

GEOLOGICAL AND DRILLING REPORT

005921

ROSS RIVER COAL

N.T.S. 105-F-16
Coal Lease 2986

By:

L.C. Pigage, Ph.D.

Curragh Resources Inc.
February, 1988

Field work completed September 2-28, 1987

TABLE OF CONTENTS

	<u>PAGE</u>
SUMMARY	1
INTRODUCTION	2
LOCATION AND ACCESS	2
PREVIOUS WORK	3
SEPTEMBER 1987 FIELD PROGRAM	5
Geology mapping	5
Overburden trenching	5
Percussion drilling	6
REGIONAL GEOLOGY	6
SEPTEMBER 1987 FIELD PROGRAM RESULTS	7
Geology mapping	7
Overburden trenching	13
Percussion drilling	13
SUMMARY OF RESULTS	40
RECOMMENDATIONS FOR FURTHER WORK	41
11. Vertical cross-section G-E (173232)	
SELECTED REFERENCES	42
APPENDIX A	43
APPENDIX B	58

LIST OF FIGURES

	<u>PAGE</u>
1. Location map	4
2. Geology map (1:2000)	Pocket
3. Detailed stratigraphy of coal seam interval	9
4. Contoured stereonet - poles to bedding	11
5. Plan map of 1987 drill hole locations	16
6. Stratigraphic thickness of upper coal seam	20
7. Stratigraphic thickness of lower coal seam	22
8. Stratigraphic thickness between the coal seam	24
9. Ash content and heating values of upper coal seam	27
10. Ash content and heating values of lower coal seam	28
11. Vertical cross-section A-B (1:2000)	30
12. Vertical cross-section C-D (1:2000)	31
13. Vertical cross-section E-F (1:2000)	32
14. Vertical cross-section G-H (1:2000)	33
15. Vertical cross-section I-J (1:2000)	34
16. Vertical cross-section K-L (1:2000)	35
17. Vertical cross-section M-N (1:2000)	36
18. Vertical cross-section O-P (1:2000)	37
19. Vertical cross-section Q-R (1:2000)	38
20. Vertical cross-section S-T (1:2000)	39

LIST OF TABLES

	<u>PAGE</u>
1. Regional Tertiary stratigraphy - Ross River Coal	8
2. 1987 Percussion drill hole collar locations	14
3. Upper coal seam intersections	18
4. Lower coal seam intersections	19
5. Thickness of sandstone-siltstone sequence between coal seams	23
6. Test results for upper seam composite samples	25
7. Test results for lower seam composite samples	26

each seam contains high ash content and low heating value.

SUMMARY

Downdip and along strike to the southwest from the present open pit, the upper and lower coal seams have a uniform southeast dip of 25 degrees. To the southeast the seams are truncated by a northeast-trending steep fault. The eastern extension of the coal seams across this fault was not found.

Between the present pit and the North Canol highway the coal seams are displaced by a small northwest-trending fault. Vertical offset across the fault surface is approximately 10 meters with the south side being downthrown.

Coal quality is consistent and reasonable down dip from the present open pit area. Along strike to the southwest isolated samples from each seam contain high ash content and low heating values. These variations may be related to surface weathering or sampling problems.

A small selective trenching program is recommended to determine precisely the location of the coal seams and the northwest-trending fault on the hillslope north of Whisker Lake. Samples should be taken from the coal exposures and tested for quality as part of this trenching program.

INTRODUCTION

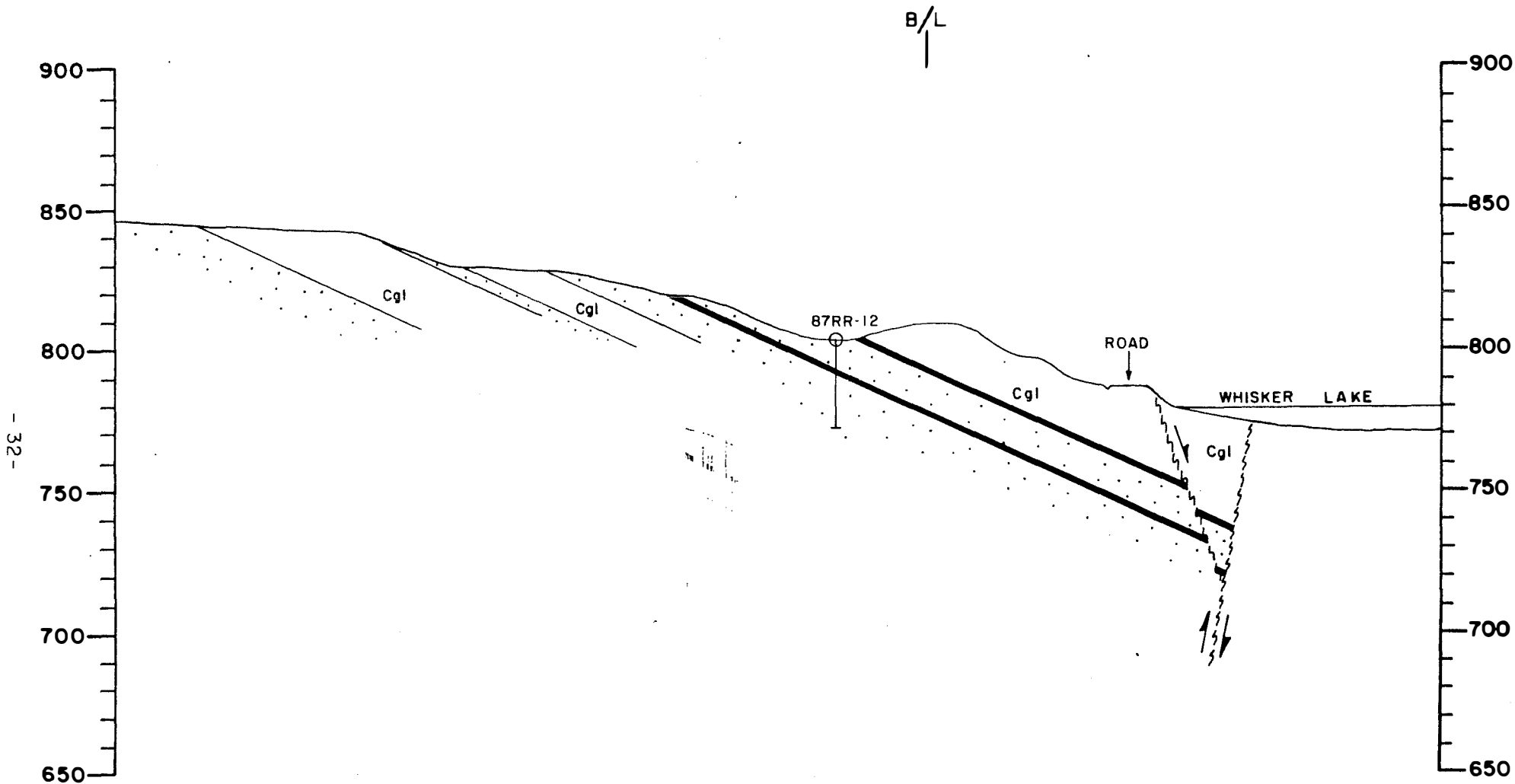
During the years 1986-87 coal requirements for the Faro mill operation have been met through strip mining of two coal seams immediately southwest of Ross River, Yukon by Nadahini Mining Corporation. The present open pit encompasses most of the area originally outlined for mining reserves.

A small exploration and development program was conducted in September 1987 to assess the potential for enlarging the present open pit to the southwest (along strike) and southeast (down dip). Specifically the program was designed to:

1. attempt to locate the eastern extension of the coal seams which were displaced an unknown amount by late faulting,
2. test the continuity and quality of the coal seams immediately downdip from the present open pit,
3. test the continuity and quality of the coal seams in the area between the present open pit and the North Canol highway by Whisker Lake.

This report describes the geology results of the September 1987 program as they pertain to the goals delineated above.

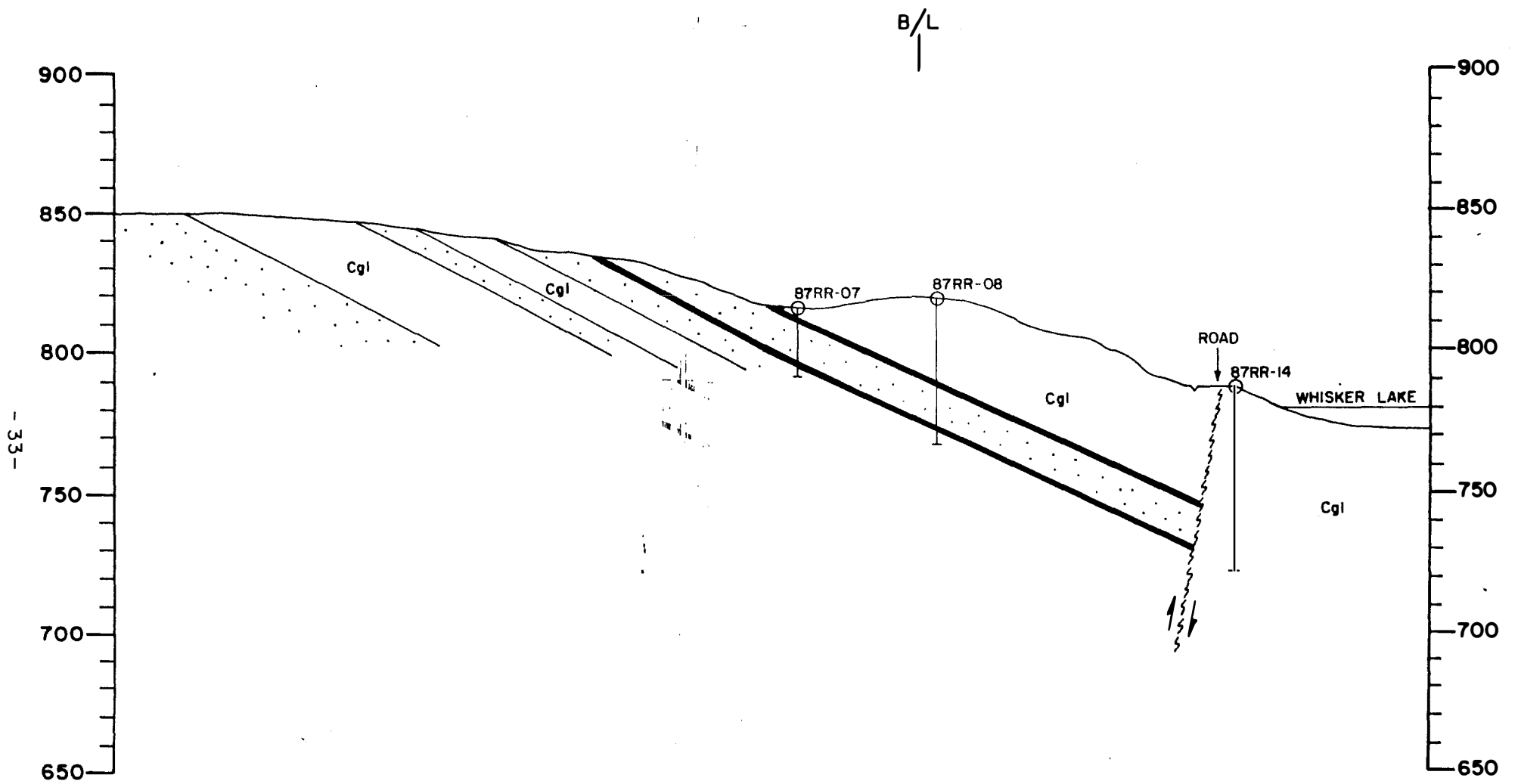
LOCATION AND ACCESS



- 32 -

SECTION E-F

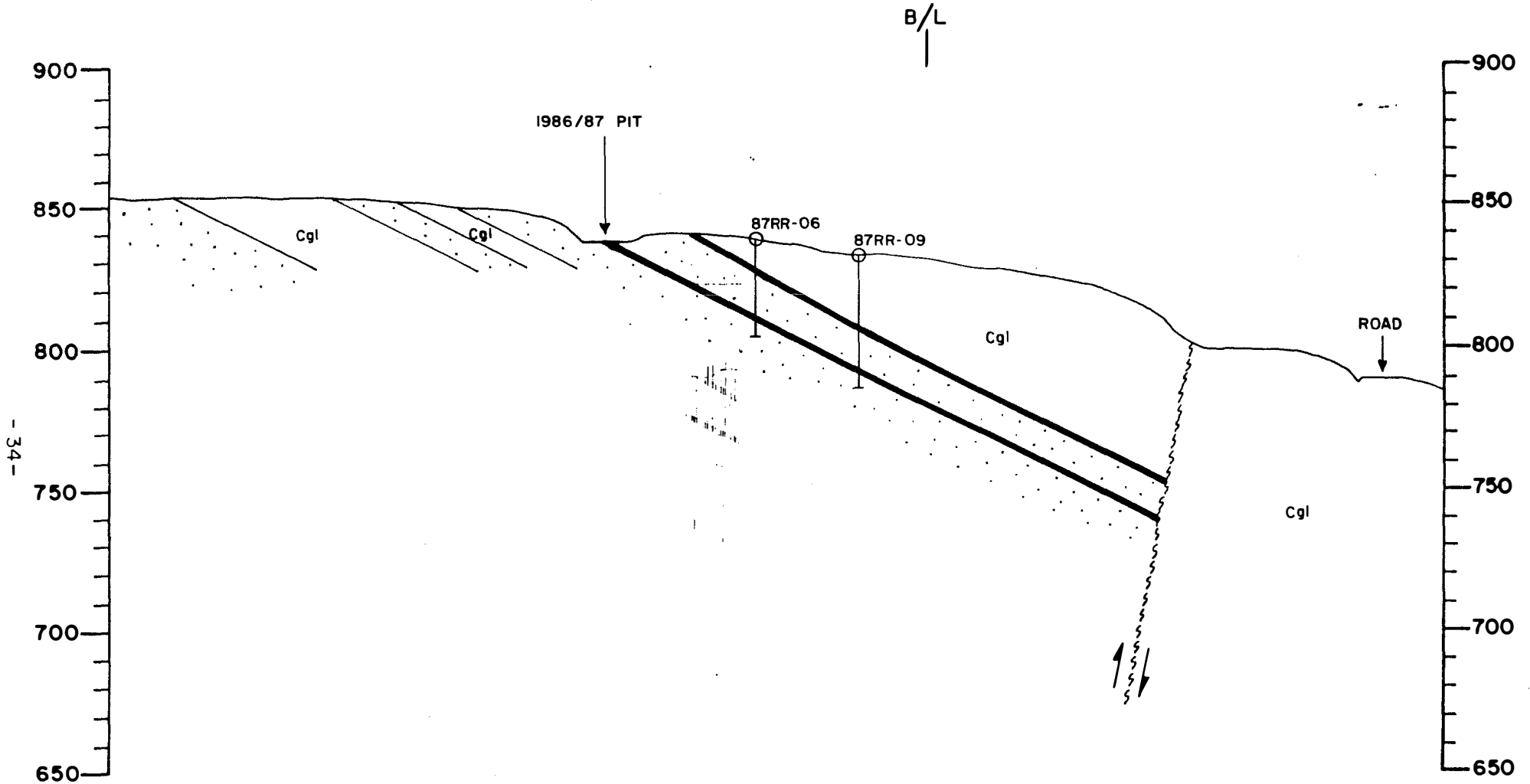
ROSS RIVER COAL



- 33 -

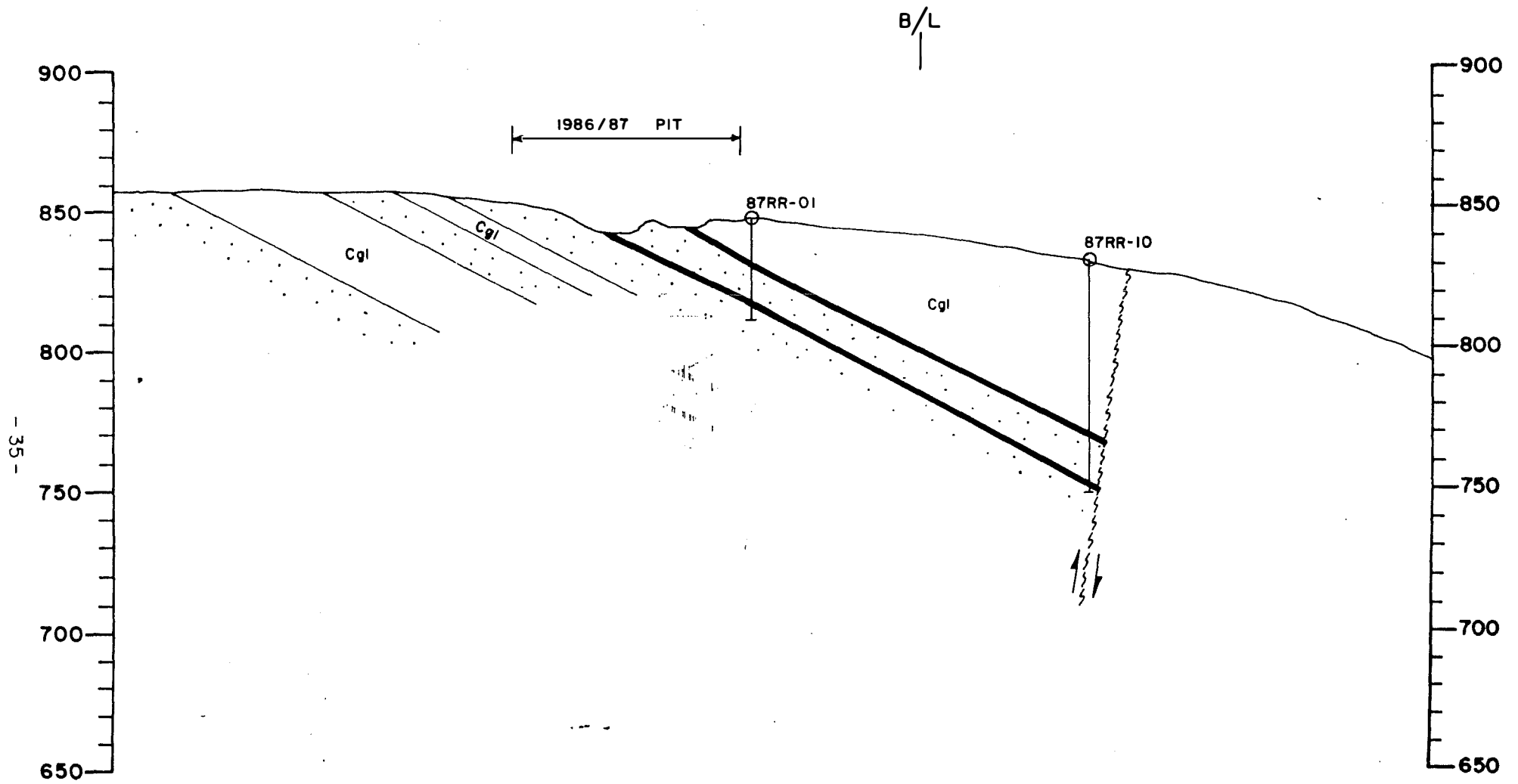
SECTION G-H

ROSS RIVER COAL



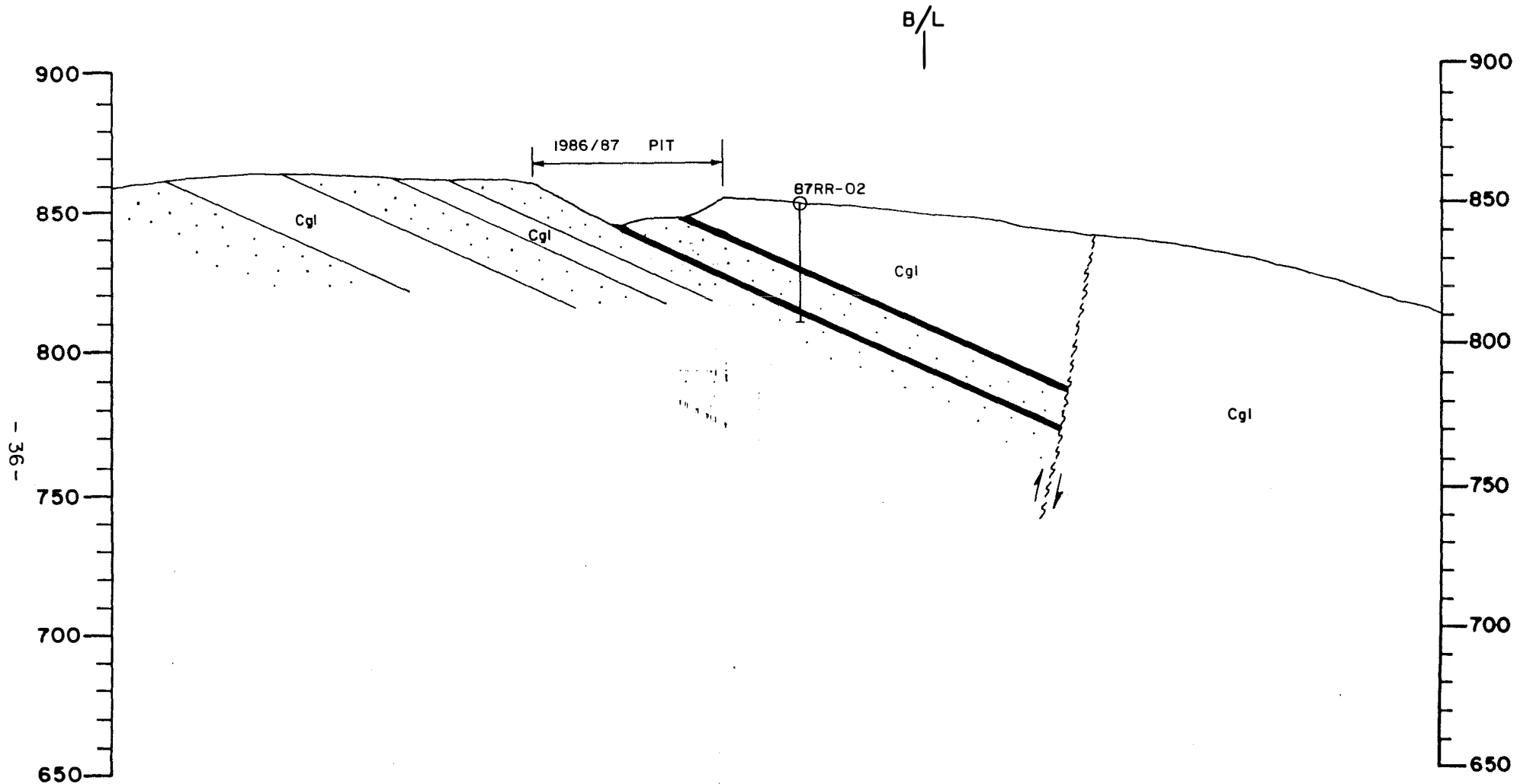
SECTION I-J

ROSS RIVER COAL



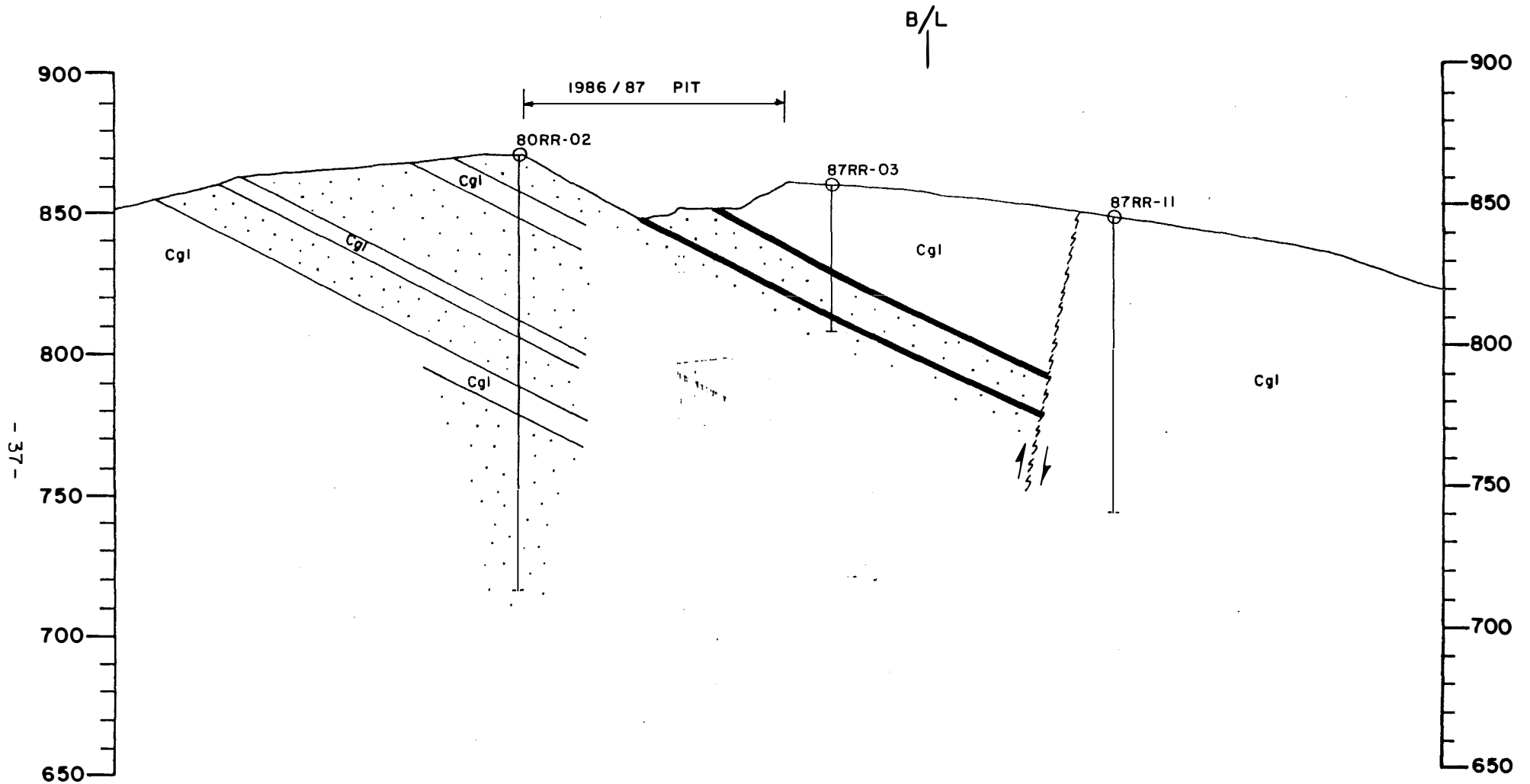
SECTION K-L

ROSS RIVER COAL



SECTION M-N

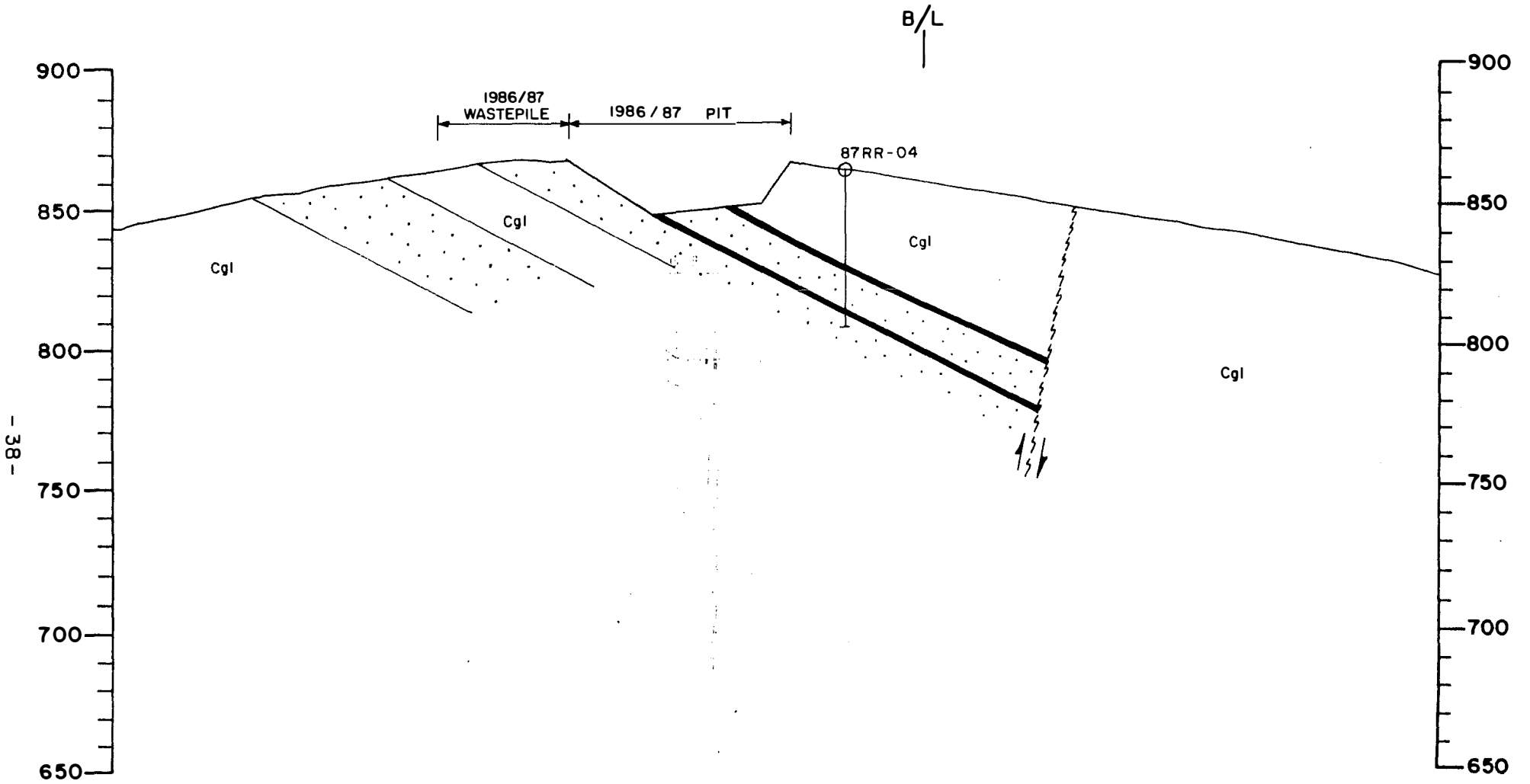
ROSS RIVER COAL



- 37 -

SECTION O-P

ROSS RIVER COAL

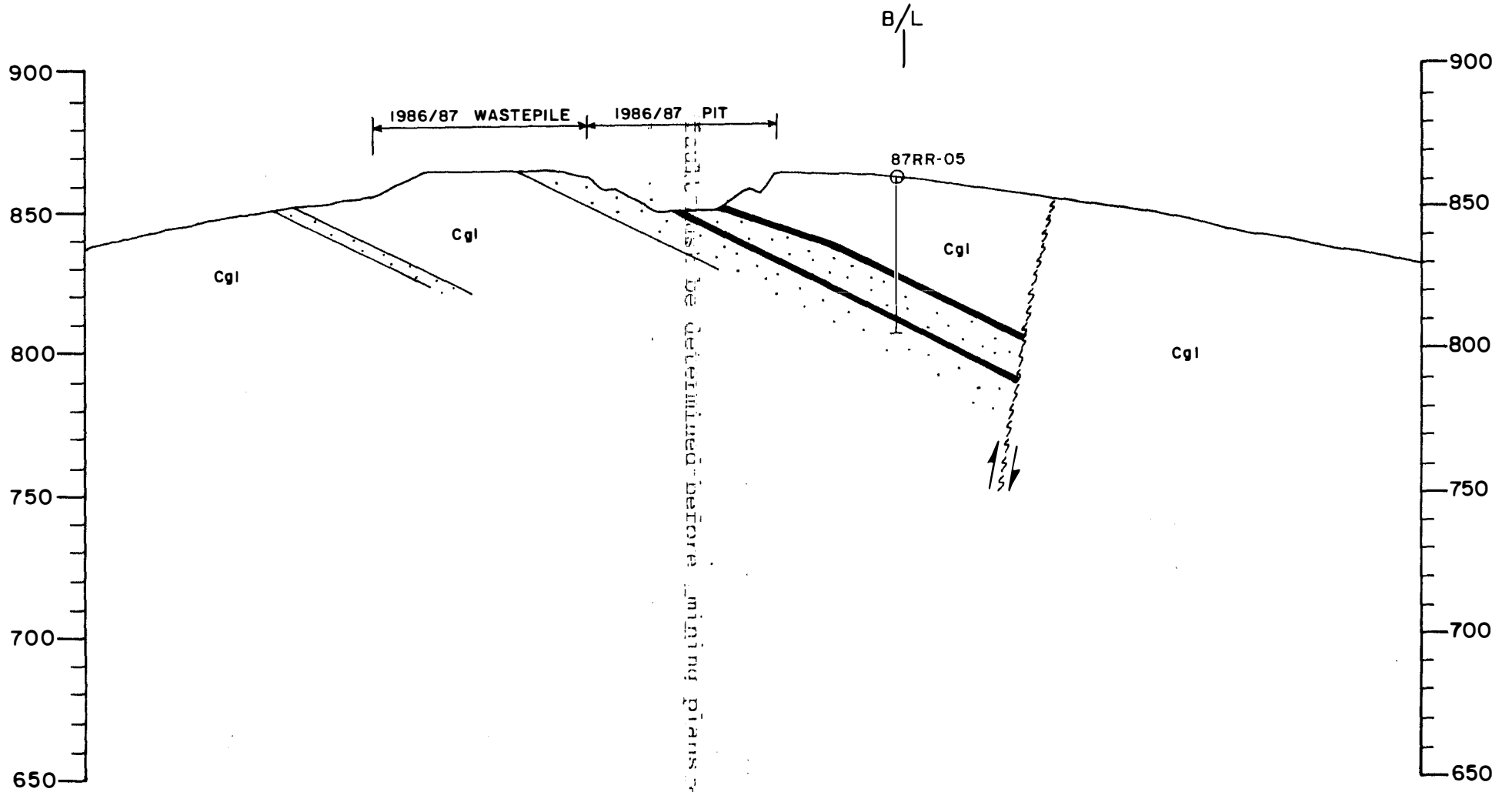


- 38 -

SECTION Q-R

ROSS RIVER COAL

- 39 -



SECTION S-T

ROSS RIVER COAL

The September 1987 program was conducted on coal lease 2986 located approximately 3 km southwest of Ross River, Yukon (figure 1). The coal lease is located in N.T.S. map sheet 105 F/16.

The North Canol highway traverses immediately south of the area of interest. The north edge of the area is bordered by a power line right-of-way. With the recent strip mining by Nadahini Mining Corporation, access to the centre of the area is readily facilitated by the haulage road to the pit operations.

PREVIOUS WORK

The occurrence of numerous Tertiary coal seams immediately southwest of Ross River has been known for many years (Hughes and Long, 1980).

In 1980 three coal leases covering the known extent of the coal occurrences were acquired by Cyprus Anvil Mining Corporation. A rotary drilling program totaling 974.3 meters in 13 drill holes was completed in June 1980 to investigate the full stratigraphic thickness of the Tertiary basin containing the coal seams (Adamson 1980). Some minor bulldozer trenching further explored the known surface coal exposures. Two relatively thick seams of good quality thermal coal were located immediately north of Whisker Lake (rotary hole 80RR-08) during this program (Adamson 1980).

During August, 1981 a bulldozer trenching program was carried out

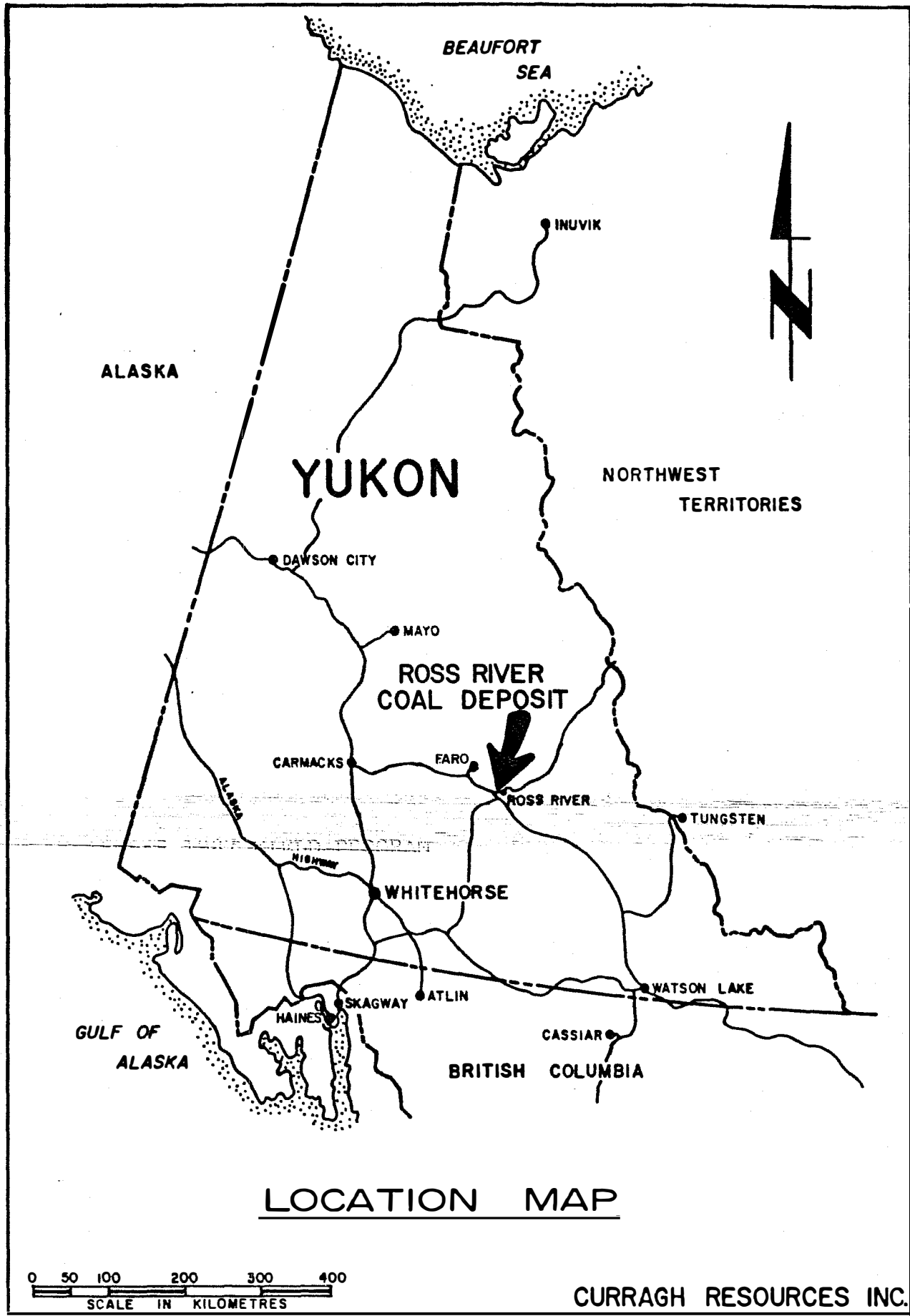


FIGURE 1. ROSS RIVER COAL LOCATION MAP

to assess the continuity of the two coal seams intersected in drill hole 80RR-08 (Adamson 1981). Ten bulldozer trenches totaling 557 linear meters were excavated. Based on this program, preliminary geological reserves of 90 125 tonnes with a stripping ratio of 4.5 m³/tonne were outlined.

Open pit mining of the outlined reserves by Nadahini Mining Corporation commenced in 1986. Mining is conducted on a seasonal basis. The coal is trucked to Faro minesite using highway trucks.

During June, 1987, a preliminary geological mapping program was conducted to outline, if possible, the eastern extension of the coal seams. Possible coal subcrops were located on the power line right-of-way northeast of the present open pit. Further detailed investigation was suggested for this area.

intersected in 12 of the drillholes. Composite samples from the
SEPTEMBER 1987 FIELD PROGRAM

Geology Mapping

Geologic mapping in the immediate vicinity of the present open pit was completed during the interval September 2-4, 1987. Emphasis was placed on delineating the surface geology northeast and south of the current mining area. Figure 2 details the results of the mapping program.

Overburden Trenching

Two overburden trenches totaling 100 linear meters were completed September 27, 1987; they are located immediately south of the power line right-of-way northeast of the present open pit (figure 2). Trench A successfully exposed bedrock at intervals along its entire length. Trench B was not completed because the bulldozer was sinking in soft ground. Bedrock was exposed only at the extreme north end.

Percussion Drilling

A total of 712 meters in 14 vertical percussion drill holes was completed by Midnight Sun Drilling Company Ltd. of Whitehorse during the interval September 24-28, 1987. The drill holes were located to test the extent and continuity of the two coal seams being mined (see figure 2). The coal seams were successfully intersected in 12 of the drillholes. Composite samples from these intersections were tested for proximate, sulphur, and heating values by Birtley Coal and Minerals Testing Limited of Calgary, Alberta. Where possible, downhole depths of the coal seams were electronically logged using a downhole neutron moisture gauge depthprobe immediately after the drill hole was completed.

REGIONAL GEOLOGY

Early Tertiary basins locally containing coal seams form fault-bounded blocks within Tintina Trench (Hughes and Long 1980). The basins formed adjacent to normal faults complexly related to major transcurrent movement along the Late Cretaceous-Early

Tertiary Tintina Fault Zone.

The small fault-bounded Tertiary basin immediately southwest of Ross River approximates a parallelogram with an east-west extent of 6 km and a north-south extent of 850 meters (Adamson 1980).

Rotary drilling in 1980 established an aggregate thickness of greater than 570 meters for Tertiary strata in the basin. Rock types consist dominantly of conglomerate and sandstone with lesser mudstone, siltstone and coal. Adamson (1980) outlined five regional stratigraphic units within the Ross River block (Table 1).

The 1981 trenching program confirmed the presence of two mineable coal seams within unit TS₄ immediately underlying unit TS₅ (Adamson 1981). Figure 3 outlines the detailed stratigraphy in the immediate vicinity of the coal seams. The average stratigraphic thickness separating the two seams is 14.4 meters. The seams are contained within a sequence of dark grey and brown, micaceous siltstones and sandstones immediately underlying massive conglomerates.

SEPTEMBER 1987 FIELD PROGRAM RESULTS

Geology Mapping

Adjacent to the mining area (figure 2), Tertiary strata form an upright homoclinal sequence striking northeast-southwest and dipping moderately to the southeast. The average bedding

TABLE OF GEOLOGIC FORMATIONS

Table I

<u>Age</u>	<u>Symbol</u>	<u>Thickness</u>	<u>Lithology</u>
Tertiary Paleocene-Eocene?	Ts	570 m +	Sandstone, shale, conglomerate, <u>coal</u>
	Ts ₅	120 m +	Conglomerate, conglomeratic sandstone, coarse grained sandstone, very minor mudstone.
	Ts ₄	130 m	Sandstone, conglomeratic sandstone, mudstone, <u>coal</u> , minor conglomerate. (11 coal seams .2 - 1.7 m thick, distributed throughout section).
	Ts ₃	140 m	Mudstone, siltstone, very fine-grained sandstone, minor conglomerate, very minor thin <u>coal</u> . (3 seams .3 - .5 m thick)
	Ts ₂	60 m +	Dark brown to grey to black mudstone, siltstone.
	Ts ₁	120 m +	Top 40 m + thinly interbedded mudstone, very fine-grained, light grey sandstone, dirty coal seams; middle 20 m fine-grained very clean quartzose sandstone; lower 60 m + light grey to pink clean siliceous siltstone to very fine-grained clean sandstone.
Carboniferous or Permian	Pc		Recrystallized crinoidal limestone.
	CPv		Basalt, tuff, minor augite porphyry.
Age Unknown	PIPk		Phyllite, greywacke, marble.

FROM ADAMSON (1981)

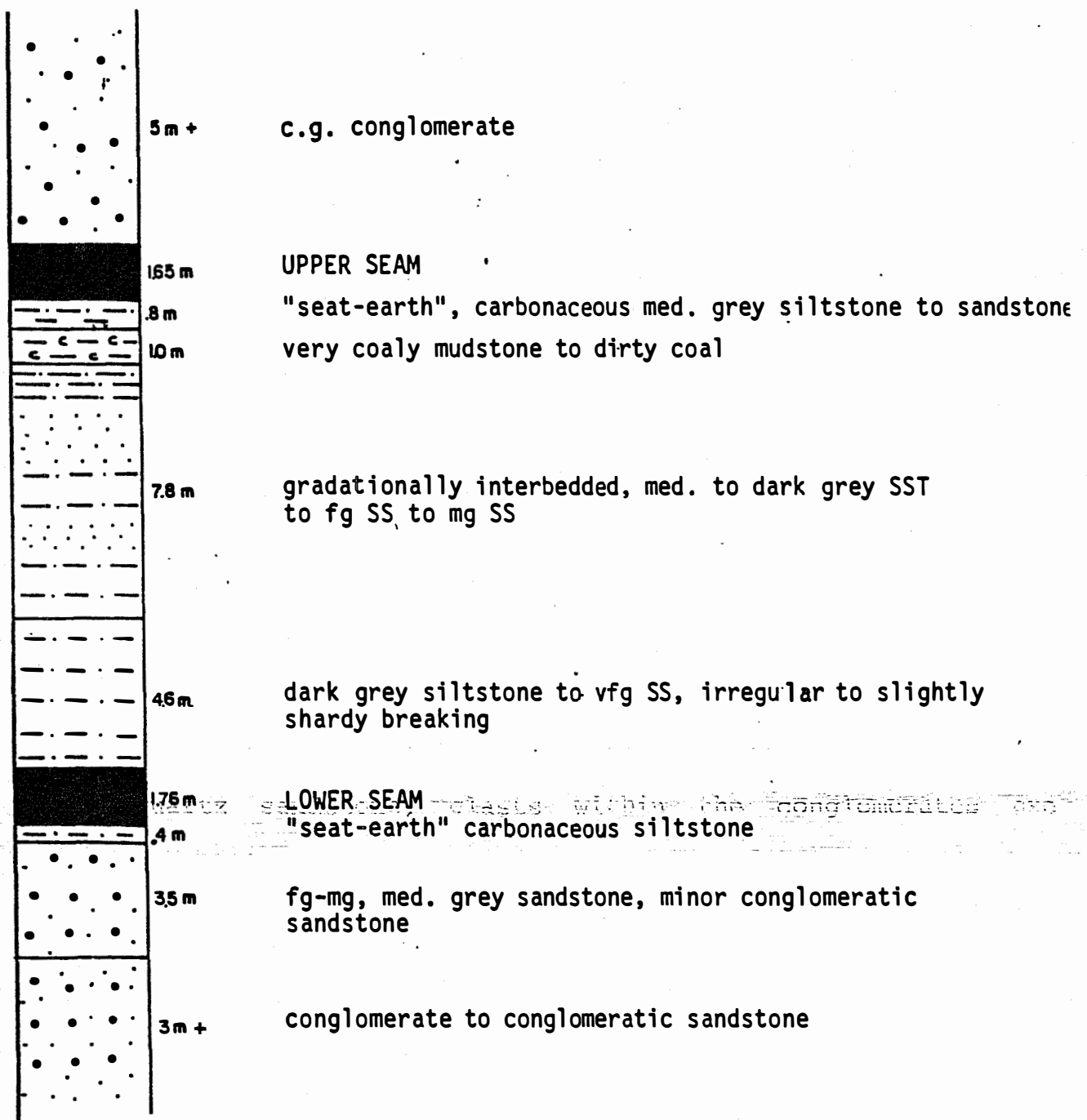


FIGURE 3. DETAILED STRATIGRAPHY OF COAL SEAM INTERVAL, FROM ADAMSON (1981)

1:200
 Ross River Coal
 Generalized Stratigraphic between
 Lower Seam - Upper Seam Interval

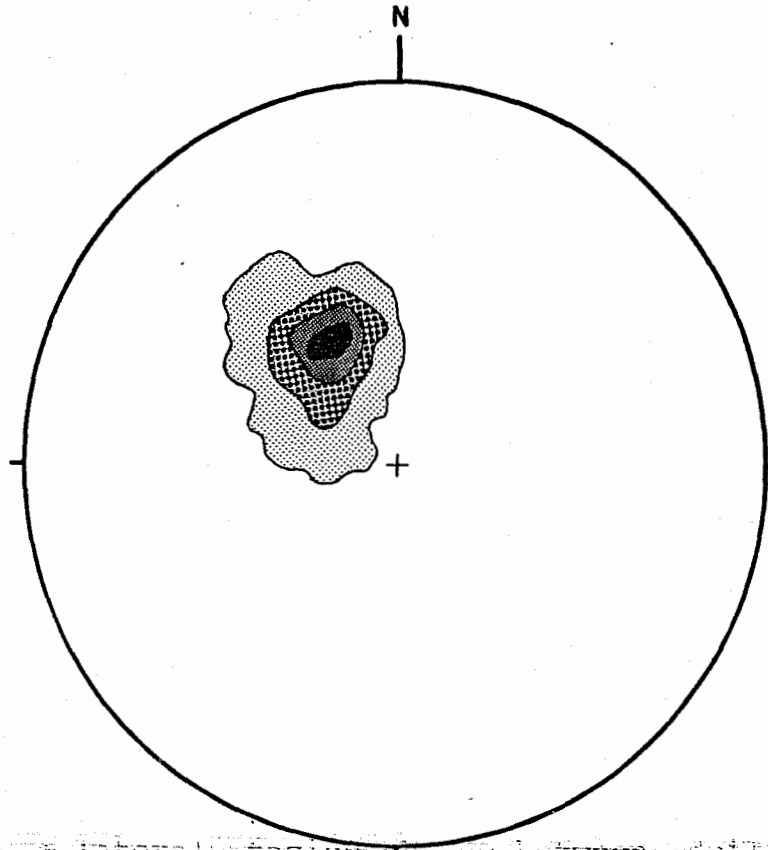
orientation for 20 measurements is 055/29SE (figure 4).

The two coal seams are contained within a sequence of fine-grained, dark brown to brownish gray, micaceous sandstones and siltstones. Typically this sequence weathers to a dull brown; exposures break with an irregular conchoidal surface. Detrital muscovite is visible as silvery flakes. Locally the sequence contains thin beds of light gray, coarse-grained, quartz sandstone.

Immediately overlying the upper coal seam is a series of massive, coarse, quartz conglomerates. Clasts within the conglomerate consist largely of white, dark gray, and black metamorphic quartzite. Minor amounts of emerald green quartzite, dull red quartzite, coal, and gray shale also occur as clasts locally. The matrix for the clasts consists of a light gray, coarse-grained, quartz sandstone; clasts within the conglomerates are matrix supported.

Bedding in the conglomerates is delineated by variations in the amount and size of clasts. Intercalated with the conglomerates are thin beds of coarse-grained, light gray, quartz sandstone. The sandstones exhibit rapid and extensive thickness variations laterally.

The conglomerates also occur as thin beds within the brown siltstones and sandstones beneath the lower coal seam. Previously the massive conglomerates overlying the coal were mapped as unit



to be a lateral facies change between 20 points
 average bedding along strike

055/29 SE

ROSS RIVER COAL

Equal area stereonet plot of poles to bedding
 Contours at 0, 15%, 30%, 45% per 1% area

FIGURE 4. CONTOURED STERCONET - POLES TO BEDDING



Curragh Resources Inc.

TS₅ (Adamson, 1980, 1980), and the conglomerates beneath the coal seams were included within unit TS₄.

Near power pole 526 (figure 2), the conglomerates contain a thin, brown micaceous sandstone bed lithologically identical to the sandstones containing the coal seams. This sandstone is exposed for most of its 5 meter thickness, and it does not contain any coal layers. Furthermore, Trench A exposed only conglomerate outcrops; the sandstone does not appear to extend laterally to Trench A.

Along the North Canol highway and in drill holes 8ORR-08 and 8ORR-02 the conglomerates beneath the coal seams occur as thin beds intercalated with greater amounts of brown siltstone and sandstone. Near power poles 522 and 523, however, the conglomerates form thick extensive outcrops underlying the lower coal seam. There appears to be a lateral facies change between drillhole 8ORR-02 and the power line with a dramatic increase in conglomerate along strike to the northeast.

At outcrop station 87-13 the lower coal seam is truncated by a steep planar fault with orientation 028/81W. Coarse mullion grooves on the fault surface have the lineation orientation 005/60; fine striation slickensides on the fault have the lineation orientation 218/45. Both sets of lineations indicate that there is substantial horizontal component to movement along the fault.

Offset across the fault surface is unknown. The horizontal component of displacement is left lateral because the thick

conglomerates overlying the coal seams are exposed in all outcrops east of the fault.

Overburden Trenching

Trenches A and B were completed to possibly expose the eastern extension of the coal seams offset along the fault in outcrop 87-13. Trench A was successfully completed and exposed conglomerate outcrops at several locations along its length. Trench B, however, only exposed conglomerate at the extreme north end of the excavation. Further work in trench B was discontinued because of soft ground conditions.

Conglomerate outcrops in Trench A indicate the coal seams do not extend through the area of minimal outcrop immediately south of the power line right-of-way. The micaceous sandstone at station 87-12 does not appear to be laterally extensive and cannot be readily correlated with the coal seam sequence of micaceous sandstones and siltstones.

Percussion Drilling

Table 2 lists the drill holes completed during the 1987 program. All holes were drilled by Midnight Sun Drilling Company Ltd. using a Schramm percussion drill mounted on a Nodwell track vehicle. In all cases the holes were oriented vertically downward.

Collar locations were determined in the field by measuring

ROSS RIVER COAL 1987 DRILLING PROJECT

Work Completed September 24-28

Name	Site	UTM Coordinates			Total Depth	
		Northing	Easting	Elev	(m)	(ft)
87RR-01	7J	6,873,231	631,696	844.8	36.6	120.0
87RR-02	8L	6,873,263	631,754	850.2	42.7	140.0
87RR-03	9N	6,873,301	631,809	857.0	51.8	170.0
87RR-04	10P	6,873,333	631,853	862.4	56.4	185.0
87RR-05	11R	6,873,354	631,914	859.0	55.8	183.0
87RR-06	5H	6,873,201	631,662	832.0	33.5	110.0
87RR-07	4G	6,873,159	631,642	814.1	24.4	80.0
87RR-08	3F	6,873,117	631,668	815.5	51.8	170.0
87RR-09	6H	6,873,171	631,683	835.4	45.7	150.0
87RR-10	14	6,873,148	631,783	830.7	82.3	270.0
87RR-11	13	6,873,233	631,881	845.1	104.9	344.0
87RR-12	2F	6,873,129	631,626	803.8	30.5	100.0
87RR-13	1E	6,873,088	631,631	793.9	31.7	104.0
87RR-14	15	6,873,049	631,752	784.9	64.0	210.0
Total					712.0	2336.0

TABLE 2 DRILL HOLE LOCATIONS

distances relative to labelled field grid stations (pickets) previously surveyed by Yukon Engineering Services. R. Harvey of Y.E.S. then reduced these field locations to Curragh Resources Inc. orthophoto UTM coordinates. Figures 2 and 5 show the resulting collar locations.

The drill holes were monitored and logged for rock types as they were being drilled. Depths were recorded from ground level. Appendix A contains the geology logs for each of the drill holes.

Each drill hole was sampled continuously. Except for the coal seam intersections, fresh sample bags were installed at 5-foot intervals. Drilling was stopped immediately upon encountering a coal seam. The hole was then blown out with air. The entire coal seam intersection was sampled using fresh sample bags at 1-foot intervals.

After each drill hole was completed, all rods were withdrawn and two inch PVC tubing was lowered down the hole. A CPN Corporation 501 depthprobe neutron moisture gauge was then lowered down the hole on a coaxial cable. The downhole depths of the coal seams were electronically logged using a 1-foot interval spacing. Appendix B contains a technical summary of the neutron moisture gauge and listings of the instrument drill hole logs.

Drill holes 87RR-11 and 87RR-14 encountered sandstone and conglomerate through the entire intervals drilled. The dark brown micaceous siltstone and sandstone sequence containing the coal

ROSS RIVER COAL

Drill Hole Locations

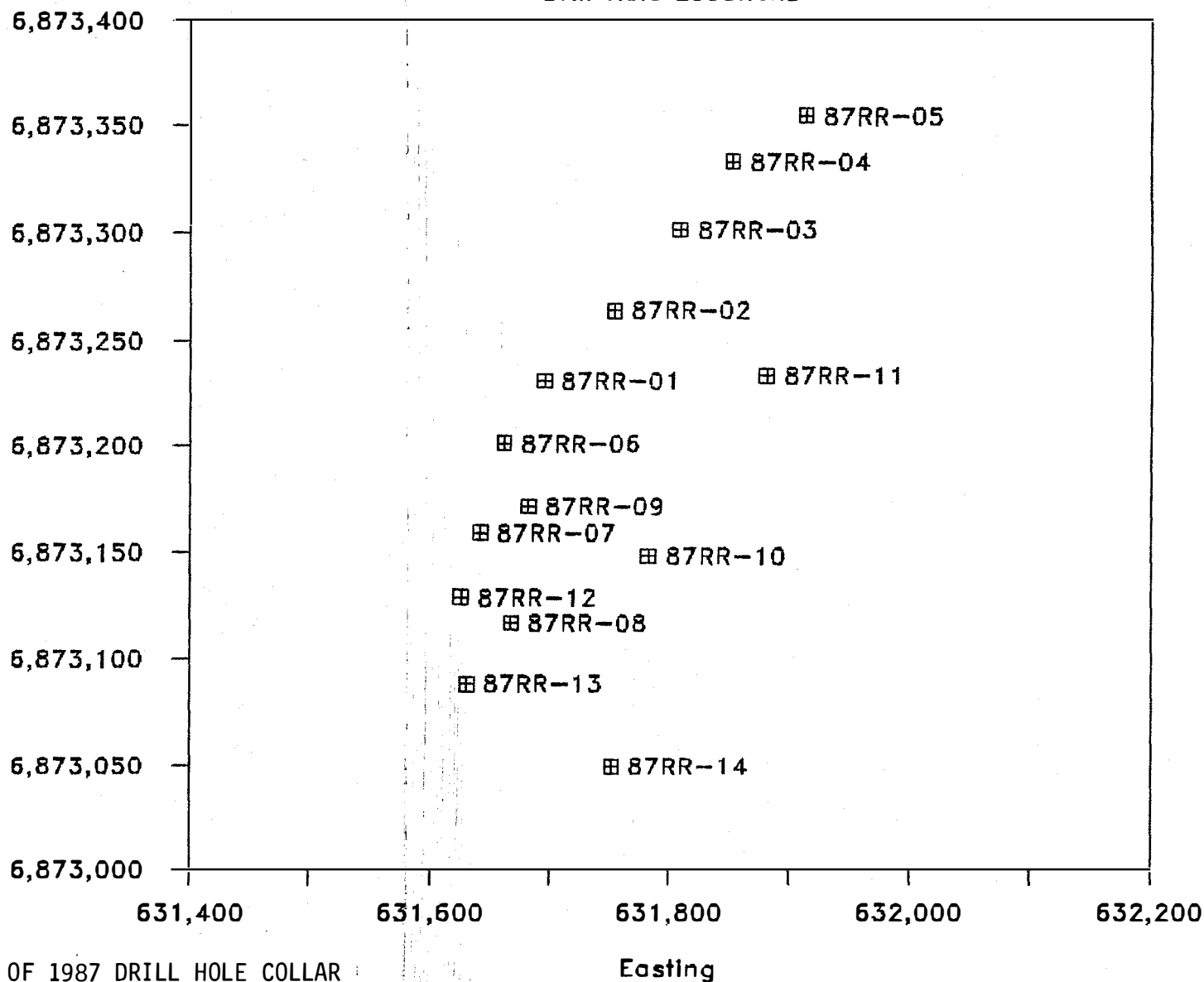


FIGURE 5. PLAN MAP OF 1987 DRILL HOLE COLLAR LOCATIONS.
NB: HORIZONTAL AND VERTICAL SCALES ARE NOT THE SAME.

seams was not intersected. The fault mapped in outcrop 87-13 was therefore interpreted as passing west of these two drill holes. This steep fault truncates the coal seams to the southeast.

Drill hole 87RR-07 intersected the upper coal seam immediately beneath the overburden. Drill hole 87RR-12 was collared between the two coal seams and only encountered the lower seam. In contrast, drill holes 87RR-13 and 80RR-08 intersected both coal seams. The geometry of these intersections requires a fault between drill holes 87RR-12 and 87RR-13. A northwest-southeast trending fault with apparent right lateral displacement is geologically most consistent with the drill hole intersections. Cross-section interpretation (see below) indicates a vertical displacement of 10 meters across the fault surface with the south side being downthrown.

Tables 3 and 4 delineate the intersection depths for the upper and lower coal seams, respectively. From the tables and from figures B1 to B12 in Appendix B, the intersection thicknesses of both seams as measured by the neutron moisture gauge are identical to the percussion drill logs. The instrument depths are displaced deeper in the drill hole by up to 1 meter when compared to the drill logs; this may be related to measuring problems with the coaxial cable.

The upper coal seam has an average stratigraphic thickness of 1.7 meters (Table 3). Figure 6 shows the spatial distribution of the upper coal seam thickness as indicated from the drill hole

ROSS RIVER COAL 1987 DRILLING PROJECT

Work Completed September 24 - September 28

Name	UPPER COAL SEAM (Schramm)								UPPER COAL SEAM (Instrum)							
	Start (ft)	Stop (ft)	Start (m)	Stop (m)	Vertical Thickness (ft)	Vertical Thickness (m)	True # (ft)	True # (m)	Start (ft)	Stop (ft)	Start (m)	Stop (m)	Vertical Thickness (ft)	Vertical Thickness (m)	True # (ft)	True # (m)
87RR-01	54.0	60.0	16.5	18.3	6.0	1.8	5.4	1.7	55.0	61.0	16.8	18.6	6.0	1.8	5.4	1.7
87RR-02	80.0	86.0	24.4	26.2	6.0	1.8	5.4	1.7	81.6	87.6	24.9	26.7	6.0	1.8	5.4	1.7
87RR-03	107.0	114.0	32.6	34.7	7.0	2.1	6.3	1.9	108.5	115.5	33.1	35.2	7.0	2.1	6.3	1.9
87RR-04	116.0	123.0	35.4	37.5	7.0	2.1	6.3	1.9	117.7	123.7	35.9	37.7	6.0	1.8	5.4	1.7
87RR-05	119.0	126.0	36.3	38.4	7.0	2.1	6.3	1.9	119.3	125.3	36.4	38.2	6.0	1.8	5.4	1.7
87RR-06 *	38.0	46.0	11.6	14.0	8.0	2.4	7.3	2.2	39.0	47.2	11.9	14.4	8.2	2.5	7.4	2.3
87RR-07	16.0	21.5	4.9	6.6	5.5	1.7	5.0	1.5	17.9	22.9	5.5	7.0	5.0	1.5	4.5	1.4
87RR-08	98.0	104.0	29.9	31.7	6.0	1.8	5.4	1.7	99.5	104.5	30.3	31.9	5.0	1.5	4.5	1.4
87RR-09	86.0	91.0	26.2	27.7	5.0	1.5	4.5	1.4	85.2	91.2	26.0	27.8	6.0	1.8	5.4	1.7
87RR-10	205.0	210.0	62.5	64.0	5.0	1.5	4.5	1.4	-	-	-	-	-	-	-	-
87RR-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
87RR-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
87RR-13	37.0	42.0	11.3	12.8	5.0	1.5	4.5	1.4	37.3	43.3	11.4	13.2	6.0	1.8	5.4	1.7
87RR-14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Average				6.1	1.9	5.6	1.7	Average				6.1	1.9	5.5	1.7

* includes a 2-foot (0.61 m) interval of siltstone

assumes a 25 degree dip for bedding

TABLE 3 UPPER COAL SEAM INTERSECTIONS

ROSS RIVER COAL 1987 DRILLING PROJECT

Work Completed September 24 - September 28

Name	LOWER COAL SEAM (Schramm)								LOWER COAL SEAM (Instrum)							
	Start (ft)	Stop (ft)	Start (m)	Stop (m)	Vertical Thickness (ft)	Vertical Thickness (m)	True # Thickness (ft)	True # Thickness (m)	Start (ft)	Stop (ft)	Start (m)	Stop (m)	Vertical Thickness (ft)	Vertical Thickness (m)	True # Thickness (ft)	True # Thickness (m)
87RR-01	100.0	105.0	30.5	32.0	5.0	1.5	4.5	1.4	103.3	109.3	31.5	33.3	6.0	1.8	5.4	1.7
87RR-02	127.0	132.0	38.7	40.2	5.0	1.5	4.5	1.4	128.2	133.2	39.1	40.6	5.0	1.5	4.5	1.4
87RR-03	155.0	160.0	47.2	48.8	5.0	1.5	4.5	1.4	156.5	161.5	47.7	49.2	5.0	1.5	4.5	1.4
87RR-04	168.0	174.0	51.2	53.0	6.0	1.8	5.4	1.7	169.0	174.0	51.5	53.0	5.0	1.5	4.5	1.4
87RR-05	168.0	174.0	51.2	53.0	6.0	1.8	5.4	1.7	168.6	174.6	51.4	53.2	6.0	1.8	5.4	1.7
87RR-06	90.5	97.0	27.6	29.6	6.5	2.0	5.9	1.8	-	-	-	-	-	-	-	-
87RR-07	66.0	71.0	20.1	21.6	5.0	1.5	4.5	1.4	67.1	72.1	20.5	22.0	5.0	1.5	4.5	1.4
87RR-08	148.0	156.0	45.1	47.5	8.0	2.4	7.3	2.2	148.5	156.5	45.3	47.7	8.0	2.4	7.3	2.2
87RR-09 *	133.0	139.0	40.5	42.4	6.0	1.8	5.4	1.7	132.6	139.2	40.4	42.4	6.6	2.0	6.0	1.8
87RR-10	256.0	261.0	78.0	79.6	5.0	1.5	4.5	1.4	-	-	-	-	-	-	-	-
87RR-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
87RR-12	39.0	46.0	11.9	14.0	7.0	2.1	6.3	1.9	40.3	46.3	12.3	14.1	6.0	1.8	5.4	1.7
87RR-13	90.0	94.0	27.4	28.7	4.0	1.2	3.6	1.1	90.5	94.5	27.6	28.8	4.0	1.2	3.6	1.1
87RR-14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Average				5.7	1.7	5.2	1.6	Average				5.7	1.7	5.1	1.6

* includes a 1-foot (0.30 m) interval of siltstone

assumes a 25 degree dip for bedding

TABLE 4 LOWER COAL SEAM INTERSECTIONS

UPPER COAL SEAM

True Stratigraphic Thickness

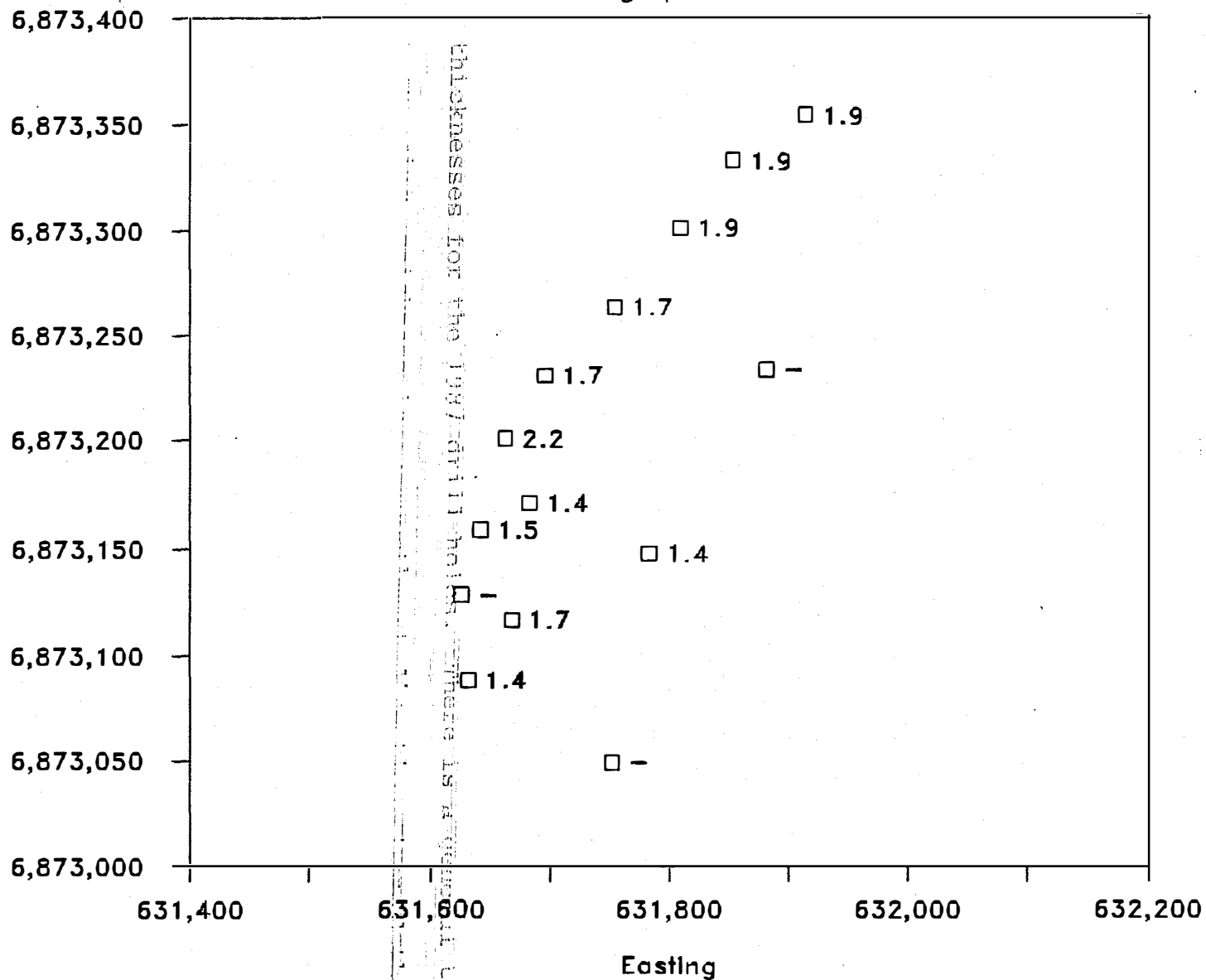


FIGURE 6. STRATIGRAPHIC THICKNESS OF THE UPPER COAL SEAM

intersections. There is a slight general trend of decreasing thickness in a southwest direction toward the North Canol Road. Drill hole 87RR-06 is anomalous in this trend because of a siltstone bed within the coal seam. If only the thickness of the coal beneath the siltstone in this hole is considered, it would not be anomalous.

The lower coal seam has an average stratigraphic thickness of 1.6 meters (table 4). Lower seam thicknesses are illustrated in figure 7. No definite trend is apparent from the diagram.

Table 5 lists the thickness of the siltstone and sandstone sequence between the two coal seams. The average stratigraphic thickness is 12.0 meters. This average thickness is slightly less than the 14.4 meter thickness reported by Adamson (1981). Figure 8 displays the thicknesses for the 1987 drill holes. There is a general trend for increasing thickness in a southwest direction toward the North Canol highway. This trend is consistent with the decreasing thickness of the upper coal seam in the same direction.

Tables 6 and 7 list the test results for the composites from the upper and lower coal seams, respectively. Figures 9 and 10 display the ash content and heating values for the upper and lower seams from each drill hole. The lower coal seam consistently gives slightly better values for both ash content and heating values than the upper coal seam.

ROSS RIVER COAL 1987 DRILLING PROJECT

Work Completed September 24 - September 28

Name	Stratigraphic Thickness between the coal seams	
	Vertical (m)	True ‡ (m)
87RR-01	12.2	11.0
87RR-02	12.5	11.3
87RR-03	12.5	11.3
87RR-04	13.7	12.4
87RR-05	12.8	11.6
87RR-06	13.6	12.3
87RR-07	13.6	12.3
87RR-08	13.4	12.2
87RR-09	12.8	11.6
87RR-10	14.0	12.7
87RR-11	-	-
87RR-12	-	-
87RR-13	14.6	13.3
87RR-14	-	-
Average	13.2	12.0

‡ assumes a 25 degree dip for bedding

TABLE 5 STRATIGRAPHIC THICKNESS OF SANDSTONES AND SILTSTONES
BETWEEN THE COAL SEAMS

INTERVAL BETWEEN COAL SEAMS

True Stratigraphic Thickness

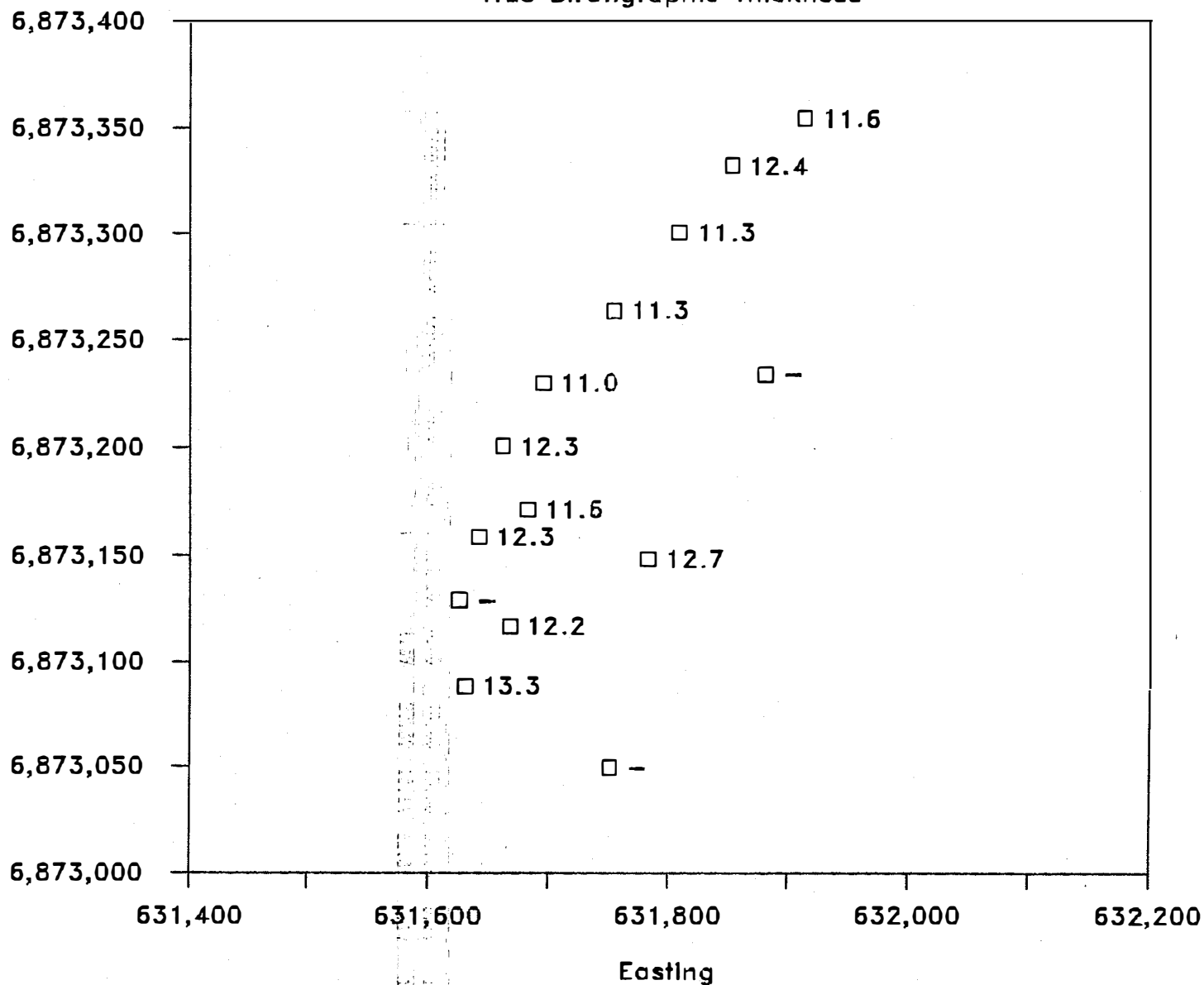


FIGURE 8. STRATIGRAPHIC THICKNESS BETWEEN THE COAL SEAMS

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Test Results for Composite Samples
Upper coal seam

Drill Hole	From (ft)	To (ft)	From (m)	To (m)	ADM (%)	RM (%)	ASH (%)	VOL (%)	FC (%)	S (%)	HV BTU/LB	basis
87RR-01	54.0	59.0	16.5	18.0	1.20	0.50	26.70	15.40	57.40	0.27	11033	adb
						1.69	26.38	15.22	56.71	0.27	10901	arb
							26.83	15.48	57.69	0.27	11088	db
87RR-02	81.0	86.0	24.7	26.2	0.60	0.30	20.10	15.90	63.70	0.62	12143	adb
						0.90	19.98	15.80	63.32	0.62	12070	arb
							20.16	15.95	63.89	0.62	12180	db
87RR-03	107.0	114.0	32.6	34.7	0.80	0.40	21.30	15.10	63.20	0.32	11960	adb
						1.20	21.13	14.98	62.69	0.32	11864	arb
							21.39	15.16	63.45	0.32	12008	db
87RR-04	116.0	123.0	35.4	37.5	1.30	0.90	18.90	15.30	64.90	0.19	11953	adb
						2.19	18.65	15.10	64.06	0.19	11798	arb
							19.07	15.44	65.49	0.19	12062	db
87RR-05	119.0	125.0	36.3	38.1	1.00	0.60	20.60	15.80	63.00	0.19	11945	adb
						1.59	20.39	15.64	62.37	0.19	11826	arb
							20.72	15.90	63.38	0.19	12017	db
87RR-06	42.0	46.0	12.8	14.0	1.60	0.50	22.00	15.70	61.80	0.22	11639	adb
						2.09	21.65	15.45	60.81	0.22	11453	arb
							22.11	15.78	62.11	0.22	11697	db
87RR-07	17.0	21.0	5.2	6.4	3.40	1.30	28.10	15.90	54.70	0.24	9850	adb
						4.66	27.14	15.36	52.84	0.23	9515	arb
							28.47	16.11	55.42	0.24	9980	db
87RR-08	98.0	104.0	29.9	31.7	0.70	0.30	20.00	17.70	62.00	0.30	12107	adb
						1.00	19.86	17.58	61.57	0.30	12022	arb
							20.06	17.75	62.19	0.30	12143	db
87RR-09	86.0	90.0	26.2	27.4	1.00	0.30	14.20	17.80	67.70	0.62	13342	adb
						1.30	14.06	17.62	67.02	0.61	13209	arb
							14.24	17.85	67.90	0.62	13382	db
87RR-10	205.0	210.0	62.5	64.0	1.10	0.30	16.50	16.60	66.60	0.61	12905	adb
						1.40	16.32	16.42	65.87	0.60	12763	arb
							16.55	16.65	66.80	0.61	12944	db
87RR-13	37.0	42.0	11.3	12.8	0.70	0.50	17.00	16.30	66.20	0.22	12552	adb
						1.20	16.88	16.19	65.74	0.22	12464	arb
							17.09	16.38	66.53	0.22	12615	db

TABLE 6 TEST RESULTS FOR UPPER COAL SEAM COMPOSITE SAMPLES

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Test Results for Composite Samples
Lower coal seam

Drill Hole	From (ft)	To (ft)	From (m)	To (m)	ADM (%)	RM (%)	ASH (%)	VOL (%)	FC (%)	S (%)	HV BTU/LB	basis
87RR-01	101.0	105.0	30.8	32.0	0.60	0.40	26.40	15.90	57.30	0.19	11077	adb
						1.00	26.24	15.80	56.96	0.19	11011	arb
							26.51	15.96	57.53	0.19	11121	db
87RR-02	127.0	132.0	38.7	40.2	0.40	0.30	20.00	16.00	63.70	0.21	12194	adb
						0.70	19.92	15.94	63.45	0.21	12145	arb
							20.06	16.05	63.89	0.21	12231	db
87RR-03	155.0	159.0	47.2	48.5	2.10	0.30	13.50	17.10	69.10	0.35	13228	adb
						2.39	13.22	16.74	67.65	0.34	12950	arb
							13.54	17.15	69.31	0.35	13268	db
87RR-04	168.0	173.0	51.2	52.7	0.80	0.30	10.90	18.20	70.60	0.26	13523	adb
						1.10	10.81	18.05	70.04	0.26	13415	arb
							10.93	18.25	70.81	0.26	13564	db
87RR-05	168.0	174.0	51.2	53.0	0.60	0.30	15.00	17.20	67.50	0.21	12967	adb
						0.90	14.91	17.10	67.10	0.21	12889	arb
							15.05	17.25	67.70	0.21	13006	db
87RR-06	91.0	97.0	27.7	29.6	1.00	0.40	16.90	17.70	65.00	0.26	12596	adb
						1.40	16.73	17.52	64.35	0.26	12470	arb
							16.97	17.77	65.26	0.26	12647	db
87RR-07	66.0	71.0	20.1	21.6	0.70	0.30	13.00	18.60	68.10	0.31	13325	adb
						1.00	12.91	18.47	67.62	0.31	13232	arb
							13.04	18.66	68.30	0.31	13365	db
87RR-08	148.0	155.0	45.1	47.2	0.90	0.30	14.90	17.80	67.00	0.25	12969	adb
						1.20	14.77	17.64	66.40	0.25	12852	arb
							14.94	17.85	67.20	0.25	13008	db
87RR-09	133.0	138.0	40.5	42.1	0.70	0.30	11.40	19.70	68.60	0.33	13423	adb
						1.00	11.32	19.56	68.12	0.33	13329	arb
							11.43	19.76	68.81	0.33	13463	db
87RR-10	255.0	260.0	77.7	79.2	1.60	0.30	20.70	18.50	60.50	0.22	11675	adb
						1.90	20.37	18.20	59.53	0.22	11488	arb
							20.76	18.56	60.68	0.22	11710	db
87RR-12	39.0	46.0	11.9	14.0	0.60	0.30	41.70	13.30	44.70	0.23	8643	adb
						0.90	41.45	13.22	44.43	0.23	8591	arb
							41.83	13.34	44.83	0.23	8669	db
87RR-13	90.0	94.0	27.4	28.7	0.90	0.30	23.90	17.60	58.20	0.19	11369	adb
						1.20	23.68	17.44	57.68	0.19	11267	arb
							23.97	17.65	58.38	0.19	11403	db

TABLE 7. TEST RESULTS FOR LOWER COAL SEAM COMPOSITE SAMPLES

UPPER COAL SEAM

Ash (%) and Heating Values (BTU/lb)

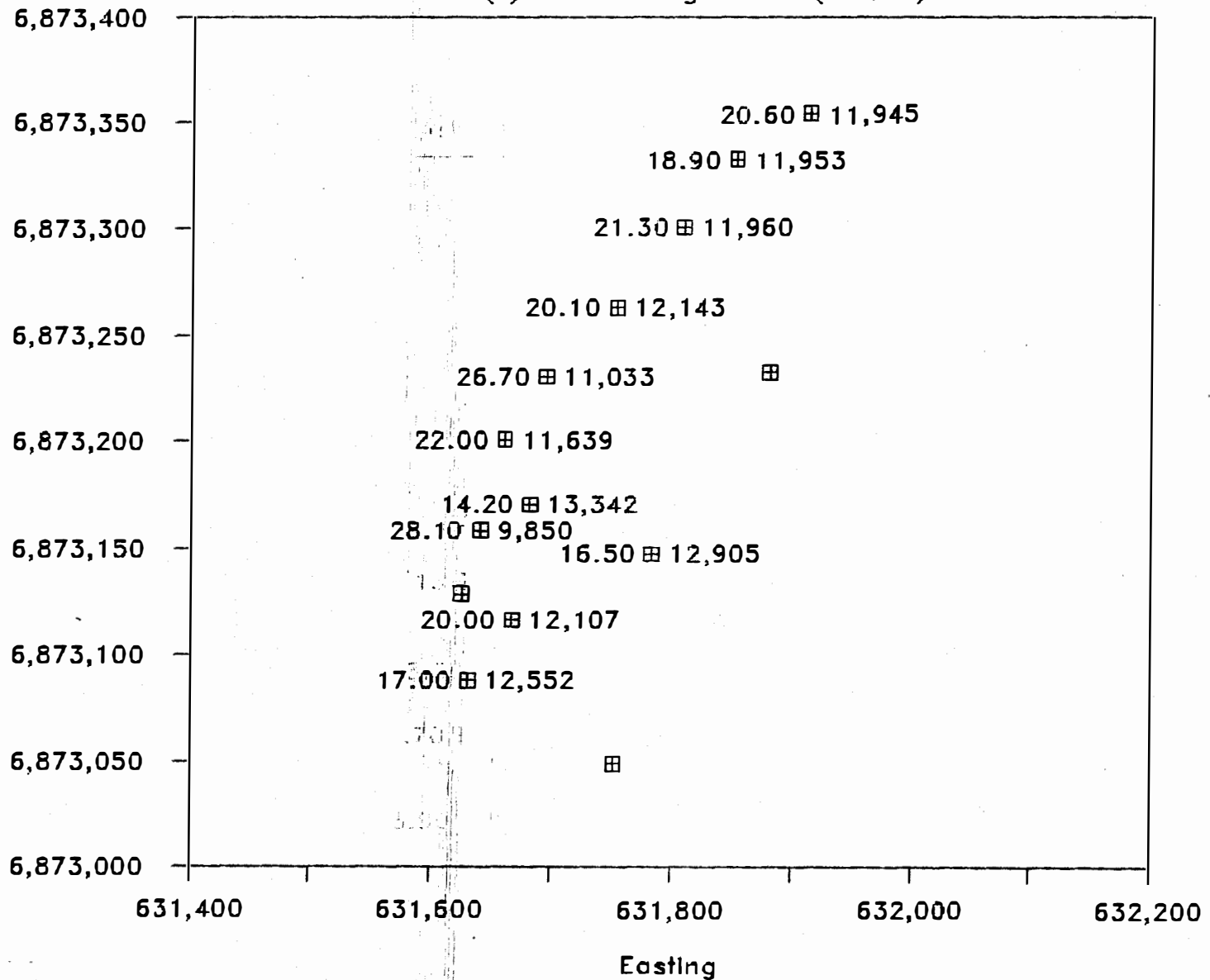


FIGURE 9. ASH CONTENT AND HEATING VALUES OF THE UPPER COAL SEAM

LOWER COAL SEAM

Ash (%) and Heating Values (BTU/lb)

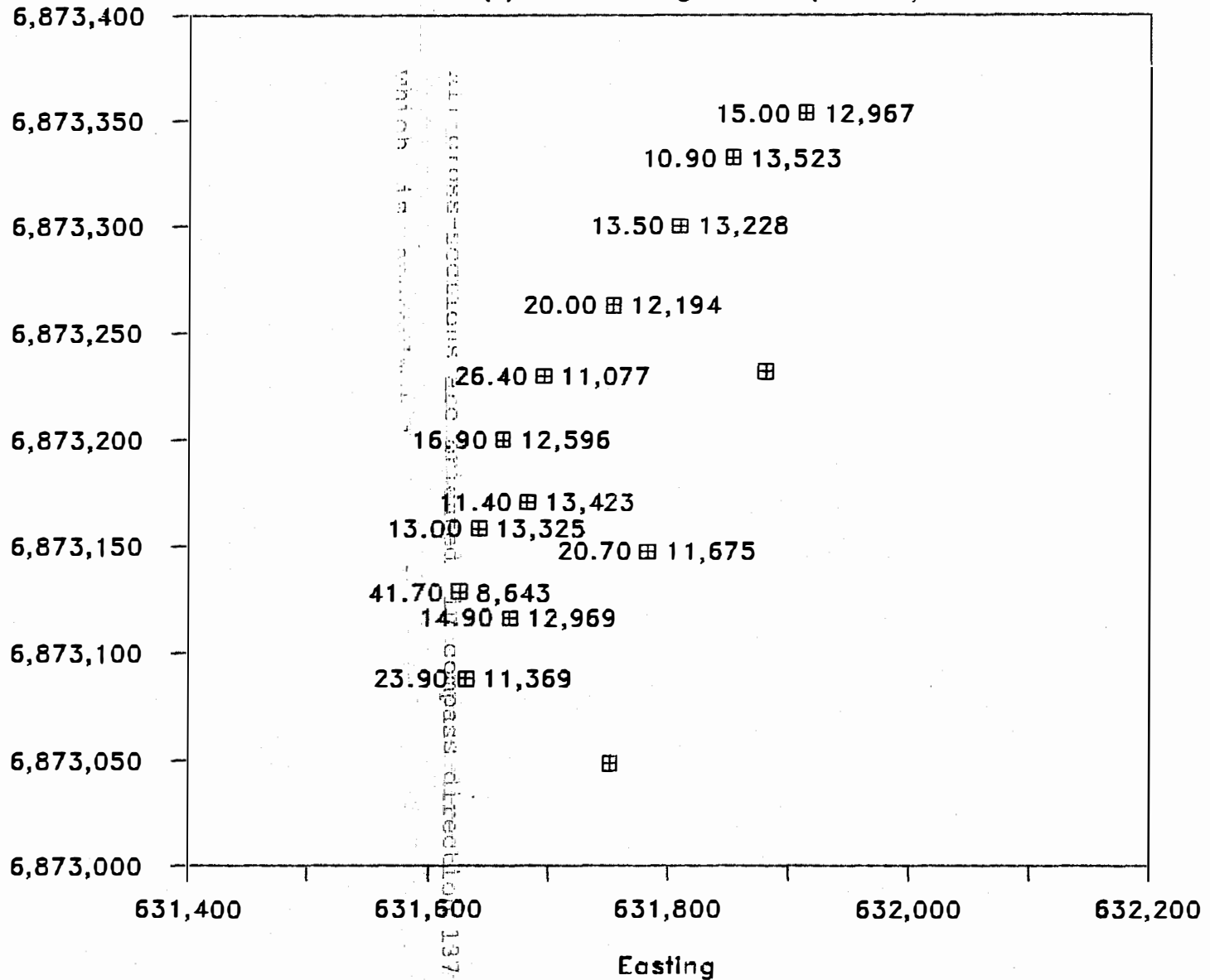


FIGURE 10. ASH CONTENT AND HEATING VALUES OF THE LOWER COAL SEAM

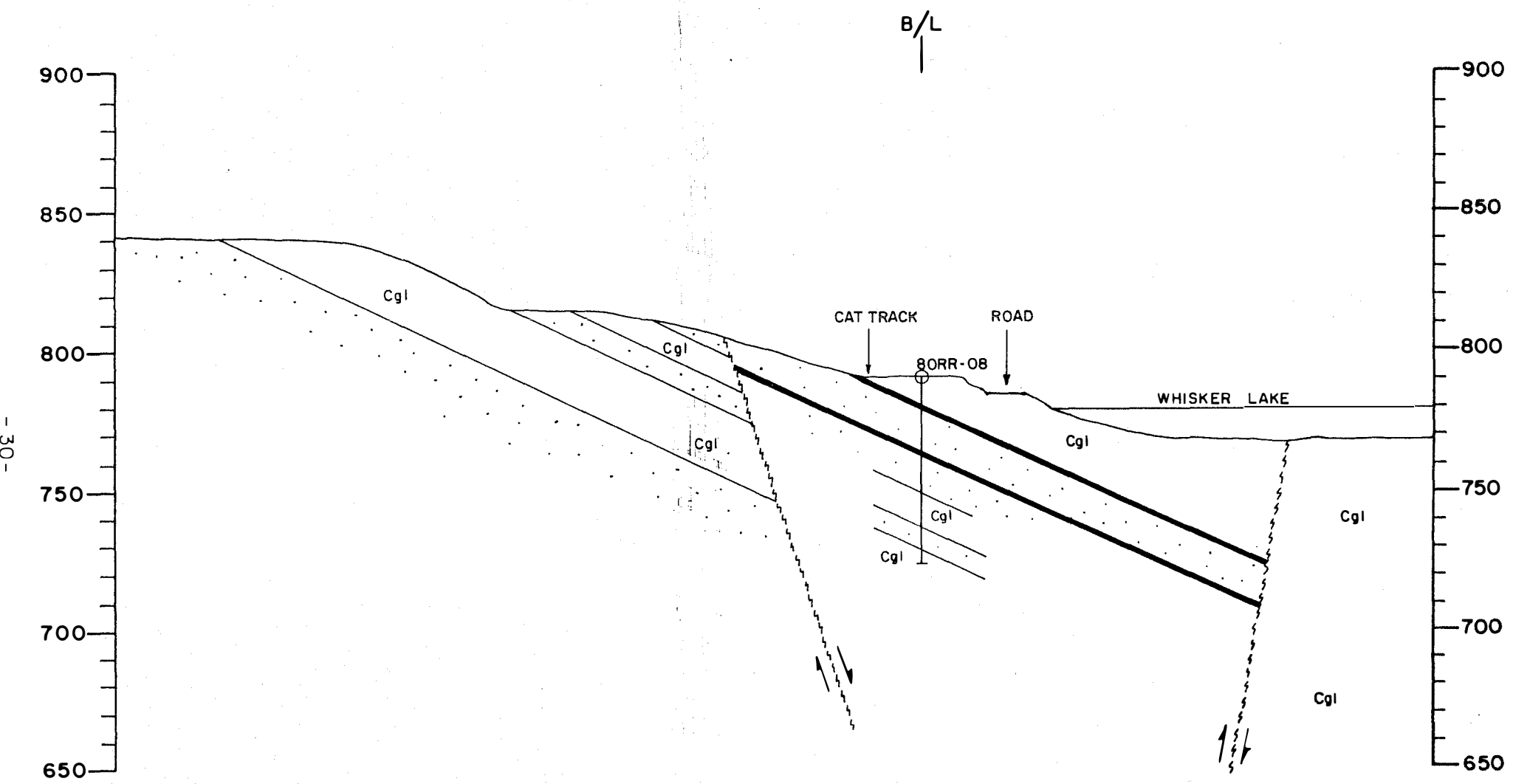
Drill hole 87RR-07 contains high ash and low heating values for the upper seam composite sample. The upper seam was intersected immediately beneath the soil cover in this drill hole. The poor results may be related to either surface weathering or possible contamination of the sample during drilling.

The composite sample from drill hole 87RR-12 (lower seam) gives an extremely high ash content and a correlated anomalously low heating value. These anomalous results are not duplicated in any of the surrounding drill holes. The coal seam intersection was not logged as containing siltstone interbeds. No geological reason is apparent for these anomalous results.

The drill hole intersections were used to construct 10 vertical cross-sections through the potential mining area (figures 11-20). All cross-sections are oriented in compass direction 137.5 degrees which is approximately normal to the strike of the bedding. Section lines are shown in figure 2. Sections are irregularly spaced to minimize projection distances of the drill holes onto the appropriate section. All drill holes were projected horizontally normal to the plane of the section.

In all sections the steep fault mapped in outcrop 87-13 truncates the coal seams to the southeast. The fault surface represent a major geological boundary.

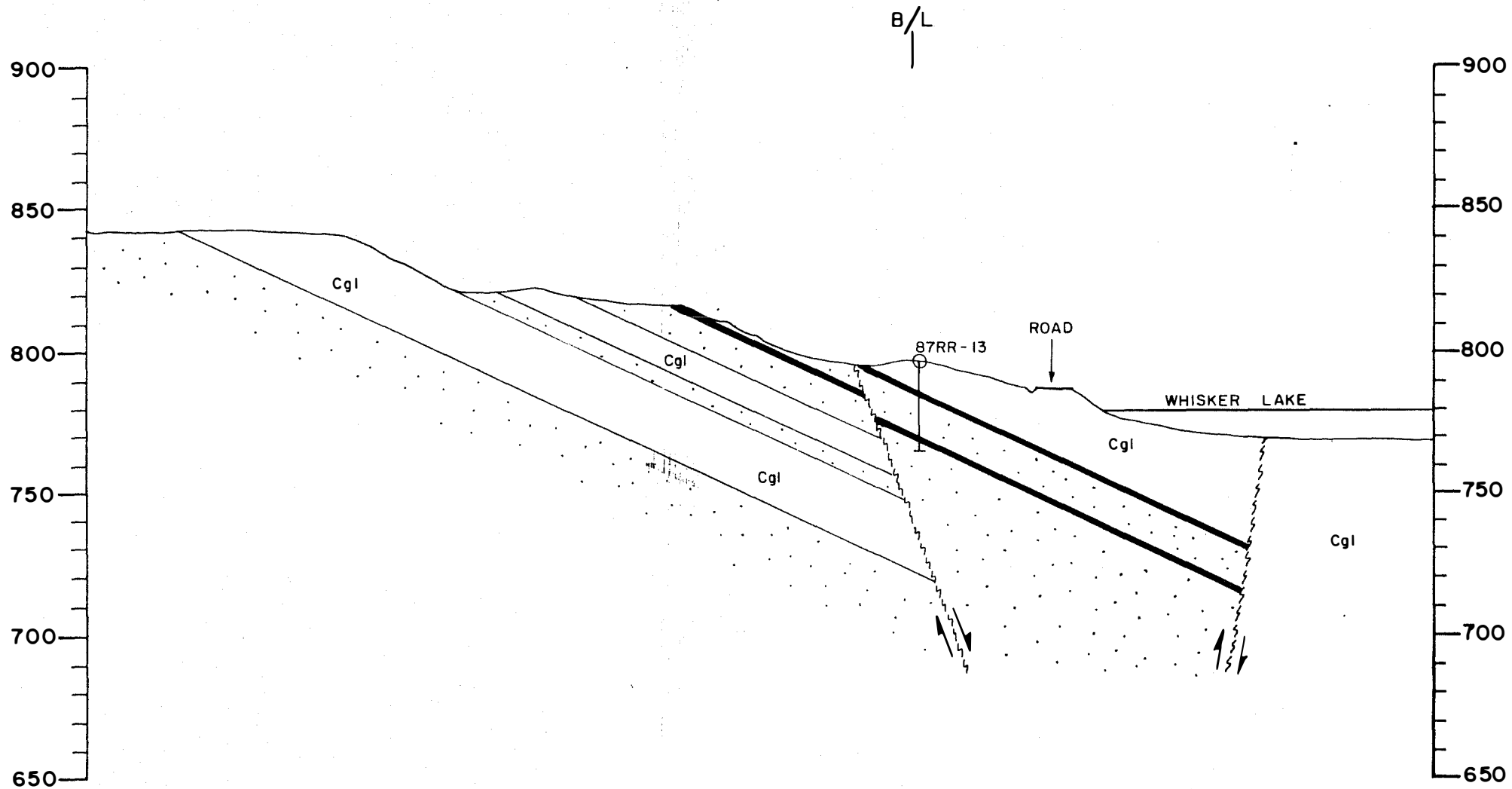
Sections A-B, C-D, and E-F show the northwest-striking fault extending between drill holes 87RR-12 and 87RR-13. Vertical



SECTION A-B

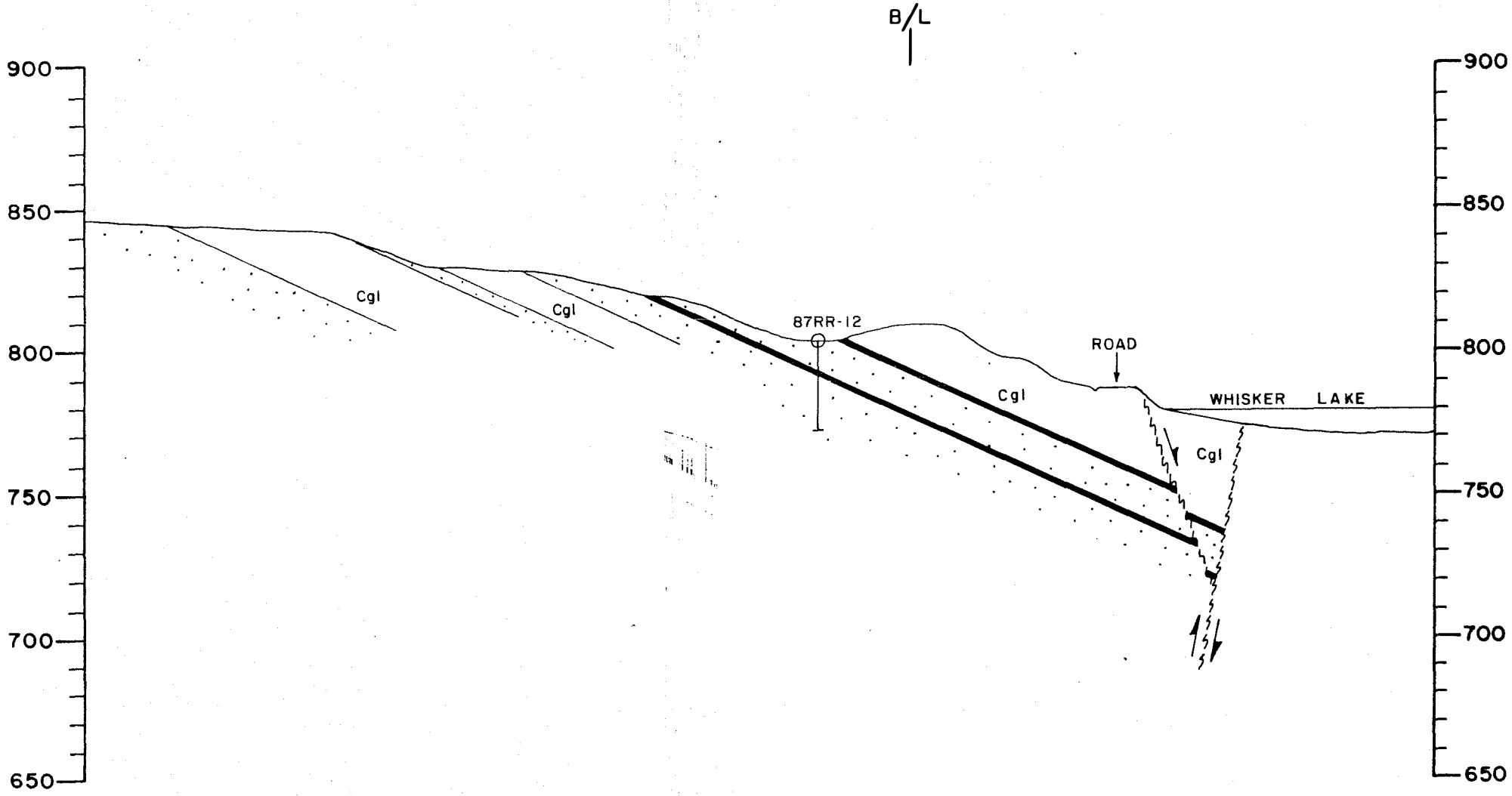
ROSS RIVER COAL

CURRAGH RESOURCES INC.



SECTION C-D

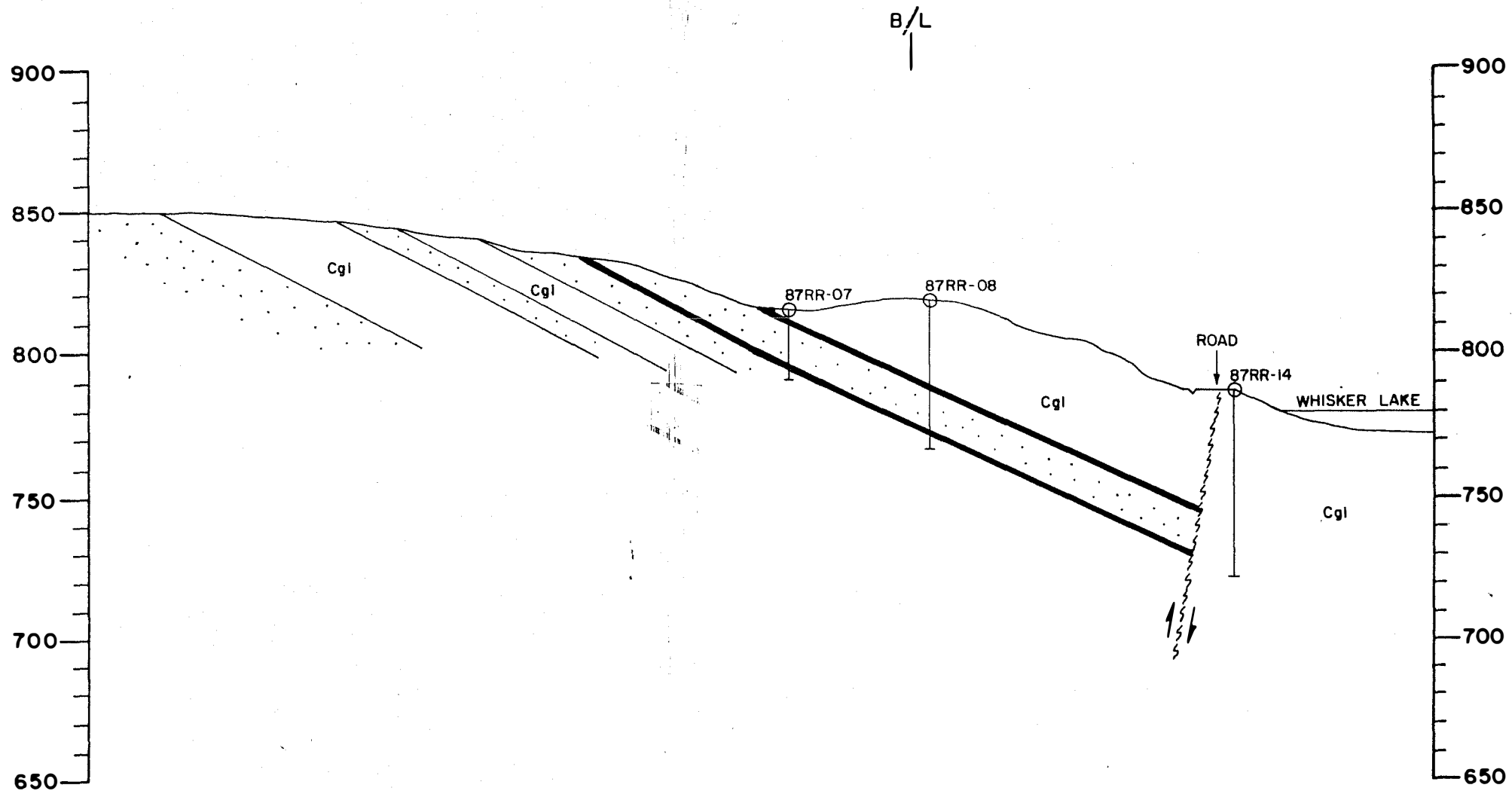
ROSS RIVER COAL



SECTION E-F

ROSS RIVER COAL

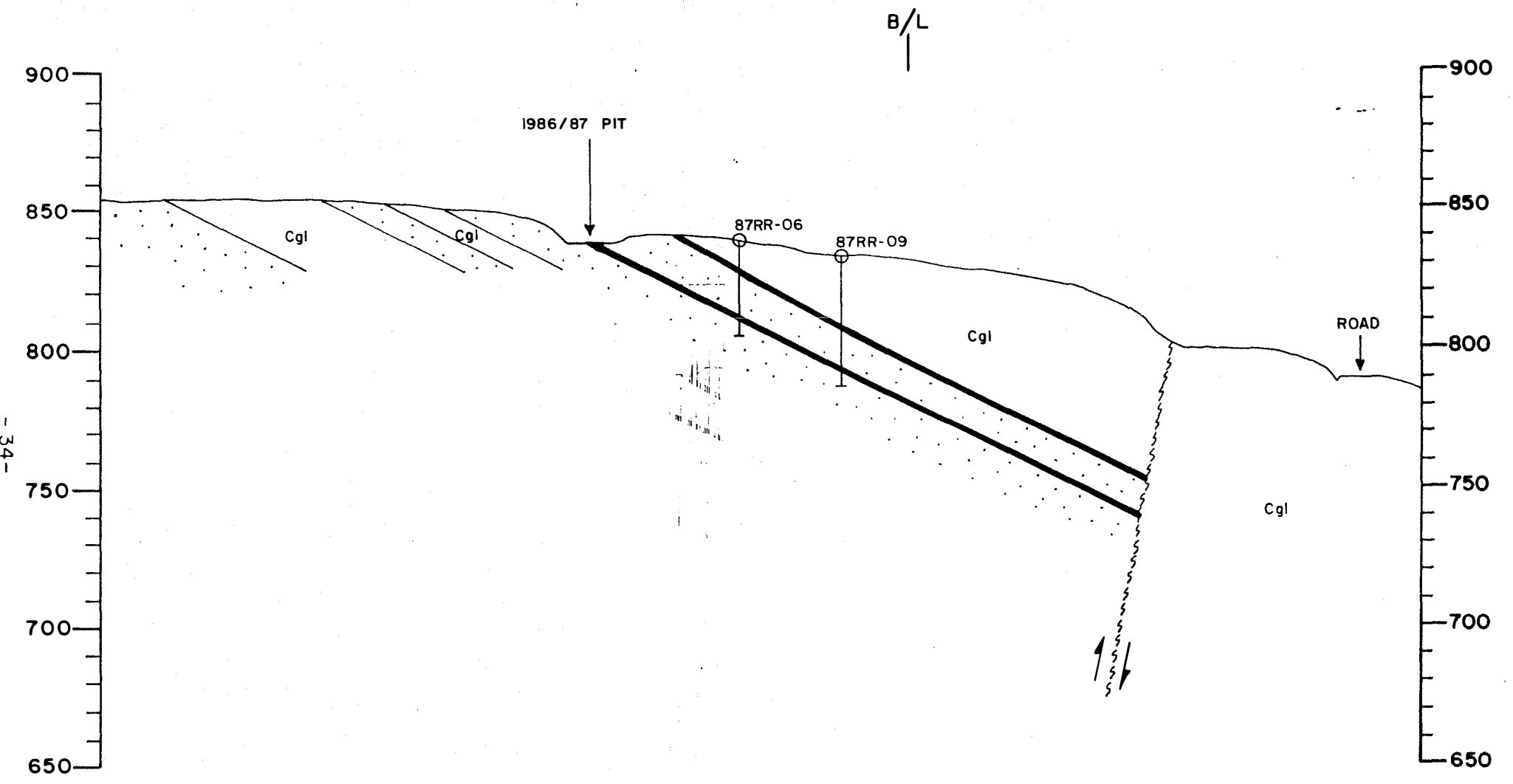
- 32 -



SECTION G-H

ROSS RIVER COAL

Fig. 14



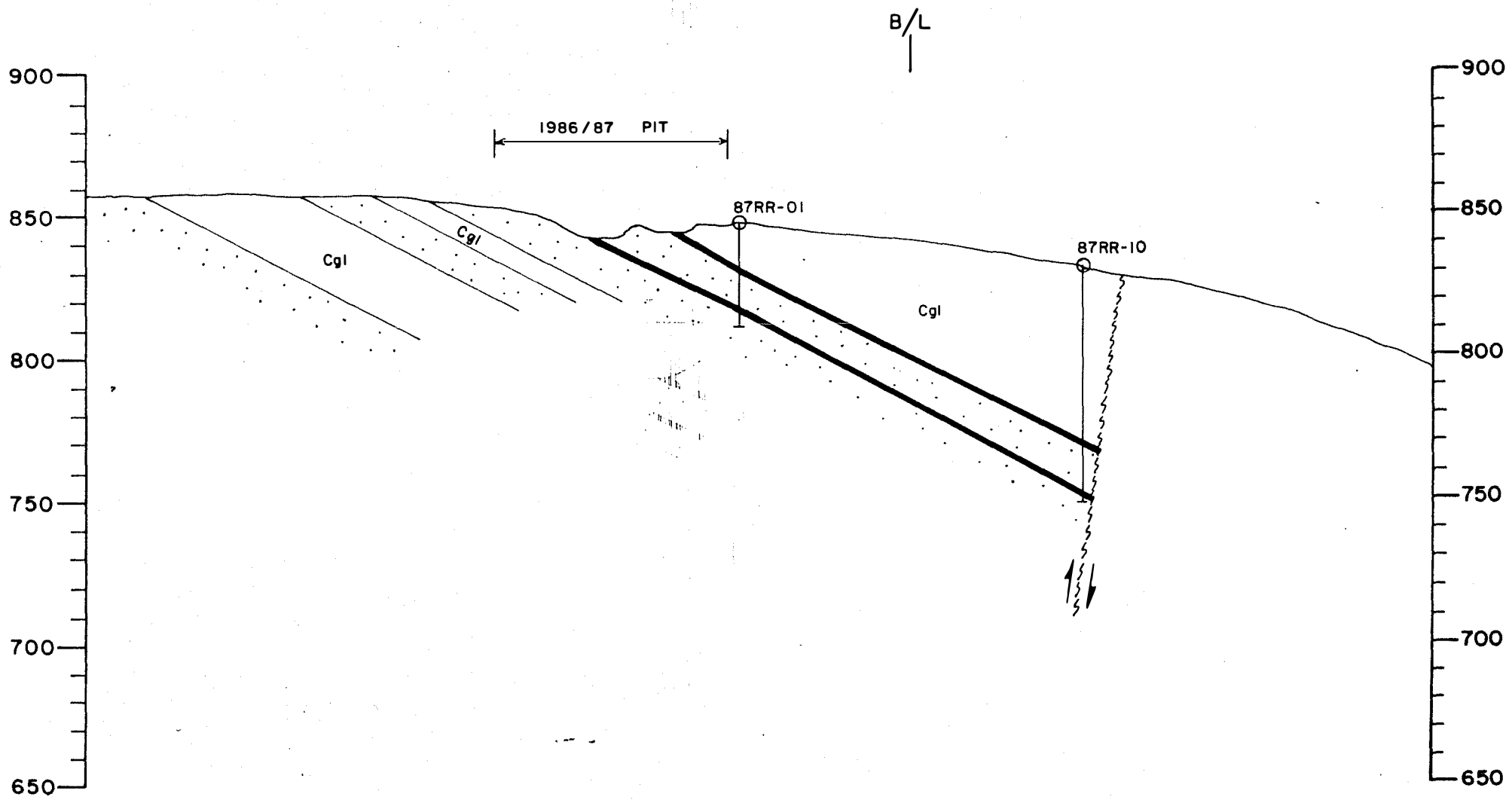
SECTION I-J

ROSS RIVER COAL

CURRAGH RESOURCES INC.

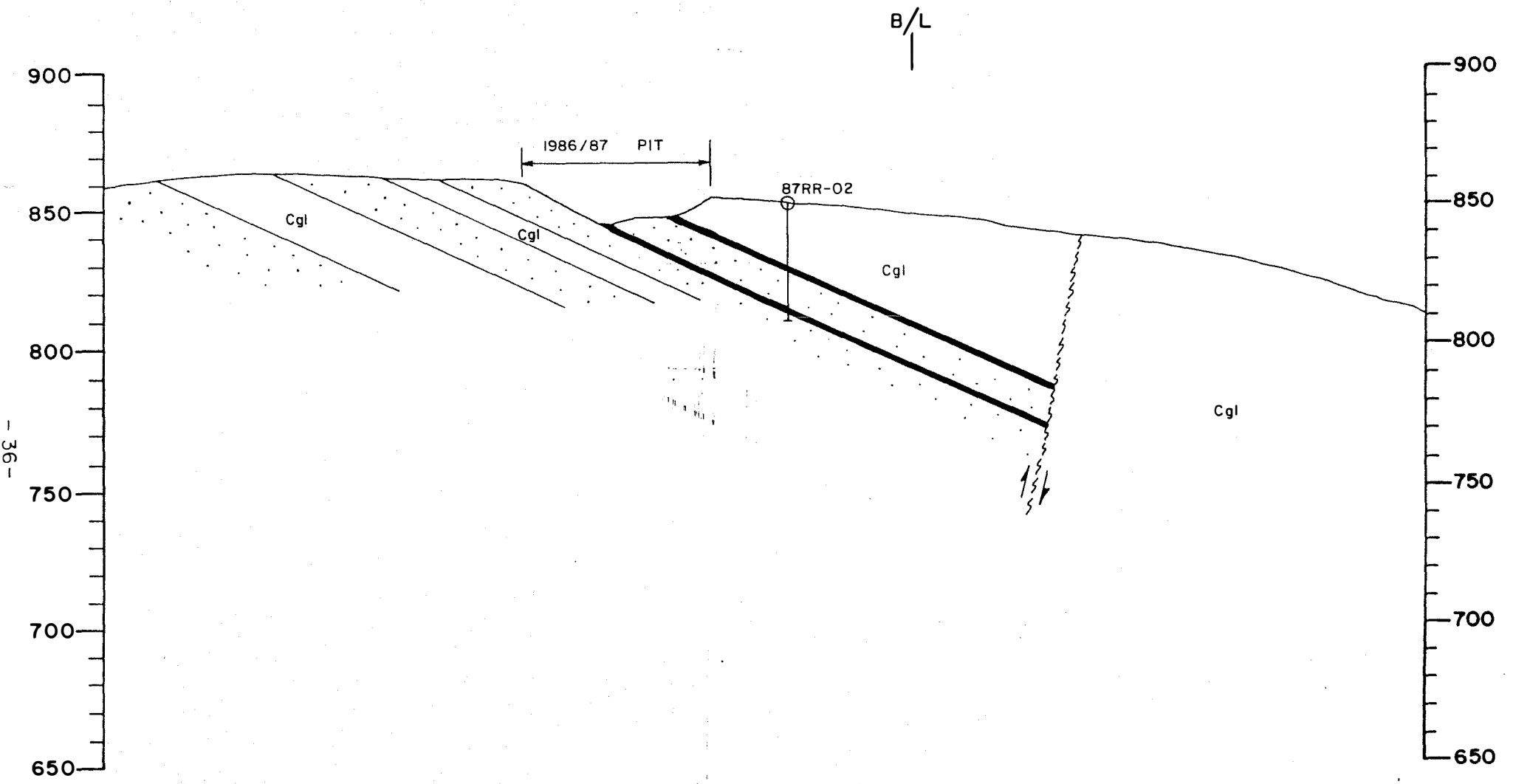
SCALE 1:2000 (metres)

Fig 15



SECTION K-L

ROSS RIVER COAL



SECTION M-N

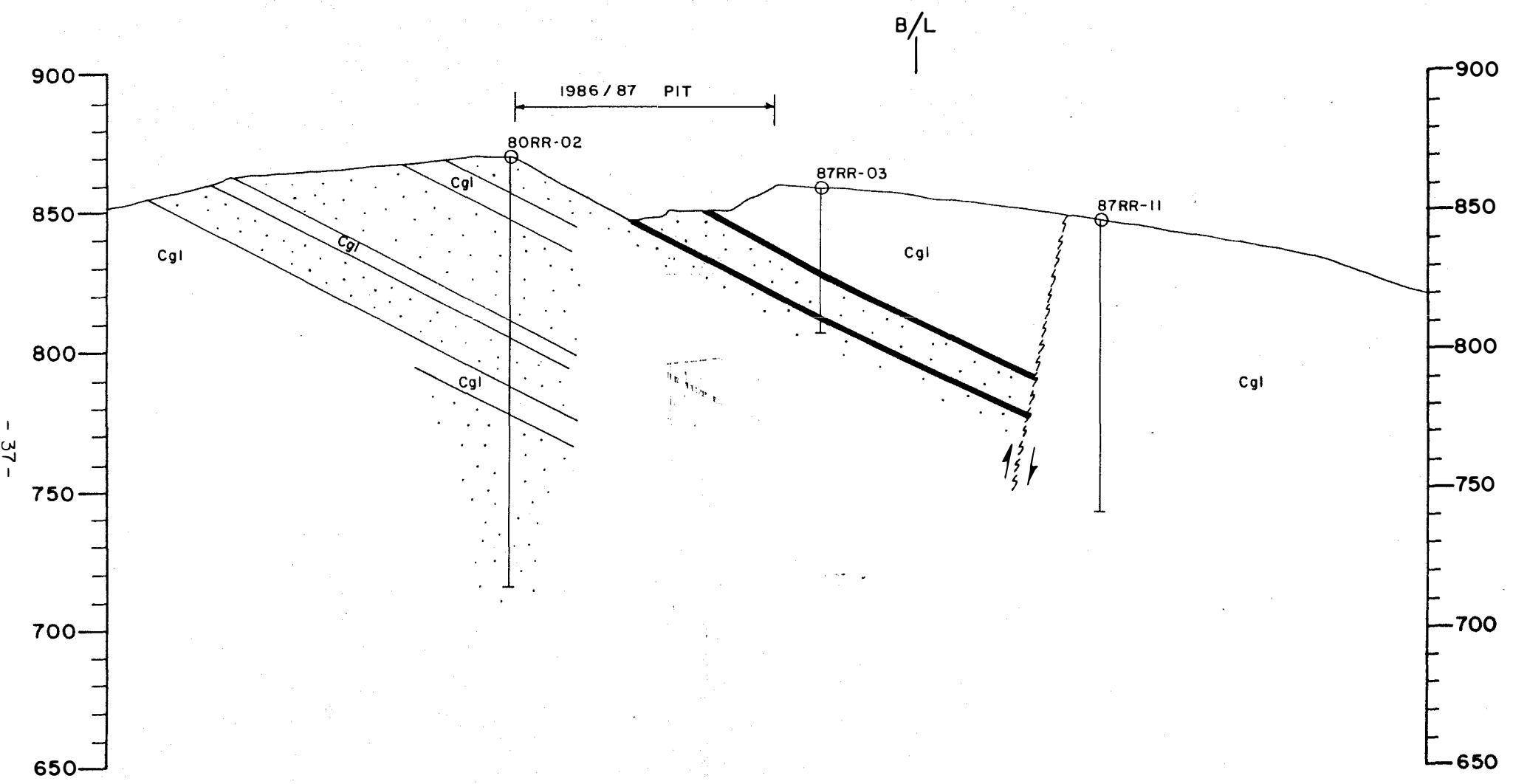
ROSS RIVER COAL

CURRAGH RESOURCES INC.

SCALE 1:2000 (metres)

Fig. 17

- 36 -



SECTION O-P

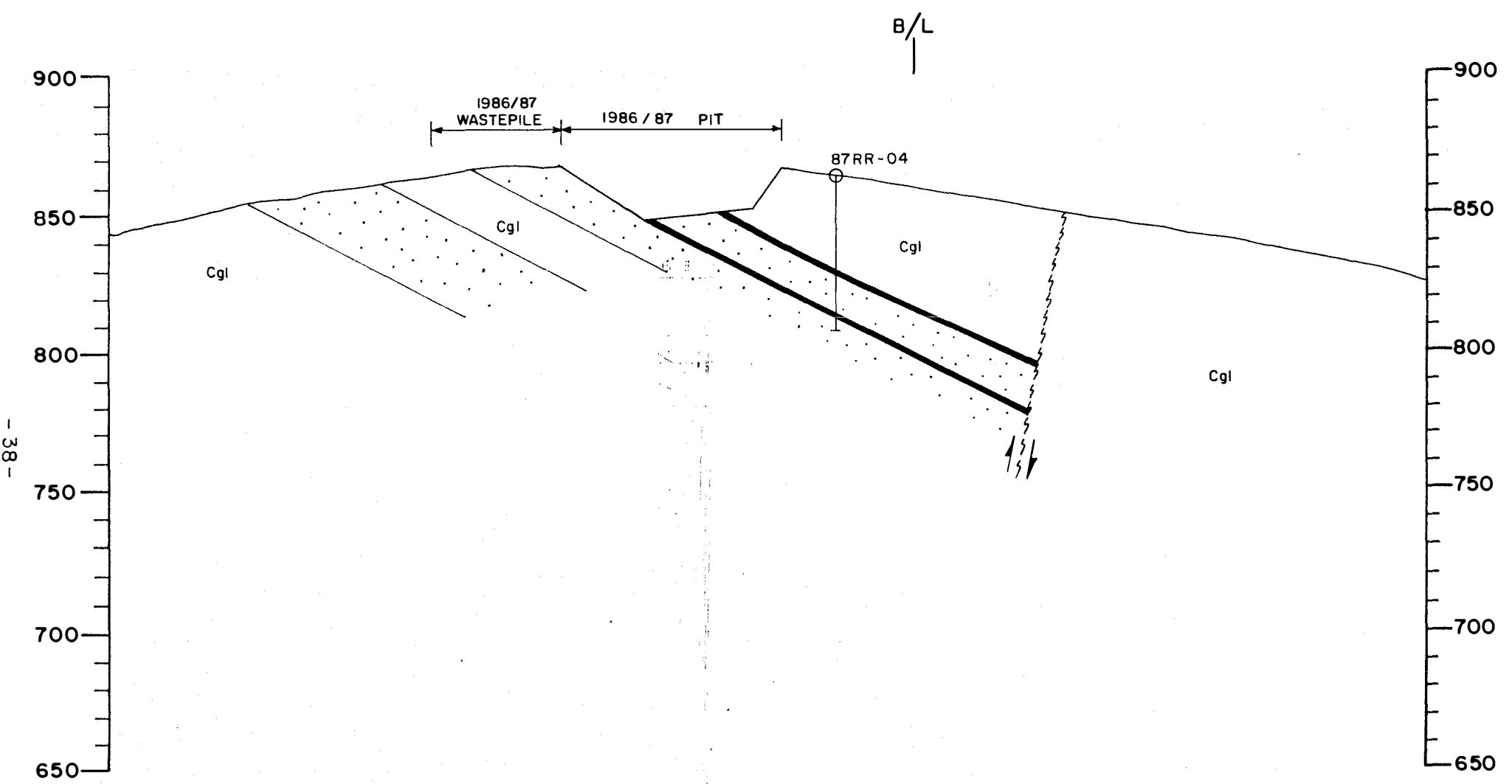
ROSS RIVER COAL

CURRAGH RESOURCES INC.

SCALE 1:2000 (metres)

Fig 18

- 37 -

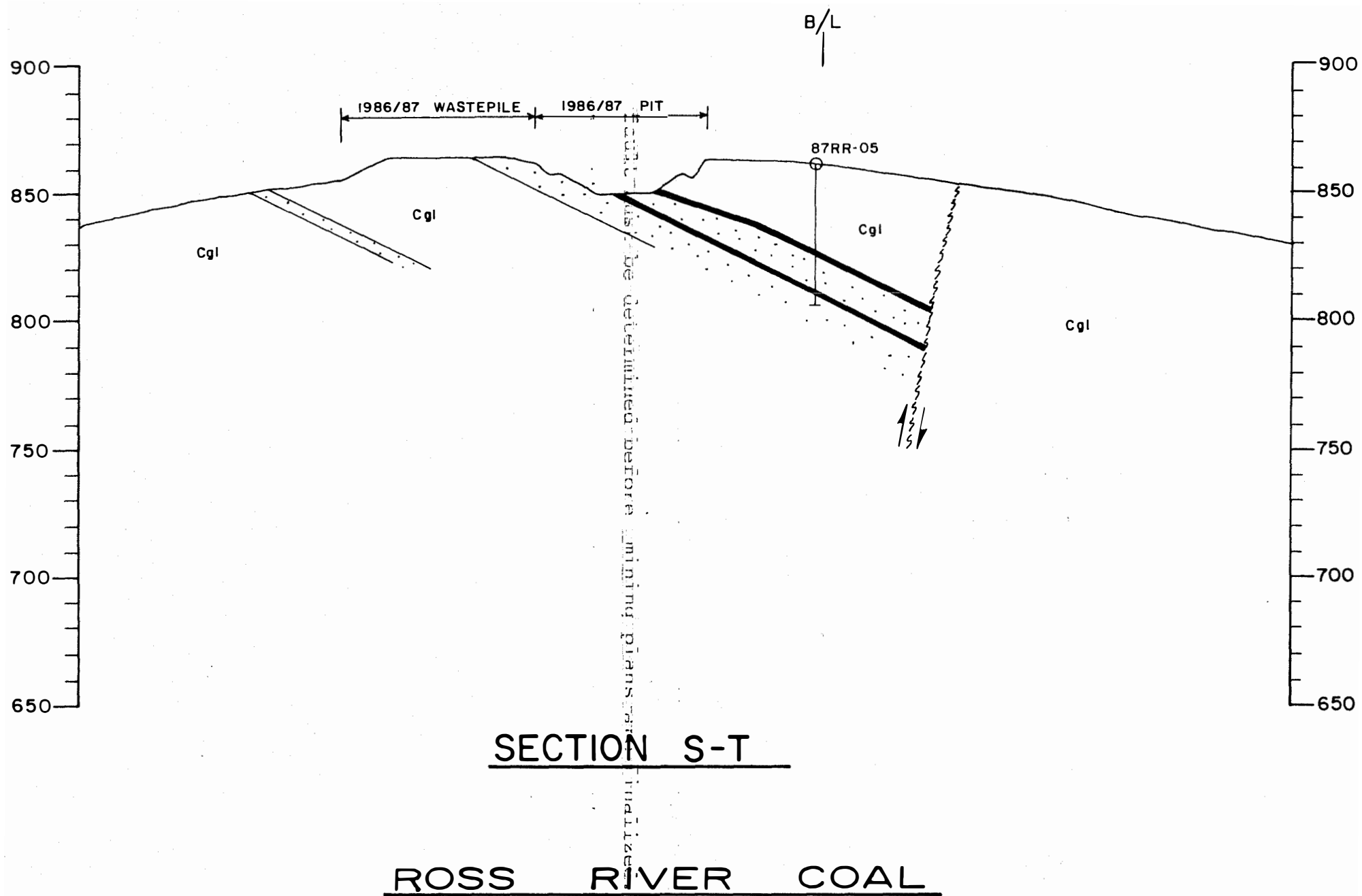


SECTION Q-R

ROSS RIVER COAL

- 38 -

- 39 -



SCALE 1:2000 (metres)

Fig. 20

CURRAGH RESOURCES INC.

displacement on the fault appears to be about 10 meters. For mining purposes this results in a significant horizontal offset of the coal seams.

All sections indicate a uniform southeasterly dip of 25 degrees for the upper and lower coal seams. In section S-T the upper coal seam appears to have a significant decrease in dip between the open pit and drill hole 87RR-05. Because of the uniform nature of the dip in all other sections, this variance is probably caused by a small fault displacing the upper seam by a minor amount.

SUMMARY OF RESULTS

Drilling and mapping in the vicinity of the 1986/87 open pit indicate the upper and lower coal seams have a uniform southeast dip of about 25 degrees. The coal seams are truncated to the southeast by a steep northeast-trending fault. Displacement across this fault was not determined; the eastern extension of the coal seams was not found in the area mapped.

Between the 1986/87 pit and the North Canal highway the coal seams are displaced by a small northwest-trending fault. Vertical offset across the fault surface is approximately 10 meters with the south side being downthrown.

Average thicknesses for the upper and lower coal seams are 1.7 meters and 1.6 meters, respectively. The upper seam thins slightly along strike in a southwest direction. Ash contents and heating

values are reasonable for both seams down dip from the present open pit. Along strike to the southwest both seams contain irregular variations in ash content and heating value which may be related to sampling contamination problems.

RECOMMENDATIONS FOR FURTHER WORK

The exact location of the coal seams between the 1986/87 open pit and the North Canol highway is important for mine planning purposes. The 1987 field program had delineated a northwest trending fault offsetting the coal seams traversing through the area. At the same time composites from the drill holes in this area contained isolated high ash contents and low heating values.

The exact locations of the coal seams and the northwest-trenching fault must be determined before mining plans are finalized. These locations can be readily determined through selective overburden trenching. Sampling and testing the quality of the coal exposed in trenches (to determine if the isolated anomalous results in the 1987 drilling program resulted from sampling problems) must be considered an integral part of this trenching program.

SELECTED REFERENCES

Adamson, T.J., 1980. Ross River Coal Project - Report on 1980 Field Work. CAMC internal report, February, 1980.

Adamson, T.J., 1981. Ross River Coal Project - Report on 1981 Field Work. CAMC internal report, November, 1981.

Hughes, J.D. and Long, D.G.F., 1980. Geology and coal resource potential of Early Tertiary strata along Tintina Trench, Yukon Territory. Geological Survey of Canada, Paper 79-32.

APPENDIX A

DRILL HOLE LOGS

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-01	0.0	5.0	0.0	1.5	No recovery
87RR-01	5.0	54.0	1.5	16.5	Grey conglomerate
87RR-01	54.0	60.0	16.5	18.3	Coal
87RR-01	60.0	100.0	18.3	30.5	Brown siltstone to sandstone
87RR-01	100.0	105.0	30.5	32.0	Coal
87RR-01	105.0	120.0	32.0	36.6	Brown siltstone to sandstone

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-02	0.0	7.0	0.0	2.1	No recovery
87RR-02	7.0	75.0	2.1	22.9	Grey conglomerate
87RR-02	75.0	80.0	22.9	24.4	Conglomerate changing to brown siltstone
87RR-02	80.0	86.0	24.4	26.2	Coal
87RR-02	86.0	127.0	26.2	38.7	Brown and grey siltstone to sandstone
87RR-02	127.0	132.0	38.7	40.2	Coal
87RR-02	132.0	140.0	40.2	42.7	Brown siltstone to sandstone

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-03	0.0	5.0	0.0	1.5	No recovery
87RR-03	5.0	100.0	1.5	30.5	Grey conglomerate
87RR-03	100.0	107.0	30.5	32.6	Brown and grey siltstone to sandstone
87RR-03	107.0	114.0	32.6	34.7	Coal
87RR-03	114.0	155.0	34.7	47.2	Dark brown siltstone to sandstone
87RR-03	155.0	160.0	47.2	48.8	Coal
87RR-03	160.0	170.0	48.8	51.8	Brown and grey siltstone to sandstone

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-04	0.0	5.0	0.0	1.5	No recovery
87RR-04	5.0	55.0	1.5	16.8	Grey conglomerate
87RR-04	55.0	75.0	16.8	22.9	Brown and grey siltstone to sandstone
87RR-04	75.0	110.0	22.9	33.5	Grey conglomerate
87RR-04	110.0	116.0	33.5	35.4	Brown and grey siltstone to sandstone
87RR-04	116.0	123.0	35.4	37.5	Coal
87RR-04	123.0	168.0	37.5	51.2	Brown and grey siltstone to sandstone
87RR-04	168.0	174.0	51.2	53.0	Coal
87RR-04	174.0	185.0	53.0	56.4	Brown siltstone to sandstone

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-05	0.0	5.0	0.0	1.5	No recovery
87RR-05	5.0	119.0	1.5	36.3	Grey conglomerate
87RR-05	119.0	126.0	36.3	38.4	Coal
87RR-05	126.0	140.0	38.4	42.7	Brown siltstone to sandstone
87RR-05	140.0	160.0	42.7	48.8	Grey siltstone to sandstone
87RR-05	160.0	168.0	48.8	51.2	Brown siltstone to sandstone
87RR-05	168.0	174.0	51.2	53.0	Coal
87RR-05	174.0	183.0	53.0	55.8	Brown siltstone to sandstone

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-06	0.0	5.0	0.0	1.5	No recovery
87RR-06	5.0	38.0	1.5	11.6	Grey conglomerate
87RR-06	38.0	40.0	11.6	12.2	Coal
87RR-06	40.0	42.0	12.2	12.8	Brown siltstone to sandstone
87RR-06	42.0	46.0	12.8	14.0	Coal with minor dark grey siltstone
87RR-06	46.0	65.0	14.0	19.8	Brown siltstone to sandstone
87RR-06	65.0	70.0	19.8	21.3	Brown siltstone to sandstone
					WATER in hole
87RR-06	70.0	90.5	21.3	27.6	Brown siltstone to sandstone
87RR-06	90.5	97.0	27.6	29.6	Coal
87RR-06	97.0	110.0	29.6	33.5	Brown siltstone to sandstone

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-07	0.0	5.0	0.0	1.5	No recovery
87RR-07	5.0	15.0	1.5	4.6	Soil
87RR-07	15.0	16.0	4.6	4.9	Grey siltstone to sandstone
87RR-07	16.0	21.5	4.9	6.6	Coal
87RR-07	21.5	66.0	6.6	20.1	Brown siltstone to sandstone
87RR-07	66.0	71.0	20.1	21.6	Coal
87RR-07	71.0	80.0	21.6	24.4	Grey siltstone to sandstone

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-08	0.0	5.0	0.0	1.5	No recovery
87RR-08	5.0	95.0	1.5	29.0	Grey conglomerate with minor brown siltstone to sandstone beds
87RR-08	95.0	98.0	29.0	29.9	Brown siltstone to sandstone
87RR-08	98.0	104.0	29.9	31.7	Coal
87RR-08	104.0	115.0	31.7	35.1	Brown siltstone to sandstone
87RR-08	115.0	148.0	35.1	45.1	Grey siltstone to sandstone
87RR-08	148.0	156.0	45.1	47.5	Coal
87RR-08	156.0	170.0	47.5	51.8	Brown siltstone to sandstone

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-09	0.0	5.0	0.0	1.5	No recovery
87RR-09	5.0	86.0	1.5	26.2	Grey conglomerate
87RR-09	86.0	91.0	26.2	27.7	Coal
87RR-09	91.0	133.0	27.7	40.5	Brown and grey siltstone to sandstone
87RR-09	133.0	139.0	40.5	42.4	Coal
87RR-09	139.0	150.0	42.4	45.7	Grey-brown siltstone to sandstone

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-10	0.0	5.0	0.0	1.5	No recovery
87RR-10	5.0	140.0	1.5	42.7	Grey conglomerate
87RR-10	140.0	170.0	42.7	51.8	Grey conglomerate with minor brown siltstone to sandstone
87RR-10	170.0	205.0	51.8	62.5	Grey conglomerate
87RR-10	205.0	210.0	62.5	64.0	Coal
87RR-10	210.0	256.0	64.0	78.0	Grey-brown siltstone to sandstone
87RR-10	256.0	261.0	78.0	79.6	Coal
87RR-10	261.0	270.0	79.6	82.3	Brown siltstone to sandstone

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-11	0.0	5.0	0.0	1.5	No recovery
87RR-11	5.0	35.0	1.5	10.7	Soil
87RR-11	35.0	255.0	10.7	77.7	Grey conglomerate with minor brown siltstone to sandstone
87RR-11	255.0	295.0	77.7	89.9	Grey siltstone to sandstone
87RR-11	295.0	300.0	89.9	91.4	Grey conglomerate - WATER in hole
87RR-11	300.0	310.0	91.4	94.5	Grey conglomerate
87RR-11	310.0	344.0	94.5	104.9	Grey conglomerate - WATER in hole

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-12	0.0	10.0	0.0	3.0	No recovery
87RR-12	10.0	39.0	3.0	11.9	Brown and grey siltstone to sandstone
87RR-12	39.0	46.0	11.9	14.0	Coal
87RR-12	46.0	100.0	14.0	30.5	Brown and grey siltstone to sandstone

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-13	0.0	5.0	0.0	1.5	No recovery
87RR-13	5.0	35.0	1.5	10.7	Grey conglomerate
87RR-13	35.0	37.0	10.7	11.3	Brown siltstone
87RR-13	37.0	42.0	11.3	12.8	Coal
87RR-13	42.0	90.0	12.8	27.4	Brown and grey siltstone to sandstone
87RR-13	90.0	94.0	27.4	28.7	Coal
87RR-13	94.0	104.0	28.7	31.7	Brown-grey siltstone to sandstone

1987 ROSS RIVER COAL PERCUSSION DRILLING PROJECT

Work completed September 24 - September 28

NAME	From (ft)	To (ft)	From (m)	To (m)	Unit
87RR-14	0.0	5.0	0.0	1.5	No recovery
87RR-14	5.0	45.0	1.5	13.7	Grey conglomerate
87RR-14	45.0	210.0	13.7	64.0	Grey conglomerate - WATER in hole

APPENDIX B

NEUTRON PROBE LOGS

The 501 Depthprobe moisture gauge consists of a radioactive source emitting fast neutrons and a detector tube recording slow (thermal) neutrons. The source consists of small amounts of Americium 242 in a beryllium host. The detector tube contains the compound boron trifluoride (BF_3). Both source and detector are housed in a metal cylinder which is lowered down the drill hole. The detector records slow neutrons within an approximate sphere with a radius of 3 - 6 inches depending on the nature of the material surrounding the probe.

The fast neutrons emitted by the source cannot be detected by the tube. The fast neutrons are slowed to different extents by numerous collisions with atoms in the surrounding material. For most elements, the fast neutrons are not slowed sufficiently within the effective range of the detector to be counted and recorded. The element hydrogen, however, has the capability of very effectively slowing down fast neutrons. The instrument is therefore recording the number of neutrons slowed down by interaction with hydrogen. Because the source has a constant neutron emission rate, the number of slow neutrons detected is directly proportional to the amount of hydrogen contained in the material surrounding the probe. The instrument is commonly called a moisture gauge because the primary source of hydrogen in most natural inorganic materials is water.

In this project, the depthprobe was used to detect the hydrogen

contained in the organic matter forming the coal seams. The instrument was not calibrated against standards and therefore only indicates qualitative amounts of hydrogen. The coal seams can be readily detected by the significant increase in slow neutrons detected.

After each drill hole was completed, all rods were withdrawn and 2 inch PVC tubing was lowered down the hole. The downhole depth of the coal seams were then measured using the neutron moisture gauge lowered down the hole on a coaxial cable. Measurements were taken at 1-foot intervals through the coal seam intersections. All depths were corrected to depth below ground surface level. The instrument recorded slow neutrons for a 30-second interval at each depth.

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-01

DRILLHOLE	Depth (ft)	Cor	Dpth (ft)	Neutron Count	Coal Seam
87RR-01	48.6		47.1	866	U
87RR-01	50.6		49.1	829	U
87RR-01	51.6		50.1	846	U
87RR-01	52.6		51.1	910	U
87RR-01	53.6		52.1	833	U
87RR-01	54.6		53.1	2072	U
87RR-01	55.6		54.1	1408	U
87RR-01	56.6		55.1	2841	U
87RR-01	57.6		56.1	2911	U
87RR-01	58.6		57.1	2832	U
87RR-01	59.6		58.1	2759	U
87RR-01	61.6		60.1	2640	U
87RR-01	63.6		62.1	1073	U
87RR-01	65.6		64.1	1243	U

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-01

DRILLHOLE	Depth (ft)	Cor	Dpth (ft)	Neutron Count	Coal Seam
87RR-01	99.8		98.3	1151	L
87RR-01	101.8		100.3	1116	L
87RR-01	103.8		102.3	1464	L
87RR-01	105.8		104.3	2871	L
87RR-01	107.8		106.3	2875	L
87RR-01	109.8		108.3	2136	L
87RR-01	111.8		110.3	1108	L
87RR-01	113.8		112.3	1047	L
87RR-01	114.8		113.3	1007	L

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-02

DRILLHOLE	Depth (ft)	Cor	Dpth (ft)	Neutron Count	Coal Seam
87RR-02	78.4		77.1	907	U
87RR-02	79.4		78.1	883	U
87RR-02	80.4		79.1	896	U
87RR-02	81.4		80.1	908	U
87RR-02	82.4		81.1	1673	U
87RR-02	83.4		82.1	2388	U
87RR-02	84.4		83.1	2757	U
87RR-02	85.4		84.1	2588	U
87RR-02	86.4		85.1	2768	U
87RR-02	87.4		86.1	2790	U
87RR-02	88.4		87.1	2460	U
87RR-02	89.4		88.1	1193	U
87RR-02	90.4		89.1	959	U
87RR-02	91.4		90.1	1229	U
87RR-02	92.4		91.1	1430	U
87RR-02	93.4		92.1	1733	U

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-02

DRILLHOLE	Depth (ft)	Cor (ft)	Dpth (ft)	Neutron Count	Coal Seam
87RR-02	124.0		122.7	939	L
87RR-02	125.0		123.7	981	L
87RR-02	126.0		124.7	963	L
87RR-02	127.0		125.7	1017	L
87RR-02	128.0		126.7	1008	L
87RR-02	129.0		127.7	1507	L
87RR-02	130.0		128.7	2846	L
87RR-02	131.0		129.7	2914	L
87RR-02	132.0		130.7	2877	L
87RR-02	133.0		131.7	2877	L
87RR-02	134.0		132.7	3013	L
87RR-02	135.0		133.7	1251	L
87RR-02	136.0		134.7	933	L
87RR-02	137.0		135.7	1061	L
87RR-02	138.0		136.7	1098	L

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-03

DRILLHOLE	Depth (ft)	Cor	Dpth (ft)	Neutron Count	Coal Seam
87RR-03	108.0		105.0	876	U
87RR-03	109.0		106.0	869	U
87RR-03	110.0		107.0	857	U
87RR-03	111.0		108.0	863	U
87RR-03	112.0		109.0	2484	U
87RR-03	113.0		110.0	2677	U
87RR-03	114.0		111.0	2661	U
87RR-03	115.0		112.0	3044	U
87RR-03	116.0		113.0	2846	U
87RR-03	117.0		114.0	2926	U
87RR-03	118.0		115.0	2505	U
87RR-03	119.0		116.0	1003	U
87RR-03	120.0		117.0	1201	U

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-03

DRILLHOLE	Depth Cor (ft)	Dpth (ft)	Neutron Count	Coal Seam
87RR-03	156.0	153.0	952	L
87RR-03	157.0	154.0	1003	L
87RR-03	158.0	155.0	912	L
87RR-03	159.0	156.0	1329	L
87RR-03	160.0	157.0	2815	L
87RR-03	161.0	158.0	2915	L
87RR-03	162.0	159.0	2464	L
87RR-03	163.0	160.0	2869	L
87RR-03	164.0	161.0	2188	L
87RR-03	165.0	162.0	915	L
87RR-03	166.0	163.0	1033	L
87RR-03	167.0	164.0	1078	L

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-04

DRILLHOLE	Depth (ft)	Cor Dpth (ft)	Neutron Count	Coal Seam
87RR-04	116.2	114.2	842	U
87RR-04	117.2	115.2	824	U
87RR-04	118.2	116.2	1048	U
87RR-04	119.2	117.2	1841	U
87RR-04	120.2	118.2	2692	U
87RR-04	121.2	119.2	2757	U
87RR-04	122.2	120.2	2785	U
87RR-04	123.2	121.2	3031	U
87RR-04	124.2	122.2	2853	U
87RR-04	125.2	123.2	2494	U
87RR-04	126.2	124.2	1108	U
87RR-04	127.2	125.2	1074	U
87RR-04	128.2	126.2	1133	U
87RR-04	129.2	127.2	1281	U
87RR-04	130.2	128.2	1292	U
87RR-04	131.2	129.2	1784	U
87RR-04	132.2	130.2	1453	U
87RR-04	133.2	131.2	1318	U
87RR-04	134.2	132.2	1304	U
87RR-04	135.2	133.2	1092	U

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-04

DRILLHOLE	Depth (ft)	Cor Dpth (ft)	Neutron Count	Coal Seam
87RR-04	167.5	165.5	1006	L
87RR-04	168.5	166.5	979	L
87RR-04	169.5	167.5	914	L
87RR-04	170.5	168.5	1518	L
87RR-04	171.5	169.5	2883	L
87RR-04	172.5	170.5	3000	L
87RR-04	173.5	171.5	2938	L
87RR-04	174.5	172.5	2908	L
87RR-04	175.5	173.5	2786	L
87RR-04	176.5	174.5	1430	L
87RR-04	177.5	175.5	1036	L
87RR-04	178.5	176.5	1030	L
87RR-04	179.5	177.5	888	L

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-05

DRILLHOLE	Depth (ft)	Cor	Dpth (ft)	Neutron Count	Coal Seam
87RR-05	118.2		115.8	859	U
87RR-05	119.2		116.8	877	U
87RR-05	120.2		117.8	874	U
87RR-05	121.2		118.8	1930	U
87RR-05	122.2		119.8	2840	U
87RR-05	123.2		120.8	2748	U
87RR-05	124.2		121.8	2789	U
87RR-05	125.2		122.8	2862	U
87RR-05	126.2		123.8	2802	U
87RR-05	127.2		124.8	2510	U
87RR-05	128.2		125.8	1182	U
87RR-05	129.2		126.8	1043	U
87RR-05	130.2		127.8	1155	U
87RR-05	131.2		128.8	1288	U

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-05

DRILLHOLE	Depth (ft)	Cor Dpth (ft)	Neutron Count	Coal Seam
87RR-05	167.5	165.1	880	L
87RR-05	168.5	166.1	960	L
87RR-05	169.5	167.1	1034	L
87RR-05	170.5	168.1	1814	L
87RR-05	171.5	169.1	2984	L
87RR-05	172.5	170.1	2936	L
87RR-05	173.5	171.1	2906	L
87RR-05	174.5	172.1	3012	L
87RR-05	175.5	173.1	2988	L
87RR-05	176.5	174.1	2678	L
87RR-05	177.5	175.1	1075	L
87RR-05	178.5	176.1	978	L
87RR-05	179.5	177.1	998	L

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-06

DRILLHOLE	Depth (ft)	Cor	Dpth (ft)	Neutron Count	Coal Seam
87RR-06	37.2		35.5	849	U
87RR-06	38.2		36.5	895	U
87RR-06	39.2		37.5	846	U
87RR-06	40.2		38.5	794	U
87RR-06	41.2		39.5	2239	U
87RR-06	42.2		40.5	1186	U
87RR-06	43.2		41.5	1778	U
87RR-06	44.2		42.5	2480	U
87RR-06	45.2		43.5	2941	U
87RR-06	46.2		44.5	2895	U
87RR-06	47.2		45.5	2886	U
87RR-06	48.2		46.5	2676	U
87RR-06	49.2		47.5	1052	U

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-06

DRILLHOLE	Depth (ft)	Cor (ft)	Dpth (ft)	Neutron Count	Coal Seam
-----------	---------------	-------------	--------------	------------------	--------------

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-07

DRILLHOLE	Depth (ft)	Cor	Dpth (ft)	Neutron Count	Coal Seam
87RR-07	15.8		13.4	1017	U
87RR-07	16.8		14.4	1322	U
87RR-07	17.8		15.4	1263	U
87RR-07	18.8		16.4	1589	U
87RR-07	19.8		17.4	1653	U
87RR-07	20.8		18.4	2431	U
87RR-07	21.8		19.4	2636	U
87RR-07	22.8		20.4	2259	U
87RR-07	23.8		21.4	2618	U
87RR-07	24.8		22.4	2445	U
87RR-07	25.8		23.4	1156	U
87RR-07	26.8		24.4	1315	U
87RR-07	27.8		25.4	1343	U
87RR-07	28.8		26.4	1850	U
87RR-07	29.8		27.4	1913	U
87RR-07	30.8		28.4	1284	U

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-07

DRILLHOLE	Depth Cor (ft)	Dpth (ft)	Neutron Count	Coal Seam
87RR-07	65.0	62.6	1113	L
87RR-07	66.0	63.6	995	L
87RR-07	67.0	64.6	940	L
87RR-07	68.0	65.6	1006	L
87RR-07	69.0	66.6	1378	L
87RR-07	70.0	67.6	2834	L
87RR-07	71.0	68.6	3011	L
87RR-07	72.0	69.6	2985	L
87RR-07	73.0	70.6	3034	L
87RR-07	74.0	71.6	2916	L
87RR-07	75.0	72.6	1096	L
87RR-07	76.0	73.6	1024	L
87RR-07	77.0	74.6	953	L
87RR-07	78.0	75.6	1130	L
87RR-07	79.0	76.6	927	L
87RR-07	80.0	77.6	1004	L

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-08

DRILLHOLE	Depth (ft)	Cor	Dpth (ft)	Neutron Count	Coal Seam
87RR-08	98.0		95.0	969	U
87RR-08	99.0		96.0	877	U
87RR-08	100.0		97.0	911	U
87RR-08	101.0		98.0	1638	U
87RR-08	102.0		99.0	1343	U
87RR-08	103.0		100.0	3065	U
87RR-08	104.0		101.0	2966	U
87RR-08	105.0		102.0	2849	U
87RR-08	106.0		103.0	2998	U
87RR-08	107.0		104.0	2925	U
87RR-08	108.0		105.0	1740	U
87RR-08	109.0		106.0	975	U
87RR-08	110.0		107.0	1323	U
87RR-08	111.0		108.0	1423	U
87RR-08	112.0		109.0	1956	U
87RR-08	113.0		110.0	1838	U
87RR-08	114.0		111.0	1807	U
87RR-08	115.0		112.0	1933	U

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-08

DRILLHOLE	Depth (ft)	Cor	Dpth (ft)	Neutron Count	Coal Seam
87RR-08	148.0		145.0	984	L
87RR-08	149.0		146.0	970	L
87RR-08	150.0		147.0	1057	L
87RR-08	151.0		148.0	1049	L
87RR-08	152.0		149.0	2124	L
87RR-08	153.0		150.0	2915	L
87RR-08	154.0		151.0	2984	L
87RR-08	155.0		152.0	2848	L
87RR-08	156.0		153.0	2838	L
87RR-08	157.0		154.0	2983	L
87RR-08	158.0		155.0	2975	L
87RR-08	159.0		156.0	2941	L
87RR-08	160.0		157.0	1113	L
87RR-08	161.0		158.0	970	L
87RR--08	162.0		159.0	899	L

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-09

DRILLHOLE	Depth (ft)	Cor (ft)	Dpth (ft)	Neutron Count	Coal Seam
87RR-09	86.4		81.7	832	U
87RR-09	87.4		82.7	874	U
87RR-09	88.4		83.7	948	U
87RR-09	89.4		84.7	864	U
87RR-09	90.4		85.7	2203	U
87RR-09	91.4		86.7	2479	U
87RR-09	92.4		87.7	2658	U
87RR-09	93.4		88.7	2799	U
87RR-09	94.4		89.7	2770	U
87RR-09	95.4		90.7	2574	U
87RR-09	96.4		91.7	1100	U
87RR-09	97.4		92.7	1210	U
87RR-09	98.4		93.7	1841	U

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-09

DRILLHOLE	Depth (ft)	Cor Dpth (ft)	Neutron Count	Coal Seam
87RR-09	134.6	129.9	1013	L
87RR-09	135.6	130.9	1034	L
87RR-09	136.6	131.9	1041	L
87RR-09	137.6	132.9	1916	L
87RR-09	138.6	133.9	2760	L
87RR-09	139.6	134.9	2807	L
87RR-09	140.6	135.9	2903	L
87RR-09	141.6	136.9	1755	L
87RR-09	142.6	137.9	2937	L
87RR-09	143.6	138.9	1884	L
87RR-09	144.6	139.9	1045	L
87RR-09	145.6	140.9	1137	L
87RR-09	146.6	141.9	1028	L
87RR-09	147.6	142.9	944	L

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-12

DRILLHOLE	Depth (ft)	Cor	Dpth (ft)	Neutron Count	Coal Seam
87RR-12	37.8		35.8	1041	L
87RR-12	38.8		36.8	1117	L
87RR-12	39.8		37.8	1090	L
87RR-12	40.8		38.8	1017	L
87RR-12	41.8		39.8	1490	L
87RR-12	42.8		40.8	3042	L
87RR-12	43.8		41.8	2901	L
87RR-12	44.8		42.8	3082	L
87RR-12	45.8		43.8	3037	L
87RR-12	46.8		44.8	3188	L
87RR-12	47.8		45.8	3075	L
87RR-12	48.8		46.8	1529	L
87RR-12	49.8		47.8	1031	L
87RR-12	50.8		48.8	1050	L
87RR-12	51.8		49.8	1124	L
87RR-12	52.8		50.8	1146	L

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-13

DRILLHOLE	Depth (ft)	Cor	Dpth (ft)	Neutron Count	Coal Seam
87RR-13	33.8		31.8	900	U
87RR-13	34.8		32.8	950	U
87RR-13	35.8		33.8	818	U
87RR-13	36.8		34.8	1221	U
87RR-13	37.8		35.8	1795	U
87RR-13	38.8		36.8	1255	U
87RR-13	39.8		37.8	2127	U
87RR-13	40.8		38.8	2956	U
87RR-13	41.8		39.8	2984	U
87RR-13	42.8		40.8	2964	U
87RR-13	43.8		41.8	2968	U
87RR-13	44.8		42.8	2342	U
87RR-13	45.8		43.8	979	U
87RR-13	46.8		44.8	978	U
87RR-13	47.8		45.8	1291	U

1987 Ross River Coal Project
Downhole Neutron "Moisture" Gauge

Measurements for drillhole:87RR-13

DRILLHOLE	Depth (ft)	Cor (ft)	Dpth (ft)	Neutron Count	Coal Seam
87RR-13	88.0		86.0	923	L
87RR-13	89.0		87.0	1032	L
87RR-13	90.0		88.0	965	L
87RR-13	91.0		89.0	1194	L
87RR-13	92.0		90.0	1675	L
87RR-13	93.0		91.0	2949	L
87RR-13	94.0		92.0	3083	L
87RR-13	95.0		93.0	3077	L
87RR-13	96.0		94.0	2895	L
87RR-13	97.0		95.0	1104	L
87RR-13	98.0		96.0	1099	L
87RR-13	99.0		97.0	1048	L
87RR-13	100.0		98.0	1288	L

87RR-01

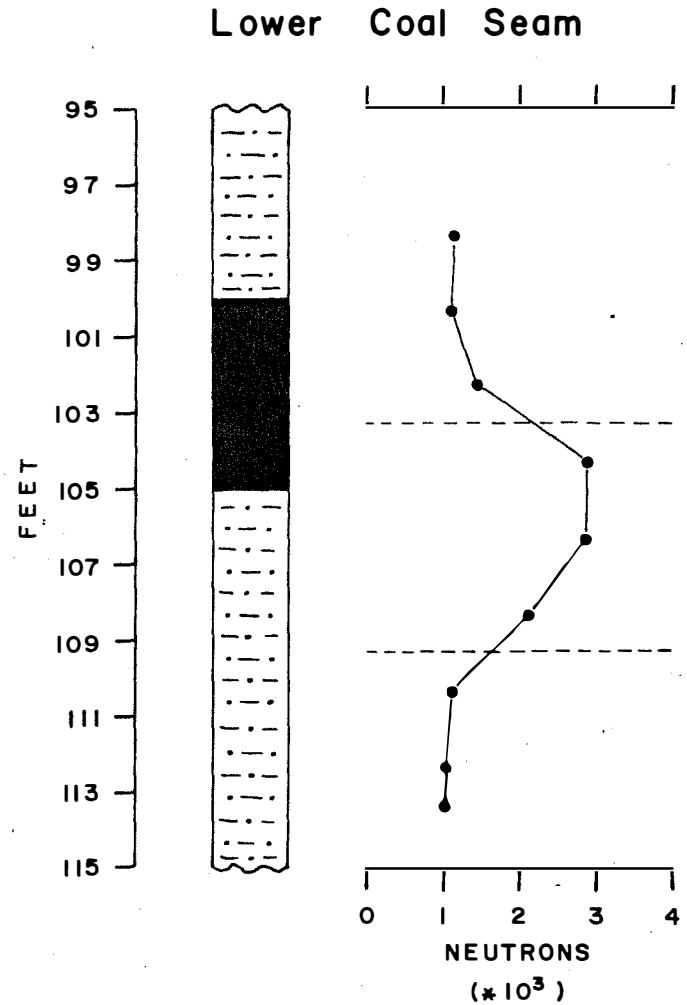
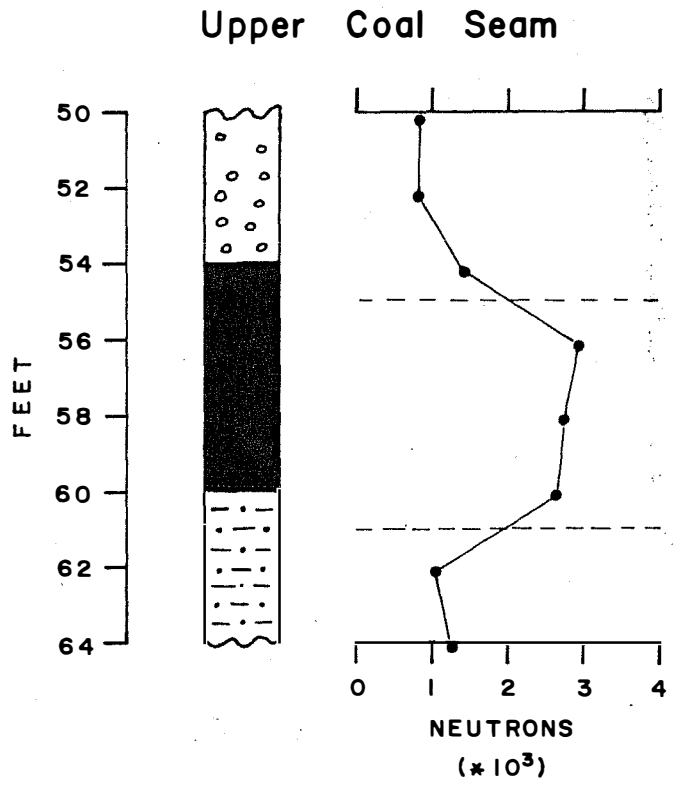


FIGURE B-1 COMPARISON OF GEOLOGY AND ELECTRONIC DRILL LOGS FOR HOLE 87RR-01

87RR-02

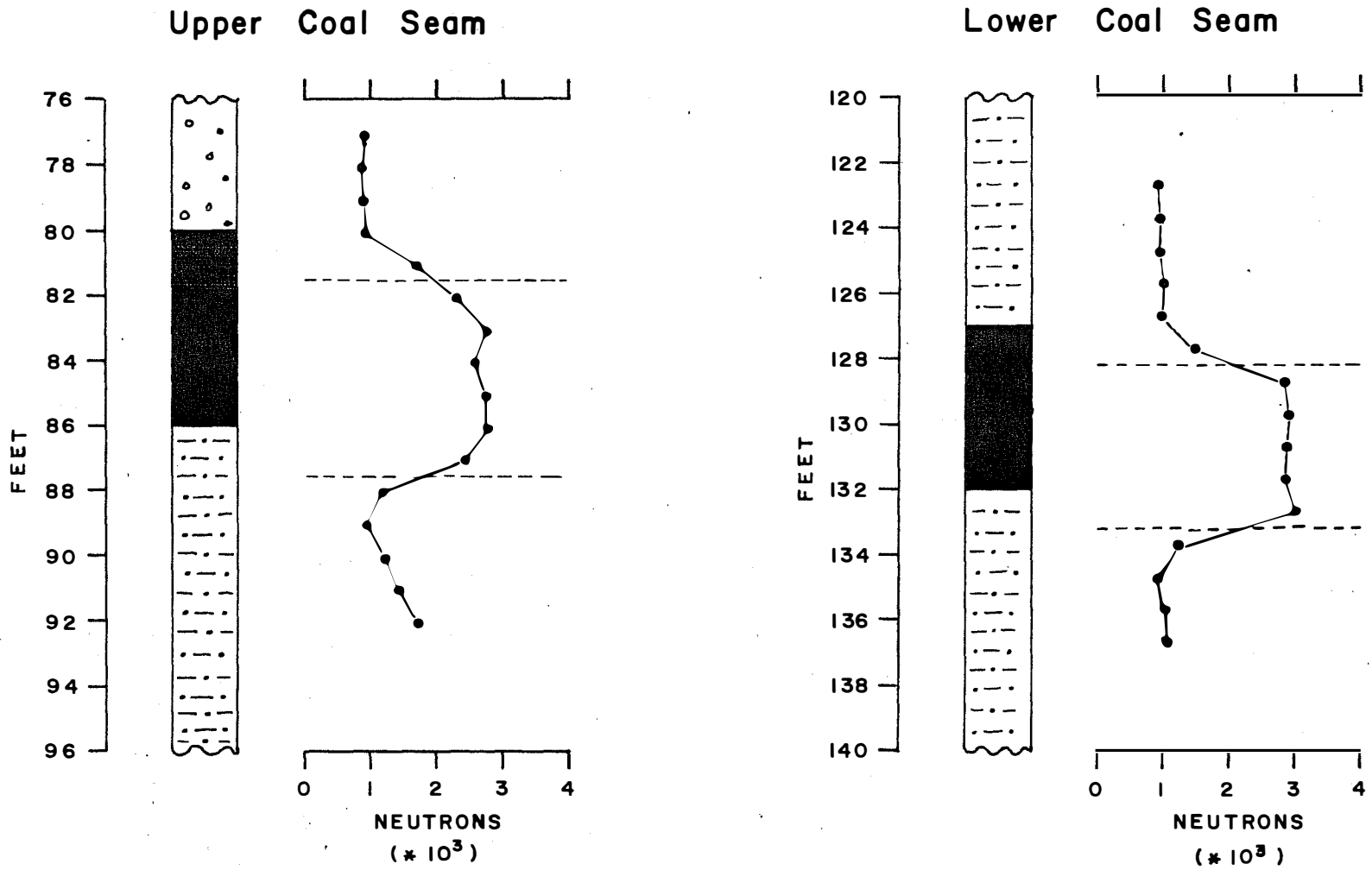
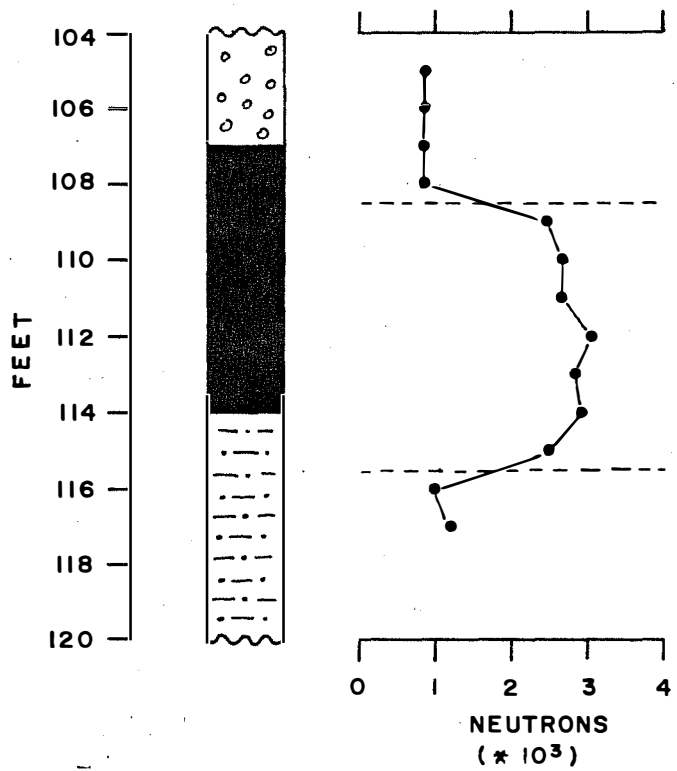


FIGURE B-2 COMPARISON OF GEOLOGY AND ELECTRONIC DRILL LOGS FOR HOLE 87RR-02

87RR-03

Upper Coal Seam



Lower Coal Seam

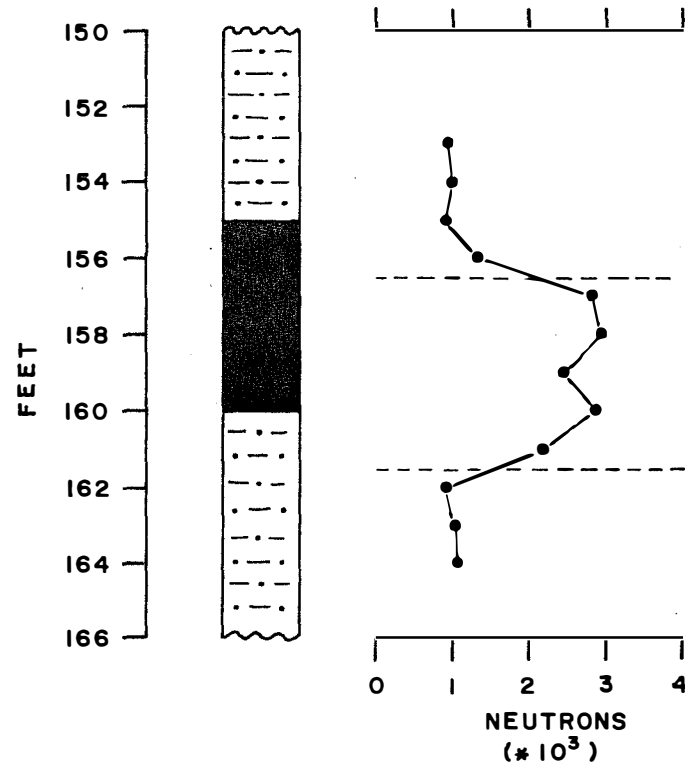
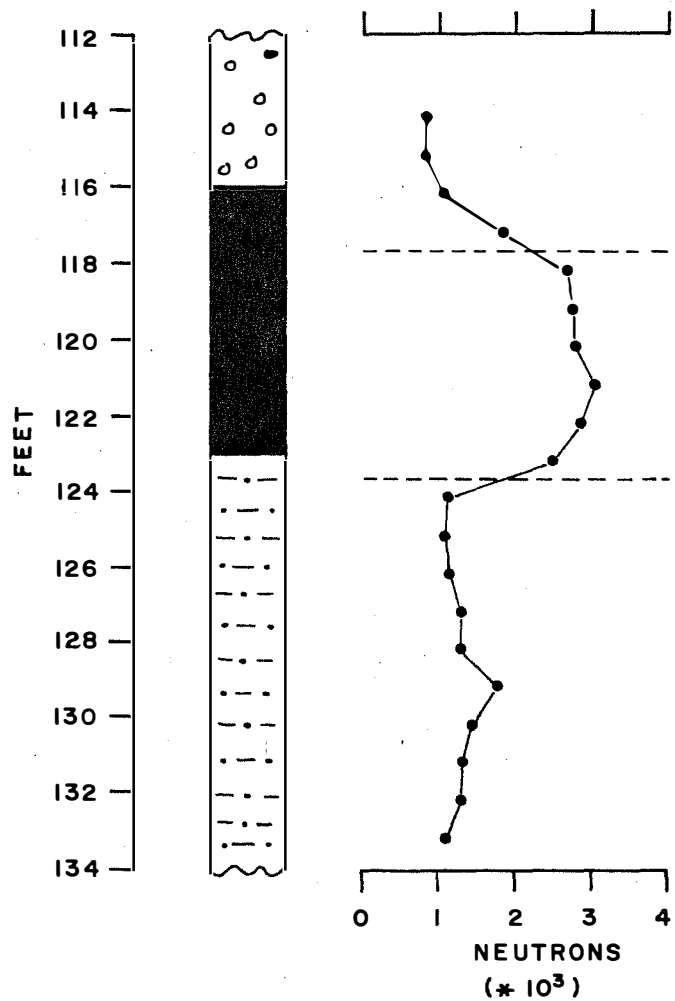


FIGURE B-3 COMPARISON OF GEOLOGY AND ELECTRONIC DRILL LOGS FOR HOLE 87RR-03

87RR-04

Upper Coal Seam



Lower Coal Seam

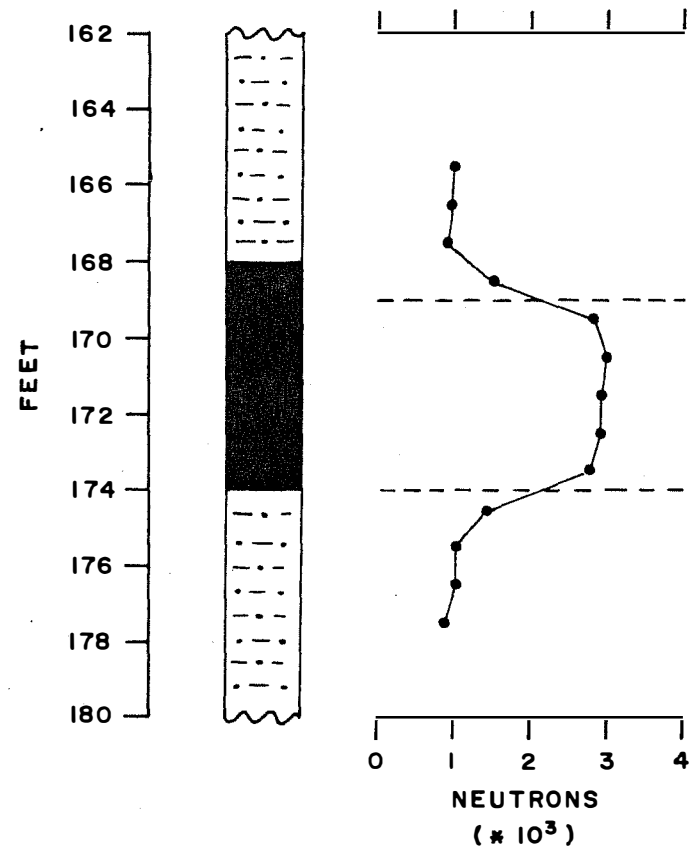
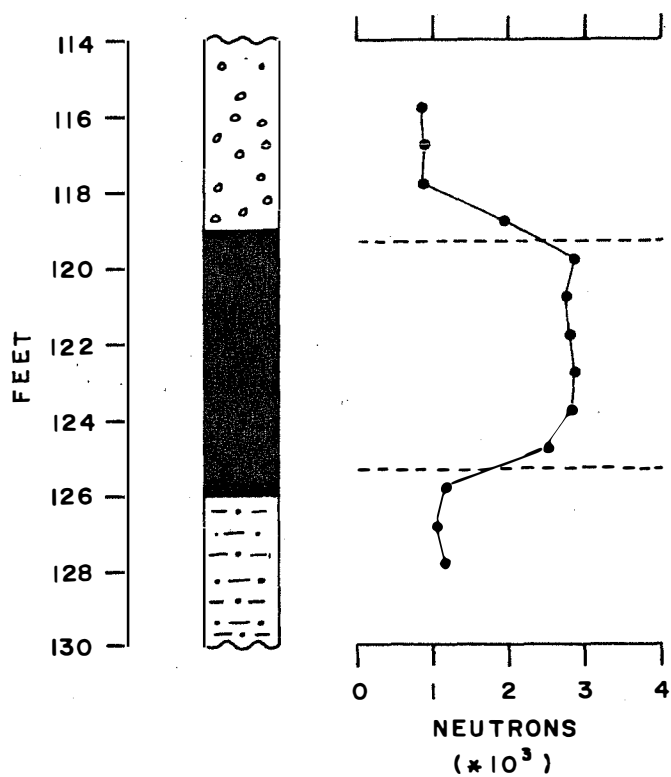


FIGURE B-4 COMPARISON OF GEOLOGY AND ELECTRONIC DRILL LOGS FOR HOLE 87RR-04

87RR-05

Upper Coal Seam



Lower Coal Seam

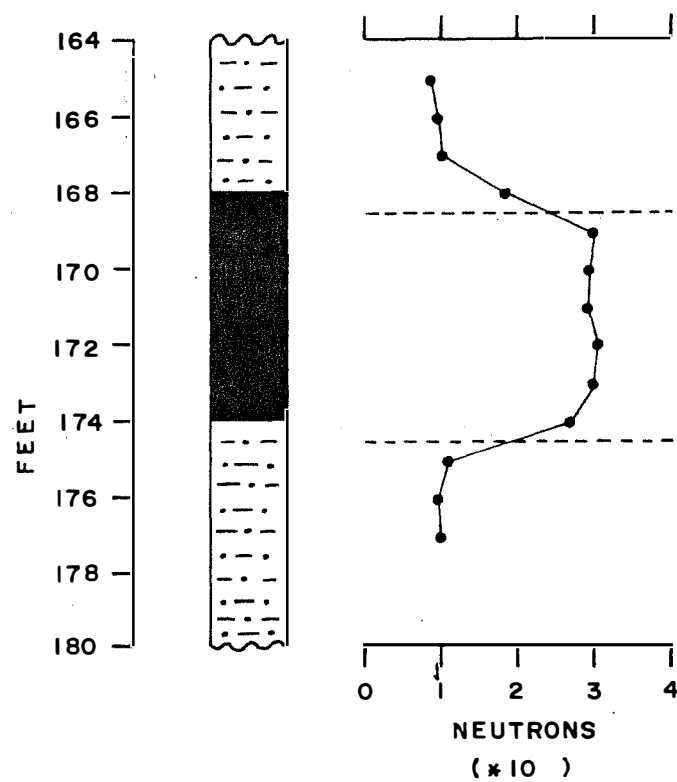
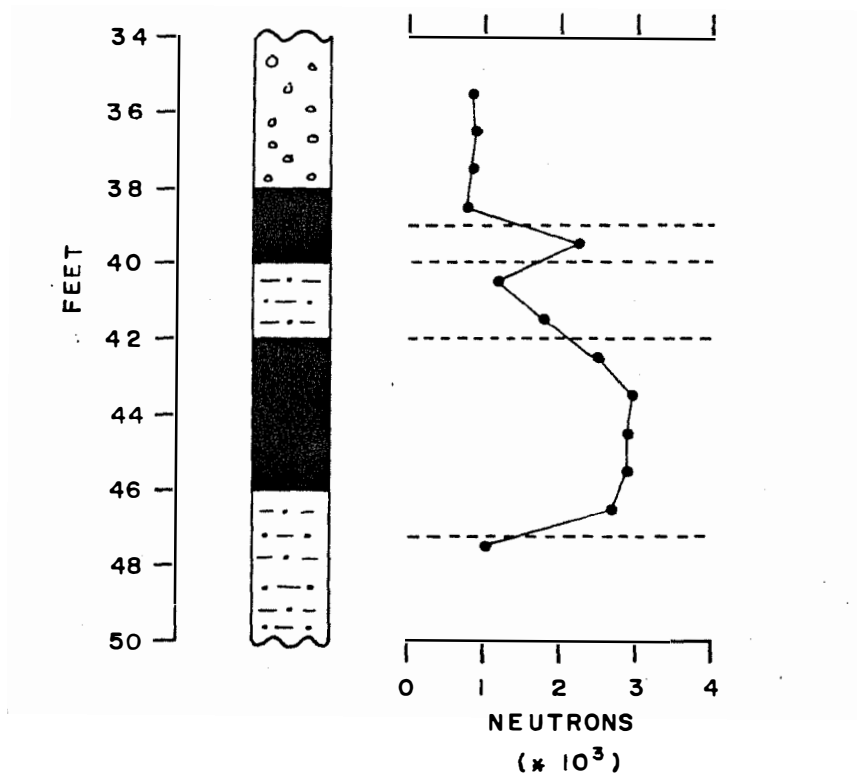


FIGURE B-5 COMPARISON OF GEOLOGY AND ELECTRONIC DRILL LOGS FOR HOLE 87RR-05

87RR-06

Upper Coal Seam



Lower Coal Seam

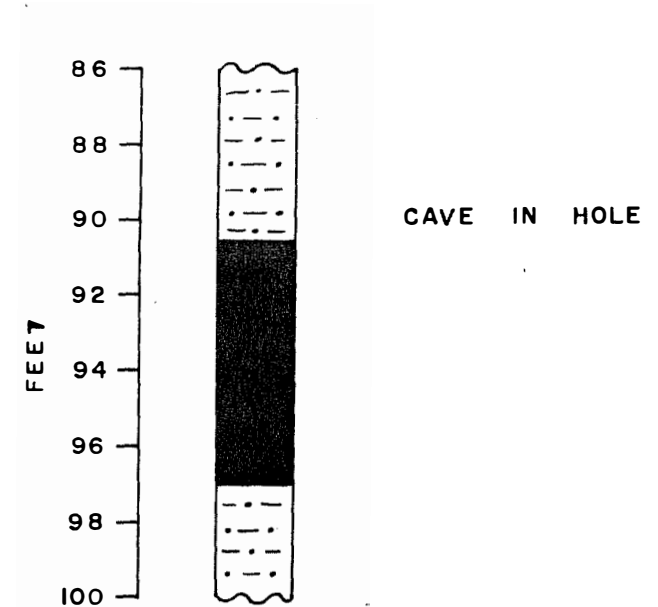


FIGURE B-6 COMPARISON OF GEOLOGY AND ELECTRONIC DRILL LOGS FOR HOLE 87RR-06

87RR-07

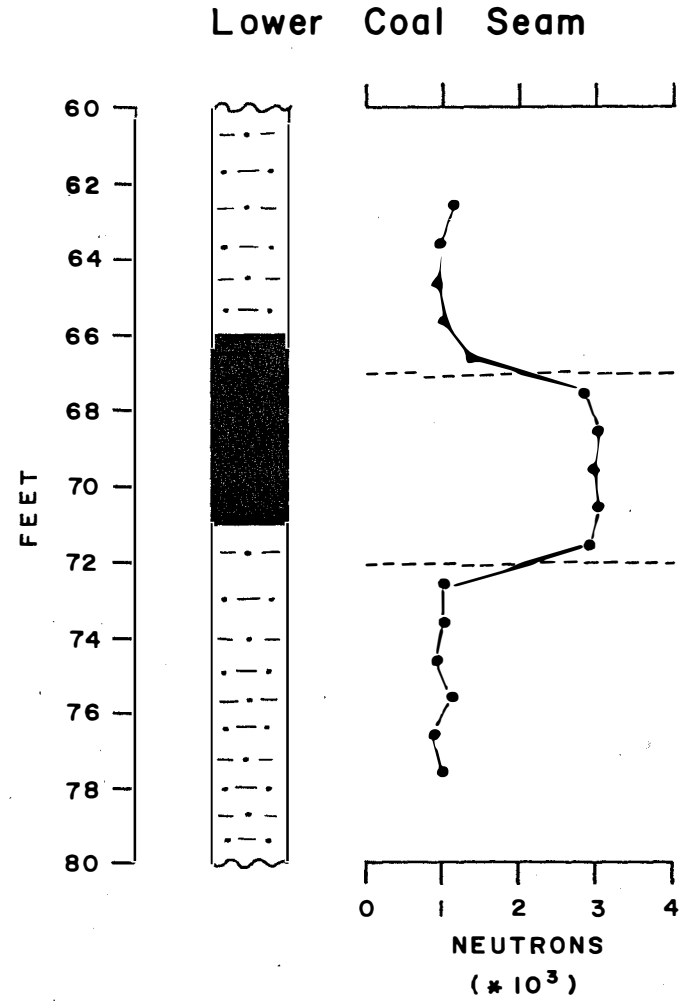
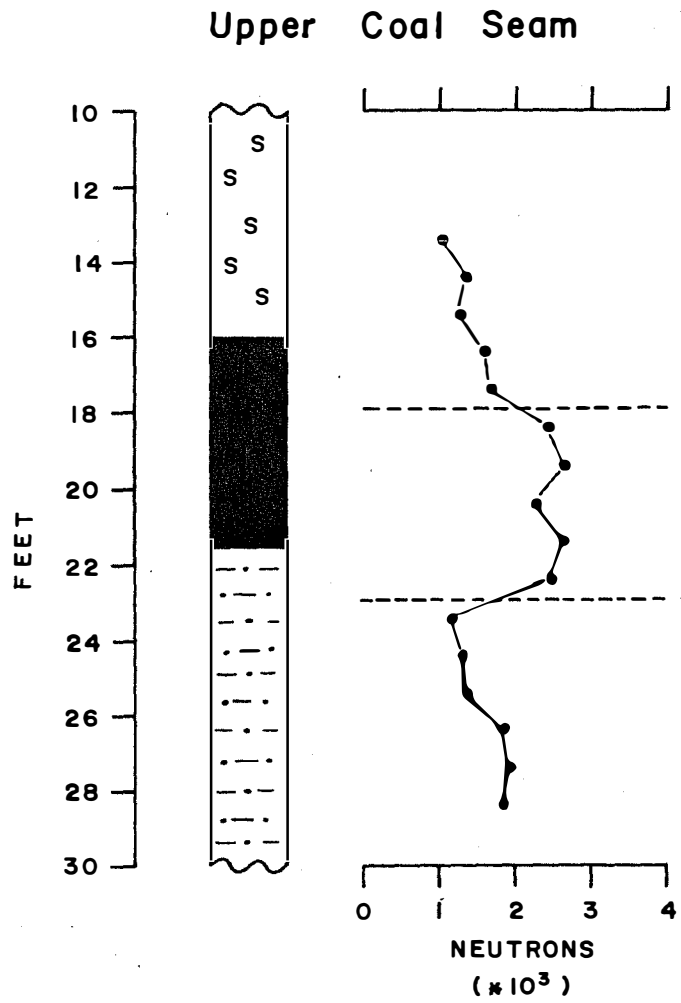


FIGURE B-7 COMPARISON OF GEOLOGY AND ELECTRONIC DRILL LOGS FOR HOLE 87RR-07

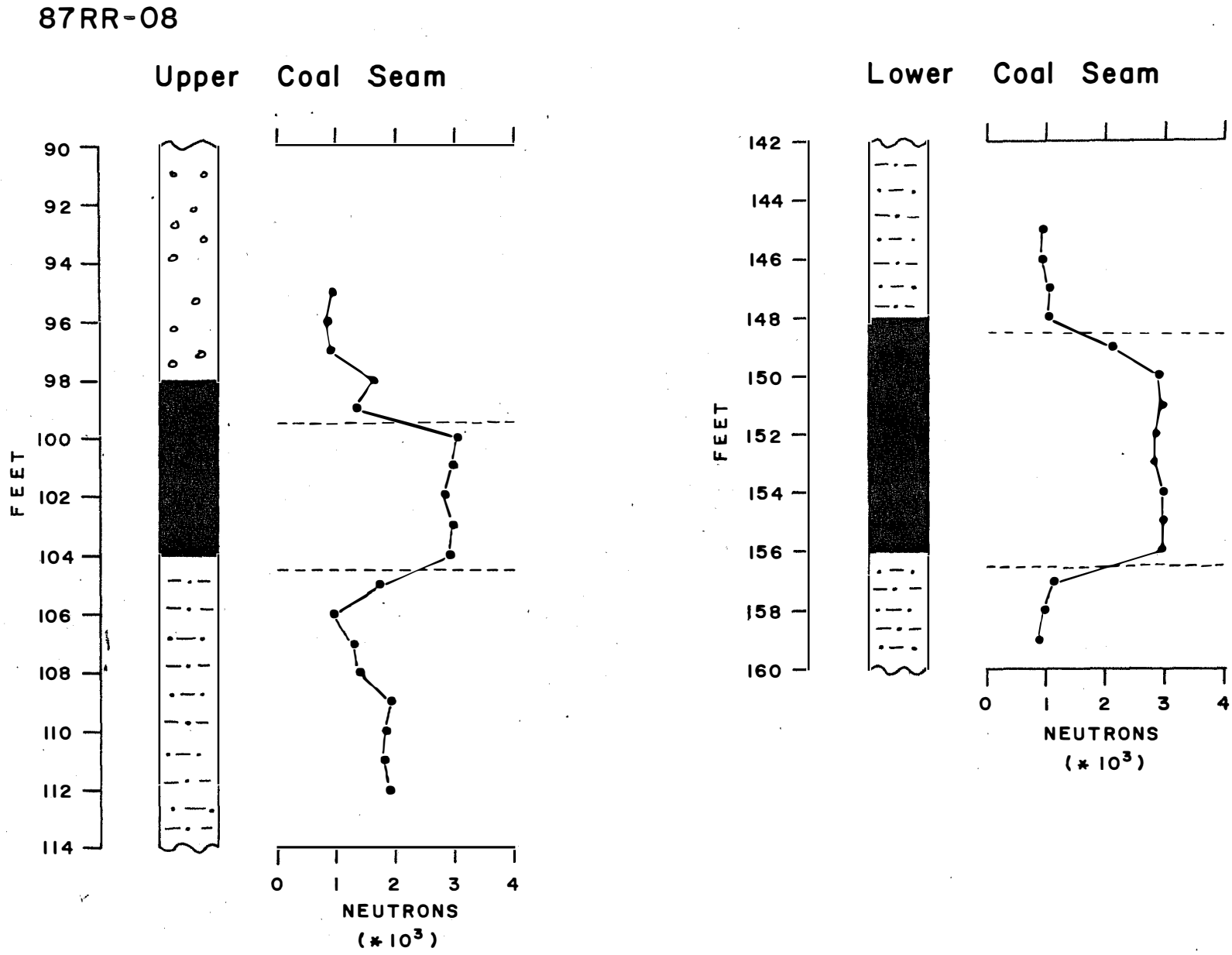


FIGURE B-8 COMPARISON OF GEOLOGY AND ELECTRONIC DRILL LOGS FOR HOLE 87RR-08

87RR-09

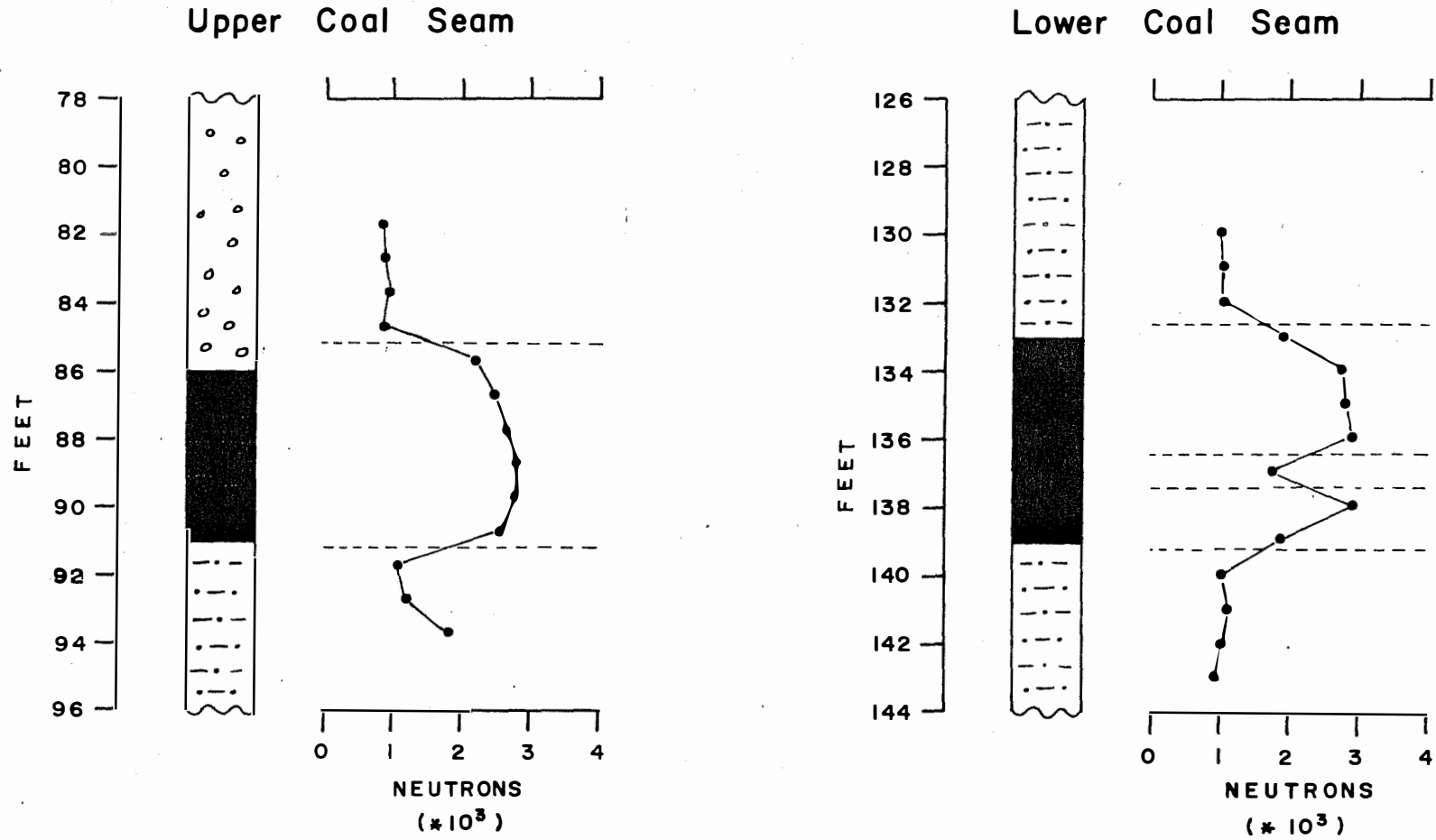
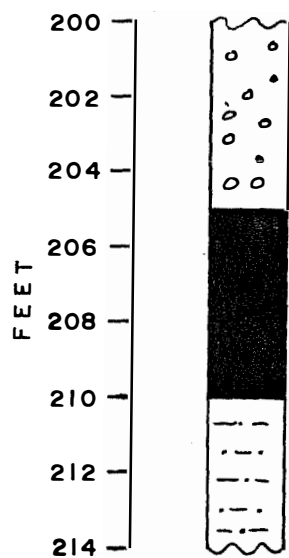


FIGURE B-9 COMPARISON OF GEOLOGY AND ELECTRONIC DRILL LOGS FOR HOLE 87RR-09

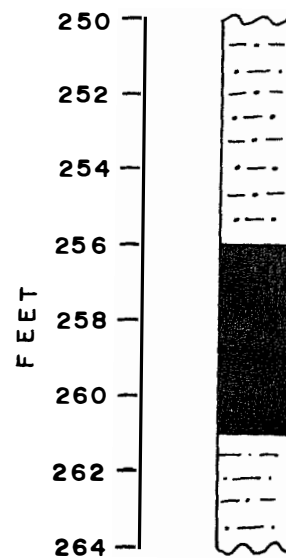
87RR-10

Upper Coal Seam



SEAM TOO DEEP

Lower Coal Seam



SEAM TOO DEEP

FIGURE B-10 COMPARISON OF GEOLOGY AND ELECTRONIC DRILL LOGS FOR HOLE 87RR-10

87RR-12

Lower Coal Seam

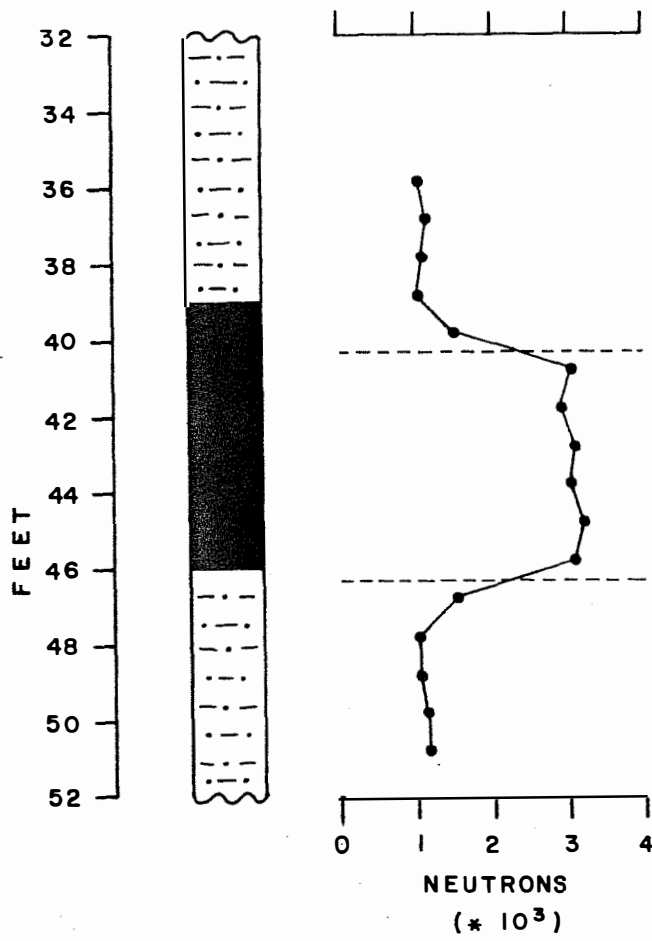


FIGURE B-11 COMPARISON OF GEOLOGY AND ELECTRONIC DRILL LOGS FOR HOLE 87RR-12

87RR-13

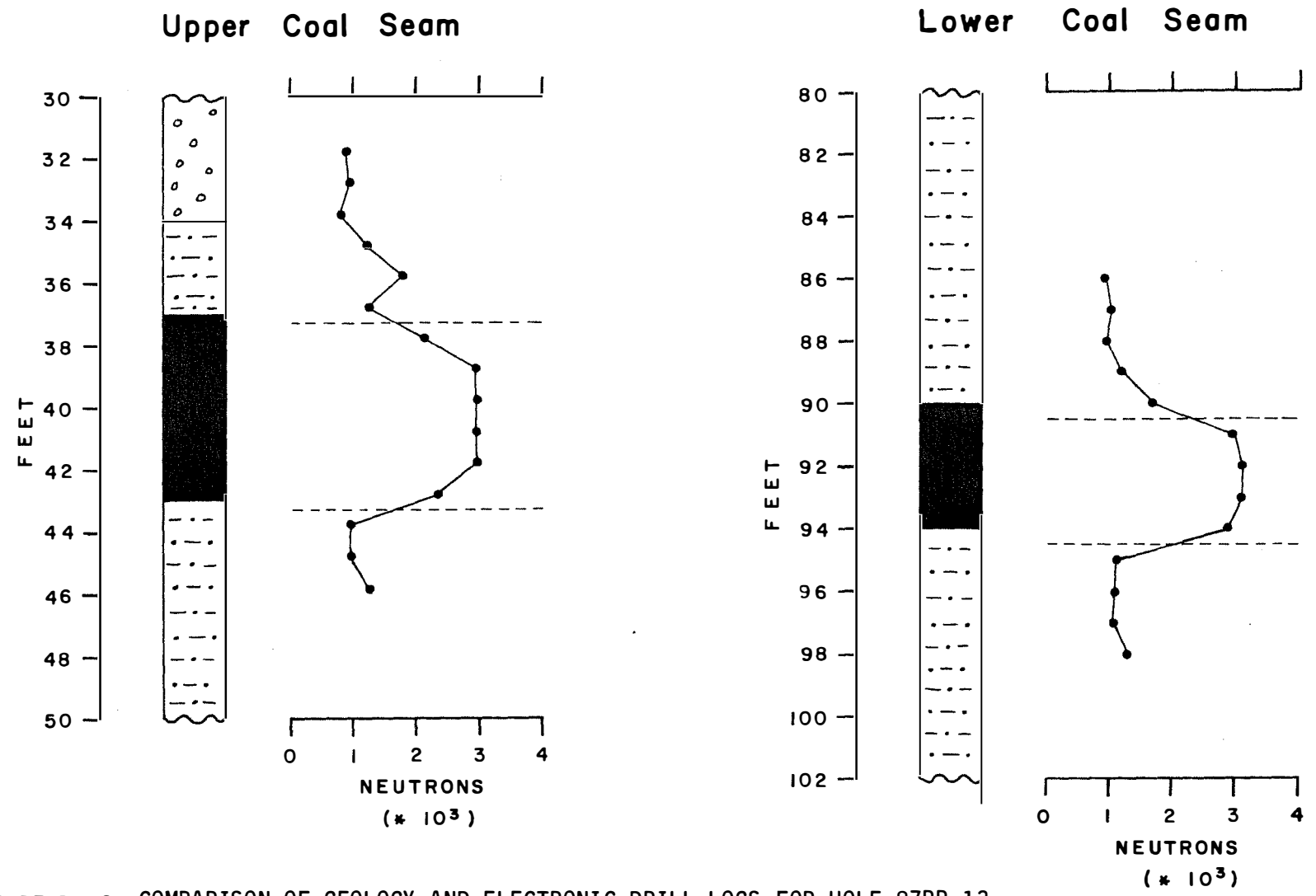


FIGURE B-12 COMPARISON OF GEOLOGY AND ELECTRONIC DRILL LOGS FOR HOLE 87RR-13