

000

436001

Dept M	A.O.	C.G.	E.O.	D.S.M.E.
	84	2119		Registrar
J. DIR.	- 1 MAY 1984			E & IL
DEPT. OF MINES				
No. 4253/84				

**MICROFILMED**

EXPLORATION LICENCE 20/80 LAUNCESTON  
EXPLORATION PROGRESS REPORT FOR  
QUARTER ENDED 22 FEBRUARY 1984

**OPEN FILE**

Exploration and Evaluation Group,  
 CSR Coal Division,  
 144 Edward Street,  
 BRISBANE, Qld. 4000

M.J. Carr April 1984  
 P.R. Ellis

CONTENTS

	<u>Page No.</u>
1. SUMMARY	1
2. INTRODUCTION	2
2.1 Scope of Report	2
2.2 Tenement Details	2
2.3 Location, Access, Climate, Physiography, and Land Use	2
3. GEOLOGY OF EL 20/80 LAUNCESTON	6
3.1 Regional Geological Setting	6
3.2 Local Geology of the Rosevale Coalfield	11
4. EXPLORATION AND GEOLOGICAL EVALUATION	14
4.1 Previous Exploration and Geological Evaluation	14
4.2 Exploration During the Three Month Period Ended 22 November, 1983	15
4.2.1 Exploration Drilling	15
4.2.2 Geological Evaluation	17
4.3 Future Exploration and Geological Evaluation	21
5. COAL RESOURCES OF EL 20/80	23
5.1 Brown Coal Reserves	23
5.2 Coal Quality	25
6. REFERENCES	28

TABLES

	<u>Page No.</u>
4.2.1.1 Summary of Drillhole Statistics	16
4.2.2.2 Summary of Correlatable Coal Seams - Loatta Deposit	19
5.1.1 Brown Coal Reserves, EL 20/80	24
5.2.1 Weighted Average Coal Quality, Rosevale Coalfield	26

FIGURES

	<u>Page No.</u>
2.3.1 Exploration Licence 20/80 Tasmania	3
3.1.1 Stratigraphy of the Parmeener Supergroup and Launceston Basin in EL 20/80	7
3.1.2 Sedimentary Basins and Tertiary Structural Elements of Tasmania	8
3.1.3 Rosevale Coalfield and Location of Prospective Areas in EL 20/80	9
3.2.1 EL 20/80 Launceston, Westbury Area, Brown Coal Deposits and Prospects	31
4.2.1.1 EL 20/80 Launceston Location of Exploration	32
4.2.2.1 Cross Section Location Plan	20
4.2.2.2 E - W Cross Section AA'	33
4.2.2.3 E - W " " BB'	34
4.2.2.4 E - W " " CC'	35
4.2.2.5 E - W " " DD'	36
4.2.2.6 E - W " " EE'	37
4.2.2.7 E - W " " FF'	38
4.2.2.8 N - S " " GG'	39
4.2.2.9 N - S " " G'G"	40
4.2.2.10 N - S " " G"G"'	41

1. SUMMARY

An exploration drilling programme commenced in the Rosevale Coalfield sector of EL 20/80 during October, 1983 and was completed in December, 1983. A total of 28 open and 3 partly cored holes were drilled in the Loatta deposit, and 3 open holes were completed in the northern part of Pipers Lagoons, to a total metreage of 2,643.76m rotary and 76.54m KMLC core. All holes were geophysically logged by BPB Instruments.

The stratigraphic sequence of the Loatta deposit is somewhat simpler than previously reported. A partially eroded uppermost banded coal interval (B) 10-30m thick is separated by approximately 20m of clay from an areally persistent mid coal zone (D) 6-50m thick, which in turn, in the southern part of the deposit, is underlain first by 20-30m of clay then a lowermost split group of seams (F) 7-25m thick. Seam structure contouring suggests greater structural complexity than originally envisaged, with at least the north-eastern and central areas of the deposit having been affected by faulting.

Indicated brown coal reserves of the Loatta, Pipers Lagoons, and Selbourne deposits remain unchanged at 118 Mt.

005

2. INTRODUCTION

2.1 Scope of Report

This report summarises geological and mining investigations conducted by CSR Limited in Exploration Licence (EL) 20/80 Launceston, and more specifically, the Rosevale Coalfield, during the three month period ended 22 February 1984.

2.2 Tenement Details

EL 20/80, originally covering an area of 2,339 km<sup>2</sup>, was granted to AAR Limited (a wholly-owned subsidiary of CSR) on 19 September, 1980. The term of the EL has been progressively extended as first oil shale then coal exploration continued. In February 1983 the licence was transferred from AAR Limited to CSR Limited and the area was reduced to 984 km<sup>2</sup>. The tenement is currently due to expire on the 22nd August, 1984.

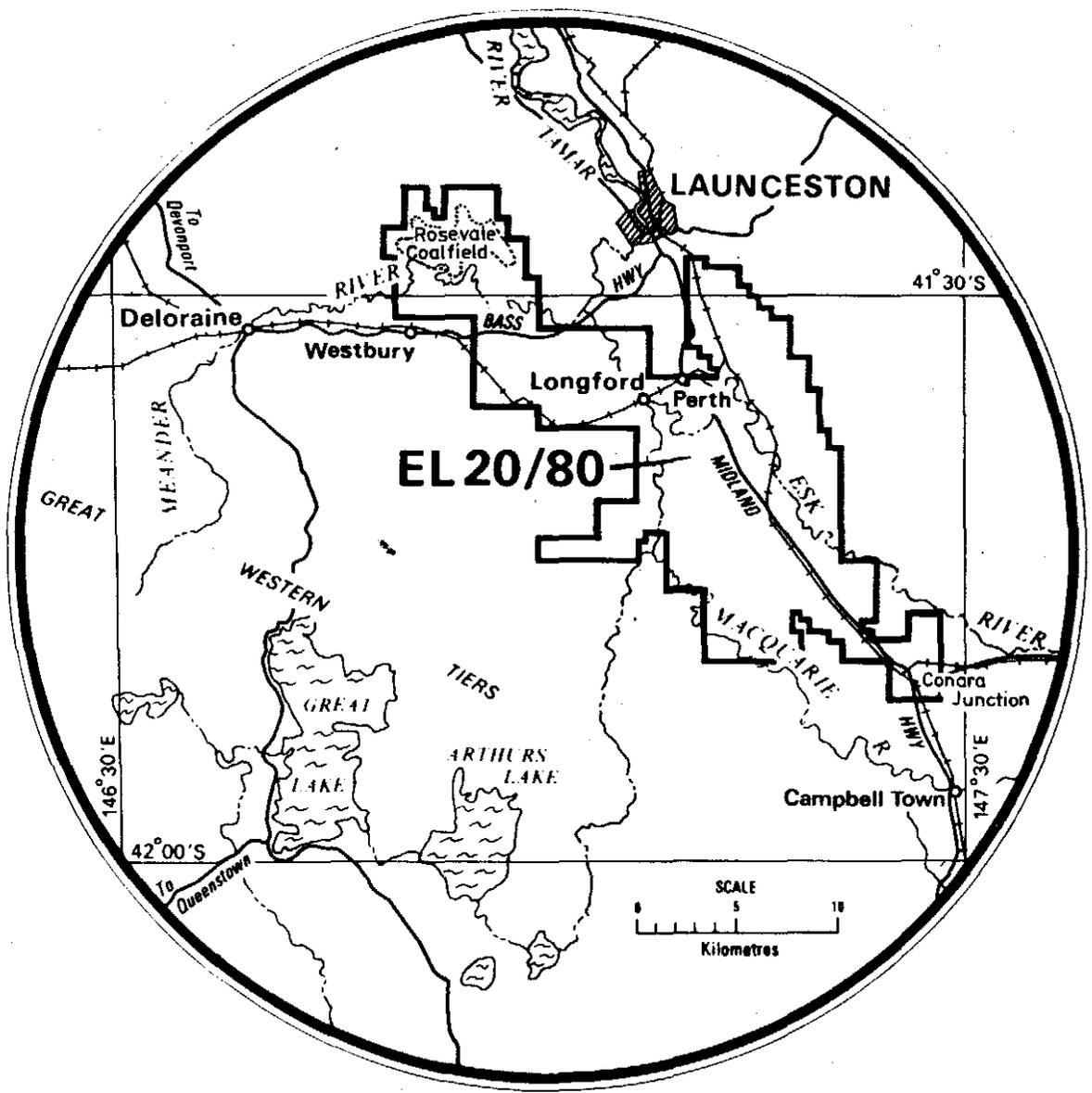
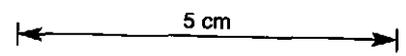
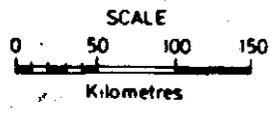
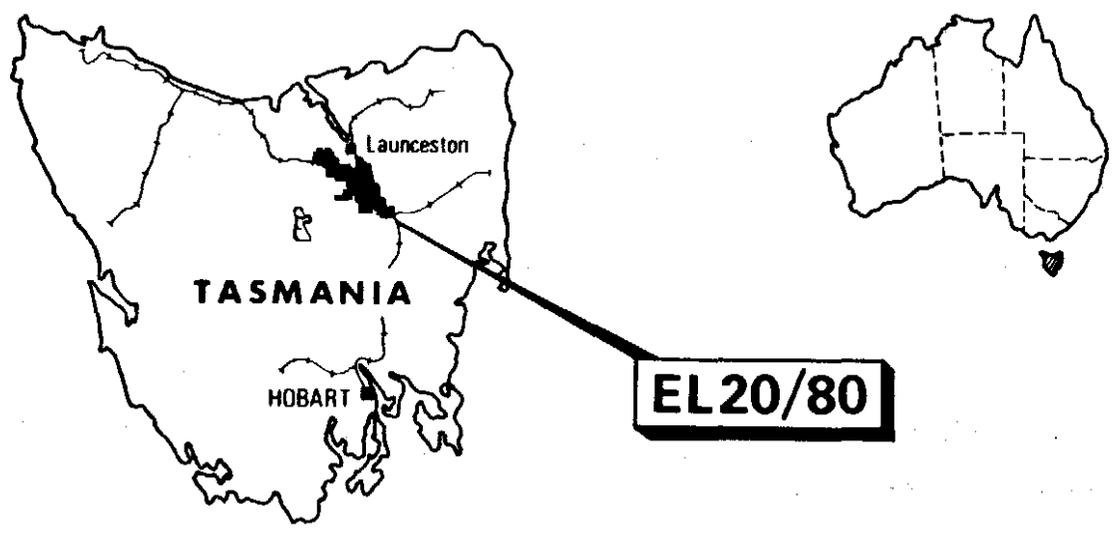
2.3 Location, Access, Climate, Physiography, and Land Use

EL 20/80 extends northwards from Conara Junction to the southern suburbs of Launceston, thence continues north-west from Longford as far as Rosevale and Westbury (Figure 2.3.1).

The Rosevale Coalfield, defined on the basis of three closely related yet discrete brown coal deposits, is located near the north-western corner of EL 20/80, 20 km due west of Launceston and 12 km north-east of Westbury. The Bass Highway and the Western railway line pass 8 - 10 km south of the deposits.

006

436007



**EXPLORATION LICENCE 20/80  
TASMANIA**

70020-8

FIGURE 231

007

Local access to the coalfield is via sealed and good quality unsealed shire roads linking Westwood and Rosevale settlements with Carrick, Hagley and Westbury. Farm tracks provide dry weather access to the greater part of the three deposits. During the wet winter and spring months local pastures become boggy and restrict the movement of vehicles off farm roads.

The climate of the area is temperate, with cold winters in which low-level snowfalls are occasionally recorded and warm, drier summers. Annual rainfall averages 750mm, falling principally in the winter months. January through March is generally dry and is the ideal time for exploration activity.

Topography of the Rosevale area is a reflection of the local geology, with the soft, coal-bearing, Tertiary Launceston Beds expressed as physiographic lows, and the more erosion-resistant Jurassic dolerites and Permo-Triassic sediments occurring as hills around the northern, eastern and western margins of the coal deposits. Late Tertiary basalts cover isolated areas of the Launceston Beds, forming low flat-topped hills and ridges. Total relief in the immediate environs of the coalfield is of the order of 50m. However, a major range of hills separates the Rosevale basin from Launceston, and encircles it to the north.

Southerly flowing ephemeral streams drain the coalfield area, through various low gradient marshy zones (e.g. Pipers Lagoons) into the Meander River, which is the major water course around Westbury and is the source of Westbury's reticulated water supply. The river crosses the Tertiary basin just south of the coal deposits, though it does pass over the southern limit of one coal area, before joining the South Esk River close to Hadspen.

000

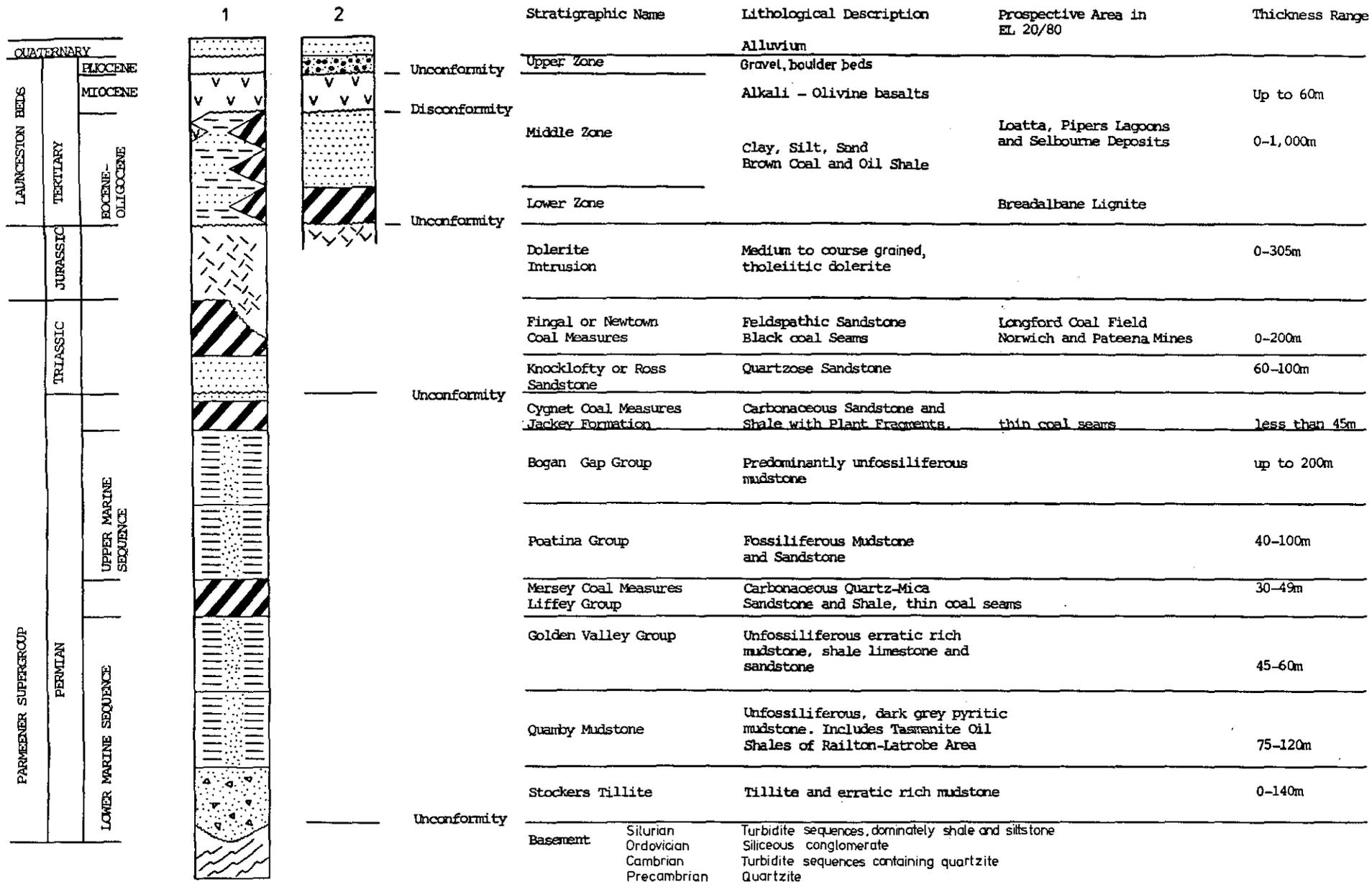
The principal land use over the Rosevale Coalfield is sheep and cattle raising, with small areas being under cultivation. With the exception of the most easterly of the coal deposits, Pipers Lagoons, which is largely covered with light forest, the land on and around the coalfield has been cleared and improved to varying degrees.

### 3. GEOLOGY OF EL 20/80 LAUNCESTON

#### 3.1 Regional Geological Setting

Tertiary brown coals at Rosevale occur in a different structural and stratigraphic setting from Tasmania's better-known Permo-Triassic black coals. Within EL 20/80, it is the Permo-Triassic Parmeener Supergroup and intrusive Jurassic tholeiitic dolerite dykes and sills, which constitute "basement" to the Tertiary coal-bearing Launceston Beds. Black coal has been recorded from EL 20/80 at several horizons within the Parmeener Supergroup (see stratigraphic column, Figure 3.1.1), but not in quantities of any economic significance. Dolerites, as sills up to 300m thick, have consistently intruded Parmeener sediments in the Launceston Basin area at the base of the Triassic succession.

In Tasmania during the early Tertiary a series of north to north-west trending grabens formed, in which predominantly non-marine sediments ranging up to 1,000m in thickness accumulated. Four main grabens are recognised, and each contains traces of brown coal or carbonaceous material. The northern part of the Midlands Graben (Figure 3.1.2), known as the Launceston Basin, contains the largest volume of Tertiary sediments in Tasmania, and consequently has the best potential for development of brown coal deposits in the state. The presence of brown coal has been recorded at several locations in the Launceston Basin, extending from Conara Junction in the south, north to Launceston and north-west to Rosevale (Figure 3.1.3).

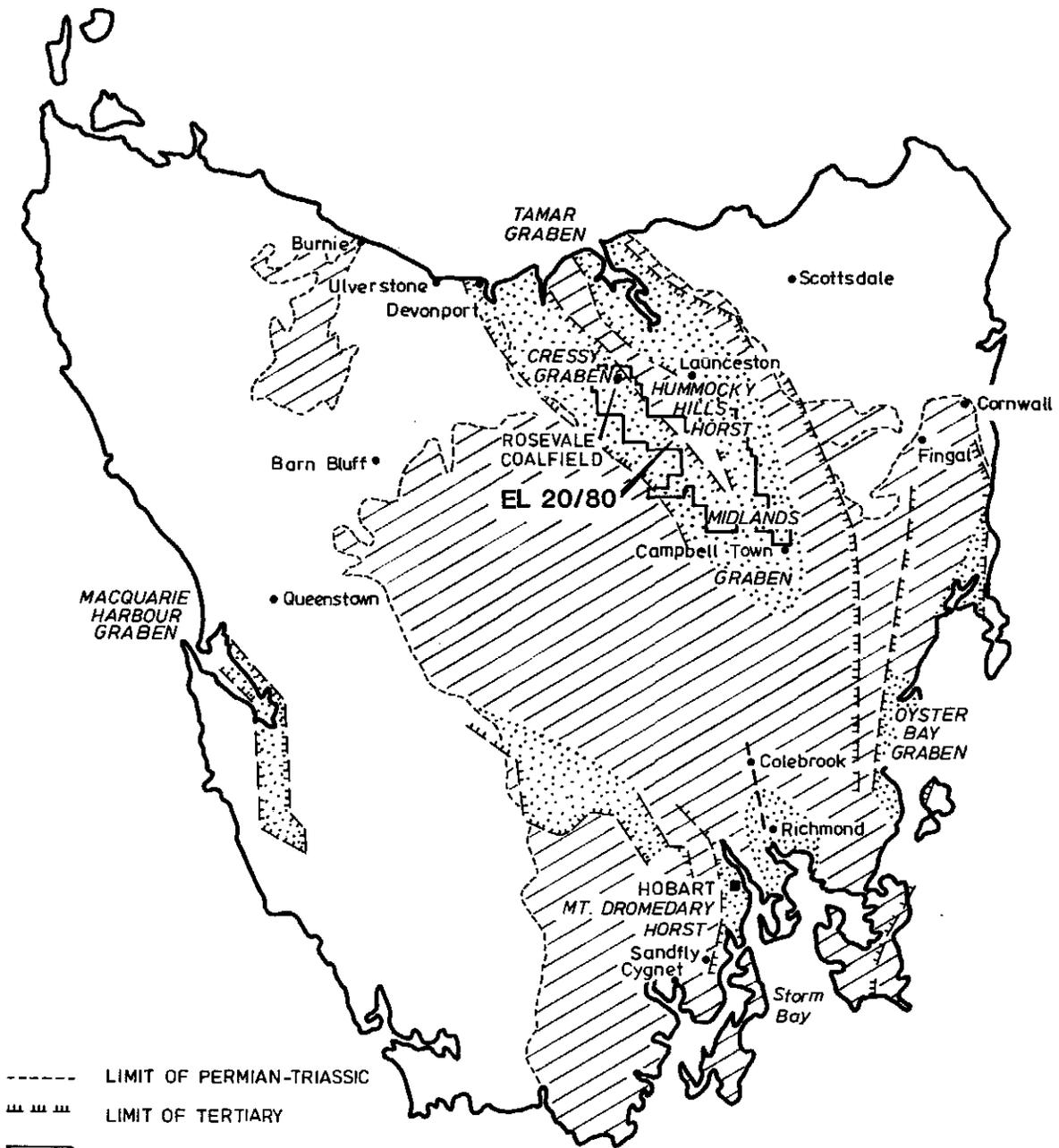


Note: Column 2 after Johnson 1873 only applies to Stratigraphy of Launceston Area

Compiled from information contained in Mathews (1974).

CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		CSIR	
DRAWING	DATE	STRATIGRAPHY OF THE PARMEENER SUPERGROUP AND LAUNCESTON BASIN IN EL 20/80		SCALE	
DRAWN	C. J.			Nov. '82	FIGURE 3-1-1
CHECKED					
REVISED				Oct. '83	
				DRAWING No 70020 - 90	

BASS STRAIT



- LIMIT OF PERMIAN-TRIASSIC
- ≡≡≡ LIMIT OF TERTIARY
- PRE-PERMIAN BASEMENT
- ▨ PERMIAN-TRIASSIC BASINS
- ▤ TERTIARY BASINS

SCALE  
0 20 40 60 80  
Kms.

5 cm

CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		CSR	
DRAWING / DATE		SEDIMENTARY BASINS AND TERTIARY STRUCTURAL ELEMENTS OF TASMANIA		SCALE	
DRAWN C.J. Dec. '82				AS SHOWN	
CHECKED				FIGURE 3-1-2	
REVISED Oct. '83				DRAWING No 70020 - 92	

012

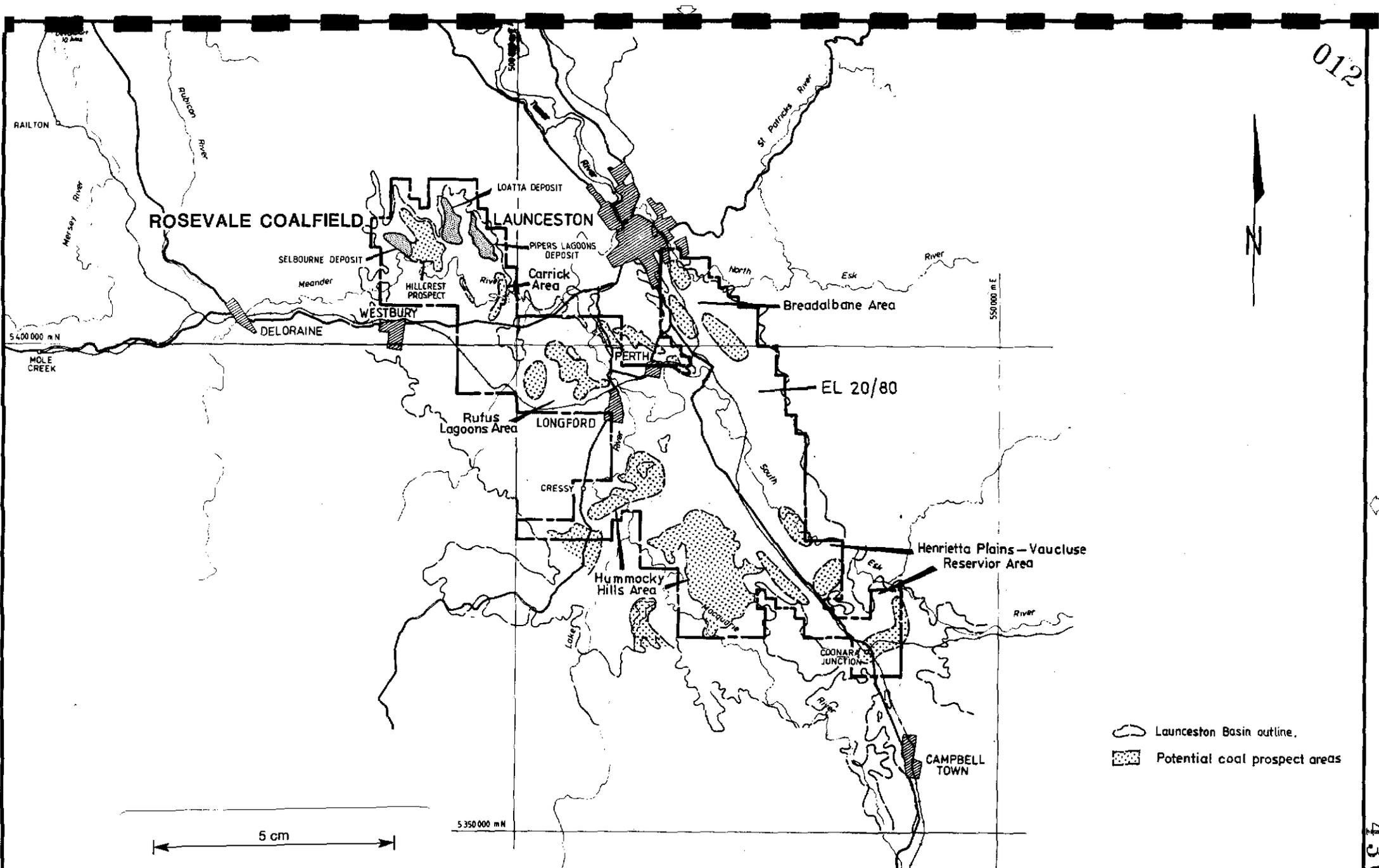


FIGURE 213

<b>CSR Limited Coal Division</b>		<b>EXPLORATION AND EVALUATION GROUP</b>			
DRAWING	DATE	<b>ROSEVALE COALFIELD AND LOCATION OF PROSPECTIVE AREAS IN EL 20/80</b>		SCALE 1 : 500 000	
DRAWN	MRN			Dec '82	FIGURE 3.1.3
CHECKED					DRAWING NO. 70020 - 94 'R'
REVISED	J.M.	Oct '89			

436013

013

The Launceston Basin is further subdivided by the Hummocky Hills Horst into a western (Cressy) graben and an eastern (Tamar) graben. The Rosevale Coalfield is located on the eastern edge of the Cressy Graben.

Deposition of sediments in the grabens commenced in the Paleocene to Lower Eocene and continued until the Upper Oligocene. The sequence is composed primarily of non-marine clays, silts, sands and gravel, with brown coal and carbonaceous facies, together with minor marine or brackish water sediments. Environments of deposition were in a state of constant flux during the Tertiary, alternating from fluvial to lacustrine to subaerial, and are reflected in the rapid lateral facies changes revealed from exploratory drilling. The primary source of the inorganic sediments which infilled the Tertiary grabens was the sandstone, siltstone and mudstone of the Parmeener Supergroup and the Jurassic dolerite.

Basin-wide correlation of Tertiary strata, and particularly brown coal horizons, has not been established in the Launceston Basin, nor has a formal intrabasinal stratigraphic sequence. Johnson (1888) proposed the term "Launceston Beds" for the Tertiary succession and arbitrarily divided it into three zones. The lower zone contains laminated strata, with brown coal seams and fossilised leaves, resting unconformably upon Parmeener Supergroup strata. It is presumed to have accumulated in a lacustrine flood-plain environment. The middle zone is represented by cross-bedded fluvial sands, as well as clay, silt, oil shale and brown coal. The upper zone comprises gravel and boulder beds on terraces flanking the present course of the Tamar River. The brown coal at Rosevale nominally lies within a dominantly fine clastics facies of Johnson's "middle zone".

014

Late Tertiary "Newer" volcanics (basalt flows) extensively overlie the Launceston Beds and because the Tertiaries occupy topographically low areas there is widespread veneering by uppermost Tertiary and Quaternary marsh and swamp deposits, alluvium and colluvium.

### 3.2 Local Geology of the Rosevale Coalfield

The Rosevale Coalfield comprises three discrete brown coal deposits, the Loatta, Pipers Lagoons and Selbourne deposits, together with a less well defined area having coal potential referred to as the Hillcrest prospect (Figure 3.2.1).

The coal deposits lie close to the eastern edge of the Cressy Graben, in a series of restricted "embayments" in the pre-Tertiary basement (locally Jurassic dolerite).

Individual coal basins are constrained by outcropping or sub-cropping dolerite and in certain cases the contact between Tertiary sediments and basement rocks is steep, suggestive of penecontemporaneous downwarping or fault displacement.

At Rosevale the Tertiary Launceston Beds comprise a monotonous sequence of interbedded clays, carbonaceous clays and brown coal, with minor sandy intercalations. They have yet to be subdivided stratigraphically. The strata pinch out towards the basin margins by onlap onto basement, and thicken rapidly towards the depositional centres. Total thickness represented locally is not known - one drillhole has penetrated 152m of Tertiary sediments without significant change in lithology.

015

Whilst clay is the dominant lithology, sandy beds constitute up to a few percent of the drilled section in a number of holes, and locally may comprise 25 - 100% of a known section. The sands are therefore considered to be lenticular in section, but insufficient is known of their areal distribution and spatial relationships to determine their environment of deposition, whether channel, fan plain, or deltaic. Individual sand bands range in thickness from 2m to about 12m, and almost always occur at a stratigraphic level below the brown coal bearing strata.

Exploration drilling by CSR has identified up to four principal brown coal intervals, named in descending stratigraphic order, A, B, D and F, each comprising up to 16 individual seams. Refer to section 4.2.2, Geological Evaluation, for a more detailed description of the coalfield geology. The three stratigraphically lowest intervals, B, D and F, occur at depths of 4m to 75m, and have been used for reserve calculation. All seams are lenticular, generally thinning towards basement highs.

The brown coal seams have been correlated using characteristic downhole geophysical log signatures and by examination of cross-sections. Correlations can be made with reasonable confidence in the central areas of the deposits where maximum coal development occurs, but become tentative towards the margins. Seam correlation between deposits has not been possible, although with additional drilling, the Hillcrest prospect may provide a link between Loatta and Selbourne.

Cumulative overburden ratios (expressed as bank cubic metres overburden per tonne of coal) calculated to the lowest workable horizon at Loatta, Pipers Lagoons and Selbourne are, respectively, 3:1, 5:1, and 8.3:1.

Remnants of late Tertiary basalt cap the Launceston Beds in a number of areas around the margins of the Rosevale coal deposits, forming prominent hills and ridges. Up to 17.7m of weathered volcanic material has been recorded in drilling to date. The maximum thickness likely to be present on the coalfield is estimated to be 20m. Recent cover, soil, clay and sand is volumetrically insignificant except in low-lying swampy areas.

#### 4. EXPLORATION AND GEOLOGICAL EVALUATION

##### 4.1 Previous Exploration and Geological Evaluation

CSR has undertaken three drilling programmes on EL 20/80 over the periods March-April, 1981, October-December 1981 and March-April, 1982. In all 106 holes were completed to a total metreage of 6,888.3m. The later programmes concentrated on the Rosevale area and of the 106 holes drilled 60 are located on the Rosevale Coalfield (refer to Figure 3.2.1 for borehole locations). Some 27 drillholes lie within the three main deposits, 11 in Loatta (8 non-core, 3 core), 12 in Pipers Lagoons (7 non-core, 5 core), and 4 at Selbourne (1 non-core, 3 core). Coring intervals were determined from adjacent logged open holes and KMLC (100mm diameter) cores were taken from about 1m above each seam to well into floor rock.

All but three of the Rosevale drillholes have been geophysically logged, the earlier ones with a portable S.I.E. unit, the later ones with truck-mounted digital equipment utilising a full suite of probes (gamma, dual-spaced density, caliper, neutron, resistivity, and S.P.). By establishing an empirical relationship between logged long-spaced density and measured ash content (from core analysis) it has been possible to utilise logged non-cored holes for estimation of seam ash content to a high degree of reliability.

018

Rotary chip cuttings and drillcore were logged in detail. Cored intervals were logged immediately after drilling to minimise bed moisture loss. They were then sealed in PVC tubing or plastic for despatch to CSR's NATA-registered testing laboratory. Analytical work on ply samples generally comprised determination of total moisture, specific energy and relative density, together with proximate analysis. Selected mining sections were then composited and a more comprehensive suite of tests undertaken.

All borehole data (geological and analytical) have been encoded for computer manipulation and drillhole profiles prepared. Subsequent geological evaluation has centred on plan and section generation and computation of coal reserves. Most recent work has been in the area of seam lithotype analysis and sedimentological modelling.

#### 4.2 Exploration During the Three Month Period Ended 22 February, 1984

##### 4.2.1 Exploration Drilling

CSR commenced its 1983 exploration drilling programme in EL 20/80 on October 17 and completed it on December 5. Site investigations were confined to the Rosevale Coalfield sector of the EL, and largely to the Loatta deposit.

A total of 3 partly cored holes and 28 open holes were drilled in the Loatta deposit, and 3 open holes were completed in the northern part of the Pipers Lagoons deposit for a total metreage of 76.54m of KMLC core and 2,643.76m of rotary drilling. For the location of drillholes, refer to Figure 4.2.1.1 and for a summary of drillhole statistics refer to Table 4.2.1.1.

TABLE 4.2.1.1  
Summary of Drillhole Statistics

Borehole	Co-ordinates (AMG)			Total Depth	Date Commenced	Date Completed	Metres Drilled	
	Easting	Northing	CRL				Rotary	KMLC Core
COO81	492,630	5,414,680	155.00	51.10	06.11.83	08.11.83	27.45	23.65
COO82	492,970	5,412,430	200.00	79.40	09.11.83	14.11.83	31.57	47.83
CO116	493,250	5,413,250	160.00	81.00	05.11.83	06.11.83	75.94	5.06
ROO96	492,320	5,414,715	168.00	60.00	17.10.83	17.10.83	60.0	-
ROO97	492,510	5,414,530	165.00	80.00	02.10.83	04.10.83	80.0	-
ROO98	492,730	5,414,550	158.00	80.60	17.10.83	18.10.83	80.6	-
ROO99	493,010	5,414,480	157.00	60.00	17.10.83	17.10.83	60.0	-
RO100	492,450	5,413,750	212.00	60.00	21.10.83	23.10.83	60.0	-
RO101	492,750	5,413,780	185.00	87.00	30.10.83	31.10.83	87.0	-
RO102	493,460	5,413,730	156.00	80.00	25.10.83	26.10.83	80.0	-
RO103	492,740	5,412,730	197.00	33.00	31.10.83	31.10.83	33.0	-
RO104	493,000	5,413,000	165.00	152.00	26.10.83	27.10.83	152.0	-
RO105	493,500	5,412,750	165.00	86.30	26.10.83	27.10.83	86.3	-
RO106	492,750	5,412,000	195.00	51.00	04.11.83	05.11.83	51.0	-
RO107	494,250	5,412,750	155.00	72.90	21.10.83	21.10.83	72.9	-
RO108	493,000	5,412,000	190.00	100.00	01.11.83	04.11.83	100.0	-
RO109	493,500	5,412,000	175.00	85.90	25.10.83	26.10.83	85.9	-
RO110	493,750	5,412,000	185.00	76.40	23.10.83	25.10.83	76.4	-
RO111	494,000	5,412,000	175.00	90.50	22.10.83	22.10.83	90.5	-
RO112	495,750	5,413,250	145.00	52.40	01.11.83	01.11.83	52.4	-
RO113	495,750	5,412,750	145.00	62.00	30.10.83	30.10.83	62.0	-
RO114	496,000	5,412,080	145.00	85.60	31.10.83	31.10.83	85.6	-
RO115	493,000	5,413,750	170.00	121.00	24.10.83	27.10.83	121.0	-
RO117	493,500	5,411,750	175.00	80.00	06.11.83	07.11.83	80.0	-
RO118	492,450	5,415,010	160.00	67.00	15.11.83	16.11.83	67.0	-
RO119	493,750	5,413,250	158.00	81.00	16.11.83	17.11.83	81.0	-
RO120	493,360	5,411,210	180.00	99.00	17.11.83	19.11.83	99.0	-
RO121	493,250	5,412,250	170.00	92.20	21.11.83	22.11.83	92.2	-
RO122	492,370	5,415,740	160.00	39.00	22.11.83	22.11.83	39.0	-
RO123	493,180	5,414,000	162.00	90.00	23.11.83	24.11.83	90.0	-
RO124	493,000	5,413,500	160.00	104.00	26.11.83	27.11.83	104.0	-
RO125	492,840	5,413,250	165.00	70.00	27.11.83	27.11.83	70.0	-
RO126	493,000	5,412,790	180.00	109.00	28.11.83	29.11.83	109.0	-
RO127	493,000	5,410,720	160.00	101.00	29.11.83	05.12.83	101.0	-
Total 34							2,643.76	76.54

020

All drillholes have been geophysically logged by BPB, using CCS (dual-spaced density natural gamma, and caliper), neutron, and focussed electric sondes, and in cored hole CO82 a sonic sonde was run for demonstration purpose.

In conjunction with the exploratory drilling, investigations in support of engineering and geotechnical studies have been undertaken. Special 100mm diameter core samples were obtained for stockpile testing by Rheinbraun in Germany, penetrometer tests undertaken on coal and overburden core samples, and piezometers were set in drillholes RO104 and RO125. The results of the engineering and geotechnical studies will be included in future progress reports as results come to hand.

#### 4.2.2 Geological Evaluation

Computer based modelling of the Loatta deposit is nearing completion.

Individual seams 41 to X (B - interval), H1 to T (D - interval) and A to D (F - interval) have been modelled. Structure contour plans, and interburden and overburden isopach plans have been created. Seam reserves, strip reserves, and mining strip ratios are still to be calculated.

The results of the computer based modelling will be included in future progress reports as results come to hand.

021

Drilling at Loatta indicates a simpler stratigraphic picture, the result of regrouping and recorrelation of seams. An uppermost banded coal interval, A, which ranges in thickness over 5 - 10m is restricted to the central portion of the deposit in a downthrown block, and occurring as it does very close to surface is limited by erosion. Approximately 10m of clay separates the A seam interval from a banded B seam interval, which ranges in thickness over 10 - 30m.

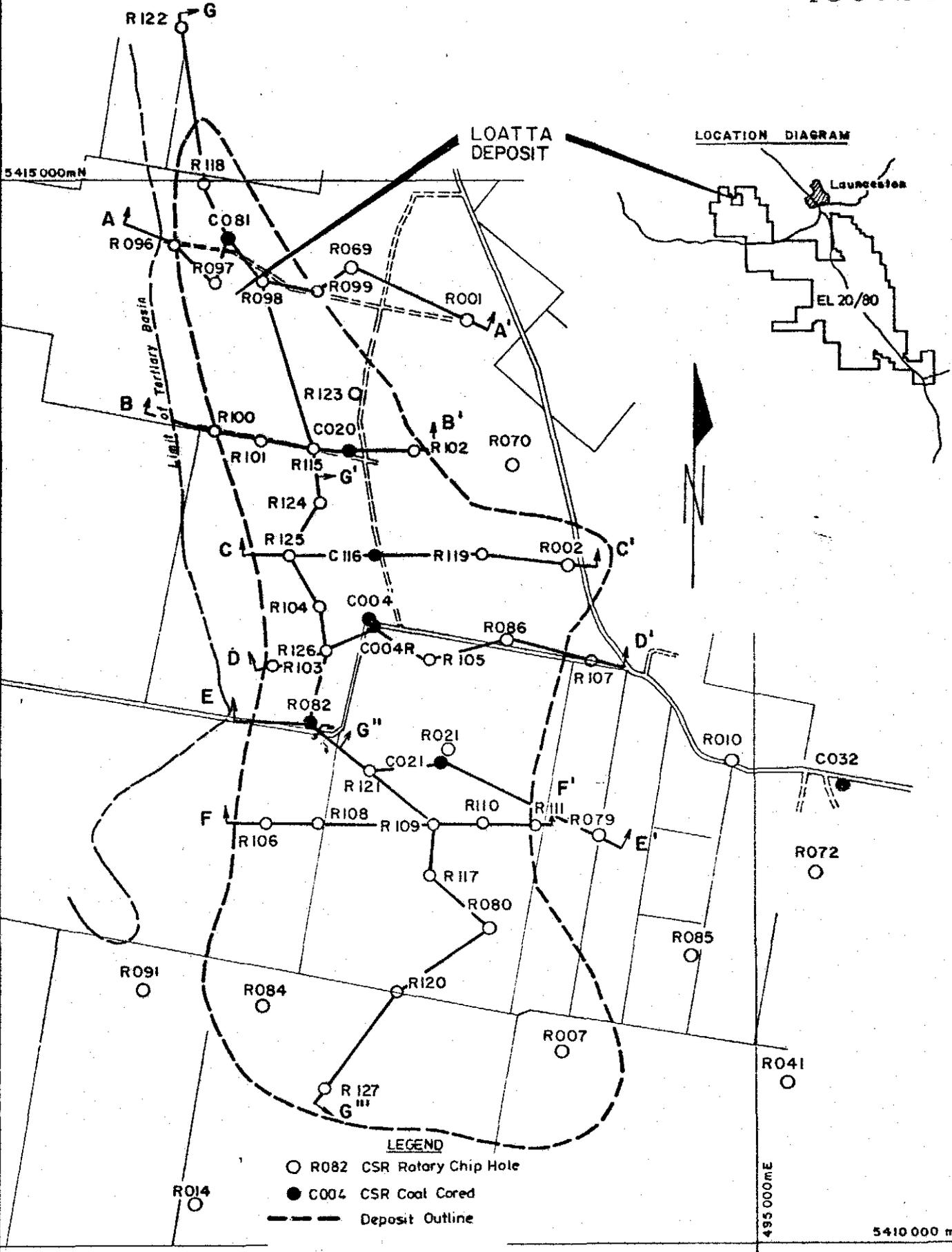
Approximately 20m of clay separates the B seam interval from a variably split D seam interval 6 - 50m thick and averaging about 30m. This D - zone persists areally over the greater part of the deposit, although it has been subject to erosion in certain areas. In the south of Loatta, a lower seam group, F, 7 - 25m thick, occurs 20 - 30m below the D seam interval.

Table 4.2.2.1 summarises the individual seams in each of the A, B, D and F seam intervals. Figures 4.2.2.2 to 4.2.2.10 inclusive show representative cross sections through the Loatta deposit whilst Figure 4.2.2.1 locates section lines.

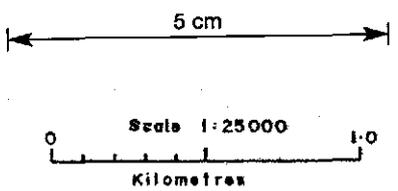
With the assistance of geophysical log information, coal horizons, and certain individual coal plies, can now be reasonably positively correlated between data points 250 - 500m apart. Correlations are less certain in the south-western sector of the deposit, where both stratigraphic and structural problems are apparent, and where borehole separation exceeds 500m. Considerable stratigraphic and lateral variation of working sections within the correlatable coal horizons is in evidence.

TABLE 4.2.2.1Summary of Correlatable Coal Seams - Loatta Deposit

Seam Interval	Individual Seam
A	No individual seams correlated
B	21, 22, 31, 32, 33, 41, 42, 43, 51, 52, 53, 6, 7, 8, 9, X.
D	H1, H2, I, JI, J2, K, L, M, N, O, P, Q, R, S, T.
F	A, B, C, D.



- LEGEND**
- R082 CSR Rotary Chip Hole
  - C004 CSR Coal Cored
  - - - Deposit Outline



CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP <b>CSR</b>	
DRAWING / DATE		SCALE	
DRAWN	Aug '82	1:25000	
CHECKED		FIGURE 4:2:1	
REVISED		DRAWING No 70020 - 201	
EL 20/80 LAUNCESTON LOATTA DEPOSIT LOCATION OF CROSS SECTIONS			

024

Structure contouring of the persistent D coal horizon suggests greater structural complexity than originally envisaged. A narrow south-south-east plunging syncline, with limb dips of  $6^{\circ}$  -  $8^{\circ}$ , in the north of the deposit, gives way to generally flatter structures in the south.

North-north-west and north-east trending faulting is indicated by seam RL differences in the northern central section of Loatta.

Indicated in situ geological reserves at Loatta will probably exceed the original estimate of 56 Mt. However, because of the structural setting total extraction may not be possible, in which case recoverable reserves could be somewhat reduced.

The 1983 exploration programme has demonstrated that drilling on 250m centres (with more closely-spaced drilling in structurally disturbed zones) will be required for elevation of reserve status to measured status.

Overburden to coal ratios have yet to be calculated. First impression is that mean O.R. will probably be higher than indicated in the original mining study, especially in early mine years.

#### 4.3 Future Exploration and Geological Evaluation

Further to assimilation and compilation of results from the current programme, future geological investigations must centre on:

- evaluating brown coal prospects previously identified within EL 20/80 yet outside the immediate Rosevale Coalfield area;

- . at Rosevale, increasing confidence in less positive seam correlations, and demonstrating seam continuity within deposit bounds;
- . resolving apparent structural difficulties;
- . improving definition of deposit limits;
- . upgrading reserve status to a "measured" category and increasing total reserves;
- . assessing consistency of coal quality by obtaining a wider distribution of sample points (cored boreholes);
- . determining the impact of variation in key geotechnical and hydrogeological parameters.

5. COAL RESOURCES OF EL 20/80

5.1 Brown Coal Reserves

Pending completion of the computer based modelling of the Loatta deposit, indicated geological ("in situ") brown coal reserves of the Rosevale Coalfield, and EL 20/80, remain unchanged at 118 Mt, as detailed in Table 5.1.1. Inferred resources are very small.

Reserve figures are reported according to the Geological Survey of Queensland guidelines (as quoted in Australian Standard 2519-1982) in the absence of a more suitable scheme. It is acknowledged that for brown coal deposits in general, and especially those as variable as Rosevale, reserve measurement criteria designed for black coals are not wholly applicable. Specifically, indicated reserves at Rosevale were calculated from cored and geophysically logged non-cored drillholes according to the following criteria:

- . cored and non-cored holes are spaced not more than 2km apart, and generally less than 1km, such that coal seams can be correlated with a reasonable degree of confidence;
- . limits of coal deposits are projected, on available geological data, for a limited distance from points of observation (drillholes), always less than 750m and usually under 300m;
- . coal seams must have a minimum thickness of 1.5m and a weighted mean dry basis ash content of less than 50% (or approximately 27.5% ash at a nominal 45% total moisture coal);

TABLE 5.1.1

Brown Coal Reserves, EL 20/80

Area	Indicated	Indicated	Total	Inferred *
	Class 1	Class 2		
	Mt	Mt	Mt	Resources
Loatta	33	23	56	V. Small
Pipers Lagoons	23	20	43	-
Selbourne	14	5	19	V. Small
Hillcrest	-	-	-	V. Small
Total	70	48	118	

\* "V. Small" inferred resources means less than 20 Mt

- . partings greater than 0.5m thick and containing over 50% (dry basis) ash are excluded from reserve calculation;
- . ash values from non-cored holes are derived from geophysical logs using an empirical linear density versus ash relationship established by calibrating geophysical logs against analysed core sections.

Class 1 indicated reserves for the Rosevale Coalfield were calculated for specific seams provided each seam was cored at three or more sites, situated less than 2km apart, and provided seam correlation could reasonably be demonstrated. Indicated Class 2 status applies where these criteria (except drillhole spacing) cannot be met, as is the case towards the margins of the coal deposits where correlations are at present tentative.

## 5.2 Coal Quality

Quoted coal quality data are based on core samples from 11 partially cored holes in the Loatta, Pipers Lagoons and Selbourne deposits. Table 5.2.1 shows the weighted average coal quality for the 118 Mt of indicated reserves outlined to date. Analytical results for core obtained during the 1983 drilling programme have not yet been processed. Coal quality by seam has not been recalculated since the recorrelation of coal seams. Amended coal quality by seam will be reported when results come to hand.

029

TABLE 5.2.1

Weighted Average Coal Quality, Rosevale Coalfield

## Total Moisture Basis

Deposit	R.D.	Total Moisture %	V.M. %	F.C. %	Ash %	Total Sulphur %	Specific Energy MJ/kg
Loatta	1.32	48.1	18.0	12.1	21.8	0.17	7.6
Pipers Lagoons	1.33	46.3	18.0	13.8	21.9	0.11	7.6
Selbourne	1.33	46.4	18.0	11.9	23.7	0.18	7.2
Weighted Mean	1.33	47.2	18.0	12.7	22.1	0.13	7.5

030

Rosevale coal can be described as a typical low sulphur, low specific energy, high ash, and comparatively low moisture, lignite with no known detrimental properties. It is suitable for combustion in existing commercially available boilers designed for coal of this type.

6. REFERENCES

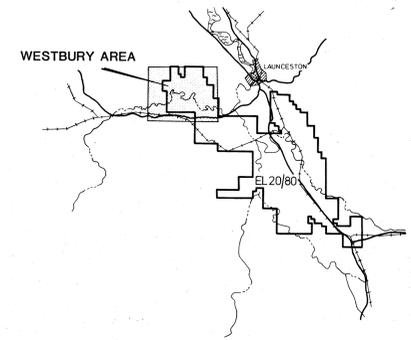
- Banks, M.R.,  
Maxwell, R.A.,  
Spry, A. 1962 The Geology of Tasmania.  
Jour. Geol. Soc. Aust. V9,  
Part 2.
- Australian  
Standard 2519-82 1982 Guide to the Evaluation of  
Hard Coal Deposits Using  
Borehole Techniques.
- Burns, S.D. 1981 A Review of the Longford  
Basin, Tasmania, Australia.  
Mines Administration Pty.  
Limited. (Unpublished Company  
Report).
- Carr, M.J. 1983 Exploration Licence 20/80  
Launceston, Exploration  
Progress Report for Quarter  
Ended 22 November, 1983. CSR  
Limited. (Unpublished  
Company Report).
- Ellis, P. 1982a Six Monthly Report for the  
Period Ending 19th January,  
1982. Exploration Licence  
20/80 Launceston, Tasmania.  
AAR Limited. (Unpublished  
Company Report).
- Ellis, P. 1982b Three Monthly Report for the  
Period Ending 22nd May, 1982.  
Exploration Licence 20/80  
Launceston, Tasmania. AAR  
Limited. (Unpublished  
Company Report).
- Ellis, P. 1982c Six Monthly Report for the  
Period Ending 22nd August,  
1982. Exploration Licence  
20/80. Launceston, Tasmania,  
AAR Limited. (Unpublished  
Company Report).
- Ellis, P. 1982d Exploration Licence 20/80  
Launceston, Tasmania. A  
Review of the Coal Resources  
and Prospectivity. CSR  
Limited. (Unpublished  
Company Report).

- Ellis, P. 1982e Exploration Licence 20/80  
Launceston, Tasmania. A  
Review of the Non-Coal  
Resources and Prospectivity.  
CSR Limited. (Unpublished  
Company Report).
- Ellis, P. 1982f Three Monthly Report for the  
Period Ending 22nd November  
1982. Exploration Licence  
20/80 Launceston. AAR  
Limited. (Unpublished  
Company Report).
- Ellis, P. 1983a Report on Area Relinquished.  
22nd February 1983.  
Exploration Licence 20/80  
Launceston, Tasmania. AAR  
Limited. (Unpublished  
Company Report).
- Ellis, P. 1983b Exploration Licence 20/80  
Launceston, Annual  
Exploration Progress Report  
and Exploration Progress  
Report for Three Month Period  
Ended 22nd February 1983.  
CSR Limited. (Unpublished  
Company Report).
- Ellis, P. 1983c Exploration Licence 20/80  
Launceston, Exploration  
Progress Report for Three  
Month Period Ended 22nd May  
1983. CSR Limited.  
(Unpublished Company Report).
- Ellis, P. 1983d Exploration Licence 20/80  
Launceston, Exploration  
Progress Report for Three  
Month Period Ended 22nd  
August 1983. CSR Limited.  
(Unpublished Company Report).
- Johnston, R.M. 1873 Regarding the Composition and  
Extent of Certain Tertiary  
Beds In and Around  
launceston. Proc. Roy. Soc.  
Tas. 1873, pp 39-47.
- Johnston, R.M. 1888 Systematic Account of the  
Geology of Tasmania.  
Government Printer, Hobart.

- 033
- Matthews, W.L.      1974      The Geology and Groundwater Resources of the Longford Tertiary Basin. Bull. Geol. Surv. Tasm. 59.
- Mengel, D.C.      1977      The Roles of the Geological Survey of Queensland in Exploratory Coal Drilling, in the Aus. I.M.M. Southern Queensland Branch Symposium on Coal Borehole Evaluation, October 1977.
- Middleton, T.W.      1973      Launceston Basin Project, Report on Phase I Exploration Drilling in the Launceston Basin Area, Tasmania. Getty Oil Development Co. Limited. Open File, Mines Department, Tasmania.
- Osborne, R.      1981      Six Monthly Report for the Period Ending 23rd August, 1981. Exploration Licence 20/80 Launceston, Tasmania. AAR Limited. (Unpublished Company Report).



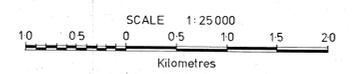
- LEGEND**
- Highway, sealed road
  - Unsealed road, vehicular track, lane
  - Railway
  - Homestead
  - Drain
  - C033 CSR drillhole coal cored
  - R009 CSR drillhole chip sampled
  - Deposit Outline
  - Prospect Outline
  - Outline of Potential Reserves
  - Outline of Basement Rock



KEY SHEET DIAGRAM  
(TASMANIAN 1:25000 TOPO. SERIES)

PARKHAM	BRIDGENORTH	LAUNCESTON
DELORANE	WESTBURY	PROSPECT

TRUE NORTH GRID NORTH AND MAGNETIC NORTH ARE SHOWN DIAGRAMMATICALLY FOR THE CENTRE OF THE MAP. MAGNETIC NORTH IS CORRECT FOR 1980 AND ABOUT EVERY THREE YEARS.

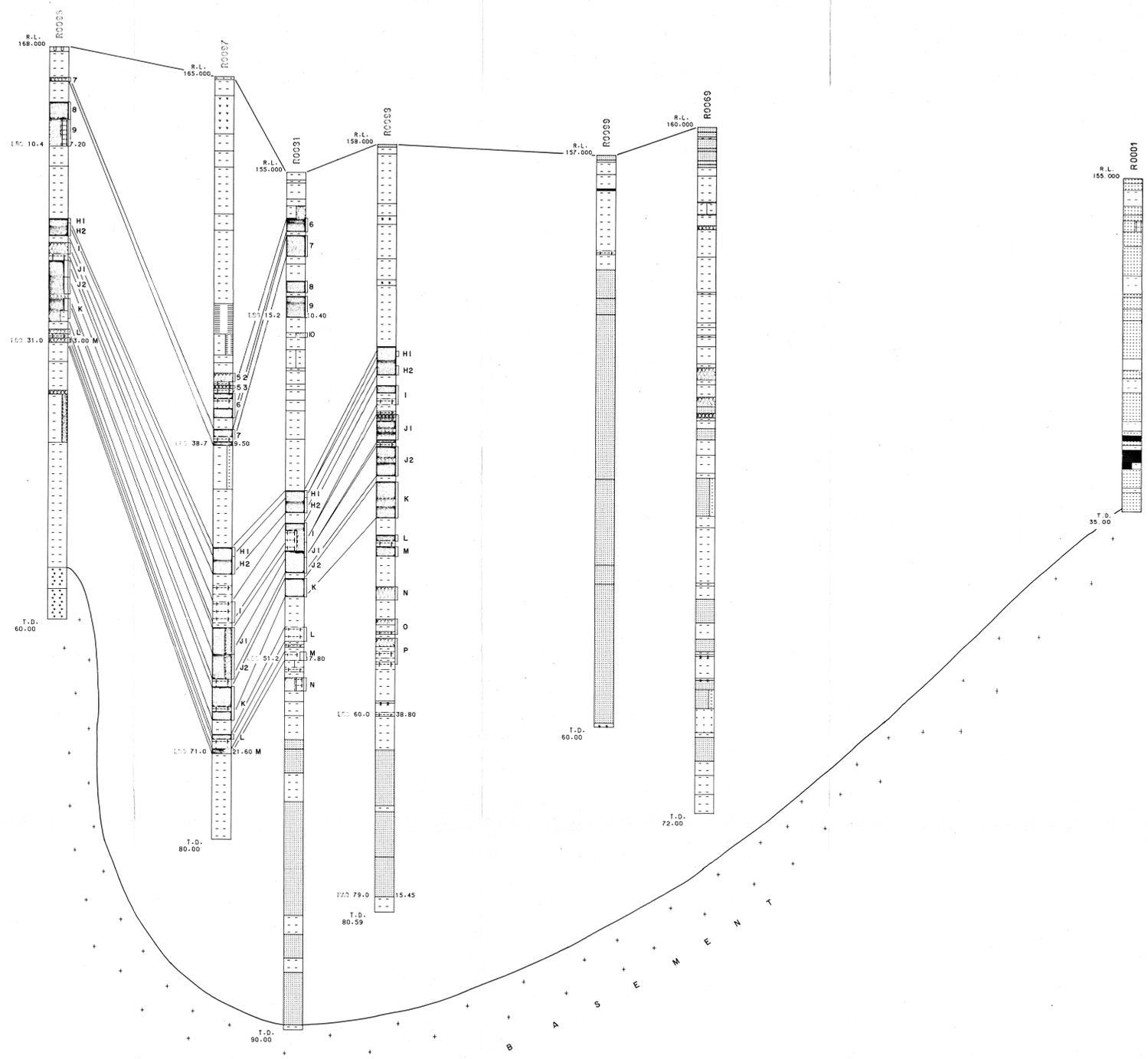


<b>CSR Limited</b>		<b>EXPLORATION AND EVALUATION GROUP</b>		<b>CSR</b>
DRAWN	DATE	EL 20/80 LAUNCESTON WESTBURY AREA BROWN COAL DEPOSITS & PROSPECTS		SCALE 1:25000
A. Y.	Sept '82			FIGURE 3-21
CHECKED				DRAWING No. 70020 - 72
REVISION	DATE			
B. A. W.	April '84			



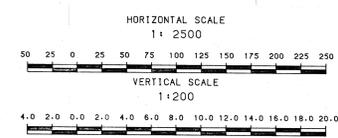
W

E



**LEGEND**  
LITHOLOGY REFERENCE

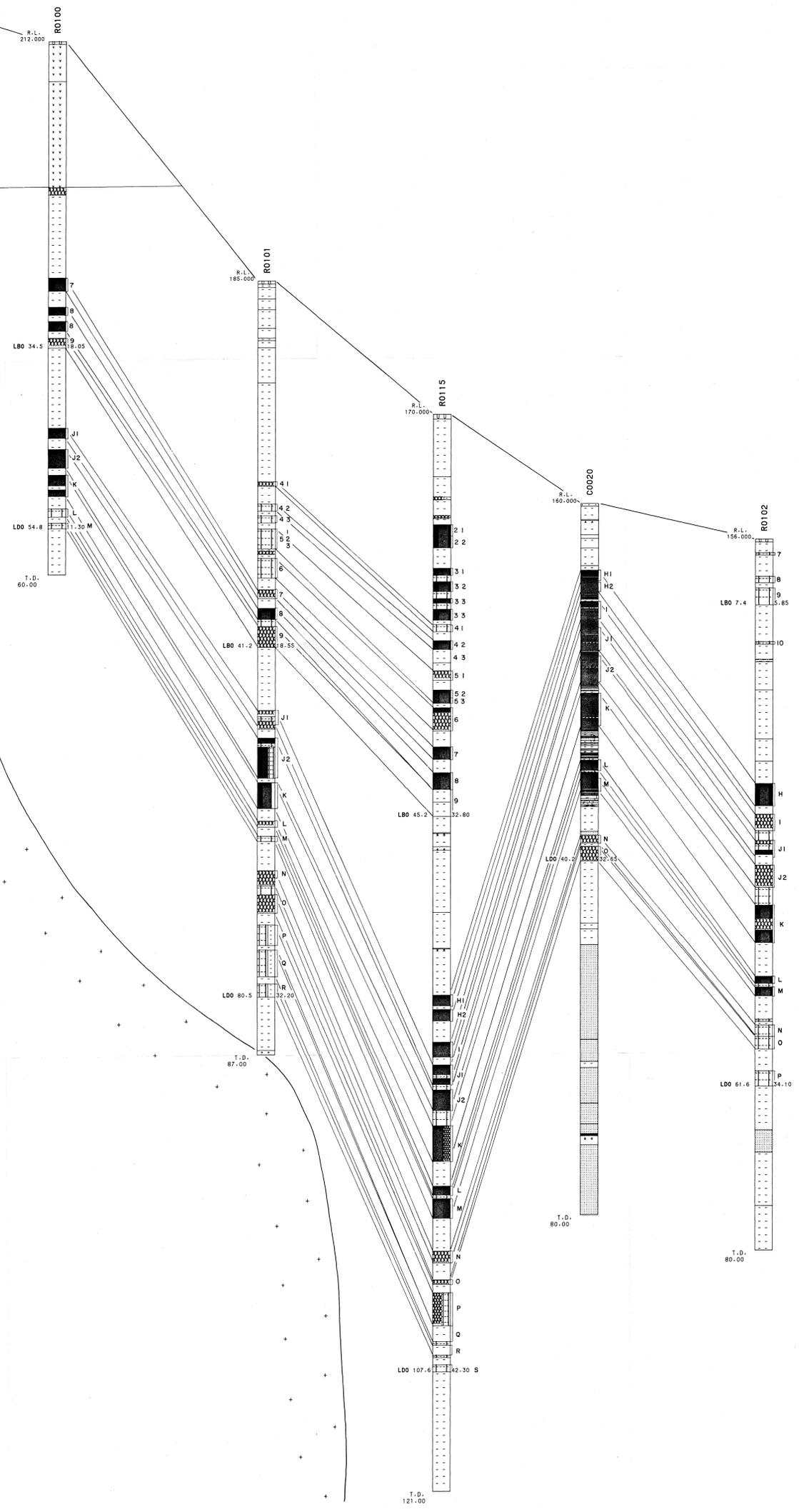
- |  |              |  |   |
|--|--------------|--|---|
|  | SOIL         |  | INTERBEDDED SEDIMENTS (SAND/CLAY 50:50) |
|  | CLAY         |  | LIMESTONE                               |
|  | SILT         |  | SIDERITE                                |
|  | SAND         |  | LIGNITE                                 |
|  | GRAVEL       |  | LIGNITE CUNDIFF. J                      |
|  | ALLUVIUM     |  | LIGNITE WEATHERED                       |
|  | CLAYSTONE    |  | LIGNITE INFERIOR                        |
|  | MUDSTONE     |  | LIGNOUS CLAY                            |
|  | SHALE        |  | DOLERITE                                |
|  | SILTSTONE    |  | BASALT                                  |
|  | SANDSTONE    |  | BASEMENT (CUNDIFF. J)                   |
|  | CONGLOMERATE |  | CORE LOSS                               |



CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	EL20/80 LAUNCESTON LOATTA DEPOSIT		SCALE V 1:200 H 1: 2500
ELLIS	6-APR-84	E-W CROSS SECTION A-A'		FIGURE 4-2-2
CHECKED				DRAWING NO. 70020 - 192
REVISED				

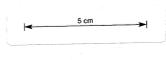
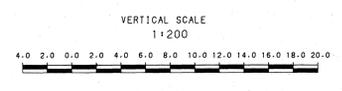
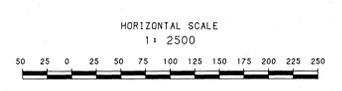
W

E

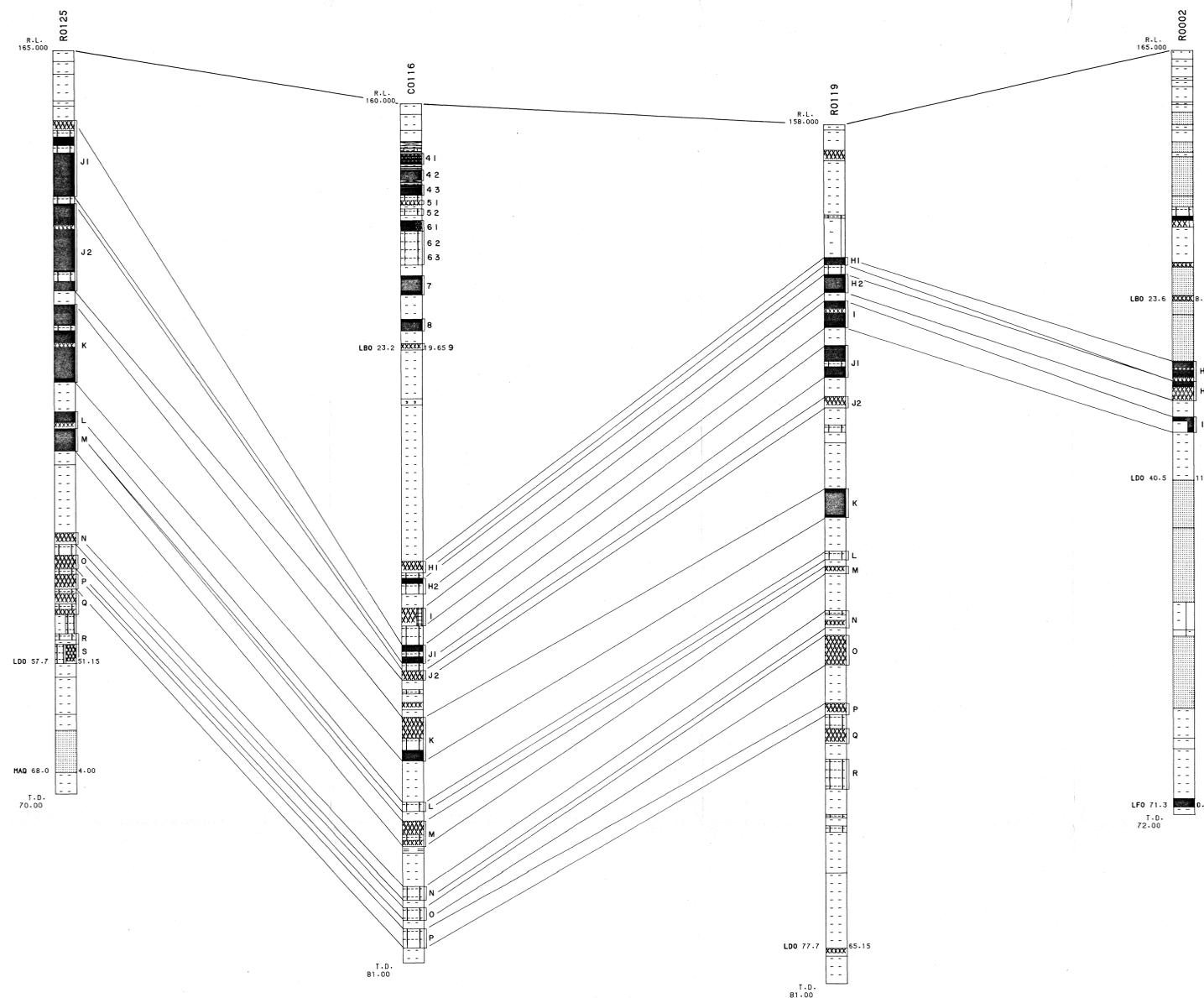


**LEGEND**  
LITHOLOGY REFERENCE

- |  |              |  |  |
|--|--------------|--|--|
|  | SOIL         |  | INTERBEDDED SEDIMENTS (SANDST./MUDST. 50:50) |
|  | CLAY         |  | LIMESTONE                                    |
|  | SILT         |  | SIDERITE                                     |
|  | SAND         |  | LIGNITE                                      |
|  | GRAVEL       |  | LIGNITE CUNDIFF. J                           |
|  | ALLUVIUM     |  | LIGNITE WEATHERED                            |
|  | CLAYSTONE    |  | LIGNITE INFERIOR                             |
|  | MUDSTONE     |  | LIGNEOUS CLAY                                |
|  | SHALE        |  | ODLERITE                                     |
|  | SILTSTONE    |  | BASALT                                       |
|  | SANDSTONE    |  | BASEMENT CUNDIFF. J                          |
|  | CONGLOMERATE |  | CORE LOSS                                    |

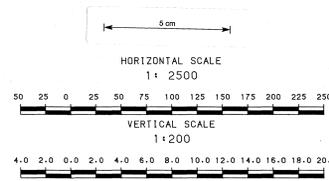


CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	EL20/80 LAUNCESTON LOATTA DEPOSIT E-W CROSS SECTION B-B'		
DRAWN	ELLIS	6-APR-84		SCALE V 1:200 H 1: 2500
CHECKED				FIGURE 4-2-23
REVISED				DRAWING NO. 70020 - 193



LEGEND  
LITHOLOGY REFERENCE

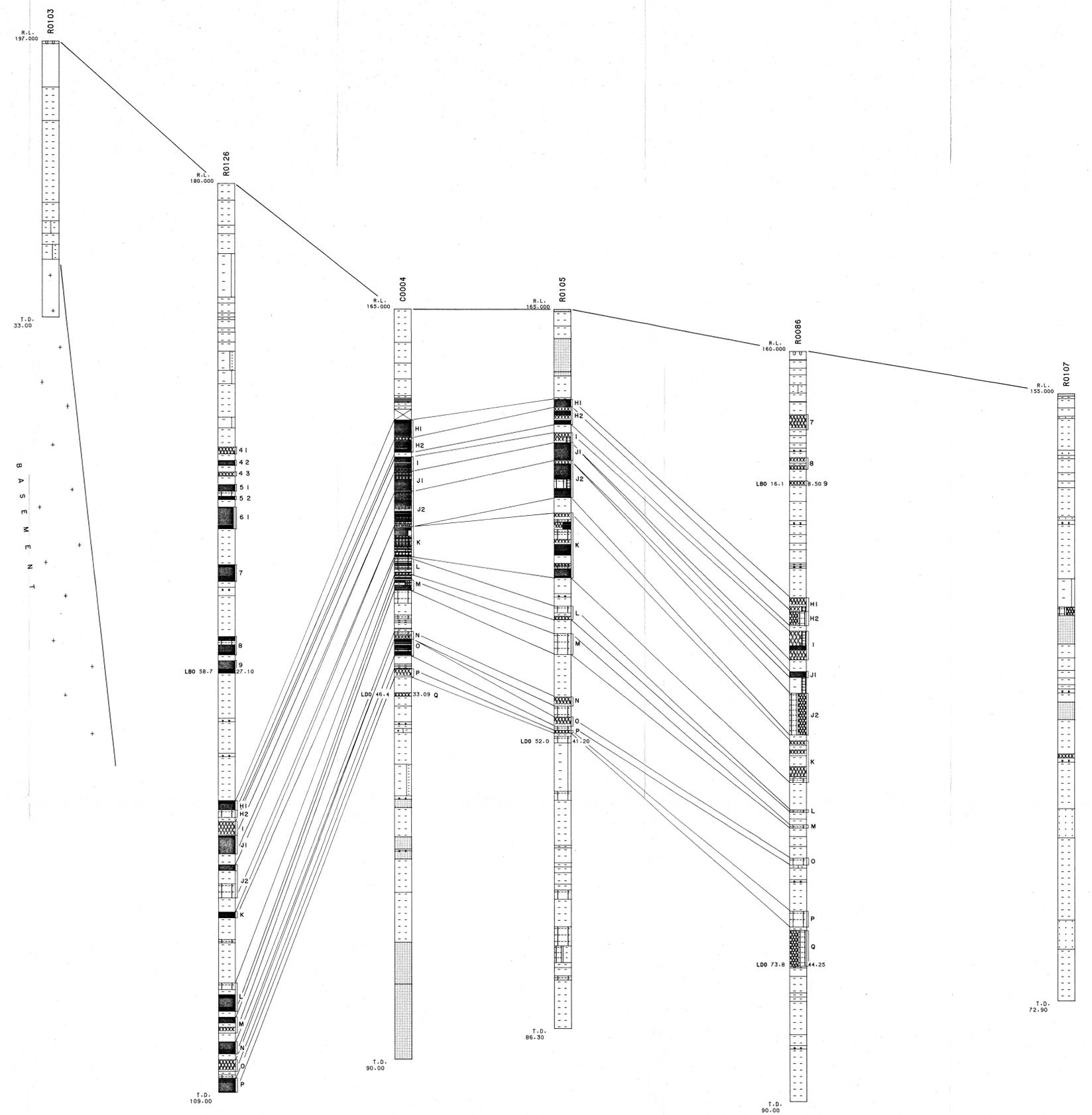
- SOIL
- CLAY
- SILT
- SAND
- GRAVEL
- ALLUVIUM
- CLAYSTONE
- MUDSTONE
- SHALE
- SILTSTONE
- SANDSTONE
- CONGLOMERATE
- INTERBEDDED SEDIMENTS (SANDST/MUDST 50:50)
- LIMESTONE
- SIDERITE
- LIGNITE
- LIGNITE (UNDIFF.)
- LIGNITE (WEATHERED)
- LIGNITE (INFERIOR)
- LIGNEOUS CLAY
- DOLERITE
- BASALT
- BASEMENT (UNDIFF.)
- CORE LOSS



CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	EL20/80 LAUNCESTON		SCALE V 1:200 H 1:2500
ELLIS	6-APR-84	LOATTA DEPOSIT		FIGURE 4-2-4
CHECKED		E-W CROSS SECTION C-C'		DRAWING NO. 70020 - 194
REVISED				

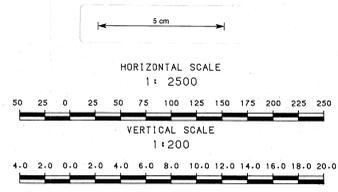
W

E



**LEGEND**  
LITHOLOGY REFERENCE

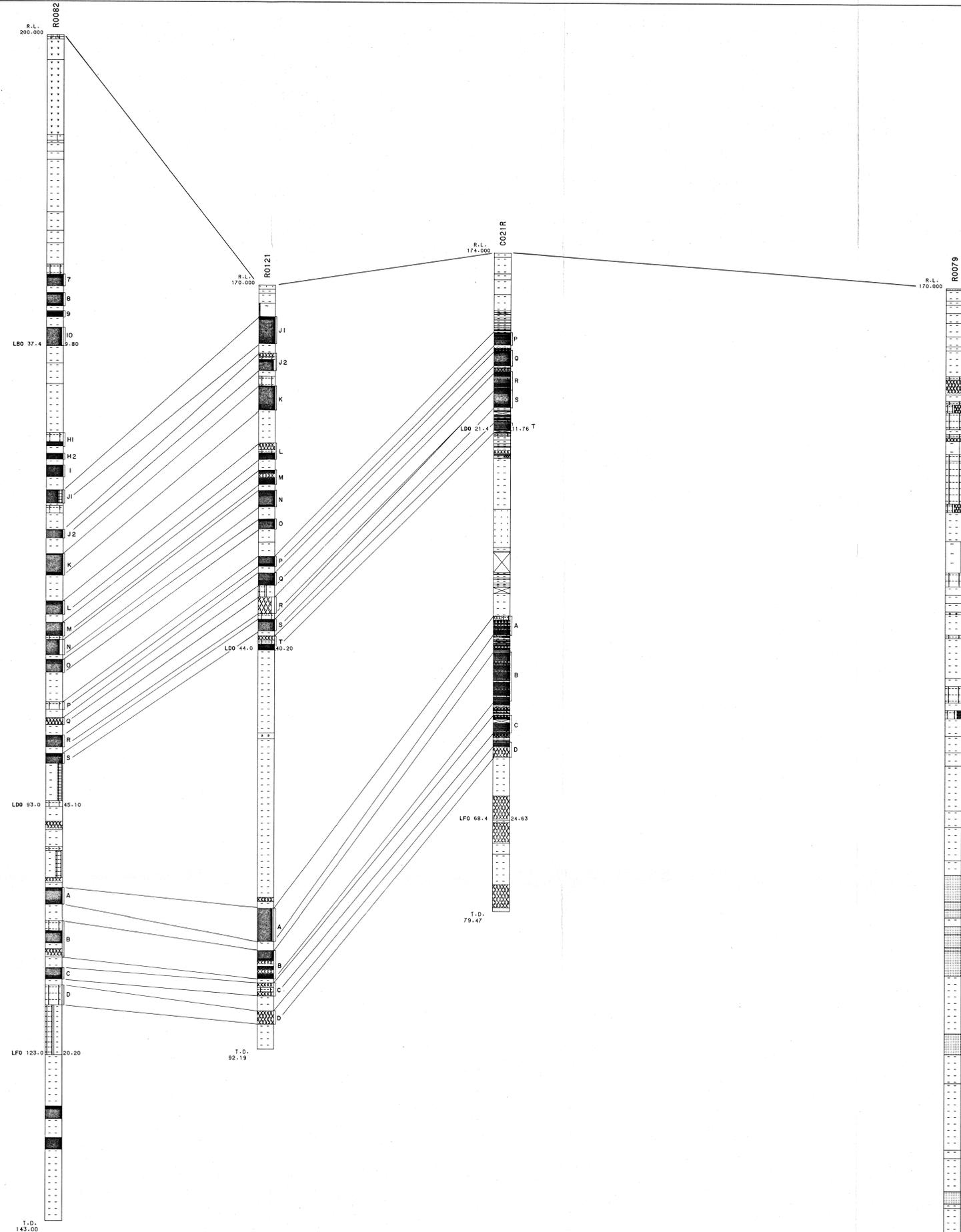
- SOIL
- CLAY
- SILT
- SAND
- GRAVEL
- ALLUVIUM
- CLAYSTONE
- MUDSTONE
- SHALE
- SILTSTONE
- SANDSTONE
- CONGLOMERATE
- INTERBEDDED SEDIMENTS (SAND/CLAY 50:50)
- LIMESTONE
- SIDERITE
- LIGNITE
- LIGNITE CUNDIFF. J
- LIGNITE WEATHERED
- LIGNITE INFERIOR
- LIGNEOUS CLAY
- OOLITE
- BASALT
- BASEMENT CUNDIFF. J
- CORE LOSS



CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP	
DRAWING	DATE	SCALE V 1:200 H 1:2500	
ELLIS	6-APR-84	EL20/80 LAUNCESTON LOATTA D.I. SIT	
CHECKED		FIGURE 4-2-2-5	
REVISED		DRAWING NO. 70020 - 195	
			436040 039

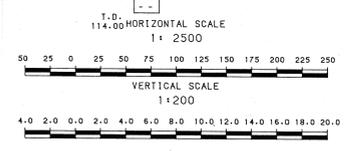
WNW

ESE



LEGEND  
LITHOLOGY REFERENCE

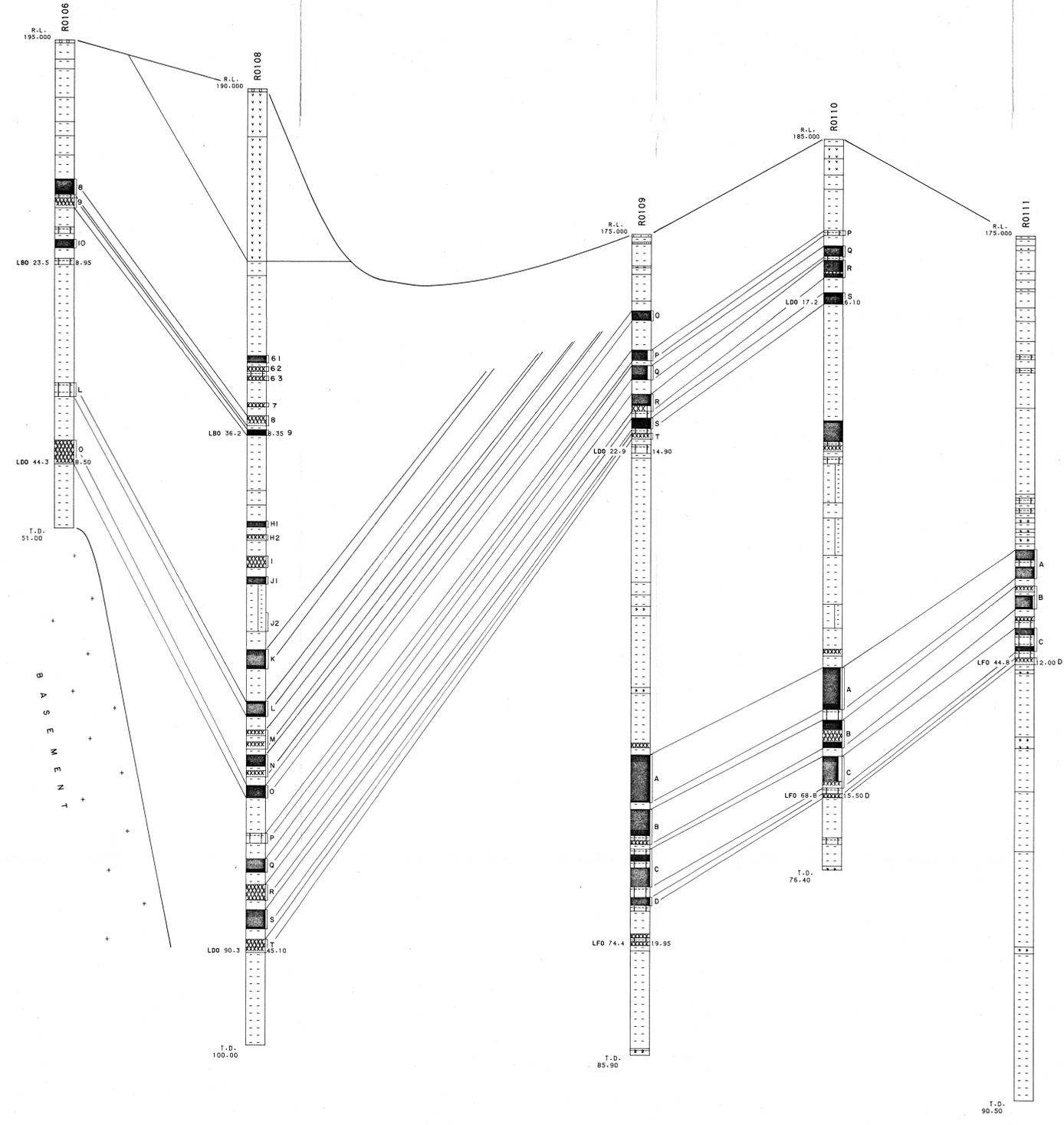
- |                       |  |
|-----------------------|--|
| [Symbol] SOIL         | [Symbol] INTERBEDDED SEDIMENTS (SAND/CLAY 50:50) |
| [Symbol] CLAY         | [Symbol] LIMESTONE                               |
| [Symbol] SILT         | [Symbol] SIDERITE                                |
| [Symbol] SAND         | [Symbol] LIGNITE                                 |
| [Symbol] GRAVEL       | [Symbol] LIGNITE CUNDIFF. J                      |
| [Symbol] ALLUVIUM     | [Symbol] LIGNITE WEATHERED                       |
| [Symbol] CLAYSTONE    | [Symbol] LIGNITE INFERTOR                        |
| [Symbol] MUDSTONE     | [Symbol] LIGNEOUS CLAY                           |
| [Symbol] SHALE        | [Symbol] DOLERITE                                |
| [Symbol] SILTSTONE    | [Symbol] BASALT                                  |
| [Symbol] SANDSTONE    | [Symbol] BASEMENT CUNDIFF. J                     |
| [Symbol] CONGLOMERATE | [Symbol] CORE LOSS                               |



CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	EL20/80 LAUNCESTON LOATTA DEPOSIT E-W CROSS SECTION E-E'		
DRAWN	ELLIS	6-APR-84		SCALE V 1:200 H 1:2500
CHECKED				FIGURE 4-2-26
REVISED				DRAWING NO. 70020 - 196

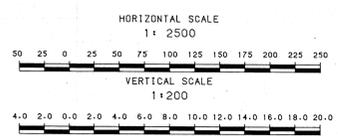
W

E



**LEGEND**  
LITHOLOGY REFERENCE

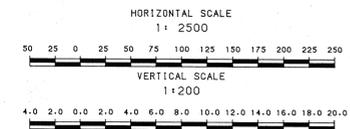
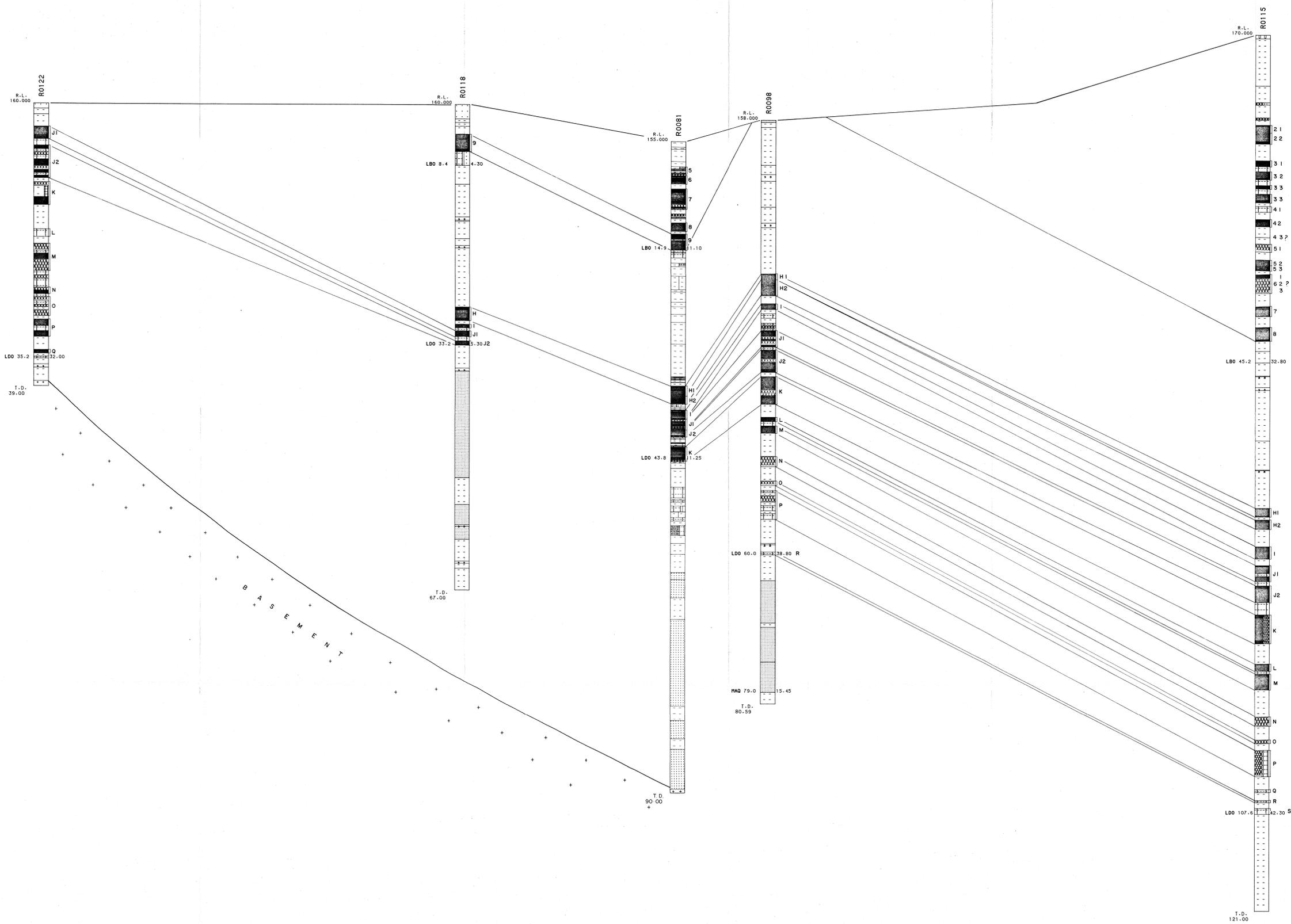
- |          |              |          |  |
|----------|--------------|----------|--|
| [Symbol] | SOIL         | [Symbol] | INTERBEDDED SEDIMENTS (SANDST/MUDST 50:50) |
| [Symbol] | CLAY         | [Symbol] | LIMESTONE                                  |
| [Symbol] | SILT         | [Symbol] | SIDERITE                                   |
| [Symbol] | SAND         | [Symbol] | LIGNITE                                    |
| [Symbol] | GRAVEL       | [Symbol] | LIGNITE CUNDIFF. J                         |
| [Symbol] | ALLUVIUM     | [Symbol] | LIGNITE WEATHERED                          |
| [Symbol] | CLAYSTONE    | [Symbol] | LIGNITE INFERIOR                           |
| [Symbol] | MUDSTONE     | [Symbol] | LIGNEOUS CLAY                              |
| [Symbol] | SHALE        | [Symbol] | DOLERITE                                   |
| [Symbol] | SILTSTONE    | [Symbol] | BASALT                                     |
| [Symbol] | SANDSTONE    | [Symbol] | BASEMENT CUNDIFF. J                        |
| [Symbol] | CONGLOMERATE | [Symbol] | CORE LOSS                                  |



CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWN	DATE	EL20/80 LAUNCESTON LOATTA DEPOSIT E-W CROSS SECTION F-F'		
CHECKED				FIGURE 4-2-2-7
REVISED				DRAWING NO. 70020 - 197

NNW

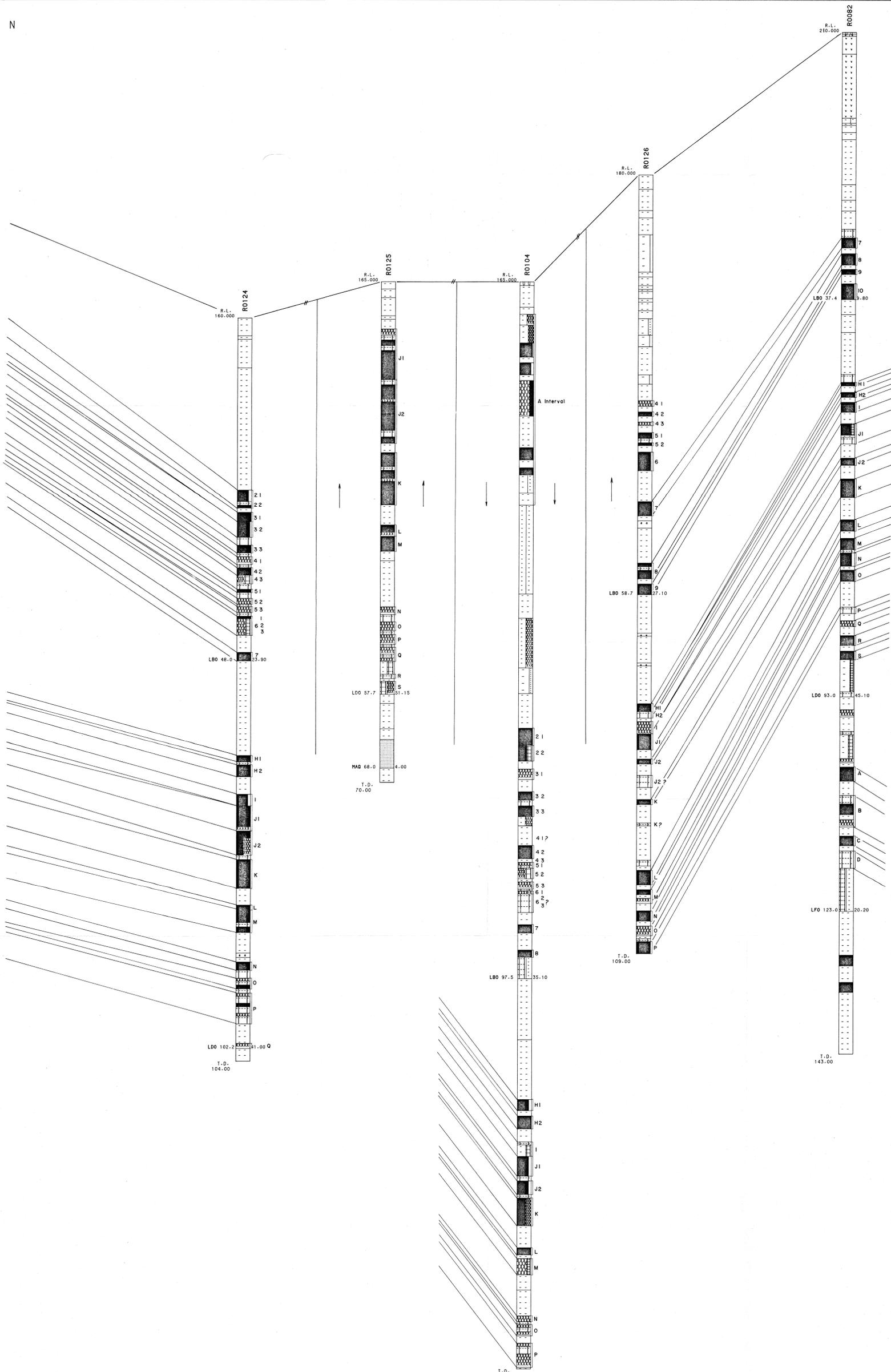
SSE



CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	EL20/80 LAUNCESTON LOATTA DEPOSIT		
DRAWN	ELLIS	6-APR-84	NORTH-SOUTH CROSS SECTION G-G'	
CHECKED			SCALE V 1:200 H 1:2500	
REVISED			FIGURE 4-2-2-8	
			DRAWING NO. 70020 - 198	

N

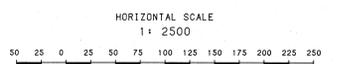
S



LEGEND

LITHOLOGY REFERENCE

- |              |  |
|--------------|--|
| SOIL         | INTERBEDDED SEDIMENTS (SANDST/MUDST 50:50) |
| CLAY         | LIMESTONE                                  |
| SILT         | SIDERITE                                   |
| SAND         | LIGNITE                                    |
| GRAVEL       | LIGNITE (UNDIFF.)                          |
| ALLUVIUM     | LIGNITE WEATHERED                          |
| CLAYSTONE    | LIGNITE INFERIOR                           |
| MUDSTONE     | LIGNEOUS CLAY                              |
| SHALE        | DOLERITE                                   |
| SILTSTONE    | BASALT                                     |
| SANDSTONE    | BASEMENT (UNDIFF.)                         |
| CONGLOMERATE | CORE LOSS                                  |

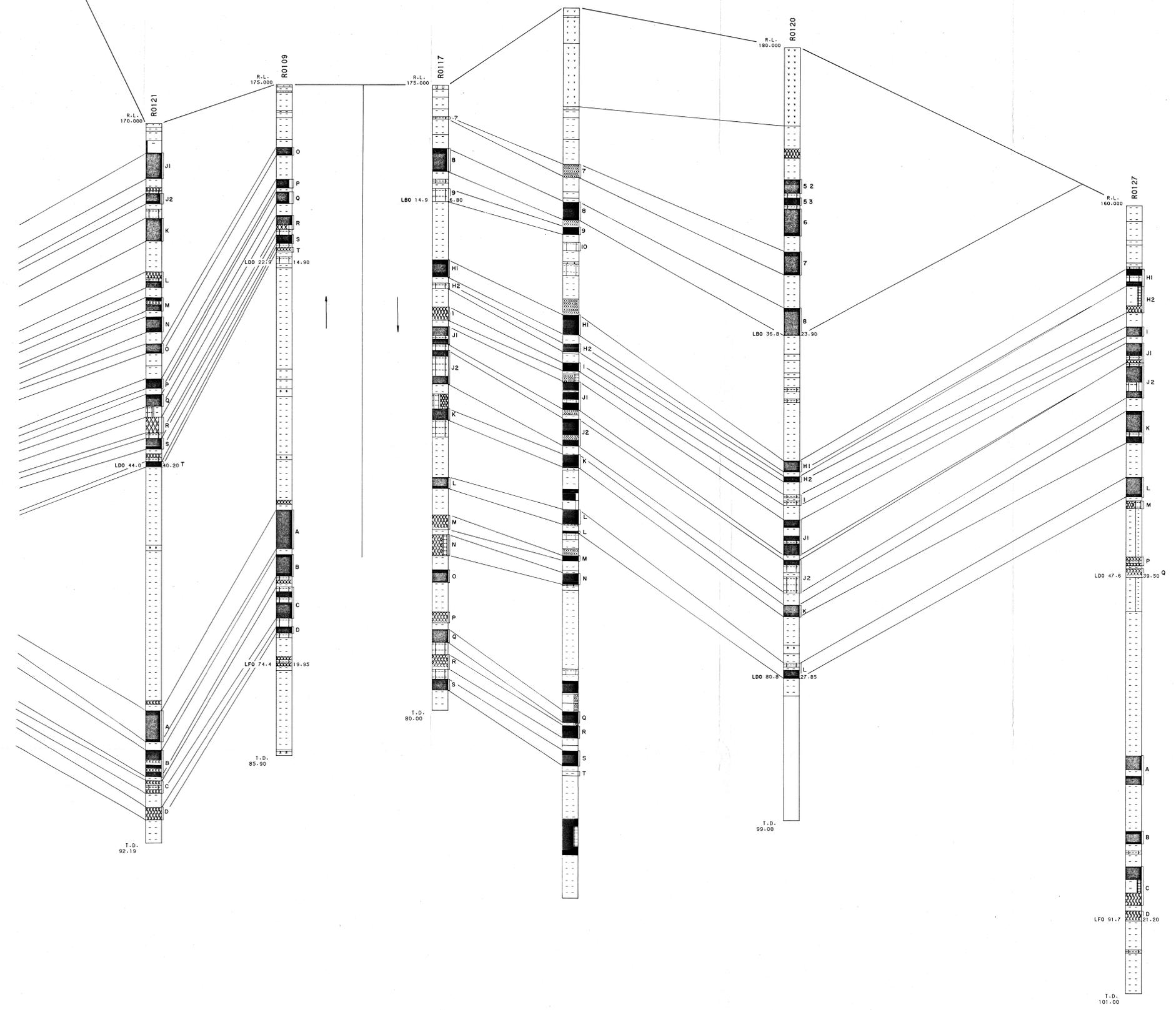


8cm

CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	EL20/80 LAUNCESTON LOATTA DEPOSIT		
DRAWN	6-APR-84	N-S CROSS SECTION G'-G''		SCALE V 1:200 H 1:2500
CHECKED				FIGURE 4-2-9
REVISED				DRAWING NO. 70020 - 199

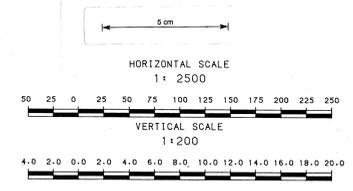
N

S



**LEGEND**  
LITHOLOGY REFERENCE

- |              |  |
|--------------|--|
| SOIL         | INTERBEDDED SEDIMENTS (SANDST/MUDST 50:50) |
| CLAY         | LIMESTONE                                  |
| SILT         | SIDERITE                                   |
| SAND         | LIGNITE                                    |
| GRAVEL       | LIGNITE CUNDIFF. J                         |
| ALLUVIUM     | LIGNITE WEATHERED                          |
| CLAYSTONE    | LIGNITE INFERIOR                           |
| MUDSTONE     | LIGNEDUS CLAY                              |
| SHALE        | DOLERITE                                   |
| SILTSTONE    | BASALT                                     |
| SANDSTONE    | BASEMENT CUNDIFF. J                        |
| CONGLOMERATE | CORE LOSS                                  |



CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	EL20/80 LAUNCESTON		SCALE V 1:200
ELLIS	6-APR-84	LOATTA DEPOSIT		H 1:2500 8w.2119
CHECKED		N-S CROSS SECTION G''-G'''		FIGURE 4-2:10
REVISED				DRAWING NO. 70020-200