

000

908001

MINES

MINES	
File Ref. EL20/80	
22 JUL 1987	
Doc. Ref.	
Action Officer	Initials
LETTER	
17. 7. 87	
REFERS	
Resubmit to	Date

EXPLORATION LICENCE 20/80 LAUNCESTON

FINAL REPORT

OPEN FILE

CSR Coal Division
Technical Group
Level 5
60 Edward Street
BRISBANE, QLD. 4000

B.A. COXHEAD - JULY, 1987

TABLE OF 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	5
3.1 Regional Geological Setting	5
3.2 Local Geology of the Rosevale Coalfield	9
3.2.1 Loatta Deposit	11
3.2.2 Pipers Lagoons Deposit	13
3.2.3 Selbourne Deposit	14
4. EXPLORATION AND GEOLOGICAL EVALUATION	16
5. COAL RESOURCES OF EL 20/80	18
6. COAL QUALITY	20
7. MARKET PROSPECTS	21
8. FUTURE DEVELOPMENT	22
9. REFERENCES	23

002

LIST OF TABLES

		<u>Page No.</u>
Table 1	Summary of Correlatable Coal Seam Subsections - Loatta Deposit	13
Table 2	EL 20/80 Brown Coal Reserves to 60 m Depth	18
Table 3	Weighted Average Coal Quality, Rosevale Coalfield	20

LIST OF FIGURES

Figure 1	Exploration Licence 20/80 Tasmania	3
Figure 2	Stratigraphy of the Parmeener Supergroup and Launceston Basin in EL 20/80	6
Figure 3	Sedimentary Basins and Tertiary Structural Elements of Tasmania	7
Figure 4	Rosevale Coalfield - Location of Major Coal Deposits	10
Figure 5	Rosevale Coalfield - Loatta Deposit Representative Stratigraphy	12

PLATES

PLATE 1	Rosevale Coalfield - Brown Coal Deposits and Prospects	Map Pocket
PLATE 2	Loatta Deposit - E-W Cross-Section A-A'	Map Pocket
PLATE 3	Loatta Deposit - E-W Cross-Section B-B'	Map Pocket
PLATE 4	Loatta Deposit - E-W Cross-Section C-C'	Map Pocket
PLATE 5	Loatta Deposit - E-W Cross-Section D-D'	Map Pocket
PLATE 6	Loatta Deposit - E-W Cross-Section E-E'	Map Pocket
PLATE 7	Loatta Deposit - E-W Cross-Section F-F'	Map Pocket
PLATE 8	Loatta Deposit - N-S Cross-Section G-G'	Map Pocket
PLATE 9	Loatta Deposit - N-S Cross-Section G'-G''	Map Pocket
PLATE 10	Loatta Deposit - N-S Cross-Section G'''-G''''	Map Pocket

004
1. SUMMARY

Exploration Licence 20/80 was granted to a subsidiary of CSR Limited on 19 September 1980 to explore for oil shale and later for coal over a 2339 km² area south and west of Launceston. By 1984 the area of the EL was reduced to its current size of 100 km².

Three brown coal deposits and one prospect area collectively referred to as the Rosevale Coalfield were outlined by drilling along the northern margin of a Tertiary basin located 20 km west of Launceston near the town of Westbury.

Infill drilling on the deposits has outlined 134 Mt of indicated category brown coal resources within 60 m of the surface. Mining feasibility studies to supply a 400 MW on site power station with 98 Mt of the coal have been completed in response to the Hydro Electric Commission's 1983 Power Station Coal Enquiry.

In excess of \$1M has been spent on exploration and evaluation of the licence area since 1980. Further detailed evaluation cannot be justified until improved market opportunities arise and a change in environmental attitude towards the coals on-site utilization, is taken. CSR Limited wishes to retain title to the deposits for future development through the grant of a Retention Licence to cover a 50 km² of EL 20/80.

INTRODUCTION

2.1 Scope of Report

This report summarises exploration evaluation work carried out by CSR Limited on the currently held area of Exploration Licence (EL) 20/80 Launceston, and more specifically, the Rosevale Coalfield, during its seven year term.

2.2 Tenement Details

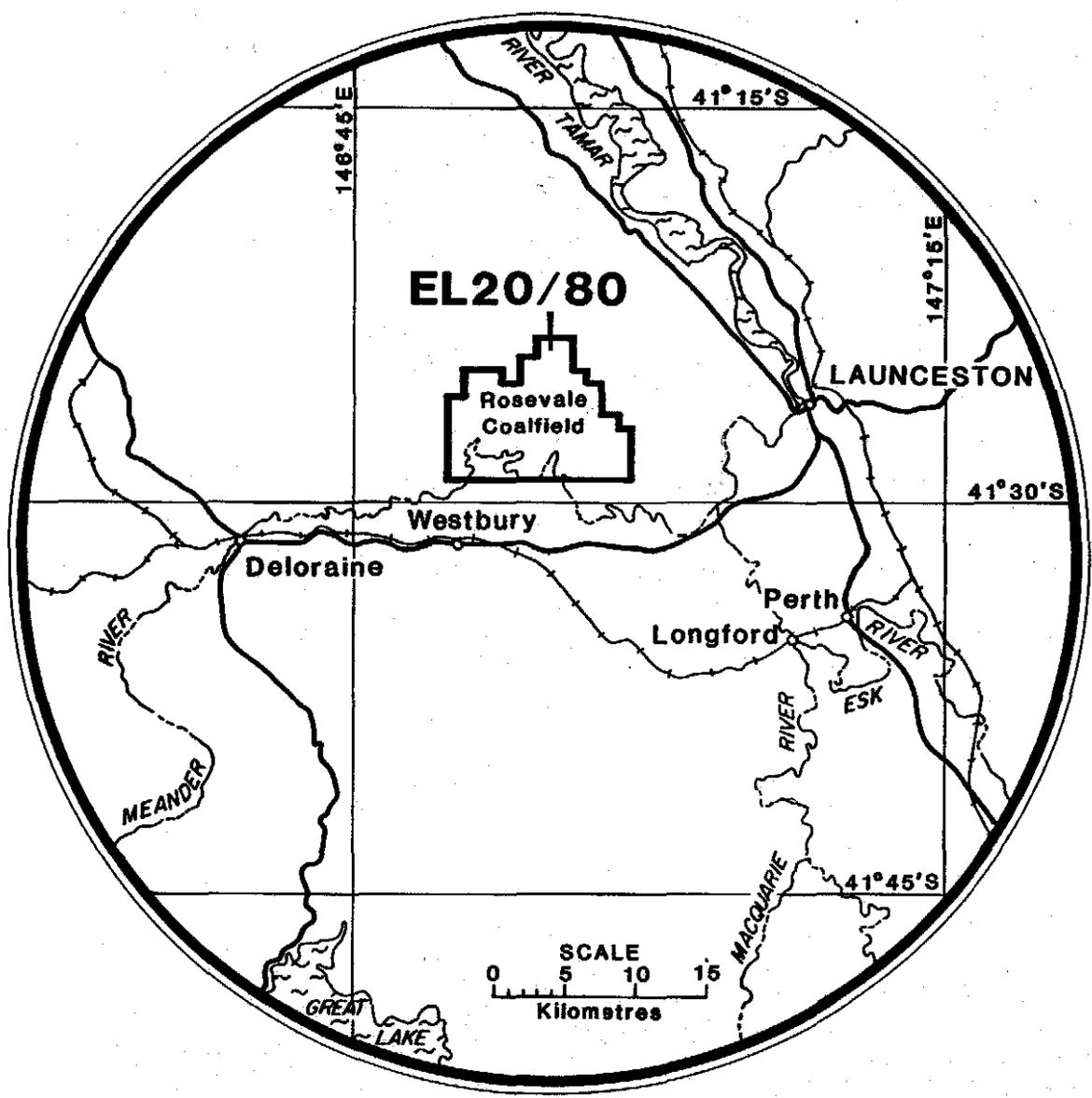
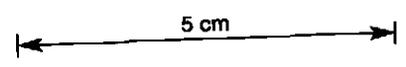
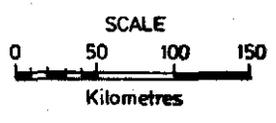
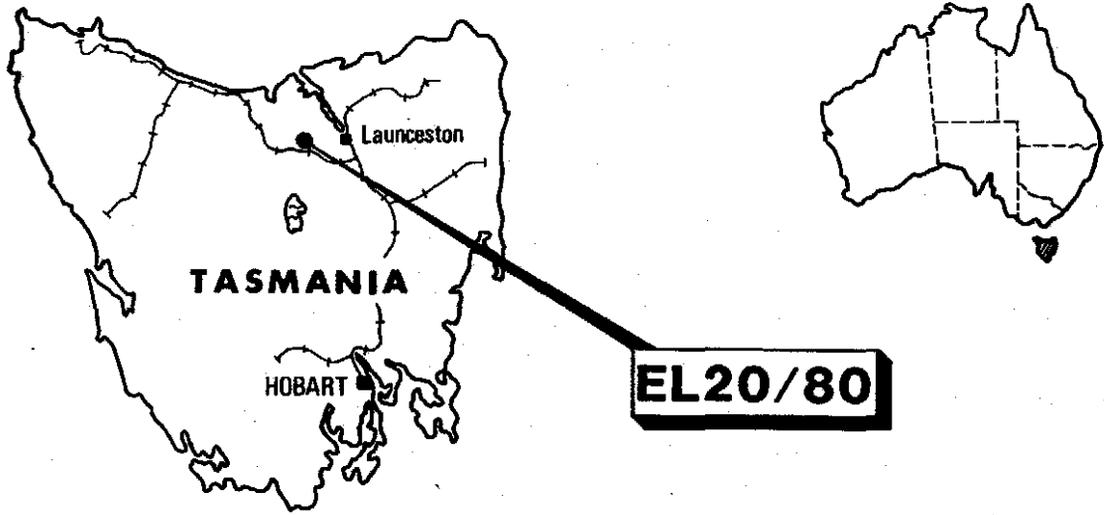
EL 20/80 was originally granted for one year to AAR Limited (a wholly-owned subsidiary of CSR) over an area of 2,339 km², on 19 September 1980. The term of the EL was progressively extended to cover at first oil shale exploration and later, coal exploration. In February 1983 the licence was transferred from AAR Limited to CSR Limited. The area was reduced to 984 km² in August 1983 and further reduced in August 1984 to its current size of 100 km² (Figure 1). Reports covering the areas relinquished from the EL have been prepared by CSR and submitted as relinquishment reports dated August 1983 and August 1984.

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

The Rosevale Coalfield consists of three closely related yet discrete brown coal deposits located 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

908007



**EXPLORATION LICENCE 20/80
TASMANIA**

FIGURE 1

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 across them.

The climate is temperate, ranging from cold winters in which low-level snowfalls are occasionally recorded, to 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 total relief in the immediate environs of the coalfield in the order of 50 m. However, a moderately high range of hills separates the Rosevale basin from Launceston, and encircles it to the north.

Southerly flowing ephemeral streams drain the coalfield through low gradient marshy zones (for example, 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 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.

The principal land use 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

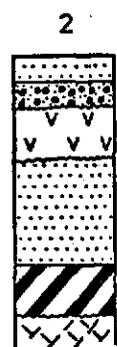
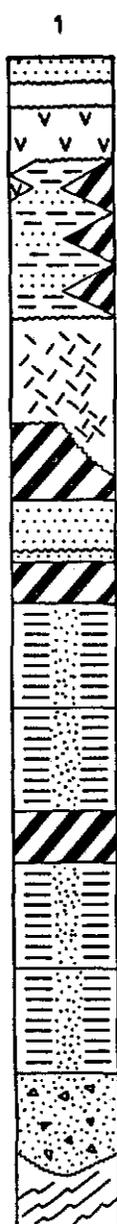
3.1 Regional Geological Setting

The brown coals (lignite) 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 (Figure 2). Black coal has been recorded within the Parmeener Supergroup from a number of locations previously covered by EL 20/80. These occurrences were found to have no economic significance and were subsequently relinquished from the EL.

During the early Tertiary a series of north to north-west trending grabens formed, into 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), 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 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.

LAUNCESTON BEDS	QUATERNARY	ELIocene
		MIOCENE
PARMEENER SUPERGROUP	TERTIARY	Eocene-Oligocene
	JURASSIC	
	TRIASSIC	
	PERMIAN	UPPER MARINE SEQUENCE
		LOWER MARINE SEQUENCE



Stratigraphic Name	Lithological Description	Prospective Area in EL 20/80	Thickness Range
Unconformity	Upper Zone	Alluvium	
		Gravel, boulder beds	
Disconformity		Alkali - Olivine basalts	Up to 60m
	Middle Zone	Loatta, Pipers Lagoons and Selbourne Deposits	0-1,000m
		Clay, Silt, Sand Brown Coal and Oil Shale	
Unconformity	Lower Zone	Breadalbane Lignite	
	Dolerite Intrusion	Medium to coarse grained, tholeiitic dolerite	0-305m
	Fingal or Newtown Coal Measures	Feldspathic Sandstone Black coal Seams	Longford Coal Field Norwich and Pateena Mines 0-200m
	Knocklofty or Ross Sandstone	Quartzose Sandstone	60-100m
Unconformity			
	Cygnat Coal Measures Jackey Formation	Carbonaceous Sandstone and Shale with Plant Fragments	thin coal seams less than 45m
	Bogan Gap Group	Predominantly unfossiliferous mudstone	up to 200m
	Portina Group	Fossiliferous Mudstone and Sandstone	40-100m
	Mersey Coal Measures Liffey Group	Carbonaceous Quartz-Mica Sandstone and Shale, thin coal seams	30-49m
	Golden Valley Group	Unfossiliferous erratic rich mudstone, shale limestone and sandstone	45-60m
	Quamby Mudstone	Unfossiliferous, dark grey pyritic mudstone. Includes Tasmanite Oil Shales of Railton-Latrobe Area	75-120m
	Stockers Tillite	Tillite and erratic rich mudstone	0-140m
Unconformity			
Basement	Silurian Ordovician Cambrian Precambrian	Turbidite sequences, dominately shale and siltstone Siliceous conglomerate Turbidite sequences containing quartzite Quartzite	

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

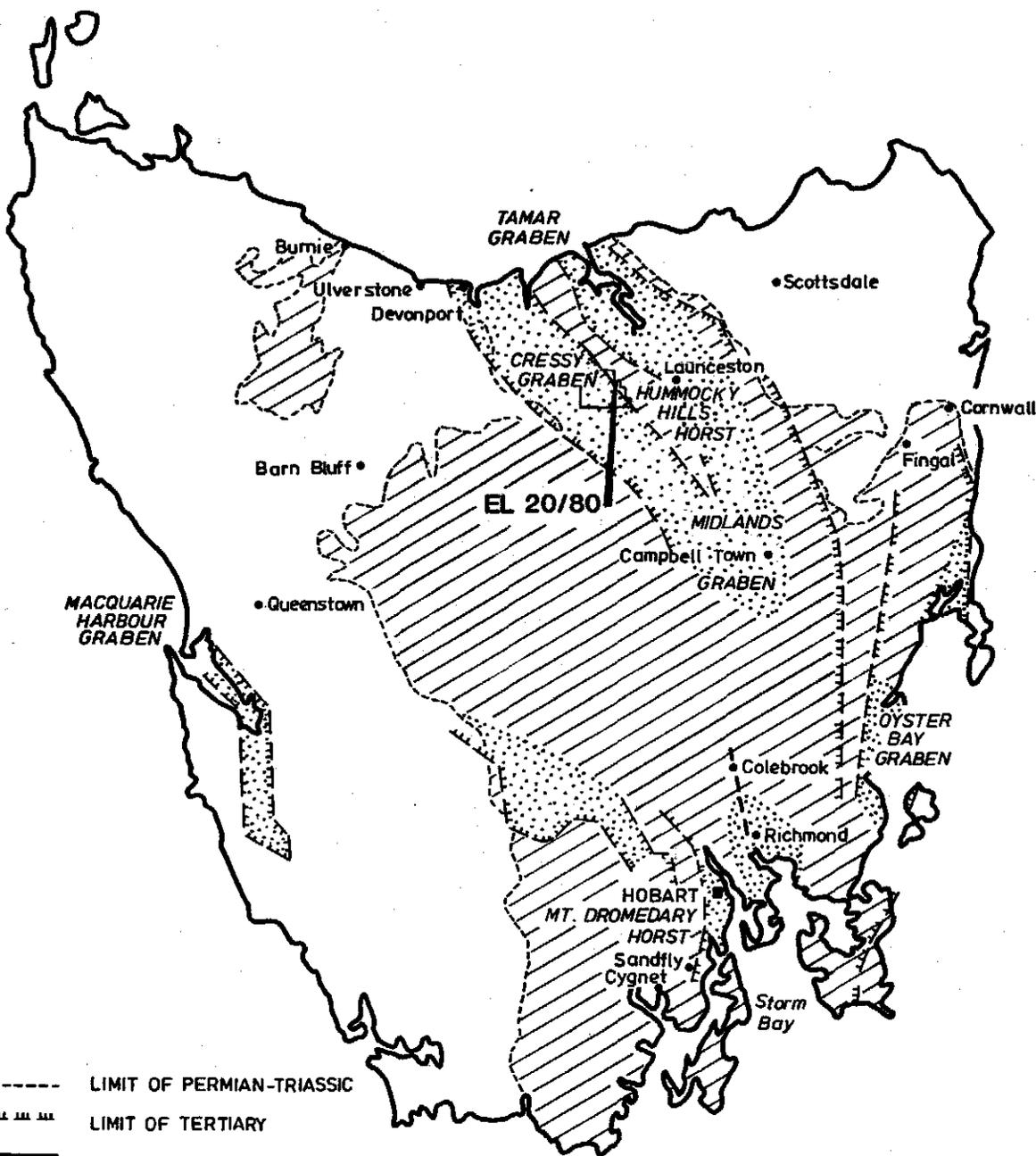
Compiled from information contained in Mathews (1974).

CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		CSR
DRAWING	DATE	STRATIGRAPHY OF THE PARMEENER SUPERGROUP		SCALE
DRAWN		AND LAUNCESTON BASIN IN EL 20/80		FIGURE 2
CHEKED				DRAWING No
NOVED				70020-90

009

908010

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	
REVISED BAL July '87				DRAWING No 70020 - 92	

011

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 minor brown coal and carbonaceous facies, as well as 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 sources of the inorganic sediments which infilled the Tertiary grabens were the sandstones, siltstones and mudstones of the Parmeener Supergroup and the Jurassic dolerite.

Basin-wide correlation of Tertiary strata, and particularly the 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".

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

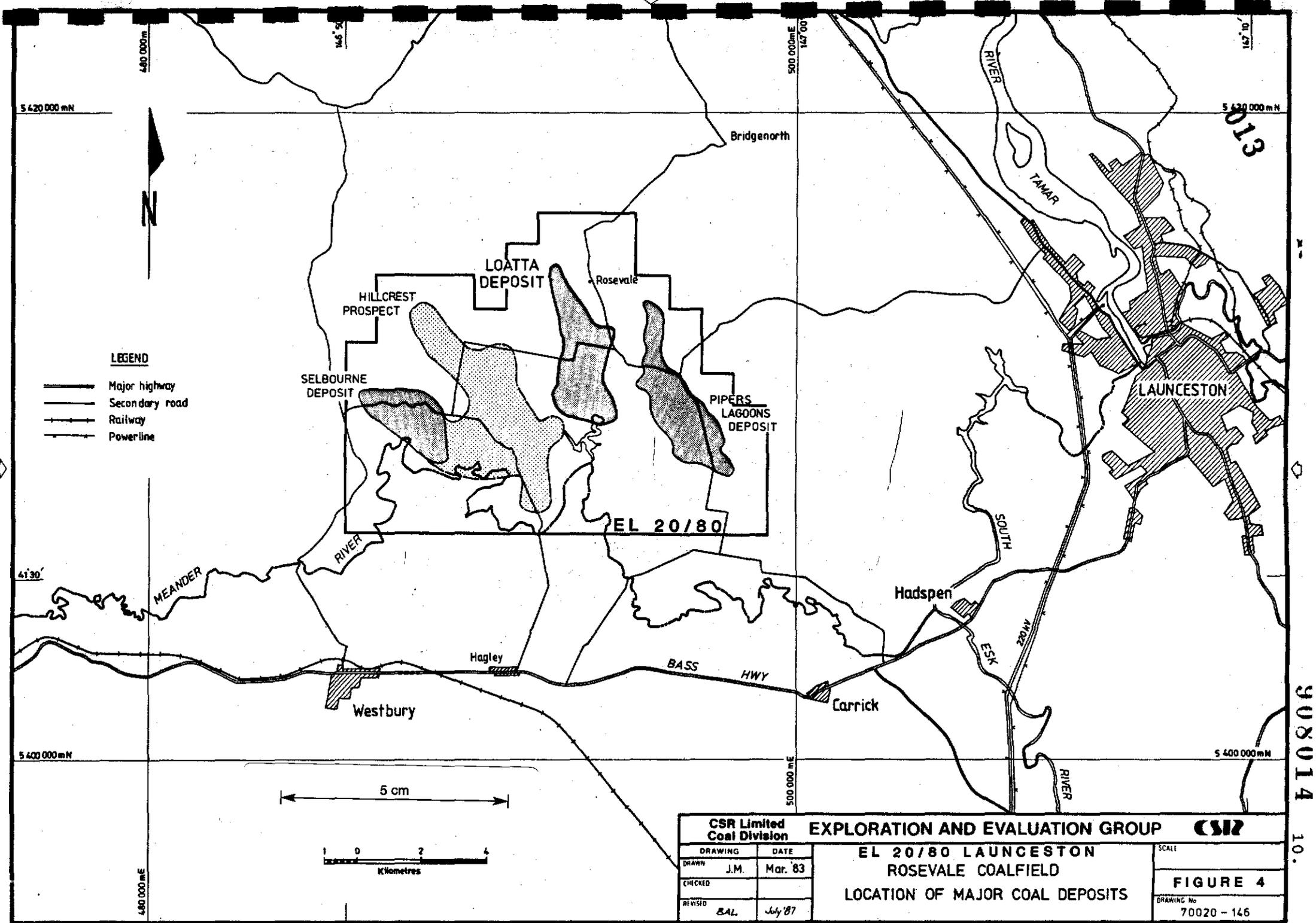
3.2 Local Geology of the Rosevale Coalfield

The Rosevale Coalfield contains three brown coal deposits, the Loatta, Pipers Lagoons and Selbourne deposits, together with a less well defined area having coal potential and referred to as the Hillcrest prospect (Figure 4).

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 is not known - one drillhole has penetrated 152 m of Tertiary sediments without significant change in lithology.

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% or more of the section. The sands are therefore considered to be lenticular as well, but very little is known of their distribution and spatial relationships to the finer grained sediments.



5 420 000 m N
31013

LEGEND

- Major highway
- Secondary road
- +— Railway
- Powerline

EL 20/80

5 cm

1 0 2 4
Kilometres

CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		CSR
DRAWING		DATE		SCALE
DRAWN J.M.		Mar. 83		EL 20/80 LAUNCESTON ROSEVALE COALFIELD LOCATION OF MAJOR COAL DEPOSITS
CHECKED				
REVISED BAL		July 87		
				FIGURE 4
				DRAWING No 70020 - 146

908014 10.

014

3.2.1 Loatta Deposit

The Loatta deposit is the largest and most significant of the Rosevale deposits (Plate 1). It is bounded on the north, east and west by dolerite basement and deteriorates to the south where it is also covered in part by remnants of weathered Tertiary basalt which make a significant contribution to total overburden thickness in that area.

The deposit contains four seam horizons, A, B, D and F, within a 130 m to 140 m thick lignite bearing interval. A typical stratigraphic column for the deposit is presented in Figure 5. The A seam which consists of 5 m-10 m of banded lignite and clay at the top of the sequence is confined to a small area in the centre of the deposit and is not shown on the column. A summary description of the three other seams accompanies the stratigraphic column.

Overburden and interburden is principally grey clay with very minor sand interbeds as well as dark carbonaceous clays, often grading to inferior lignite in proximity to the lignite seams. Seam boundaries are usually gradational and dependent on ash content rather than any distinct lithological change.

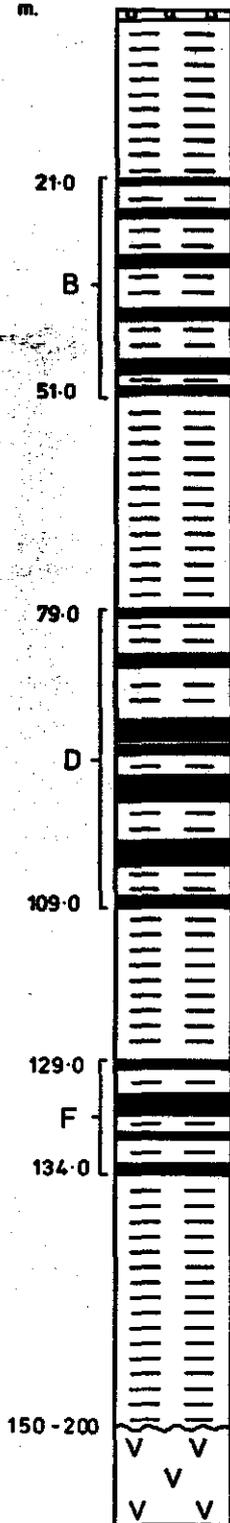
A total of 34 seam subsections have been established and correlated in the four main lignite seams (Plates 2-10), although only 25 were modelled for coal resource calculations (Table 1).

908016

015

DEPTH
m.

THICKNESS
m.



21.0 CLAYSTONE (soft)

B. COAL INTERVAL; top and base characteristically sharp; clean coal seams towards bottom of section; 3.5 m. average cumulative coal thickness; max cumulative thickness of 11.4 m.

30.0

28.0 CLAYSTONE (soft)

D. COAL INTERVAL; top sharp, base gradational but with characteristic recognisable seams; average cumulative coal thickness 6.5 m; maximum cumulative thickness 22.6 m.

30.0

24.0 CLAYSTONE (soft)

F. COAL INTERVAL; largely coal; average cumulative coal thickness 3.5 m; maximum cumulative coal thickness 12.2 m.

CLAYSTONE (soft)

DOLERITE BASEMENT 150-200 m. Depth

CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		CSIR
DRAWING / DATE		ROSEVALE COALFIELD EL 20/80		SCALE
DRAWN C. J. Jan. '84		LOATTA DEPOSIT		FIGURE 5
CHECKED		REPRESENTATIVE STRATIGRAPHY		DRAWING No.
REVISED				70020-108

016

TABLE 1Summary of Correlatable Coal Seam Subsections - Loatta Deposit

Seam Interval	Seam Subsection
A	No individual subsections correlated*
B	21*, 22*, 31*, 32*, 33*, 41*, 42*, 43*, 51, 52, 53, 6, 7, 8, 9, X.
D	H1, H2, I, J1, J2, K, L*, M, N, O, P, Q, R, S, T*.
F	A, B, C, D.

* Not modelled

The geology and coal resources of the Loatta deposit are described in detail in Exploration Progress Report for EL 20/80 covering the quarter ended 27 May, 1984.

3.2.2 Pipers Lagoons Deposit

The geology of the Pipers Lagoon deposit is similar to the Loatta deposit. It is constrained to the east and west by basement outcrop or subcrop and is closed to the south by pinching out of the coal seams. The deposit has an irregular elongate shape, with a distinct, almost separate, lobe in the north (Plate 1).

Here, the B and C seams are better developed, with 11 seam subsections being recognised. Maximum seam thickness is 8.5 m in the far north of the deposit, but there are two distinct depocentres of coal formation. Structure contouring of B and C seam intervals shows the presence of a saddle between two weakly developed domal structures in the north and the south. Overburden ratios at Pipers Lagoons are not as controlled by topography as at Loatta, with the lowest ratios occurring over the domal features and the higher ratios towards the deposit margins. Both overburden and interburden are composed of grey clay with lesser carbonaceous material. Sand is virtually non-existent in the sequence, having been noted in only one drillhole at depth (beneath the C coal interval).

3.2.3 Selbourne Deposit

Selbourne is a small, shallow, flat-lying deposit, formed in apparent isolation without obvious basement confinement. It may, however, interconnect with Loatta via the Hillcrest prospect south of the dolerite basement outcrop.

Five separate brown coal seams ranging from 1.5 m to 3.7 m in thickness have been identified from exploration drilling. Clay, and to a lesser degree, inferior brown coal and carbonaceous clay, dominate the non-coal Tertiary section, with minor sand lenses appearing in the east. Overburden is primarily clay, except towards the eastern limit of the deposit where basalt veneers the sediments and the overburden to coal ratio increases rapidly.

A description of the geology and coal resources of the Pipers Lagoon and Selbourne deposits is provided in CSR's Response to the HEC Power Station Coal Enquiry-October 1983. Details of the work are also documented in Exploration Quarterly Reports to the Mines Department prior to that date.

In the Hillcrest area coal seams thicker than 1.5 m have been drilled at depths ranging between 15 m and 42 m. They are possible stratigraphic equivalents of the B and D intervals of the Loatta deposit. Hillcrest coal is of inferred status only at present and therefore is not included in the Rosevale resources.

019

4. EXPLORATION AND GEOLOGICAL EVALUATION

CSR has undertaken five drilling programmes in EL 20/80 over the periods March-April 1981, October-December 1981, March-April 1982, October-December 1983 and May 1984. In all, 144 holes were completed to a total metreage of 9,808 m. The drilling is concentrated near Rosevale and of the 144 holes drilled, 94 are located in the Rosevale Coalfield (Figure 4 and Plate 1). Some 56 drillholes lie within the three main deposits, 37 in Loatta (31 non-core, 6 core), 15 in Pipers Lagoons (10 non-core, 6 core), and 4 at Selbourne (1 non-core, 3 core). Coring intervals were determined using pilot geophysically logged open holes and KMLC (100 mm diameter) cores were drilled for each targetted coal seam and included representative roof and floor strata as well.

All but three of the Rosevale drillholes have been geophysically logged, the earlier ones with a portable S.I.E. unit and the later ones using truck-mounted digital equipment carrying 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 use the geophysically logged non-cored holes for estimation of seam ash content to a high degree of reliability.

Rotary chip cuttings and drillcore were logged in detail. Cored intervals were logged immediately after drilling to minimise bed moisture loss. They were then sampled according to their lithotypes and 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. Potential mining sections were then composited and a more comprehensive suite of tests and analyses undertaken.

The brown coal seams have been correlated using characteristic downhole geophysical log signatures and by examination of drill hole cross-sections. Correlations can be made with reasonable confidence in the central portion 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.

All borehole geological and analytical data have been encoded for computer storage and manipulation. Subsequent geological evaluation has centred on computer modelling, plan and section generation, and calculation of coal reserves to support mine planning studies carried out by CSR. The most recent studies being in response to the Hydro Electricity Commission's Power Station Enquiry of 1983.

A copy of CSR's October 1983 Response to the HEC enquiry has been lodged with the Mines Department together with supporting documentation relating to associated environmental and infrastructure studies.

021

5. COAL RESOURCES OF EL 20/80

In situ brown coal resources for EL 20/80 total 134 m tonne indicated category (Table 2).

TABLE 2
EL 20/80 Brown Coal Reserves to 60 m Depth

Area	Measured Resources Mt	Indicated Resources Mt	Inferred Resources
Loatta	-	72	-
Pipers Lagoons	-	43	-
Selbourne	-	19	-
Hillcrest	-	-	V. Small*
TOTAL	-	134	V. Small

* Less than 20 Mt.

The coal resources have been calculated on the basis that seam subsections containing greater than 50% dry basis ash (approximately 27% ash at 45% total moisture content) have been excluded or treated as parting material. All partings greater than 0.5 m in thickness were also excluded from the tonnage calculations.

Cumulative overburden ratios (expressed as bank cubic metres overburden per tonne of lignite) calculated for the resources are:

Loatta	3:1
Pipers Lagoons	5:1
Selbourne	8:1

023

6.0 COAL QUALITY

Rosevale coal is a low sulphur, low specific energy, comparatively low moisture, high ash lignite suitable for combustion in commercially available boilers designed for coal of this type.

Weighted average coal quality for the three main deposits, based on analytical results to hand prior to the October - December 1983 drilling programme, is summarised in Table 3.

TABLE 3
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

024

7. MARKET PROSPECTS

Brown coals cannot be economically transported over any significant distance, and therefore are most commonly utilised in on-site power stations or industrial installations. Rosevale brown coal is no exception. It is well suited to on-site thermal power generation, being a very low sulphur fuel, and could readily be burnt in commercially available boilers using either pulverised fuel firing or fluidised bed combustion technology. Indeed, use of Rosevale brown coal for power generation would free Tasmania's limited resources of black coal for other appropriate industrial applications.

A detailed submission was made to the Hydro Electricity Commission in October 1983 offering brown coal from Rosevale as a fuel for its proposed thermal generating plant. However, soon after CSR's Rosevale submission was presented, it was announced that thermal power station sites within the Tamar Valley, which was defined to include Rosevale, would not be considered.

A review of potential alternative markets, other than to a power station, for Rosevale lignite to the turn of the century, indicates that possible openings will be too limited to allow development at an economic scale. Nevertheless, Rosevale brown coal is a valuable resource for Tasmania, and every effort should be made to avoid sterilising the resource and keep open the possibility for development to satisfy the State's growing energy requirements.

8. FUTURE DEVELOPMENT

Sufficient work has been completed at Rosevale to identify its coal resources and quality, seam geometry, and geotechnical parameters. CSR has also demonstrated the technical feasibility of mining up to 4 Mtpa of brown coal from the deposits. Estimates of production costs, based on a dual bucketwheel excavator operation, have been made.

In excess of \$1M has been spent by CSR on exploration and evaluation of EL 20/80. However, further large-scale expenditure on field and engineering investigations cannot readily be justified until reasonable prospects for development become evident, and until present conceptions about the limited impact a modern, well-designed, thermal power station would have on the environment, can be changed, particularly if it was fuelled by low sulphur Rosevale coal.



**B.A. COXHEAD
EXPLORATION MANAGER**

JULY 1987

026
9. REFERENCES

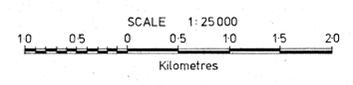
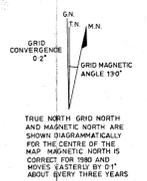
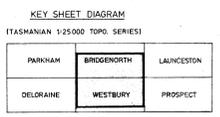
- Banks, M.R., 1962 The Geology of Tasmania.
Maxwell, R.A., Jour. Geol. Soc. Aust., Vol.
Spry, A. 9, Part 2.
- Burns, S.D. 1981 A Review of the Longford Basin,
Tasmania, Australia. Mines
Administration Pty. Limited.
(Unpublished Company Report).
- Carr, M.J. 1983-4 Exploration Licence 20/80
Launceston, Exploration Progress
Reports. CSR Limited.
(Unpublished Company Reports).
- CSR Limited 1983 (a) Response to the Hydro Electric
Commission Tasmania Power
Station Coal Enquiry.
- (b) Rosevale Coalfield Project
Picture, Infrastructure and
Environment 400 MW Case.
- Ellis, P. 1982-3 Exploration Licence 20/80
Launceston, Exploration Progress
Reports. CSR Limited.
(Unpublished Company Reports).
- 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.

REFERENCES (Cont'd)

- Johnston, R.M. 1888 Systematic Account of the Geology of Tasmania. Government Printer, Hobart.
- Matthews, W.L. 1974 The Geology and Groundwater Resources of the Longford Tertiary Basin. Bull. Geol. Surv. Tas., 59.
- 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).

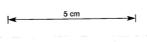


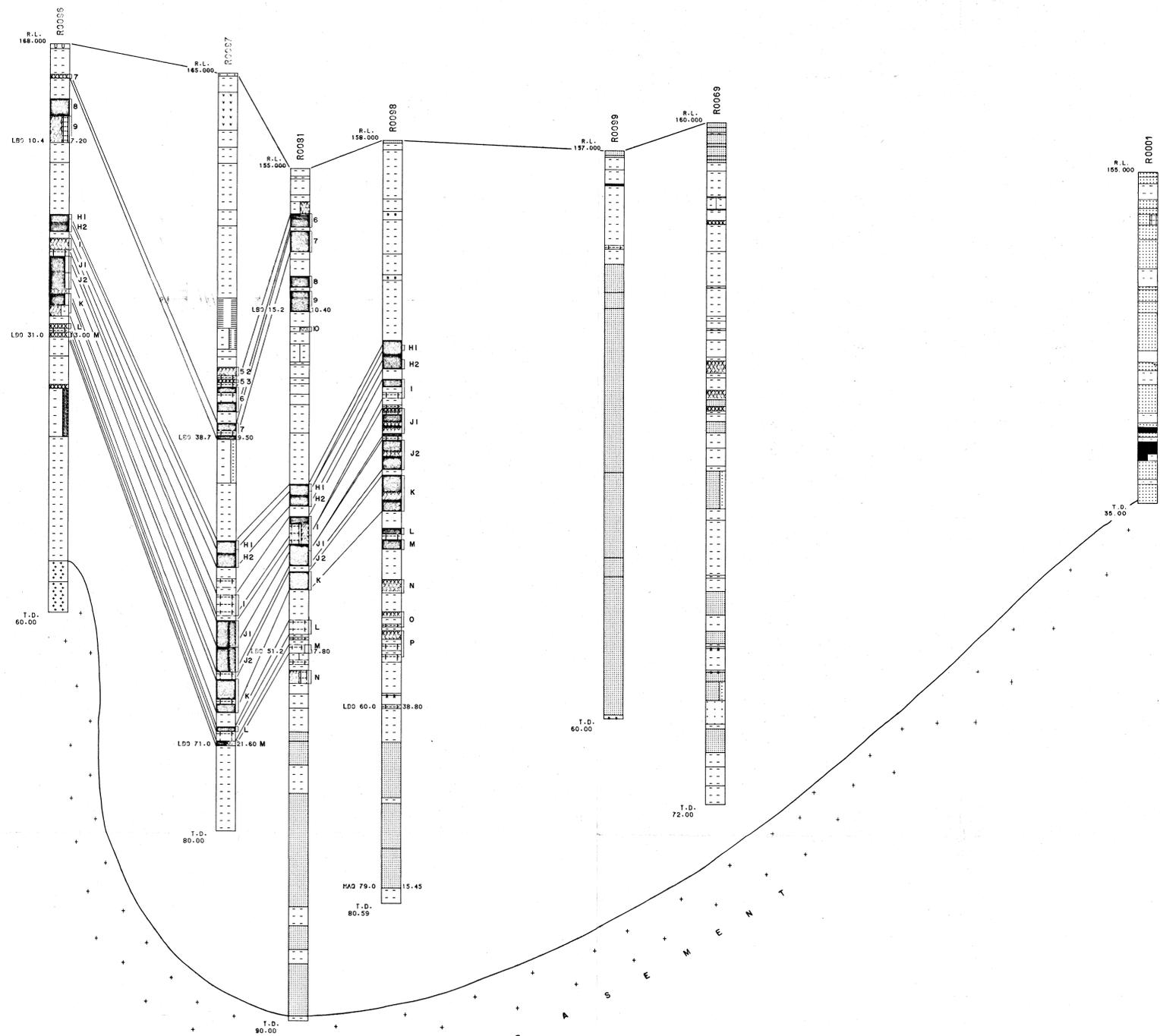
- LEGEND**
- Highway, sealed road
 - Unsealed road, vehicular track, lane
 - Railway
 - Homestead
 - Drain
 - C033 CSR drillhole coal cored
 - R009 CSR drillhole chip sampled
 - Deposit Outline
 - Prospect Outline
 - Outline of Potential Reserves
 - Outline of Basement Rock



CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	EL 20/80 LAUNCESTON		SCALE 1:25000
A. Y.	Sept '82	ROSEVALE COALFIELD		PLATE 1
CHECKED		BROWN COAL DEPOSITS & PROSPECTS		DRAWING No. 70020 - 72 6450
REVISED	BAL JULY '87			

908029



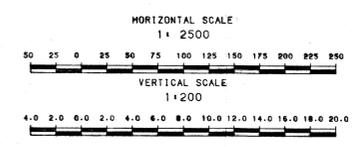


LEGEND
LITHOLOGY REFERENCE

- | | | | |
|--|--------------|--|--|
| | 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 | | DOLERITE |
| | SILTSTONE | | BASALT |
| | SANDSTONE | | BASEMENT CUNDIFF. J |
| | CONGLOMERATE | | CORE LOSS |

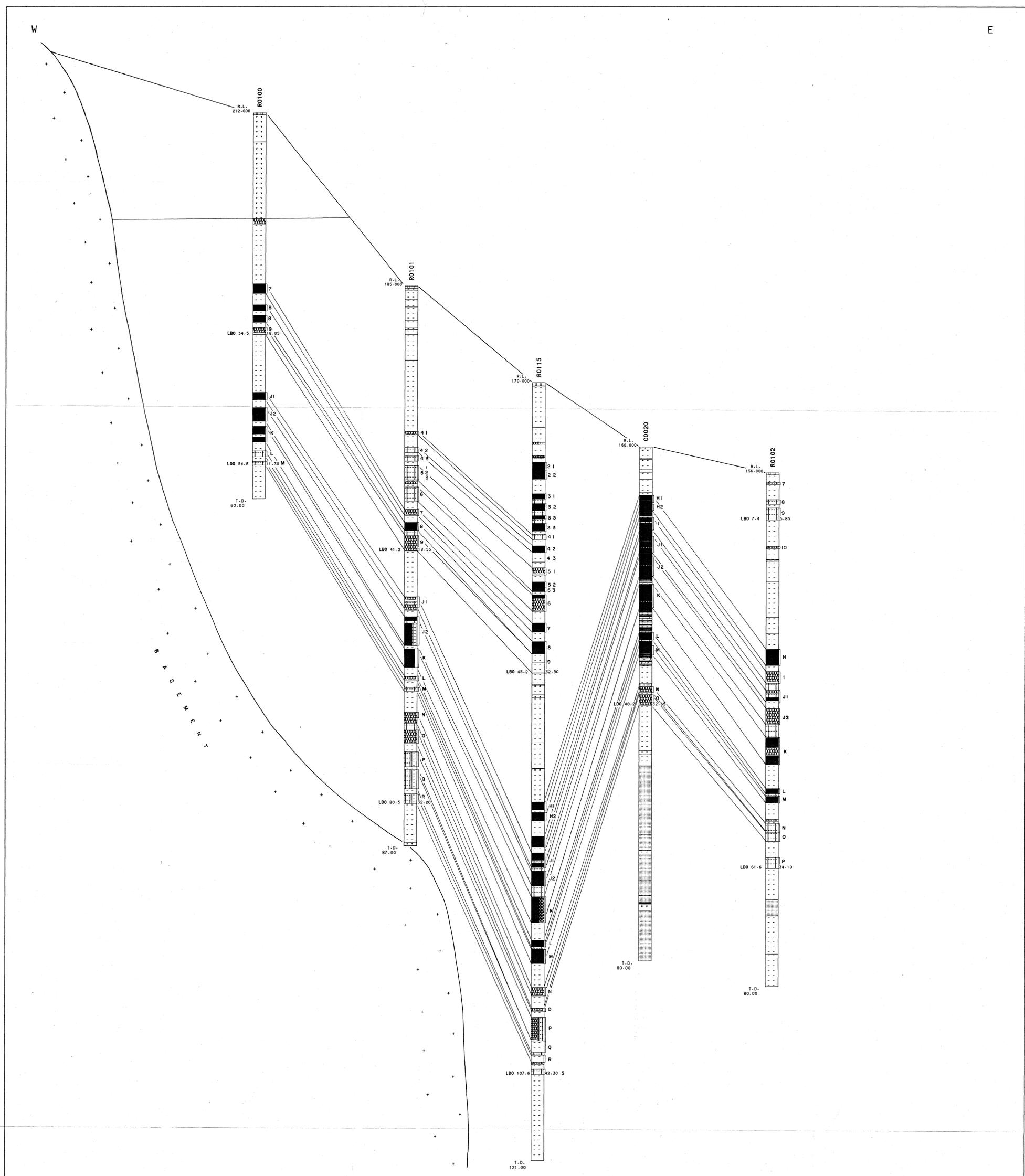
B
A
S
E
M
E
N
T

908030
5 cm



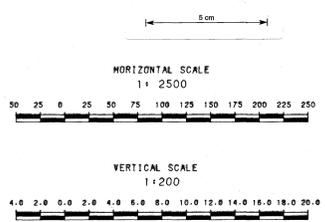
CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	SCALE V 1:200 H 1:2500		
ELLIS	6-APR-84	PLATE 2		
CHECKED		DRAWING NO. 70020 - 192		
REVISED		87-2680 6451		

02/80 LAINGESTON
LOATIA DEPOSIT
E-W CROSS SECTION A-A



LEGEND
LITHOLOGY REFERENCE

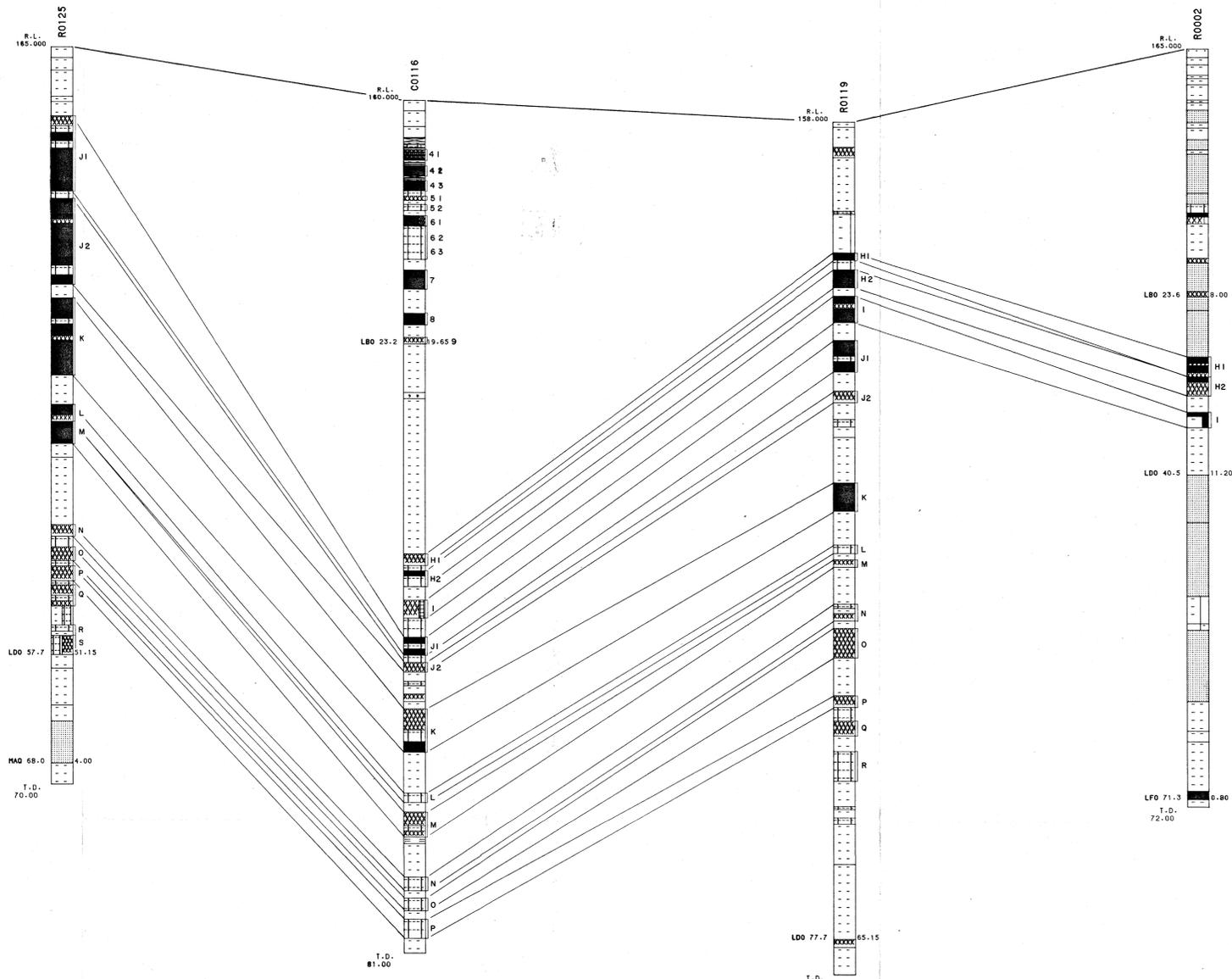
- | | | | |
|--|--------------|--|--|
| | SOIL | | INTERBEDDED SEDIMENTS (SANDST/MUDST 50:50) |
| | CLAY | | LIMESTONE |
| | SILT | | SIDERITE |
| | SAND | | LIGNITE |
| | GRAVEL | | LIGNITE CUNDIFF. J |
| | ALLUVIUM | | LIGNITE WEATHERED |
| | CLAYSTONE | | LIGNITE INFERIOR |
| | MUDSTONE | | LIGNEOUS CLAY |
| | SHALE | | 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 E-W CROSS SECTION B-B'		SCALE V 1:200 H 1:2500
CHECKED	6-APR-84			PLATE 3
REVISED				DRAWING NO. 6452 70020 - 193

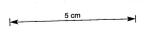
W

E

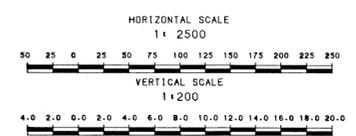


LEGEND
LITHOLOGY REFERENCE

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



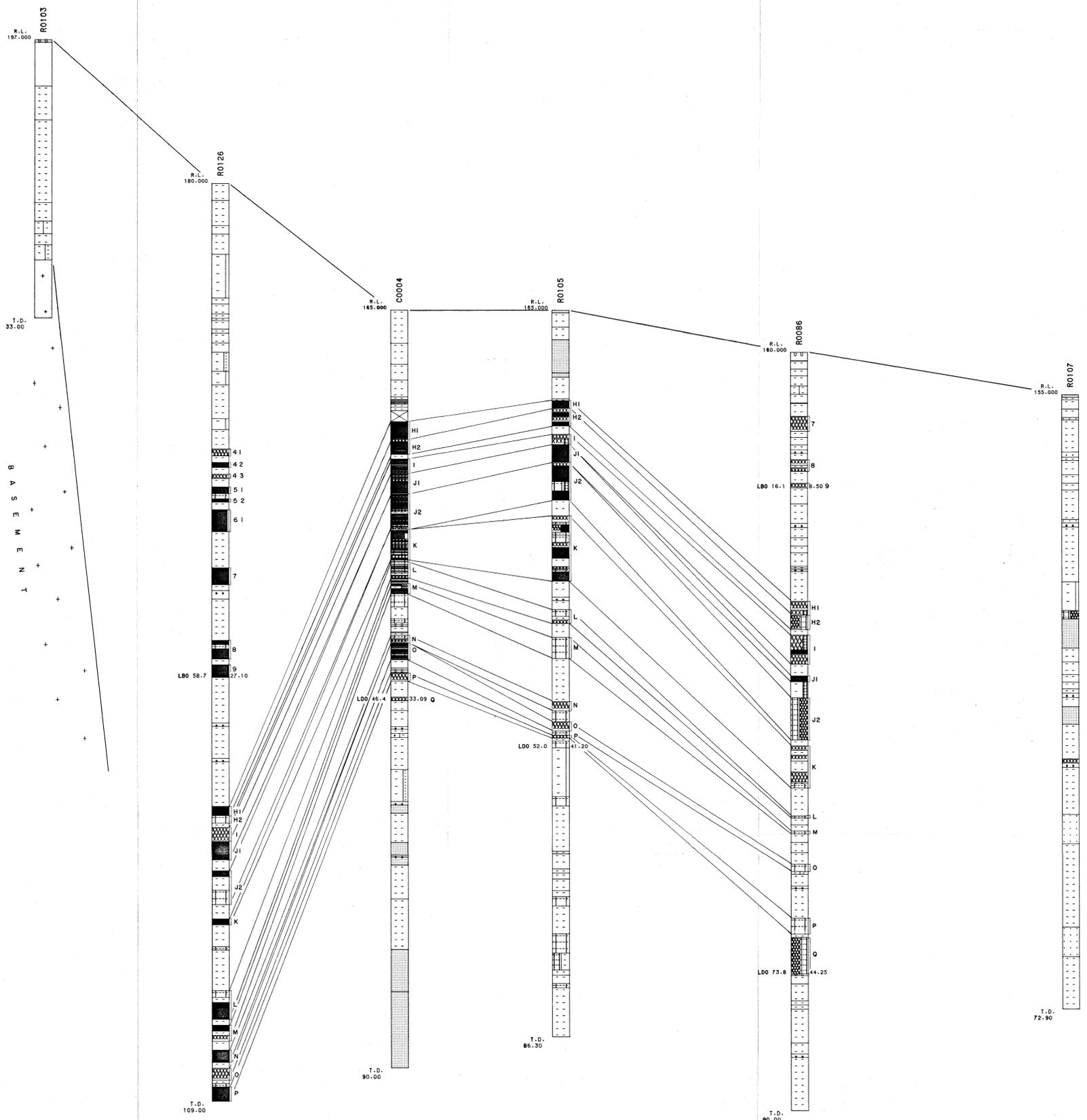
908032



CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	EL20/80 LAUNCESTON LOATTA DEPOSIT E-W CROSS SECTION C-C'		
DRAWN	ELLIS	6-APR-84		SCALE V 1:200 H 1:2500
CHECKED				PLATE 4
REVISED				DRAWING NO. 6453 70020 - 194

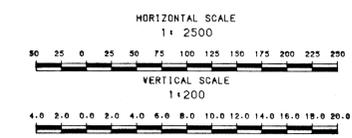
W

E



LEGEND
LITHOLOGY REFERENCE

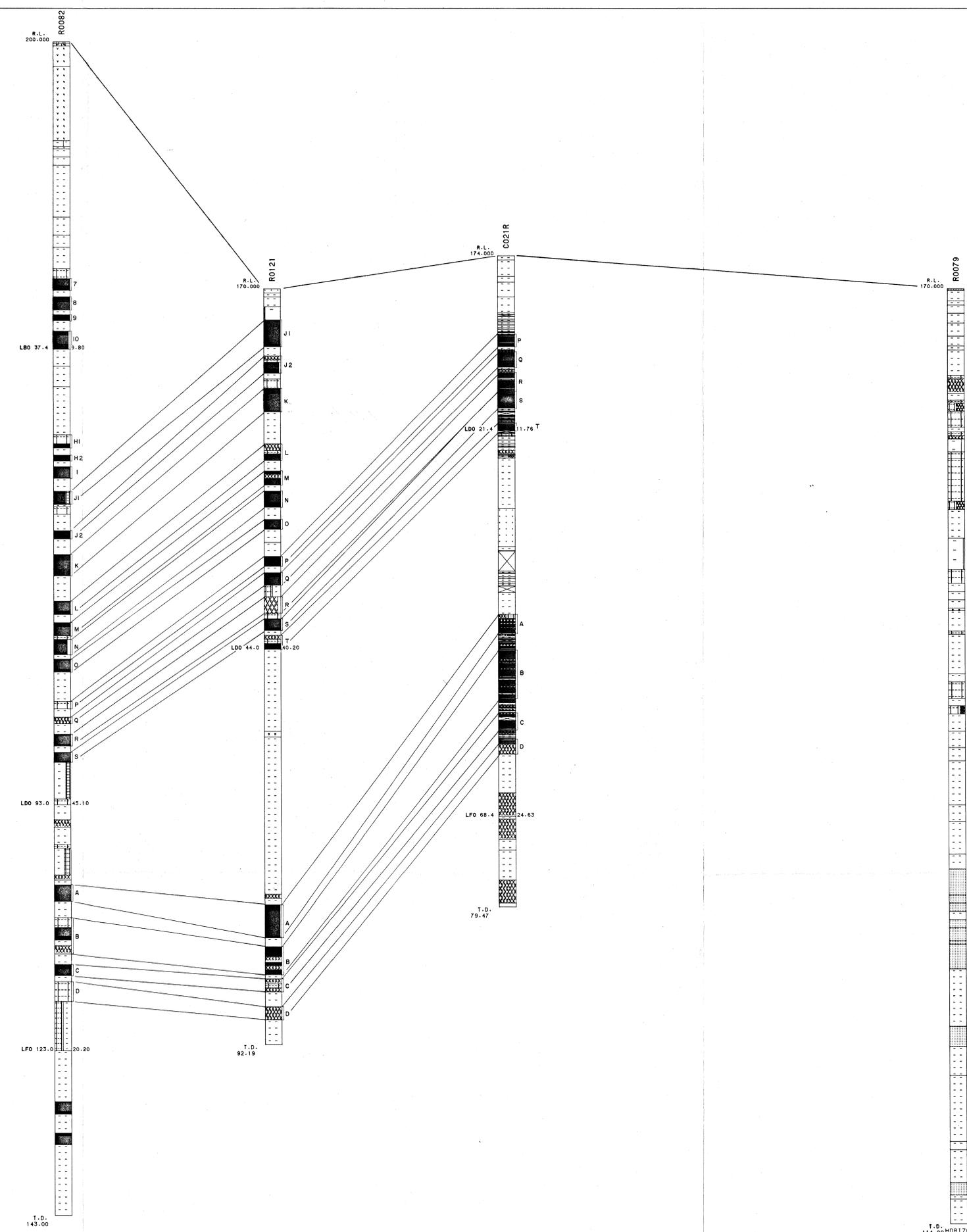
[Symbol]	SOIL	[Symbol]	INTERBEDDED SEDIMENTS (SANDST/MUDST. 50:50)
[Symbol]	CLAY	[Symbol]	LIMESTONE
[Symbol]	SILT	[Symbol]	SIDERITE
[Symbol]	SAND	[Symbol]	LIGNITE
[Symbol]	GRAVEL	[Symbol]	LIGNITE CUNDIFF. J
[Symbol]	ALLUVIUM	[Symbol]	LIGNITE WEATHERED
[Symbol]	CLAYSTONE	[Symbol]	LIGNITE INFERIOR
[Symbol]	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		905033
DRAWN	DATE	EL20/80 LAUNCESTON		SCALE V 1:200
ELLIS	6-APR-84	LDATTA D.J. SIT		H 1:2500
CHECKED		E-W CROSS SECTION D-D'		PLATE 5
REVISED				DRAWING NO. 70020 - 195

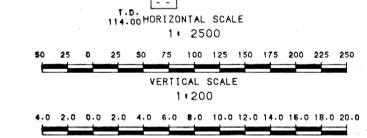
WNW

ESE

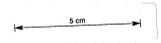


LEGEND
LITHOLOGY REFERENCE

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



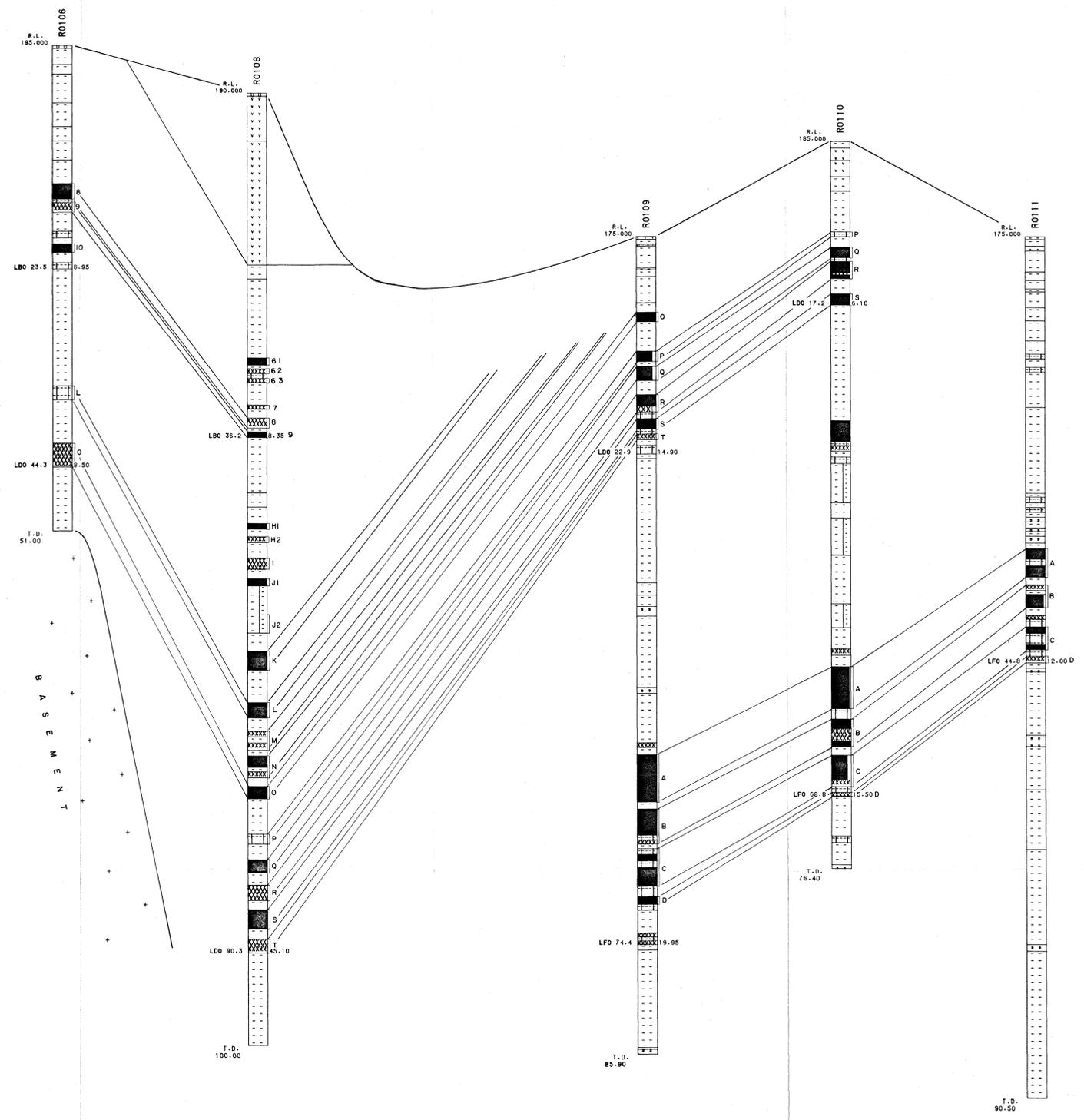
CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP	
DRAWING	DATE	EL20/80 LAUNCESTON LOATTA DEPOSIT E-W CROSS SECTION E-E'	
ELLIS	6-APR-84	SCALE	V 1:200 H 1:2500
CHECKED		PLATE 6	
REVISED		DRAWING NO.	70020 - 196



908034

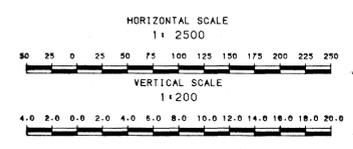
W

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 |



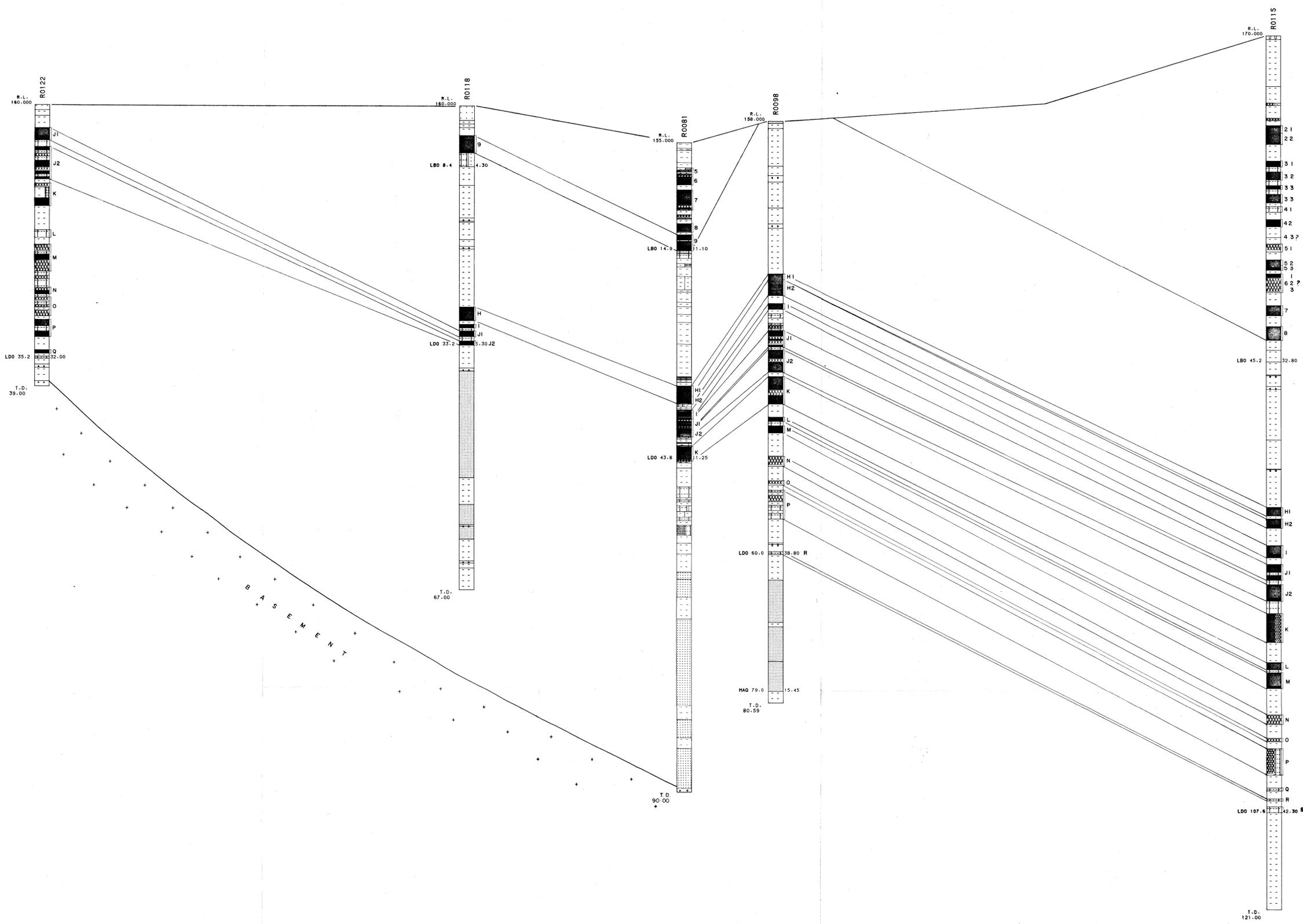
CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	EL20/80 LAUNCESTON LOATTA DEPOSIT E-W CROSS SECTION F-F'		
DRAWN	ELLIS	6-APR-84		SCALE V 1:200 H 1:2500 PLATE 7
CHECKED				DRAWING NO. 6456 70020 - 197
REVISED				



905035

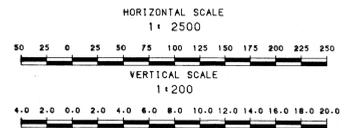
NNW

SSE



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

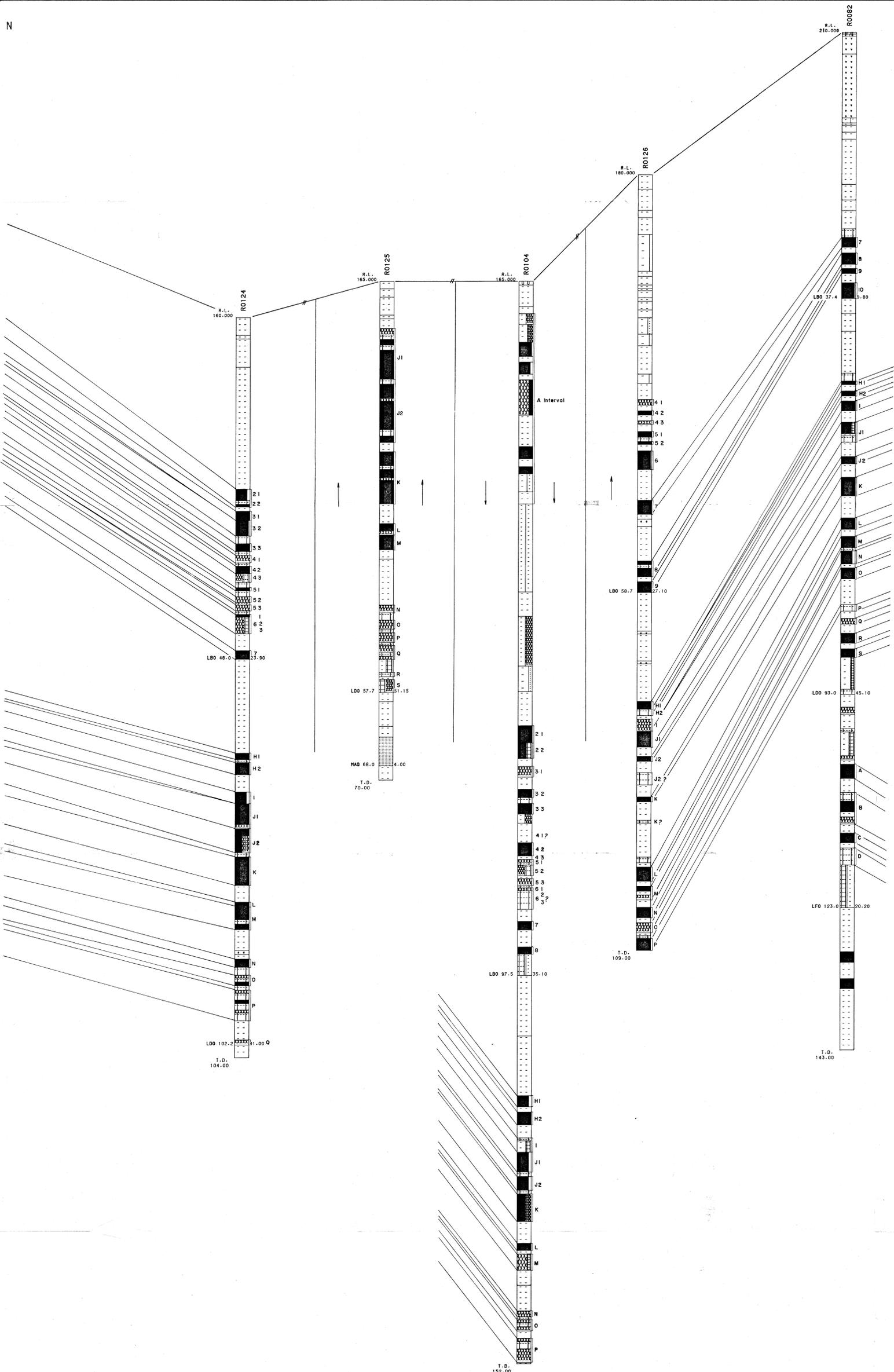


CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	EL20/80 LAUNCESTON		SCALE V 1:200 H 1:2500
DRAM	ELLIS	LOATTA DEPOSIT		PLATE B
CHECKED	6-APR-84	NORTH-SOUTH CROSS SECTION G-G'		DRAWING NO. 6457 70020-198
REVISED				

908036

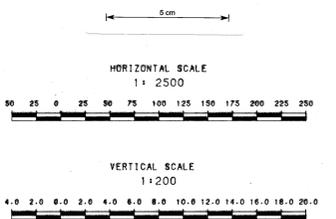
N

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 | LIGNEOUS CLAY |
| SHALES | DOLERITE |
| SILTSTONE | BASALT |
| SANDSTONE | BASEMENT CUNDIFF. J |
| CONGLOMERATE | CORE LOSS |

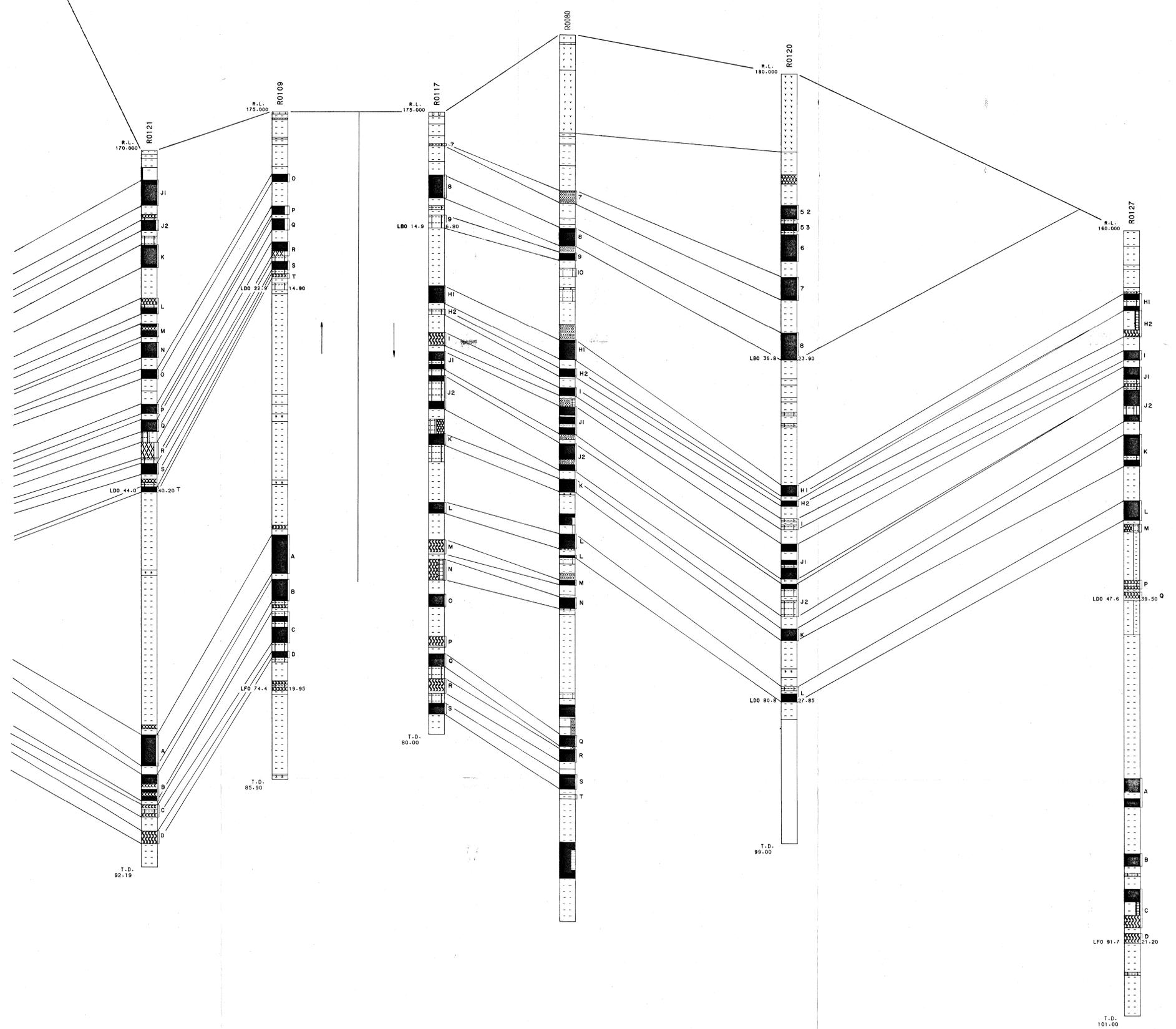


908037

CSR Limited Coal Division		EXPLORATION AND EVALUATION GROUP		
DRAWING	DATE	EL20/80 LAUNCESTON		SCALE V 1:200
ELLIS	6-APR-04	LOATTA DEPOSIT		M 1:2500
CHECKED		N-S CROSS SECTION G'-G''		PLATE 6458
REVISED				DRAWING NO. 70020 - 199

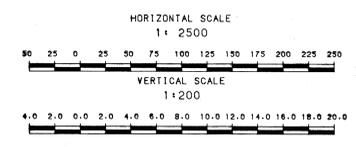
N

S



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] LIGNEDUS 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 N-S CROSS SECTION G''-G'''		
DRAWN	ELLIS	6-APR-84		SCALE V 1:200 H 1:2500
CHECKED				PLATE 10
REVISED				DRAWING NO. 6459 70020-200

908038
5cm