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1. INTRODUCTION

1.0 Location and Access (see figure 1)

The Adams property lies within the Rocky Mountain Foothills in front of the Rocky Mountains in northeastern British Columbia. It is twenty-three kilometers west of the W.A.C. Bennett Dam, eight kilometers south of the Williston Reservoir and sixty-four kilometers north west of Chetwynd. On the west side of Carbon Creek from the Adams property is Utah Mines Carbon Creek Development and on its eastern edge is the old BRI property now held by Utah Mines.

Geographically Adams licences extend between:

122° 21' and 122° 37' 30" of Western Longitude, and

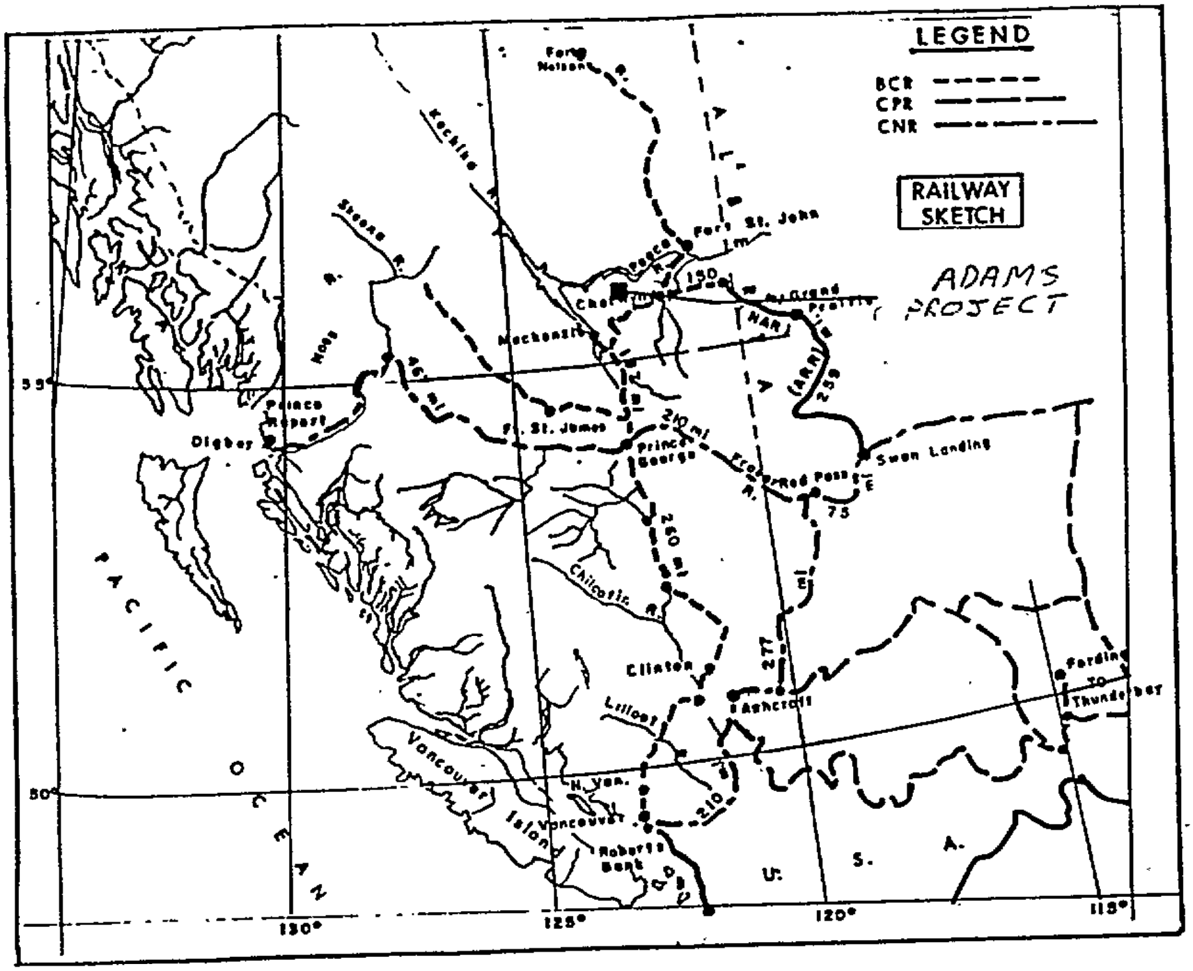
55° 53' and 56° 05' of northern Latitude

are found on NTS map sheets 93 0 15 and 16 94 B 1 and 2.

Access to the property is:

1) from the east by way of gravel Johnson Creek Forestry Road which intersects Highway 29 thirty-two kilometers north of Chetwynd, and
2) from the east through Hudson Hope, across Bennett Dam and along a Utah Road that intersects the Johnson Creek Forestry Road at kilometer forty-seven.

Within the Adams block the Johnson Creek Forestry road crosses the property in the north and has several networks of old logging roads and logging landings heading north from it (see Enclosure 1).



Report on Coal Licences 4153 to 4184 Inclusive

Peace River District B.C.

Held by: Shell Canada Resources Limited

Operated by: Crows Nest Resources Limited

OPEN FILE

GEOLOGICAL REPORT ON THE
ADAMS PROJECT

PEACE RIVER DISTRICT

Map Reference: 94 B/1 E & W

93 O/15 E & W

55° 53' to 56° 05' Northern Latitude

120° 21' to 122° 37' 30" Western Longitude

Coal Licences 4153 to 4184 Inclusive

Held by: Shell Canada Resources Limited

Operated by: Crows Nest Resources Limited

Calgary, Alberta

Author: B. Ryan
Manager - Geologist
Crows Nest Resources Ltd.

Exploration Period: 1982

Report Date: November 1984

C2/cn.1

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LIST OF ENCLOSURES

C2/cn.3

SUMMARY

The Adams property covers 9288 hectares in thirty-two Coal Licences Nos. 4153 to 4184 inclusive. It is located in northeastern British Columbia twenty-three kilometres west of the W.A.C. Bennett Dam and is situated between two of Utah Mines properties in northeastern B.C.

In June and July 1979 an exploration program was conducted on the Adams property that consisted of:

1) geological mapping
2) photogrammetric and geodetic surveying
3) drilling four diamond core holes and two rotary holes

In 1982 an exploration program was conducted that included the drilling of 2 diamond drill holes.

The coal measures of the Gething Formation were the target of the exploration programs. Drilling encountered a 2 to 2.5 metre thick seam approximately 70 meters below the top of the Gething formation that is correlateable in 3 holes. Two other seams over 2 metres thick were encountered in two separate drill holes.

The structure of the Adams property is relatively simple consisting of a syncline and an anticline. It is the relatively flat lying axial regions of these structure that could hold potential for underground mining.

1.2 *Tenure*

The Adams property was held by Shell Canada Resources Limited and operated by Crows nest Resources Limited. The property consisted of thirty-two coal licences, Numbers 4153 - 4184, inclusive, totalling 9288 hectares. These licences were granted on August 17, 1978. The licences were dropped in December 1982 and October 1984. Shell Canada Resources Limited holds no licences in the area at this date.

1.3 1982 Program Cost

The cost of the 1982 program was $133,463.56 direct costs and $12,706.96 company labour costs. Application to extend the term of the Licences has not been made so the costs are not broken down further.

2 1979 EXPLORATION PROGRAM

2.1 Aerial Photography and Topographic Mapping

McElhanney Surveying and Engineering Ltd. of Vancouver, B.C. was contracted to produce a preliminary set of topographic maps from government photographs and a new series of air photographs and set of 1:10,000/10 m topographic maps of the Adams property (see 1979 Report).

The photographs from 1979 together with maps from photographs flown in August 1977 were used to produce 1:10,000 topographic maps.

2.2 Geological Mapping

Mapping on the Adams property consisted primarily of stream traverses and was undertaken with a view to:

1) better define the upper and lower Gething contacts,
2) gain as much structural information as possible, and
3) gain an understanding of the coal-bearing Gething formation.

Transportation to and from most traverses was by means of a Bell 206B helicopter contracted from Maple Leaf Helicopters in Chetwynd.

The geology was plotted originally on 1:10,000/10.0 m McElhanney topographic maps from June, 1978 and was later transferred to the more extensive coverage maps from September, 1979 (see 1979 Report).

2.3 Surveying

Conventional surveying methods were used to determine locations, elevations and UTM coordinates of all six 1979 drill holes and five old Utah drill holes, two of which (Utah #1 and Utah #2) are on the Adams property.

2.4 Drilling

Four diamond holes and two rotary holes were drilled in July, 1979. In total 1430.3 metres were drilled.

2.5 Downhole Geophysical Logging

Upon completion of each hole, Roke Oil Enterprises Ltd. ran the following suite of geophysical logs:

Logged through the rods	Gamma ray (1:200)
	Neutron (1:200)
	Sidewall Densilog (1:200 and 1:20 for coal seams over a metre in thickness)
	Caliper (1:200 and 1:20 for coal seams over a meter in thickness)
Logged open hole	Focused beam on both 0-4000 and 0-2000 scales (1:200 and 1:20 for coal seams over a metre in thickness)
	Directional survey

3. 1982 EXPLORATION PROGRAM

The 1982 program consisted of geological mapping; geophysical surveying and diamond drilling.

1. The geological mapping resulted in no major changes to the geological map in the 1979 report.
2. Geophysical surveying; a copy of Geophysicon VLF Radiohm survey for the Adams property is in enclosure 2.
3. 2 NQ core diamond drill holes were drilled. Details follow in Table 1. The holes are approximately located on the 1 to 50,000 Land Map (Enclosure 1).

TABLE 1

	HOLE 82-1	HOLE 82-2
Depth-Metres	242	224
Inclination	Vertical	Vertical
Location*		
Northing	6198650	6201900
Easting	535000	534000
Elevation (M.A.M.S.L.)	1050	1030
Geophysical Logs		
Seam Thickness	x	x
Coal Lithology	x	x
Coal Quality	x	x
Gamma + Neutron*	x	x
Deviation	x	x

* Approximate

Coal samples from the two 1982 drill holes were not analyzed but quality from the 1979 program is included (Enclosure 3)*. Copies of the geophysical logs are included in Enclosure 4. * confidential

4. GEOLOGY

4.1 General Statement

The bedrock on the Adams property consists mostly of Lower Cretaceous Formations. The nomenclature used in this report follows Stott, 1971, and is as follows:

Fort St. John Group	Commotion Formation Moosebar Formation
Bullhead Group	Gething Formation Cadomin Formation

See Figure 4 for a table of Formations and their descriptions.

4.2 Stratigraphy

4.2.1 Cadomin Formation

The Cadomin is the oldest Cretaceous formation on the Adams property and is the best exposed. It consists of massive, cross-bedded, coarse-grained, greyish to reddish-brown weathering, conglomeratic sandstones and fine conglomerates with some interbedded fine-grained sandstones, carbonaceous shales and thin coaly beds.

TABLE OF FORMATIONS

		Formation or Group	Thickness (feet)	Lithology
Lower Cretaceous		Fort St. John Group	3,000-5,000	Dark grey, marine shale with fine grained sandstone.
Lower Cretaceous	Bullhead Group 0-2,500	Gething Formation	900 - 1,000	Fine-grained, cherty to quartzose sandstone rusty weathering shales; carbonaceous mudstone and coal seams; minor conglomerate.
Lower Cretaceous	Bullhead Group 0-2,500	Cadomin Formation	0 - 500	Massive chert conglomerate and coarse-grained sandstone; carbonaceous shale,minor coal.
		Regional erosional unconformity; bevels rocks of succeedingly older age northward or eastward.		
Jurassic		Minnes Group	0 - 6,000	Massive, Quartzose sandstone; alternating units of fine-grained sandstone and mudstone; minor carbonaceous sediments.
Jurassic		Fernie Formation	0 - 1,000	Calcareous and phosphatic shales; rusty weathering shales; glauconitic siltstone; sideritic shales; thinly interbedded sandstone, shale, and siltstone.

Figure 2

4.2.2 Gething Formation

The Gething Formation directly overlies the Cadomin Formation and consists of interbedded mudstones, coals, siltstones, sandstones and occasional conglomerates. These units are all relatively thin and it is their frequent repetitions that characterize the Gething Formation. In the Peace River Canyon five miles northeast of Adams the Gething is between 500 metres and 550 metres thick.

4.2.3 Moosebar Formation

The Moosebar Formation directly overlies the Gething Formation and is rarely exposed on the Adams property. The formation consists of a sequence of dark grey to black friable shales. On Track Creek, thirteen kilometers east of Adams, the Moosebar is 407 metres thick.

4.3 Structure

Structure

The Adams property lies within the Foothills structural belt of the Rocky Mountains. At depth this area falls within a structurally complex area, but the surface structure of the area is considered to be of the Foothills compression type. The Cretaceous was deformed during the Laramide Orogeny, being folded into elongate plunging anticlines and synclines. Structurally the Adams property is composed of two such units: the Adams syncline in the northwest and the Gething Creek syncline in the southeast. The axial portions of both structures have gentle dips (10°-20°) while dips on the flanks increase to up to 60°. Both structures plunge gently to the southeast.

In the northwest portion of the property, immediately east of Carbon Peak and Battleship Mountain, the Carbon Creek Fault thrusts Triassic and Jurassic rocks from the west onto the Cretaceous. From the limited surface and drill hole information, however, faulting on the Adams property within the Cretaceous is minor.

3.4 Coal Geology

The coal of interest on the Adams property lies within the Gething Formation. In the Peace River Canyon area coal beds vary from a few centimetres to 4.5 metres thick. Although the 1979 drill program was concerned with locating any sizeable coal seam, it was the "Trojan" seam that was of primary interest since to date it has been found to be the thickest seam in the Gething. In the 1979 drill holes the seam over 2 metres thick and occurring in the top 70 metres of the Gething has been tentatively identified as the Trojan seam.

In the 1982 drilling program no seams over 1.5 metres were encountered. Coal intersections for the 1982 holes are tabulated in Table 2.

TABLE 2

Coal Intersections 1982 Holes

82-1

128.85 - 129.52	.67m	Coal
132.03 - 132.24	.21m	Coal
137.52 - 137.82	. 3m	Coal
140.5 - 140.71	.21m	Coal
149.91 - 150.71	. 8m	Coal
172.5 - 172.88	.38m	Coal
180.03 - 180.38	.35m	Coal
193.36 - 194.47	1.1m	Coal
201.07 - 202.37	1.3m	Coal
211.63 - 211.83	.2m	Coal
221.67 - 211.99	.33m	Coal

82-2

190.77 - 191.77	1m	Coal
193.95 - 194.31	.36m	Coal
205.74 - 206.14	. 4m	Coal

4. UTAH QUALITY

All seams in the 1979 diamond drill holes over 2 metres thick were sampled and were sent to the C.N.R.L. Lab in Fernie to be analyzed. Results of these analyses are included in Enclosure 3. Coal from the 1982 drill holes was not analyzed.

Upper Gething coals in the Peace River District are medium volatile bituminous (ASTM), with high heat value and low ash content and often exhibit good coking characteristics. Utah Mines in 1973, analyzed all seams in their drill holes over -.3 metres and the FSI's varied from 1 to 7, ash varied from 3.17% to 28.10% and volatile matter from 20.70% to 32.90%.

5. MINEABILITY

5.1 Open Pit

Due to the lack of thick coal seams and dip-slope situations, open pit mining possibilities appear to be remote.

5.2 Underground

Possibilities of underground mining are governed by the thickness of the coal seam, its attitude and its roof conditions. On the Adams property the Adams syncline and the Gething Creek anticline hold the greatest potential for underground mining, particularly the synclinal area. Dips in the syncline region are as low as 7° from outcrop evidence whereas in the anticline region the gentler dips are in the 15° - 20° range from outcrop information. A 2 to 2.5 metre seam does exist from drill hole information but to date is persistence both in thickness and in lateral extent are unknown. Roof conditions, while good in the two core holes that encountered the seam, are also unproven.

CONCLUSIONS

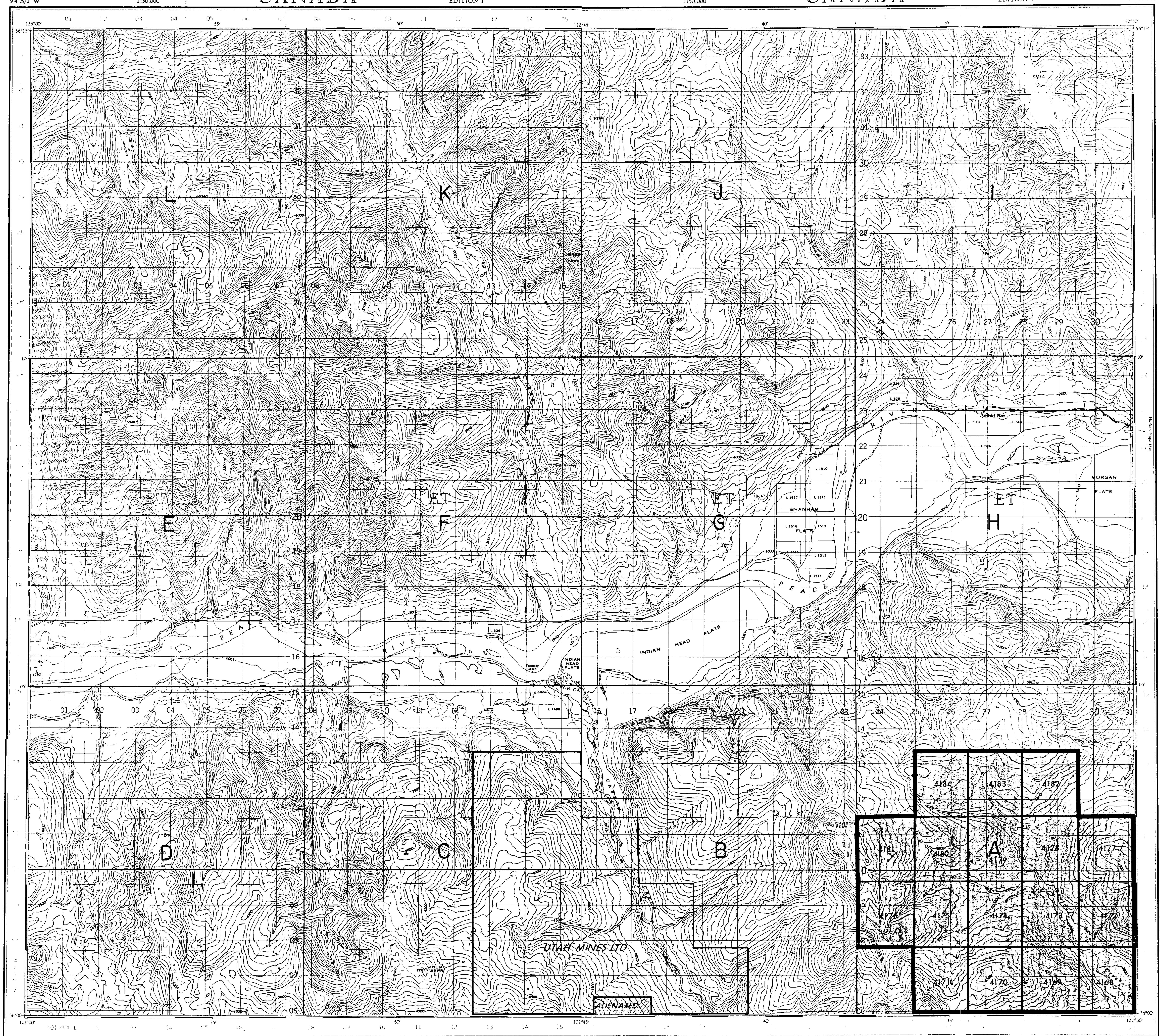
The property has limited underground potential and no surface mining potential. The decision was made in 1983 to relinquish all the Licences of the Adams property.

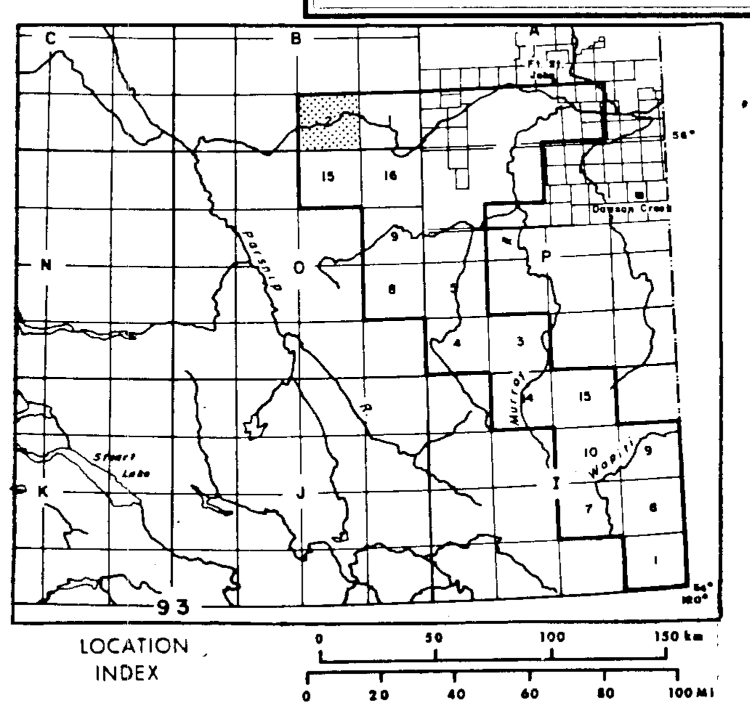
8. REFERENCES

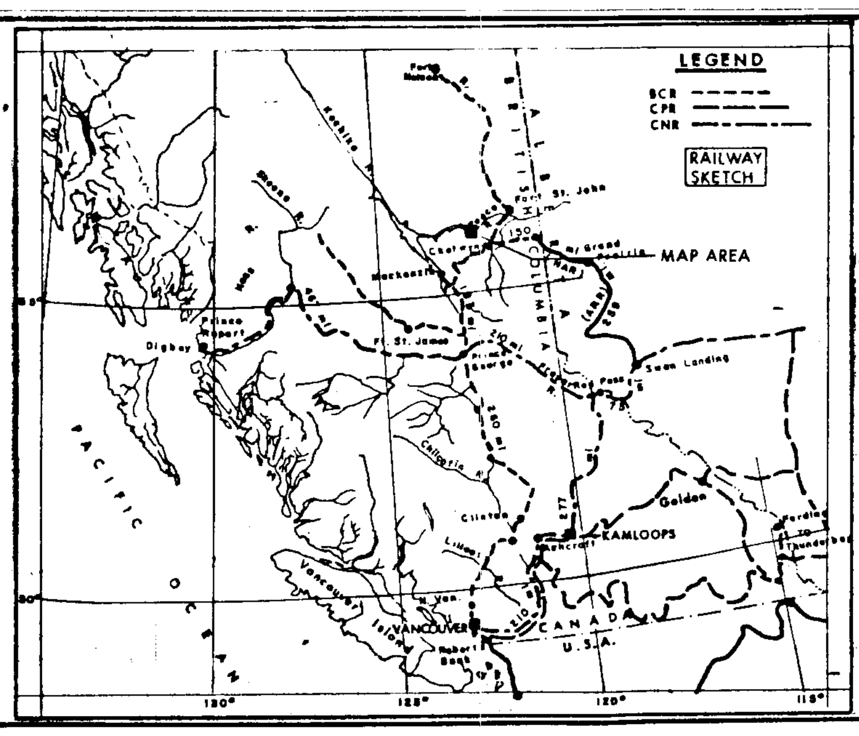
C. Beavan 1979 Report on Coal Licences 4153 to 4184 inclusive Peace River District B.C. submitted to B.C. E.M.M.P.R.

Stott. 1971 Lower Cretaceous Bullhead Group between Bullmouse Mountain and Tetsa River, Rocky Mountain Foothills, Northeastern B.C. Geol. Surv. Can. Bell 219

94 B/2 W 1:50,000 CANADA EDITION 1 | 1:50,000 CANADA EDITION 1 94 B/2 E







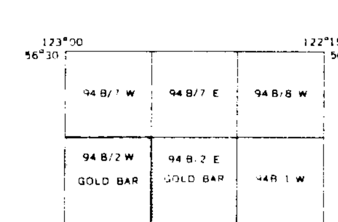
GOLD BAR

PEACE RIVER DISTRICT
BRITISH COLUMBIA

SCALE 1 50,000 ÉCHELLE

CONTOUR INTERVAL 100 FEET
Elevations in Feet above Mean Sea Level
North American Datum 1927
Transverse Mercator Projection
MAGNETIC DECLINATION 28° 33′ EAST AT CENTRE OF MAP 1961
Annual change decreasing 4.5′

ÉQUIDISTANCE DES COURBES 100 PIEDS
Élévations en pieds au-dessus du niveau moyen de la mer
Reseau geodésique nord-américain unifié (1927)
Projection transverse de Mercator
DÉCLINAISON MAGNÉTIQUE AU CENTRE DE LA FEUILLE EN 1961 28° 33′ EST
Variation annuelle (décroissante) 4.5′



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94 B/2

Crows Nest Resources Limited

EXPLORATION

GOLD BAR

NORTHEASTERN B.C.
PEACE RIVER LAND DISTRICT

COAL LAND DISPOSITION MAP

NTS 94B/2

AUTHOR: OLSON-MARTONHEGYI	SCALE: 1:50000	ENCLOSURE No: 1-1
DATE: FEB. 1979	REVISED:	DRAWING No: HC-18J
To Accompany		

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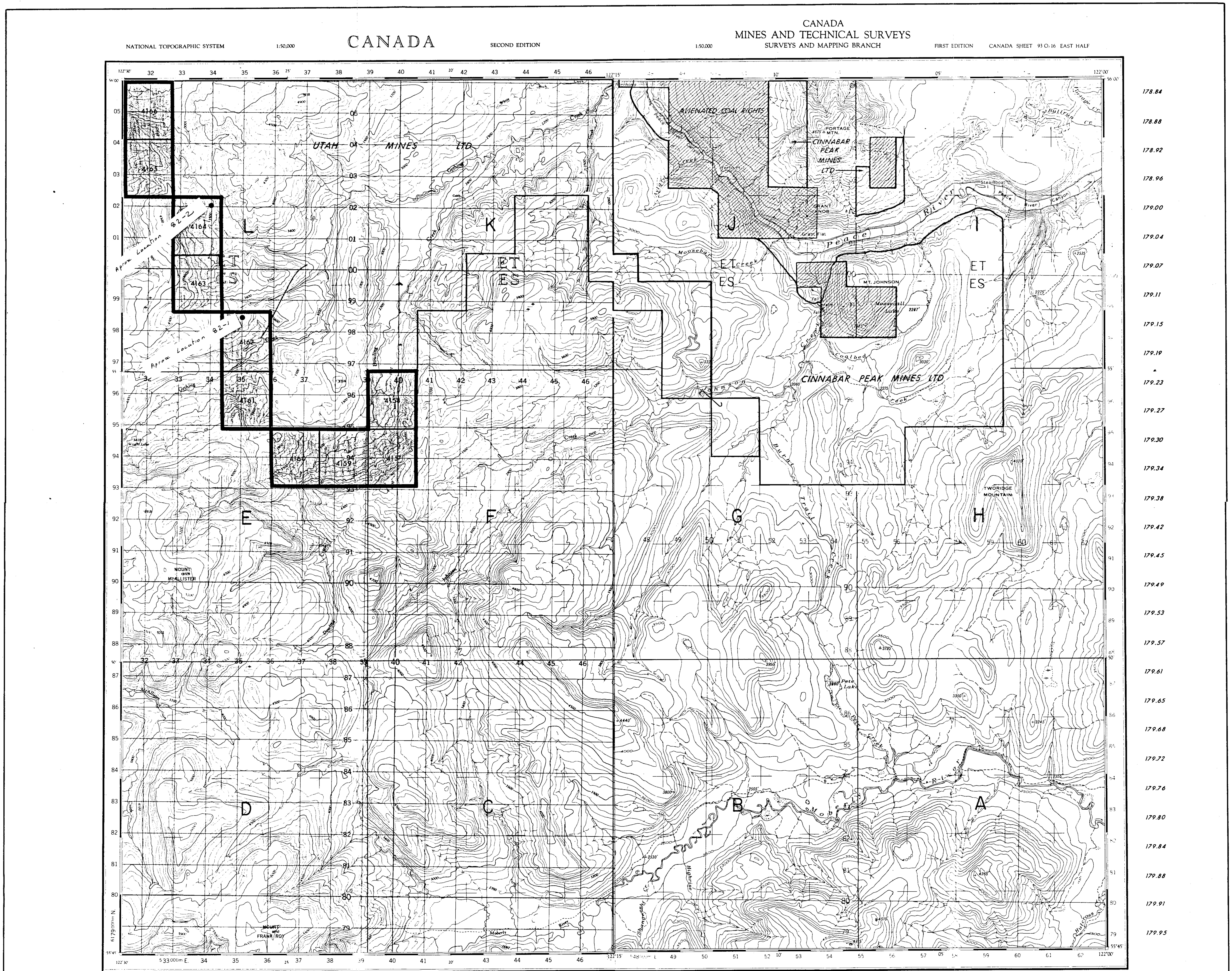
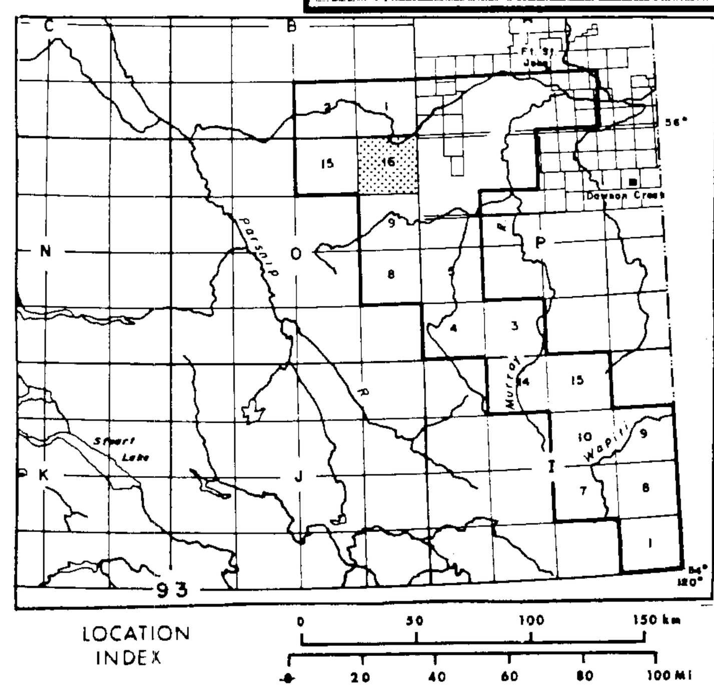
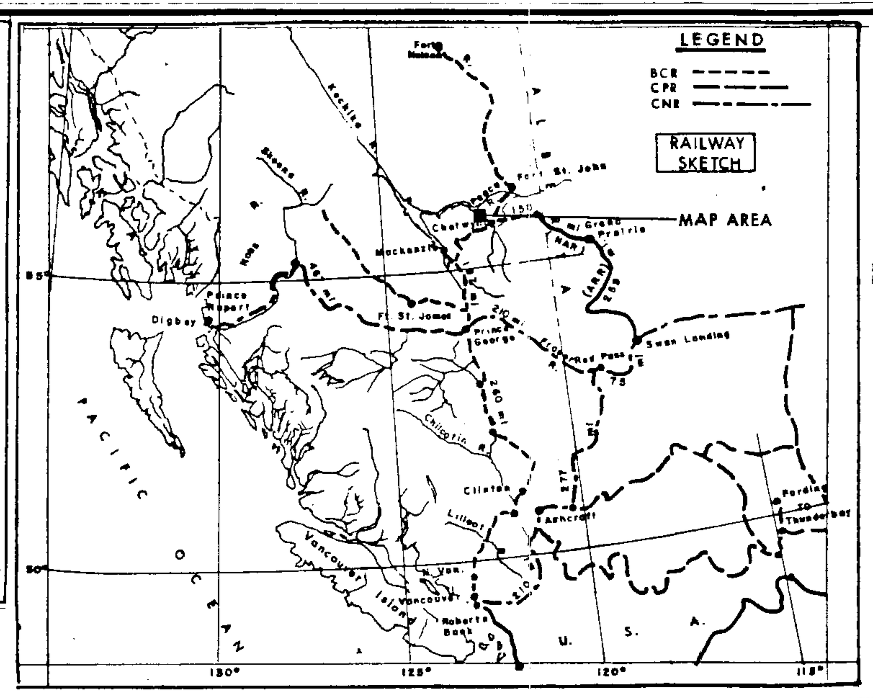


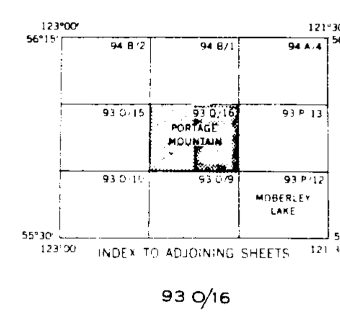




PORTAGE MOUNTAIN
PEACE RIVER DISTRICT
BRITISH COLUMBIA

SCALE 1:50,000
1.25 inches to 1 mile approximately

CONTOUR INTERVAL 100 FEET
All Elevations in Feet above Mean Sea Level



Crows Nest Resources Limited
EXPLORATION

PORTAGE MOUNTAIN
NORTHEASTERN B.C.
PEACE RIVER LAND DISTRICT

COAL LAND DISPOSITION MAP

NTS 93O/16

AUTHOR: OLSON-MARTONHEGYI	SCALE: 1:50000	ENCLOSURE No: 1-4
DATE: FEB. 1979	REVISED:	DRAWING No: HC-18 I
To Accompany		

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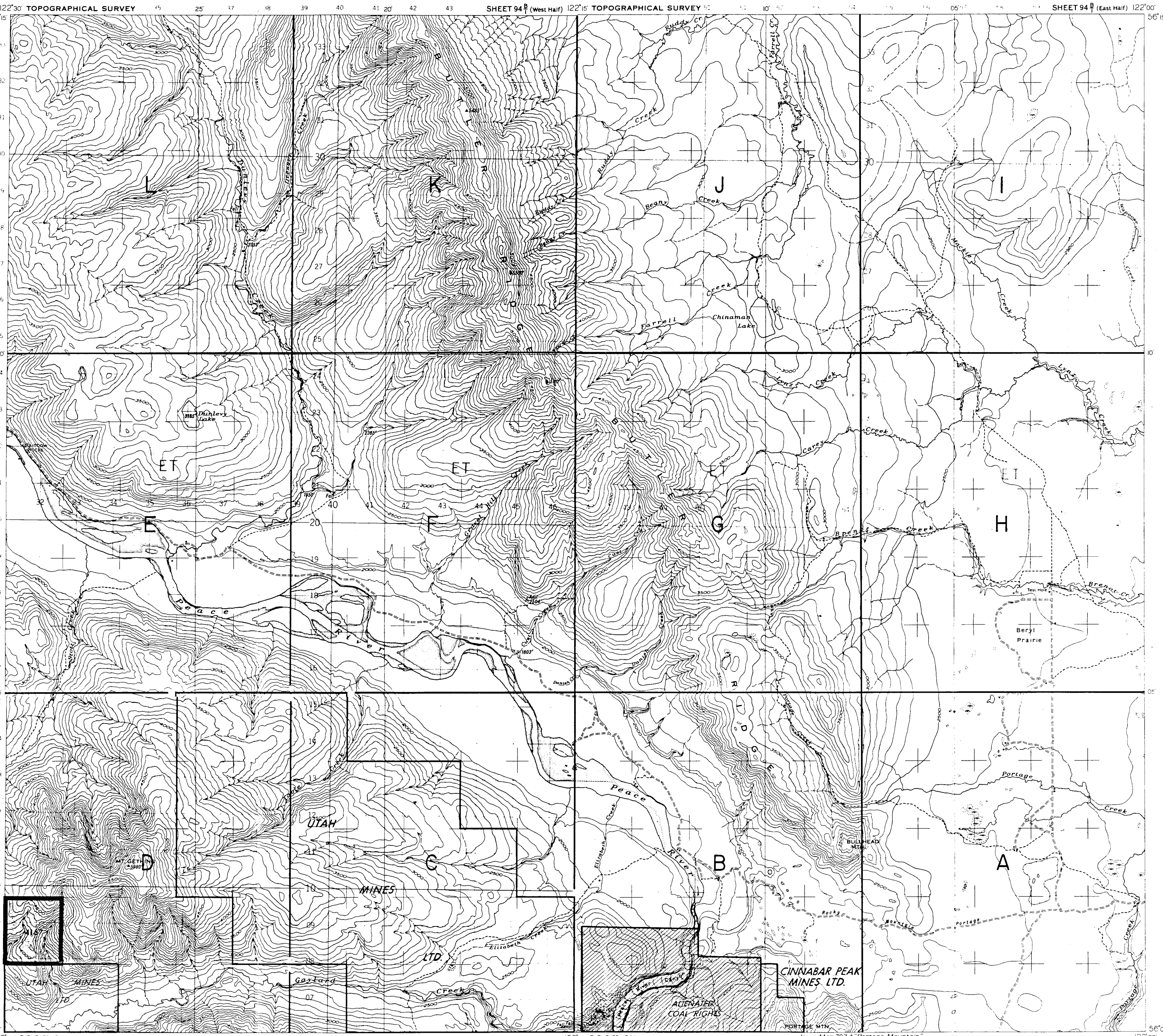
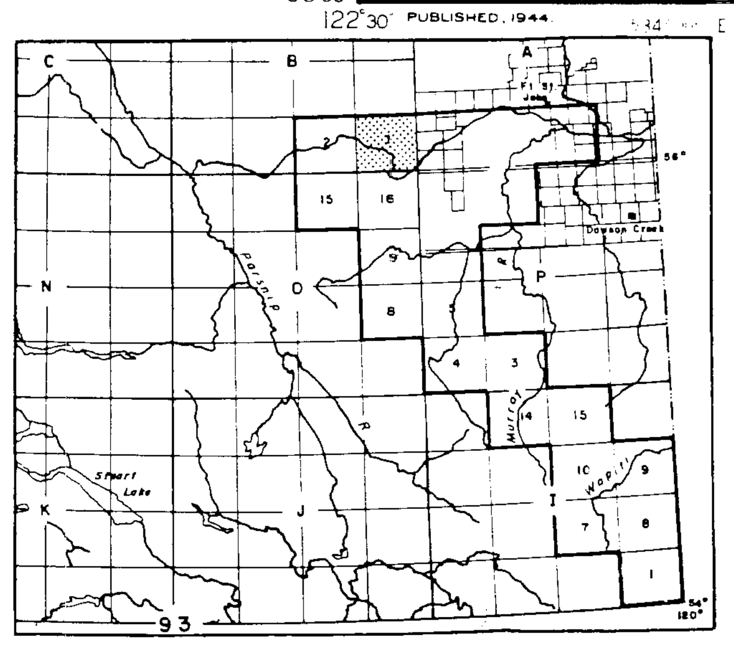
DEPARTMENT OF MINES AND RESOURCES
MINES AND GEOLOGY BRANCH
BUREAU OF GEOLOGY AND TOPOGRAPHY

PROVISIONAL MAP

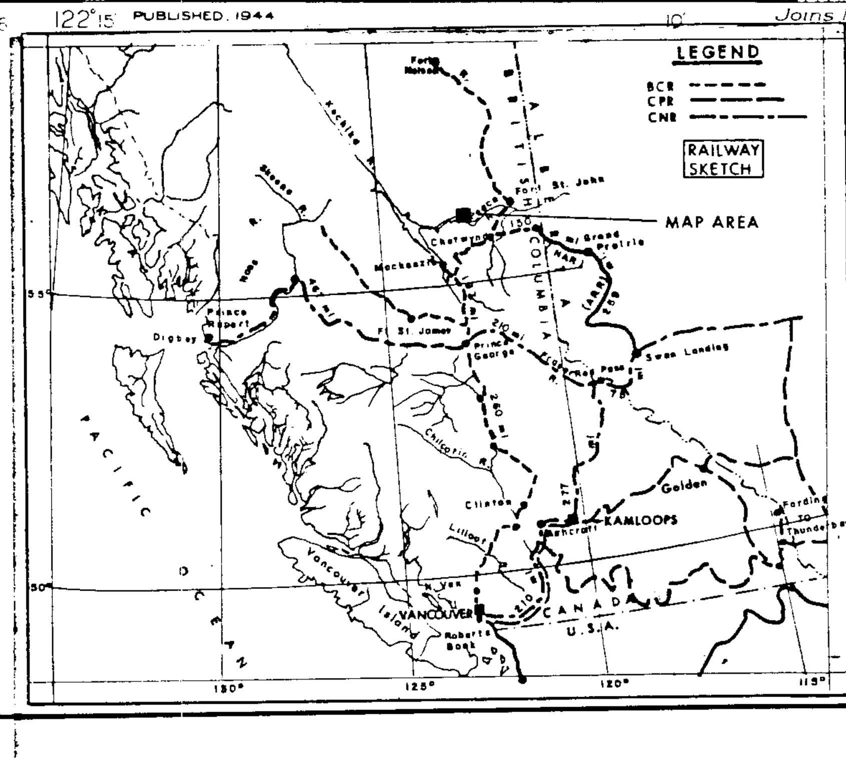




DUNLEVY CREEK
CHINAMAN LAKE

PEACE RIVER DISTRICT
BRITISH COLUMBIA

SCALE 1:50,000
1.25 inches to 1 mile approximately



Crows Nest Resources Limited

EXPLORATION

DUNLAVY CREEK
CHINAMAN LAKE

NORTHEASTERN B.C.
PEACE RIVER LAND DISTRICT

COAL LAND DISPOSITION MAP

NTS 94B/1

AUTHOR: OLSON-MARTONHEGYI	SCALE: 1:50000	ENCLOSURE No: 1-2
DATE: FEB. 1979	REVISED:	DRAWING No: HF-18D
To Accompany		

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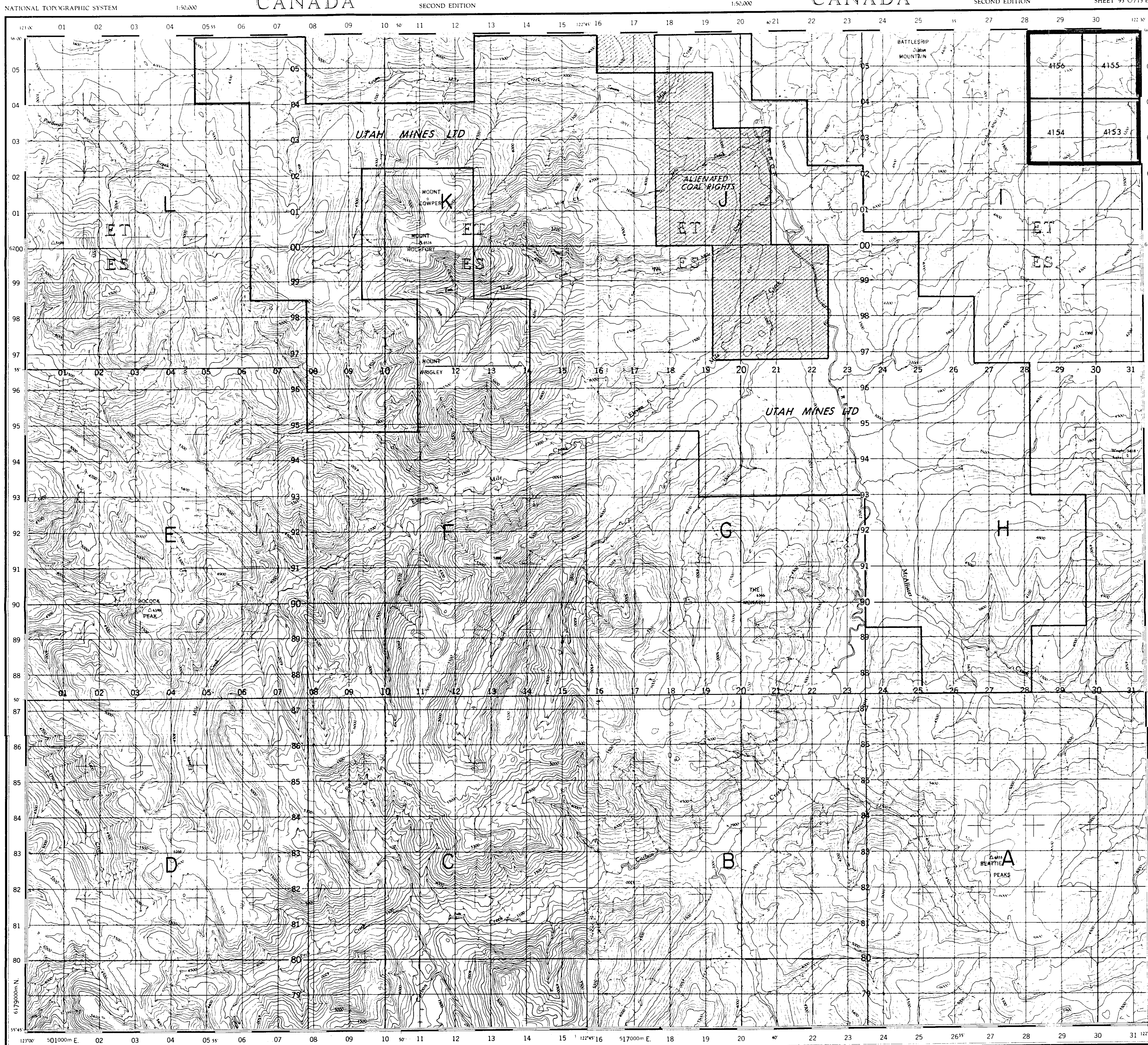
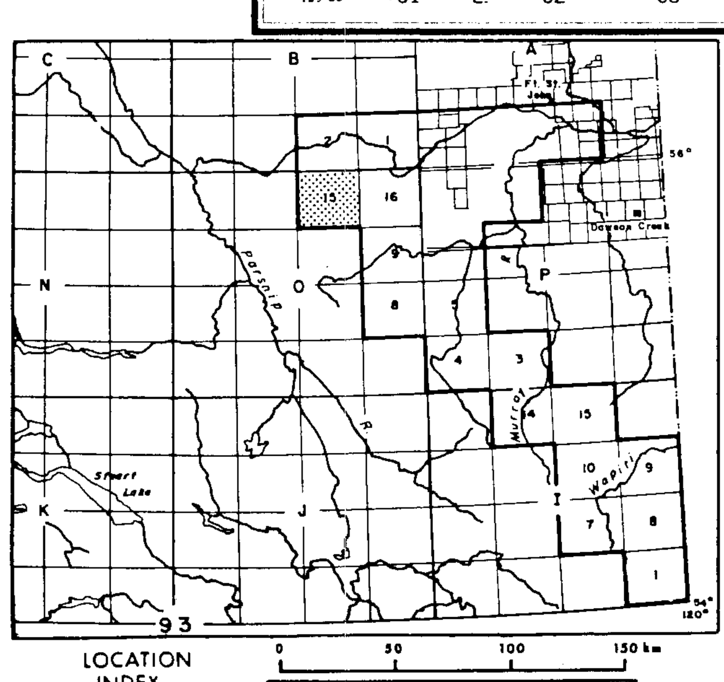
NATIONAL TOPOGRAPHIC SYSTEM 1:50,000 CANADA SECOND EDITION 1:50,000 CANADA SECOND EDITION

Refer to this Map as 93 O/15 EAST EDITION 2 ASE SERIES A 721

SHEET 93 O/15 EAST





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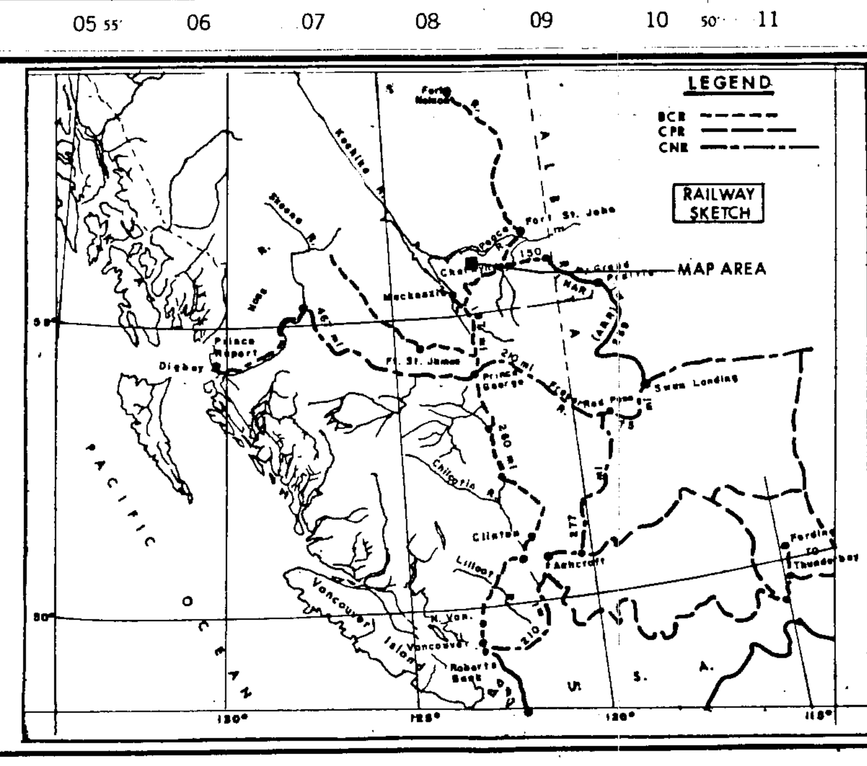

CARBON CREEK

PEACE RIVER DISTRICT

BRITISH COLUMBIA

SCALE 1:50,000

1.25 Inches to 1 Mile approximately

CONTOUR INTERVAL 100 FEET
Elevations in Feet above Mean Sea Level

Transverse Mercator Projection
North American Datum 1927

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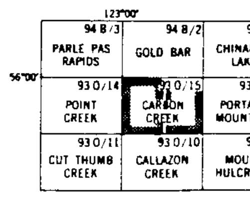

93 O/15

Crows Nest Resources Limited

EXPLORATION

CARBON CREEK

NORTHEASTERN B.C.
PEACE RIVER LAND DISTRICT

COAL LAND DISPOSITION MAP

NTS 93O/15

AUTHOR: OLSON-MARTONHEGYI	SCALE: 1:50000	ENCLOSURE No: 1-3
DATE: FEB. 1979	REVISED:	DRAWING No: HC-18H
To Accompany		

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APPENDIX A

VLF RADIOHM SURVEY

ADAMS COAL PROPERTY, B.C.

Prepared For

CROWS NEST RESOURCES LTD.
CALGARY, ALBERTA

Prepared By

GEO-PHYSI-CON CO. LTD.
CALGARY, ALBERTA

July 1982
82-33

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1.0 INTRODUCTION

This report presents the results of a geophysical survey conducted for Crows Nest Resources Ltd. at the Adams Coal Property in the Peace River Land District, B.C. A location map of the survey area is given in Figure 1. The objective of the survey was to map the lateral contact between formations in the area to assist drillhole location. The work was authorized by Mr. Bob Gilchrist under Purchase Order Number CN 24113.

2.0 LOGISTICS AND DATA ACQUISITION

The survey was conducted by a three-man crew during the period July 7 to July 14, 1982. Transportation and accommodation were arranged by Geo-Physi-Con Co. Ltd. The crew was equipped with a Geonics EM16R (VLF Radiohm) supplied by Geo-Physi-Con Co. Ltd. Manufacturer's specifications for this instrument are included in Appendix A.

Since the objective of the survey was to map the contact between bedrock lithologies, the survey lines were selected daily according to the previous days results. The survey lines were set out by Geo-Physi-Con Co. Ltd. personnel using a compass and hip chain. The location, orientation and numbering of survey lines are shown in Figure 2. Stations were selected at 20 metre, 10 metre and 5 metre intervals, according to proximity to the contact. The stations were identified by orange fluorescent flagging and the position of the contact by red and white striped flagging.

At each station the apparent resistivity of the ground in ohm-meters and the phase angle in degrees were measured with the EM16R. Typical survey results along the lines are shown in Figures 3 to 6.

3.0 PRINCIPLES OF VLF RADIOHM MEASUREMENTS

VLF radiohm measurements are made on the radio ground waves of distant low frequency (15 to 30 kilohertz) stations used by the navies of the world for submarine communication. In western Canada the station NLK, out of Jim Creek, Washington, and operating at 24.8 kilohertz, is used.

The principle of the method is schematically illustrated in Figure 7. Far away from the transmitter, the ground wave has three vectors, a horizontal magnetic field (H_y), a horizontal electric field (E_x), and a vertical electric field (E_z). E_x and H_y propagate nearly vertical in the ground and their amplitude decays with depth. These waves reflect from different subsurface strata. Figure 1a illustrates that only E_x changes due to local subsurface conditions. By measuring the ratio of E_x/H_y, a local measurement is obtained that is not influenced by effects due to the path between the transmitter (Wash., U.S.A.) and the measurement station (Peace River Land District, B.C.). From the ratio of phase and amplitude of E_x and H_y a local measurement of subsurface resistivity and type of subsurface layering is obtained.

The effective depth of exploration is a function of the resistivity of the ground. Effective exploration depth is usually taken to be about equal to the skin depth of the radiation in ground of uniform resistivity. Skin depth, δ, is defined as the depth over which the amplitude of a plane wave decays by a value of 1/e (0.37). Skin depth is given by:

$$\delta = \left(\frac{2\rho}{2\pi \mu_0 f} \right)^{1/2}$$

where δ is skin depth in metres,

μ_0 is magnetic susceptibility, $4\pi \times 10^{-7}$ henry/m,

f is frequency in hertz.

In Figure 8 the skin depth at VLF frequencies, as a function of ground resistivity, is shown. For example, at a

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resistivity of 100 ohm-metres, the skin depth at 24.8 khz is 35 metres. The overburden resistivity in the survey area was about 100 ohm-metres, so that the effective exploration depth was about 30 metres.

4.0 INTERPRETATION

As a general approximation, the near-surface geology of the Adams Coal Property consists of overburden over bedrock. The objective of the survey was to determine changes in bedrock lithology. Figure 9 is a schematic illustration of the geoelectric section on a line traversing the contact of the two formations. The two geophysical formations to be mapped are the Moosebar and the Gething Formations. Figure 10 shows a section of a focused beam resistivity log across the contact of the two formations. This shows a consistent low resistivity for the Moosebar of approximately 50 ohm-metres and a fluctuating higher resistivity for the Gething Formation of approximately 500 ohm-metres.

In a two-layer geoelectric situation, there are three parameters to be determined; the resistivity of the upper and lower layers, ρ_1 and ρ_2, and the thickness of the upper layer, h_1.

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The EM16R measures only two factors, the apparent resistivity and the phase. The apparent resistivity, in a two-layer case, generally assumes a value between ρ_1 and ρ_2. The phase is useful as an indicator for the type of resistivity layering. A phase angle of 45 degrees indicates a uniform resistivity within the effective depth of exploration; a phase value less than 45 degrees indicates a ratio of $\rho_2 / \rho_1 < 1$, and a phase value greater than 45 degrees a ratio of $\rho_2 / \rho_1 > 1$.

A two-layer interpretation diagram is given in Figure 11. The axes of the graphs are the experimental measured parameters of the EM16R, the apparent resistivity on the vertical axis, and the phase angle on the horizontal axis. The curves show the behavior for different values of ρ_2 and h_1, at a constant value of ρ_1 (100 ohm-metres).

A value of 100 ohm-metres (for the overburden, ρ_1) was used in the interpretation of all the data. This value was derived from sections of line with deep overburden.

In Figure 9 a model illustrates the VLF radiohm data expected over the Moosebar-Gething contact with an overburden thickness of 5 metres, 10 metres and 30 metres. The vertical axis gives the apparent resistivity in ohm-metres and the phase angle

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in degrees that would be measured by the EM16R in the field. The resistivity is recorded in black and the phase angle in red.

With an overburden of 5 metres and 10 metres the model clearly illustrates a two-layer case.

With a thin overburden of 5 metres the change across the contact in resistivity and phase is well marked. The phase angle is above 45 degrees over the Moosebar indicating a conductor at depth. Across the contact the phase angle moves to less than 45 degrees indicating a resistor, the Gething Formation, at depth.

With an overburden of 10 metres the contrast in resistivity and phase angle over the contact is reduced as the influence of the overburden increases.

Finally, with an overburden of 30 metres, the upper layer thickness is about equal to the effective depth of penetration. The EM16R is, thus, looking at a single layer case within the overburden and a uniform resistivity within the depth of penetration. In this case, the EM16R reads the true upper layer resistivity for the overburden and a phase angle of 45 degrees.

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5.0 RESULTS

On line 19 (Figure 5) between stations 2+00 and 6+10, phase angles are below 45 degrees and resistivities approximately 200 ohm-metres. Between stations 6+10 and 7+00, phase angles are above 45 degrees and resistivities are approximately 100 ohm-metres. Based on computations of the model, a resistor (the Gething) is expected at depth betewen stations 2+00 and 6+10. Betweens stations 6+10 and 7+00 a conductor is expected below the overburden (Moosebar). Using the two-layer interpretation diagram in Figure 11 for the EM16R, the overburden depth for all of line 19 was derived to be less than 20 metres. The overburden profile is also shown on Figure 5. Consequently, the contact was selected at station 6+10.

On line 20 (Figure 6) between station 0+00 and 0+90 the phase angle is above 45 degrees. Between station 0+90 and 1+65 the phase angle is consistent at 45 degrees. Between 0+00 and 0+90, a conductor (Moosebar) is expected at depth and overburden thickness was interpreted to be less than 20 metres. Between 0+90 and 1+65 the overburden depth is greater than 30 metres. From bedrock outcrop in this area, topography and the decrease in phase angle, the contact is chosen at station 0+90. Beyond 0+90, due to

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the thickness of overburden, the influence of the resistor at depth is not felt. Between stations 1+65 and 2+00 the overburden decreases in thickness causing a local increase in resistivity and decrease in phase angle.

On lines 14 and 15 (Figures 3 and 4) there is little variation in resistivity and the contact is located by the change in phase angle. Beyond station 2+00 on line 14 and station 4+00 on line 15, the effect of the deep overburden (greater than 30 metres) is indicated by little change in resistivity and a phase angle fluctuating about 45 degrees.

Along lines 17 and 18 no significant changes in phase angle could be measured; the overburden is expected to be deeper than 30 metres and the contact could not be mapped. Line 19 was accessed by helicopter. The overburden decreased along the creek and the contact could be clearly located as illustrated in Figure 5. A drill site is planned near line 19, and based on this profile it can be located close to the contact.

6.0 ACCURACY

Errors in determination of overburden thickness are mainly caused by errors in estimating overburden resistivity. The absolute accuracy of the instrument is ±10% in resistivity and ±2% in phase. The accuracy of determining depth to bedrock for thicknesses less than 30 metres is expected to be ±20%.

The objective of the survey was to locate the contact between the Moosebar and Gething Formations. On lines where the overburden thickness was less than 30 metres, the contact could be mapped to within a lateral resolution of ±10 metres.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The VLF Radiohm survey to map the contact between the Moosebar and Gething Formations was successful in the areas where the overburden thickness was less than 30 metres. For such a survey the Geonics EM16R proved to be a very portable instrument, enabling fast and convenient readings ideal for reconnaissance in the bush.

To map the bedrock lithology at depths greater than 30 metres, other electrical methods must be used. Possible methods are the conventional 4 Probe (Galvanic) surveys, for example, using Schlumberger arrays or high power transient electromagnetic soundings with the Geonics EM37. With these instruments an exploration depth from 50 to 1000 metres can be achieved. The transient method would also be capable of measuring the vertical contact of Moosebar and Gething (thickness of Moosebar).

Respectfully submitted,

GEO-PHYSI-CON CO. LTD.,

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF ALBERTA
PERMIT NUMBER
P 2802
Geo Physi Con Co. Ltd.

Per: Jane Palfreyman.

Jane Palfreyman, B.Sc.

Per: J. Hoek

for Pieter Hoekstra, Ph.D.,P.Eng.

Calgary, Alberta
July 1982
82-33

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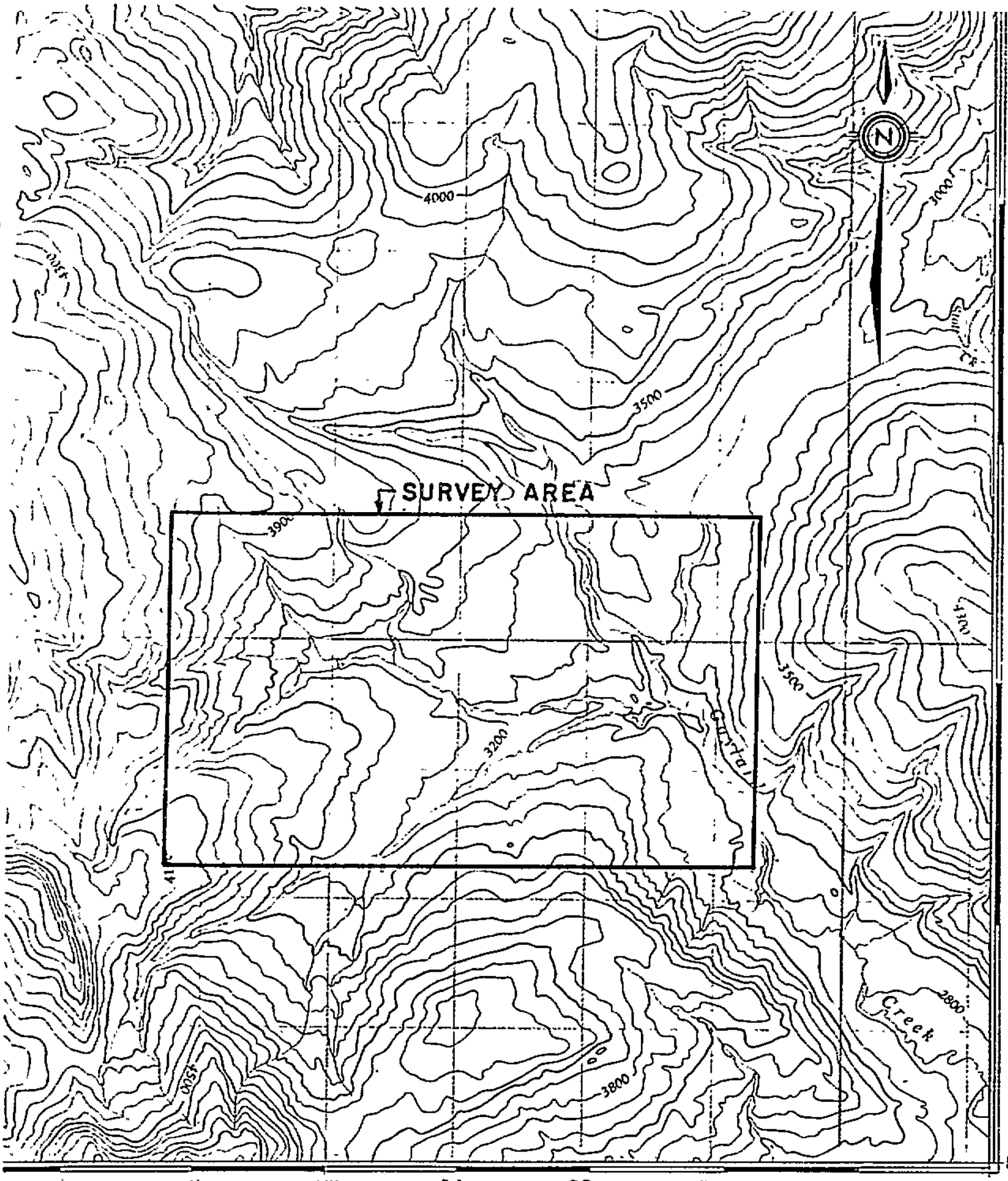
DAILY PROGRESS REPORT

	Day	
July 7	1	Mobilization from Calgary Helicopter reconnaissance of area Trial survey to locate contact of outcrop on road
July 8	2	VLF transmitter maintenance period No signal 0800 to 1600 No survey, data analysis, freight collection
July 9	3	Lines 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
July 10	4	Lines 12, 13, 14, 15
July 11	5	Return to contact at road lines 1A, 1B
July 12	6	16, 17, 18 Overburden greater than 30 metres
July 13	7	Accessed drillsite by helicopter Lines 19, 20
July 14	8	Weather day prevented survey of last line Demobilization to Calgary via Crows Nest Office, Chetwynd, B.C.



NTS Map no. 94B-2
Jones Peak
Peace River Land District, B.C.

SCALE 1:50000

0 1000 2000m

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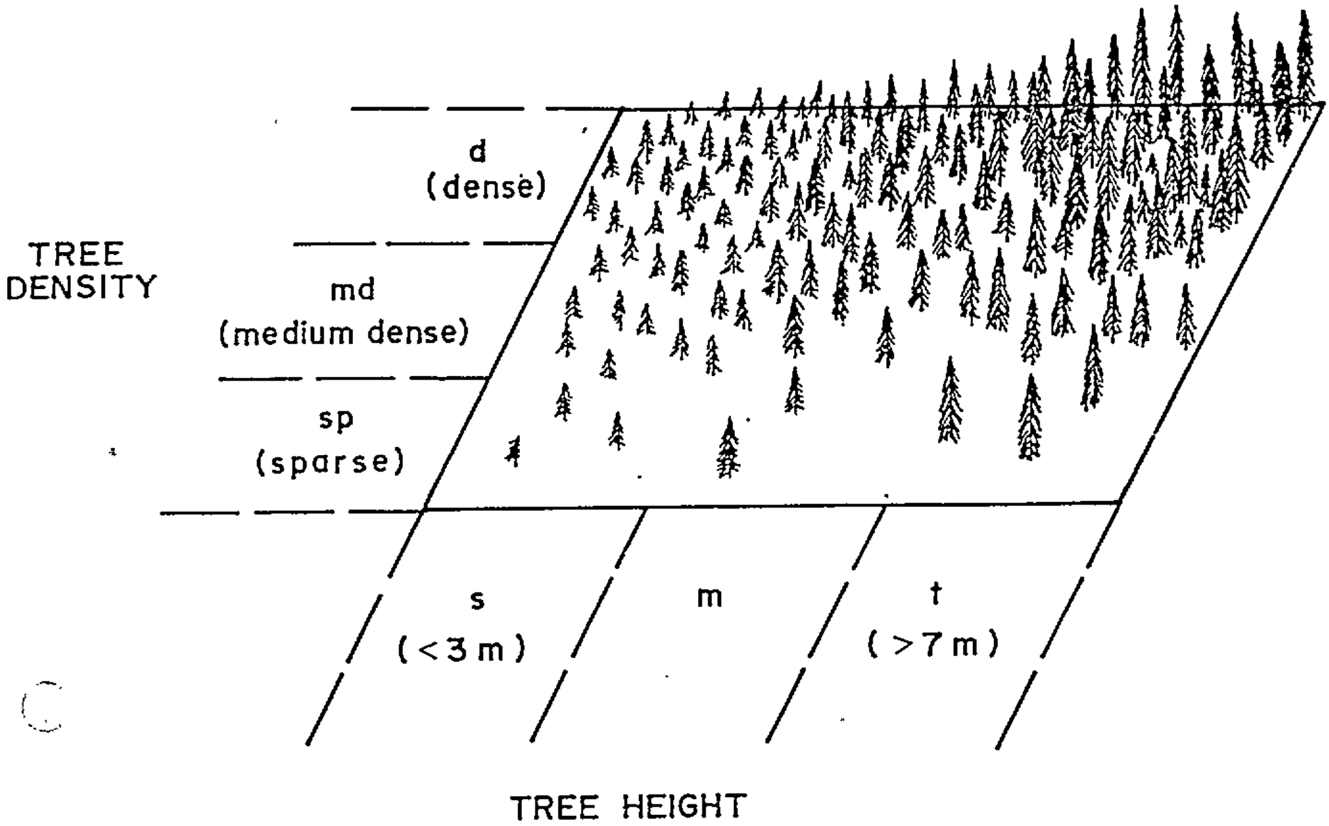
CROWS NEST RESOURCES LTD.
ADAMS COAL PROPERTY, B.C.
LOCATION MAP



TREE TYPE

WS, BS	White Spruce, Black Spruce
F	Fir
W, A	Willow, Alder
P	Poplar
JP	Jack Pine
L	Larch

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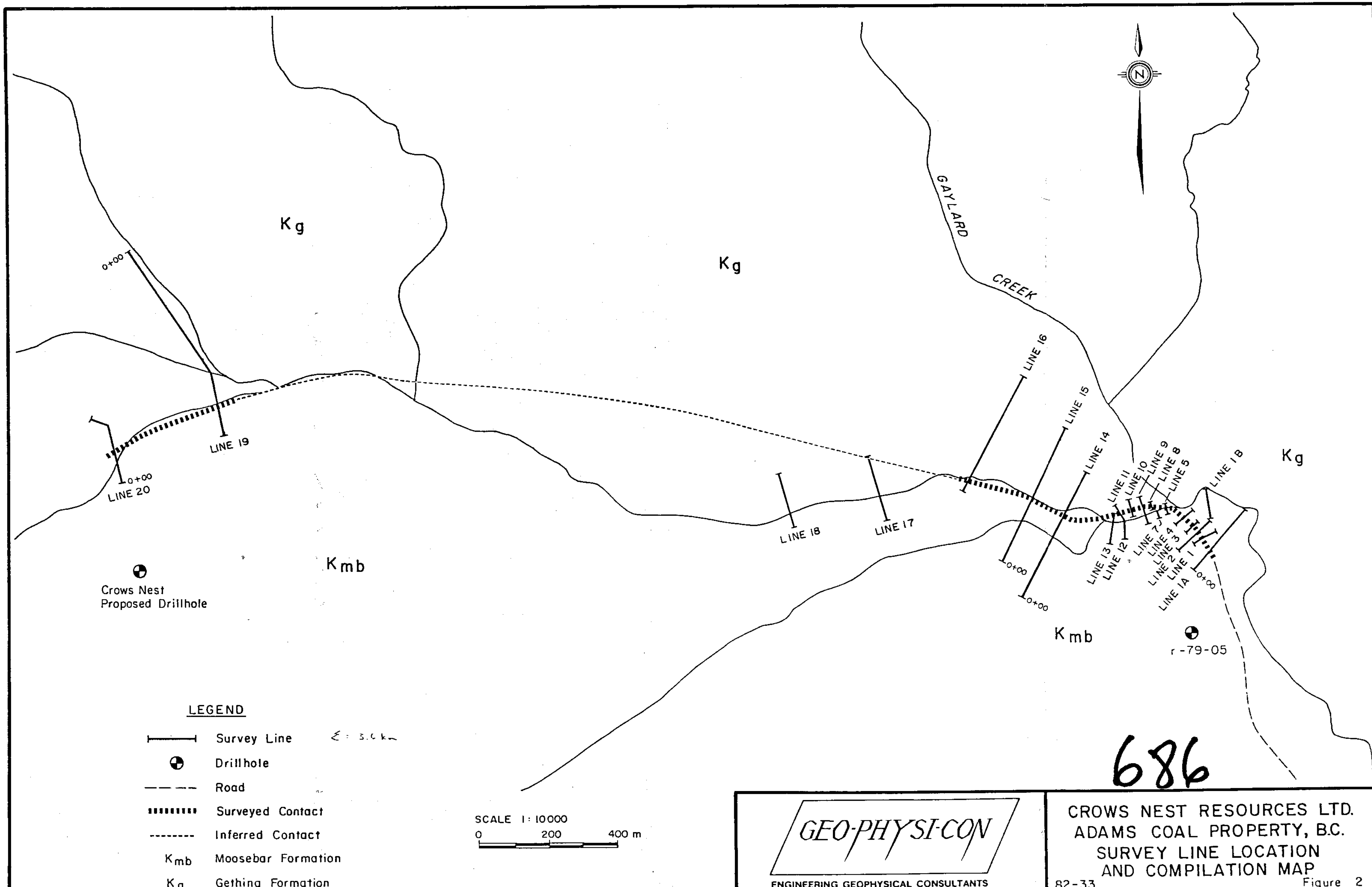
KEY TO

VEGETATION DESCRIPTION

82-33

Figure A-1



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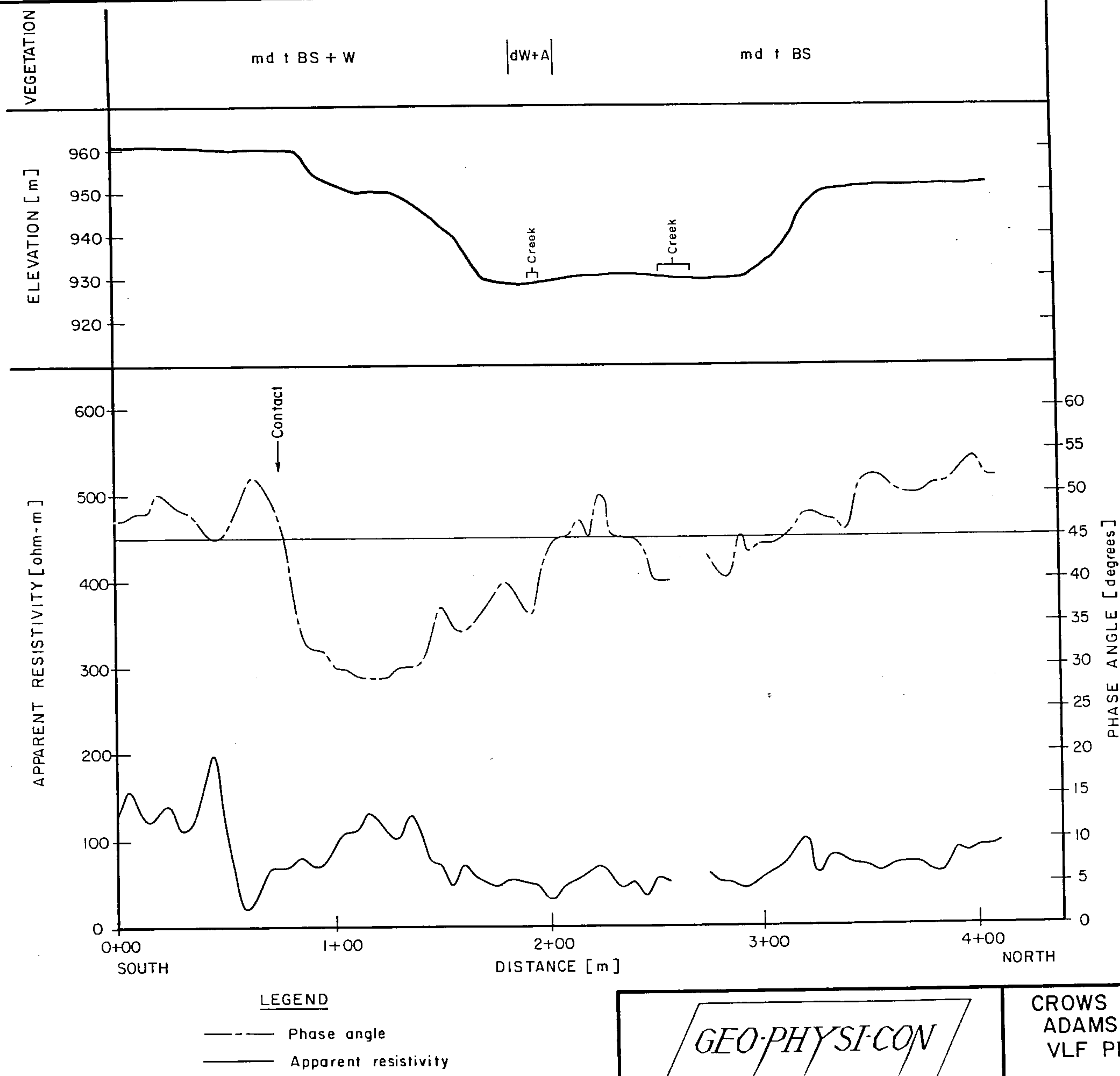
CROWS NEST RESOURCES LTD.
ADAMS COAL PROPERTY, B.C.
SURVEY LINE LOCATION
AND COMPILATION MAP

82-33

Figure 2



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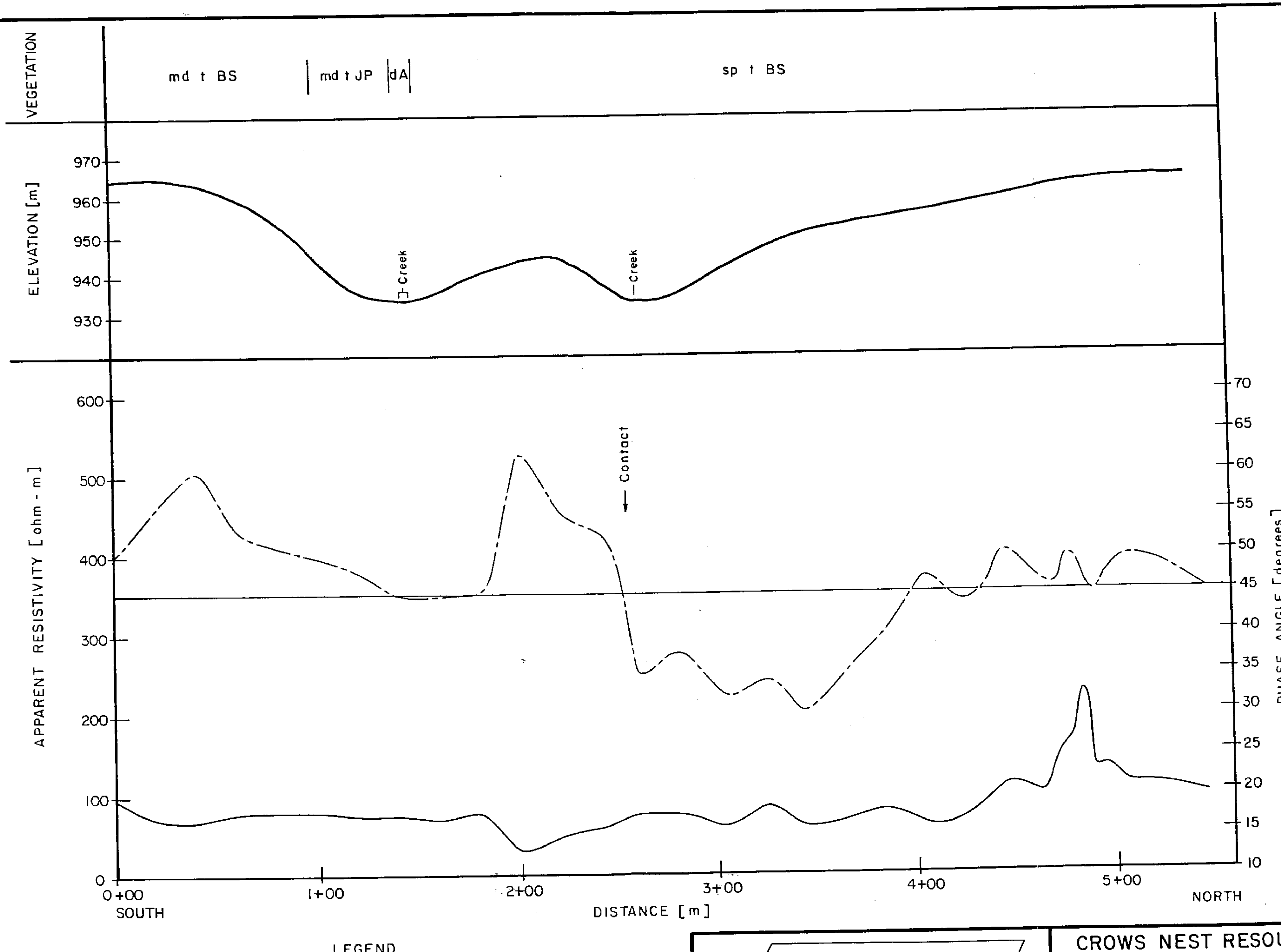
CROWS NEST RESOURCES LTD.
ADAMS COAL PROPERTY, B.C.
VLF PHASE AND AMPLITUDE MEASUREMENTS
LINE 14

82-33

Figure 3



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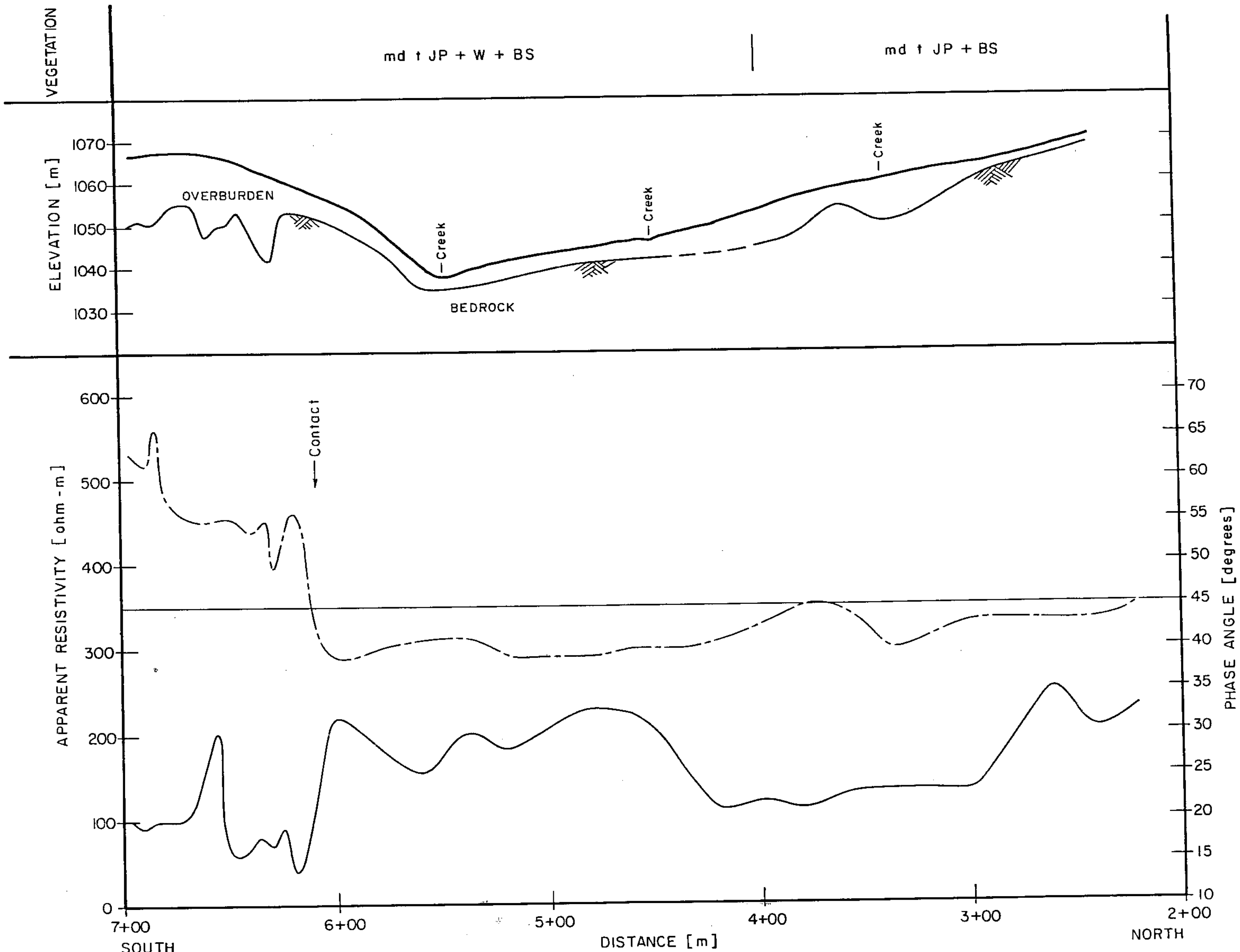
CROWS NEST RESOURCES LTD.
ADAMS COAL PROPERTY, B.C.
VLF PHASE AND AMPLITUDE MEASUREMENTS
LINE 15

82-33

Figure 4



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LEGEND

- · — Phase angle
—— Apparent resistivity

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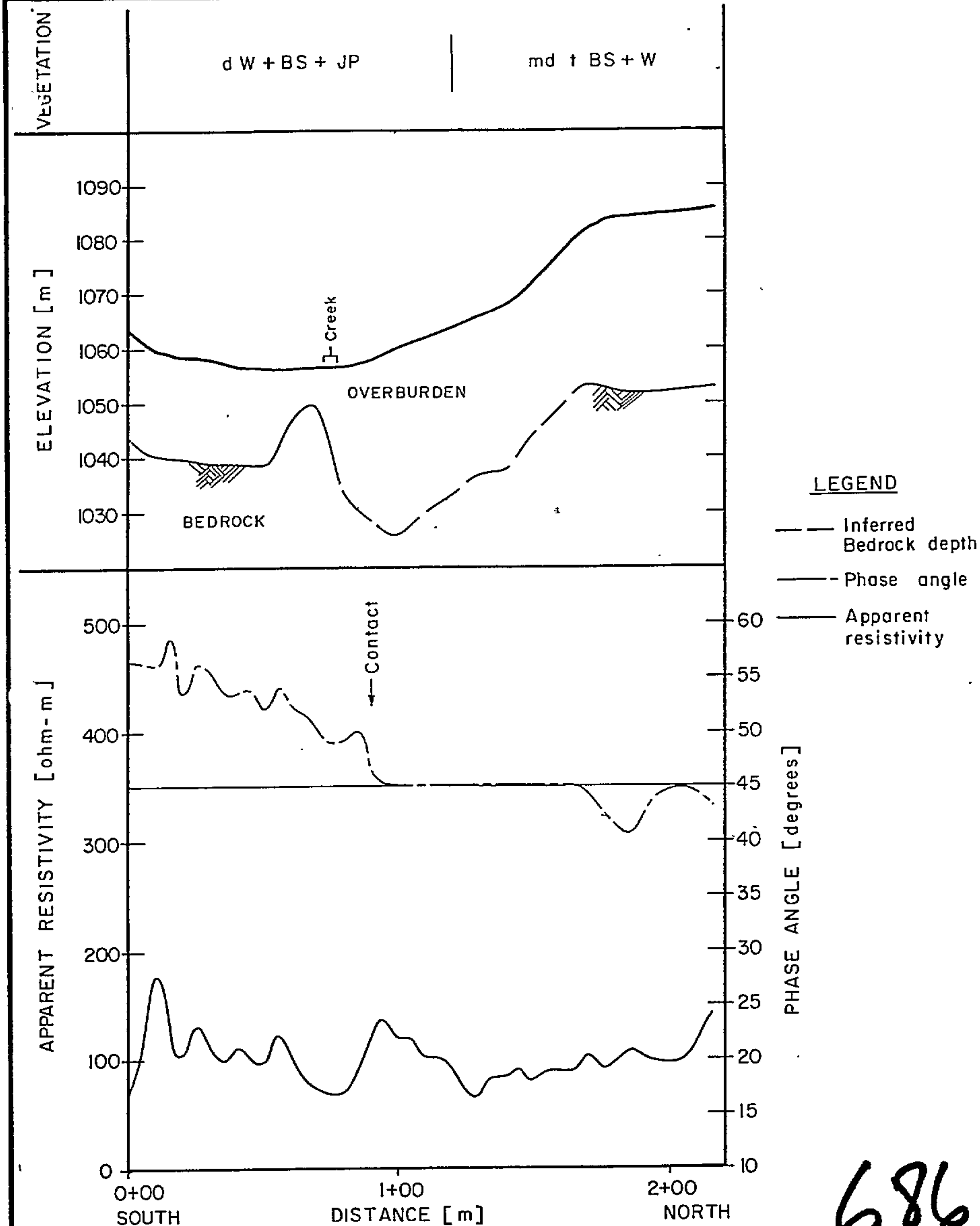
ENGINEERING GEOPHYSICAL CONSULTANTS

CROWS NEST RESOURCES LTD.
ADAMS COAL PROPERTY, B.C.
VLF PHASE AND AMPLITUDE MEASUREMENTS
LINE 19

82-33

Figure 5



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CROWS NEST RESOURCES LTD.
ADAMS COAL PROPERTY, B.C.
VLF PHASE AND AMPLITUDE MEASUREMENTS
LINE 20

82-33

Figure 6

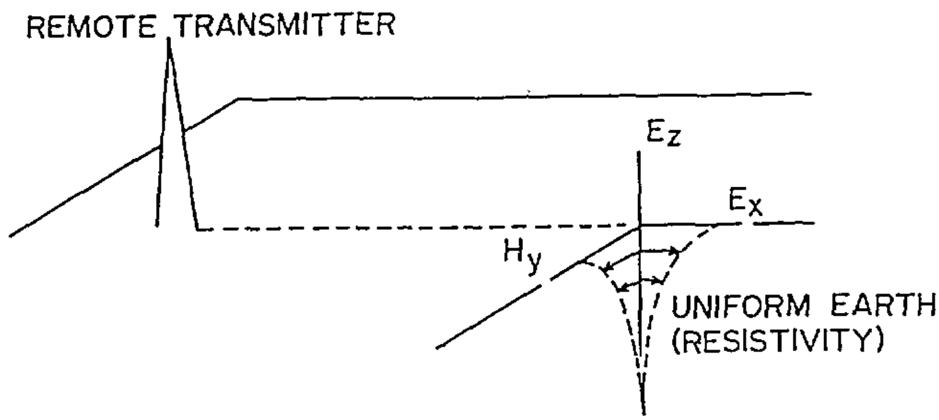

FIGURE a

FIELD VECTORS OVER A VERTICAL POLARIZED SURFACE WAVE AT GROUND SURFACE - VLF RADIOHM METHOD

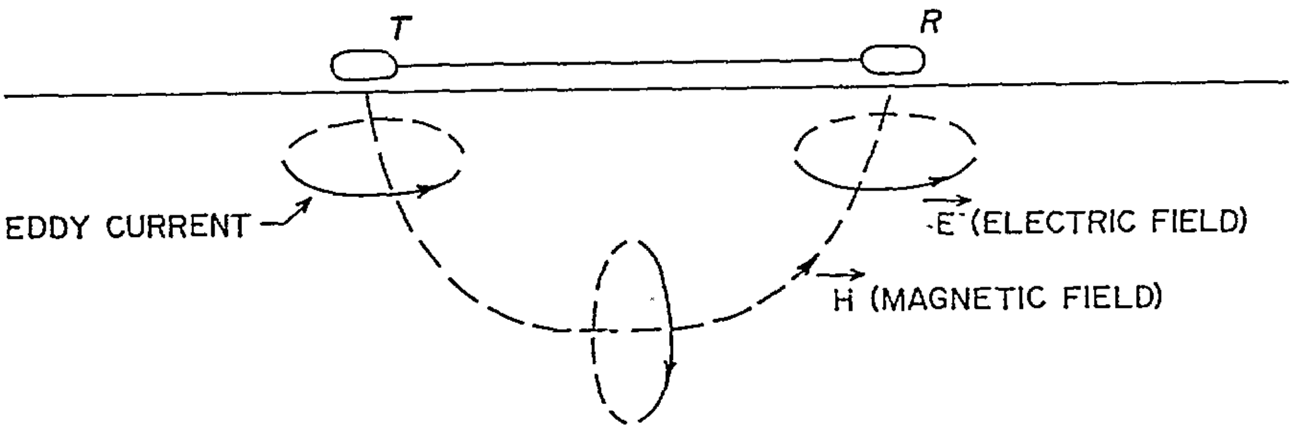

FIGURE b

SCHEMATIC ILLUSTRATION OF FIELDS AND CURRENTS IN MAGNETIC INDUCTION METHODS

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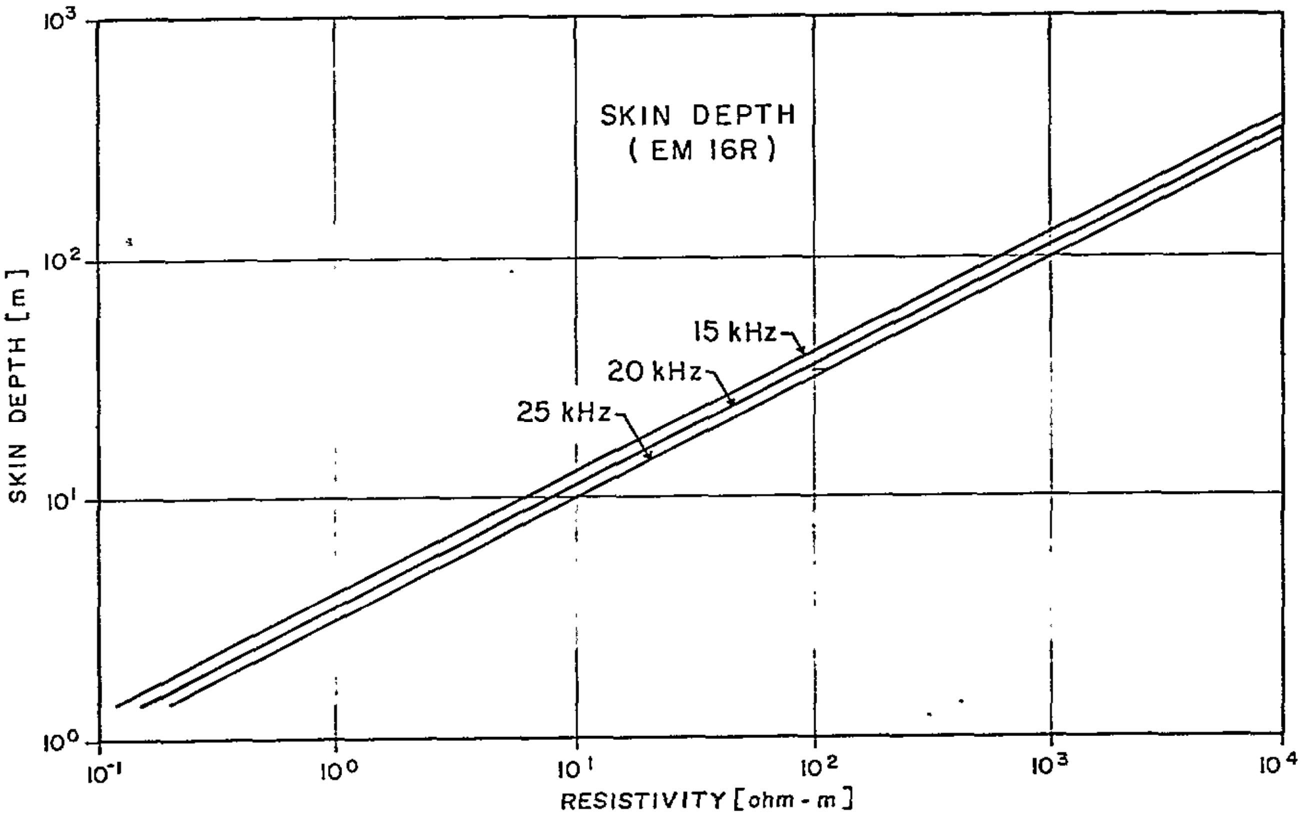
ELECTRICAL RESISITIVITY METHODS

82-33

Figure 7



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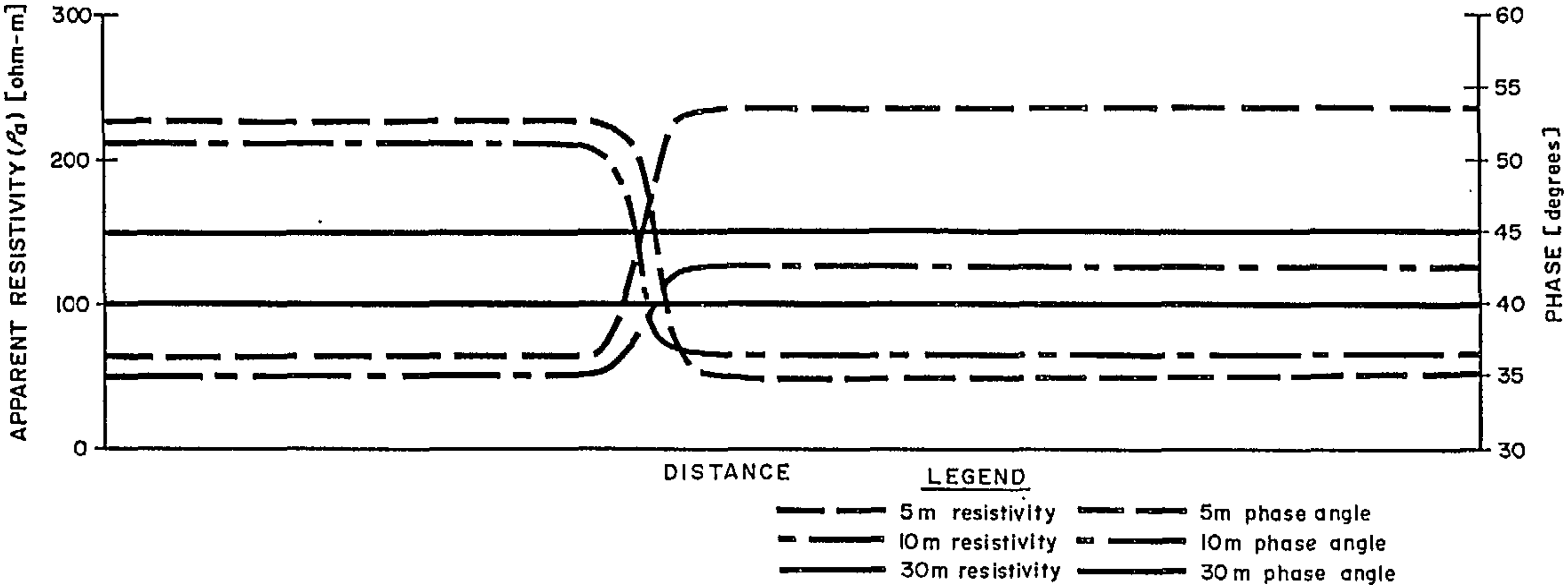
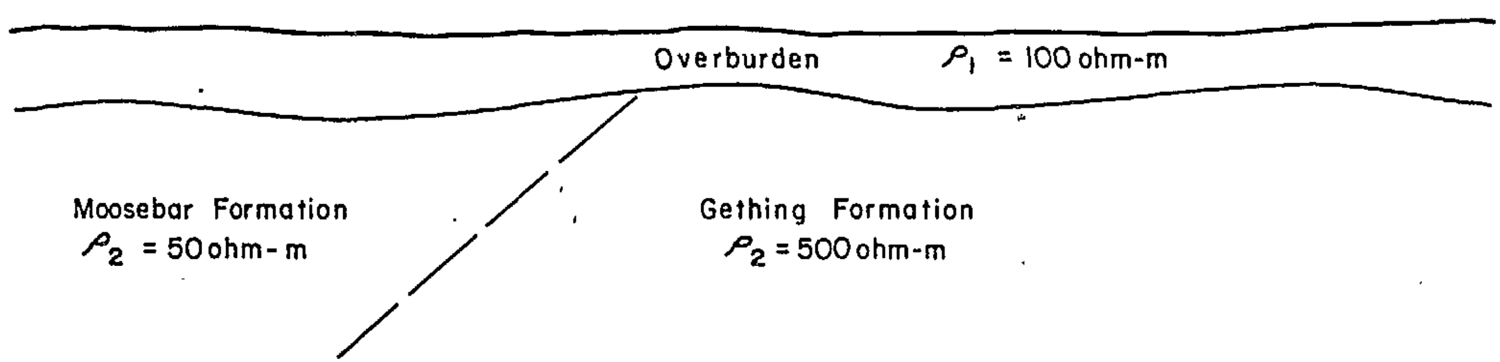
CROWS NEST RESOURCES LTD.
ADAMS COAL PROPERTY, B.C.
SKIN DEPTH VERSUS RESISTIVITY

82-33

Figure 8





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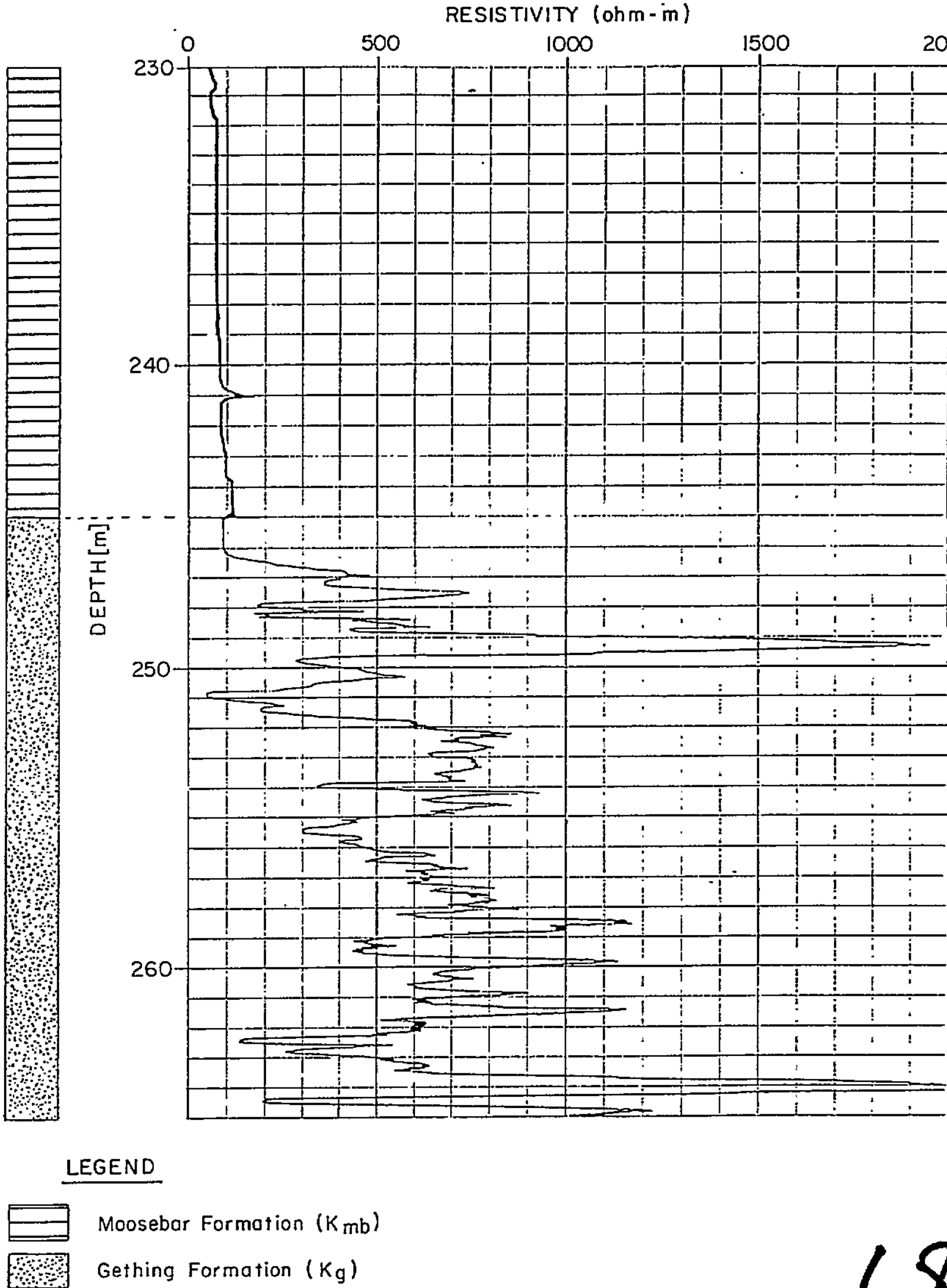
CROWS NEST RESOURCES LTD.
ADAMS COAL PROPERTY, B.C.

MODELLED VLF RADIOHM DATA AND GEOLOGIC CROSS-SECTION

82-33

Figure 9



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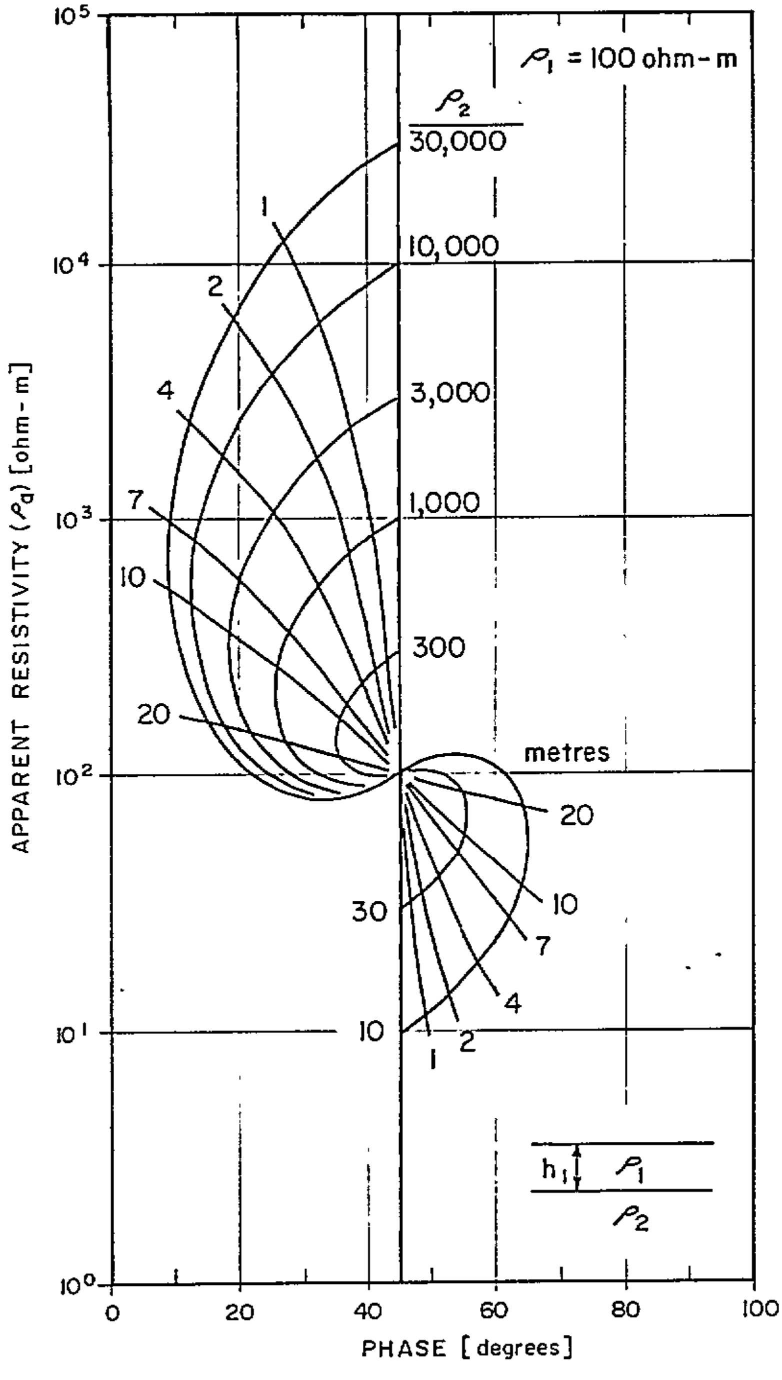
CROWS NEST RESOURCES LTD.
ADAMS COAL PROPERTY, B.C.
FOCUSED BEAM RESISTIVITY LOG
WELL R-79-03

82-33

Figure 10



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ADAMS COAL PROPERTY, B.C.
TWO - LAYER
INTERPRETATION DIAGRAMS

82-33

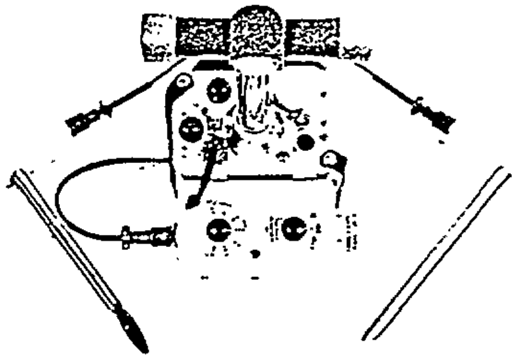
Figure 11

EM16R

DIRECT READING GROUND RESISTIVITY METER (ATTACHMENT TO EM16 VLF EM)

ast R   nnaisance *Overburden Evaluation*
EM16R gives a direct reading of the apparent resistivity of the ground in ohm-meters, while doing a normal VIF EM survey, equiring only the additional non-critical insertion of two ground probes 10 meters apart. The method enables speedy stimation of conductivity and thickness of overburden cover or the purpose of choosing an appropriate EM system or to id interpretation, delineation of contact zones and detection f anomalous CONDUCTIVE AND RESISTIVE zones beneath he surface.

ast and Convenient Readings
he major advantages of the method compared to other esistivity systems are extreme portability and low power and e direct relationship to VLF EM measurements. It is not ecessary to establish good contact with the ground because f the extremely high input impedance of the probes. A single easurement with probes only 10 meters apart can yield formation normally obtainable only with a spread of lectrode spacings with other systems.



pe fications

easured Quantity	Apparent resistivity of the ground, in ohm-meters, and phase angle by which E_x leads H_y in degrees.
perating Frequency	15 kHz to 25 kHz. Station frequency is selected with a switch.
imary Field Source	VLF transmitting station.
nimum Field Strength	< 200 uV/meter depending on ambient noise.
sistivity Ranges	10 Ω m to 300 Ω m 100 Ω m to 3000 Ω m 1000 Ω m to 30,000 Ω m
ase Range	0° to 90°
sistivity Reliability	± 5% at bottom to ± 2% at full scale. (± 15% at 10 Ω m).
ase Readability	± ½%
solute Accuracy	± 10% full scale resistivity ± 2% phase.
dification	EM16 unit has to be returned to GEONICS to be modified to take the EM16R attachment.
wer Supply	Obtained from EM16 via connector. The probes are also powered from the EM16R attachment.
Controls	Resistivity range switch Station selector switch Phase potentiometer EM16/EM16R conversion switch Resistivity potentiometer (on EM16) The other controls on EM16 perform their normal functions.
Probe Cables	Marked at 5 meters. Terminated in jack plugs at both ends for quick safe release. Any two wire unshielded cable may be used.
Probe Input	Approximately 100 M Ω, ½ pF. (Even in frozen ground probes need not be inserted more than a couple of inches).
Mechanical Info	Dimensions Electronic Console 19.0 cm x 11.4 cm x 10.1 cm (7.5" x 4.5" x 4") Probes 25.4 cm x 12.7 cm (10" x 5") Weight 0.68 kg (1.5 lbs.) 0.23 kg (.5 lbs.)

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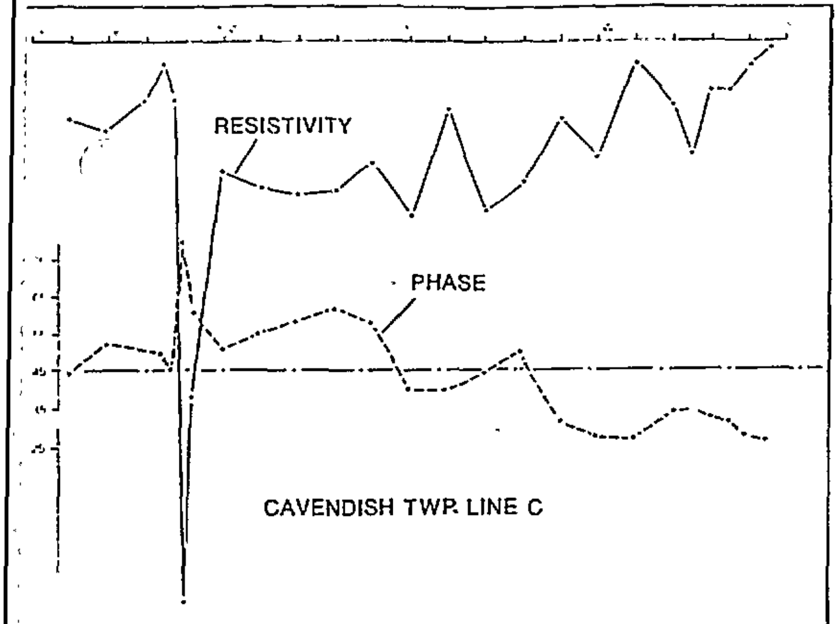
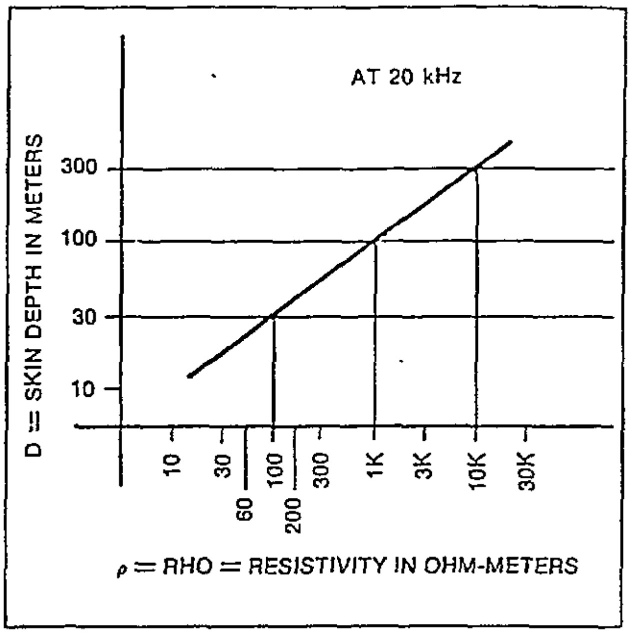
GEONICS LIMITED Designers & manufacturers of geophysical instruments
2 Thorncliffe Park Drive
Toronto/Ontario/Canada
M4H 1H2
Tel: (416) 425-1821
Cables: Geonic's





ies Layered Conditions
pth to which the field is penetrating is proportional to called skin depth which is a function of the apparent ity.

ayering is present the apparent resistivity depends on istivity and thickness of the top layer and the resistivity second layer.

eral the rock beneath overburden will be of much higher vity and if the overburden is less than a skin depth thick, ase a apparent resistivity will indicate the overburden ctivity and thickness quite well. The phase between E_x is nominally 45° and generally decreases if there is nd layer of higher resistivity, and increases over a more ctive second layer.

ment Comprises Two Ground Probes and Small Console
tachment comprises a pair of ground electrodes with al preamps, which are pushed into the ground, 10 meters *in the direction of the station to receive the electric field,* attachment to the EM16, containing electronic circuits ontrols to amplify and phase shift the electric field signal, e EM16 unit itself, of which the reference coil is maxi- coupled to the magnetic field. The EM16 null detection *try is employed.*

es Phenomenon of Wave Tilt
R measures the ratio and phase between the horizontal etic field and the horizontal electric field components *plane wave which is radiated from a selected one of a* er of powerful VLF radio stations located about the world.

Operation is based on the principle of the RADIOHM patent of Becker and Collett of the Geological Survey of Canada. *From the theory of wave impedance it can be shown that for* a wide range of practical conditions and in homogenous ground:

$$\rho = \left|\frac{E_x}{H_y}\right|^2 \frac{1}{2\pi f \mu}$$

and E_x leads H_y by 45°.

Where ρ is ground resistivity in ohm-meters. E_x is the potential gradient along the ground in volts/meter. H_y is the horizontal magnetic field strength in amps/meter. f is the frequency in Hz. μ is the permeability of the ground in henries/meter.

Operation Possible in Most Areas
Operation is relatively unaffected by power line noise, and the VLF *stations used are maintained to almost continual operation* and have extensive global coverage as they are used for military communications, navigation, and time signals.

Users of EM16R are kept informed of the most suitable stations *for their particular survey location.*

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BPB

COAL LITHOLOGY LOG

LOG SUITE:	SONDE TYPE:
GAMMA RAY L.S. DENSITY CALIPER	COAL COMBINATION SONDE

BOREHOLE ADAM 82-1

CLIENT CROWSNEST RES. LTD.

AREA HUDSON HOPE

COUNTRY CANADA

DATE LOGGED 4 AUG. 1982

DEPTH SCALE 1:100

1 OF 4 LOGS

BOREHOLE DATA

PERMANENT DATUM	GROUND LEVEL	
ELEVATION OF P.D.		
MEASUREMENTS FROM	BPB	DRILLER
DEPTH REACHED	242m	
CASING SHOE	80m	799'
CASING SHOE	CASING	CASING
BIT SIZES	1 NQ TO TD	2 TO
BIT SIZES	3	4 TO
CASING SIZES	1 NQ TO 80m	2 TO

FLUID DATA

NATURE	WATER
S.G.	
LEVEL	
VISCOSITY	
Rm at meas temp	
BHT	

OPERATION DATA

FIRST READING	221
LAST READING	0
INTERVAL LOGGED	221m
UNIT-TRUCK No.	HELI
ENGINEER	R.G.M.
WITNESS	

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EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE

LOG	EQUIPMENT: SONDE	SOURCE	CALIBRATOR	TAPING: LOG TAPED	RECORD SPEED	DIRECT or REPLAY	PANEL: SPEED	T.C. SECS	NORM	CAL COEFF	DEPTHS: FROM	TO	INTERVAL	SEAM LOG RUN
GAMMA RAY	198D			Y	9	R	9	1	1.71		238	0	238m	
L.S. DENSITY		0028		Y	9	R	9	.3		7.10	238	01	237m	
CALIPER	SIDEWALL POSITION		7" 2"	Y	9	R	9	.3		1.0	238	01	237m	

COAL QUALITY/SEAM THICKNESS LOG INTERVALS (Refer to relevant log)

FROM	205	196	186	176	153	140	INTERVAL TOTAL
TO	200	191	182	167	149	111	
INTERVAL	5	5	4	9	4	29	56

ADDITIONAL SONDES RUN

SONDE	LOG	GENERAL SCALE LOG	DETAIL SCALE LOG	
09	N-N	1:100		REFER TO ADDITIONAL HEADINGS
204	VERT			

REMARKS

BPB COAL LITHOLOGY LOG

CALIBRATION DATA

JIG No. VALUE @ 5"DIAM	JIG CAL DATE	JIG VALUE	SDU @ g/cm³ — 7 "ins 924 cps
JIG MARK SHOWN AT ABOVE VALUE –	JIG No	SPAN 6000	NORM SDU/CPS = 7.10 — 2 "ins 538 cps

GAMMA RAY	DEPTH	BULK DENSITY g/cm³	CALIPER INCHES

HOLE SIZE CORRECTION DATA

GAMMA RAY	DEPTH	BULK DENSITY g/cm³	CALIPER INCHES

BPB

BOREHOLE ADAM 82-1 AREA HUDSON HOPE

CLIENT CROWSNEST RES. LTD. COUNTRY CANADA

COAL LITHOLOGY LOG

MY (1)137483 R

BPB

COAL QUALITY LOG

SONDE TYPE: COAL COMBINATION SONDE

LOG SUITE: GAMMA RAY, L.S. DENSITY

BOREHOLE: ADAM 82-1

CLIENT: CROWSNEST RESOURCES LTD

AREA: HUDSON HOPE, B.C.

COUNTRY: CANADA

DATE LOGGED: 4 AUG. 1982

DEPTH SCALE 1:20

2 OF 4 LOGS

BOREHOLE DATA: REFER TO LITHOLOGY LOG

OPERATION DATA: REFER TO LITHOLOGY LOG

EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE — SIDEWALL POSITION

LOG	TAPED	RECORD SPEED	DIRECT or REPLAY	SPEED	T.C SECS	NORM	CAL COEFF
GAMMA RAY	Y	2	R	2	2		
LS DENSITY	Y	2	R	2	1	7.10	1.71

SOURCE SONDE AND CALIBRATION: REFER TO LITHOLOGY LOG

COAL QUALITY LOG INTERVALS

FROM	205	196	186	176	153	140	
TO	200	191	182	167	149	111	
INTERVAL	5	5	4	9	4	29	TOTAL 56

REMARKS

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BPB COAL QUALITY LOG

GAMMA RAY	DEPTH	COAL BULK DENSITY g/cm³
0 API 150		6000 sdu 0

HOLE SIZE CORRECTION DATA

0 API 150		6000 sdu 0
GAMMA RAY		COAL BULK DENSITY g/cm³
	DEPTH	

BPB

BOREHOLE: ADAM 82-1 | AREA: HUDSON HOPE, B.C.

CLIENT: CROWSNEST RESOURCES LTD. | COUNTRY: CANADA

COAL QUALITY LOG

MY 88002 R

SEAM THICKNESS LOG

BOREHOLE ADAM 82-1
CLIENT CROWSNEST RESOURCES LTD.
AREA HUDSON HOPE, B.C
COUNTRY CANADA
DATE LOGGED 4 AUG.'82
DEPTH SCALE 1:20
3 OF 4 LOGS

SONDE TYPE: COAL COMBINATION SONDE
LOG SUITE: CALIPER B.R.DENSITY

BOREHOLE DATA: REFER TO LITHOLOGY LOG
OPERATION DATA: REFER TO LITHOLOGY LOG

EQUIPMENT AND RECORDING DATA
COAL COMBINATION SONDE: SIDEWALL POSITION

LOG	TAPING: LOG TAPED	TAPING: RECORD SPEED	TAPING: DIRECT or REPLAY	PANEL: SPEED	PANEL: TC SECS	PANEL: NORM	CAL COEFF
CALIPER	Y	2	R	2	1		
B R DENSITY	Y	2	R	2	-	7.1	

SOURCE, SONDE AND CALIBRATION: REFER TO LITHOLOGY LOG

SEAM THICKNESS LOG INTERVALS

FROM	205	196	186	176	153	140	
TO	200	191	182	167	149	111	
INTERVAL	5	5	4	9	4	29	TOTAL = 56

REMARKS

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B P B SEAM THICKNESS LOG

CALIPER (INCHES)	DEPTH	BED RESOLUTION DENSITY
7" 6" 5" dia 4" 3" 2"		25000 SBRDU 15000

CALIPER (INCHES)	DEPTH	BED RESOLUTION DENSITY
7" 6" 5" dia 4" 3" 2"		25000 SBRDU 15000

BOREHOLE ADAM 82-1
CLIENT CROWSNEST RESOURCES LTD.
AREA HUDSON HOPE
COUNTRY CANADA

SEAM THICKNESS LOG

MY 88002 R

NEUTRON-NEUTRON & GAMMA RAY

BOREHOLE ADAM 82-1

CLIENT CROWSNEST RESOURCES LTD.

AREA HUDSON HOPE

COUNTRY CANADA

DATE LOGGED 4 August 82

DEPTH SCALE 1:100

4 OF 4 LOGS

BOREHOLE DATA REFER TO Lithology LOG

OPERATION DATA REFER TO Lithology LOG

EQUIPMENT AND RECORDING DATA

LOG	TAPING LOG TAPED	RECORD SPEED	DIRECT or REPLAY	PANEL SPEED	T.C. SECS	NORM	CAL COEFF
Gamma	Y	9	R	9	1		1.71
N-N	N	9	R	9	1	.776	

SONDE NO	9	SOURCE NO	

REMARKS

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GAMMA RAY	DEPTH	NEUTRON-NEUTRON
0 API 150		0 SNU 800

GAMMA RAY	DEPTH	NEUTRON-NEUTRON
0 API 150		0 SNU 800

BOREHOLE ADAM 82-1

CLIENT CROWSNEST RESOURCES LTD.

AREA HUDSON HOPE

COUNTRY CANADA

MY A58452R

BPB

COAL LITHOLOGY LOG

BOREHOLE	GC-82-2
CLIENT	CROWSNEST RES. LTD.
AREA	HUDSON HOPE
COUNTRY	CANADA
DATE LOGGED	SEPT 13/82
DEPTH SCALE	1:100
	1 OF 4 LOGS

SONDE TYPE: COAL COMBINATION SONDE

LOG SUITE: GAMMA RAY, L.S. DENSITY, CALIPER

BOREHOLE DATA

PERMANENT DATUM	GROUND LEVEL	
ELEVATION OF P.D.		
MEASUREMENTS FROM	BPB: G.L.	DRILLER: G.L.
DEPTH REACHED	221m	736'
CASING SHOE	11m	37'
BIT SIZES	1 NQ TO TD	2 TO
CASING SIZES	1 NQ TO 11m	2 TO
	3 TO	4 TO

FLUID DATA

NATURE	WATER & QUIK GEL
SG	
LEVEL	
VISCOSITY	
Rm at meas temp	
BHT	

OPERATION DATA

FIRST READING	221m
LAST READING	0m
INTERVAL LOGGED	221m
UNIT-TRUCK No	HELI
ENGINEER	R.W.
WITNESS	

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EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE

LOG	EQUIPMENT: SONDE	SOURCE	CALIBRATOR	TAPING: LOG TAPED	RECORD SPEED	DIRECT or REPLAY	PANEL: SPEED	TC SECS	NORM	CAL COEFF	DEPTHS: FROM	TO	INTERVAL	SEAM LOG RUN
GAMMA RAY	184B			Y	9	R	9	1		1.59	221	0	221	
L.S. DENSITY		0028		Y	9	R	9	.3	6.60		221	01	220	
CALIPER	SIDEWALL POSITION		7" 2"	Y	9	R	9	.3		1.0	221	01	220	

COAL QUALITY/SEAM THICKNESS LOG INTERVALS (Refer to relevant log)

FROM	221	214	199	180	161	135	119	INTERVAL TOTAL
TO	217	202	186	176	139	124	101	
INTERVAL	04	12	13	04	22	11	18	= 84m

ADDITIONAL SONDES RUN

SONDE	LOG	GENERAL SCALE LOG	DETAIL SCALE LOG
10	N-N	1:100	

REFER TO ADDITIONAL HEADINGS

REMARKS

BPB COAL LITHOLOGY LOG

CALIBRATION DATA

JIG No. VALUE @ 5"DIAM	JIG CAL DATE	JIG VALUE	SDU @ g/cm³
JIG MARK SHOWN AT ABOVE VALUE ÷	JIG No	SPAN 6000	NORM SDU/CPS = 6.60

7" ins 895 cps

2" ins 459 cps

GAMMA RAY	DEPTH	BULK DENSITY g/cm³	CALIPER INCHES

HOLE SIZE CORRECTION DATA

0 API 150		6000 sdu 0	7" 2"
GAMMA RAY	DEPTH	BULK DENSITY g/cm³	CALIPER INCHES

BPB

BOREHOLE	GC-82-2	AREA	HUDSON HOPE
CLIENT	CROWSNEST RES. LTD.	COUNTRY	CANADA

COAL LITHOLOGY LOG

MY (1)137483 R

GAMMA RAY & NEUTRON-NEUTRON

BOREHOLE GC-82-2
CLIENT CROWSNEST RES. LTD.
AREA HUDSON HOPE
COUNTRY CANADA
DATE LOGGED SEPT 13/84

DEPTH SCALE 1:100

2 OF 4 LOGS

BOREHOLE DATA REFER TO LITHOLOGY LOG

OPERATION DATA REFER TO LITHOLOGY LOG

EQUIPMENT AND RECORDING DATA

LOG	LOG TAPED	RECORD SPEED	DIRECT or REPLAY	SPEED	T.C. SECS	NORM	CAL COEFF
GAMMA	Y	9	R	9	1		
N-N	Y	9	R	9	1	6.20	1.59

SONDE NO 184 10 SOURCE NO 7202

REMARKS

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GAMMA RAY	DEPTH	NEUTRON-NEUTRON
0 API 150		0 SNU 800

0 API 150		0 SNU 800
GAMMA RAY	DEPTH	NEUTRON-NEUTRON

BOREHOLE GC-82-2
CLIENT CROWSNEST RES. LTD.
AREA HUDSON HOPE
COUNTRY CANADA

MY A58452R

COAL QUALITY LOG

BOREHOLE GC-82-2
CLIENT CROWSNEST RES. LTD.
AREA HUDSON HOPE
COUNTRY CANADA
DATE LOGGED SEPT 13/82
DEPTH SCALE 1:20
3 OF 4 LOGS

SONDE TYPE: COAL COMBINATION SONDE

LOG SUITE: GAMMA RAY, L.S. DENSITY

BOREHOLE DATA: REFER TO LITHOLOGY LOG

OPERATION DATA: REFER TO LITHOLOGY LOG

EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE — SIDEWALL POSITION

LOG	LOG TAPED	RECORD SPEED	DIRECT OR REPLAY	TAPING SPEED	PANEL T.C. SECS	NORM	CAL COEFF
GAMMA RAY	Y	3	R	3	2		
LS DENSITY	Y	3	R	3	1	6.60	1.59

SOURCE SONDE AND CALIBRATION: REFER TO LITHOLOGY LOG

COAL QUALITY LOG INTERVALS

FROM	221	214	199	180	161	135	119
TO	217	202	186	176	139	124	101
INTERVAL	04	12	13	04	22	11	18

FROM / TO / INTERVAL — INTERVAL TOTAL 84 m

REMARKS

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BPB COAL QUALITY LOG

GAMMA RAY	DEPTH	COAL BULK DENSITY g/cm3
0 API 150		6000 sdu 0

HOLE SIZE CORRECTION DATA

GAMMA RAY	DEPTH	COAL BULK DENSITY g/cm3
0 API 150		6000 sdu 0

BOREHOLE GC-82-2
CLIENT CROWSNEST RES. LTD.
AREA HUDSON HOPE
COUNTRY CANADA

COAL QUALITY LOG

MY 85002 R

SEAM THICKNESS LOG

BOREHOLE GC-82-2

CLIENT CROWSNEST RES. LTD.

AREA HUDSON HOPE

COUNTRY CANADA

DATE LOGGED SEPT 13/82

DEPTH SCALE 1:20

4 OF 4 LOGS

SONDE TYPE: COAL COMBINATION SONDE

LOG SUITE: CALIPER B.R. DENSITY

BOREHOLE DATA — REFER TO LITHOLOGY LOG

OPERATION DATA — REFER TO LITHOLOGY LOG

EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE: SIDEWALL POSITION

LOG	TAPING: LOG TAPED	TAPING: RECORD SPEED	TAPING: DIREC. OF REPLAY	PANEL: SPEED	PANEL: TC SECS	PANEL: NORM	CAL COEFF
CALIPER	Y	3	R	3	.3		1.0
B.R. DENSITY	Y	3	R	3	3.3	7.53	

SOURCE, SONDE AND CALIBRATION: REFER TO LITHOLOGY LOG

SEAM THICKNESS LOG INTERVALS

FROM	221	214	199	180	161	135
TO	217	202	186	176	139	124
INTERVAL	04	12	13	04	22	11
FROM	119					
TO	101					
INTERVAL	18					INTERVAL TOTAL = 84 m

REMARKS

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B P B SEAM THICKNESS LOG

CALIPER (INCHES)	DEPTH	BED RESOLUTION DENSITY
7 6 5 dia 4 3 2		23500 SBRDU 13500

CALIPER (INCHES)	DEPTH	BED RESOLUTION DENSITY
7 6 5 dia 4 3 2		23500 SBRDU 13500

BOREHOLE GC-82-2 AREA HUDSON HOPE

CLIENT CROWSNEST RES. LTD. COUNTRY CANADA

SEAM THICKNESS LOG

MY 88002 R

CONTINUOUS VERTICALITY ANALYSIS

CLIENT	CROWS NEST RESOURCES
BOREHOLE	ADAM 82-1
AREA	HUDSON HOPE
COUNTRY	CANADA

DATE LOGGED.....05-AUG-82
DATE PROCESSED..12-AUG-82
UPPER REFERENCE POINT....68.8
LOWER REFERENCE POINT....239.9

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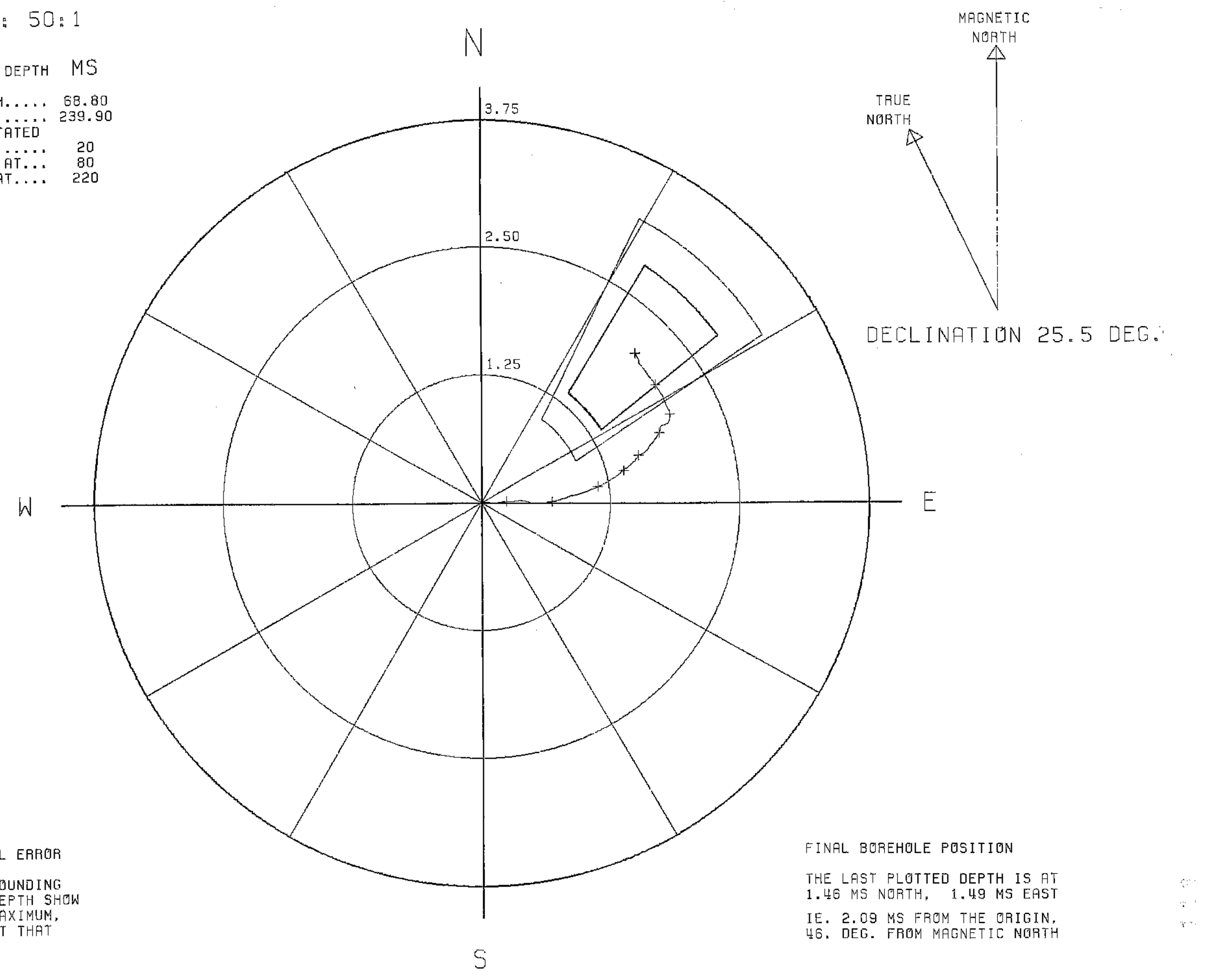
CROSS-SECTION

SCALE: 50:1

ALL FIGURES IN LOG DEPTH MS

TARGET ORIGIN DEPTH..... 68.80
LAST PLOTTED DEPTH...... 239.90
DEPTH MARKERS ANNOTATED
IN MULTIPLES OF......... 20
FIRST DEPTH MARKER AT... 80
LAST DEPTH MARKER AT.... 220



BOREHOLE POSITIONAL ERROR

THE TWO BOXES SURROUNDING THE LAST PLOTTED DEPTH SHOW THE TYPICAL, AND MAXIMUM, POSITIONAL ERROR AT THAT DEPTH.

FINAL BOREHOLE POSITION

THE LAST PLOTTED DEPTH IS AT 1.46 MS NORTH, 1.49 MS EAST

IE. 2.09 MS FROM THE ORIGIN. 46. DEG. FROM MAGNETIC NORTH

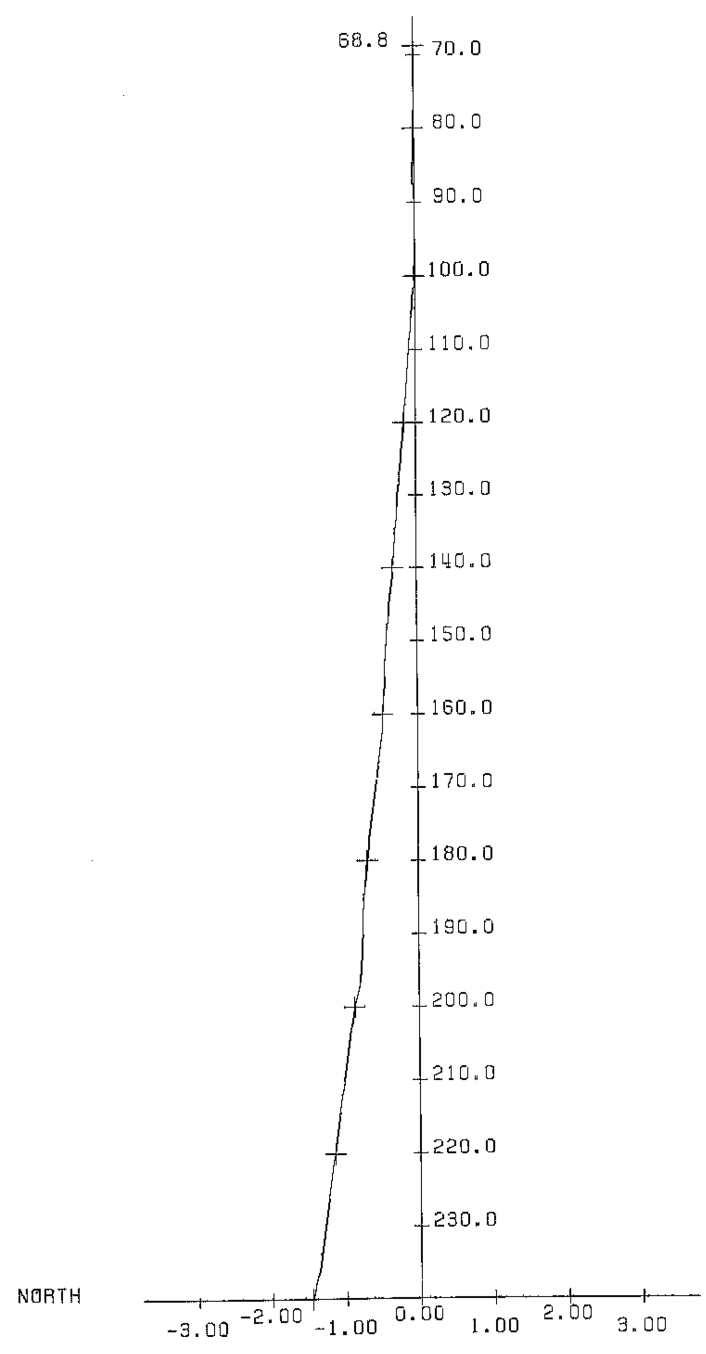
VERTICAL SECTIONS

(TRUE DEPTH VS. DISPLACEMENT)

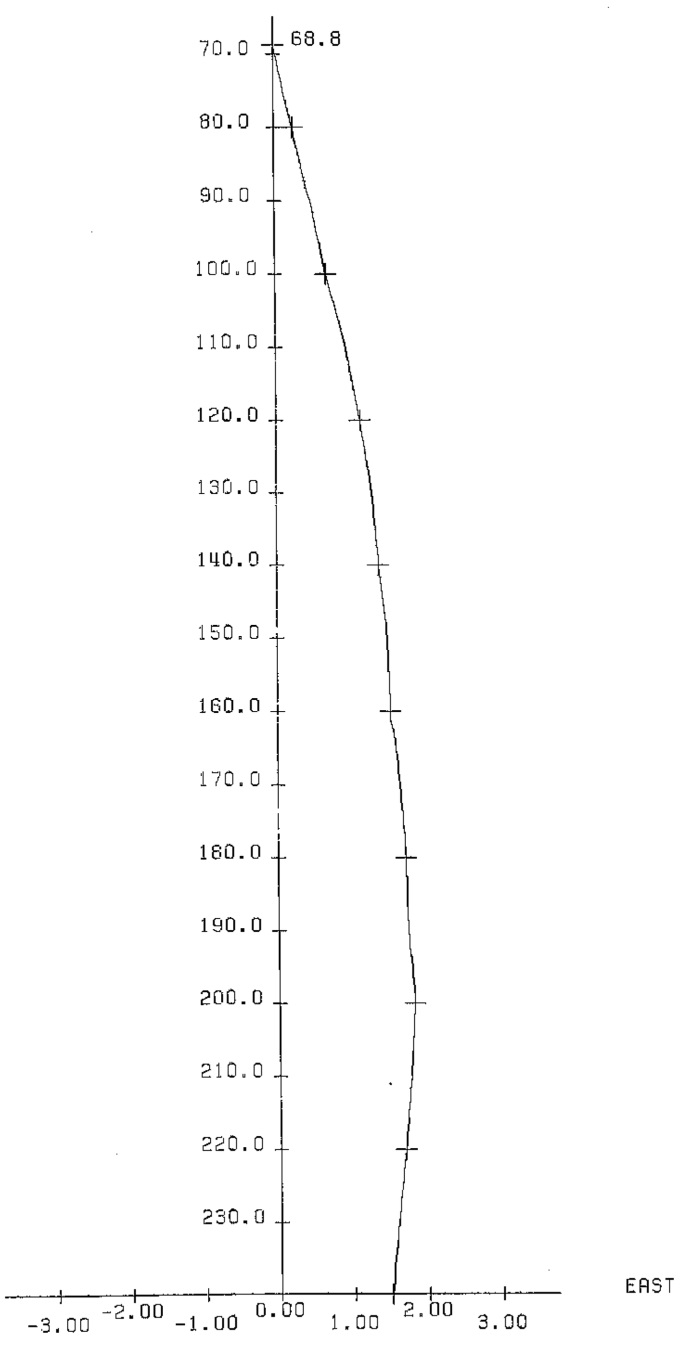
VERTICAL SCALE 1000 :1

MARKERS ANNOTATED AS ABOVE

N-S SECTION

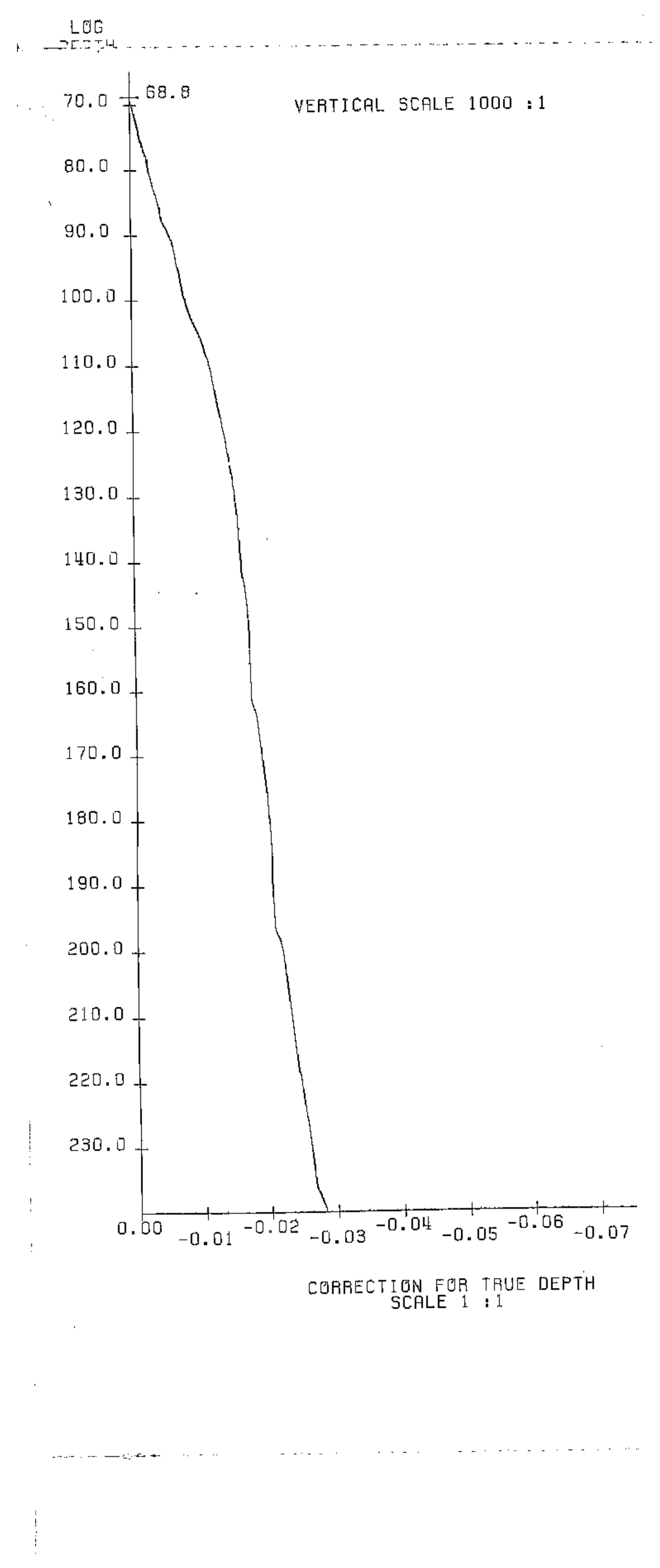


W-E SECTION



HORIZONTAL SCALE 100 :1

DEPTH CORRECTION ANALYSIS



CORRECTION FOR TRUE DEPTH
SCALE 1 :1

DEPTHS: LOG	TRUE	DEPTHS: LOG	TRUE	DEPTHS: LOG	TRUE
69.00	69.00	139.00	138.98	209.00	208.98
70.00	70.00	140.00	139.98	210.00	209.98
71.00	71.00	141.00	140.98	211.00	210.98
72.00	72.00	142.00	141.98	212.00	211.98
73.00	73.00	143.00	142.98	213.00	212.98
74.00	74.00	144.00	143.98	214.00	213.98
75.00	75.00	145.00	144.98	215.00	214.98
76.00	76.00	146.00	145.98	216.00	215.98
77.00	77.00	147.00	146.98	217.00	216.98
78.00	78.00	148.00	147.98	218.00	217.98
79.00	79.00	149.00	148.98	219.00	218.98
80.00	80.00	150.00	149.98	220.00	219.98
81.00	81.00	151.00	150.98	221.00	220.98
82.00	82.00	152.00	151.98	222.00	221.98
83.00	83.00	153.00	152.98	223.00	222.97
84.00	84.00	154.00	153.98	224.00	223.97
85.00	85.00	155.00	154.98	225.00	224.97
86.00	86.00	156.00	155.98	226.00	225.97
87.00	87.00	157.00	156.98	227.00	226.97
88.00	88.00	158.00	157.98	228.00	227.97
89.00	88.99	159.00	158.98	229.00	228.97
90.00	89.99	160.00	159.98	230.00	229.97
91.00	90.99	161.00	160.98	231.00	230.97
92.00	91.99	162.00	161.98	232.00	231.97
93.00	92.99	163.00	162.98	233.00	232.97
94.00	93.99	164.00	163.98	234.00	233.97
95.00	94.99	165.00	164.98	235.00	234.97
96.00	95.99	166.00	165.98	236.00	235.97
97.00	96.99	167.00	166.98	237.00	236.97
98.00	97.99	168.00	167.98	238.00	237.97
99.00	98.99	169.00	168.98	239.00	238.97
100.00	99.99	170.00	169.98	240.00	239.97
101.00	100.99	171.00	170.98		
102.00	101.99	172.00	171.98		
103.00	102.99	173.00	172.98		
104.00	103.99	174.00	173.98		
105.00	104.99	175.00	174.98		
106.00	105.99	176.00	175.98		
107.00	106.99	177.00	176.98		
108.00	107.99	178.00	177.98		
109.00	108.99	179.00	178.98		
110.00	109.99	180.00	179.98		
111.00	110.99	181.00	180.98		
112.00	111.99	182.00	181.98		
113.00	112.99	183.00	182.98		
114.00	113.99	184.00	183.98		
115.00	114.99	185.00	184.98		
116.00	115.99	186.00	185.98		
117.00	116.99	187.00	186.98		
118.00	117.99	188.00	187.98		
119.00	118.99	189.00	188.98		
120.00	119.99	190.00	189.98		
121.00	120.99	191.00	190.98		
122.00	121.99	192.00	191.98		
123.00	122.99	193.00	192.98		
124.00	123.99	194.00	193.98		
125.00	124.99	195.00	194.98		
126.00	125.99	196.00	195.98		
127.00	126.99	197.00	196.98		
128.00	127.98	198.00	197.98		
129.00	128.98	199.00	198.98		
130.00	129.98	200.00	199.98		
131.00	130.98	201.00	200.98		
132.00	131.98	202.00	201.98		
133.00	132.98	203.00	202.98		
134.00	133.98	204.00	203.98		
135.00	134.98	205.00	204.98		
136.00	135.98	206.00	205.98		
137.00	136.98	207.00	206.98		
138.00	137.98	208.00	207.98		

BPB VERTICALITY ANALYSIS
INTERPRETATION NOTES

1. All plotted output is automatically scaled to obtain the best visual effect within the physical space available. The maximum scales being 50000:1 (metric) & 48000:1 (imperial), and the minimum 1:1.

2. The analysis is derived by integrating 10 cm./6" sampled data down the borehole. However the listing supplied will contain a maximum of 200 points in multiples of 1,2,5,10,20,25,50, or 100 metres/feet depending upon the total range of the analysis. However the analysis is calculated for the entire range of the borehole, and the final borehole position is included in the listing.

3. Computed verticality may only be fully derived in open sections of the borehole, away from the influence of any magnetic media (as the azimuth calculations are derived from three solid state magnetometers). So the analysis will generally begin at the end of the casing, and all borehole positional information will relate to this depth.

4. Up to ten cross-sections may be requested for any borehole to be displayed at any scale (the default scale is that of the cross-section for the entire hole).

5. Borehole positional error is derived assuming the following parameters:

	TILT(degrees)	AZIMUTH(degrees)
Typical Error	+/- 0.33333	+/- 10.0
Maximum Error	+/- 0.5	+/- 15.0

6. Error analysis may be calculated and plotted from the data listing as follows:

   a) Plot the four coordinates from the error listing (based upon zero azimuth error) on a target plot, origin at the start of the analysis.
   b) Describe arcs of +/- 10 degrees & +/- 15 degrees (centre at the origin) through the inner and outer points respectively.
   c) Connect the respective arcs together with straight lines to give the typical & maximum borehole positional error.

7. Given below is a full description of the parameters displayed on the ensuing listing:

LOG DEPTH	the depth recorded on the field logs for the borehole
TRUE DEPTH	the true vertical depth corresponding to the above depth, corrected from the start of the analysis
HOLE TILT & AZIMUTH	the SAMPLED borehole orientation
AXIAL COORDINATES	the coordinates North & East from the target origin
POLAR COORDINATES	the polar, or radial, coordinates of the borehole
ERROR COORDINATES	the polar coordinates corresponding to the typical and maximum tilt error

N.B. The reference point for ALL bearing angles on this listing is given at the top of each sheet

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Verticality Data Listing

All co-ordinates with respect to True North

DEPTHS log	DEPTHS true	BOREHOLE tilt	BOREHOLE AZI	AXIAL CO-ORDS. North	AXIAL CO-ORDS. East	POLAR brng	POLAR radius	POLAR ERROR CO-ORDINATES (maximum & typical) brng	radius	brng	radius	brng	radius	brng	radius
69.00	69.00	1.3	88.	0.00	0.00	59.	0.00	59.	0.01	59.	0.00	59.	0.01	59.	0.00
70.00	70.00	1.2	112.	-0.01	0.02	108.	0.02	108.	0.03	108.	0.02	108.	0.03	108.	0.02
71.00	71.00	1.2	118.	-0.02	0.04	111.	0.05	111.	0.06	110.	0.03	111.	0.06	111.	0.03
72.00	72.00	1.3	114.	-0.03	0.06	113.	0.07	113.	0.09	113.	0.04	113.	0.09	113.	0.05
73.00	73.00	1.1	115.	-0.04	0.08	114.	0.09	114.	0.12	114.	0.05	114.	0.11	114.	0.06
74.00	74.00	1.2	107.	-0.04	0.10	114.	0.11	114.	0.15	114.	0.06	114.	0.14	114.	0.08
75.00	75.00	1.2	115.	-0.06	0.12	115.	0.13	115.	0.18	115.	0.08	115.	0.16	115.	0.09
76.00	76.00	1.2	113.	-0.06	0.14	115.	0.15	115.	0.21	115.	0.09	115.	0.19	115.	0.11
77.00	77.00	1.2	112.	-0.07	0.16	114.	0.18	114.	0.25	114.	0.11	114.	0.22	114.	0.13
78.00	78.00	1.4	110.	-0.08	0.19	113.	0.20	114.	0.28	113.	0.12	114.	0.25	113.	0.15
79.00	79.00	1.2	114.	-0.09	0.21	113.	0.22	113.	0.31	113.	0.14	113.	0.28	113.	0.17
80.00	80.00	1.3	112.	-0.10	0.23	113.	0.25	113.	0.34	113.	0.15	113.	0.31	113.	0.18
81.00	81.00	1.1	115.	-0.10	0.24	113.	0.27	113.	0.37	113.	0.16	113.	0.34	113.	0.20
82.00	82.00	1.4	110.	-0.11	0.27	113.	0.29	113.	0.40	113.	0.18	113.	0.36	113.	0.21
83.00	83.00	1.5	117.	-0.12	0.29	113.	0.31	113.	0.43	113.	0.19	113.	0.39	113.	0.23
84.00	84.00	1.6	114.	-0.13	0.31	113.	0.34	113.	0.47	112.	0.20	113.	0.42	113.	0.25
85.00	85.00	1.3	110.	-0.14	0.33	112.	0.36	112.	0.50	112.	0.22	112.	0.45	112.	0.27
86.00	86.00	1.1	111.	-0.14	0.35	112.	0.38	112.	0.53	112.	0.23	112.	0.48	112.	0.28
87.00	87.00	1.2	132.	-0.15	0.37	112.	0.40	112.	0.55	112.	0.24	112.	0.50	112.	0.29
88.00	88.00	1.4	133.	-0.17	0.39	113.	0.42	113.	0.59	113.	0.26	113.	0.53	113.	0.31
89.00	88.99	1.8	125.	-0.19	0.41	114.	0.45	114.	0.63	114.	0.28	114.	0.57	114.	0.34
90.00	89.99	1.8	131.	-0.20	0.44	115.	0.48	115.	0.66	115.	0.30	115.	0.60	115.	0.36
91.00	90.99	1.3	126.	-0.22	0.46	116.	0.51	116.	0.70	116.	0.32	116.	0.64	116.	0.38
92.00	91.99	1.1	130.	-0.23	0.48	116.	0.53	116.	0.73	116.	0.33	116.	0.66	116.	0.40
93.00	92.99	1.3	122.	-0.24	0.49	116.	0.55	116.	0.76	116.	0.34	116.	0.69	116.	0.41
94.00	93.99	1.1	117.	-0.25	0.51	116.	0.57	116.	0.78	116.	0.35	116.	0.71	116.	0.42
95.00	94.99	1.2	110.	-0.26	0.53	116.	0.59	116.	0.81	116.	0.36	116.	0.74	116.	0.44
96.00	95.99	1.2	114.	-0.26	0.55	116.	0.61	115.	0.84	116.	0.37	116.	0.76	116.	0.45
97.00	96.99	1.1	101.	-0.27	0.57	115.	0.63	115.	0.87	116.	0.39	115.	0.79	116.	0.47
98.00	97.99	1.0	111.	-0.28	0.59	115.	0.65	115.	0.90	115.	0.40	115.	0.81	115.	0.48
99.00	98.99	1.2	105.	-0.28	0.60	115.	0.67	115.	0.93	115.	0.41	115.	0.84	115.	0.49
100.00	99.99	1.4	101.	-0.29	0.63	115.	0.69	114.	0.96	115.	0.42	114.	0.87	115.	0.51
101.00	100.99	1.6	99.	-0.29	0.65	114.	0.71	114.	0.99	114.	0.44	114.	0.90	114.	0.53
102.00	101.99	1.5	96.	-0.30	0.68	114.	0.74	113.	1.02	114.	0.45	113.	0.93	114.	0.55
103.00	102.99	1.5	104.	-0.30	0.70	113.	0.76	113.	1.06	113.	0.47	113.	0.96	113.	0.57
104.00	103.99	1.8	96.	-0.30	0.74	112.	0.80	112.	1.10	112.	0.49	112.	1.00	112.	0.59
105.00	104.99	1.7	102.	-0.31	0.77	112.	0.83	112.	1.14	112.	0.51	112.	1.03	112.	0.62
106.00	105.99	1.6	102.	-0.31	0.79	111.	0.85	112.	1.17	111.	0.53	112.	1.07	111.	0.64
107.00	106.99	1.5	103.	-0.32	0.82	111.	0.88	111.	1.21	111.	0.55	111.	1.10	111.	0.66
108.00	107.99	1.4	91.	-0.32	0.85	111.	0.90	111.	1.24	111.	0.57	111.	1.13	111.	0.68
109.00	108.99	1.3	96.	-0.32	0.87	110.	0.93	110.	1.27	110.	0.58	110.	1.16	110.	0.70
110.00	109.99	1.3	93.	-0.33	0.89	110.	0.95	110.	1.30	110.	0.60	110.	1.18	110.	0.71
111.00	110.99	1.3	96.	-0.33	0.91	110.	0.97	110.	1.33	110.	0.61	110.	1.21	110.	0.73
112.00	111.99	1.3	96.	-0.33	0.93	110.	0.99	110.	1.36	109.	0.62	110.	1.24	109.	0.74
113.00	112.99	1.2	95.	-0.33	0.95	109.	1.01	109.	1.39	109.	0.63	109.	1.26	109.	0.76
114.00	113.99	1.0	90.	-0.34	0.97	109.	1.03	109.	1.41	109.	0.64	109.	1.28	109.	0.77
115.00	114.99	1.1	96.	-0.34	0.99	109.	1.04	109.	1.44	109.	0.65	109.	1.31	109.	0.78
116.00	115.99	1.0	98.	-0.34	1.01	109.	1.06	109.	1.47	109.	0.66	109.	1.33	109.	0.80
117.00	116.99	1.3	93.	-0.34	1.03	108.	1.08	108.	1.50	108.	0.67	108.	1.36	108.	0.81
118.00	117.99	1.1	95.	-0.34	1.05	108.	1.10	108.	1.53	108.	0.68	108.	1.39	108.	0.82

All co-ordinates with respect to True North

DEPTHS log	DEPTHS true	BOREHOLE tilt	BOREHOLE AZI	AXIAL CO-ORDS. North	AXIAL CO-ORDS. East	POLAR brng	POLAR radius	POLAR ERROR CO-ORDINATES (maximum & typical) brng	radius	brng	radius	brng	radius	brng	radius
119.00	118.99	1.1	99.	-0.34	1.07	108.	1.12	108.	1.55	108.	0.70	108.	1.41	108.	0.84
120.00	119.99	1.2	84.	-0.34	1.09	107.	1.14	107.	1.58	107.	0.71	107.	1.44	107.	0.85
121.00	120.99	1.3	91.	-0.34	1.11	107.	1.16	107.	1.61	107.	0.72	107.	1.46	107.	0.87
122.00	121.99	1.0	95.	-0.34	1.13	107.	1.18	107.	1.64	107.	0.73	107.	1.48	107.	0.88
123.00	122.99	1.1	79.	-0.34	1.15	107.	1.20	106.	1.66	107.	0.74	107.	1.51	107.	0.89
124.00	123.99	0.9	97.	-0.34	1.17	106.	1.21	106.	1.68	107.	0.74	106.	1.53	106.	0.90
125.00	124.99	1.1	85.	-0.34	1.18	106.	1.23	106.	1.71	106.	0.75	106.	1.55	106.	0.91
126.00	125.99	1.0	89.	-0.34	1.20	106.	1.25	106.	1.73	106.	0.76	106.	1.57	106.	0.92
127.00	126.99	0.9	85.	-0.34	1.22	105.	1.26	105.	1.76	106.	0.77	105.	1.59	106.	0.93
128.00	127.98	0.9	84.	-0.34	1.23	105.	1.28	105.	1.78	106.	0.77	105.	1.61	105.	0.94
129.00	128.98	0.9	90.	-0.33	1.25	105.	1.29	105.	1.80	105.	0.78	105.	1.63	105.	0.95
130.00	129.98	0.8	84.	-0.33	1.26	105.	1.31	104.	1.82	105.	0.79	105.	1.65	105.	0.96
131.00	130.98	0.7	81.	-0.33	1.28	104.	1.32	104.	1.85	105.	0.79	104.	1.67	105.	0.97
132.00	131.98	0.7	91.	-0.33	1.29	104.	1.33	104.	1.87	105.	0.80	104.	1.69	105.	0.98
133.00	132.98	0.8	61.	-0.33	1.30	104.	1.34	104.	1.89	105.	0.80	104.	1.70	104.	0.98
134.00	133.98	0.8	58.	-0.32	1.31	104.	1.35	103.	1.90	105.	0.80	104.	1.72	104.	0.99
135.00	134.98	0.7	87.	-0.32	1.33	104.	1.36	103.	1.92	105.	0.80	103.	1.74	104.	0.99
136.00	135.98	0.6	82.	-0.32	1.34	103.	1.37	103.	1.94	104.	0.81	103.	1.75	104.	1.00
137.00	136.98	0.6	81.	-0.31	1.35	103.	1.38	103.	1.96	104.	0.81	103.	1.77	104.	1.00
138.00	137.98	0.6	63.	-0.31	1.36	103.	1.39	102.	1.98	104.	0.81	102.	1.78	104.	1.01
139.00	138.98	0.7	70.	-0.31	1.37	103.	1.41	102.	1.99	104.	0.82	102.	1.80	103.	1.01
140.00	139.98	0.7	63.	-0.30	1.38	102.	1.42	102.	2.01	104.	0.82	102.	1.81	103.	1.02
141.00	140.98	0.8	78.	-0.30	1.40	102.	1.43	101.	2.03	104.	0.82	102.	1.83	103.	1.02
142.00	141.98	1.0	80.	-0.30	1.41	102.	1.44	101.	2.06	104.	0.83	101.	1.85	103.	1.03
143.00	142.98	1.1	82.	-0.29	1.43	102.	1.46	101.	2.08	103.	0.84	101.	1.87	103.	1.04
144.00	143.98	0.9	81.	-0.29	1.45	101.	1.48	101.	2.10	103.	0.85	101.	1.89	102.	1.06
145.00	144.98	0.7	67.	-0.29	1.46	101.	1.49	100.	2.13	103.	0.85	101.	1.91	102.	1.06
146.00	145.98	1.0	66.	-0.28	1.47	101.	1.50	100.	2.15	103.	0.86	100.	1.93	102.	1.07
147.00	146.98	0.7	61.	-0.28	1.49	101.	1.51	100.	2.16	103.	0.86	100.	1.95	102.	1.08
148.00	147.98	0.6	54.	-0.27	1.50	100.	1.52	100.	2.18	102.	0.86	100.	1.96	101.	1.08
149.00	148.98	0.7	75.	-0.27	1.51	100.	1.53	99.	2.20	102.	0.87	99.	1.98	101.	1.09
150.00	149.98	0.6	70.	-0.27	1.52	100.	1.54	99.	2.22	102.	0.87	99.	1.99	101.	1.09
151.00	150.98	0.5	69.	-0.26	1.53	100.	1.55	99.	2.24	102.	0.87	99.	2.01	101.	1.10
152.00	151.98	0.3	92.	-0.26	1.54	100.	1.56	98.	2.25	102.	0.87	99.	2.02	101.	1.10
153.00	152.98	0.3	90.	-0.25	1.54	99.	1.56	98.	2.26	102.	0.87	99.	2.03	101.	1.10
154.00	153.98	0.3	91.	-0.25	1.54	99.	1.56	98.	2.27	102.	0.86	99.	2.03	101.	1.10
155.00	154.98	0.4	40.	-0.26	1.55	99.	1.57	98.	2.28	102.	0.86	99.	2.04	101.	1.10
156.00	155.98	0.5	46.	-0.25	1.56	99.	1.58	98.	2.29	102.	0.86	98.	2.05	101.	1.10
157.00	156.98	0.4	65.	-0.25	1.56	99.	1.58	98.	2.31	102.	0.86	98.	2.06	101.	1.10
158.00	157.98	0.3	51.	-0.24	1.57	99.	1.59	97.	2.32	102.	0.86	98.	2.07	101.	1.10
159.00	158.98	0.3	51.	-0.24	1.57	99.	1.59	97.	2.33	102.	0.86	98.	2.08	101.	1.10
160.00	159.98	0.4	41.	-0.23	1.58	98.	1.60	97.	2.34	102.	0.86	97.	2.09	101.	1.10
161.00	160.98	0.5	117.	-0.23	1.58	98.	1.60	97.	2.35	102.	0.85	97.	2.10	101.	1.10
162.00	161.98	1.7	88.	-0.24	1.60	99.	1.62	97.	2.38	103.	0.87	97.	2.13	101.	1.12
163.00	162.98	1.2	79.	-0.24	1.63	98.	1.65	97.	2.41	102.	0.88	97.	2.16	100.	1.14
164.00	163.98	1.3	67.	-0.23	1.65	98.	1.67	97.	2.44	102.	0.90	97.	2.18	100.	1.15
165.00	164.98	0.7	74.	-0.22	1.67	98.	1.68	96.	2.46	101.	0.90	97.	2.20	100.	1.16
166.00	165.98	0.7	58.	-0.22	1.68	97.	1.70	96.	2.48	101.	0.91	96.	2.22	99.	1.17
167.00	166.98	0.6	72.	-0.21	1.69	97.	1.71	96.	2.50	101.	0.91	96.	2.24	99.	1.18
168.00	167.98	0.9	54.	-0.20	1.70	97.	1.72	95.	2.52	101.	0.92	96.	2.25	99.	1.18

DEPTHS log	DEPTHS true	BOREHOLE tilt	BOREHOLE AZI	AXIAL CO-ORDS. North	AXIAL CO-ORDS. East	POLAR brng	POLAR radius	POLAR ERROR CO-ORDINATES (maximum & typical) brng	radius	brng	radius	brng	radius	brng	radius
169.00	168.98	1.1	56.	-0.20	1.72	96.	1.73	95.	2.54	100.	0.92	95.	2.27	99.	1.19
170.00	169.98	1.0	73.	-0.19	1.73	96.	1.74	95.	2.56	100.	0.93	95.	2.29	98.	1.20
171.00	170.98	1.1	59.	-0.18	1.75	96.	1.76	94.	2.58	100.	0.94	95.	2.31	98.	1.21
172.00	171.98	0.9	59.	-0.17	1.76	96.	1.77	94.	2.61	100.	0.94	95.	2.33	98.	1.22
173.00	172.98	0.9	56.	-0.17	1.78	95.	1.78	94.	2.63	99.	0.95	94.	2.34	97.	1.22
174.00	173.98	0.7	57.	-0.16	1.79	95.	1.80	94.	2.65	99.	0.95	94.	2.36	97.	1.23
175.00	174.98	1.1	55.	-0.15	1.80	95.	1.81	93.	2.67	99.	0.96	94.	2.38	97.	1.24
176.00	175.98	0.7	65.	-0.15	1.81	95.	1.82	93.	2.68	99.	0.96	94.	2.40	97.	1.25
177.00	176.98	0.7	48.	-0.14	1.82	94.	1.83	93.	2.70	99.	0.96	93.	2.41	97.	1.25
178.00	177.98	0.8	54.	-0.13	1.83	94.	1.84	93.	2.72	98.	0.96	93.	2.42	96.	1.25
179.00	178.98	0.6	59.	-0.13	1.84	94.	1.85	92.	2.73	98.	0.96	93.	2.44	96.	1.26
180.00	179.98	0.7	50.	-0.12	1.85	94.	1.85	92.	2.75	98.	0.97	93.	2.45	96.	1.26
181.00	180.98	0.6	48.	-0.12	1.86	94.	1.86	92.	2.76	98.	0.97	92.	2.46	96.	1.26
182.00	181.98	0.7	53.	-0.11	1.87	93.	1.87	92.	2.77	98.	0.97	92.	2.47	96.	1.27
183.00	182.98	0.7	39.	-0.10	1.87	93.	1.88	91.	2.79	98.	0.97	92.	2.48	96.	1.27
184.00	183.98	0.6	33.	-0.09	1.88	93.	1.88	91.	2.80	98.	0.97	91.	2.49	95.	1.27
185.00	184.98	0.4	31.	-0.09	1.88	93.	1.89	91.	2.81	98.	0.97	91.	2.50	95.	1.27
186.00	185.98	0.4	355.	-0.08	1.89	92.	1.89	91.	2.81	98.	0.97	91.	2.51	95.	1.27
187.00	186.98	0.3	384.	-0.08	1.89	92.	1.89	90.	2.82	98.	0.97	91.	2.51	95.	1.27
188.00	187.98	0.3	33.	-0.07	1.89	92.	1.89	90.	2.83	98.	0.97	91.	2.52	95.	1.27
189.00	188.98	0.1	59.	-0.07	1.90	92.	1.90	90.	2.84	99.	0.96	91.	2.53	95.	1.27
190.00	189.98	0.4	91.	-0.07	1.90	92.	1.91	90.	2.86	99.	0.96	91.	2.54	95.	1.27
191.00	190.98	0.6	92.	-0.07	1.91	92.	1.91	90.	2.88	99.	0.96	91.	2.56	95.	1.28
192.00	191.98	0.6	96.	-0.07	1.92	92.	1.92	90.	2.89	99.	0.96	91.	2.57	95.	1.28
193.00	192.98	0.8	94.	-0.08	1.93	92.	1.93	90.	2.91	99.	0.96	91.	2.59	95.	1.28
194.00	193.98	0.7	88.	-0.08	1.95	92.	1.95	90.	2.93	98.	0.97	91.	2.60	95.	1.29
195.00	194.98	0.6	72.	-0.07	1.96	92.	1.96	90.	2.95	98.	0.97	91.	2.62	95.	1.30
196.00	195.98	0.4	81.	-0.07	1.97	92.	1.97	90.	2.97	98.	0.97	91.	2.64	95.	1.30
197.00	196.98	1.7	51.	-0.06	1.98	92.	1.98	90.	3.00	98.	0.98	90.	2.66	95.	1.31
198.00	197.98	1.4	34.	-0.04	2.00	91.	2.00	89.	3.02	97.	0.99	90.	2.68	94.	1.33
199.00	198.98	1.3	384.	-0.02	2.02	91.	2.02	89.	3.04	96.	1.00	89.	2.70	93.	1.34
200.00	199.98	1.1	379.	0.00	2.02	90.	2.02	88.	3.05	96.	1.00	89.	2.71	93.	1.34
201.00	200.98	1.0	360.	0.02	2.03	89.	2.03	88.	3.06	95.	1.00	88.	2.72	92.	1.34
202.00	201.98	0.8	376.	0.03	2.03	89.	2.03	87.	3.06	95.	1.00	88.	2.72	92.	1.34
203.00	202.98	0.8	365.	0.05	2.03	89.	2.03	87.	3.07	94.	1.00	87.	2.72	91.	1.34
204.00	203.98	0.8	352.	0.06	2.03	88.	2.03	86.	3.07	94.	1.00	87.	2.72	91.	1.34
205.00	204.98	0.9	360.	0.08	2.03	88.	2.03	86.	3.07	94.	1.00	86.	2.72	91.	1.34
206.00	205.98	0.7	353.	0.09	2.03	87.	2.03	86.	3.07	93.	1.00	86.	2.73	90.	1.34
207.00	206.98	0.8	374.	0.11	2.03	87.	2.04	85.	3.08	93.	1.00	86.	2.73	90.	1.35
208.00	207.98	1.0	361.	0.12	2.03	87.	2.04	85.	3.08	92.	1.00	85.	2.73	89.	1.35
209.00	208.98	0.9	355.	0.14	2.03	86.	2.04	84.	3.08	92.	1.00	85.	2.74	89.	1.35
210.00	209.98	0.8	354.	0.15	2.03	86.	2.04	84.	3.09	92.	1.00	84.	2.74	89.	1.35
211.00	210.98	1.1	354.	0.17	2.04	85.	2.04	83.	3.09	91.	1.00	84.	2.74	88.	1.35
212.00	211.98	1.1	354.	0.19	2.04	85.	2.04	83.	3.09	91.	1.00	83.	2.74	88.	1.35
213.00	212.98	0.9	347.	0.21	2.03	84.	2.04	82.	3.09	90.	1.00	83.	2.74	87.	1.35
214.00	213.98	0.9	345.	0.22	2.03	84.	2.04	82.	3.09	90.	1.00	82.	2.74	87.	1.35
215.00	214.98	1.0	354.	0.24	2.03	83.	2.04	81.	3.10	89.	1.00	82.	2.74	86.	1.35
216.00	215.98	0.9	362.	0.25	2.03	83.	2.04	81.	3.10	89.	1.00	81.	2.75	86.	1.35
217.00	216.98	1.0	346.	0.27	2.03	83.	2.04	81.	3.10	89.	1.00	81.	2.75	86.	1.35
218.00	217.98	0.9	347.	0.28	2.02	82.	2.04	80.	3.10	88.	1.00	81.	2.75	85.	1.34

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All co-ordinates with respect to True North

DEPTHS		BOREHOLE		AXIAL CO-ORDS.		POLAR		POLAR ERROR CO-ORDINATES (maximum & typical)							
log	true	tilt	AZI	North	East	brng	radius	brng	radius	brng	radius	brng	radius	brng	radius
219.00	218.98	0.9	352.	0.30	2.02	82.	2.04	80.	3.10	88.	1.00	80.	2.75	85.	1.34
220.00	219.98	1.0	354.	0.32	2.02	81.	2.04	79.	3.10	87.	1.00	80.	2.75	84.	1.34
221.00	220.98	1.0	352.	0.33	2.02	81.	2.04	79.	3.10	87.	1.00	79.	2.75	84.	1.34
222.00	221.98	1.2	342.	0.35	2.01	80.	2.04	78.	3.10	86.	0.99	79.	2.75	83.	1.34
223.00	222.97	1.0	341.	0.37	2.01	80.	2.04	78.	3.10	86.	0.99	78.	2.75	83.	1.34
224.00	223.97	0.9	349.	0.38	2.01	79.	2.04	77.	3.10	85.	0.99	78.	2.75	82.	1.34
225.00	224.97	1.1	349.	0.40	2.01	79.	2.05	77.	3.11	85.	0.99	77.	2.75	82.	1.34
226.00	225.97	1.1	347.	0.42	2.00	78.	2.05	76.	3.11	84.	0.99	77.	2.75	81.	1.34
227.00	226.97	1.0	351.	0.43	2.00	78.	2.05	76.	3.11	84.	0.99	76.	2.75	81.	1.34
228.00	227.97	1.0	346.	0.45	2.00	77.	2.05	75.	3.11	83.	0.99	76.	2.76	80.	1.34
229.00	228.97	0.8	339.	0.47	1.99	77.	2.05	75.	3.11	83.	0.99	75.	2.76	80.	1.34
230.00	229.97	0.8	358.	0.48	1.99	76.	2.05	74.	3.11	83.	0.99	75.	2.76	79.	1.34
231.00	230.97	0.8	339.	0.50	1.99	76.	2.05	74.	3.12	82.	0.99	74.	2.76	79.	1.34
232.00	231.97	0.9	345.	0.51	1.98	76.	2.05	74.	3.12	82.	0.99	74.	2.76	79.	1.34
233.00	232.97	1.1	345.	0.53	1.98	75.	2.05	73.	3.12	81.	0.99	74.	2.76	78.	1.34
234.00	233.97	0.8	353.	0.54	1.98	75.	2.05	73.	3.12	81.	0.99	73.	2.76	78.	1.34
235.00	234.97	0.9	337.	0.56	1.97	74.	2.05	72.	3.12	80.	0.99	73.	2.77	77.	1.34
236.00	235.97	0.6	363.	0.58	1.97	74.	2.05	72.	3.12	80.	0.99	72.	2.77	77.	1.34
237.00	236.97	1.6	373.	0.60	1.98	73.	2.07	71.	3.15	79.	1.00	72.	2.79	76.	1.35
238.00	237.97	1.4	360.	0.63	1.98	72.	2.08	71.	3.17	78.	1.00	71.	2.80	75.	1.36
239.00	238.97	1.3	348.	0.65	1.98	72.	2.09	70.	3.17	77.	1.00	70.	2.81	74.	1.36
239.90	239.87	1.1	349.	0.67	1.98	71.	2.09	70.	3.18	76.	1.01	70.	2.82	74.	1.37

The Adams River
Project 1982
Confidential Analyses
(Results from 1979 Exploration)

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CROWS NEST RESC[illegible]ALYSIS REPORT

AREA: ADAMS HOLE NO. 79-01 DATE: June 1/80 ANALYST Bernie Hudyma

LAB. NO.	SAMPLE NO.	SEAM	INTERVAL (METRES)	FRACTION	% AIR DRY LOSS	% MOISTURE	% ASH	% V.M.	% F.C.	F.S.I.	SULFUR	% YIELD	BTU/LB	CALC BASI
79-427	1		27.66-29.77	RAW	1.17	1.10	4.46			3½				ADB
														ARB
							4.51							DB
				1.5 FLOAT		[illegible].00	2.88	24.42	71.70	3½				ADB
							2.91	24.67	72.42					DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
79-428	2		32.38-33.01	RAW	1.72	.94	6.74			1½				ADB
														ARB
							6.80							DB
				1.5 FLOAT		1.02	4.65	23.18	71.15	2½				ADB
							4.70	23.42	71.88					DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
				RAW										ADB
														ARB
														DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
				FLOAT										ADB

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Core

CROWS NEST RE. ‹CES' ALYSIS REPORT

AREA: ADAMS HOLE NO. 79-01 DATE: JAN 7/81 ANALYST BERNIE

LAB. NO.	SAMPLE NO.	SEAM	INTERVAL (METRES)	FRACTION	% AIR DRY LOSS	% MOISTURE	% ASH	% V.M.	% F.C.	F.S.I.	SULFUR	% YIELD	Kcal/kg
				RAW							.69		7943
79-(427	1		27.66 -										
+ 428)	Plus		33.01										
	2			FLOAT									
				FLOAT									
				FLOAT									
				RAW									
				FLOAT									
				FLOAT									
				FLOAT									
				RAW									
				FLOAT									
				FLOAT									
				FLOAT									

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CROWS NEST RES[illegible]CES [illegible]ALYSIS REPORT

AREA: ADAMS HOLE NO. 79-02 DATE: June 1/80 ANALYST Bernie Hudyma

LAB. NO.	SAMPLE NO.	SEAM	INTERVAL (METRES)	FRACTION	% AIR DRY LOSS	% MOISTURE	% ASH	% V.M.	% F.C.	F.S.I.	SULFUR	% YIELD	BTU/ LB	CALC BASI
79-429	3a		45.69-47.63	RAW	.83	.89	4.67			1½				ADB
														ARB
							4.73							DB
				1.5 FLOAT		1.47	2.62	22.80	73.11	1½				ADB
							2.66	23.14	74.20					DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
79-430	3B		47.63-48.41	RAW	3.90	.93	4.35			1½				ADB
														ARB
							4.39							DB
				1.5 FLOAT		1.35	2.19	22.80	73.70	1½				ADB
							2.22	23.11	74.67					DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
				RAW										ADB
														ARB
														DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
				FLOAT										AD

685

CROWS NEST RESOU ALYSIS REPORT

AREA: ADAMS HOLE NO. 79-02 DATE: JAN. 7/81 ANALYST BERNIE

LAB. NO.	SAMPLE NO.	SEAM	INTERVAL (METRES)	FRACTION	% AIR DRY LOSS	% MOISTURE	% ASH	% V.M.	% F.C.	F.S.I.	SULFUR	% YIELD	Kcal/ kg	CAL BAS
				RAW							.57		7855	AD
79 -			45.69 -											AR
														DB
(429 + 430)			48.41	FLOAT										AD
														DB
	3A			FLOAT										AD
	+													DB
	3B			FLOAT										AD
														DB
				RAW										AD
														AR
														DB
				FLOAT										AD
														D
				FLOAT										A
														D
				FLOAT										A
														D
				RAW										A
														A
														D
				FLOAT										A
														D
				FLOAT										A
														D
				FLOAT										A

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CROWS NEST RESOURCES ANALYSIS REPORT

AREA: ADAMS HOLE NO. 79-06 DATE: June 1/80 ANALYST Bernie Hudyma

LAB. NO.	SAMPLE NO.	SEAM	INTERVAL (METRES)	FRACTION	% AIR DRY LOSS	% MOISTURE	% ASH	% V.M.	% F.C.	F.S.I.	SULFUR	% YIELD	BTU/ LB	CALC BASI
79-434	5A		74.86-75.36	RAW	1.10	1.03	16.28			1½				ADB
														ARB
							16.45							DB
				1.5 FLOAT		1.30	4.61	29.32	64.77	1½				ADB
							4.67	29.71	65.62					DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
79-435	5B	Rock Bank	75.36-75.79	RAW	.35	.79	80.38			0				ADB
														ARB
							81.02							DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
79-436	5C		75.79-77.20	RAW	.95	1.30	5.52			1½				ADB
														ARB
							5.59							DB
				1.5 FLOAT		1.48	3.40	27.12	68.00	1½				ADB
							3.45	27.53	69.02					DB
				FLOAT										ADB
														DB
				FLOAT										ADB

686

Rob. C.

CROWS NEST RESOURCE ALYSIS REPORT Core

AREA: ADAMS HOLE NO. 79-06 DATE: JAN. 1/81 ANALYST BERNIE

LAB. NO.	SAMPLE NO.	SEAM	INTERVAL (METRES)	FRACTION	% AIR DRY LOSS	% MOISTURE	% ASH	% V.M.	% F.C.	F.S.I.	SULFUR	% YIELD	Kcal/kg	CALC. BASIS
				RAW										ADB
79 -	5A +		(74.86 -											ARB
(434 +	5C		75.36)											DB
436)			PLUS	1.65 FLOAT							.66	89	7677	ADB
			(75.79 -											DB
			77.20)	FLOAT										ADB
														DB
				FLOAT										ADB
														DB
				RAW										ADB
														ARB
														DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
				RAW										ADB
														ARB
														DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
				FLOAT										ADB

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CROWSNEST [illegible]OURCES LIMITED

ATTN: Ken McCullough

LORING LABORATORIES LTD

CERTIFICATE OF COAL TESTING

FILE NO.: 1[illegible]

DATE: May 30, 1980

SAMPLE NO.	IDENTIFICATION	SAMPLE TYPE	% RECOVERY SINK	% RECOVERY FLOAT		REC'D % H_2O	% H_2O	% VCL MATTER	% ASH	% FIXED CARBON	% S	BTU /LB.	F.S.I.	
ADAMS	HOLE # 79-04													
	SAMPLE													
79-431	4A (105.24 – 106.34)	1.5 Float			Air Dried	–	1.86	29.90	.28	67.96	8.00	15,651	12	
					Dry Basis	–	–	30.47	.29	69.24	8.15	15,948		→ 8864 Kcal/kgm
79-433	4C (106.42 – 107.48)	1.5 Float			Air Dried	–	3.30	29.80	.24	66.66	8.08	15,645	12	
					Dry Basis	–	–	30.82	.25	68.93	8.36	16,179		→ 8992 Kcal/kgm

D. Endell

686

Core

CROWS NEST RESOL[illegible] ALYSIS REPORT

AREA: ADAMS HOLE NO. 79-04 DATE: June 1, 1980 ANALYST Bernie

LAB. NO.	SAMPLE NO.	SEAM	INTERVAL (METRES)	FRACTION	% AIR DRY LOSS	% MOISTURE	% ASH	% V.M.	% F.C.	F.S.I.	SULFUR	% YIELD	Kcal Kg	CALC BASIS
79-431	4A		105.24 - 106.34	RAW	.29	.18	2.73			9+				ADB
														ARB
							2.73							DB
				1.5 FLOAT		1.50	.37	29.97	68.16	9+			8678	ADB
							.37	30.43	69.20				8810	DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
79-432	4B	Rock Band	106.34-106.42	RAW	.04	.16	82.83			1				ADB
							82.96							ARB
														DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
9-433	4C		106.42 - 107.48	RAW	1.63	.32	5.94			9+				ADB
														ARB
							5.96							DB
				1,5 FLOAT		2.77	.42	30.65	66.16	9+			8749	ADB
							.43	31.52	68.05				8998	DB
				FLOAT										ADB
														DB
				FLOAT										ADB

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686

002722
PINE
PASS

FIELD REPORT ONE

Job Ref.

Eng. Ref. | Client CNRL | Invoice No.

Eng. 1 RGM | Well ADAM 82-1 | Date 08/04/82

Eng. 2 RW | Area HUDSON HOPE | Unit No. HELI

Witness | Country | Truck No.

GENERAL

RUN No.	
DATE	080482
WELL NO.	ADAM821
P DATUM	TP-CSG
LOG MEAS FROM	TP-CSG
ELEV. OF MP	
SCALE	200
DEPTH DRILL	* 799 FT
DEPTH BPB	→ 242 M
BIT SIZE 1	NQ
TO	* 799 FT
BIT SIZE 2	
TO	
BIT SIZE 3	
TO	
CASING SIZE 1	
TO	~ 80 M
CASING SIZE 2	
TO	
CASING SIZE 3	
TO	
COUNTRY	
COMPANY	
FIELD	

TIME

SET BY CLIENT	11:30 AM
LEFT BASE	11:30 AM
ARR LOCATION	4:45 PM
START OP.	5:20 PM
OP. TIME	
DOWNTIME	1 hr
RETURN BASE	
TOTAL TIME	
MILEAGE	
GEN. NO.	
GEN. HRS.	

CALIBRATIONS

	Coeff cal/cps	
GAMMA 1	= 1.71	
SONDE NO. 198		SOURCE NO. —
GAMMA 2 X	X	
SONDE NO. X		SOURCE NO X
LSD	= 7.10	
SONDE NO 198		SOURCE NO
BIRD	= 7.10	
SONDE NO 198		SOURCE NO
NEUTRON	= .776	
SONDE NO 9		SOURCE NO

CALIPER

(1) 7 ins. = 924 cps

(2) ins. = cps

(3) ins. = cps

(4) 2 ins. = 538 cps

SONDE NO 198

MUD DETAILS

TYPE	WATER	RM	ΩM @ C	WATER LEVEL	
S.G. gm/cc		RMF	ΩM @ C	BHT	
VISC secs.		RMC	ΩM @ C	OTHER	

OTHER DETAILS

EXPENSES		SPARES USED	BREAKDOWNS	LT	COND.
ALLOWANCES: Eng. 1					
Eng. 2					
PETROL					
OTHER (specify)					
TOTAL					

COMMENTS

DRY HOLE. CCS USED

PEN OFFSET LSD 2.83

Form 962

FIELD REPORT TWO

Job Ref. CNRL (Hudson Hope) **Well Number** ADAM 82-1 **Date** 08/04/82 & 08/05/82

Cassette Number	Channel Number	Log Type	Log Label	Depths From	Depths To	Scales Left	Scales Right	Units per 1/4 Div.	Calib. Coeff.	CPS Scale or Caliper Calib.		Speed	Time Constant	Depth Scale	Sonde No.	Source No.	Depth Correction +	Depth Correction −	Comments (including Depth Error)
1	1	γ	57.0	239	60	0	150		1.71	0	88	9	1	100	198	—			THROUGH Rods
1	2	LSD	57.0	239	60	3000	0		7.10	300	0	9	—	100	198				CALIPER NOT TAPED
1	3	BRD	57.0	239	60				7.10			9	—		198				* DRY HOLE CCS
2	1	γ	57.1	238	230	0	150		1.71	0	88	9	1	200	198	—			Det". 207 ~~210~~
2	2	LSD	57.1	238	230	6000	0		7.10	600	0	9	—	200	198		2.83		① 206-200 ② ~~190~~
2	3	BRD	57.1	238	230	25000	15000		7.10	2500	1500	9	—	200	198		2.99		③ ~~181~~
2	4	CAL	57.1	238	230	7"	2"			924	538	9	—	200	198	—	2.47 ~~24~~		* ④ 177-166
2	1 2 3 4	GEN CCS	57.2	238	0	— AS ABOVE													⑤ ~~153~~ ~~148~~
																			⑥ 140-110
3	1	RPT N-N	43.1	242	228	0	800		.776	0	800	9	[illegible]	200	9				SPEED UP @ 109
3	1	N-N	43.2	242	0	— AS ABOVE													CSG - 71 M
																			OH 8 - 105
3	6 7 9A	UCRT	26.1	240	70							9	—	—	204				

VERTICALITY/DIPMETER FIELD CALIBRATIONS

HOLE NO.	ADAM 82-1	MAG. DECLINATION	
DATE	08/05/82	VERT. SONDE NO.	204
ENGINEER	RGM/RW	DIP. SONDE NO.	

CENTRE FREQUENCY CHECK

	BEFORE LOGGING			AFTER LOGGING		
	MAX.	MIN.	C/F	MAX.	MIN.	C/F
6	253	93	173			
7	276	79	177.5			
9	262	182	222			
A	250	179	214			

CALIPER AND PAD OFFSET

(Offset above PAD 1 is positive)

Caliper Inches	CPS	Offset Pad 2	Offset Pad 3
3			
4			
5			
6			
8			
10			

Z MAG.

DEPTH	READING

OPEN CIRCUIT CPS

	BEFORE	AFTER
PAD 1		
PAD 2		
PAD 3		

COMMENTS Z = 105 cps.

CH

Depth	6	7	8	9	A
240			105		
230					
220					
210					
200					
190					
180					
170					
160					
150					
140					
130					
120					
110					
100					
90					
80					
50					
40					
30					
20					
10					

PRIME CALIB.

	X	Y	Z
MAX	219	214	200
MIN	143	138	162
CE	181	176	181

04	240	24
-04	200	200

	MAX	Min	CE
6	253	93	[illegible]
7	276	79	[illegible]
9	262	182	[illegible]
A	250	179	[illegible]

253	276	262	250
93	79	182	179
346	355	444	429
173	177.5	214	

VERTICALITY/DIPMETER CALIBRATION CERTIFICATE

Sonde Serial No. 304, Calibration Location: Upstairs.
Date Calibrated: 17/4/82 Calibrated by: RW/RK

INCLINATION CALIBRATION

Tilt Degrees	Inclination 1 (CH9) Hz	Inclination (CHA) Hz
-20	113	115
-15	145	145
-10	170	170
-8	180	180
-6	190	189
-4	200	200
-2	210	210
0	220	220
+2	230	230
+4	240	240
+6	250	250
+8	260	260
+10	270	~~269~~ 270
+15	295	295
+20	321	322

30

MAGNETOMETER CALIBRATION

Magnetometers horizontal	Magnetometer X (CH6) Hz	Magnetometer Y (CH7) Hz	Magnetometer Z (CH8) Hz
Maximum	219	214	~~[illegible]~~ 200
Minimum	143	138	162
Centre Frequency (Max + Min) /2	181	176	181

002722

FIELD REPORT ONE

Job Ref.		
Eng. Ref.	Client CNRL	Invoice No.
Eng. 1 R.W	Well GC-82-2	Date 08/13/82
Eng. 2 D.M	Area Hudson Hope	Unit No. Heli
Witness	Country Canada	Truck No. 311

GENERAL

RUN No.	
DATE	081382
WELL NO.	GC82-2
P DATUM	GL
LOG MEAS FROM	GL
ELEV. OF MP	
SCALE	200
DEPTH DRILL	736 ft
DEPTH BPB	221 m
BIT SIZE 1	NQ
TO	TD
BIT SIZE 2	
TO	
BIT SIZE 3	
TO	
CASING SIZE 1	NW
TO	37 Ft
CASING SIZE 2	
TO	
CASING SIZE 3	
TO	
COUNTRY	CAN
COMPANY	
FIELD	

TIME

SET BY CLIENT	
LEFT BASE	4:30 AM
ARR LOCATION	7:00 AM
START OP.	7:15 AM
OP. TIME	including pulling rods 4 hr 15 min
DOWNTIME	—
RETURN BASE	1:30 PM
TOTAL TIME	9 hrs
MILEAGE	266 km
GEN. NO.	220
GEN. HRS.	approx - 3 hr.

CALIBRATIONS

		Coeff cal/cps
GAMMA 1		1.59
SONDE NO. 184B	SOURCE NO.	
GAMMA 2		
SONDE NO.	SOURCE NO	
LSD		6.60
SONDE NO 184B	SOURCE NO 0028	
BRD		7.53
SONDE NO 184B	SOURCE NO 0028	
NEUTRON		6.20
SONDE NO 10	SOURCE NO 7302	

CALIPER

	ins.	cps
(1)	7	895
(2)		
(3)		
(4)	2	459

SONDE NO 184B

MUD DETAILS

TYPE	WATER & QWIK-GEL	RM	ΩM @ C	WATER LEVEL	
S.G. gm/cc		RMF	ΩM @ C	BHT	
VISC secs.		RMC	ΩM @ C	OTHER	

OTHER DETAILS

EXPENSES		SPARES USED	BREAKDOWNS	LT	COND.
ALLOWANCES: Eng. 1					
Eng. 2					
PETROL					
OTHER (specify)					
TOTAL					

COMMENTS

FIELD REPORT TWO

Job Ref. CNRL Well Number GC-82-2 Date 08/13/82

Cassette Number	Channel Number	Log Type	Log Label	Depths From	Depths To	Scales Left	Scales Right	Units per 1/4" Div.	Calib. Coeff.	CPS Scale or Caliper Calib.		Speed	Time Constant	Depth Scale	Sonde No.	Source No.	Depth Correction +	Depth Correction −	Comments (including Depth Error)
1	1234	RPT CCS	57.2	221	210		AS	BELOW				9m/m							through rods
1	1	l	57.2	221	0	0	150		1.59	0	94	9m/m	1	200	184B	0028			Details 57.4 192-185
	2	LSD	"	"	"	3000	0		6.60	300	0	9m/m	.3	"	"	"	1.27		57.5 162-145
	3	BRD	"	"	"	25k	15k		7.53	2.5k	15k	2m/m	.3	"	"	"	1.42		
	4	CAL.	"	"	"	7"	2"		X	895	459	9m/m	.3	"	"	"	.95		
2	1234	RPT CCS	57.1	221	210			AS	BELOW										open hole
	1	l	57.2	221	0	0	150		1.59	0	94	9m/m	1	200	184B	0028			Details 192-185
	2	LSD				6k	0		6.60	600	0	9m/m	.3	"	"	"	1.27		162-145
	3	BRD				25k	15k		7.53	2.5k	1.5k	2m/m	.3	"	"	"	1.42		slowed momentarily at 129
	4	CAL.				7"	2"		X	895	459	9m/m	.3	"	"	"	.95		
2	1	RPT N-N	46.1	221	210			AS	Below										
	1	N-N	46.2	221	0	0	500		6.20	0	500	9m/m	1	200	10	7202			

Form 961

GENERAL LOGS

002722

DEPTH SCALE 100

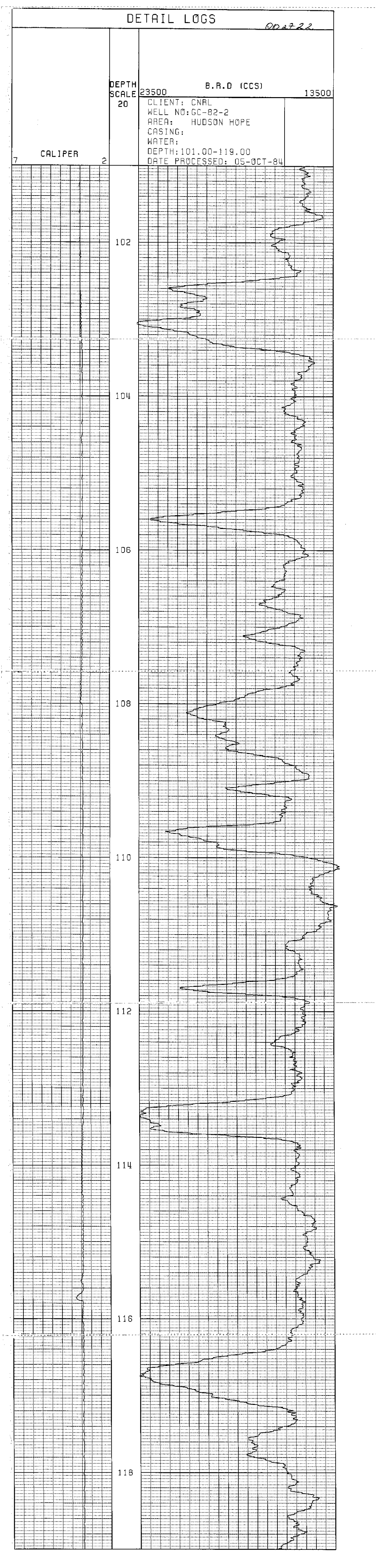
L.S.D (CCS)

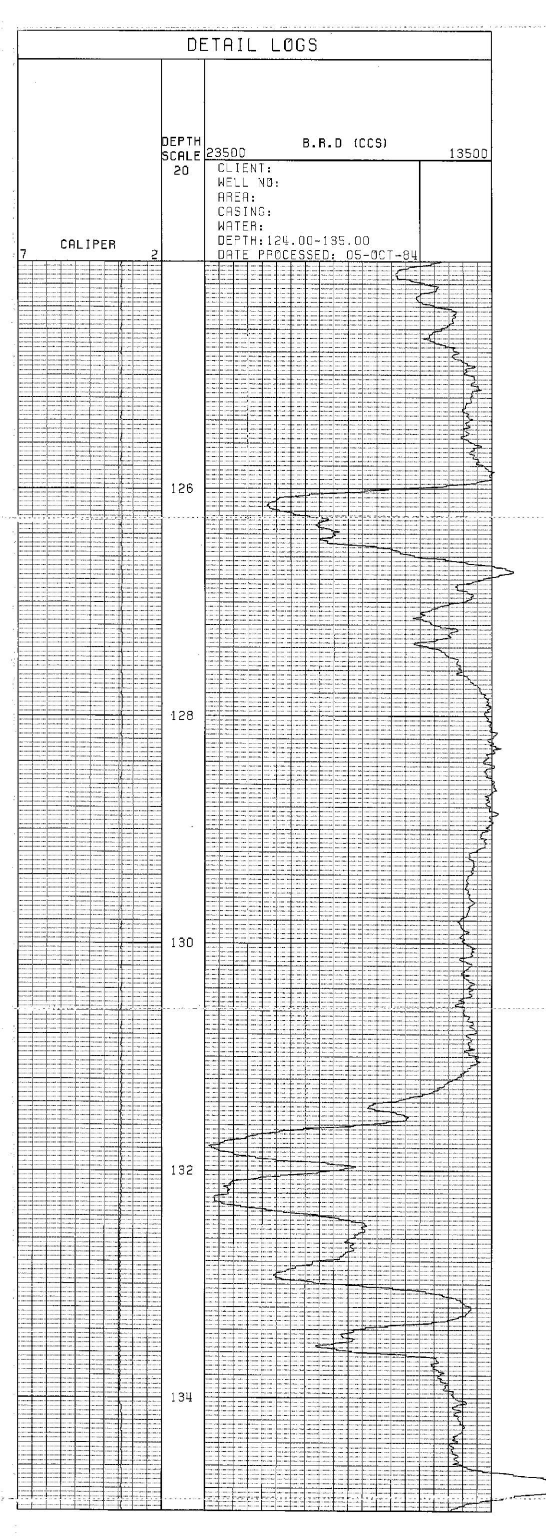
6000 -2000

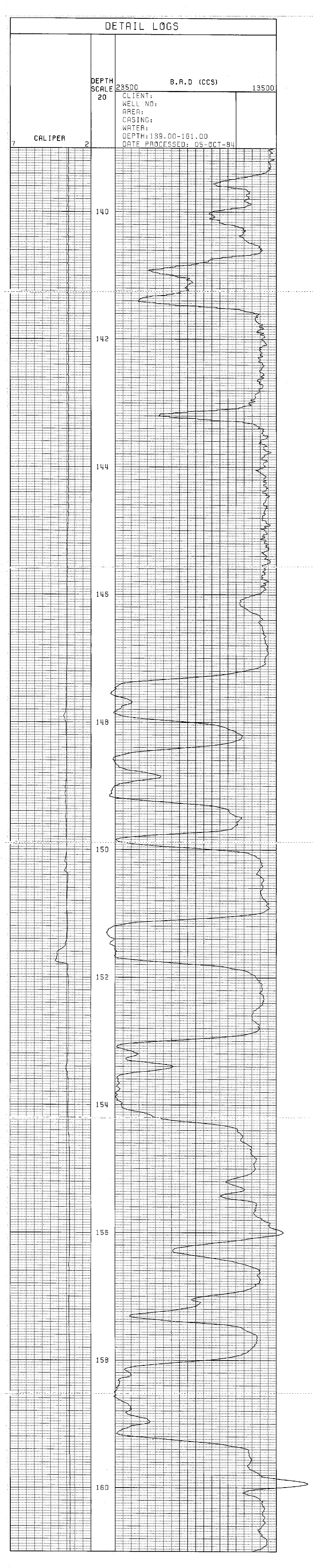
CLIENT: CNRL
WELL NO: GC-82-2
AREA: HUDSON HOPE
CASING: 12M.
WATER:
DEPTH: 0.00-222.20
DATE PROCESSED: 05-OCT-84

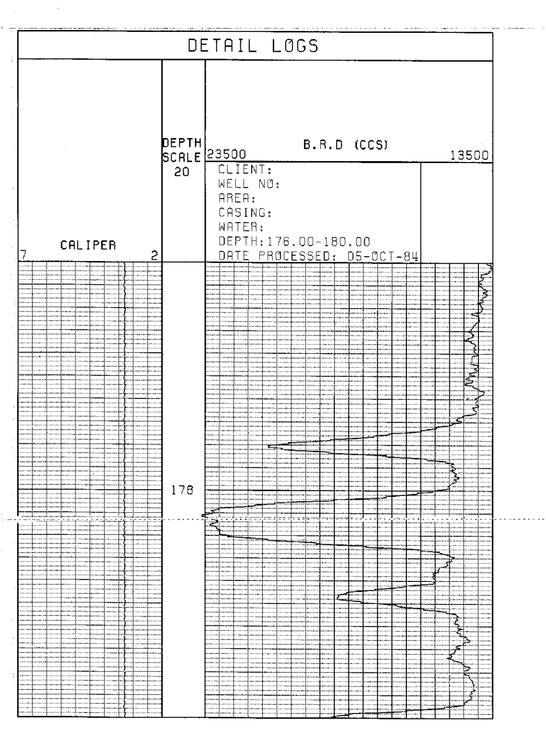
GAMMA RAY 0 150

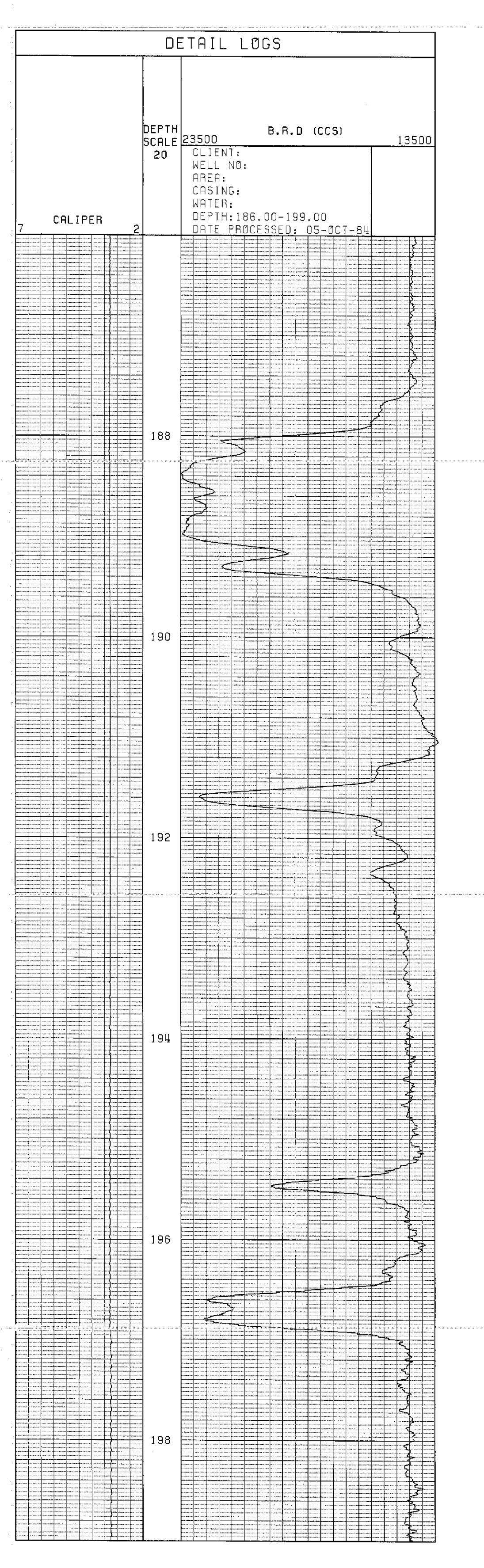
CALIPER 7 2

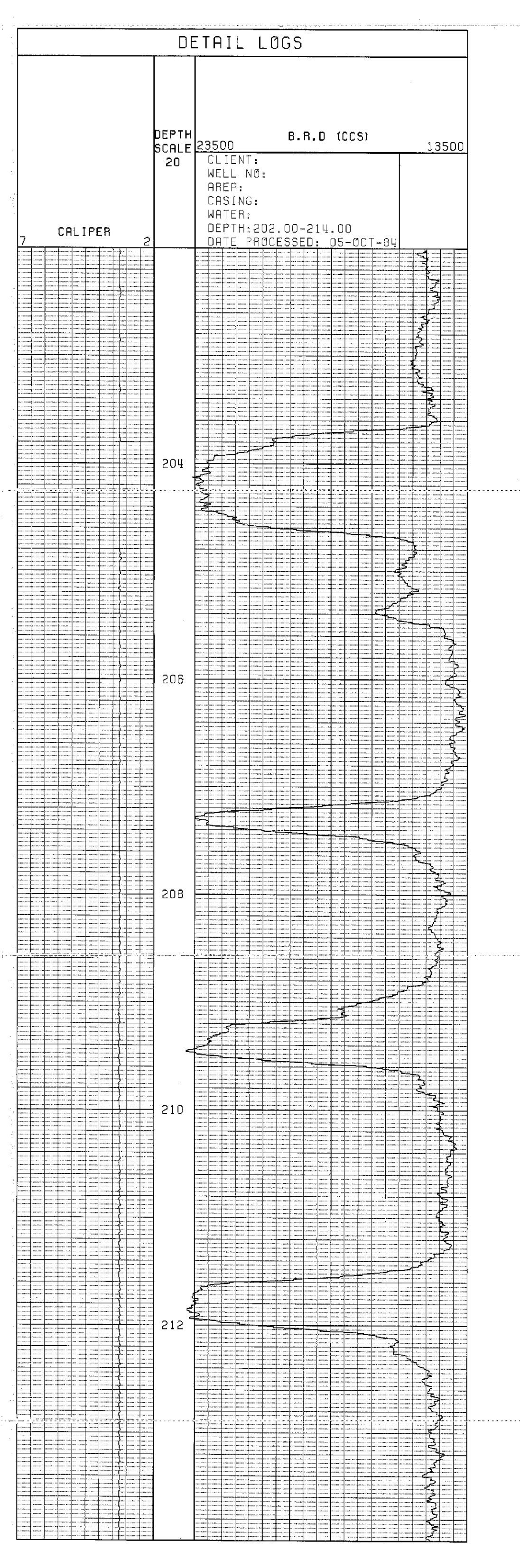

DETAIL LOGS
002722
DEPTH SCALE 20
B.R.D (CCS)
23500
13500
CLIENT: CNRL
WELL NO:GC-82-2
AREA: HUDSON HOPE
CASING:
WATER:
DEPTH:101.00-119.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2

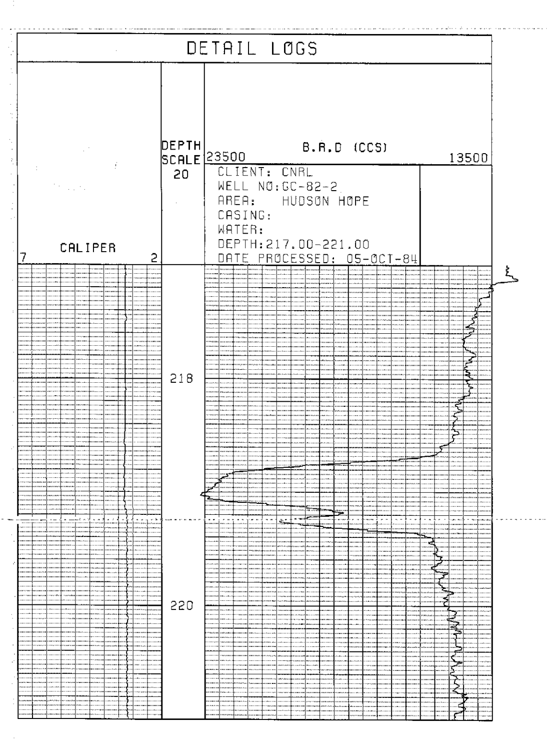

DETAIL LOGS
DEPTH SCALE 20
B.R.D (CCS)
23500
13500
CLIENT:
WELL NO:
AREA:
CASING:
WATER:
DEPTH:124.00-135.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2

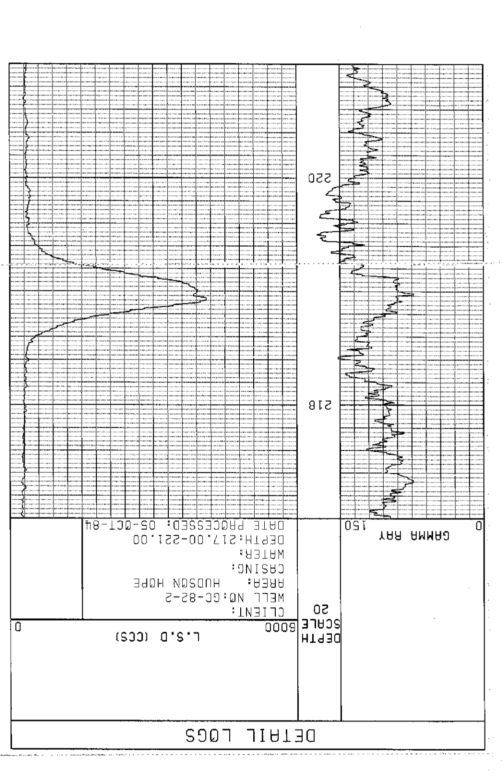

DETAIL LOGS
DEPTH SCALE 20
B.R.D (CCS)
23500
13500
CLIENT:
WELL NO:
AREA:
CASING:
WATER:
DEPTH:139.00-161.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2

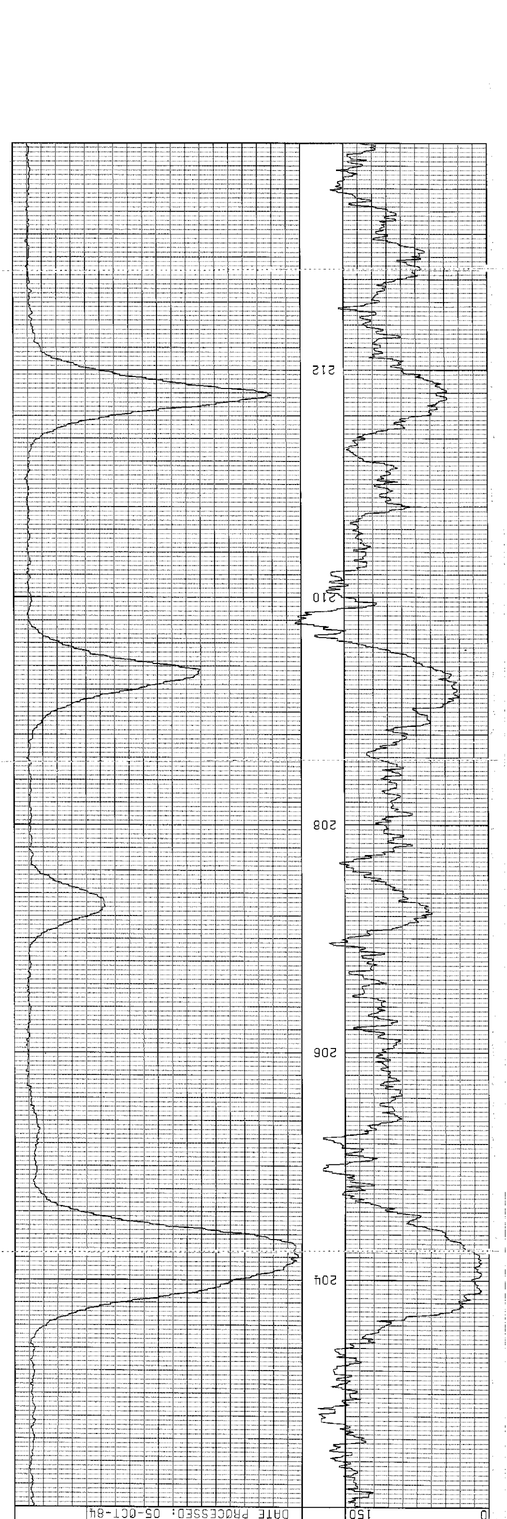

DETAIL LOGS
DEPTH SCALE 20
B.R.D (CCS)
23500
13500
CLIENT:
WELL NO:
AREA:
CASING:
WATER:
DEPTH:176.00-180.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2

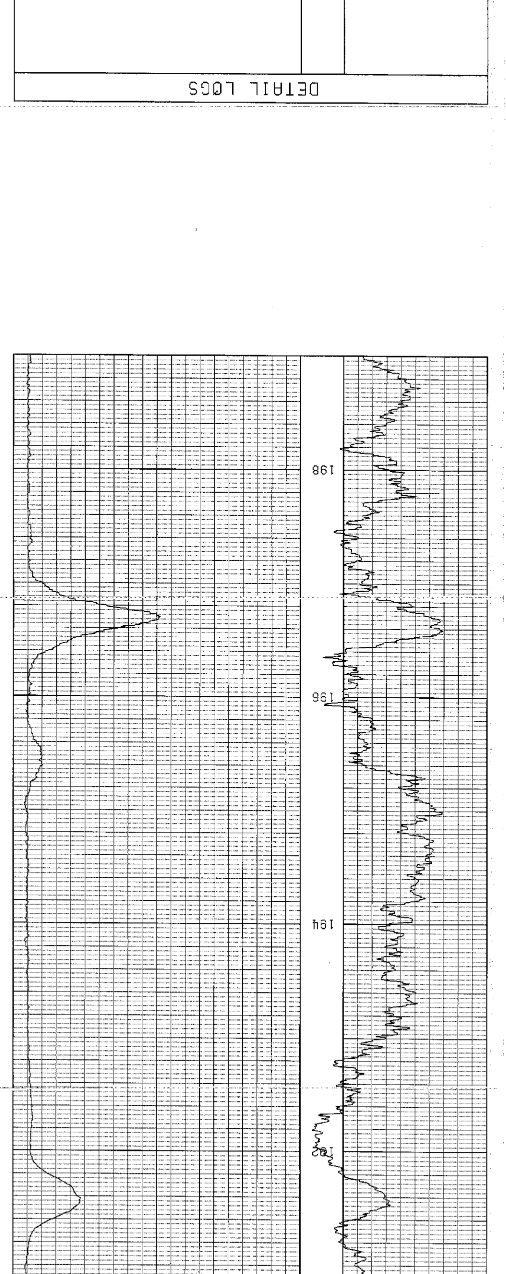

DETAIL LOGS
DEPTH SCALE 20
B.R.D (CCS)
23500
13500
CLIENT:
WELL NO:
AREA:
CASING:
WATER:
DEPTH:186.00-199.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2

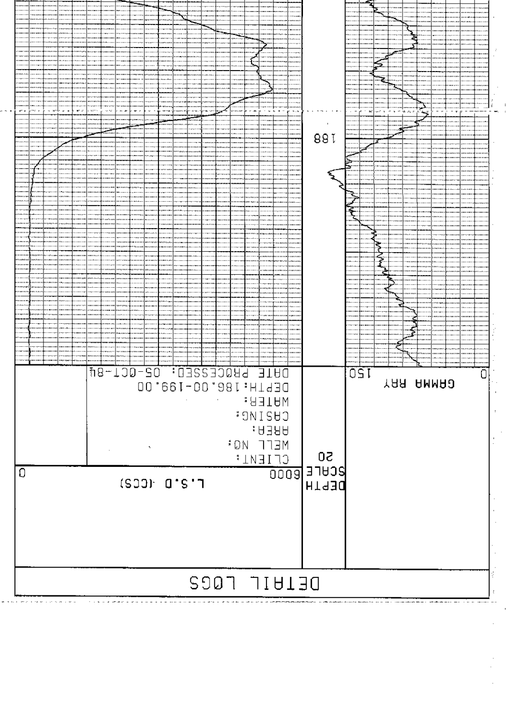

DETAIL LOGS
DEPTH SCALE 20
B.R.D (CCS)
23500
13500
CLIENT:
WELL NO:
AREA:
CASING:
WATER:
DEPTH:202.00-214.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2

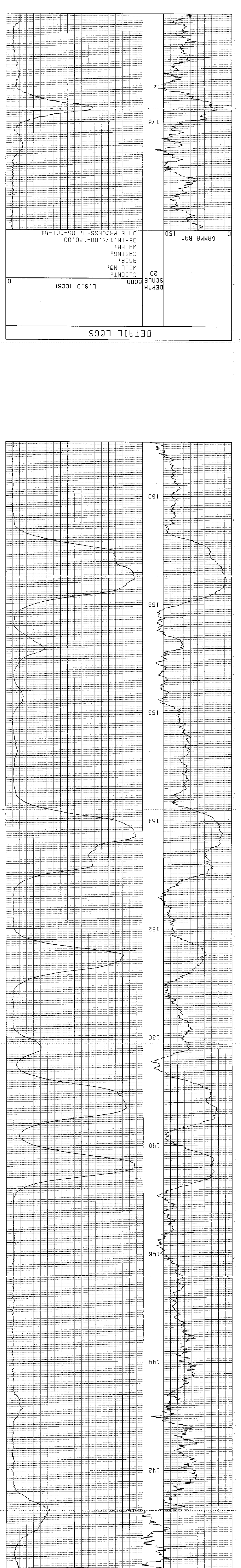

DETAIL LOGS
DEPTH SCALE 20
B.R.D (CCS)
23500
13500
CLIENT: CNRL
WELL NO:GC-82-2
AREA: HUDSON HOPE
CASING:
WATER:
DEPTH:217.00-221.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2

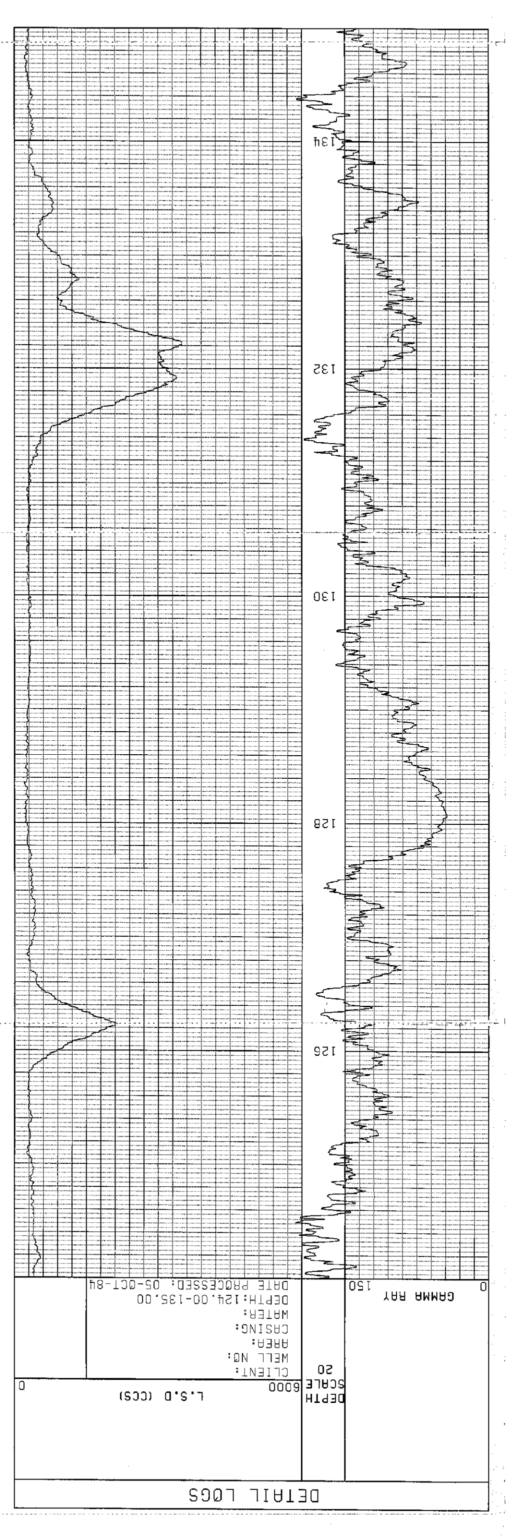


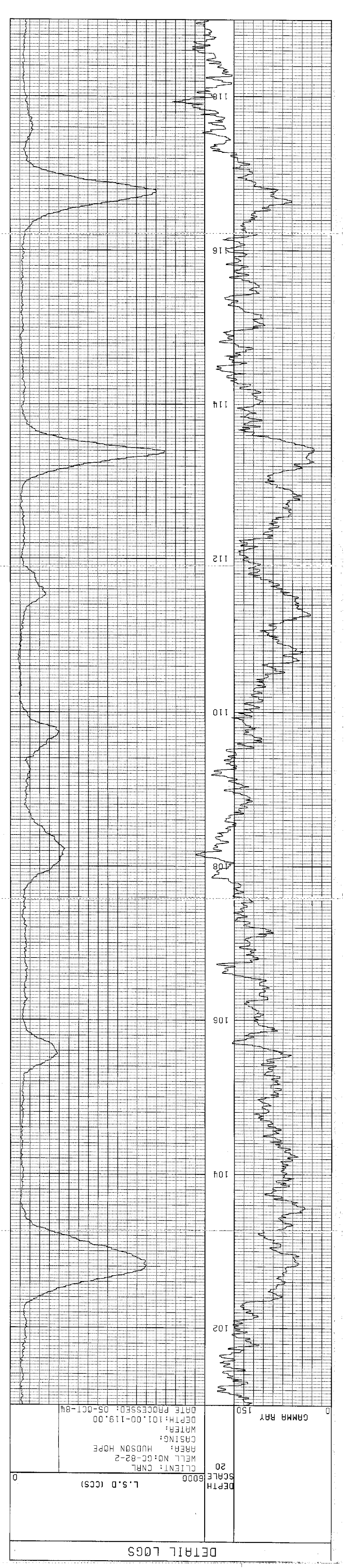










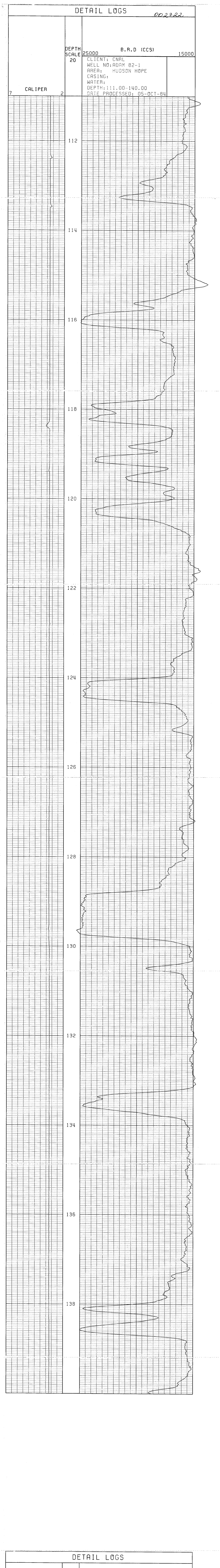


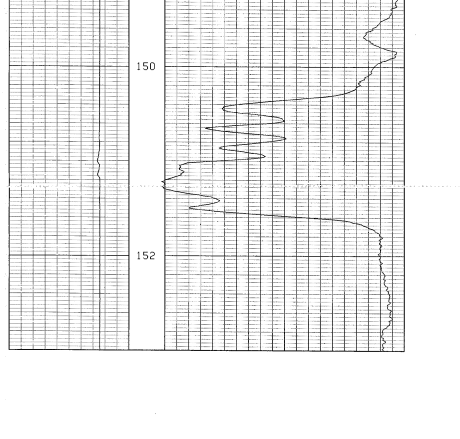
GENERAL LOGS

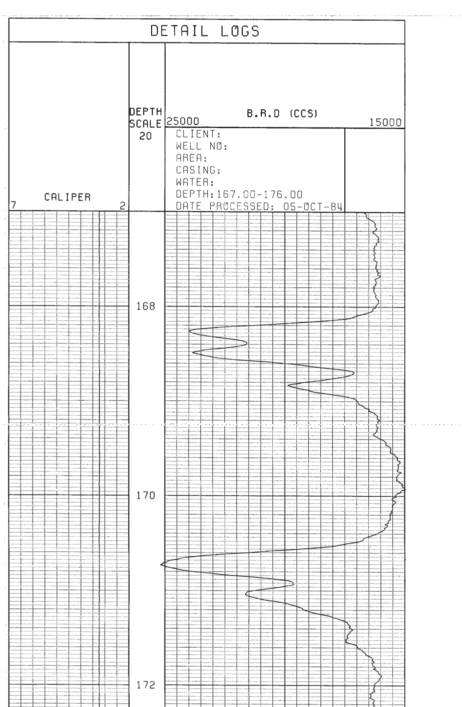
002722

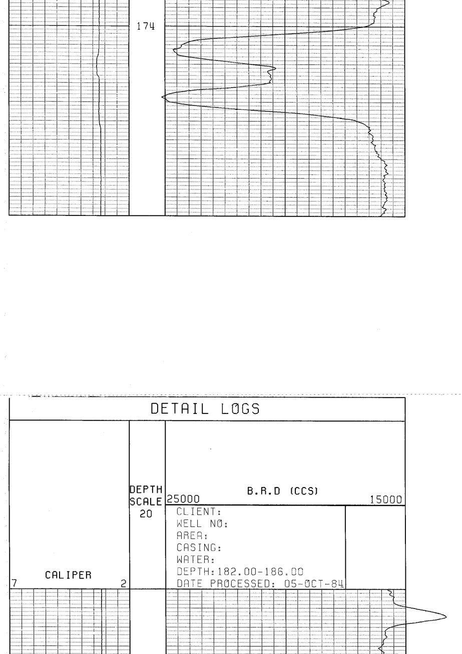
GAMMA RAY	DEPTH SCALE	NEUTRON-NEUTRON
0 — 150	100	0 — 800

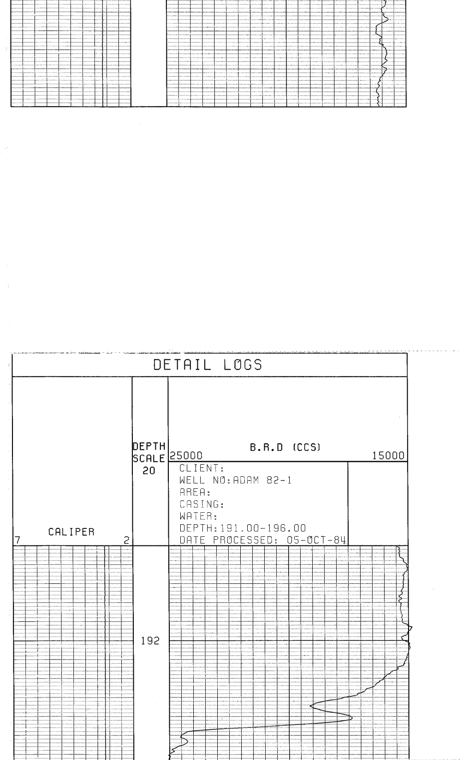
CLIENT: CNRL
WELL NO: GC-82-2
AREA: HUDSON HOPE
CASING:
WATER:
DEPTH: 0.00-221.00
DATE PROCESSED: 05-OCT-84

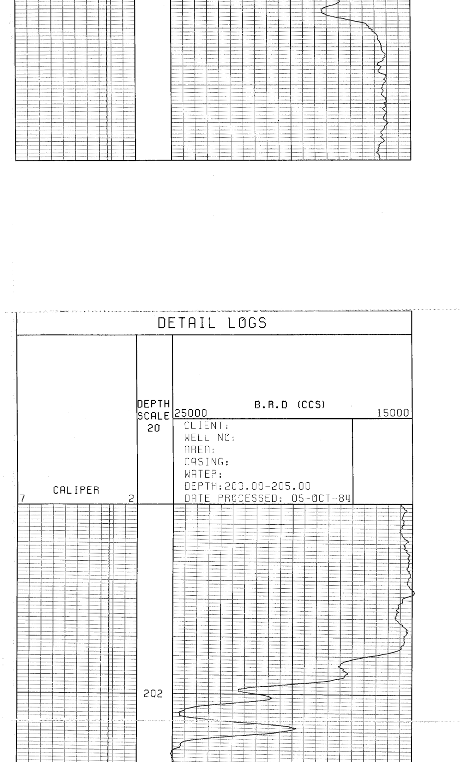

DETAIL LOGS
002722
DEPTH SCALE 20
B.R.D (CCS)
25000
15000
CLIENT: CNRL
WELL NO: ADAM 82-1
AREA: HUDSON HOPE
CASING:
WATER:
DEPTH: 111.00-140.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2
112
114
116
132
134
136
138


DETAIL LOGS
DEPTH SCALE 20
B.R.D (CCS)
25000
15000
CLIENT:
WELL NO:
AREA:
CASING:
WATER:
DEPTH: 149.00-153.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2
150
152

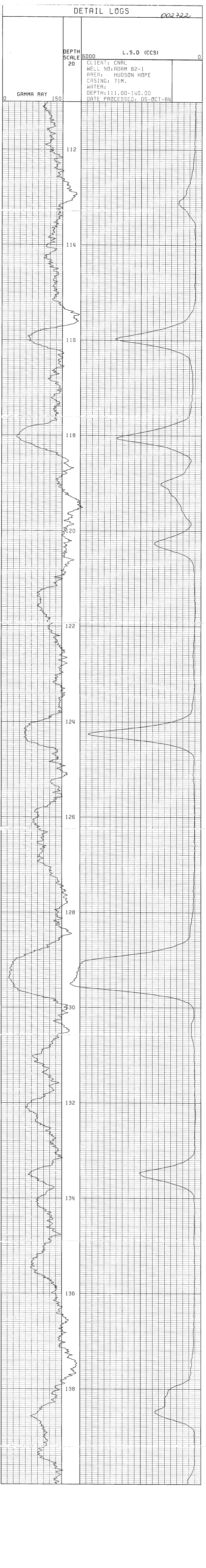

DETAIL LOGS
DEPTH SCALE 20
B.R.D (CCS)
25000
15000
CLIENT:
WELL NO:
AREA:
CASING:
WATER:
DEPTH: 167.00-176.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2
168
170
172
174


DETAIL LOGS
DEPTH SCALE 20
B.R.D (CCS)
25000
15000
CLIENT:
WELL NO:
AREA:
CASING:
WATER:
DEPTH: 182.00-186.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2
184

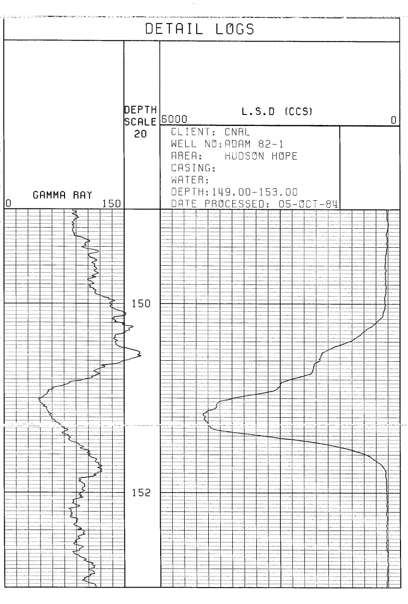

DETAIL LOGS
DEPTH SCALE 20
B.R.D (CCS)
25000
15000
CLIENT:
WELL NO: ADAM 82-1
AREA:
CASING:
WATER:
DEPTH: 191.00-196.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2
192
194


DETAIL LOGS
DEPTH SCALE 20
B.R.D (CCS)
25000
15000
CLIENT:
WELL NO:
AREA:
CASING:
WATER:
DEPTH: 200.00-205.00
DATE PROCESSED: 05-OCT-84
CALIPER
7
2
202
204

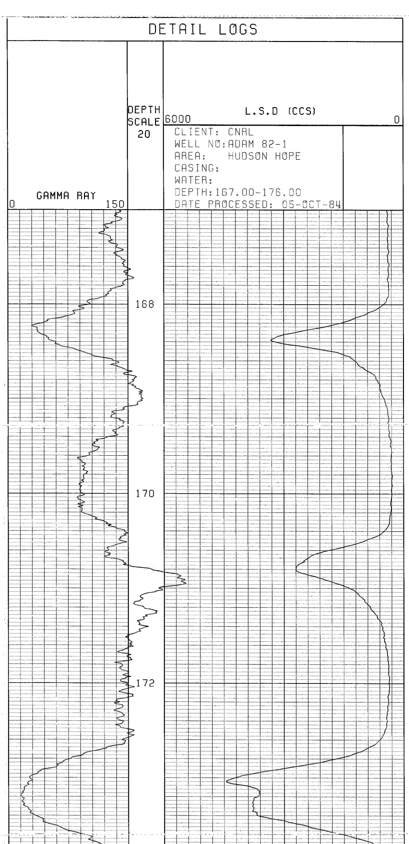
DETAIL LOGS



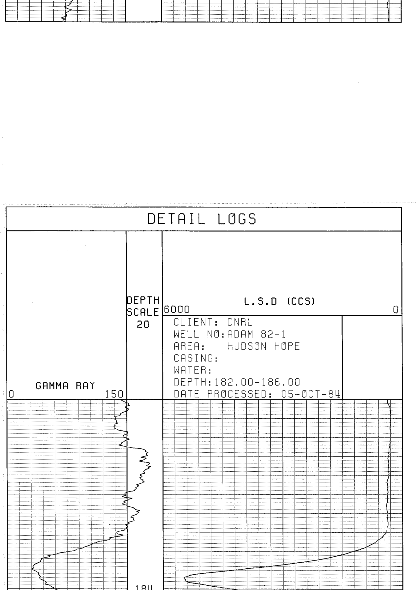
DETAIL LOGS



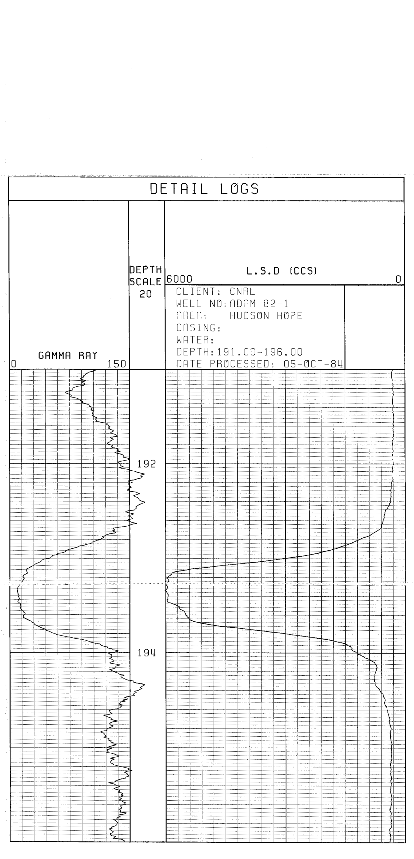
DETAIL LOGS



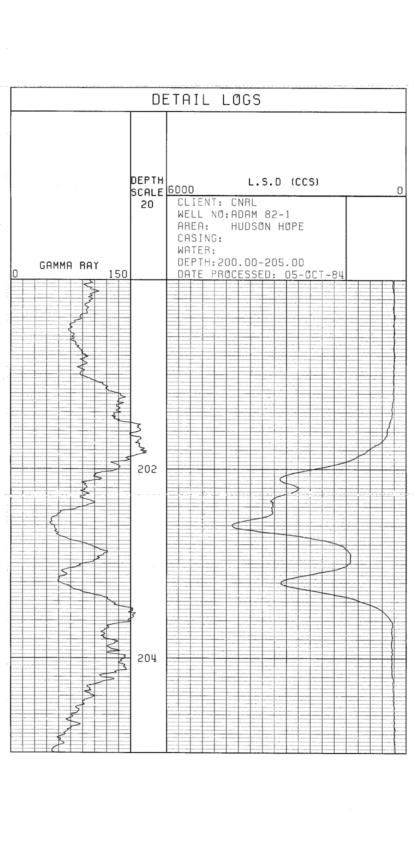
DETAIL LOGS



DETAIL LOGS



DETAIL LOGS



GENERAL LOGS

002722

GENERAL LOGS

0027221

DEPTH SCALE 100

L.S.D (CCS) 6000 -2000

CLIENT: CNRL
WELL NO: ADAM 82-1
AREA: HUDSON HOPE
CASING: 80M.
WATER:
DEPTH: 0.00-240.80
DATE PROCESSED: 04-OCT-84

GAMMA RAY 0 150

CALIPER 7 2