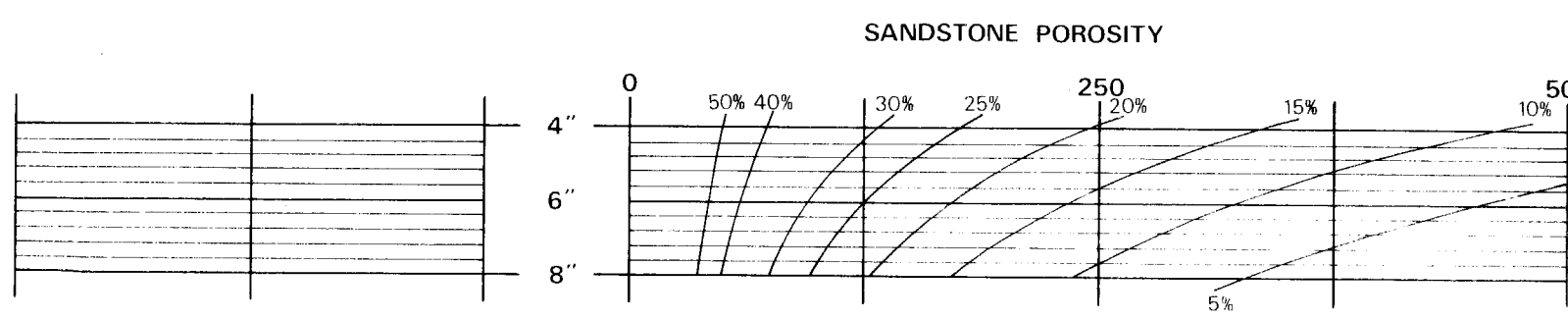
EQUIPMENT AND RECORDING DATA

LOG	TAPING	PANEL	CAL
LOG TAPED	RECORD DIRECTLY	T.C. SECS	COEFF
SPEED	REFLX	NORM	
1	1	1	1.02
2	2	2	1.02
3	3	3	1.02
4	4	4	1.02
5	5	5	1.02
6	6	6	1.02
7	7	7	1.02
8	8	8	1.02
9	9	9	1.02
10	10	10	1.02
11	11	11	1.02
12	12	12	1.02
13	13	13	1.02
14	14	14	1.02
15	15	15	1.02
16	16	16	1.02
17	17	17	1.02
18	18	18	1.02
19	19	19	1.02
20	20	20	1.02
21	21	21	1.02
22	22	22	1.02
23	23	23	1.02
24	24	24	1.02
25	25	25	1.02
26	26	26	1.02
27	27	27	1.02
28	28	28	1.02
29	29	29	1.02
30	30	30	1.02
31	31	31	1.02
32	32	32	1.02
33	33	33	1.02
34	34	34	1.02
35	35	35	1.02
36	36	36	1.02
37	37	37	1.02
38	38	38	1.02
39	39	39	1.02
40	40	40	1.02
41	41	41	1.02
42	42	42	1.02
43	43	43	1.02
44	44	44	1.02
45	45	45	1.02
46	46	46	1.02
47	47	47	1.02
48	48	48	1.02
49	49	49	1.02
50	50	50	1.02

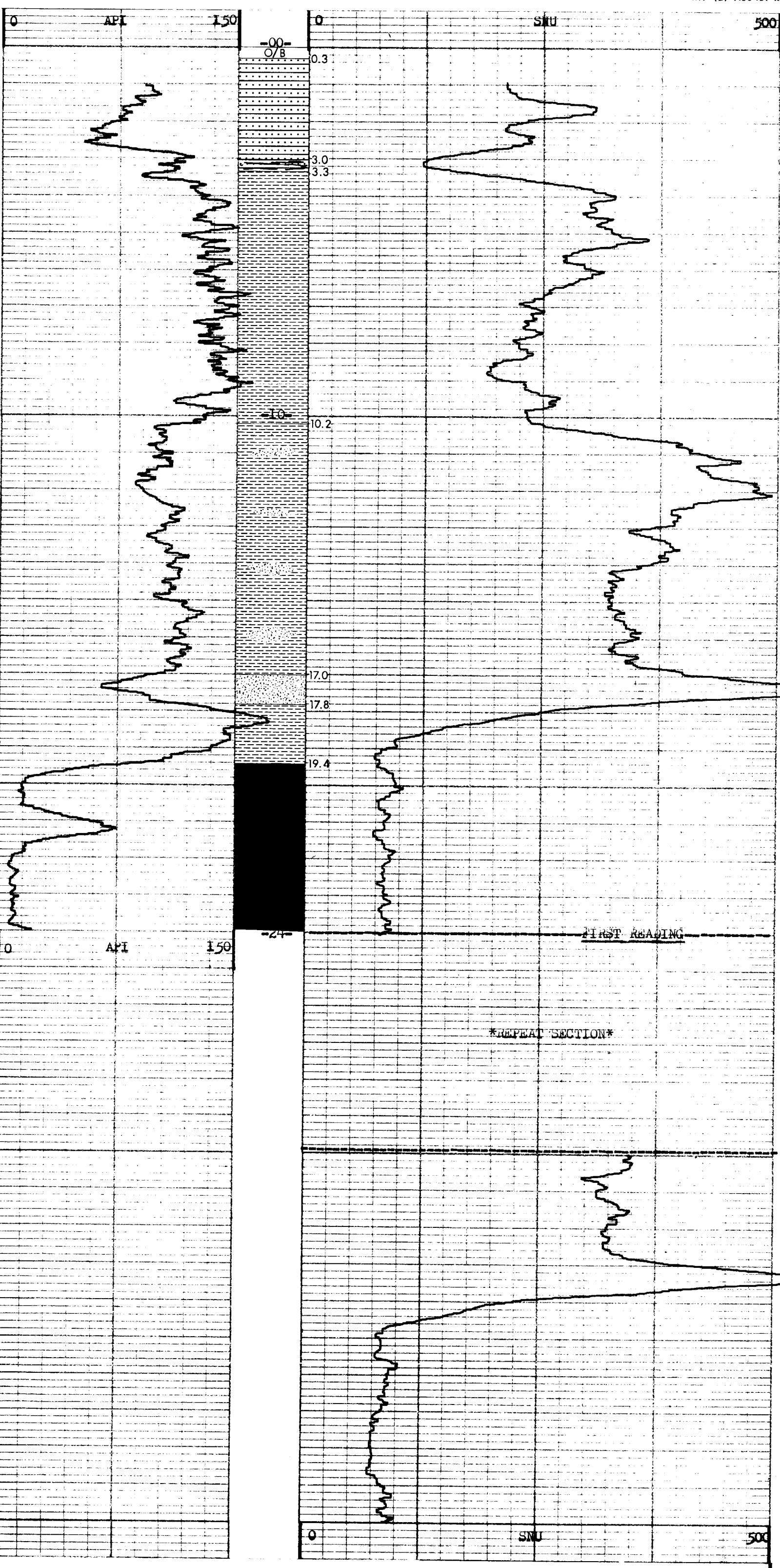
REMARKS

537

Gamma ray Log	DEPTH	Neutron-Neutron Log
API	150	SNU



MY (2) A58451 R



Gamma ray Log	DEPTH	Neutron-Neutron Log
API	150	SNU



BOREHOLE 82-1
CLIENT Crown West Resources Ltd.
AREA High Hat
COUNTRY Canada

LEGEND

- COAL
- SANDSTONE(fine)
- SANDSTONE(med.)
- SILTSTONE
- CARBONACEOUS SILTSTONE
- MUDSTONE
- SHALE
- COALY SHALE



APPROXIMATE LOCATION
 (LATITUDE AND LONGITUDE COORDINATES)

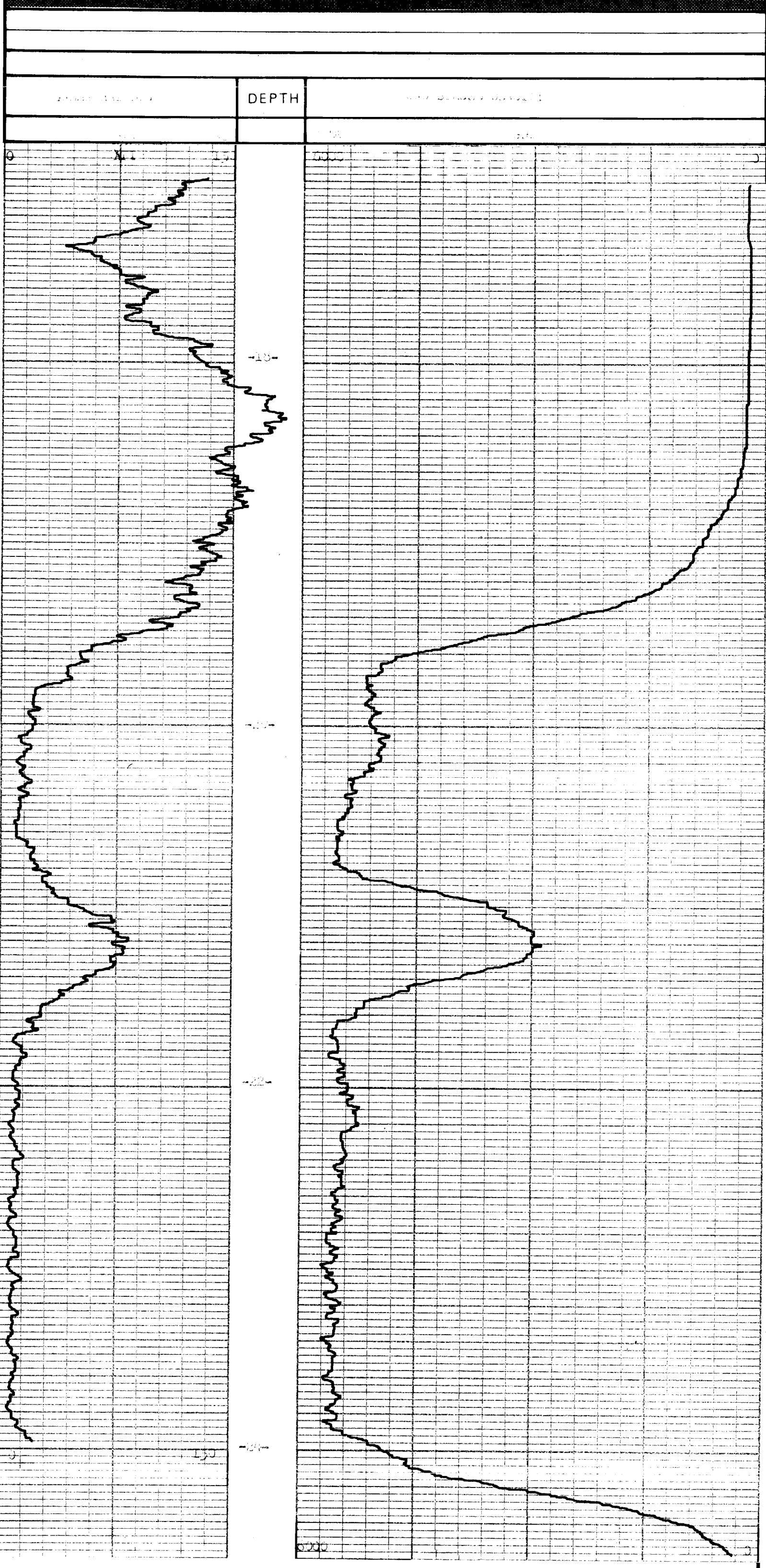
BOREHOLE 82-2
 CLIENT Mississippi Conservation Dept

AREA Miss. Delta DEPTH SCALE 100
 COUNTRY USA
 DATE LOGGED 12-1-82 OF 1 LOGS

BOREHOLE DATA REFER TO MISSISSIPPI LOG
 OPERATION DATA REFER TO MISSISSIPPI LOG
 EQUIPMENT AND RECORDING DATA

LOG	TAPING	PANEL	CAL
LOG TAPED	RECORDING SPEED	T.C SECS	COEFF

REMARKS
537



150	DEPTH	6000
-----	-------	------



BOREHOLE _____ AREA _____
 CLIENT _____ COUNTRY _____



BOREHOLE 82-1
 CLIENT _____

AREA _____ DEPTH SCALE _____
 COUNTRY _____

DATE LOGGED _____ OF _____ LOGS

BOREHOLE DATA REFER TO LITHOLOGY LOG

OPERATION DATA REFER TO LITHOLOGY LOG

EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE

LOG	TAPING	LOG RECORD DIRECTLY ON TAPE	REFLECT SPEED	PANEL	COEFF

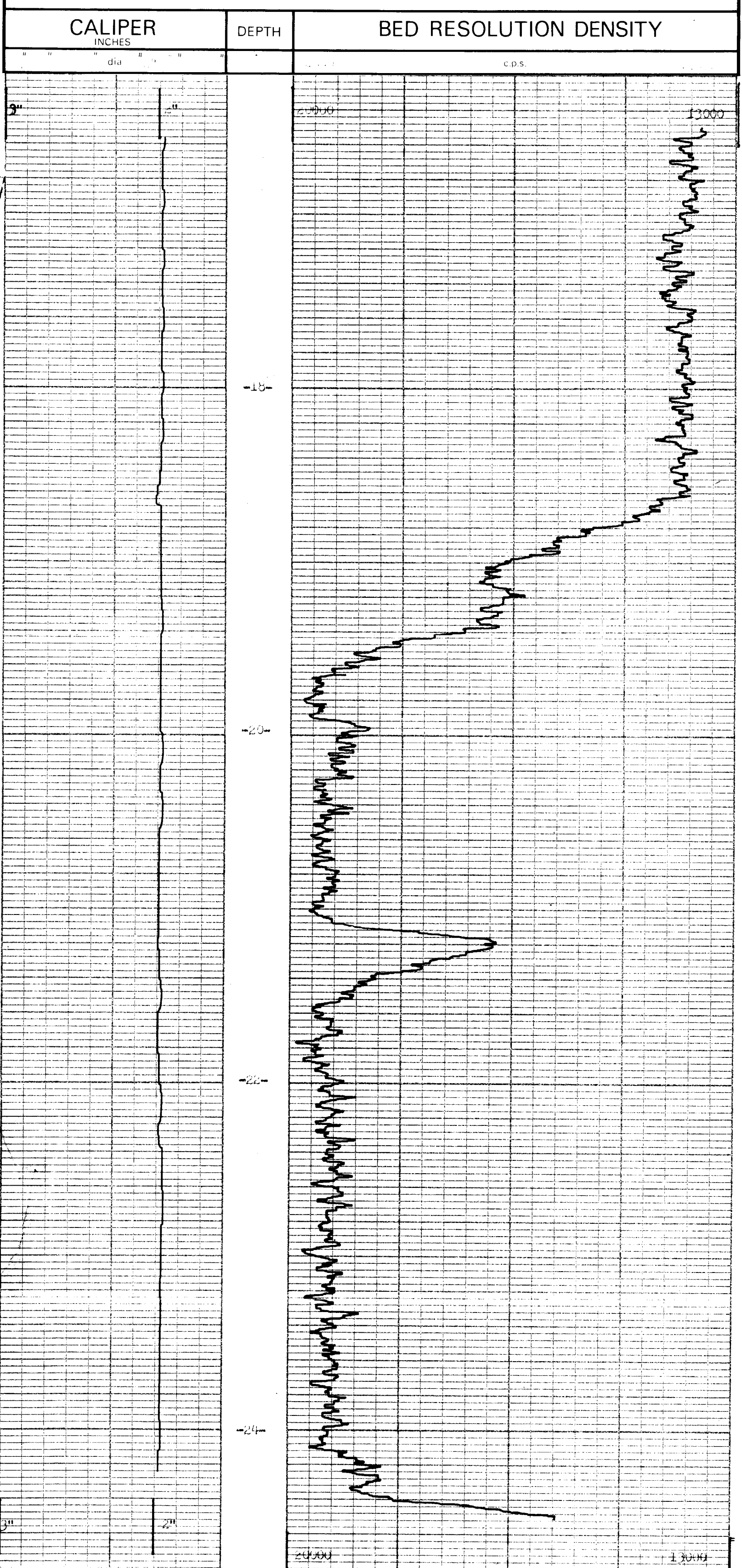
SOURCE SONDE AND CALIBRATION
 REFER TO LITHOLOGY LOG

SEAM THICKNESS LOG INTERVALS

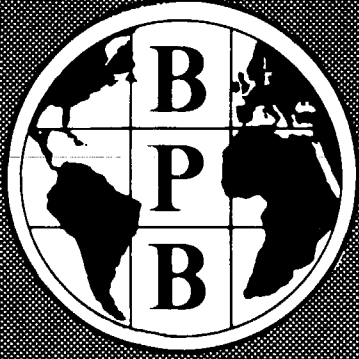
SONDE TYPE _____
 COAL _____
 COMBINATION SONDE _____

LOG SUITE:
 CALIPER
 B.R. DENSITY

B P B SEAM THICKNESS LOG



CALIPER INCHES	DEPTH	BED RESOLUTION DENSITY
----------------	-------	------------------------



BOREHOLE _____ AREA _____
 CLIENT _____ COUNTRY _____

SEAM THICKNESS LOG



Re-Highhat River 82 (3*)A *(1)

LOG RECORDING UNIT
General High Hat
Calliper Log

BOREHOLE 82-1

CLIENT _____

AREA _____

COUNTRY _____

DATE LOGGED _____

DEPTH SCALE
1:1

OF LOGS

BOREHOLE DATA

REFER TO

LOG

OPERATION DATA

REFER TO

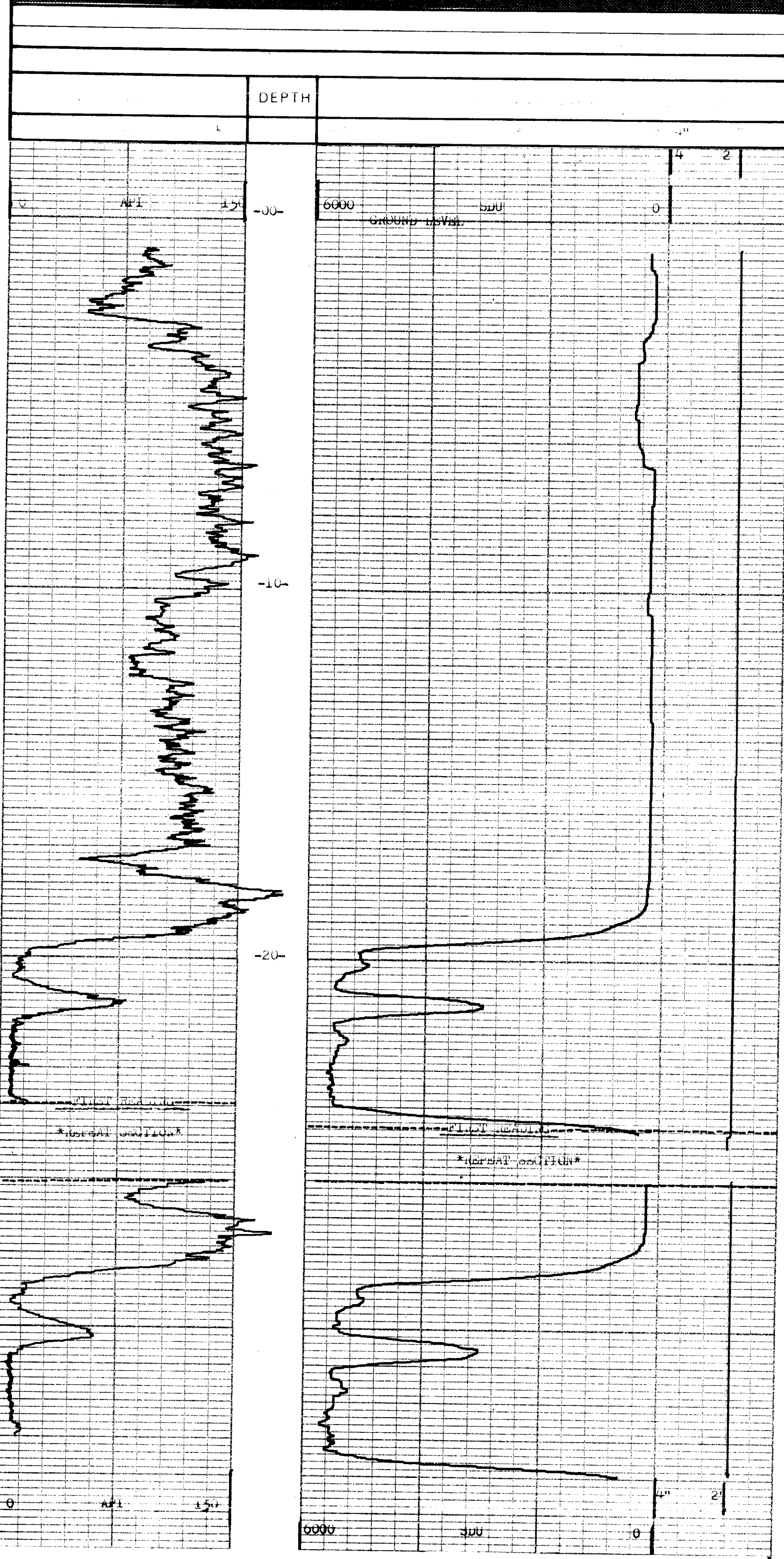
LOG

EQUIPMENT AND RECORDING DATA

LOG	TAPING	RECORD DIRECTOR	PANEL	CAL
LOG TAPED	RECORD SPEED	REPLAY SPEED	T.C SECS	COEFF
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9
10	10	10	10	10

REMARKS

537



DEPTH	TIME
0	0
2	15
4	30

BOREHOLE 82-1 AREA High Hat
 CLIENT General High Hat COUNTRY USA



537

HIGHHAT MTN. - N.E. B.C.

Winkie Drill Hole #82-1A

U.T.M. Zone 10	6,144,840 North	<	
	570,410 East)	
	1,428 m Elevation)	>	approximate only
			not surveyed

Az 215°
 Incl 60°
 T.D. 41.02 m

Geophysical Logs	GAMMA-Neut/Neut
	GAM-LSD-CAL
	GAM-LSD (Detailed)
	GAM-BRD (Detailed)

Sample # HH-82-12	3.65 - 8.84 (5.19 m app. thickness)
# HH-82-12A	29.4 - 31.6 (2.2 m app. thickness)

HIGHHAT WINKIE HOLE #82-1A

Unit #2	Box 1 2.0 - 3.92 m	Mudstone, grey, broken, poor recovery. - Roof of coal seam upper seam #1.
Unit #3	Box 1 3.92 - 8.44 m	Coal, Sample # HH 82-12.
Unit #4	Box 1 8.44 - 9.6 m	Mudstone, coaly to a clean grey, broken up floor of coal seam.
Unit #5	Box 1 & 2 9.6 - 11.2 m	Mudstone grading into Siltstone, broken.
Unit #6	Box 2 & 3 11.2 - 17.2 m	Interbedded Sandstone and Siltstone, distinct bands 30.0 - 40.0 cm in length of Sandstone and several rusty bands, fractures filled with calcite. Sandstone is generally clean with a few carb wisps, shows evidence of x-bedding. Muddy Siltstone is carbonaceous. Good stick core. C.B.A. 45°.
Unit #7	Box 3 & 4 17.2 - 20.8 m	Interbedded Sandstone and Mudstone. 30.5 cm good Mudstone, carb wisps. 1.2 m Sandstone, grey with interbedded Siltstone. Several rusty bands. Evidence of x-bedding, some calcite filled fractures. Good to broken core. Some turbulence noted by Siltstone flows in Sandstone. C.B.A. 45°, 35°. 2.1 m of Mudstone, one small band of Sandstone, C.B.A. 30°.
Unit #8	20.8 - 21.2 m	Mudstone, poor recovery, rubble.
Unit #9	21.2 - 22.6 m	Sandstone with small Mudstone bands, (15 cm). Sandstone is dirty, grey, fine grained, with coaly wisps. X-bedding, evidence of turbulence, C.B.A. 20°.
Unit #10	22.6 - 23.4 m	Mudstone, shiny coal wisps, good core recovery, stick core.
Unit #11	23.4 - 23.7 m	Carbonaceous mudstone, rubble.

HIGHHAT WINKIE HOLE #82-1A

(continued)

Unit #12	23.7 - 27.24 m	Sandstone, Mudstone, Siltstone, interbedded, each about 30 - 40 cm. Mudstone clean. Sandstone dirty, grey, with Siltstone bands. C.B.A. 25°.
Unit #13	27.24 - 31.66 m	27.24 - 29.4 m Mudstone, a few carbonaceous wisps. 30 cm of very white Sandstone, hard. 29.4 - 31.66 m <u>COAL</u> : broken, some bright, 30 cm of powder.
Unit #14	31.66 - 33.4 m	Carbonaceous Siltstone, broken, poor recovery.
Unit #15	33.4 - 41.02 m	Interbedded Mudstone, Sandstone, Siltstone, clean bands of Sandstone, a few calcite filled fractures, good core. C.B.A. 30°.

END OF WINKIE HOLE 82-1A

5-3/a.6



GAMMA RAY LOG
LONG SPACED DENSITY LOG
CALIPER LOG

BOREHOLE **82-1A**

CLIENT CROWS NEST RESOURCES LTD.

AREA HIGH HAT

DEPTH SCALE
100:1

COUNTRY CANADA

DATE LOGGED 26-08-82

1 OF 4 LOGS

BOREHOLE DATA

REFER TO LITHOLOGY LOG

OPERATION DATA

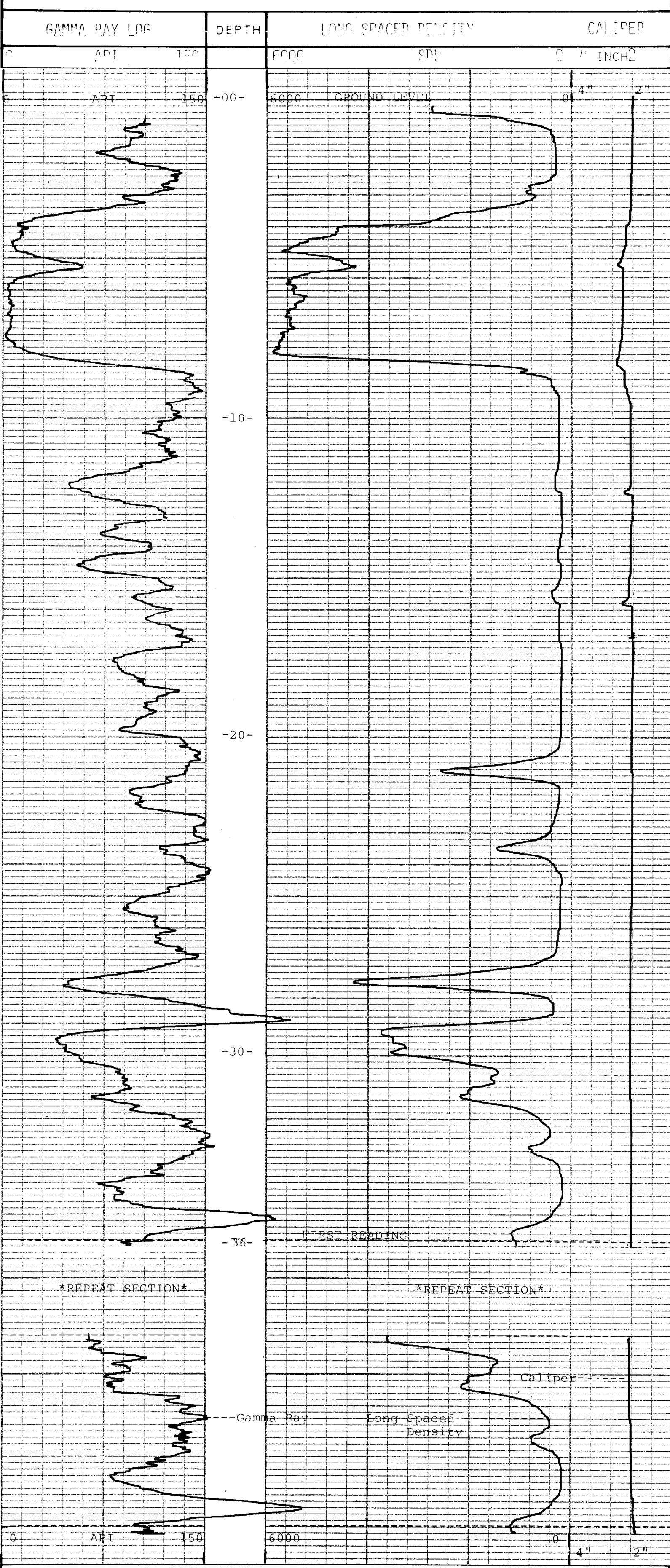
REFER TO LITHOLOGY LOG

EQUIPMENT AND RECORDING DATA

LOG	TAPING	RECORD	DIRECT	SPEED	T.C.	PANEL	CAL
	LOG TAPED	RECORD	DIRECT	SPEED	T.C.	PANEL	CAL
	Y	9m/M	R	9m/M	1	NORM	COEFF
							1.57
	DENSITY	Y	9m/M	R	9m/M	.3	3.5
	CALIPER	Y	9m/M	R	9m/M	.3	

REMARKS This hole logged with single function tools.

537

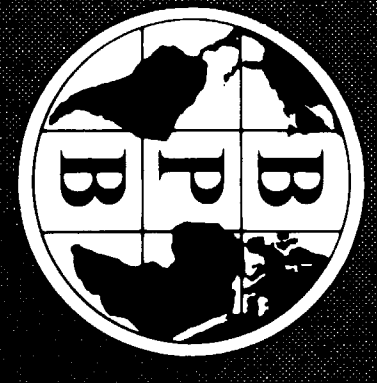


GAMMA RAY LOG	DEPTH	LONG SPACED DENSITY	CALIPER
API	150	6000	4 INCH ²



BOREHOLE 82-1
CLIENT CROWS NEST RESOURCES LTD.

AREA HIGH HAT
COUNTRY CANADA



GAMMA RAY LOG
LONG SPACED DENSITY LOG
CALIPER LOG
with lithology symbols

BOREHOLE 82-1A
CLIENT CROWS NEST RESOURCES LTD.

AREA HIGH HAT
COUNTRY CANADA
DATE LOGGED 26-08-82
DEPTH SCALE 100:1
1 of 4 LOGS

BOREHOLE DATA REFER TO LITHOLOGY LOG
OPERATION DATA REFER TO LITHOLOGY LOG
EQUIPMENT AND RECORDING DATA

LOG	TAPING	RECORDING	PANEL	CAL	
	TAPED	SPEED	T.C. SECS	COEFF	
GAMMA	Y	9m/M	R	9m/M 1	1.57
DENSITY	Y	9m/M	R	9m/M .3	3.5
CALIPER	Y	9m/M	R	9m/M .3	

REMARKS This hole logged with single function tools.
537



GAMMA RAY LOG	DEPTH	LONG SPACED DENSITY	CALIPER
API	FOOO	SDI	INCH 2



BOREHOLE 82-1A
CLIENT CROWS NEST RESOURCES LTD.

AREA HIGH HAT
COUNTRY CANADA

LEGEND

- COAL
- SANDSTONE(fine)
- SANDSTONE(med.)
- SILTSTONE
- CARBONACEOUS SILTSTONE
- MUDSTONE
- SHALE
- COALY SHALE



GAMMA RAY LOG (DUPLICATE)
LONG SPACED DENSITY LOG

BOREHOLE **82-14**

CLIENT CROWS NEST RESOURCES LTD.

AREA HIGH HAT DEPTH SCALE 20:1

COUNTRY CANADA

DATE LOGGED 26-08-82 3 OF 4 LOGS

BOREHOLE DATA REFER TO LITHOLOGY LOG

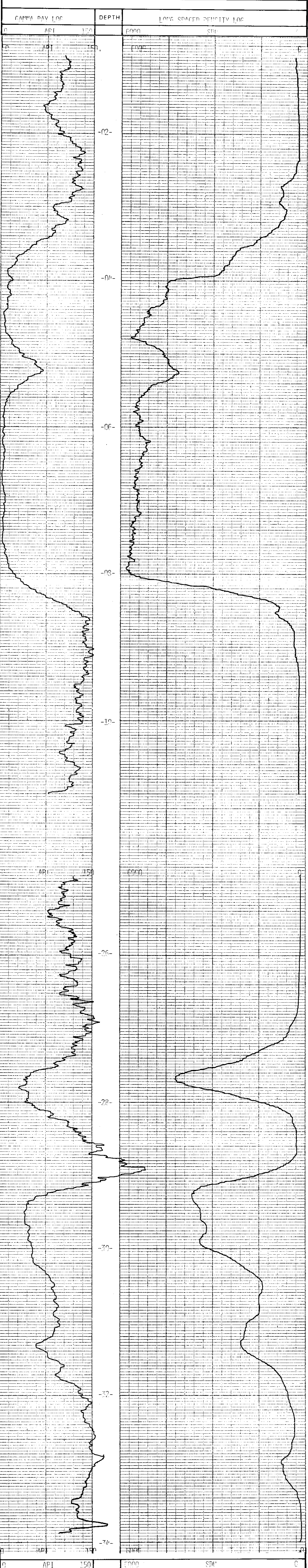
OPERATION DATA REFER TO LITHOLOGY LOG

EQUIPMENT AND RECORDING DATA

LOG	TAPING	PANEL	CAT				
GAMMA	LOG RECORD	T.C.	COEFF				
	TAPED	SPEED					
	FEET/HR	SECS	NORM				
	Y	2m/M	IR	2m/M	1	---	1.57
	DENSITY	Y	2m/M	R	2m/M	1	3.5

REMARKS: The Long Spaced Density Log is an uncalibrated log.

537



GAMMA RAY LOG	DEPTH	LONG SPACED DENSITY LOG
API	150	SGR
0	150	0



BOREHOLE 82-1 AREA HIGH HAT
CLIENT CROWS NEST RESOURCES LTD. COUNTRY CANADA



SONDE TYPE:
COAL COMBINATION SONDE
LOG SUITE:
CALIPER
BR DENSITY

SEAM THICKNESS LOG

BOREHOLE B2-2A
 CLIENT COAL & MINES ASSOCIATES LTD.
 AREA Highmat River DEPTH SCALE 1:1
 COUNTRY Canada
 DATE LOGGED 20-06-93 3 OF 7 LOGS

BOREHOLE DATA REFER TO LITHOLOGY LOG
 OPERATION DATA REFER TO LITHOLOGY LOG
 EQUIPMENT AND RECORDING DATA
 COAL COMBINATION SONDE
 SIDEWALL POSITION

LOG TAPPING PANEL CODE
 LOG RECORDING SPEED FC NORM
 CALIPER 1 2.75 1 2.75 1 2.75
 BR DENSITY 1 2.75 1 2.75 1 2.75
 SOURCE SONDE AND CALIBRATION
 REFER TO LITHOLOGY LOG

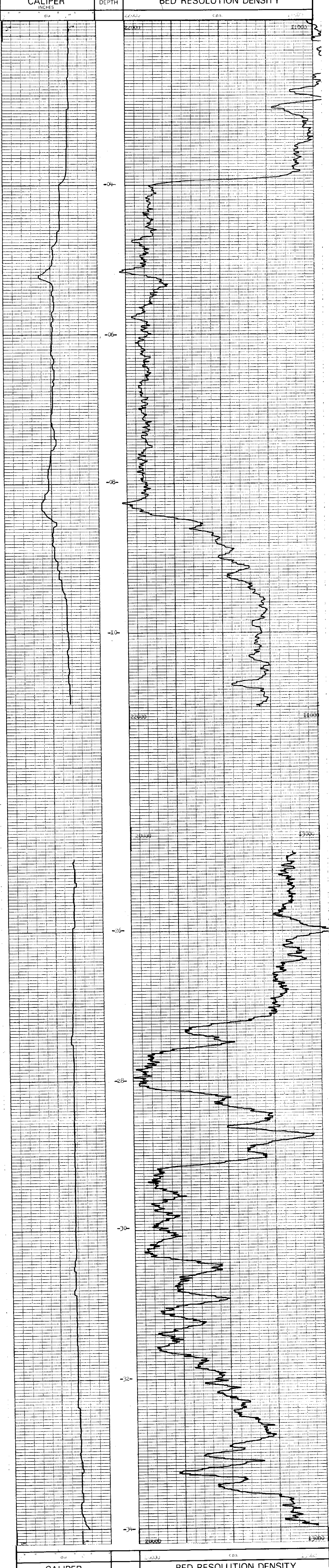
SEAM THICKNESS LOG INTERVALS

FROM	TO	INTERVAL	INITIAL
24.11	25.1	1.0	
			TOTAL
			1.0

REMARKS

537

B P B SEAM THICKNESS LOG



CALIPER INCHES	DEPTH	BED RESOLUTION DENSITY
----------------	-------	------------------------



BOREHOLE B2-2A AREA Highmat River
 CLIENT COAL & MINES ASSOCIATES LTD. COUNTRY Canada

SEAM THICKNESS LOG



Pr-Hohhat River Sg(37) * (1)

UNITED STATES GEOLOGICAL SURVEY
BUREAU OF WATER RESOURCES

BOREHOLE B2-1A

CLIENT United States Geological Survey

AREA 1000000 DEPTH SCALE

COUNTRY USA

DATE LOGGED 10/20/57 OF 1 LOGS

BOREHOLE DATA REFER TO LOG

OPERATION DATA REFER TO LOG

EQUIPMENT AND RECORDING DATA

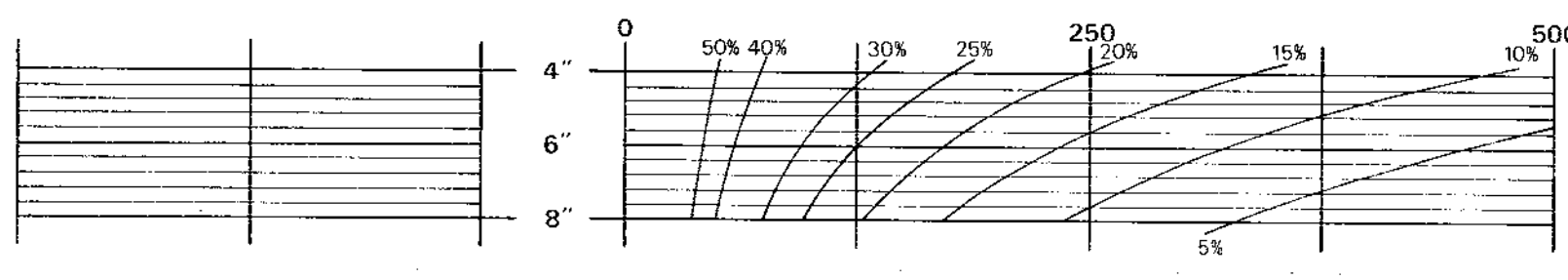
LOG	TAPING	PANEL	CAT
LOG	RECORD	T.C.	COEFF
TAPED	DIRECT	NORM	
	SPEED		
	REPLAY		
	SECS		

SONDE NO.	SUBJECT

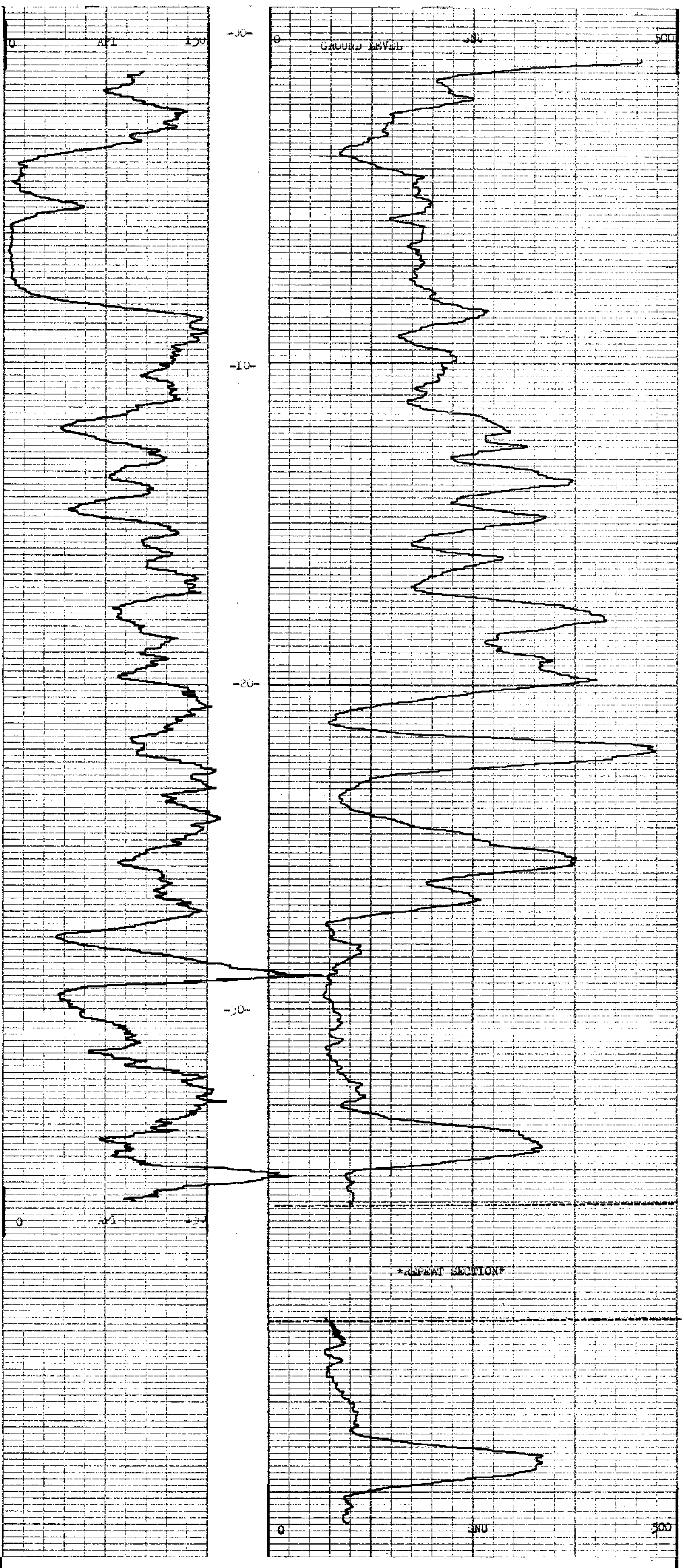
REMARKS
537

DEPTH	RECORDING METHOD

SANDSTONE POROSITY



MY (2) A58451 R



DEPTH	RECORDING METHOD



BOREHOLE B2-1A
CLIENT United States Geological Survey

AREA 1000000
COUNTRY USA

MY A58452R

P/C

537

HIGHHAT PROSPECT, N.E. R.S.C.

WINDY DAM SITE 1962

W.F.M. Zone 10 66.142, 830 North)
571, 350 East) approximate only
1, 112 m. Elevation) not surveyed

Az 50°
Incl 60°
Top 33.2 m

Geophysical Logs Wire Run (Cased Hole)

Sample # HH-92-14 14.8-16.2 m (1.4 m app. thickness)

537a-7

HIGHHAT WINKIE HOLE #82-2

Unit #1	1.7 - 7.3 m	Sandstone, clean, grey, minor Siltstone, core all rubble.
Unit #2	7.3 - 8.3 m	Sandstone, Siltstone, interbedded, rusty zones. C.B.A. 20°.
Unit #3	8.3 - 14.8 m	Mudstone, Siltstone, some carbonaceous wisps, turns to carbonaceous coal at roof of next unit, good solid core.
Unit #4	14.8 - 16.2 m	<u>COAL</u> : Sample # HH-82-14
Unit #5	16.2 - 24.8 m	Siltstone, good solid core, no fractures. One small shiny coal wisp, (5 cm), grades into Sandstone in last 30 cm.
Unit #6	24.8 - 26.2 m	Evenly interbedded Siltstone and Sandstone, quite a few coal wisps and coaly Sandstone x-beds. C.B.A. 25°.
Unit #7	26.2 - 31.4 m	Sandstone, dirty with minor Siltstone. Good solid core.
Unit #8	31.4 - 32.2 m	Mudstone, fractures show bright coal. Good stick core.
Unit #9	32.2 - 32.6 m	Dirty Sandstone with Siltstone, calcite slicked and rusty stains on fractures. Some Quartz. C.B.A. 20°.
Unit #10	32.6 - 33.2 m	Mudstone, with shiny and dull coal wisps, slickensided good core.

END OF WINKIE HOLE 82-2.

5-3/a.8

LORING LABORATORIES LTD.

CERTIFICATE OF COAL TESTING

COMPANY	Crows Nest Res. Ltd.	FILE NO.	24581
ATTENTION	Tom Cole	DATE	Apr. 20/83
PROJECT	High Hat	PAGE	1 of 6

SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY		BASIS OF ANALYSIS	REC'D % H ₂ O	% H ₂ O	% V.M.	% ASH	% F.C.	% S	Btu/lb	F.S.I	NOTES
		SINK	FLOAT										
HH82-1	Raw Coal			Air Dried Dry Basis	----	6.12		19.41 20.68					CONFIDENTIAL
	-1.60F1t	----	71.94	Air Dried Dry Basis	----	5.17		13.18 13.90					
HH82-2	Raw Coal			Air Dried Dry Basis	----	3.36		12.48 12.91					
	-1.60F1t	----	85.81	Air Dried Dry Basis	----	2.01		6.77 6.91					
HH82-3	Raw Coal			Air Dried Dry Basis	----	5.28		39.79 42.01					
	-1.60F1t	----	43.58	Air Dried Dry Basis	----	4.90		15.31 16.10					
HH82-4	Raw Coal			Air Dried Dry Basis	----	4.26		55.16 57.61					
	-1.60F1t	----	27.57	Air Dried Dry Basis	----	4.48		14.41 15.09					
HH82-5	Raw Coal			Air Dried Dry Basis	----	5.95		40.14 42.68					

PURCHASE ORDER NUMBER: 24314

ANALYST: *[Signature]*

LORING LABORATORIES LTD.

CERTIFICATE OF COAL TESTING

COMPANY	Crows Nest Res. Ltd.	FILE NO.	24581
ATTENTION	Tom Cole	DATE	Apr. 20/83
PROJECT	High Hat	PAGE	2 of 6

SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY		BASIS OF ANALYSIS	REC'D % H ₂ O	% H ₂ O	% V.M.	% ASH	% F.C.	% S	Btu/lb	F.S.I	NOTES
		SINK	FLOAT										
HH82-6	-1.60Flt	-----	27.83	Air Dried	-----	4.75		18.30					
	Raw Coal			Dry Basis	-----	-----		19.21					
HH82-7	-1.60Flt	-----	5.61	Air Dried	-----	4.81		13.36					
	Raw Coal			Dry Basis	-----	-----		14.04					
HH82-8	-1.60Flt	-----	62.72	Air Dried	-----	5.36		24.83					
	Raw Coal			Dry Basis	-----	-----		26.24					
HH82-9	-1.60Flt	-----	82.32	Air Dried	-----	5.65		13.81					
	Raw Coal			Dry Basis	-----	-----		14.64					
HH82-9	-1.60Flt	-----	92.82	Air Dried	-----	5.55		16.86					
	Raw Coal			Dry Basis	-----	-----		17.85					
HH82-9	-1.60Flt	-----	82.32	Air Dried	-----	4.39		8.04					
	Raw Coal			Dry Basis	-----	-----		8.41					
HH82-9	-1.60Flt	-----	92.82	Air Dried	-----	6.26		8.23					
	Raw Coal			Dry Basis	-----	-----		8.78					
HH82-9	-1.60Flt	-----	92.82	Air Dried	-----	4.12		6.04					
	Raw Coal			Dry Basis	-----	-----		6.30					

PURCHASE ORDER NUMBER:

CN 24314

ANALYST:



LORING LABORATORIES LTD.

CERTIFICATE OF COAL TESTING

COMPANY

Crows Nest Res. Ltd.

FILE NO.

24581

ATTENTION

Tom Cole

DATE

Apr. 20/83

PROJECT

High Hat

PAGE

3 of 6

SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY		BASIS OF ANALYSIS	REC'D % H ₂ O	% H ₂ O	% V.M.	% ASH	% F.C.	% S	Btu/lb	F.S.I	NOTES
		SINK	FLOAT										
HH82-10	Raw Coal			Air Dried Dry Basis	----- -----	1.40 ----		9.89 10.03					
	-1.60Flt	-----	92.47	Air Dried Dry Basis	----- -----	1.24 ----		5.99 6.07					
HH82-11	Raw Coal			Air Dried Dry Basis	----- -----	3.18 ----		43.07 44.48					
	-1.60Flt	-----	43.92	Air Dried Dry Basis	----- -----	4.15 ----		10.08 10.52					
HH82-15	Raw Coal			Air Dried Dry Basis	----- -----	4.26 ----		44.76 46.75					
	-1.60Flt	-----	27.37	Air Dried Dry Basis	----- -----	5.86 ----		17.54 18.63					
HH82-16	Raw Coal			Air Dried Dry Basis	----- -----	1.12 ----		7.66 7.75					
	-1.60Flt	-----	95.89	Air Dried Dry Basis	----- -----	1.09 ----		5.50 5.56					
HH82-17	Raw Coal			Air Dried Dry Basis	----- -----	5.61 ----		22.86 24.22					

PURCHASE ORDER NUMBER:

CN 24314

ANALYST:


LORING LABORATORIES LTD.

CERTIFICATE OF COAL TESTING

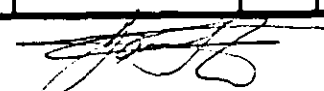
COMPANY	Crows Nest Res. Ltd.	FILE NO.	24581
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SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY		BASIS OF ANALYSIS	REC'D % H ₂ O	% H ₂ O	% V.M.	% ASH	% F.C.	% S	Btu/lb	F.S.I	NOTES
		SINK	FLOAT										
HH82-18	-1.60Flt	-----	63.76	Air Dried Dry Basis	-----	6.89		9.75 10.47					
	Raw Coal			Air Dried Dry Basis	-----	2.42		60.58 62.08					
HH82-19	-1.60Flt	-----	13.30	Air Dried Dry Basis	-----	3.58		12.34 12.80					
	Raw Coal			Air Dried Dry Basis	-----	1.64		33.90 34.47					
HH82-20	-1.60Flt	-----	57.79	Air Dried Dry Basis	-----	1.99		11.86 12.10					
	Raw Coal			Air Dried Dry Basis	-----	3.76		54.75 56.89					
HH82-21	-1.60Flt	-----	25.49	Air ^o Dried Dry Basis	-----	5.31		11.48 12.12					
	Raw Coal			Air Dried Dry Basis	-----	4.35		69.51 72.67					
	-1.60Flt	-----	6.91	Air Dried Dry Basis	-----	5.72		13.02 13.81					

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SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY		BASIS OF ANALYSIS	REC'D % H ₂ O	% H ₂ O	% V.M.	% ASH	% F.C.	% S	Btu/lb	F.S.I	NOTES
		SINK	FLOAT										
HH82-22	Raw Coal			Air Dried Dry Basis	----- -----	6.23 -----		21.54 22.97					
	-1.60F1t	-----	67.69	Air Dried Dry Basis	----- -----	4.53 -----		6.58 6.89					
HH82-23	Raw Coal			Air Dried Dry Basis	----- -----	7.06 -----		33.40 35.94					
	-1.60F1t	-----	47.59	Air Dried Dry Basis	----- -----	5.28 -----		14.95 15.78					
HH82-24	Raw Coal			Air Dried Dry Basis	----- -----	6.28 -----		31.51 33.62					
	-1.60F1t	-----	46.05	Air Dried Dry Basis	----- -----	6.52 -----		16.54 17.69					

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COMPANY

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SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY		BASIS OF ANALYSIS	REC'D % H ₂ O	% H ₂ O	% V.M.	% ASH	% F.C.	% S	Btu/lb	F.S.I	NOTES
		SINK	FLOAT										
HH82-12	Raw Coal			Air Dried	----	2.52	19.44	9.41	68.63	.31	12888	0	
				Dry Basis	----	----	19.94	9.65	70.41	.32	13221		
	-1.60Ft	----	86.48	Air Dried	----	1.51	20.26	1.94	76.29	.33	14300	0	
				Dry Basis	----	----	20.57	1.97	77.46	.34	14519		
HH82-13	Raw Coal			Air Dried	----	.52	19.24	11.54	68.70	.36	13633	4½	
				Dry Basis	----	----	19.34	11.60	69.06	.36	13704		
	-1.60Ft	----	83.99	Air Dried	----	.73	20.06	2.56	76.65	.40	15117	5	
				Dry Basis	----	----	20.21	2.58	77.21	.40	15228		
HH82-14	Raw Coal			Air Dried	----	.90	15.06	7.00	77.04	.43	14294	1½	
				Dry Basis	----	----	15.20	7.06	77.74	.43	14424		
	-1.60Ft	----	98.78	Air Dried	----	.51	15.39	6.30	77.80	.43	14567	2	
				Dry Basis	----	----	15.47	6.33	78.20	.43	14642		

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