PR-SUKUNKA RIVER 75(1)A

SUKUNKA RIVER
EXPLORATION REPORT
1975

P.H. SHIRLY . C.E.T.

DEC. 1975

PR-SUKUNKA RIVER 75(1)A

9 April 1976

I certify that the contents of the attached report represents accurately the work done on the subject coal licences in 1975 and that I have full knowledge of the data presented therein.

E. J. Panchysyn P. Eng.

E. J. Panchysyn, P.Eng.

MANALTA COAL LTD.

SUKUNKA RIVER AREA, 1975 EXPLORATION REPORT

NTS Map Reference - 93 P 4/E
93 P 5/E

Operator - Manalta Coal Ltd.

Coal Licence No.'s:
3530 - 3553 incl.
3607 - 3617 incl.

Master Explorations Ltd.

C.L NOS. FORFIETED APRIL 19, 1976 - 3546, 3550, 3553, 3607
C.L. NOS. FORFIETED MAR 10, 1976 - 3534
C.L. NOS. EXPIRED — April 19, 1980. - 3530-33, 3535-45, 3547-49, 3551, 3552. 3608-16

By: R.H. Shirley C.E.T.

December 1975

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GENERAL

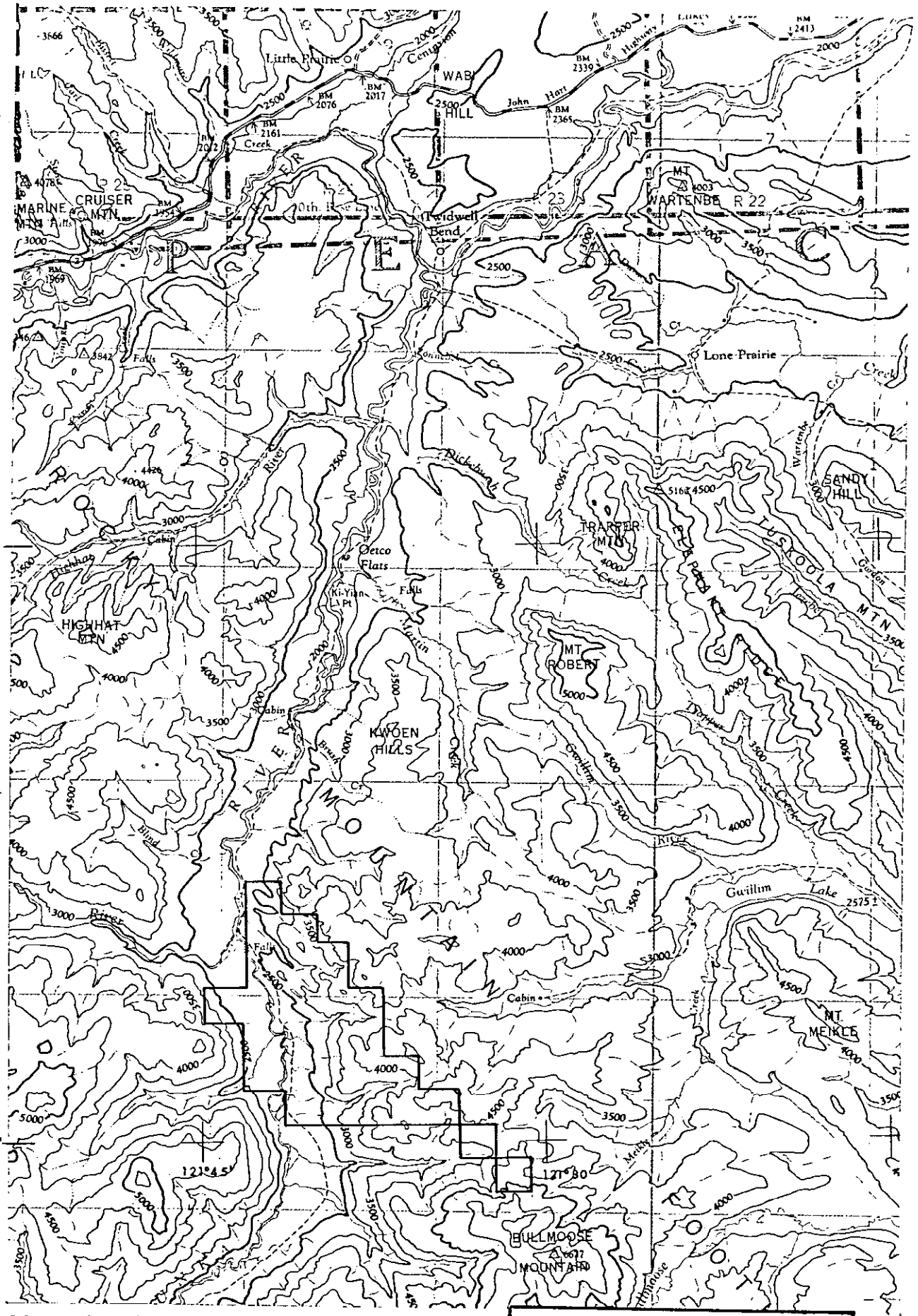
Master Explorations Ltd., a wholly owned subsidiary company of Manalta Coal Ltd., holds 35 Coal Licences, numbered 3530-3553 inclusive and 3607-3617 inclusive, in the Sukunka River are of British Columbia. (See Location Map - Fig. I). The Sukunka River divides the licenced area into two unequal portions. The north-eastern portion is accessible via a logging road originating at Chetwynd, B.C., and via numerous exploration trails originating from the logging road. Additionally, five seismic lines, trending northeast-southwest transect the property. Access to the southwestern portion is inhibited by the Sukunka River which is not presently bridged near this locality. Pilings from an old bridge, and one apparent old ford location are evident, and overgrown trails originate from these. One seismic line transects this portion.

GEOLOGY

Stratigraphy

Outcrops within the licenced area are of Lower Cretaceous age and most lie within the Bullhead and Fort St. John Groups. Natural exposures are limited to resistant units of sandstone and conglomerate. A thick succession of alluvial sand obscures bedrock as the Sukunka River is approached, and glacial deposits up to 25 ft. thick mantle most of the remaining area. The numerous seismic lines and exploration trails within the licences often penetrate this mantle to expose the less resistant rock types.

Potentially economic coal seams or "coaly horizons" are known to exist within the Gething Formation and Gates member of the Commotion Formation. The "upper Gething" Skeeter and Chamberlain seams are currently being exploited by Coalition Mining Ltd. on their licences which adjoin ours to the south-west.



SCALE: 1:250,000

LOCATION: SUKUNKA RIVER B.C.

AREA UNDER COAL LICENCE
MASTER EXPLORATIONS LTD

Fig. 1

For purpose of 1975 mapping, Master Explorations Ltd's licences contain the following succession:

Commotion formation - Gates Member

Moosebar formation

Gething formation - Upper Gething sequence

Lower Gething sequence

Cadomin formation

Pre Cadomin rocks

Detailed lithological descriptions of these divisions can be found in Stott (1963).

STRUCTURE

The structure is typical? of the Inner Foothills of the Rocky Mountains with northwesterly trending folds and faults. The folds are asymmetrical and the faults are south-westerly dipping thrusts. Numerous small faults were mapped in outcrop, particularly near the fold axes, but only those thrusts which can be correlated between at least two observation points or which are inferred to necessarily exist as an explanation to outcrop geology are displayed on the accompanying geological map. It is inferred that the most northeasterly mapped thrust is the local "sole" fault, while the other mapped thrusts are "splays" from this and converge with it at depth. To date, no economic coal seams have been discovered north-east of the sole fault, but most of the area is mapped as containing the coal-bearing Gates member of the Commotion formation.

As a general rule, dips are steeper and topography more rugged to the northeast of the sole fault than to the southwest.

PREVIOUS EXPLORATION

A preliminary reconnaissance survey of the 1971 licence area was conducted by Paul Dyson Consultants and Holdings Ltd. during June of 1971. The results of this survey are contained in "Preliminary Report on Sukunka River Coal Properties of Alberta Coal Ltd.", on file with Manalta Coal Ltd.'s exploration department.

During the period from Sept. 16 to Oct. 31, 1971, Master Explorations Ltd. conducted an exploration program on the property involving surface geological mapping, drilling of 12 holes totalling 2,318 feet, construction of 5 miles of new trail, and backhoe trenching near seven suspected coal outcrops. A "Preliminary Exploration Report" was prepared by company geologist T. N. Yoon and is on file.

This 1971 exploration project was confined to a central portion of the licences and outlines a potential coal reserve of 16×10^6 tons, recoverable at an overburden to coal ratio of 12:1.

1975 EXPLORATION

The purpose of the 1975 exploration program was to further delineate the extent of the 1971 potential reserve estimate and to determine the existence of other potentially economic coal occurrences within the licences. Field headquarters were established at Brascan Resources Ltd.'s Sukunka No. 1 Colliery camp and the co-operation and assistance of Brascans' staff is gratefully acknowledged.

The 1975 exploration program consisted of:

1. continuous field mapping from Aug. 26 - Nov. 4
2. drilling 21 holes totalling 3415 ft. with a track mounted rotary drill employing water as a circulating medium
3. digging 30 trenches totalling 11,260 horizontal feet with a John Deere Model 400 backhoe
4. constructing approximately 7 miles of new exploration trails with a Caterpillar D7-E tractor.

COAL SEAM CORRELATION

Down hole geophysical logs including natural gamma, neutron and gamma density were performed on seven of the 1971 drill holes and on one of the 1975 holes. Additionally, down hole resistance logs were performed on two other 1975 drill holes. Correlation of four separate coaly horizons is evident from the radioactive logs, and the electric logs conform to this pattern.

When compared to logs of the complete Gething sequence made available by Brascan Resources Ltd., it is evident that the major coaly horizons encountered correlate with Brascan's "Middle Coal" sequence and not with the Skeeter and Chamberlain seams as previously reported (1971 Exploration Report). Analyses performed to date show consistently high ash values, tending to confirm this correlation.

Skeeter and Chamberlain seam equivalents were encountered south-west of the "Master Creek" valley, but have thinned to uneconomic proportions for surface mining.

The geological map (in pocket) and cross-sections (Appendix III) show the interpreted spatial relationships of these seams.

ANALYSES

Analyses performed on two foot sample increments from the complete coal section encountered in drill hole SR-14-75 indicated a 22 vertical foot mineable portion from 35 ft. to 57 ft. Some higher ash zones were included within the 22 ft. zone, and when corrected for true thickness, the zone correlated with the 19.5 foot thickness (including partings) used for the reserve calculations.

A composite of the 11 two foot samples increments was analysed with the following results:

Dry basis:

raw ash	27.6%
volatile	15.5%
fixed carbon	56.9%

Sink-Float Analysis: Raw Coal

S.G.	WT %	Ash %	Cum. Ash %
- 1.35	44.7	4.2	4.2
1.35-1.45	16.2	13.0	6.5
1.45-1.55	7.4	24.1	8.4
1.55-1.65	4.0	33.1	9.8
1.65-1.80	4.3	45.4	11.8
+ 1.80	23.4	74.4	26.5

Analysis on Cumulative Floats @ 1.55 S.G. air dried basis

R.M. %	Ash %	V.M. %	F.C. %	F.S.I.	H.G.I.
0.8	8.6	17.3	73.3	4	86

Coal Quality Evaluation

Upper Seam

The most representative sample taken to date is that at depth in the upper seam in drill hole SR-14-75. While this sample was being recovered much uphole dilution was mixed with the sample, which affected the overall coal quality. The gravity distribution looks realistic in the lower specific gravity ranges, but there is quite an excess of +1.80 sink material. Assuming 10% of this is uphole dilution, the washability would be that of table I below. Because of the shallow depth (35'-57') the FSI is not expected to be high, but it is 4.

The raw coal ash content is now 20.2% which is more like other metallurgical coals being mined in Western Canada. As can be seen from the analyses of Seam I, s; and Seam II, c; the ash for the better parts of the seam can be as low as 8% for the upper seam and 4% for the lower seam.

Table I

Washability of SR-14-75

		Corrected for Uphole Dilution			
Max. S.G.	Wt.%	Ash %	Cumulative Wt.%	Ash	Corrected ± 0.1 S.G.
1.35	50.5	4.2	50.5	4.2	
1.45	18.3	13.0	68.8	6.5	30.8
1.55	8.4	24.1	77.2	8.4	14.9
1.65	4.5	33.4	81.7	9.8	9.0
1.80	4.9	45.4	86.6	11.8	
+ 1.80	13.4	74.4	100.0	20.2	

The upper seam was also trench sampled, but the entire coal and shaley sections where mixed together, so the raw coal ash was 38.7%. In addition, the sample was badly oxidized so it is not representative of the main part of the coal seam. The seam description is as follows:

	Highwall	-	shale
	5.0'	-	coaly shale
Mine this section	5.0'	-	coal
	0.2'	-	parting
	6.0'	-	coal
	2.5'	-	parting
	4.0'	-	coal
	1.0'	-	parting
	6.5'	-	coal
	10.0'	-	parting
	3.0'	-	coal
Total	18.7'	coaly shale and parting	
	24.5'	coal	

Total (if only mid-section is mined)

3.7'	parting
21.5'	coal

Assuming that the seam is selectively mined, it is reasonable to expect a raw coal ash content of 20% or less. There is no way of determining what the washability would be, but it probably will match that shown in table I.

Lower Seam

The only washability available on the lower seam (which could be the Chamberlain seam) is from the T-3 trench, and this coal was badly diluted as can be seen by the high ash content (40.2%) of the ¼" x 28 M fraction compared to the finer fractions. If one compares the elementary ash versus specific gravity curves shown in figure I, it becomes apparent that the true coal characteristics are shown in drill hole SR-14-75. The trench samples are very similar, but distorted due to oxidation and dilution, thus is may be reasonable to assume that the one washability will apply to the coal in both seams.

This can be confirmed by deeper bulk sampling in the syncline.

Product Evaluation

Based on the washability shown in table I, the probability error curves in figure II were developed. The best possible product would look roughly as follows:

	Feed Ash	Wt.%	Product Ash	Recovery
Heavy media	20.2	70%	8.9%	70%
Compound water cyclone	18.0*	15%	10.0%	70%
Froth Flotation	16.0*	15%	12.0%	75%
Net	19.2%	100%	9.6%	71%

If the amount of near gravity material could be reduced, the product would look considerably better.

Also, sulphur which has been tested extensively, is very low in the entire area (0.4%).

* Estimated from similar data on the property.

FIGURE I

ELEMENTARY ASH AS A FUNCTION OF SPECIFIC GRAVITY

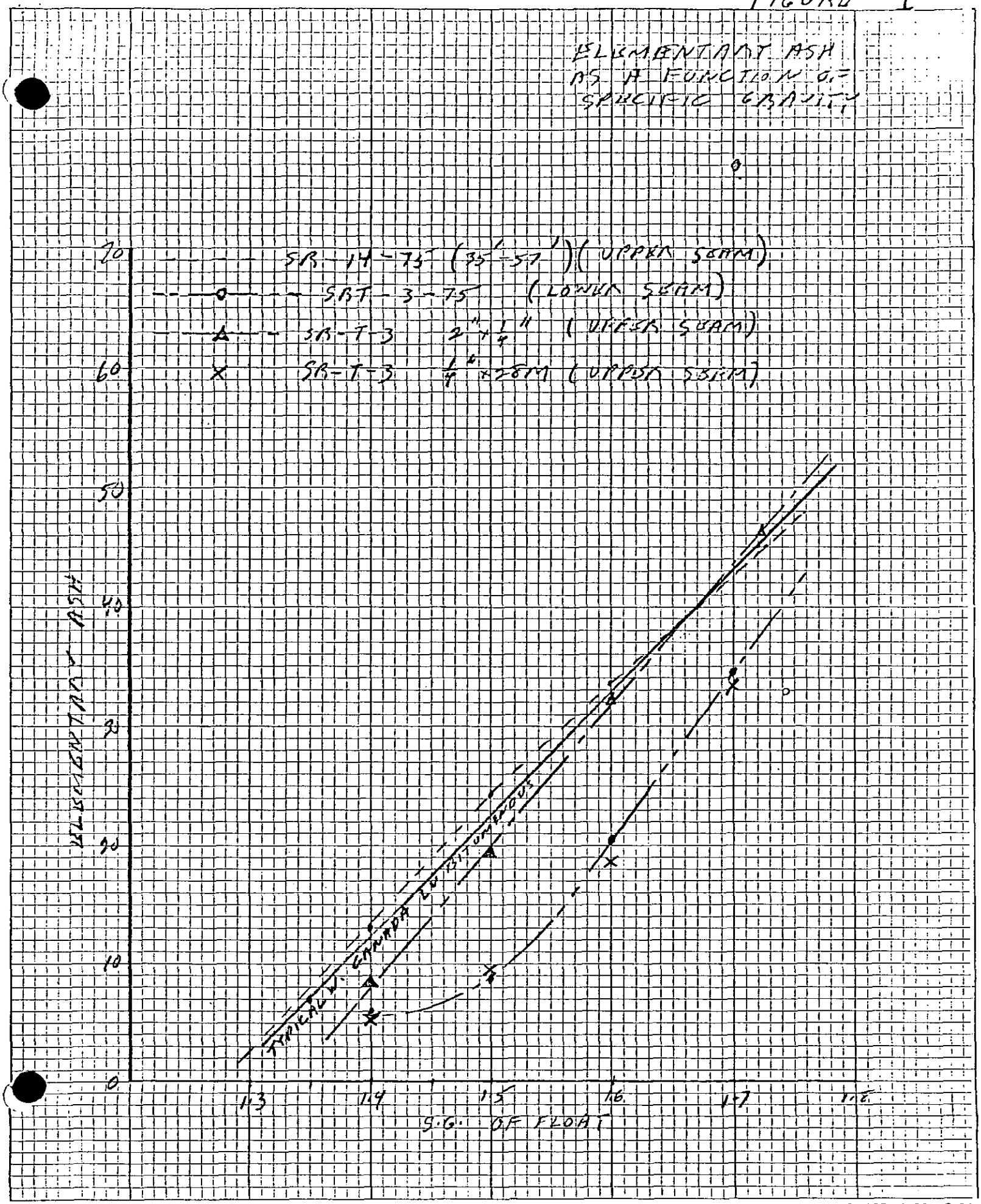
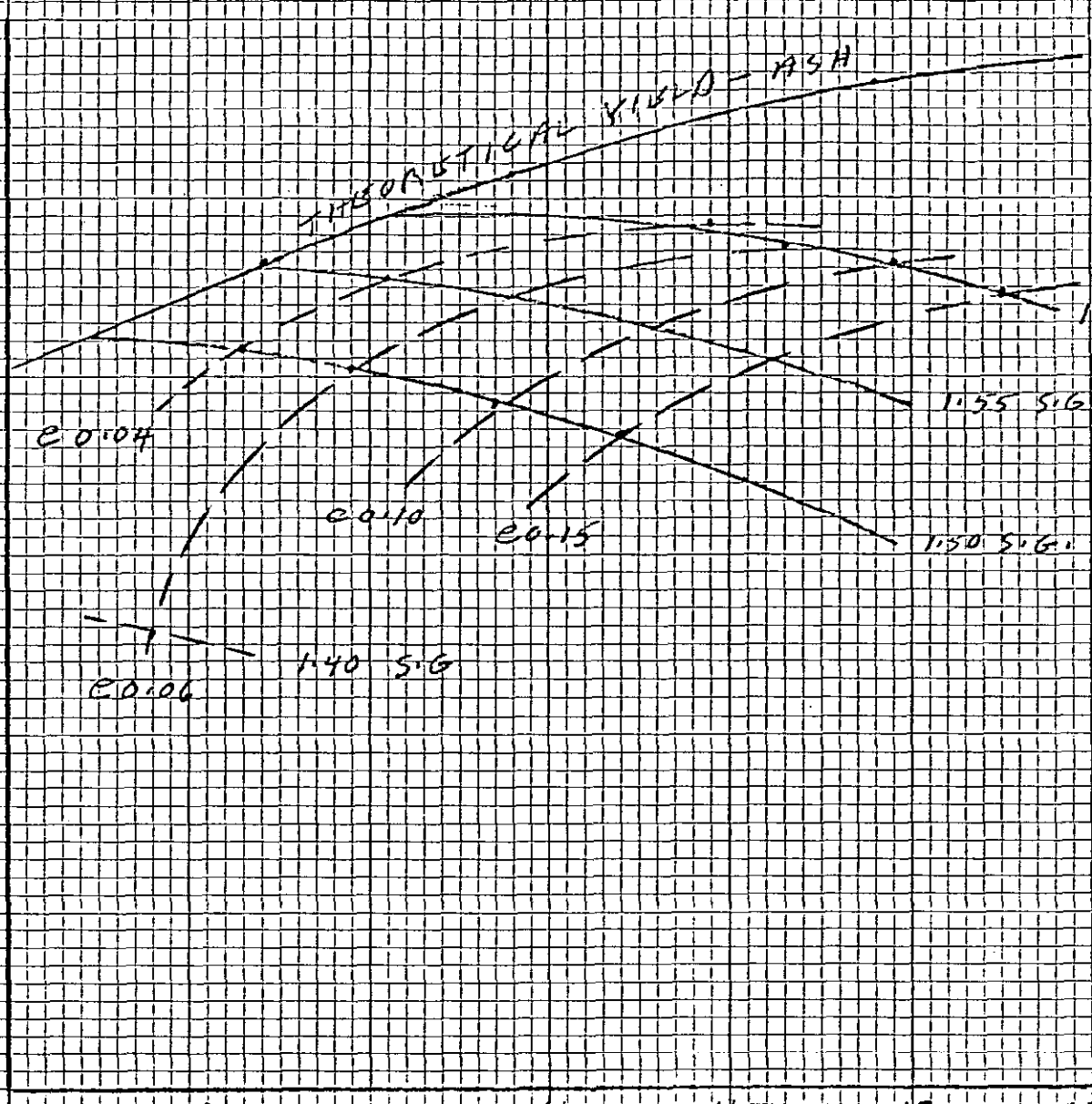


FIGURE II

CONDUCTED
YIELD VERSUS PRODUCT ASH
FOR SB-14-75
(33'-51') UPPER SEAM



CLEAN COAL ASH CONTENT %

FIGURE III

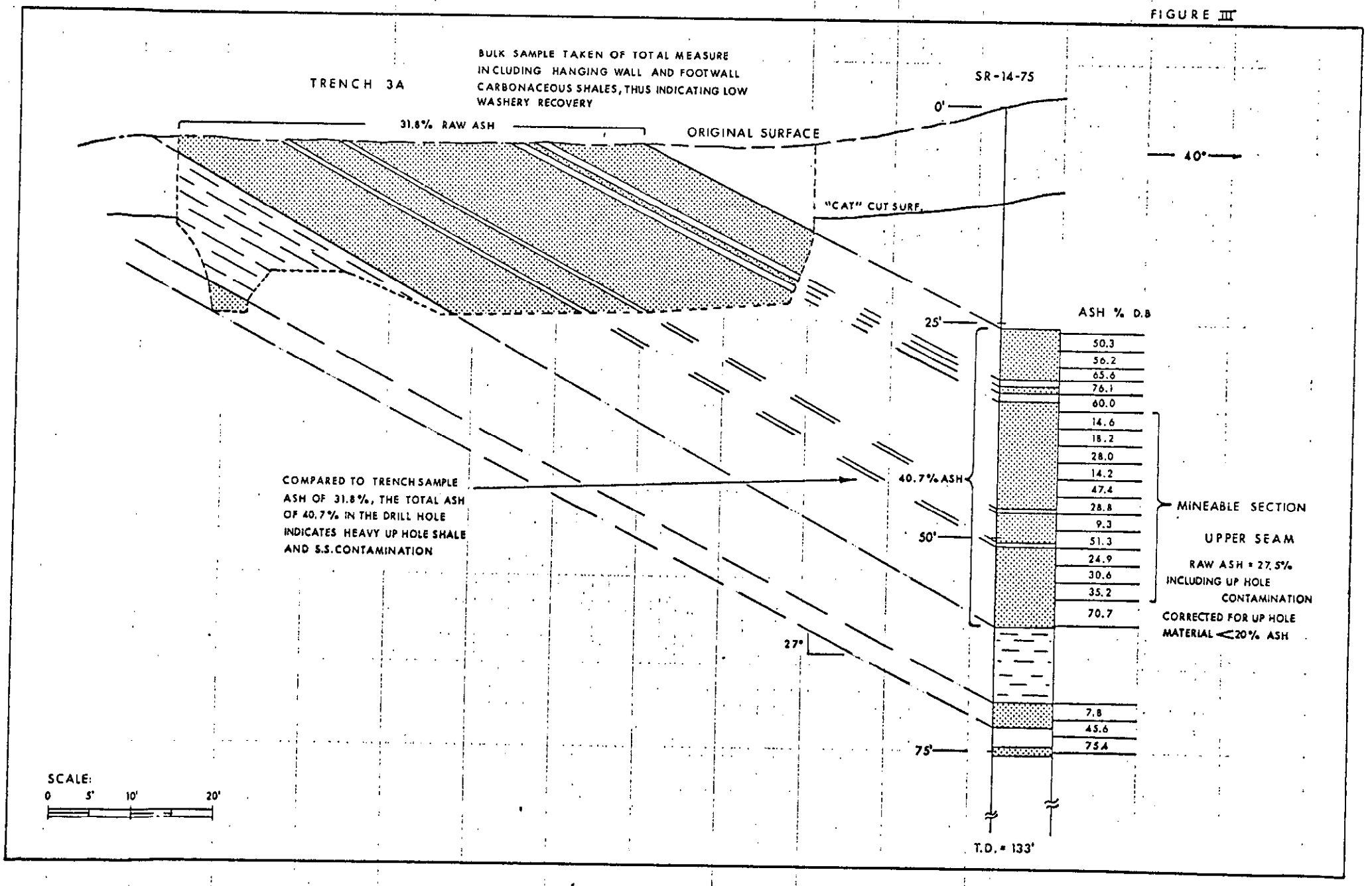
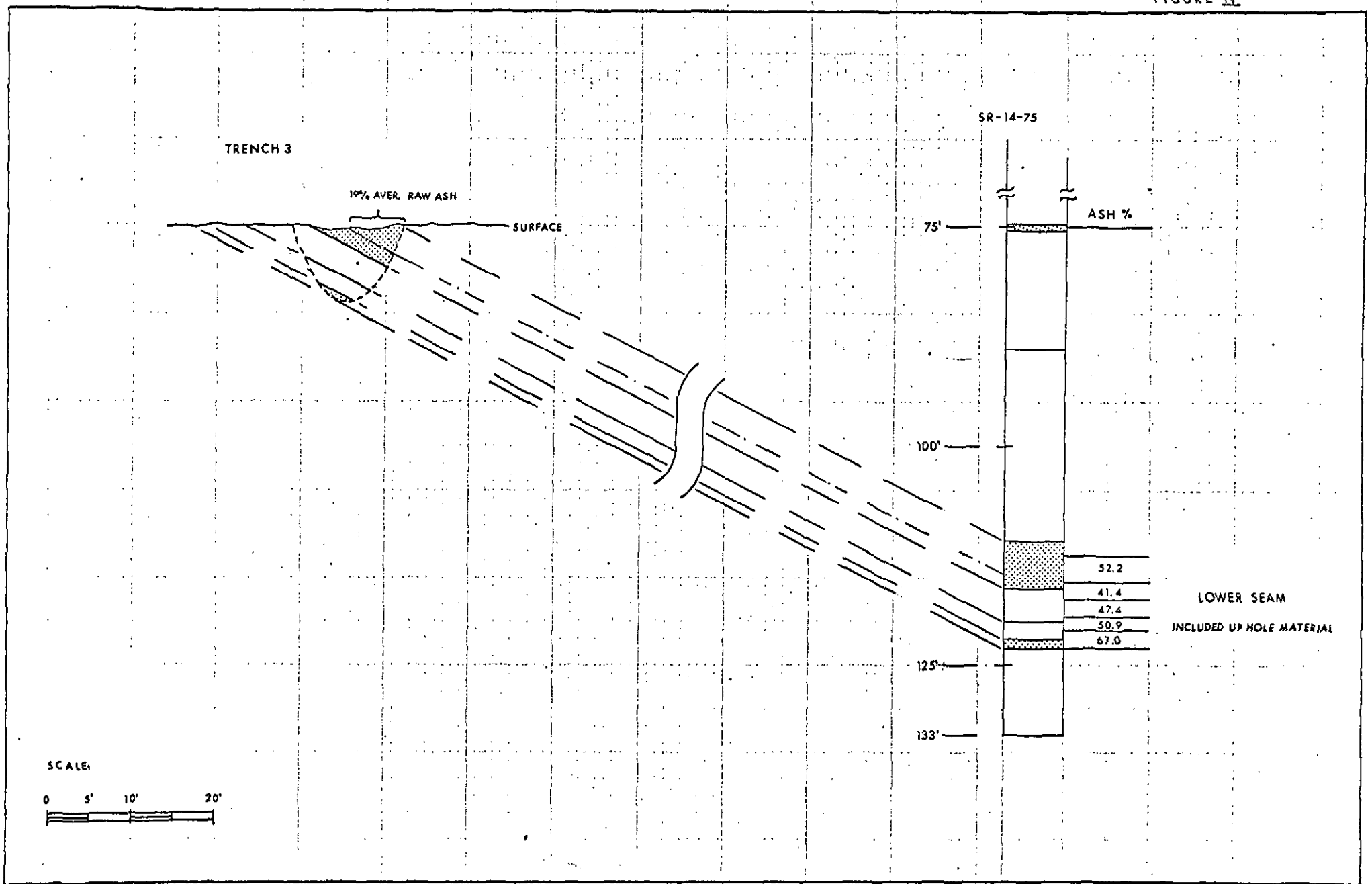

TRENCH 3A
BULK SAMPLE TAKEN OF TOTAL MEASURE INCLUDING HANGING WALL AND FOOTWALL CARBONACEOUS SHALES, THUS INDICATING LOW WASHERY RECOVERY
31.8% RAW ASH
ORIGINAL SURFACE
SR-14-75
0'
40°
"CAY" CUT SURF.
ASH % D.B
25'
50.3
56.2
65.6
76.1
60.0
14.6
18.2
28.0
14.2
47.4
28.8
9.3
51.3
24.9
30.6
35.2
70.7
40.7% ASH
50'
MINEABLE SECTION
UPPER SEAM
RAW ASH = 27.5% INCLUDING UP HOLE CONTAMINATION
CORRECTED FOR UP HOLE MATERIAL <20% ASH
COMPARED TO TRENCH SAMPLE ASH OF 31.8%, THE TOTAL ASH OF 40.7% IN THE DRILL HOLE INDICATES HEAVY UP HOLE SHALE AND S.S. CONTAMINATION
27°
7.8
45.6
75A
75'
T.D. = 133'
SCALE:
0 5' 10' 20'

FIGURE IV


TRENCH 3
19% AVER. RAW ASH
SURFACE
SR-14-75
ASH %
75'
100'
125'
133'
52.2
41.4
47.4
50.9
67.0
LOWER SEAM
INCLUDED UP HOLE MATERIAL
SCALE:
0
5'
10'
20'

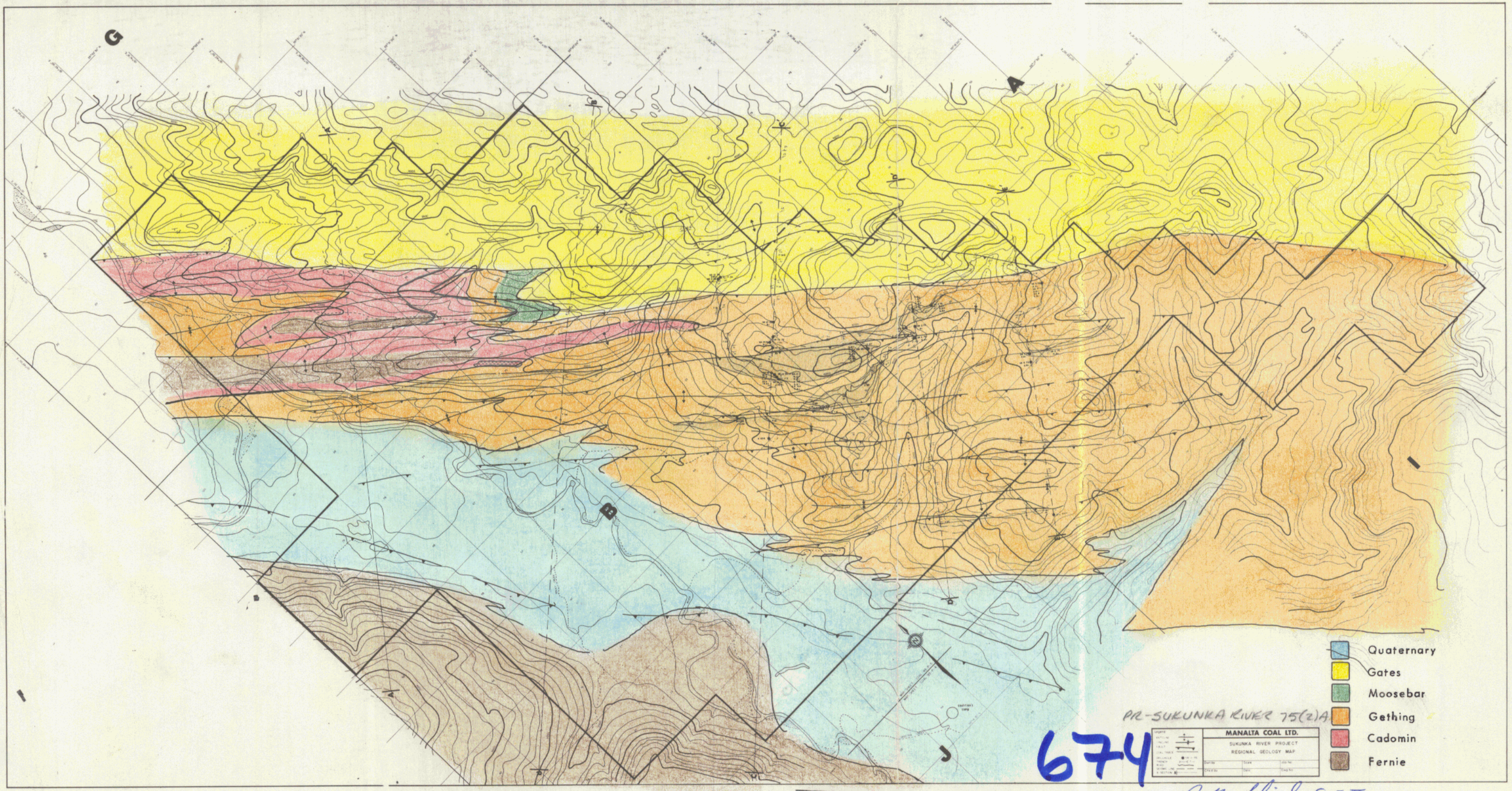
Suggestions for Future Exploration

The structural cross-sections included as Appendix III to this report indicate little chance for the existence of more Gething formation coals than already mapped, at least as far south as X-Section B-B', The mapped "middle-coals" between X-Sections A-A' and B-B' should be explored by drilling. Cross-section C-C' indicates a possible middle coal sequence between 2500 and 3500' and this section should be investigated. Confirmation of the remaining mapped structure on this cross-section should be obtained by drilling. Cross-section D-D' indicates a potential middle coal section co-relative to that above mentioned for C-C' to the east of trench T-23, and a further potential within the fault block immediately west of SR-3-73. Drilling for structural confirmation is also required. The continuation of the middle coal section indicated on cross-sections C-C' and D-D' can also be expected from cross-section E-E' in the fault block immediately east of the dry hole. This portion lies outside our licences but might provide easier access to check the existence of the middle coals than either of the other cross-sections. As interpreted, this cross-section also indicates enough stratigraphic room for the entire Gething sequence to exist within the four fault blocks terminating to the east in grid block 28 A-93 P5 and to the west in grid block 10 A-93 P5. If this sequence can be confirmed within any of the afore-mentioned fault blocks, then it should be investigated in either strike direction (NW - SE) to the licence boundaries or to its termination. As mapped on cross-section E-E', the middle coal sequence may be unattractive to open pit recovery because of depth parameters, but the "Chamberlain" seam equivalent is shown near surface and may be of economic thickness.

Up to 10 million tons of in place coal at attractive stripping ratios might be found within these potential Gething formation blocks, depending upon seams thicknesses encountered.

The mapped Gates member of the Commotion formation (including some undivided Commotion formation) is potentially coal bearing depending upon the stratigraphic position of the Gates outcrops within our licences. Two seams, numbered "A" and"B" have been encountered by Brascan Resources Limited by their drilling atop Bullmoose Mtn. These are reported to thicken up to 15' each, with variable partings. The seams are expected near the top of the Gates member, but unfamiliarity with stratigraphic markers has precluded exact positioning of the Gates within our licences. The most attractive area for exploration of the Gates within our licences is along the seismic line used to demark cross-section A-A', but topography is rugged.


MANALTA COAL LTD.
SUKUNKA RIVER PROJECT
REGIONAL GEOLOGY MAP
Legend:
ANTICLINE
SYNCLINE
FAULT
COAL TRACE
DRILLHOLE SR-1-75
TRENCH T-1
ROAD
SEISMIC LINE
X-SECTION
Dwn by:
Chk'd by:
Scale: 1"=1000'
Date:
Job No.:
Dwg. No.:
674
PR-SUKUNKA R. 75(2) A
PR-SUKUNKA RIVER 76(2)A
AREA 1
AREA 2
AREA 3
SUKUNKA RIVER
BURNT RIVER
ROCKY CREEK
SKEETER CREEK
MAP SHEET COAL 93-P-5
MAP SHEET COAL 93-P-4
coalition's camp
Likely x-sect. SR-71-1
dry hole
G
A
B
J
55°22'30" N.
55°22'00" N.
55°21'30" N.
55°21'00" N.
55°20'30" N.
55°20'00" N.
55°19'30" N.
55°19'00" N.
55°18'30" N.
55°18'00" N.
55°17'30" N.
55°17'00" N.
55°16'30" N.
55°16'00" N.
55°15'30" N.
55°15'00" N.
55°14'30" N.
55°14'00" N.
55°13'30" N.
55°13'00" N.
55°12'30" N.
121°45'00" E.
121°44'15" E.
121°43'30" E.
121°42'45" E.
121°42'00" E.
121°41'15" E.
121°40'30" E.
121°39'45" E.
121°39'00" E.
121°38'15" E.
121°37'30" E.
121°36'45" E.
121°36'00" E.
121°35'15" E.
121°34'30" E.
121°33'45" E.
121°33'00" E.
121°32'15" E.
121°31'30" E.
121°30'45" E.
121°30'00" E.



PR-SUKUNKA RIVER 75(2)A

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P.A. Sluzy C.E.T

PR - SUKUNKA RIVER 75(3)T

APPENDIX I

Lithological Logs of 20 Drill Holes

A8 - Rev. 12/72

DRILL LOG

DATE Sept. 5, 75 HOLE NO. SR - 1 - 75

COMPANY Manalta Coal Ltd. DRILLER W. Woods A. Wagg

AREA Sukunka River

LOCATION 1300's 950'W NE Cor 43 - 8 - 93 - P - 5

ELEVATION 3050 HOLE SIZE 4½"

INCLINATION Vertical

(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	5	Shattered Rock and Clay
5	9	Grey Carbonaceous Shale
9	13.5	Dark Grey Sandstone
13.5	16	Grey Shale
16	17.5	Carbonaceous Shale and Coal
17.5	20.8	Grey Shale
20.8	21.5	Carbonaceous Shale and Coal
21.5	29.5	Grey Shale
29.5	30.5	Coal
30.5	34	Grey Shale
34	37	Dark Grey Sandstone
37	40	Carbonaceous Shale and Coal
40	44	Grey Shale
44	49	Carbonaceous Shale and Coal
49	50.5	Coal
50.5	51.3	Carbonaceous Shale and Coal
51.3	52.2	Coal
52.2	55	Grey Shale
55	55.6	Coal
55.6	58	Grey Carbonaceous Shale
58	100	Dark Grey Sandstone
		Total Depth 100'

AB - Rev. 12/72

DRILL LOG

DATE Sept. 7 & Sept. 8, 1975 HOLE NO. SR - 2 - 75

COMPANY Manalta Coal Ltd. DRILLER W. Woods, A. Wagg

AREA Sukunka River

LOCATION 1175 S 375 W NE Cor 40 - A - 93 - P - 5

ELEVATION 3600 HOLE SIZE 4½"

INCLINATION Vertical

(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION Sept. 7, 1975
0	6	Shattered Rock and Clay
6	28	Clay and Rocks
28	35	Shattered Shales and Sandstone Some clay
35	65	Clay and Rocks
		Sept. 8, 1975
65	84	Clay and Rocks
84	87.5	Light Grey Sandstone (salt and pepper)
87.5	109	Clay and Rocks
109	144	Dark Grey Sandstone
		Total Depth 144'

P.A. Shirley C.E.T.

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DRILL LOG

DATE Sept. 9 - Sept 11, 1975 HOLE NO. SR - 3 - 75

COMPANY Manalta Coal Ltd. DRILLER W. Woods , A. Wagg

AREA Sukunka River 1975

LOCATION 1500 S 750 W NE Cor 40-A-93-P-5

ELEVATION 3700 HOLE SIZE 4½"

INCLINATION Vertical
(Measured from Horizontal)

MECHANICALLY LOGGED [XX] yes [ ] no FOOTAGE

FROM	TO	FORMATION
		Sept. 9, 1975
0	12	Clay and Rocks
12	25	Grey Shale
25	27.5	Dark Grey Sandstone
27.5	29	Brown Sandstone
29	35	Hard Grey Sandstone
		Sept. 10, 1975
35	46	Hard Grey Sandstone
46	43	Coal
48	52	Soft Grey Sandstone
52	58	Hard Grey Sandstone
58	60	Brown Sandstone (Lost Circulation)
60	105	Hard Grey Sandstone
		Sept. 11, 1975
105	130	Hard Grey Sandstone
130	205	Dark Grey Siltstone
		Total Depth 205

P.A. Shirley C.E.T.

A8 - Rev. 12/72

DRILL LOG

DATE Sept. 12 - Sept. 15, 1975 HOLE NO. SR - 4 - 75

COMPANY Manalta Coal Ltd. DRILLER W. Woods, A. Wagg

AREA Sukunka River

LOCATION 950 S 700 W NE Cor 40-A-93-P-5

ELEVATION 3670 HOLE SIZE 4½"

INCLINATION Vertical

(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
		Sept. 12, 1975
0	52	Shattered Rock and Clay
52	75	Dark Grey Siltstone
		Sept. 13 lost due to breakdown
75	165	Dark Grey Siltstone
		Sept. 15, 1975
165	205	Dark Grey Siltstone
		Soft Clay (brown) Lenses
		Total Depth 205'

J.H. Shirley C.E.T.

A8 - Rev. 12/72

DRILL LOG

DATE Sept. 15 & 16, 1975 HOLE NO. SR - 5 - 75

COMPANY Manalta Coal Ltd. DRILLER W. Woods

AREA Sukunka River

LOCATION 1050 S 1800 W NE Cor 39 - A - 93 - P - 5

ELEVATION 3750 HOLE SIZE 4½"

INCLINATION Vertical

(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	7.5	Clay and Rocks
7.5	17	Grey Shale
17	17.4	Coal and carbonaceous Shale
17.4	28.4	Grey Shale
28.4	32	Coal (sample chip)
32	33	Carbonaceous Shale and Coal (sample chip)
33	34.5	Grey and Brown Shale
34.5	37	Coal (sample chip)
37	38	Coal (Shaley and Shale Stringers) (sample chip)
38	39.5	Coal (sample chip)
39.5	42	Grey Shale
		Sept. 16, 1975
42	57	Grey Sandstone
57	60	Grey Shale
60	66	Grey Siltstone
66	83.5	Hard Grey Sandstone
83.5	105	Grey Shale

P. A. Shirley C.E.T.

AB - Rev. 12/72

DRILL LOG

DATE Sept. 17, 1975 HOLE NO. SR - 6 - 75

COMPANY Manalta Coal Ltd. DRILLER W. Woods

AREA Sukunka River

LOCATION 100 S 2300 W NE Cor 18 - A - 93 - P - 5

ELEVATION 4200 HOLE SIZE 4½"

INCLINATION Vertical

(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	6	Organic Material
6	13	Brown Sandstone
13	17.5	Coal (sample chip)
17.5	?5?	Hard Dark Grey Sandstone

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DRILL LOG

DATE Sept. 26 & 27, 1975 HOLE NO. SR - 7 - 75

COMPANY Manalta Coal Ltd. DRILLER D. Zeigler

AREA Sukunka River

LOCATION 2600 S 350 W NE Cor 29 - A - 93 - P - 5

ELEVATION 4120 HOLE SIZE 4½"

INCLINATION Vertical

(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	8	Clay and Rocks
8	9.5	Carbonaceous Shale and Coal
9.5	13.5	Coal (sample chip)
13.5	20	Shale
20	50	Hard Sandstone
		Sept. 27, 1975
50	65	Hard Sandstone

P.A. Shirley C.E.T.

AB - Rev. 12/72

DRILL LOG

DATE Sept. 27 & 28, 1975 HOLE NO. SR - 8 - 75

COMPANY Manalta Coal Ltd. DRILLER Don Zeigler

AREA Sukunka River

LOCATION 2950 S 600 W NE Cor 29 - A - 93 - P - 5

ELEVATION 4060 HOLE SIZE 4½"

INCLINATION Vertical

(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	11	Clay and Rocks
11	39	Sandstone
		Sept. 28, 1975
39	108	Sandstone
108	113	Coal (sample chip)
113	125	Hard Sandstone

P.A. Ashley C.E.T

A8 - Rev. 12/72

DRILL LOG

DATE Sept. 29 & 30, 1975 HOLE NO. SR - 9 - 75

COMPANY Manalta Coal Ltd. DRILLER Don Zeigler

AREA Sukunka River

LOCATION 850 S 300 W NE Cor 28 - A - 93 - P - 5

ELEVATION 4060 HOLE SIZE 4½"

INCLINATION Vertical
(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	21	Clay and Rocks
21	56	Shattered Sandstone
56	97.5	Grey Shale
97.5	115	Grey Sandstone
		Sept. 30, 1975
115	131.8	Sandstone
131.8	135	Coal (sample chip)
135	167	Shale
167	170.6	Coal
170.6	193	Sandstone
193	195	Caal
195	193	Grey Shale
193	225	Grey Sandstone

P.A. Thirsky C.E.T.

A8 - Rev. 12/72

DRILL LOG

DATE Oct. 1, 1975 HOLE NO. SR-10-75

COMPANY Manalta Coal Ltd. DRILLER Zeigler

AREA Sukunka River, B.C.

LOCATION 600'S., 2500'W., NE 39, A-93 P5

ELEVATION 3690' from map HOLE SIZE 4 3/4"

INCLINATION 90°

(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	10	Clay and rocks
10	21	Sandstone
21	34	Grey shale
34	36.4	Coal (2.4)
36.4	38	Carb. shale (1.6)
38	39	Coal (1.0)
39	43.8	Carb. shale (4.8)
43.8	45.6	Coal (1.8)
45.6	56.6	Grey shale
56.6	57.8	Coal (1.2)
57.8	63	Grey shale
63	66.5	Coal (3.5)
66.5	114	Shale
114	121	Grey sandstone
		Hole tag 30' east on tree.
		Samples not taken.

P.H. Shirley C.E.T.

AB - Rev. 12/72

DRILL LOG

DATE Oct. 2, 1975 HOLE NO. SR-10A-75

COMPANY Manalta Coal Ltd. DRILLER Zeigler

AREA Sukunka River, B.C.

LOCATION 600'S., 2500'W., NE-39 A-93 P5

ELEVATION 3690' from map HOLE SIZE 4 3/4"

INCLINATION 90°
(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	9	Clay and rocks
9	31	Sandstone
31	32	Coal sampled (1')
32	35	Shale
35	37	Coal sampled (2')
37	38.6	Black shale
38.6	43.4	Coal sampled (4.8')
43.4	45	Sandstone
		Hole tag on tree 30' east of hole
		Sampled 31-32
		32-35
		35-37
		37-38.5
		38.5-43.3

P.H. Shirley C.E.T.

A8 - Rev. 12/72

DRILL LOG

DATE Oct. 2/75 HOLE NO. SR-11-75

COMPANY Manalta Coal Ltd. DRILLER Woods

AREA Sukunka River B.C.

LOCATION 2100'S., 2050'W., NE-61-B 93 P5

ELEVATION 3295' (map) HOLE SIZE 4 3/4"

INCLINATION 90°
(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	5	Clay and rocks
5	10.5	Grey shale
10.5	15.8	Coal
15.8	83	Grey shale

C.E.T

A8 - Rev. 12/72

DRILL LOG

DATE Oct. 8, 1975 HOLE NO. SR-12-75

COMPANY Manalta Coal Ltd. DRILLER Woods

AREA Sukunka River, B.C.

LOCATION 2100'S., 2025'W., NE 61 B - 93P5

ELEVATION 3295' (map) HOLE SIZE 4 3/4"

INCLINATION 90°
(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	3	Clay and rocks
3	4.5	Carb. shale
4.5	11	Carb. shale and coal
11	16.5	Coal
16.5	21	Coal and carb. shale
21	34	Coal
34	58	Coal and carb. shale
58	142	Coal
142	146	Carb. shale
146	423	Coal and carb. shale
		Sampled 4.5 - 423

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DRILL LOG

DATE Oct. 3/75 HOLE NO. SR-13-75

COMPANY Manalta Coal Ltd. DRILLER WOODS

AREA Sukunka River, B.C.

LOCATION 1450'S., 1000'W., NE 42B - 93P5

ELEVATION 3745' HOLE SIZE 4 3/4"

INCLINATION 90° (Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	5	Clay and shattered rock
5	8.5	Carb. shale and grey shale
8.5	9	Coal
9	10	Grey shale
10	10.4	Coal and carb. shale
10.4	15	Grey shale
15	22	Grey sandstone
22	30.5	Grey shale
30.5	37	Coal (6.5)
37	49.2	Coal (dirty) (12.2)
49.2	66	Dark grey shale
66	121	Hard grey sandstone
121	123.5	Grey shale
123.5	124.5	Coal
124.5	127.7	Grey shale
127.7	128.5	Coal
128.5	130	Brown shale and carb. shale - coal traces
130	136.5	Coal (dirty)
136.5	140	Soft grey shale
140	149	Grey and brown shale - coal traces
149	184	Grey sandstone
184	192.5	Grey and brown shales
192.5	194.8	Coal and brown carb. shale
194.8	198	Grey siltsone
198	244	Hard sandstone
244	248	Grey shale
248	259	Hard sandstone
259	265	Very hard sandstone
		Sampled 30.5 - 49.9
		130 - 136.5
		Resistance log shows coal 29.5 - 38, 40 - 48, G.J.
		Plugged beyond 80'

P.A. Shirley C.E.T.

A8 - Rev. 12/72

DRILL LOG

DATE Oct. 13/75 HOLE NO. SR-14-75

COMPANY Manalta Coal Ltd. DRILLER Woods

AREA Sukunka River, B.C.

LOCATION 1300'S., 1000'W., NE42B - 93P5

ELEVATION 3750' HOLE SIZE 4 3/4"

INCLINATION 90° (Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	7	Clay and rocks
7	11	Brown sandstone
11	19	Dark grey shale
19	22	Grey siltstone
22	25.6	Grey and brown shale
25.6	31.5	Coal
31.5	32.4	Coal and brown shale
32.4	33	Coal
33	34	Coal and dark grey shale
34	46.5	Coal
46.5	47	Coal and brown shale
47	50.5	Coal
50.5	51	Soft brown sandstone
51	60.3	Coal
60.3	69	Brown and grey shale
69	72	Coal
72	74.7	Brown shale, coal traces
74.7	75.5	Coal
75.5	89	Brown shale
89	110.8	Hard black siltstone
110.8	116.2	Coal
116.2	120	Coal with brown and carb. shale
120	122	Grey and brown shale
122	123	Coal
123	133	Dark brown shale
		Resistance Log shows coal 25-30, 33-42, 44.5-49, 50.5-55, 58.5-61, 61.5-62, 66.5-73.5, 74.5 - 75.5 and 110-119 - G.J.

AB - Rev. 12/72

DRILL LOG

DATE Oct. 16, 1975 HOLE NO. SR-15-75

COMPANY Manalta Coal Ltd. DRILLER Woods

AREA Sukunka River, B.C.

LOCATION 950'W., 1150'S., NE Cor. 42B - 93-P-5

ELEVATION 3760' HOLE SIZE 4 3/4"

INCLINATION 90°

(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	12	Clay and rocks
12	18	Grey shale
18	66	Hard sandstone
66	82	Silty dark grey shale
82	84	Coal (2.0)
84	87	Coal with carb. shale (3.0)
87	94	Coal (7.0)
94	100	Coal with carb. shale stgs.
100	101	Light grey shale
101	103	Coal and carb. shale
103	107.5	Brown and grey shales
107.5	110	Grey sandstone
110	115.2	Dark grey shale
115.2	117.5	Coal (2.3')
117.5	151.4	Dark grey shale
151.4	156	Coal (5.6')
156	161	Coal with shale (5.0')
161	162.5	Carb. and brown shale with minor coal
162.5	166.5	Coal and carb. shale
166.5	173	Brown and grey shale

P.H. Shirley C.E.T.

A8 - Rev. 12/72

DRILL LOG

DATE Oct. 18, 1975 HOLE NO. SR-16-75

COMPANY Manalta Coal Ltd. DRILLER Woods

AREA Sukunka River, B.C.

LOCATION 2450'W., 0'S., NE Blk 41 B - 93 - P5

ELEVATION 3880' HOLE SIZE 4 3/4"

INCLINATION 90° (Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	22	Shattered sandstone
22	51.5	Hard sandstone
51.5	52	Carb. shale and coal
52	53.5	Coal (1.5')
53.5	223	Hard sandstone

P. Hobby C.E.T.

A8 - Rev. 12/72

DRILL LOG

DATE Oct. 22, 1975 HOLE NO. SR-17-75

COMPANY Manalta Coal Ltd. DRILLER Woods

AREA Sukunka River, B.C.

LOCATION 2000'W., 2550'S., NE Cor. 51 B 93-P-5

ELEVATION 3725' HOLE SIZE 4 3/4"

INCLINATION 90°
(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	7	Clay and rocks
7	100	Dark grey sandstone

P.A. Daly C.E.T.

AB - Rev. 12/72

DRILL LOG

DATE Oct. 24, 1975 HOLE NO. SR-18-75

COMPANY Manalta Coal Ltd. DRILLER Woods

AREA Sukunka River, B.C.

LOCATION 150'W., 300' S., NE Cor. 42 B 93 - P-5

ELEVATION 4000' HOLE SIZE 4 3/4"

INCLINATION 90°

(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	6	Clay and rocks
6	11	Brown and grey shales
11	64	Hard grey sandstone
64	118	Grey and brown sandstone
118	250	Dark grey siltstone

P.A. Kirby C.E.T.

A8 - Rev. 12/72

DRILL LOG

DATE Oct. 27, 1975 HOLE NO. SR-19-75

COMPANY Manalta Coal Ltd. DRILLER Woods

AREA Sukunka River, B.C.

LOCATION 50'W., 50'S., NE Cor. 42 B 93 - P-5

ELEVATION 3925' HOLE SIZE 4 3/4"

INCLINATION 90°
(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	9	Clay and rocks
9	205	Grey sandstone

J.A. Shirley C.E.T.

A8 - Rev. 12/72

DRILL LOG

DATE Oct. 30, 1975 HOLE NO. SR-20-75

COMPANY Manalta Coal Ltd. DRILLER Woods

AREA Sukunka River, B.C.

LOCATION 2520'W., 350 S., NE Cor. 40 A 93-P-5

ELEVATION 3925' HOLE SIZE 4 3/4"

INCLINATION 90°
(Measured from Horizontal)

MECHANICALLY LOGGED ☐ yes ☒ no FOOTAGE

FROM	TO	FORMATION
0	16	Grey shale
16	61.3	Dark grey sandstone
61.3	66	Carb. and brown shale
66	68.5	Coal (2.0')
68.5	69.2	Grey sandstone (0.7')
69.2	77	Coal (7.8')
77	77.6	Grey sandstone (0.6')
77.6	79.7	Coal (2.1)
79.7	81.5	Coal and carb. shale (1.8')
81.5	90	Brown shale
90	99	Grey siltstone
99	117	Grey sandstone
117	120	Brown and grey shales
120	122.5	Coal and carb. shale (2.5')
122.5	126	Brown shale (minor coal)
126	136	Dark grey siltstone
136	145	Hard sandstone

C.E.T.

APPENDIX II

Geophysical Logs of 3 Drill Holes (in pocket)

ROKE

GAMMA RAY-NEUTRON LOG

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO.	COMPANY MANALTA COAL LIMITED
LSD	WELL SR - 20 - 75
SEC	
TWP	LOCATION MASTER CREEK
RGE	
W_____M	FIELD SUKUNKA RIVER
	PROVINCE BRITISH COLUMBIA

6734

Other Services: DENS-CAL

Permanent Datum GROUND LEVEL Elev. K.B.
Log Measured from GROUND LEVEL Ft. Above Perm. Datum CSG
Well Depths Measured from GROUND LEVEL G.L.

Run. No.	ONE		
Date	3 NOVEMBER 1975		
First Reading	135.5		
Last Reading	000		
Footage Logged	135.5		
Depth Reached	136.5		
Depth Driller	143		
Casing Roke	3		
Casing Driller	3		
Fluid Type	AIR/MUD		
Liquid Level	104.5		
Min. Diam.	4-1/2		
Rm @ °F			
Operating Time	2 HOURS		
Truck No.	104		
Recorded By	HEDIN	Witnessed By	JACKSON

EQUIPMENT DATA

GAMMA RAY		NEUTRON	
RUN NO.	ONE	RUN NO.	ONE
TOOL MODEL NO.	340	LOG TYPE	NEUTRON/NEUTRON
DIAMETER	1 11/16	TOOL MODEL NO.	340
DETECTOR MODEL NO.		DIAMETER	1 11/16
TYPE	SCINTILLATION	DETECTOR MODEL NO.	
LENGTH	4 INCH	TYPE	PROPORTIONAL
DISTANCE TO N. SOURCE	5.5 FT.	LENGTH	6 INCH
		SOURCE MODEL NO.	MRC-N-SS-W
GENERAL		SERIAL NO.	171
HOIST TRUCK NO.	104	SPACING	17 INCH
INSTRUMENT TRUCK NO.	104	TYPE	AmBe
TOOL SERIAL NO.	340	STRENGTH	3 CURIES

LOGGING DATA

GENERAL				GAMMA RAY				NEUTRON			
RUN NO.	DEPTHS FROM	DEPTHS TO	SPEED FT/MIN	T.C. SEC.	SENS SETTINGS	ZERO DIV. L OR R	API G. R. UNITS PER LOG DIV.	T. C. SEC.	SENS SETTINGS	ZERO DIV. L OR R	API N. UNITS PER LOG DIV.
1	00	104.5	12	5	100	3L	13 API	3	1000	8L	300 API
1	104.5	135.5	12	5	100	3L	13 API	3	500	-	150 API

REMARKS

ROKE

SIDEWALL DENSILOG
CALIPER

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO. 674

LSD
SEC
TWP
RGE
W M

COMPANY MANALTA COAL LIMITED

WELL SR - 20 - 75

LOCATION MASTER CREEK

FIELD SUKUNKA RIVER

PROVINCE BRITISH COLUMBIA

Other Services: GRN

Permanent Datum GROUND LEVEL Elev.
Log Measured from GROUND LEVEL Ft. Above Perm. Datum
Well Depths Measured from GROUND LEVEL

K.B.
CSG
G.L.

Run. No.	ONE		
Date	3 NOVEMBER 1975		
First Reading	135		
Last Reading	000		
Footage Logged	135		
Depth Reached	136		
Depth Driller	143		
Casing Roke	3		
Casing Driller	3		
Fluid Type	AIR/MUD		
Liquid Level	104.5		
Min. Diam.	4-1/2		
Operating Time	2 HOURS		
Truck No.	104		

Recorded By HEDIN Witnessed By JACKSON

GENERAL: RUN NO. | DEPTHS FROM | DEPTHS TO | SPEED FT/MIN

RUN NO.	DEPTHS FROM	DEPTHS TO	SPEED FT/MIN
1	000	132	12
1	003	135	20

GAMMA RAY: T.C. SEC. | SENS SETTINGS | ZERO DIV'L OR R | API G.R. UNITS PER LOG DIV.

T.C. SEC.	SENS SETTINGS	ZERO DIV'L OR R	API G.R. UNITS PER LOG DIV.
	CALIPER		

SIDEWALL DENSILOG: T.C. SEC. | SENS SETTINGS | ZERO DIV'L OR R | CPS/ DIV

T.C. SEC.	SENS SETTINGS	ZERO DIV'L OR R	CPS/ DIV
3	1000	1.8R	53.08

REMARKS

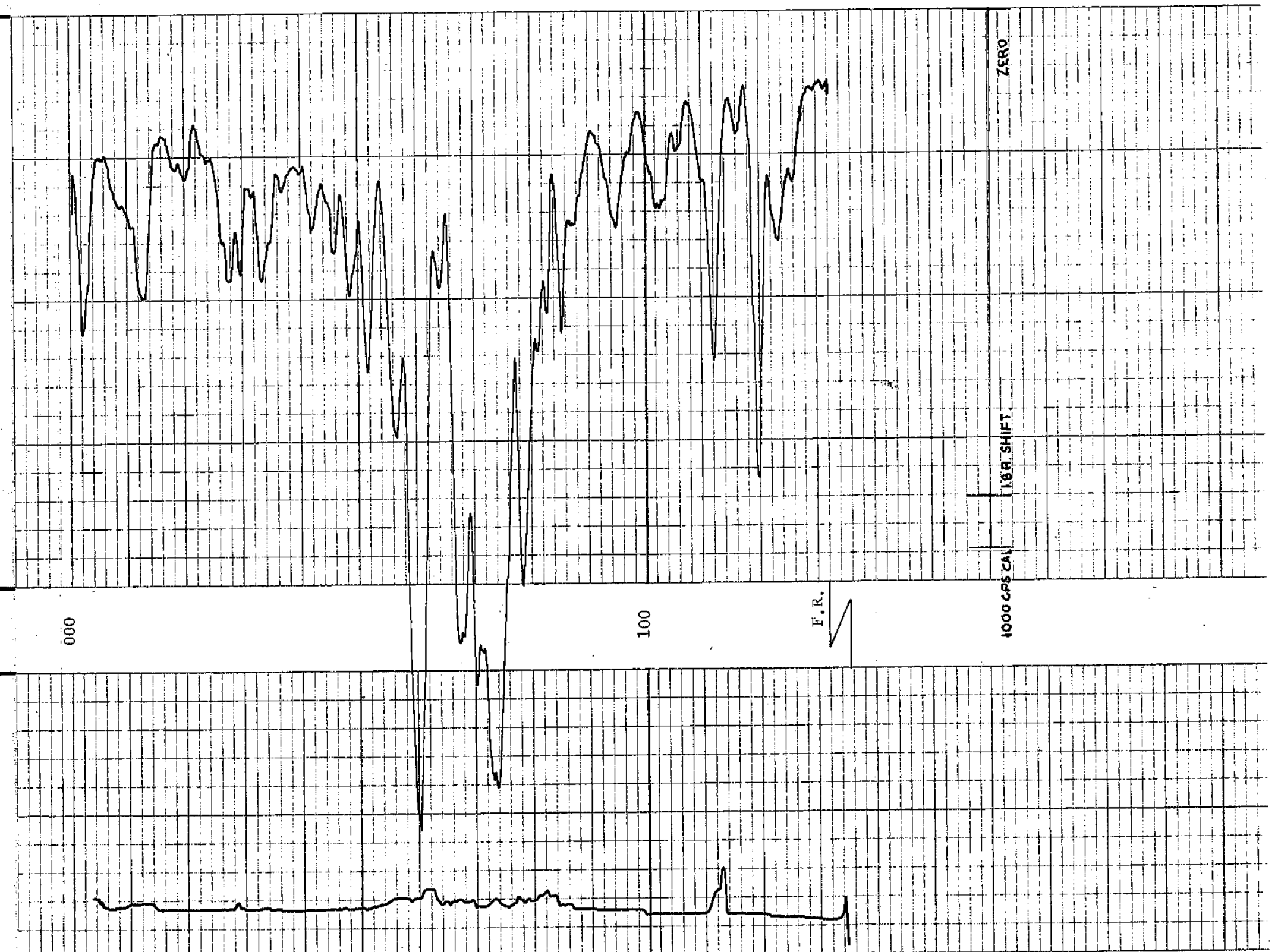
CALIPER TOOL SERIAL NO 785
DENSITY TOOL SERIAL NO 553

CALIPER (DIAMETER – INCHES) 6 12

DEPTHS

GAMMA RAY API 2 4 6 8 10

BULK DENSITY (GRAMS/CC)
2.80 2.70 2.60 2.50 2.40 2.30 2.20 2.10 2.00 1.90 1.80 1.70 1.60 1.50 1.40 1.30 1.20 1.10 1.00



MANALTA COAL LTD.

674

COMPANY MANALTA COAL LTD

HOLE SR-13-75

AREA Sukunka River

PROVINCE BRITISH COLUMBIA

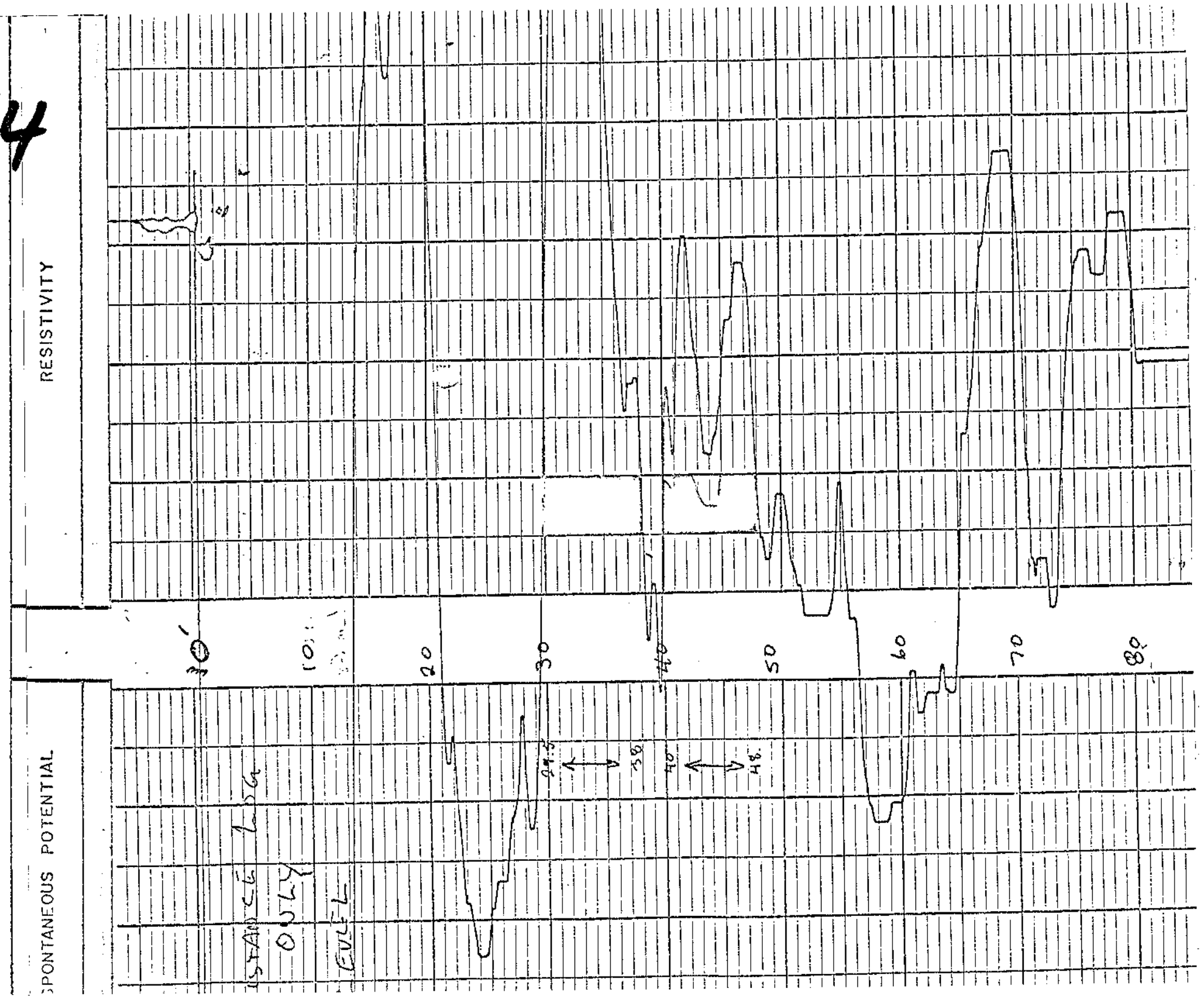
LOCATION 5000' SOUTH 1000' WEST of the N.E. CORNER

SECTION 41 TWP. 8 RGE. 93.25 W. M.

ELEVATION 3745'

MEASURED from Surface

Date	Oct 17 1975
Run No.	1
First Reading	80
Last Reading	0
Feet Measured	80
Depth Reached	21.5'
Bottom Driller	21.5'
Mud Nature	Nat.
Dens. Visc.	
Mud S.G.	
. Water Loss	
. Res.	
Bit Size	4 3/4
Equipment Type	Wdco
Own. Rig Time	
Truck No.	
Recorded By	George Jackson

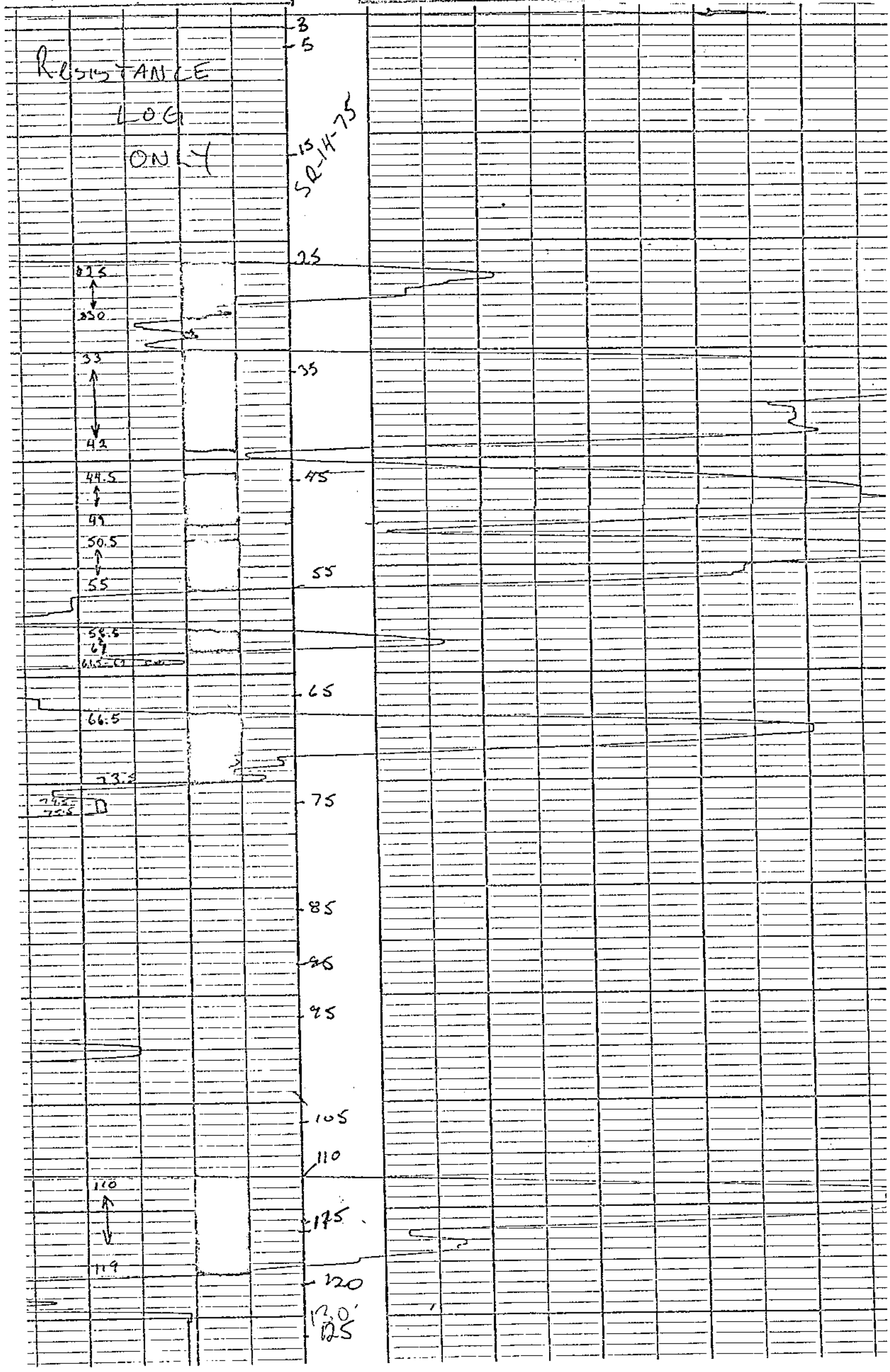


KANALTA COAL LTD.

674

COMPANY	Kanalta Coal Ltd
HOLE	SR-14-75
AREA	Sukunka River
PROVINCE	British Columbia
LOCATION	1980' SOUTH 1000 WEST of the N·E·CORNER
SECTION	41 TWP. 6 RGE. 93 P.25 W. __ M.
ELEVATION	3750
MEASURED from	Surface
Date	Oct 17 1975
Run No.	1
First Reading	125
Last Reading	0
Feet Measured	125
Depth Reached	128
Bottom Driller	130
Mud Nature	Nat.
Dens. Visc.	
Mud S.G.	
Water Loss	
Res.	
Bit Size	4 3/4
Equipment Type	Widco
Opr. Rig Time	
Truck No.	
Recorded By	George Jackson

SPONTANEOUS POTENTIAL | RESISTIVITY



MANALTA COAL LTD.

SUKUNKA RIVER AREA
STRUCTURAL CROSS SECTIONS

LEGEND

	"Middle Coal" Corelative & Attitude
	Cadomin Conglomerate
	Thrust Fault – Attitude Approximate
	Measured Attitude
	Anticlinal Axis
	Synclinal Axis
Q	Quaternary Deposits
Gates	Gates Member of Commotion Formation including Undevided Commotion Formation
amberlain	"Upper" Gething Coals
iddle Coal	"Lower" Gething Coals
J Fm	Minnes Group (including all pre-Cadomin rocks)

674

MANALTA COAL LTD.