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THE SHELL COMPANY OF AUSTRALIA LIMITED

EXPLORATION LICENCE EL 5/61

TASMANIA

AN ASSESSMENT OF THE MOUNT NICHOLAS COAL DEPOSIT

BY

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VOLUME 1A GEOLOGY AND RESERVE ESTIMATION

TEXT

CEPR 11/81

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VOLUME I A

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MOUNT NICHOLAS PRE-FEASIBILITY STUDY REPORTS

SHELL REPORTS:

Tasmania EL 5/61. An assessment of the Mount Nicholas Coal Deposit

*	Geology and Reserve Estimation : Text Vol 1A	CEPR 11/81
	Geology and Reserve Estimation : Enclosures Vol 1B	CEPR 11/81
	Mining Geology : Text Vol 2A	CEPR 11/81
	Mining Geology : Enclosures Vol 2B	CEPR 11/81
	Physical and Chemical Properties of Coal Vol 3	CEPR 11/81

Preliminary Coal Transportation Study. Mount Nicholas - Tas CEPR 19/81

A Marketing Feasability Study for the Prospective Mount Nicholas Coal Mine CEPR 20/81

ASSOCIATED REPORTS

Dames + Moore Pre-Feasability Study.
Proposed Underground Coal Mine. Mount Nicholas. Tasmania
Volume I (Text)
Volume II (Enclosures)

Report to The Shell Company of Australia Limited - Coal Division.
Geotechnical Assessment of Mining Conditions. Nicholas Range - Tasmania
Prepared by P.G. Fuller; May 1981.

Report to The Shell Company of Australia Limited - Coal Division
Tunnelling for Mine Access. Nicholas Range - Tasmania
Prepared for P.G. Fuller, June 1981 by F.J. Marshall Consulting Engineer.

*This Volume

List of Enclosures Volume 1.B.

(Abbreviations used on enclosures are L for Lower and M for Middle)

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Topographic Map	1:20,000	1/1
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MII Seam Iso-Ash Floats 1.70	"	1/30

NB * TRANSPARENCIES HELD

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SUMMARY

The Mount Nicholas coal deposit is located near the township of St. Marys in northeastern Tasmania. It occupies an area of approximately 15 km² on the northwesern edge of Exploration Licence EL5/61 jointly held by the Shell Company of Australia Limited (60%) and Industrial and Mining Investigations Pty. Limited (40%). The region is one of traditional coal mining activity, and is well served by community and transport infrastructure.

The deposit occupies a segment of the east-west trending Nicholas Range, and is bounded by coal tenement boundaries to the east and west, and by coal subcrops to the north and south. Flat lying Triassic coal measures, which account for 300m of the ranges relief, are capped by up to 150m of concordant dolerite. Recent dolerite scree deposits mantle the slopes of the range restricting exposure of the coal measure sequence.

Nineteen fully cored holes have been drilled into the deposit on a nominal 1 km grid spacing. Four coal seams of economic quality and thickness have been delineated in the basal 100m of the coal measures. Of these, three are judged to be mineable by conventional adit entry underground methods. Total in situ reserves, mainly of measured status, are 45.5 million tonnes, from which it has been estimated a total of 14.7 million tonnes of washed product coal could be produced.

The coal is dull, has a low reactives content and is classified as high volitile bituminous. This thermal coal is very similar in quality to other Tasmanian Triassic coals. A typical product specification of 9% total moisture, 20% moist ash, and 23.3 MJ/kg moist specific energy is estimated at washery yields ranging from 67.5% to 80%.

Mineable coal is restricted to a broad north-south trending graben. Within the graben the delineation of small scale faulting is conjectured, and mining methods will need to be sufficiently flexible to cope with unexpected small faults. Similarly seam washouts are to be expected in areas where sandstone forms the immediate seam roof. From a consideration of the reserves distribution and the mining geology (Volume 2), mining entry from the northern side of the deposit is indicated.

855010

1. INTRODUCTION

1.1 Scope

This report presents a basic qualitative and quantitative description of coal seams occurring in the Mount Nicholas deposit in north east Tasmania. It draws on a data base which is sufficient for a preliminary assessment only of the feasibility of mining operations, and does not represent an adequate basis for detailed mine or beneficiation plant design.

Local topography, climate, and infrastructure are briefly described as a preliminary guide to secondary operational constraints. The description of the geology of the deposit is focussed on those factors which will influence mining. The history of exploration in the region is outlined as a guide to the scope and limitations of the data base. Mining history is dealt with comprehensively elsewhere, and is only touched upon in this report.

The account of coal quality in this volume is restricted to basic float-sink data, with an account of utilization characteristics in volume 3. In situ coal reserves are quantified together with estimates of their production potential.

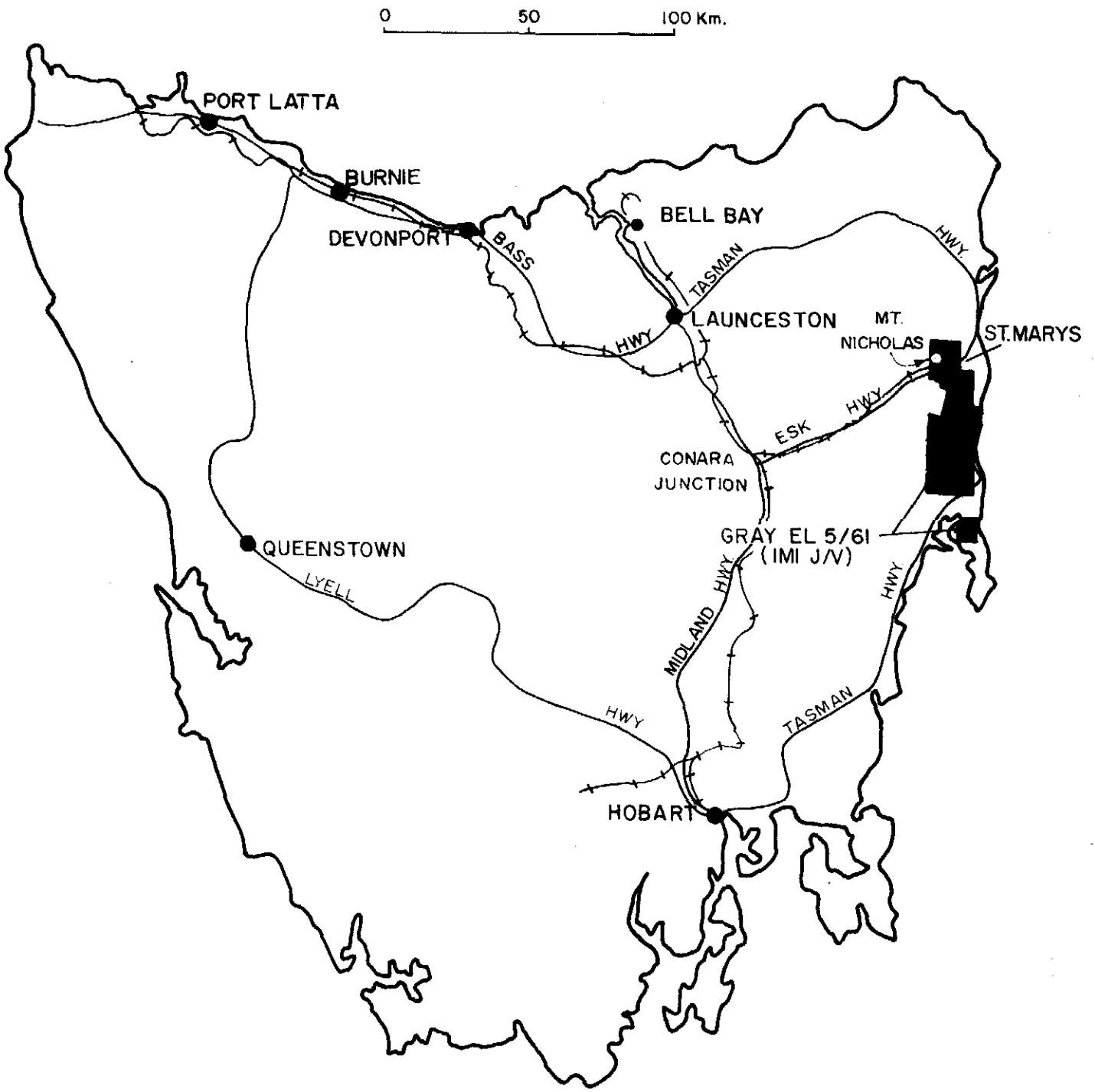
1.2 Location, Access and Infrastructure

The Mount Nicholas deposit is located in north eastern Tasmania some 16 km inland from the east coast (Figure 1). It is developed in the Nicholas Range which trends east-west and rises to over 800 m above sea level.

St. Marys (population 700), the nearest town, is some 9km to the south-east of the deposit. The mining village of Cornwall situated on the southern slopes of the Nicholas Range is about 4km closer to the deposit but does not have the hospital, schools, shops, and other community facilities possessed by St. Mary's.

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MT. NICHOLAS LOCATION MAP — TASMANIA



5 cm

Author : Coal Division	Date : June 1981	Fig. 1
Report No: CEPR 11/81	Drawing No: C-1788	

The Esk Highway which connects St. Mary's with the Midland Highway passes within 2km of the deposit, and is linked to it by an all weather gravel road controlled by the Forestry Commission of Tasmania. The northern flank of the deposit is well served by a network of minor forestry roads. The southern flank is accessible only by four-wheel drive tracks.

A 1067mm gauge railway operated by Australian National Railways passes within 2km of the deposit. It terminates at St. Marys, linking that centre with Hobart, Launceston, Bell Bay, Devonport and Burnie. The rail distances from St. Mary's to Hobart and Bell Bay are 170km and 140km respectively. At present the line is used only for the transport of freight, timber and coal.

1.3 Topography and Climate

The topography of the deposit is dominated by the Nicholas Range which rises from the Break O'Day Plain (250m A.S.L.) to a height of between 700m in the east to over 800m in the west. Mount Nicholas (857m) is the highes' point on the range.

The upper 200m of the range is a scarp bounded dolerite remnant, while the lower slopes have a moderate gradient over scree-shrouded coal measures. The symmetry of the range is disrupted by Huntsman Cap, a dolerite protusion on the northern slopes.

To the south the range falls away to the Break O'Day Plain, and in the north merges with dissected lowlands of ridges and gullies. The range forms a drainage divide between the Scamander River catchment in the north and the Break O'Day River catchment in the south. Surface water is scarce on the range during the dry summer months, and only Millstream Creek on the southern flank, and Huntsmans Creek on the northern flank and known to flow permanently.

The closest major watercourse to the deposit is the Break O'Day River (non-perennial) some 3km to the south. It meanders westward to a confluence with the South Esk River near Fingal.

The climate of the area can be classified as cool, temperate, marine, with a rainfall varying from 1038mm (100 rain days) at St. Mary's, to 1278mm (138 rain days) at Gray, 6km southeast of St. Mary's. Rainfall is greatest in the months May to September though heavy rain can occur at any time of the year when moist onshore winds prevail.

Flooding of the Break O'Day Plain and the Fingal Valley to the west may occur several times a year, and occasionally disrupts road and rail transport. Fogs extending to west of Fingal are common during autumn and winter, and occasionally do not dissipate until early afternoon.

Mean maximum daily temperature varies between 21°C in mid-summer to 9°C in mid-winter. Minimum temperatures of less than -5°C are frequent in winter.

1.4 Mining and Land Tenure

The Mount Nicholas deposit is located within the northern end of Exploration Licence (EL) 5/61 (Gray) which was granted to Industrial and Mining Investigations Property Limited (I.M.I.) on the 23rd February, 1961. The Shell Company of Australia Limited (Shell) has since earned a 60% interest in the EL. See Figure 1.

The area covered by the EL is exclusive of mining leases on the Nicholas Range held by the Cornwall Coal Company N.L., and the western edge of those leases forms the effective eastern limit of the Mount Nicholas deposit, Enclosure 1/1.

All of the land under which coal occurs at Mount Nicholas is State Forest controlled by the Forestry Commission of Tasmania.

1.5 History of Mining and Exploration

1.5.1 Mining

The presence of coal in the Mount Nicholas area has been known since the 19th century when numerous coal outcrops were observed in the creek beds and along the flanks of the Mount Nicholas Range. (Gould 1861; Thureau 1883, Twelvetrees 1902; Keid 1920, and Hills et. al. 1922).

855014

Mining commenced in the Mount Nicholas Range towards the end of the 19th century when four comapnies acquired leases in the area: Mount Nicholas Coal Mining Company, N.L.; Jubilee Coal Company; Silkstone Collieries; Cornwall Coal Company.

(i) Mount Nicholas Coal Mining Company N.L.

This company held 6.7 km^2 of leases situated on the southern flank of the range at a distance of approxiamtely 6.5km from St. Marys. The mine operated for over 30 years until 1958. Five seams were worked and they produced about 1.7 million tonnes of coal. In ascending order the worked seams were known as; 8ft seam (Fenton seam), 4ft 9" (Hittit seam), 4 ft seam, 6ft seam and Riley's seam. The stratigraphic position of these seams is shown in Figure 2.

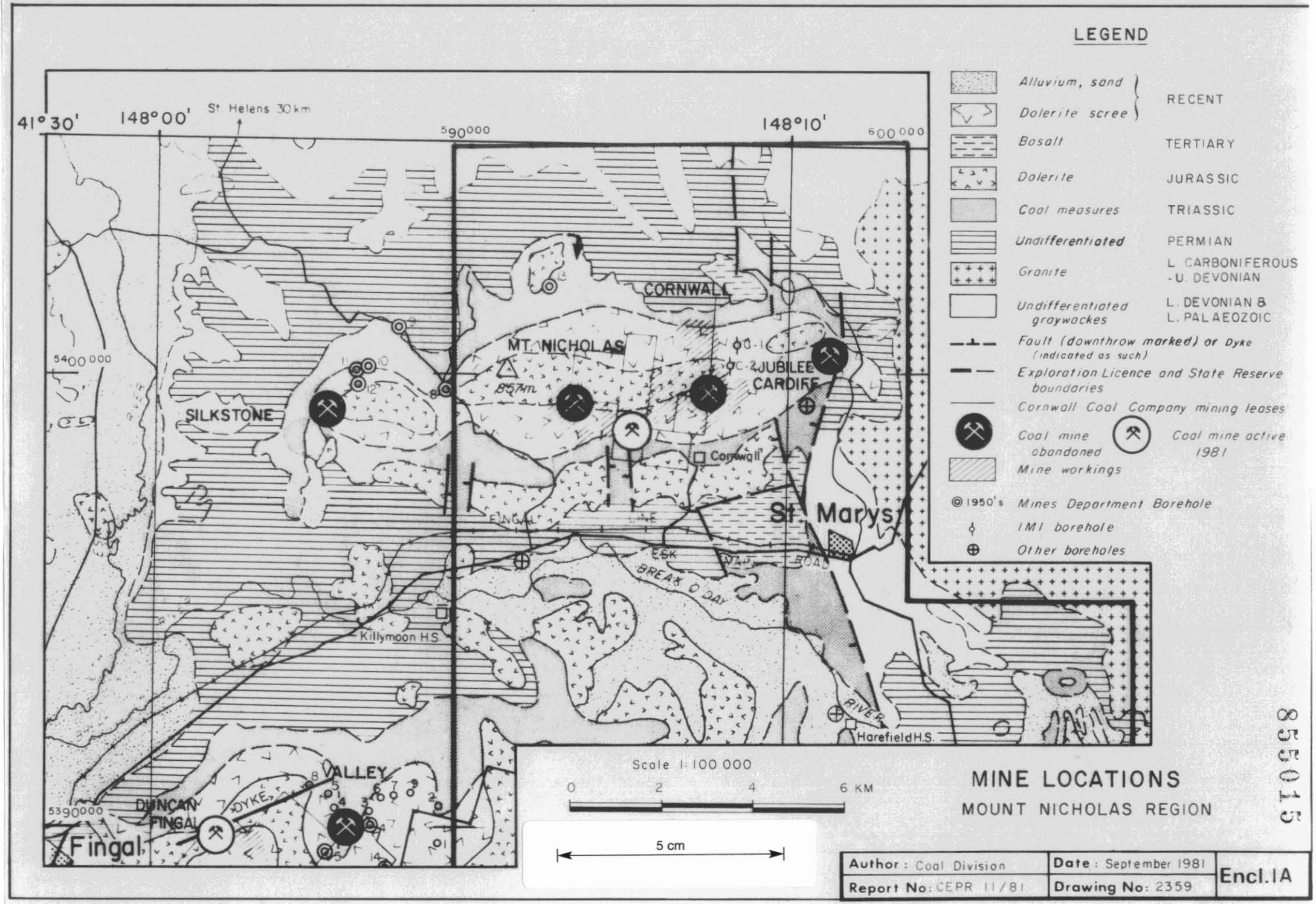
(ii) Cornwall Coal Company

At the Cornwall mine three seams - Blue (3.25m), Hittit (1.45m), and Fenton were exploited. Workings were driven in a northern direction and coal was mined using the bord and pillar system. Minor faults were common. The mine closed in 1963 after producing about 4 million tonnes of coal.

Coal production commenced at the Blackwood Mine in 1980, after considerable difficulties in constructing a portal in the unstable dolerite scree and weathered sandstone. Production levels of over 200 000 tonnes/annum are thought to have been achieved. The coal is being mined by the bord and pillar method using a continuous miner, and is then transported by road to a washery at Fingal

(iii) Jubilee Coal Company

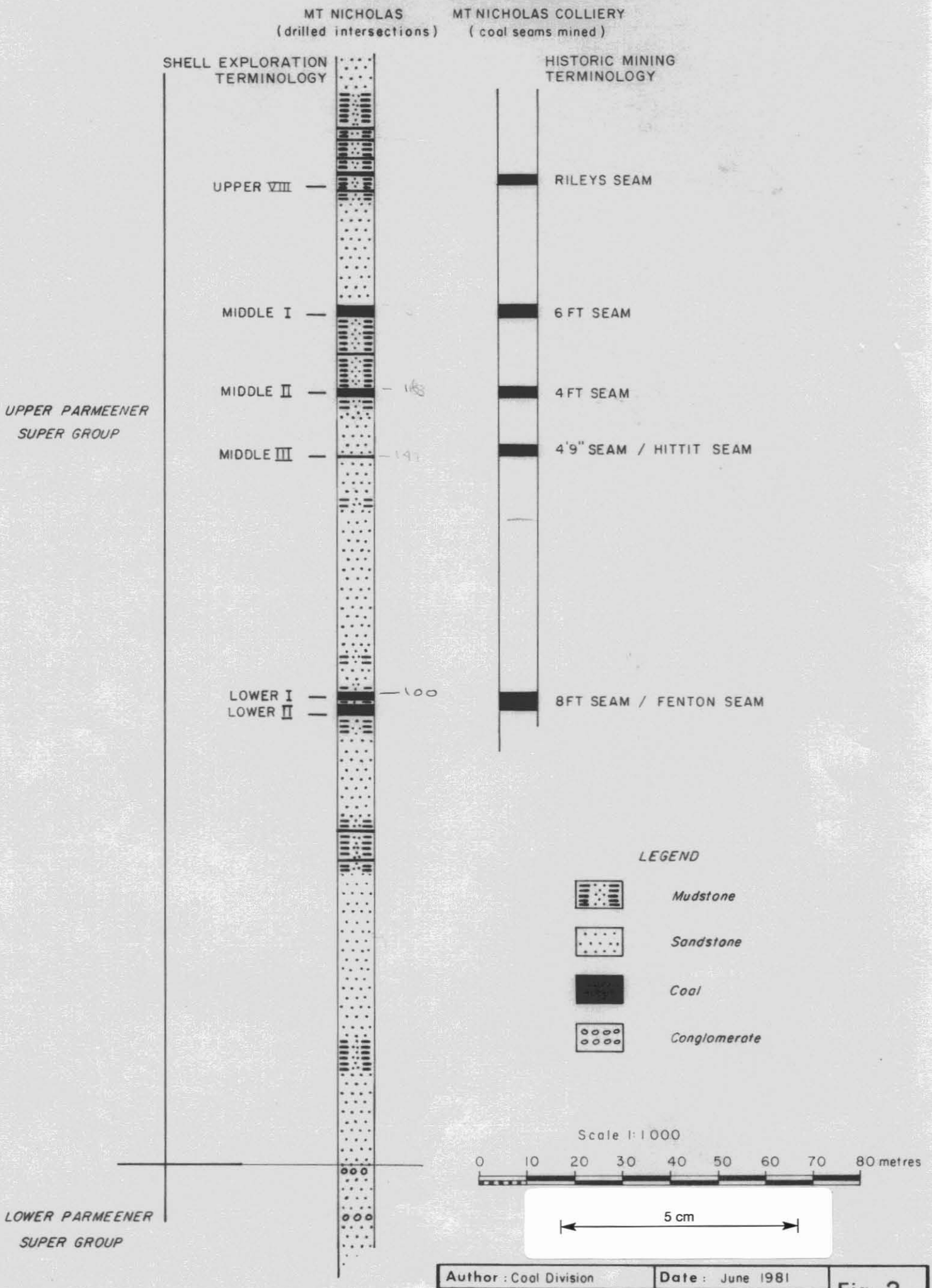
The Jubilee Coal Company held a 1.7 km^2 lease, 5km north of St. Marys with mining operations occurring at the Cardiff and Jubilee mines. The Cardiff workings were mined using the bord and pillar system until a major fault was encountered. At the Jubilee Mine a tunnel was driven over 120m and crosscuts deve-


LEGEND
Alluvium, sand
Dolerite scree
RECENT
Basalt
TERTIARY
Dolerite
JURASSIC
Coal measures
TRIASSIC
Undifferentiated
PERMIAN
Granite
L. CARBONIFEROUS - U. DEVONIAN
Undifferentiated graywackes
L. DEVONIAN & L. PALAEOZOIC
Fault (downthrow marked) or Dyke (indicated as such)
Exploration Licence and State Reserve boundaries
Cornwall Coal Company mining leases
Coal mine abandoned
Coal mine active 1981
Mine workings
1950's Mines Department Borehole
IMI borehole
Other boreholes
41°30'
148°00'
St Helens 30km
590000
148°10'
600000
5400000
5390000
CORNWALL
MT. NICHOLAS
857m
JUBILEE
CARDIFF
SILKSTONE
Cornwall
FINGAL
St. Marys
ESK
BREAK O DAY
ROAD
Killymoon H.S.
VALLEY
DUNCAN
FINGAL
DYKE
Fingal
RIVER
Harefield H.S.
Scale 1:100 000
0
2
4
6 KM
5 cm
MINE LOCATIONS
MOUNT NICHOLAS REGION
Author : Coal Division
Date : September 1981
Report No: CEPR 11/81
Drawing No: 2359
Encl.1A
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TASMANIA - EL 5/61 - MT NICHOLAS

GENERAL COAL SEQUENCE

855016



Author : Coal Division	Date : June 1981	Fig. 2
Report No: CEPR 11/81	Drawing No: 2143	

loped from this. The mine closed in 1960 after producing about 665,000 tonnes of coal.

The quality of coal produced from the Jubilee Mine differed slightly from the coal mined from the Cornwall and Mount Nicholas mines. Analyses showed a slight increase in the percentage of volatile matter which was apparently responsible for the slightly better burning qualities of the Jubilee coal.

(iv) Silkstone collieries

Mining operations carried out on the Silkstone lease south of Mount Durham were essentially of a prospecting nature. The presence of oxidised coal and excessive inflow of water due to the shallow depth of the seams limited mine development and operations ceased in the 1950's.

1.5.2 Exploration 1969-1981

Between 1969 and 1972 the Department of Mines drilled six boreholes in the vicinity of Mount Durham and one borehole (DOM 13) near Huntsman's Cap. These boreholes penetrated the major part of the Triassic sequence and confirmed the existence of potentially mineable coal seams to the west and north of Mount Nicholas.

In 1978, the Department of Mines drilled two holes (DOM 33 & 36) on the Cornwall Coal Company's lease prior to the development of the new Blackwood mine in the downfaulted block between the old Mount Nicholas and Cornwall Mines. Coal seams from these boreholes can be correlated with those worked in the old Cornwall mine. In 1978/79, the Cornwall Coal Company drilled additional holes in order to define the reserves available for the developing Blackwood mine.

In 1979, Shell commenced exploration at Mount Nicholas. This formed part of a joint venture investigation of EL 5/61 with I.M.I. A preliminary review of the area based largely on published information, aerial and Landsat photographs was undertaken by Taylor (1978), Kind (1979) and Layton et al. (1978).

Following reconaissance mapping in 1979, four boreholes were drilled at Mount Nicholas in 1980, to examine the extent, thickness and quality of any seams present. Three seams, each containing more than one coal bed, were intersected, of which two were considered to contain coal of economic potential. These seams were informally named the Lower, Middle and Upper seams as correlation with coal seams elsewhere in the Nicholas Range was uncertain. From the results of the 1980 drilling programme, the indicated coal reserves in Mount Nicholas were estimated at 50 million tonnes.

With mine pre-feasibility studies planned to commence by mid 1981, the next phase of exploration commenced in December 1980 and was designed to:

i) upgrade Mount Nicholas reserves to measured status.

ii) assess geological factors likely to infuence mining conditions.

iii) provide a preliminary assessment of coal washability and utilization quality characteristics.

Fourteen drillhole sites were selected on a 1 km grid to raise the reserve category to measured status. The programme was completed in June 1981 with a total of 2073 m being drilled.

All the coal measure sediments and most of the overlying dolerite scree was cored.

Core was logged in detail by geologists at drillsites with particular attention being paid to recording the mechanical properties of the sediments. Core intervals 2-4 m above and below the coal seams were sampled in order to provide a geotechnical evaluation of potential roof and floor conditions. Coal from the Middle and Lower seams was sampled in relation to potentially mineable plies. These samples were subjected to multiple washability tests and utilization quality analyses. Point load tests were carried out on the core collected from the drillholes in order to provide additional geotechnical information. (All cores were photographed before sampling in order to provide a permanent record).

Nine holes were wireline logged by B.P.B. Instruments Pty. Ltd. (Australia) to assist correlation between drillholes and to confirm seam thicknesses. In addition, petrophysical informaton was collected to enable further research into the prediction of geotechnical rock properties from log response.

Field mapping was undertaken to assist in delineating seam subcrops, indicating areas of shallow scree, and determining major joint directions.

Surveying of boreholes and seam outcrops was undertaken by Peacock, Darcey and Anderson Pty. Ltd. to provide accurate locations and elevations.

2. GENERAL GEOLOGY

2.1 Regional Setting

The Mount Nicholas coal deposit lies within the Permo-Triassic Tasmania Basin which extends over most of the eastern half of Tasmania. Unconformably underlying the basin is a basement of Siluro-Devonian sediments and Upper Devonian granite. Intruded into the basin, but now effectively overlying it, are dolerite sills emplaced during the Jurassic concurrent with an episode of major tensional faulting. Surficial deposits of alluvium, dolerite talus and scree have accumulated during recent phases of topographic evolution (Figure 3).

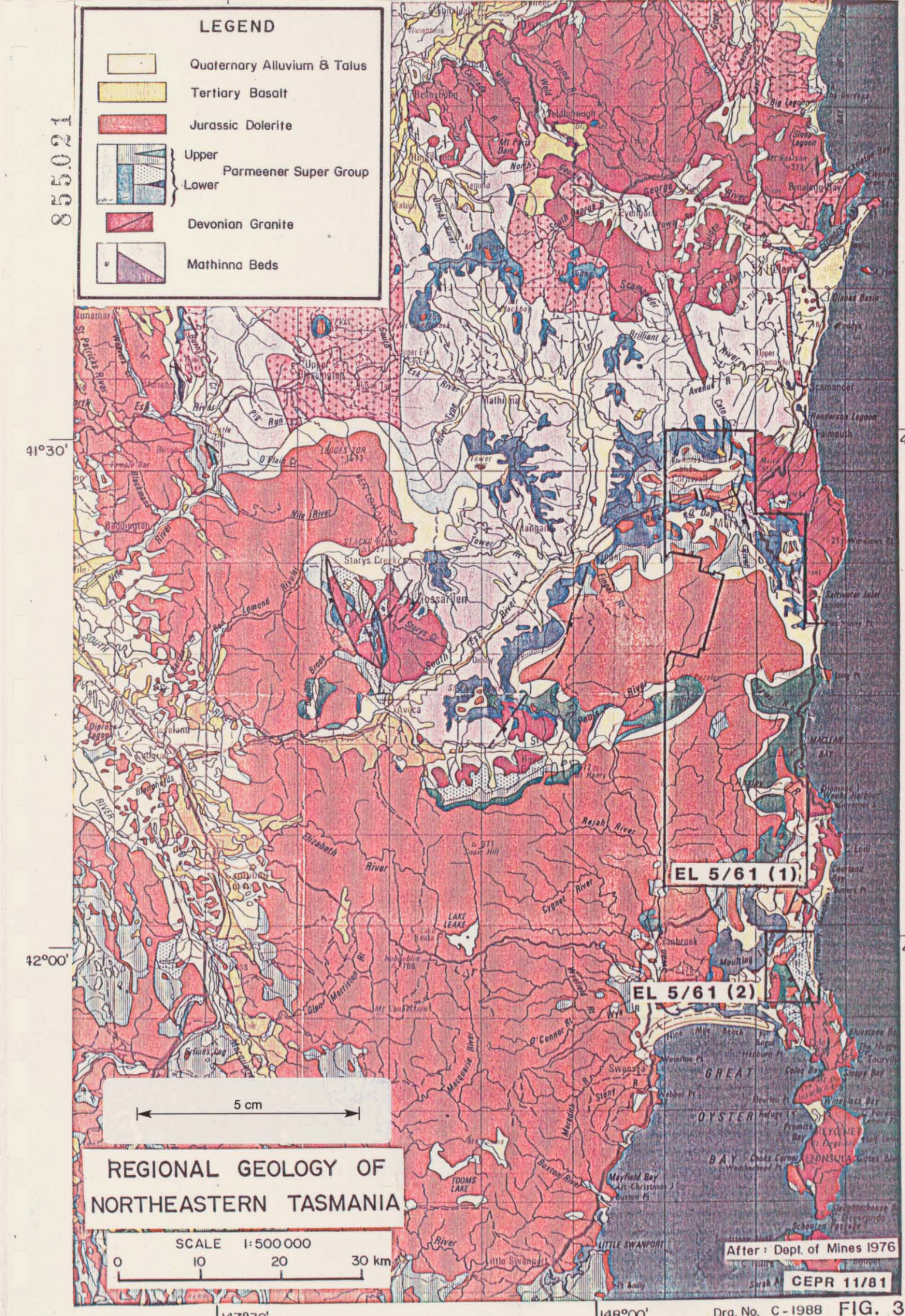
2.2 Mount Nicholas Geology

2.2.1 General

The Mount Nicholas deposit is part of the Nicholas Range, an east-west elongated outlier of Permo-Triassic sediments capped by Jurassic dolerite. Both the Permo-Triassic sediments and the dolerite sill dip very gently to the south east. Mount Nicholas has a relief of 650m above the surrounding lowlands, of which the upper 150m consists of dolerite and the lower 500m is Permo-Triassic sediments. The unconformably underlying Siluro-Devonian Mathinna Beds are exposed in deeply incised gullies to the north of the range. Dolerite talus and scree blanket the slopes of the range restricting the exposure of Permo-Triassic sediments. (Enclosure 1/4)

Two major north-south trending normal faults have been inferred within and adjacent to the deposit. The bulk of the deposit is contained within a graben defined by faults of 70m and 50m displacement, in the west and east respectively.

Two discordant dolerite bodies, both on the northern flank of Mount Nicholas, have been inferred. Huntsmans Cap is regarded as a plug. A linear dolerite exposure trending between Mount Nicholas and Huntsmans Cap is interpreted as a dyke. (Enclosure 1/2).


LEGEND
Quaternary Alluvium & Talus
Tertiary Basalt
Jurassic Dolerite
Upper
Parmeener Super Group
Lower
Devonian Granite
Mathinna Beds
8550 21
41°30'
42°00'
EL 5/61 (1)
EL 5/61 (2)
5 cm
REGIONAL GEOLOGY OF
NORTHEASTERN TASMANIA
SCALE 1:500 000
0 10 20 30 km
After : Dept. of Mines 1976
CEPR 11/81
Drg. No. C-1988 FIG. 3

2.2.2 Stratigraphy

The name Parmeener Super-Group (Banks, 1973) has been introduced to define the sediments of essentially Permo-Triassic age, but extending in age from the late Carboniferous to the late Triassic. This Permo-Triassic sequence contains two broad lithological units differentiated on the basis of depositional environments and includes a lower division of glacial and marine beds (Lower Parmeener Super-Group), and an upper essentially freshwater sequence (Upper Parmeener Super-Group). In the past this lithological division has been equated with the Permo-Triassic System boundary, a practice which is no longer followed due to insufficient supporting fossil evidence (Forsyth et al, 1973).

The 500m thick sedimentay sequence at Mount Nicholas consists of approximately 100m of Lower Parmeener Super-Group and up to 400m of Upper Parmeener Super-Group.

The Lower Parmeener Super Group (formerly designated Permian) has been intersected in five holes at Mount Nicholas (DOM 8, GY 24, 26, 28 and 31) and is exposed at several locations around the base of the range. The sediments consist mainly of quartzose sandstones, fossiliferous limestones, and marine mudstones that often contain erratic quartz granules and pebbles which have been regarded as having an ice-raft origin.

The basal 85m of the Upper Parmeener Super-Group is transitional between the underlying marine sequence and the overlying entirely non-marine coal measure sequence. While the upper part of this interval contains a few thin coal beds, the absence of significant coal seams is consistent with a paralic depositional environment.

The remaining 300m of Upper Parmeener Super Group at Mount Nicholas is made up of Triassic coal measures. In this programme only the basal 200m of these coal measures have been drilled, of which only the lower 100m interval contains coal seams of economic significance. Four seams, each with thicknesses extending into the 1.5m to 3.0m range, have been designated in ascending order, Lower II, Lower I, Middle II and Middle I. Two minor coal horizons have

been tentatively correlated and designated Middle III and Upper VIII (Figure 2).

2.2.3 Coal Measure Sedimentation

The coal measure sequence is typical of sediments deposited in an upper fluvial flood plain regime. Upwards fining cycles predominate. The coal seams consist of low sulphur durainous coal, and are prone to splitting and rapid lateral quality variation. The coal seams are generally associated with mudstones while cross bedded sandstones with erosional basal contacts make up the bulk of the interseam sediments.

The floor to coal sequence is invariably a transition from sandstone to siltstone to mudstone to coal, reflecting a lateral depositional transition from channel, to overbank, to flood plain to swamp. The coal to roof transition tends to be a coal to mudstone oscillation which is disrupted by erosional sandstones resulting from channel migration. Generally the roof lithology of the coal seams is mudstone, except where subsequent channel activity has superimposed a sandstone roof.

Seam washouts have been inferred in three drillholes (GY 43, 45, 46) and are known to be extremely common in the Duncan Mine at Fingal. There is no reliable method of estimating the extent of individual washouts, or their frequency, from widely spaced drillholes. The occurrences at the Duncan Mine suggest a usual channel width of approximately 15m. The few observed cross-bedding azimuths (figure 5) suggest appreciable variation in channel orientation, and patterns of washout variation are best inferred from seam roof lithofacies maps. Washouts are expected to be more common in sandstone roof areas, and less likely with the increasing thickness of mudstone roof. The thickest seam section inferred to have been removed by washout is 3 m in the Middle I seam at GY45.

The interseam sandstones are light grey, medium to coarse grained, lithic labile, with large scale cross stratification. Local concentrations of coaly fragments and laminae on foresets are the main source of rock inhomogenety.

The siltstones range from massive to finely laminated, and may contain mica on bedding planes. Mudstones are generally massive to poorly bedded and occasionally grade into well laminated shales. Mudstones are generally grey and light brown to cream when thinly interbedded with coal seams. A few of the interseam mudstones have the well developed kaolinite recrystallisations characteristic of tonsteins.

Some of the pale coloured argillaceous rocks in the sequence may be of pyroclastic origin. Pyroclastic rocks and flow volcanics have been reported in the Upper Parmeener Super-Group elsewhere in the region (Bacon and Everand, 1981).

2.2.4 Coal Measure Structure

The coal seams at Mount Nicholas dip to the south east within a graben bounded by north south trending faults on the western and eastern flanks of the deposit. The subcrop limits the northern and southern extent of the deposit (Enclosures 1/3 A, B + C, 1/10, 13, 17, 21, 35 & 36). Dip magnitude varies between 10 to 20 m/km with marked consistency between all seams. Folding is almost completely absent except for mild drag adjacent to the major faults, and mild diapiric drag which has been inferred around the dolerite plug at Huntsmans Cap.

Both of the major faults were previously known. The recent drilling programme has assisted in defining their location and quantifying their displacements. The western fault has a displacement of approximately 72m and strikes between DOM8 and GY40. The eastern fault has a displacement of approximately 48m and strikes between GY44 and GY45. Several interpretations of the detailed structure within this fault bound graben block are possible. The structural variation which is evident from borehole intersections can be regarded as due to flexuring or faulting. Three possible interpretations are presented. In interpretation A it is assumed there is no faulting, while interpretation B and C present alternative fault configurations.

Interpretation A (Enclosure 1/3A) reconciles the drill hole data without the use of faulting. The implied structure is that of a gentle monoclinal warping that pitches to the south east, and of mild diapiric doming in the vicinity of Huntsmans Cap.

Interpretation B (Enclosure 1/3B) reconciles the drill hole data with a combination of faults. The seam is assumed to have no folding, a constant east-west strike and a variable southern dip. The structural anomaly around GY34, near Huntsmans Cap, is assumed to be a small scissor north-south fault with a down thrown western side of 2 to 5m, and pinching out to the south. This fault is in general alignment with the northern dolerite dyke. A set of larger faults is postulated further to the west, with a north-south strike and a downthrown (15m) eastern block. This faults splits to the south and south east between GY36 and GY37, with a downthrow of 4m and 6-13m respectively, forming a wedge-shaped block. This fault pattern is consistent with the graben tensional faulting pattern.

Interpretation C (Enclosure 1/3C) retains the inferred fault west of Huntsmans Cap and proposes an alternative faulting pattern to reconcile the drill hole data. The seam is assumed to have a constant strike and variable dip as in interpretation B. Two parallel normal scissor faults striking NNW to SSE are located on the western side of the Mount Nicholas area. The fault striking from just east of GY31 to east of GY43 has a downthrown eastern block with increasing displacement (10 to 15m) to the north. The fault striking from just east of GY39 to the west of GY38 forms a parallel step block 1km wide with a western upthrow displacement of 1 to 4m. This fault may pinch out further to the north. This fault pattern would be equally consistent with the graben tensional fault pattern.

The nature of small displacement faults (up to 10m), as recorded in the nearby Nicholas Range mines, is that they are not generally persistant with strikes rarely exceeding 500m. Thus some slightly more complex combination of any of the above interpretations may occur. For simplicity in expression the fault free interpretation A is used as the basis for the displayed cross sections (enclosures 1/35 + 36) and seam structure of the Lower I, Middle II + I (enclosures 1/13, 17 + 21).

The major east-west tensional axis which has been inferred from the north-south orientation of the major faults is also reflected in outcrop jointing patterns (Figures 4 & 5). Similarly, faults encountered in the old Mount Nicholas mine also show a predominant north-south orientation (Figure 6).

2.2.5 Igneous Intrusions

The intrusive rocks at Mount Nicholas are dolerites which conform to the general character of Tasmanian mid-Jurassic dolerites. Intrusion margins are sharp, with chilled margins and only slight thermal metamorphism of the intruded rocks, indicating a magma of low heat capacity or in a low aqueous phase. Columnar jointing is common close to the boundaries and is usually perpendicular to the bounding surface. Later injections are believed to have been injected higher in the stratigraphic column. During dolerite intrusions most of the sedimentary column was subject to brittle fracture (Leaman, 1975). There are three distinct types of dolerite intrusions at Mount Nicholas.

Mount Nicholas is capped with a dolerite sill which is an outlier of the regional complex dolerite emplacements located further to the south. The sill is estimated to be 150m thick and to have a slightly transgressive base at an approximate elevation of 650m. Gravity surveys (Leaman, 1980), and records of nearby coal mines indicate an absence of underlying plugs.

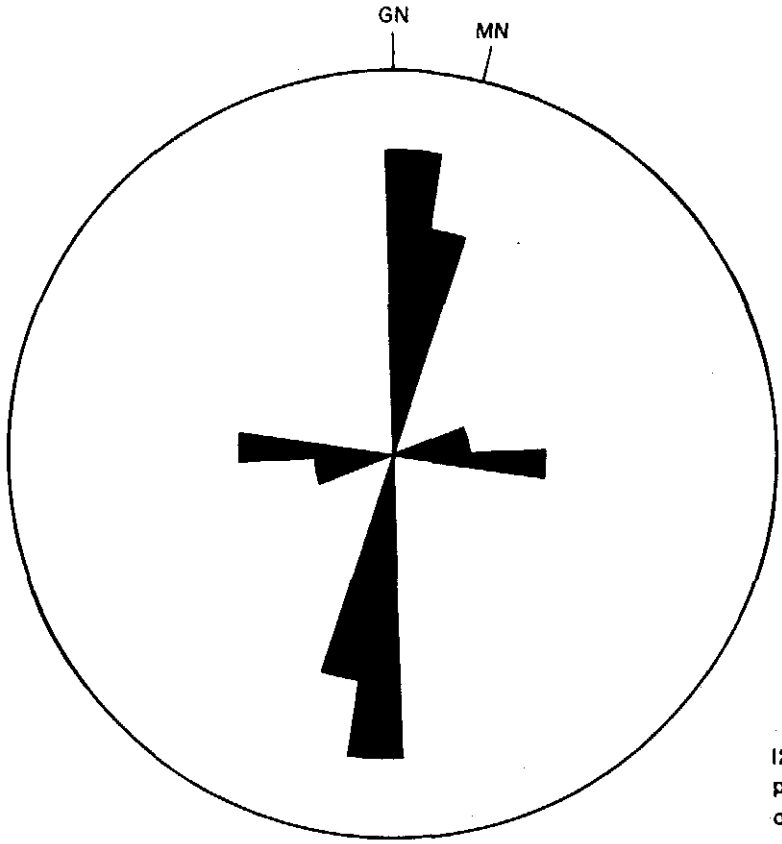
Two dolerite dykes have been located at Mount Nicholas, and each may be associated with north south air photo lineaments (Kind, 1978). The northern dyke outcrops for 250m between Huntsmans Cap and Mount Nicholas, varies in width from 5m to 30m, and appears to be near vertical. The southern dyke was intersected in GY43 below the Lower II coal seam. The latter dyke consists of two sections 2m and 3m thick, dipping at 60 to 70 degrees and exhibits chilled margins and negligible contact thermal metamorphism, though shearing and some minor mineralization extends for 3m above the dyke.

Huntsmans Cap, a dolerite protrusion on the northern flank of the range, is inferred to be a feeder plug. The anomalously low elevat-

ROSE DIAGRAMS OF JOINT SETS

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AREA NORTH OF GY 36

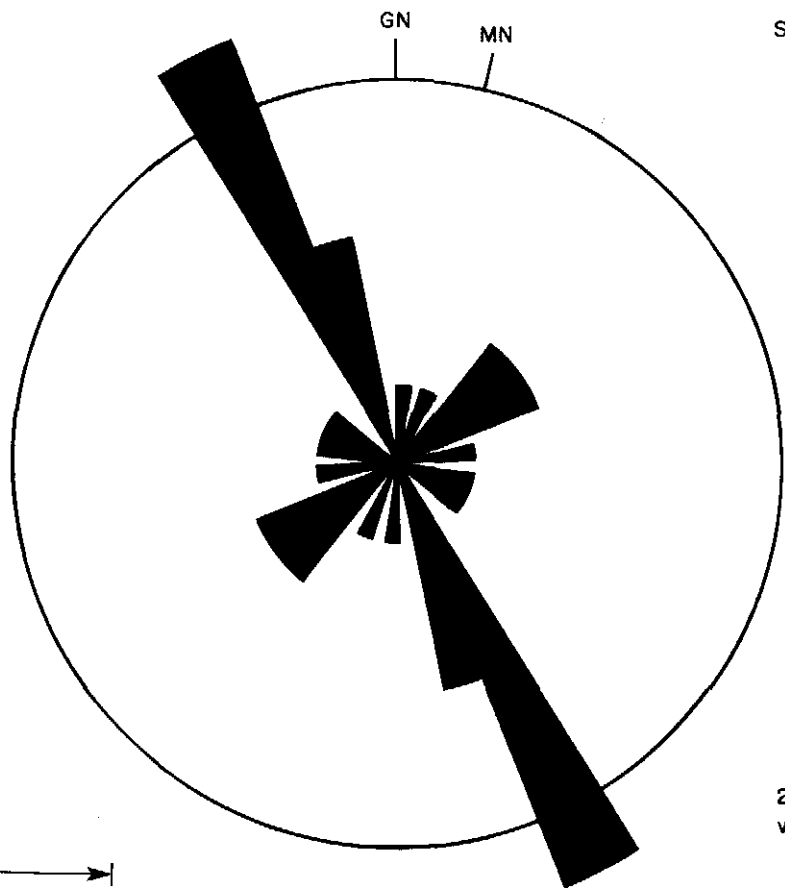


12 Joint sets with steep dips predominantly to the North and West.



SCALE OF JOINT SETS

AREA SOUTH OF GY 33



21 Joint sets with near vertical dips.

5 cm

Author : Coal Division	Date : June 1981
Report No. CEPR 11/81	Drawing No. 2290

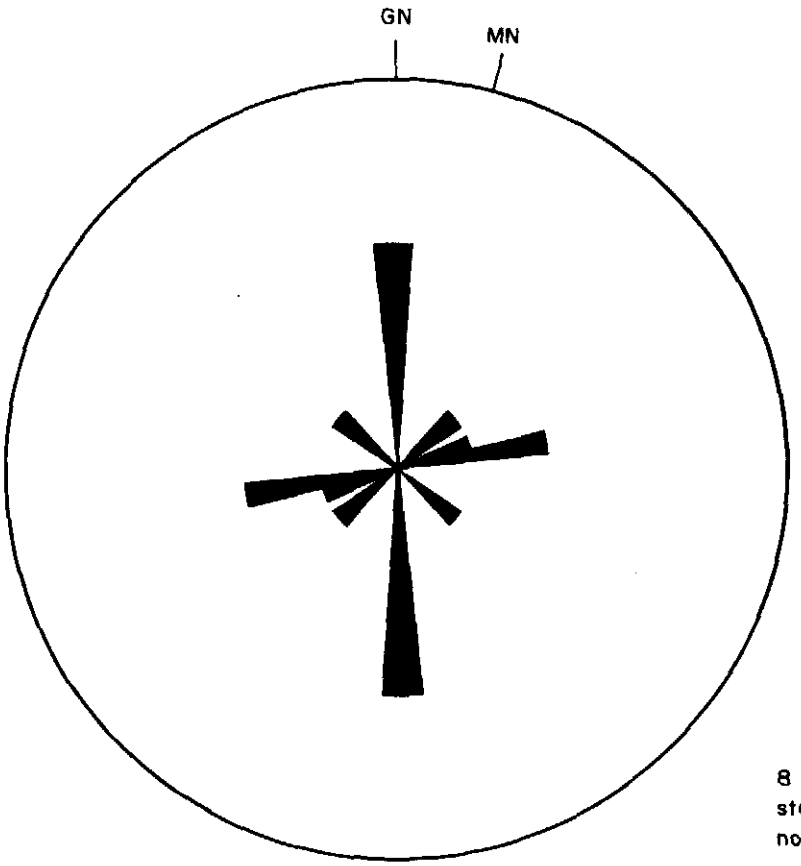
Fig. 4

855028

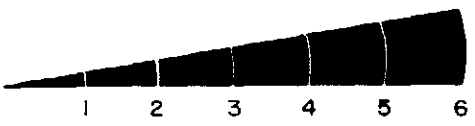
TASMANIA - MT. NICHOLAS AREA EL 5/61

JOINT ROSE DIAGRAM

AREA NORTH OF GY 34

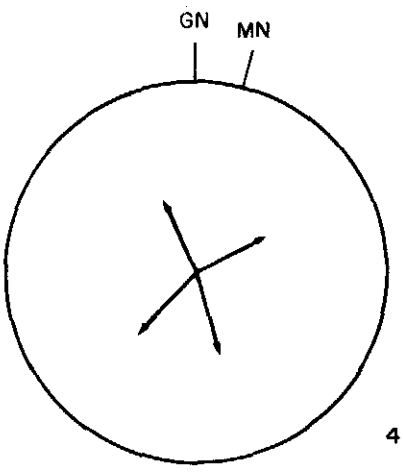


8 Joint sets generally steeply dipping to the north west.



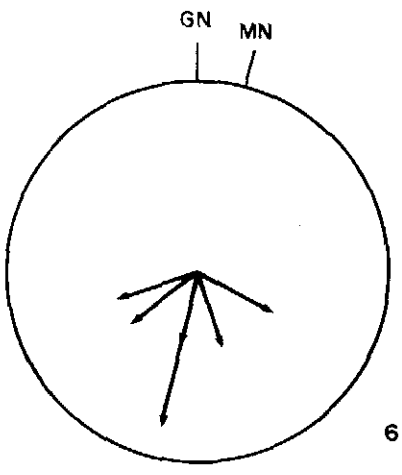
SCALE OF JOINT SETS

CROSS BEDDING DIRECTIONS NORTH OF GY 34



4 Foresets

CROSS BEDDING DIRECTIONS SOUTH WEST OF GY 33



6 Foresets

5 cm

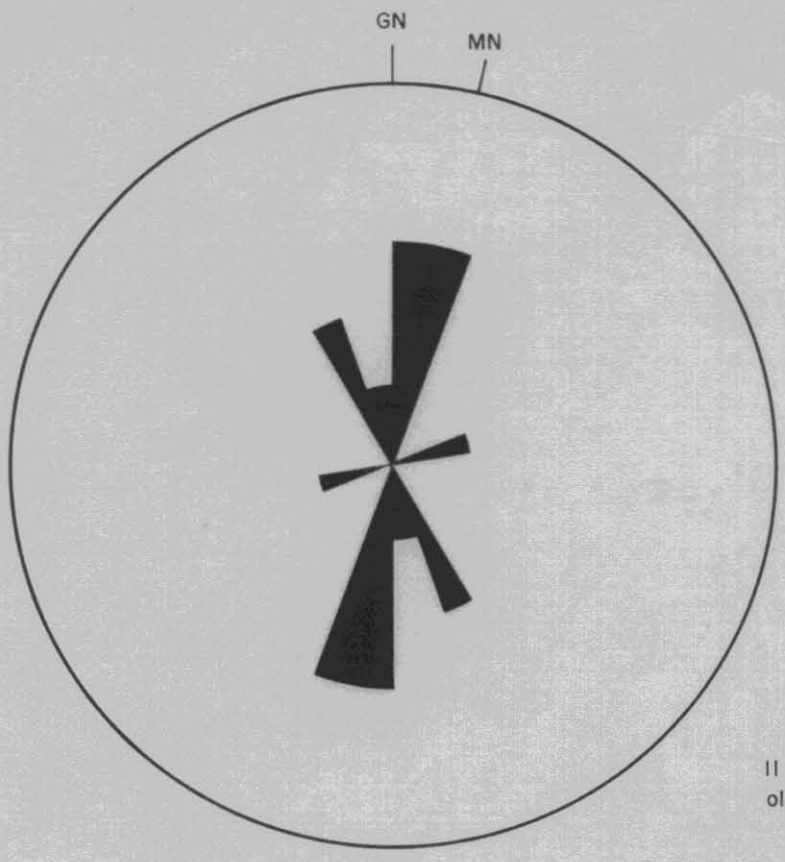
Author : Coal Division	Date : June 1981	Fig. 5
Report No: CEPR 11/81	Drawing No. 2291	

TASMANIA - MT. NICHOLAS AREA EL 5/61

ROSE DIAGRAMS OF SHEAR SETS

855029

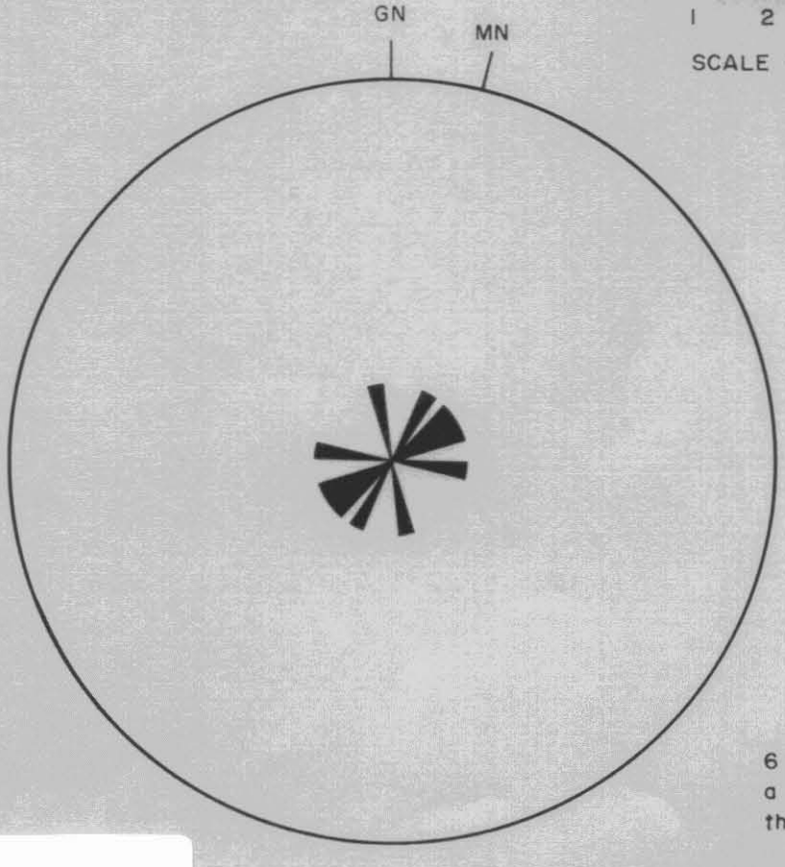
OLD MINES S.E. OF GY43



11 Faults recorded on old mine records.



SCALE OF SHEAR SETS



6 small roof shears with a medium to high dip to the north.

5 cm

Author : Coal Division	Date : June 1981	Fig. 6
Report No: CEPR 11/81	Drawing No: 2892	

ion of the basal exposed dolerite, the shape of the body, and the location on the projection of an exposed dyke all favour the plug interpretation. Furthermore a mild structural anomaly in coal seams to the west of the body can readily be explained by drag on an intrusive body.

2.2.6 Surficial Cover

Surficial cover at Mount Nicholas consists of a very thin soil cover, and dolerite scree and talus of variable thickness and extent.

Dolerite scree and talus blankets most of the upper slopes of the range, with a maximum inferred vertical thickness approaching 200m (Enclosure 1/4). The constituent dolerite boulders are most commonly 0.5m diameter, although blocks up to 30m across have been seen in surface exposures.

The basal section of the thickest scree and talus cover consists of highly weathered dolerite boulders set in a clay matrix. Higher up the sequence the boulders are less weathered, with the interstices only partially clay infilled. Recent talus development with a complete lack of clay matrix is evident at several locations. The extent and type of surficial cover is related to the earlier topographic and climatic expression at Mount Nicholas.

Overall the talus and scree cover has a high porosity, and forms a substantial reservoir of ground water. Huntsmans Creek and Millstream Creek which continue to flow off the flanks of the range during the dry summer months are fed by this ground water.

3. COAL DISTRIBUTION

3.1 General

Coal seams are developed at six distinct intervals within the Mount Nicholas stratigraphic column (Figure 2). Four of these seam intervals (Lower II, Lower I, Middle II + Middle I) are considered to be of potential economic significance.

Coal distribution information is based on the results of 20 fully cored holes, outcrop mapping and inferences drawn from nearby mines and regional geology. Drillholes are spaced on a 1km grid, though this spacing increases slightly under the inaccessible Mount Nicholas peak. Map plans are presented on a 1:20,000 scale. Accuracy has been assured with topographic surveying of drillhole collars and selected outcrops to an accuracy of 1:10,000. Nine drill holes have been checked with petrophysical logging, with a mean depth variance of 0.20m between drillers depth and petrophysical logging depth.

3.2 Seam Correlation and Nomenclature

Enclosure 1/5 graphically displays the lithology as intersected in the coal drillholes on Mount Nicholas. Drill holes GY35, 37 and 38 are excluded as these holes are entirely within the scree profile. Confident correlations have been achieved from a consideration of stratigraphic sequence, macropetrological and petrophysical seam character, seam thickness and elevation, and to a lesser extent marker beds and coal quality.

The coal seams intersected at Mount Nicholas during the 1980 exploration phase of drilling were informally referred to in ascending order as the Lower, Middle and Upper Seams. This nomenclature has been retained and subdivided on a descending numerical basis. (Figure 2)

3.3 Lower II Seam

3.3.1 Thickness and Extent

The thickness of the Lower II seam varies from 1.55 to 3.40m, with a mean of 2.26m, as recorded in 15 drill intersections (Enclosure 1/9). The thickest portion of the seam extends from GY40 north east under Mount Nicholas to GY24 and then northwards to D.O.M. 13 near Huntsmans Cap. On the north west side of this trend the seam thins to the west. On the south east side the seam thins to less than 1.5m to the east and south.

The areal extent of the seam, as bounded by the subcrop, lease boundaries and a minimum thickness of 1.5m is 12.2 km^2. Mining within this area will be subject to a variety of engineering, geological and economic criteria, which reduce the area of reserves to 8.8 km^2 (Enclosure 1/33).

3.3.2 Macrolithology

Enclosure 1/6 A + B presents the detailed seam lithology and petrophysical correlations in graphic form. It is possible to subdivide the seam into an upper and lower ply divided by a light coloured mudstone/tonstein marker bed with a distinctive petrophysical repsonse.

The lower ply comprises about 30% of the total seam thickness, is composed of essentially dull and heavy dull coal with a few bright bands and a few mudstone bands. This ply exhibits a sharp petrophysical response which reflects the distinct boundaries between coal and non-coal horizons.

The marker bed is composed of a kaolin rich mudstone that often appears as a well developed tonstein bed, and varies in thickness from 20 to 160mm. The petrophysical response of this marker bed is that of a distinctive high gamma and density peak. Where the marker bed is split by a thin band of coal, the distinctive petrophysical response is associated with the lower band.

The upper ply is composed of essentially dull coal with a few bright bands, and a few mudstone beds. The ply exhibits a rounded and ragged petrophysical response, which reflects gradational boundaries between the coal and non-coal horizons and the presence of disseminated mudstone lenses and pellets. The iso-ash and iso-yield isopachs (Enclosures 1/24 + 25) suggest that the trend of less distinctive mudstone partings increases to the south east.

The marker bed, and all other stone bands, vary in distance from the roof and floor of the seam throughout the area. These bands may be used for local control of mining intervals.

3.3.3 Micropetrology

Maceral counts on washed coal samples of the Lower II, Middle II and Middle I seams are presented in Table 1. All three seams have characteristically low percentage of reactives (Vitrinite and Exinite) and correspondingly high inerts (Inertinite). The high inerts content and the high inherent ash content of the coal both support the concept of peat accumulation in an environment subject to substantial oxidation. Smyth (1980), has proposed a palsamire environment of deposition for Tasmanian Triassic coals.

The significance of the petrographic properties of the coal seams in relation to chemical and physical characteristics is discussed in Volume 3.

TABLE 1

MICROPETROLOGY PROPERTIES OF MOUNT NICHOLAS COAL SEAMS - FLOATS 1.70
(NEW MACERAL CLASSIFICATION)

COAL SEAM		Lower II	Middle II	Middle I
Sample No.		34A22	34A20	43 A20
Mean Maximum Vitrinite Reflectance%		0.55	0.55	0.88*
VITRINITE	% Vol.	17	13	25
EXINITE	"	3	4	3
Resinite	"	1	2	2
Sporinite	"	2	2	1
Cutinite	"	Trace	Trace	-
INERTINITE	"	73	76	48
Fusinite	"	3	2	1
Semi fusinite	"	61	65	27
Macrinite	"	1	-	5
Sclerotinite	"	-	-	-
Micrinite	"	1	1	1
Inertodetrinite	"	7	8	14
MINERAL MATTER	"	7	7	24

* Maximum reflectance has two modes of approximately 0.60% and 1.20%

3.3.4 Workable Section

Thoughout most of the areal extent of the Lower II seam the geological seam thickness corresponds to the workable section (Enclosure 1/6A & B). Roof and floor contacts with interseam sediments are sharp, and the seam does not split. The exception to this generalisation occurs in the eastern part of the deposit (GY43, GY45) where the upper part of the seam has deteriorated to a carbonceous mudstone. In practice this will not create a difficulty in mining operations since the lower part of the seam on these areas is poor quality and is unlikely to be mined.

In the far north of the deposit (DOM 13) the seam exceeds 3m in thickness, and it may not be possible to mine the full seam height.

Both roof and floor coal sections contain dirt bands which may provide useful control markers for potential extraction. On quality grounds it may be preferable to exclude the roof coal.

3.3.5 Structure and Depth

The seam has a gentle uniform dip to the south east within the confinement of the main graben structure (Section 2.2.4). Three alternative interpretations of seam flexures and minor faulting are presented in Enclosures 1/3 A, B and C. The large number of small scale faults encountered in the nearby Nicholas Range mines indicate that a variety of faults are likely to exist at Mount Nicholas, though the location of these faults can only by approximated from the present 1km spaced drillholes.

The variation of depth to the coal seam is primarily a function of topography and faulting, with minimal contribution from sedimentary dip (Enclosure 1/11). Approximately 94% of the coal reserves have a depth cover of less than 350m, 79% less than 250m of cover, and 39% less than 150m cover. The distribution of the reserves with respect to cover is such that 75% of the reserves in each of these categories are on the northern side of the deposit.

3.3.6 Washouts

Thoughout the northwestern part of the deposit, the Lower II seam has a sandstone roof, generally with a sharp erosional contact. The drilling has shown two instances of the erosion of coal from the seam. In GY36 it is apparent that approximately 400mm of the upper coal ply has been removed, and in GY 46 the seam is missing in its entirety. In the latter case a sandstone body occupies the stratigraphic interval in which a 1.9m thick Lower II had been inferred.

In the north western part of the deposit it can reasonably be inferred that channel washouts will be relatively common in the Lower II seam. They will probably have an east-west orientation parrallel to the elongation of the sandstone roof distribution (Enclosure 2/67). By analogy with the Duncan mine at Fingal the washouts are likely to be of the order of 15m in width.

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The likelihood of washout occurrence decreases with increasing thickness of argillaceous sediments and coal in the immediate roof. Thus where the Lower I seam is developed there is negligable likelihood of washouts in the underlying Lower II seam, and similarly where there is a thick mudstone roof to the Lower II seam the likelihood of a sandstone channel having cutdown into the coal is small.

For reserve calculation purposes it has been assumed that a circular area of 350m has been washed out about GY46. In reality the area of washout is almost certainly much smaller, but equally it is likely that many other small washouts have not been detected by the drilling.

3.4 LOWER I Seam

3.4.1 Thickness and Extent

The thickness of the Lower I seam workable varies from 1.21 to 2.64m, with a mean of 2.08m as recorded in 7 drill intersections (Enclosure 1/12). The seam is thickest between GY33 and GY28, and thins progressively away from this area.

The areal extent of the seam, as bounded by the subcrop, lease boundaries and a minimum thickness of 1.5m, is approximately 5 km^2. The seam occurs only on the southern flank of Mount Nicholas and was not identified in any of the drill holes north of GY26. The absence of the seam in the north may have resulted from non-deposition, or contemperaneous erosion may have removed any peat which was deposited.

3.4.2 Macrolithology

Enclosure 1/6B presents the detailed seam lithology profiles and the corresponding petrophysical logs The seam is essentially similar to the Lower II seam except that it contains a higher proportion of dirt bands, and a slightly higher proportion of stoney coal.

From both core descriptions and petrophysical logs the seam is divisible into three major plies of roughly equal thickness. The upper and lower plies contain only a moderate proportion of dirt bands, but the middle ply is heavily dirt banded. This distribution of dirt bands severely restricts the opportunities for selective mining of the relatively clean coal plies.

3.4.3 Workable Section

The interval of coal in the Lower I seam which would normally be worked corresponds to the geological thickness of the seam. Roof and floor boundaries are well defined and there is an absence of splitting. However it is only in the area around GY40 that the seam is of viable quality. Elsewhere the yields are unacceptably low and because of the ply distribution there is no opportunity for selective mining.

3.4.4 Structure and Depth

The possible interpretations of the structure of the Lower I seam are essentially the same as those for the associated Lower II seam. A fault free interpretation is shown in Enclosure 1/13.

3.4.5 Separation from Lower II Seam

The interseam sediments between Lower I and Lower II seam thicken to the south east (Enclosure 1/15). The rate of thickening is moderate and relatively uniform to GY33 where it is 1.5m thick and composed of mudstone. Further to the south east it thickens rapidly to 3.25m at GY41, with the inclusion of sandstone beds.

3.4.6 Washouts

A seam washout has been inferred in drillhole GY43, as this hole intersected a sandstone sequence with an erosional basal contact instead of the interpolated 2.4m thick seam. It can be assumed that channel erosion of the coal in areas of sandstone roof (Enclosure 2/68) will be relatively common and will become less frequent with the increase in mudstone content, although a thin sandstone bed underlying much of the mudstone roof area may form local roof rolls and minor washouts. The regional lineation of the sandstone roof areas suggests that washouts may have a preferred east west orientation of their long axes, and by analogy with the Duncan Mine at Fingal the washouts are likely to be in the order of 15m in width.

The absence of the seam in the northern part of the deposit may be due to a lensing out or due to a washout. The isopach trends of seam thickness (Enclosure 1/12) indicate a combination of these possibilies in that the seam thins towards the north and is then truncated by erosion.

3.5 MIDDLE II SEAM

3.5.1 Thickness and Extent

The Middle II seam is developed throughout the deposit, but exceeds 1.50m in thickness only in the north (Enclosure 1/16). To the south it thins and generally splits into two or more coal beds. In the far northeast (GY45), the seam has its thickest development, but it is a thickening accompanded by the inclusion of numerous dirt bands which have an adverse affect on quality. Within and adjacent to the area of reserves (GY34, 36, 42, 44, 45, DOM13), the seam has an arithmetic mean thickness of 2.00m.

3.5.2 Macrolithology

The Middle II seam characteristically consists of dull coal with a volumetrically insignificant proportion of either dirt bands or heavy dull coal. Throughout the area of reserves it contains no

more than three thin dirt bands (Enclosure 1/7), and it is only in the far northeast (GY45) that dirt bands become a significant component.

The general homogeneity of the seam is reflected in a uniform petrophysical response.

3.5.3 Micropetrology

Maceral counts on washed coal samples of the Middle II seam are presented in Table 1. The seam has a low percentage of reactives (Vitrinite and Exinite) and correspondingly high inerts (Inertinite). The Middle II seam is similar in character to that of the Lower II and has marginally lower Vitrinite and correspondingly higher Inertinite. The high inerts content and the high inherent ash content of the coal support the concept of peat accumulation in an environment subject to substantial oxidation.

The significance of the petrographic properties of the coal seam in relation to its chemical and physical characteristics is discussed in Volume 3.

3.5.4 Workable Section

Within the area of reserves the roof and floor are well defined, the coal is uniform and the workable section corresponds to the geological seam thickness, eventhough the Middle II seam is more prone to splitting than the Lower seams. A minimum working thickness of 1.50m has been adopted for reserves calculation purposes. In the area around GY45, which has been excluded from reserves, it may be possible to selectively mine the middle section of the seam excluding the highly stone banded roof and floor plies. Equally however it may well be that the dirt bands will slake and be incorporated into the product coal.

3.5.5 Structure and Depth

The structure of the Middle II is essentially similar to that of the Lower seams. The only significant disparity arises in the northeast

where a thinning of the Lower to Middle interseam interval has resulted in slight differences in dip and strike. A fault free structural interpretation is shown in Enclosure 1/17.

The variation of depth to the seam reserves is a function of topography and faulting, with a small contribution from dip (Enclosure 1/18). All of the reserves have a cover of less than 250m, and 99% have less than 150m cover.

A significant area of the seam in the north west of the area (GY46) has such a shallow coal measure cover that the state of the weathered roof excludes it from safe mining practices.

3.5.6 Washouts

There are no recorded washouts in the Middle II seam, though some may be anticipated in the southern half of the area, as this contains a sandstone and thin mudstone roof area with a distinct north south orientation. The area of reserves is unlikely to be affected.

3.6 Middle I Seam

3.6.1 Thickness and Extent

The Middle I seam has a geological thickness of over 3m on the eastern side of the deposit and splits into two or more coal beds to the west. Although the seam is developed throughout the deposit, individual coal beds exceed 1.5m thickness only in a 5 km^2 area in the east (Enclosure 1/20).

In the area of reserves the arithmetic means of the geological seam thickness and the workable seam thickness are 3.13 m and 2.37 m respectively.

3.6.2 Macrolithology

The Middle I has the same macrolithological relationship to the Middle II as the Lower I seam has to the Lower II seam. That is, while the coal of the Middle I seam is basically similar to that of the Middle II seam, the Middle I seam as a whole contains many more

dirt bands than does the Middle II (Enclosure 1/6B). The coal is relatively uniform dull coal with a minimal amount of the heavy dull coal which is a prominent component of the Lower seams. Given the relatively wide spacing of drill-holes, the variability of dirt band development, and the tendency of the seam to split, it has not been possible to identify consistent seam plies.

3.6.3 Micropetrology

The maceral count for the Middle I seam shown in Table 1 should be treated with some caution. The maximum vitrinite reflectance distribution has two modes of approximately 0.60% and 1.20%. The higher reflectance is anomalous, and indicates that part of the seam has been affected by heat from a nearby igneous intrusion. The presence of thermally affected coal may well have caused some misidentification of maceral and mineral matter. It is for instance anomalous that the volume percentage of mineral matter is reported as 24% while the analysed ash mass percentage is 21.5%. In the circumstances the apparently higher reactives to inertinites ratio of the Middle I relative to the Middle II and Lower II seams should not be regarded as representative.

3.6.4 Workable Sections

The Middle I seam is developed as a single thick seam along the eastern edge of the deposit, and splits into two or more coal beds to the west. Consequently mineable reserves are restricted to the eastern half of the deposit.

In the northeast (GY24, GY44), the basal part of the seam has deteriorated (Enclosure 1/8), and only the upper part of the seam is workable. The working floor is however well defined by thick dirt bands, and definition of the roof is sharp. In the southern part of the reserves the working roof and floor correspond to the geological roof and floor, except where the thickness of the other exceeds machine capacity. In the latter area, which occupies the south-eastern corner of the deposit, there is insufficient data available to indicate whether suitable working marker beds are consistently developed.

3.6.5 Structure and Depth

The structure of the Middle I is nearly indentical to that of the Middle II, and differs very little from that of the Lower seams (Enclosure 1/21).

The variation of depth to the seam reserves is a function of topography and faulting with a small contribution from dip (Enclosure 1/22). All of the reserves have a depth cover of less than 350m cover, 72% less than 250m cover and 46% less than 150m cover. These reserves are evenly distributed on the north and south sides of Mount Nicholas.

3.6.6 Washouts

In GY45, the Middle I seam which by extrapolation from adjacent holes should have been 3.0m thick, is completely replaced by a sandstone sequence interpreted as a washout. The eastern portion of the coal areas have a sandstone roof and are thus more likely to incur washouts. The orientation of the roof mudstone isopach, (Enclosure 2/70), indicate that these channel features may have a preferred north south orientation.

3.6.7 Separation from Middle II

Enclosure 1/24 shows that the interseam sediments thicken to the south west of the area from an inferred thickness of 5m at GY45 to an intersected thickness of 26.9m at GY33. In the northern part of the area there is a slight variance from this regional trend, with a thickening to the north west from 7.9m to 10.7m at DOM13. These trends of increasing interseam thickness are associated with a corresponding facies variation from mudstone to sandstone.

4. BASIC COAL QUALITY

4.1 Scope

The treatment of coal quality data in this volume is restricted primarily to basic float/sink tests, and utilization quality is dealt with in Volume 3. The only departure from this demarcation is a discussion here of the relationship between coal ash and gross specific energy, which, together with the float/sink data is sufficient for basic specification of potential product quality.

4.2 Sampling and Analytical Regime

All analyses discussed in this report were determined on whole samples of NQ wireline triple tube core (nominal 45.1 mm diameter) with a recovery of greater than 95% and a coal mass of 2.4 kg/m. The exceptions to this sample size and recovery technique were:-

i) A deflection redrill using BQ double tube core (nominal 36.5 mm diameter) in the Lower II seam at GY45

ii) The re-analyses of Department of Mines cores where samples available were split BX core (nominal 33.4 mm diameter) and BQ core.

After detailed logging in the field, the seams were separated into ply samples, the number and thickness of samples being governed by the variation in the particular seam. Attempts to achieve a deposit wide ply consistency were only partially successful owing to the variation in seam profiles, and the need to relate sample intervals to local mining intervals. Wherever possible nominal 0.3m roof and floor plies in thick seams where analysed separately, to allow for a possible requirement to leave roof and floor coal during mining.

All samples, were crushed to -25mm to provide an adequate particle frequency for float/sink testing. The samples were floated at RD's 1.60, 1.70 and 1.80, though some of the 1980 samples were only floated at the RD of 1.70. The mass yields and ash contents were determined. The raw coal RD's were also determined to enable the re-evaluation of whole seam analyses.

After completion of the float/sink tests, composite samples were reconstituted for detailed utilization testing, generally on the 1.70 cumulative float fraction.

4.3 Lower II Seam

4.3.1 General

In its raw state the coal of the Lower II seam shows a wide range of ash content (16.3 - 51.9%) reflecting a considerable variation in the proportion of dirt bands within the seam as well as a variation in the inherent ash of the coal itself. That most of the ash variation is due primarily to extraneous ash is shown by the relative consistency of the ash content of the 1.70 floats (Table 2).

TABLE 2

LOWER II SEAM BASIC COAL QUALITY

HOLE	THICKNESS (m)	RAW ASH (mass % a.d.)	RAW RD	ASH 1.70 (mass % a.d.)	YIELD 1.70 (mass % a.d.)
GY24	3.02	31.2	1.56	19.1	72.1
GY26	2.48	29.9	1.55	16.3	67.6
GY28	2.04	28.8	1.52	21.1	81.8
GY31	1.96	32.8	1.47	25.2	79.1
GY33	1.71	31.9	1.63	22.4	74.4
GY34	2.05	27.3	1.59	19.7	82.7
GY36	1.57	28.3	1.54	18.8	79.8
GY39	1.90	25.9	1.52	17.4	83.5
GY40	2.11	30.8	1.57	20.1	80.1
GY41	1.55	44.8	1.72	31.4	56.8
GY42	2.06	26.5	1.49	17.1	81.9
GY44	2.96	26.3	1.52	17.3	78.7
GY45**	2.20	39.2	1.66	20.9	58.7
DOM8	2.29	26.7	1.43	17.6	80.9
DOM13	3.23	34.6	1.51	19.0	62.1
MEAN+	2.21	31.0	1.55	20.2	71.7
MEAN 'RESERVES'*		29.5	1.54	19.4	76.9

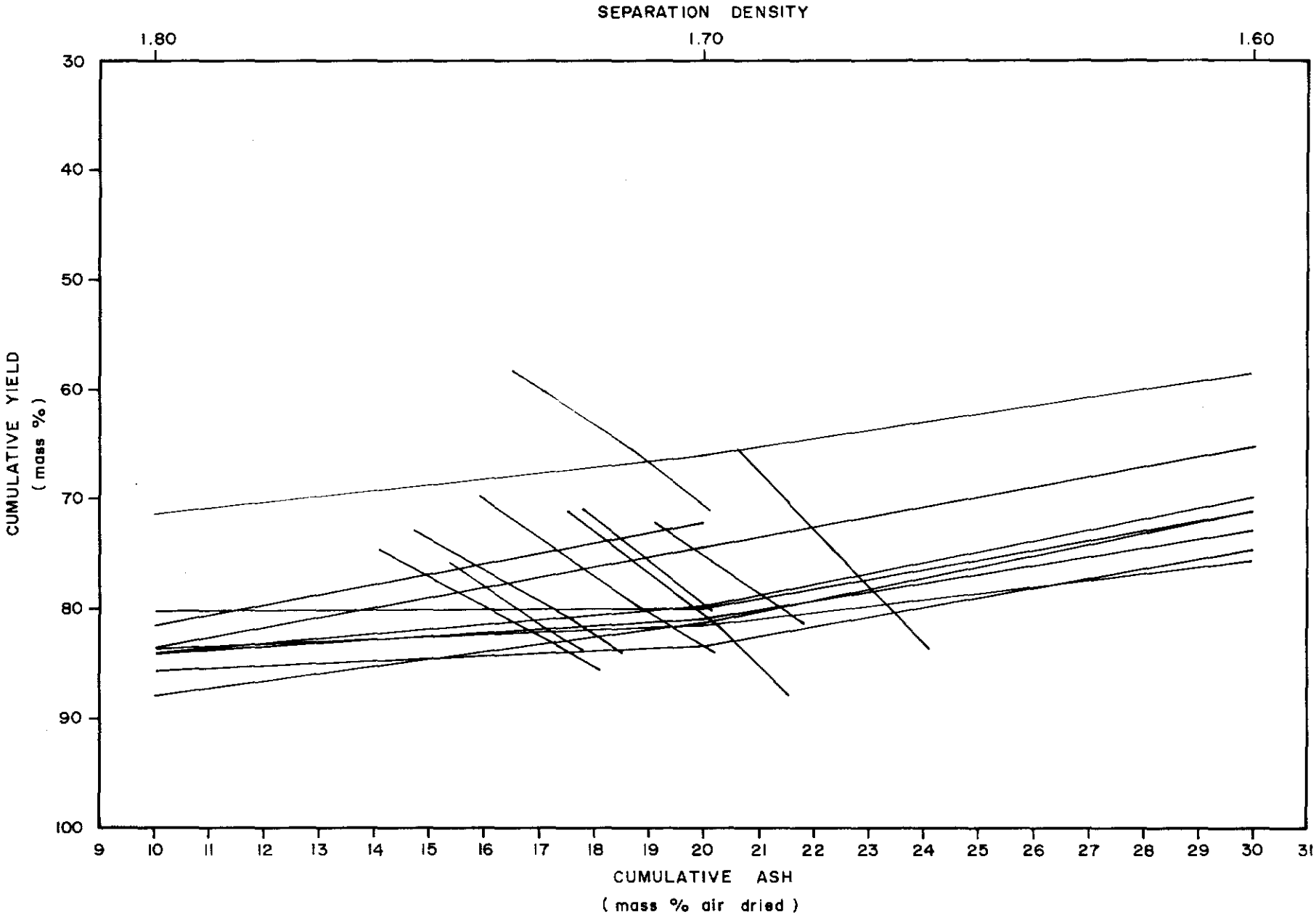
\+ Arithmetic Mean

* Excludes DOM8, GY41, 43, 45

** Mean loss weighted values of NQ core (GY45) and BQ core (GY45A)

FLOAT SINK PLOTS

LOWER II (-25mm)



Author : Coal Division	Date : June 1981	Fig. 7
Report No: CEPR 11/81	Drawing No: 2293	

4.3.2 Washability

Float/sink plots for the Lower II seam (Figure 7) reflect the relatively high proportion of 'heavy dull' near density coal in the seam. Of the samples from within the area of reserves, all have a near density (1.60 - 1.80) component of between 10% and 20%. In practice, efficient wash plant separation is likely to be difficult to very difficult to achieve. On the other hand the ash in the near density washed coal is almost entirely bound up in finely disseminated form, and a coarser feed size than the 25mm laboratory size is unlikely to result in significantly less ash liberation. A nominal separation density of 1.70 is indicated to provide a product of around 20% ash.

4.3.3 Areal Yield Variation

The iso-yield map for the Lower II seam (Enclosure 1/25) shows a well defined north-east trending area of high yield coal running across the western and central parts of the deposit. Quality deterioration near the eastern limits of the deposit is marked, and only the lower part of the seam is represented in Enclosure 1/23 and 1/24 for GY43 and GY45 where the upper section has deteriorated to carbonaceous mudstone.

4.3.4 Areal Ash Variation

The iso-ash map for the Lower II seam (Enclosure 1/26) shows a very similar trend to iso-yield. One apparant departure is represented by the value in GY31. The proximate analyses from that hole indicate that the coal is slightly oxidised, and relative density reduction of the coal may have resulted in a misleadingly high ash value, and conversely a high yield value.

4.4 Lower I Seam

4.4.1 General

The basic quality data in table 3 reflect the similarity of the coal to that of the Lower II seam. The principal difference between the

two seams is that the Lower I seam has a higher proportion of dirt bands with correspondingly lower float yields. The ash content of the float fractions is only marginally higher.

TABLE 3

LOWER I SEAM BASIC COAL QUALITY

HOLE	THICKNESS(m)	RAW ASH (mass % a.d.)	RAW R.D.	ASH 1.70 (mass % a.d.)	YIELD 1.70 (mass % a.d.)
GY26	1.22	46.0	1.75		
GY28	2.64	39.0	1.67	24.6	58.9
GY33	2.49	38.1	1.69	19.9	54.0
GY39	1.72	46.1	1.75	22.7	48.7
GY40	2.20	35.7	1.63	20.6	66.0
GY41	2.45	39.9	1.61	24.8	56.5
DOM8	1.83	38.1	1.55	25.8	67.1
MEAN	2.02	39.5	1.65	23.1	58.5

4.4.2 Washability

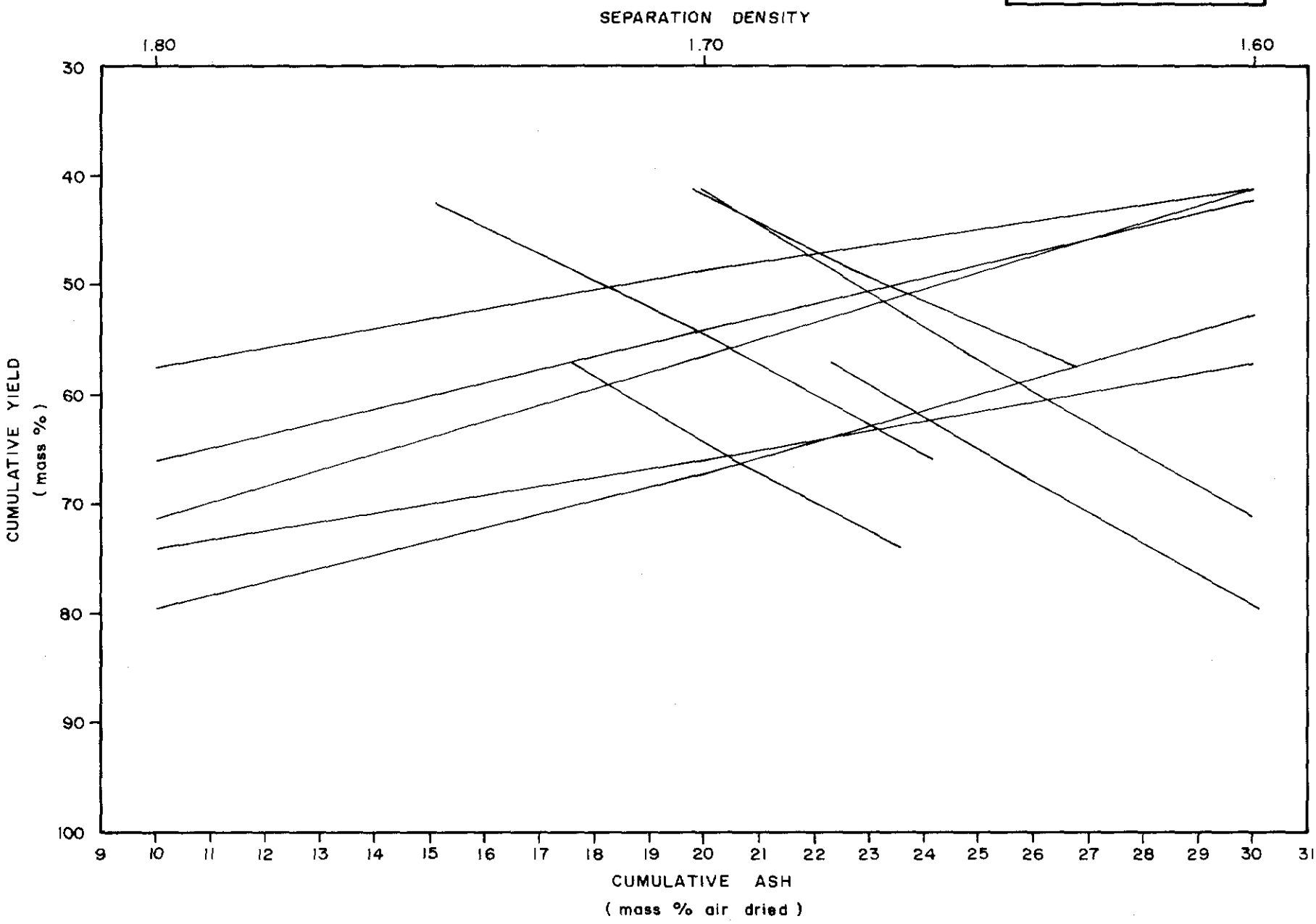
Figure 8 shows that the washability characteristics of the Lower I seam are very similar to those for the Lower II, except for the lower yield. This seam is also characterised by a high proportion of near density coal and would be difficult to very difficult to partition efficiently. However, none of the seam has been included in mineable reserves.

4.4.3 Areal Yield Variation

The sparse quality data for the Lower I seam indicate a moderate yield area localised around GY40 (Enclosure 1/27). The absence of a quality control point in the eastern part of the seams extent, leaves the iso-yield configuration there open to doubt.

FLOAT SINK PLOTS

LOWER I (-25mm)



Author : Coal Division	Date : June 1981	Fig. 8
Report No: CEPR 11/81	Drawing No: 2294	

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4.4.4 Areal Ash Variation

The iso-ash configuration (Enclosure 1/28) indicates that low ash coal is restricted to the western half of the seam extent. The absence of quality control in the eastern part of the area makes the ash levels assumed there conjectural.

4.5 Middle II Seam

4.5.1 General

The Middle II seam is by far the most attractive of the Mount Nicholas seams in terms of quality. In general it consists of relatively low inherent ash coal and a low proportion of dirt bands. The heavy dull coal which is a prominent component of the Lower seams, is almost completely absent. The exception to these generalizations is the seam intersected in GY45 where there is a thickening of dirt bands as well as an increase in the inherent ash of the coal. The coal within and adjacent to the reserve boundaries is very consistent in quality with only one sample (GY42) departing significantly from the raw coal mean of 21.8% ash (Table 4). If roof and floor dilution can be minimised there is some prospect of being able to market raw coal. Alternatively washing to remove dirt bands will provide a product of around 14% ash for blending with the other higher ash coals.

TABLE 4

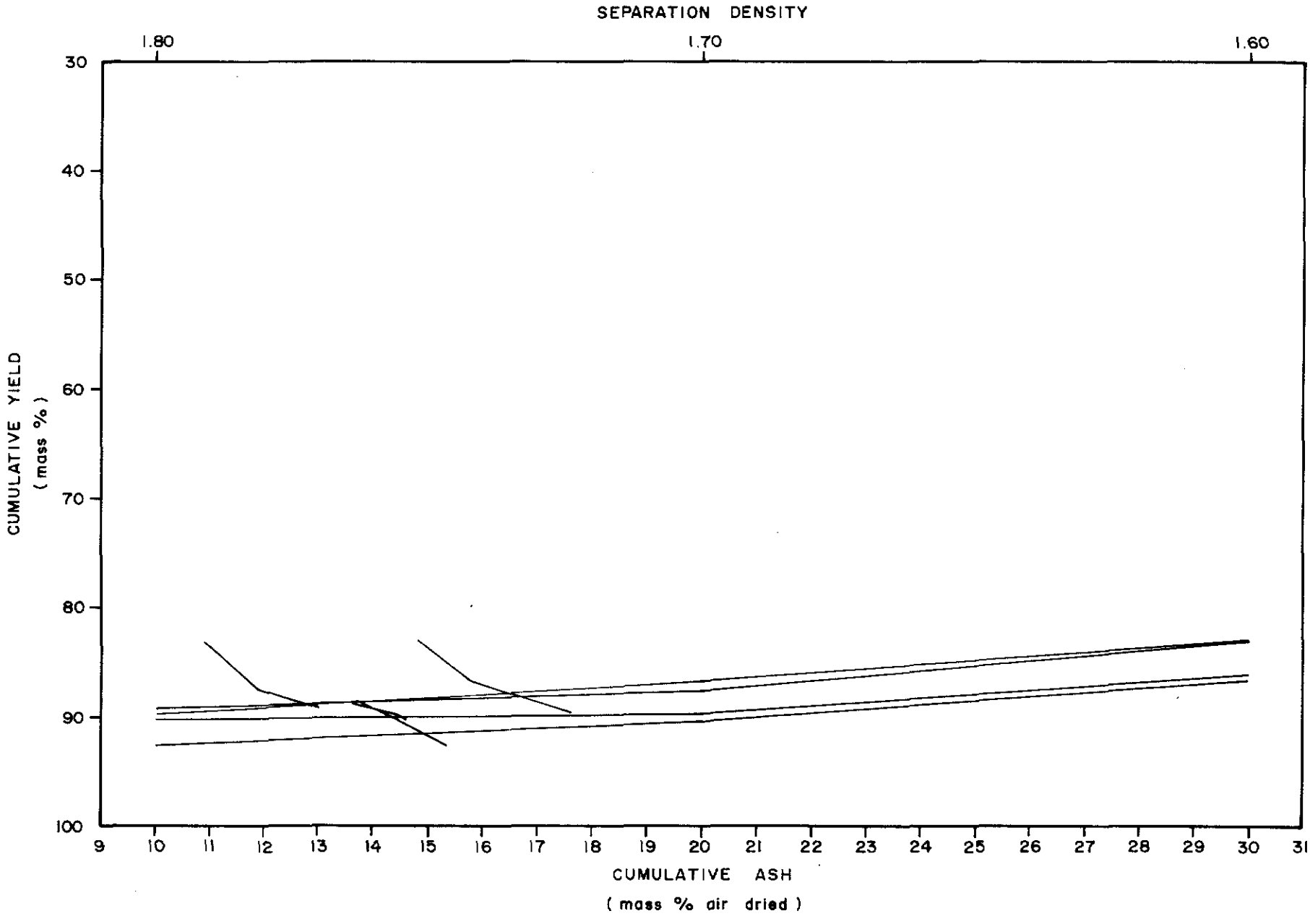
MIDDLE II SEAM BASIC COAL QUALITY

HOLE	THICKNESS(M)	RAW ASH (mass % a.d.)	RAW R.D.	ASH 1.70 (mass % a.d.)	YIELD 1.70 (mass % a.d.)
GY34	2.14	19.3	1.51	14.5	90.3
GY36	1.53	19.7	1.43	11.9	86.4
GY42	0.69	28.2	1.49	13.8	77.1
GY44	2.74	21.8	1.39	15.7	86.2
GY45	2.82	40.5	1.60	22.2	64.2
GY46	1.46	21.5	1.45	12.9	80.7
DOM13	2.18	20.4	1.42	14.4	89.7
MEAN	1.94	24.5	1.47	14.9	82.1
MEAN 'RESERVES'*		21.8	1.45	13.7	85.1

* GY45 excluded

FLOAT SINK PLOTS

MIDDLE II (-25mm)



Author : Coal Division	Date : June 1981	Fig. 9
Report No: CEPR 11/81	Drawing No: 2295	

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4.5.2 Washability

Float sink plots for the Middle II seam (Figure 9) show that efficient separation should be relatively easy to obtain. Almost all the ash reduction is achieved by the removal of dirt bands in the 1.80 sinks, and there is only around 5% of the coal in the 1.60 - 1.80 density range. The contrast with the Lower seams in the latter respect is marked.

4.5.3 Areal Yield Distribution

There is a well defined trend of increasing yield to the north of the deposit (Enclosure 1/29). The decrease in yield in the south-east is attributable to the increasing proportion of dirt bands with increasing proximity to the seam split developed in GY24.

4.5.4 Areal Ash Variation

The trend of ash increase is towards to east (Enclosure 1/30), with a marked ash increase gradient between GY44 and GY45. However, all of the reserves fall within the low ash area of less than 20%.

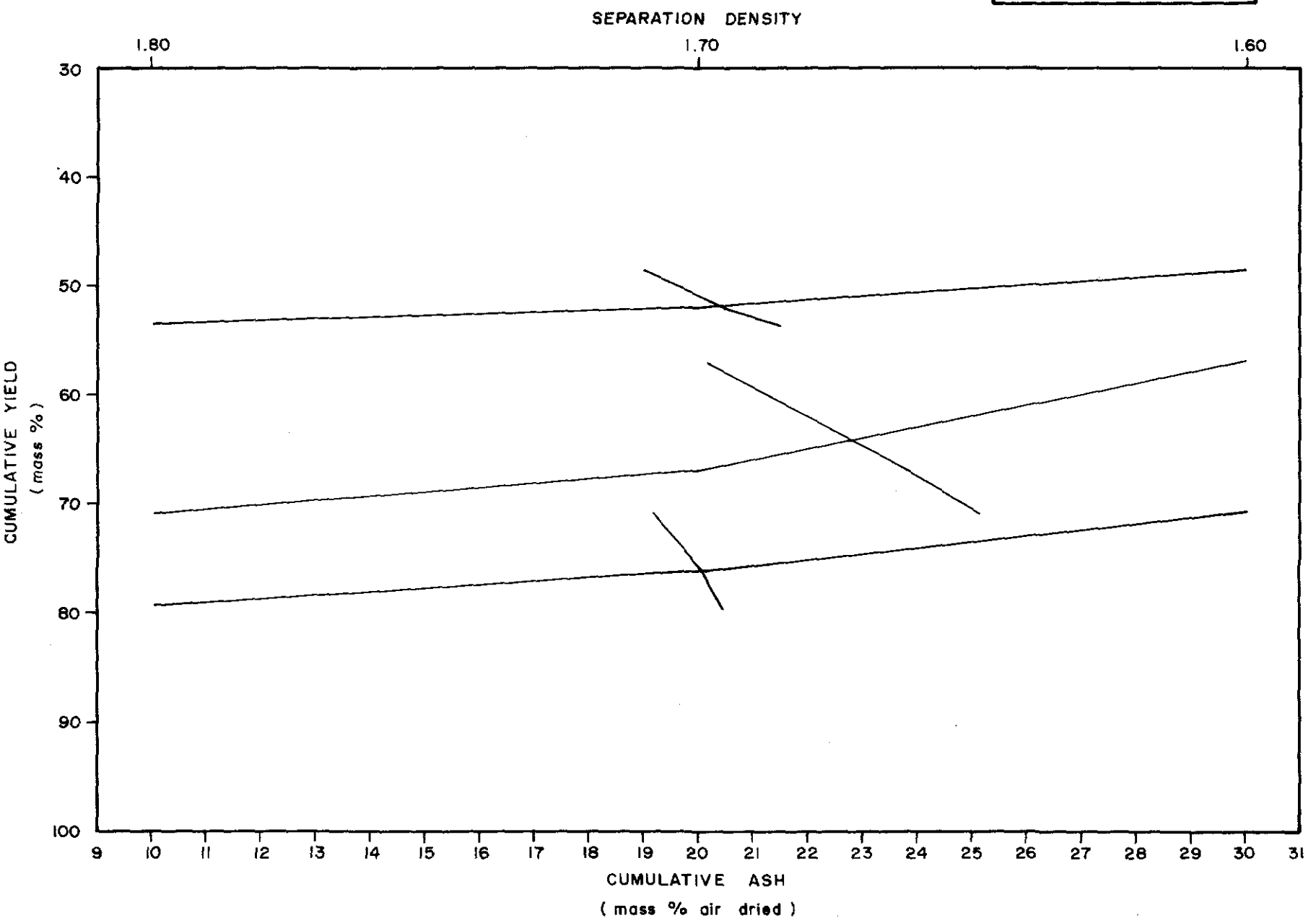
4.6 Middle I Seam

4.6.1 General

The quality of the Middle I Seam is substantially inferior to that of the Middle II seam. It has a much higher proportion of dirt bands and consequently a much higher raw ash content. However like the Middle II seam, it contains a relatively low proportion of heavy dull coal, and the 1.70 float fraction ash contents fall within a restricted range about a mean of 20.5% (Table 5).

FLOAT SINK PLOTS

MIDDLE I (-25mm)



Author : Coal Division	Date : June 1981	Fig. 10
Report No: CEPR 11/81	Drawing No: 2296	

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TABLE 5

MIDDLE I SEAM BASIC COAL QUALITY

HOLE	THICKNESS(M)	RAW ASH (mass % a.d.)	RAW RD	ASH 1.70 (mass % a.d.)	YIELD 1.70 (mass % a.d.)
GY24	1.69	30.5	1.56	17.0	71.2
GY28	2.08	48.5	1.80	20.5	52.0
GY43	3.29	33.1	1.50	20.6	76.0
GY44	2.55	41.0	1.54	23.8	67.0
MEAN	2.40	38.3	1.60	20.5	66.6
MEAN 'RESERVES*'	2.51	34.9	1.53	20.5	71.4

*GY28 excluded

4.6.2 Washability

Although washability data for the Middle I seam (Figure 10) are restricted in number, it is evident that the washability characteristics of the seam have more in common with those of the Middle II seam than those of the Lower seams. Although the yields are much lower than those of the Middle II seam, as a consequence of the high proportion of dirt bands in the Middle I, the proportion of coal in the 1.60 - 1.80 range is not markedly higher. With as little as 5% of near density coal, efficient separation of the Middle I should be less difficult to obtain than for the Lower seams, and the product ash should be comparable.

4.6.3 Areal Yield Variation

With analyses from only four holes, an accurate delineation of quality trends is beyond reach. However the inferred improvement in yield to the southeast (Enclosure 1/31) is supported by reported analyses of what is probably the Middle I seam in the old Mount Nicholas mine.

4.6.4 Areal Ash Variation

The inferred ash trend (Enclosure 1/32) is the reverse of the yield trend, with an increase in 1.70 ash to the east. It appears that the inherent content of the coal does not vary in sympathy with the extraneous ash.

4.7 Potential Product Quality

In assessing potential quality specifications for product coal from the Mount Nicholas deposit the relative contribution of each of the four seams must be considered. Disregarding the Lower I seam for which no mineable reserves have been established, the proportions of washed coal product reserves are:-

Middle I	25.0%
Middle II	12.5%
Lower II	63.5%

It is evident that the Lower II seam will be the mainstay of production, with probable concurrent extraction of either the Middle I or the Middle II. It may be useful to consider product specification in the following terms:

Product A - a 60:40 blend of Lower II and Middle II
Product B - a 60:40 blend of Lower II and Middle I

4.7.1 Product A

A 60:40 blend of Lower II, and Middle II separated at laboratory efficiency at RD 1.70, would provide an overall average 80% yield of of 17.1% ash coal. Efficient washplant separation may be difficult to achieve for the Lower II seam however, and there will be a significant difference in yield between the seams at a 1.70 separation density. Increasing the separation density to 1.80 would reduce the yield differential. This would increase the overall yield by about 3% and increase the product ash to about 18.5%. In practice, taking into account wash plant efficiency and the lower ash percentage, when quoted on a moist as-sold basis, there should be no difficulty in obtaining a product A specification of:

Moisture	8%-10% (6% air dried)
Ash	19-21%
Yield	75-80%

4.7.2 Product B

A 60:40 blend of Lower II and Middle I, separated at laboratory efficiency at RD 1:70, would provide an overall average 74.7% yield of 19.8% ash coal. A reduction in the relative yield differential between the two seams could result from a reduction of the separation density to 1.60. Ash would be reduced to approximately 18% but would reduce yield to approximately 67%. Given a requirement for a relatively constant mine life ash content it should be possible to produce a product B specification of:

Moisture	8%-10% (6% air dried)
Ash	19-21%
Yield	67.5-72.5%

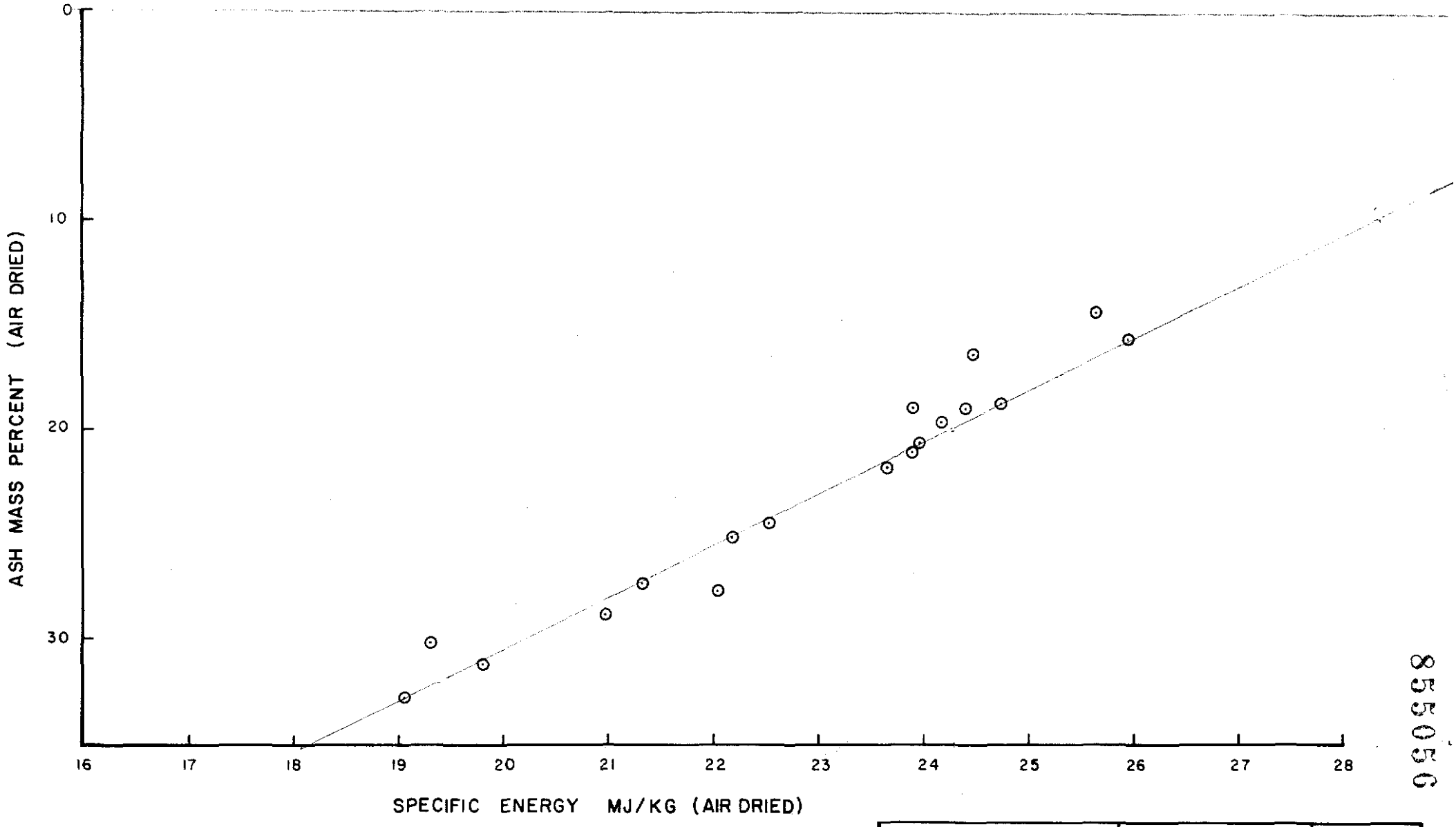
4.7.3 Specific Energy Specification

The available Mount Nicholas data (Figure II) indicate a specific energy (air-dried) to ash (air-dried) relationship of Specific Energy (MJ/kg) = 30.557 - 0.319 Ash Percentage.

The above relationship converted to moist as-sold basis (9% moisture) will give a specific energy range of 23.6 MJ/kg to 23.0 MJ/kg corresponding to the 19% to 21% ash range.

MT NICHOLAS - TASMANIA

ASH vs. SPECIFIC ENERGY



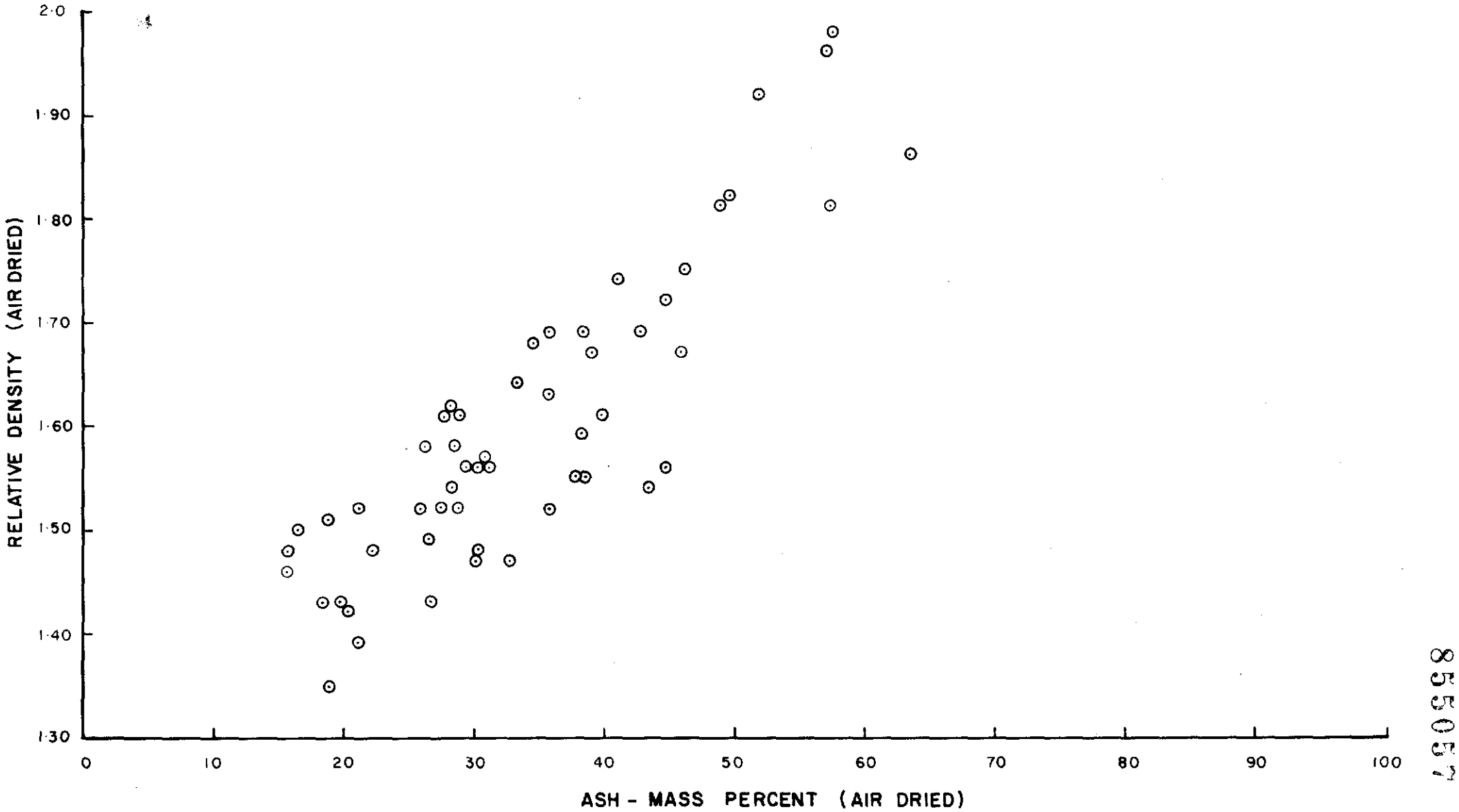
Author : Coal Division	Date : June 1981
Report No: CEPR 11/81	Drawing No: 2297

Fig. 11

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MT NICHOLAS - TASMANIA

RAW ASH vs. RELATIVE DENSITY (PLY SAMPLES)



Author : Coal Division	Date : June 1981	Fig. 12
Report No: CEPR 11/81	Drawing No: 2298	

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5. COAL RESERVES

5.1 Methodology and Criteria

The drill-hole spacing at Mount Nicholas is a nominal 1 km except for the area beneath the crest of the range. This spacing has been sufficient for the accurate definition of seam thickness variation and has provided a satisfactory basis for subcrop delineation. The location of major faults has been reasonably well defined although a degree of imprecision must be accepted with 1 km spaced holes. A dyke inferred from surface exposures is accurately located, but the orientation of dykes intersected in borehole GY43 is not certain. Huntsman's Cap, is for the purposes of reserves calculation, regarded as being an intrusive plug. Washouts have been inferred in three drillholes, but it has not been possible to delineate their extent. Seam splitting is relatively common in the Middle seams, and in general it has not been possible to define individual split geometry. The variation in coal quality within individual seams is marked, and in general only seams of mineable thickness have been analysed. Quality variation provides the most significant source of potential error in reserves estimation.

In situ reserves have been measured from 1:20,000 scale seam thickness and extent maps marked by exclusion criteria for seam thickness, seam quality, proximity to subcrop, proximity to old mine workings, proximity to intrusive plugs, minimum thickness of unweathered roof and area of influence of boreholes. Area corresponding to the minimum inter-hole spacing have been excluded in the case of washouts and where seams split into plies of sub-economic thickness. Reserve block boundaries have been placed at the eastern fault and the projected extension of the exposed dyke. No exclusion from in situ reserves has been made for proximity to either the fault or the dyke, although allowance is made in the estimation of extractable coal for the effect of faults and dykes in general.

Reserves have been established by the planimeter measurement of the inter-contour areas from seam thickness maps and assigning to each area the inter-contour mid-point thickness (i.e. 2.125 m for the interval 2.00m to 2.25m). Analytically derived raw coal relative densities of 1.50, 1.50, 1.40 and 1.50 have been applied to the Lower II, Lower I, Middle II and Middle I seams respectively. Tangentially extended radii

of influence of 500m and 1000m have been used for the classification of reserves as measured and indicated respectively.

The exclusion criteria used to delimit in situ reserves have been as follows:

- minimum seam thickness 1.50m
- maximum seam thickness 3.00m (for thicknesses greater than 3m a full seam extraction reserve is also quoted)
- a minimum float-sink yield at RD 1.70 of 60%
- coal less than 50m from sub-crop
- coal less than 50m from old workings
- coal less than 100m from the intrusive plug
- coal with less than 10m of unweathered roof strata

Reserves of mine accessible coal have been derived by eliminating small areas of reserves isolated by the eastern fault or by the exclusion barriers, and by disregarding the reserves in one of two seams subject to mining interaction. For the latter purpose it is assumed that where two seams are separated by between 1 and 10m of interseam strata, only one of the seams will be accessible to mining.

Estimates of potential raw coal production have been derived using a 60% extraction ratio, less a further 20% for losses due to adverse geological conditions such as faults, dykes and difficult roof conditions. Exclusions of washouts and splits are incorporated in the in situ reserves. Overall, the potential raw coal production represents 48% of the mine accessible reserves.

Estimates of potential washed product coal are based on the mean RD 1.70 yield percentages for holes applicable to the accessible reserves. It is acknowledged that the yield factors are more favourable than could be obtained in an operating wash-plant. The product estimates are therefore to be regarded as provisional, and subject to amendment when detailed washability data and wash plant partition coefficients become available.

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5.2 Lower II Seam

With total in situ reserves of 26.503 million tonnes and a production estimate of 9.349 million tonnes the Lower II seam makes up 58% and 63% respectively of the total resource (Table 6). In the area where there is potential mining interaction between the Lower II and the overlying Lower I, the Lower I rather than the Lower II has been excluded from the reserves. A washery yield of 76.9% has been applied in the estimation of potential production.

TABLE 6

LOWER II SEAM RESERVES AND PROUCTION ESTIMATES

(TONNES x 10^6)

PRELIMINARY - TO BE AMENDED

		BLOCK A	BLOCK B	BLOCK C	TOTAL
IN SITU - 3m Maximum					
	MEASURED	18.025	6.511	1.003	25.539
	INDICATED	0.598	0.193	0.173	0.964
	TOTAL	18.623	6.704	1.176	26.503
IN SITU - NO MAXIMUM					
	MEASURED	18.066	6.593	1.003	25.662
	INDICATED	0.598	0.193	0.173	0.964
	TOTAL	18.664	6.786	1.176	26.626
ACCESSIBLE - 3m MAXIMUM					
	MEASURED	18.025	6.511	-	24.536
	INDICATED	0.598	0.183	-	0.791
	TOTAL	18.623	6.704	-	25.327
MINEABLE - 3m MAXIMUM					
	MEASURED	8.652	3.125	-	11.777
	INDICATED	0.287	0.093	-	0.380
	TOTAL	8.939	3.218	8-	12.157
WASHED PRODUCT - 3m MAXIMUM					
	MEASURED	6.653	2.403	-	9.056
	INDICATED	0.221	0.072	-	0.293
	TOTAL	6.874	2.475	-	9.349

The distribution of the reserves (Enclosure 1/33) is such that the coal could be accessed from either the southern or northern end of Block A, or the northern end of Block B.

5.3 Lower I Seam

Of the four major seams in the deposit, the reserves of the Lower I seam are the least significant. They makes up only 3% of the total in situ reserves, and because those reserves are developed less than 10m above the Lower II seam, they are not regarded as accessible.

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TABLE 7

LOWER I SEAM RESERVES AND PRODUCTION ESTIMATES

(TONNES x 10^6)

	BLOCK A	BLOCK B	BLOCK C	TOTAL
IN SITU - 3m MAXIMUM				
MEASURED	1.399	-	-	1.399
INDICATED	-	-	-	-
TOTAL	1.399	-	-	1.399
IN SITU - NO MAXIMUM				
MEASURED	1.399	-	-	1.399
INDICATED	-	-	-	-
TOTAL	1.399	-	-	1.399
ACCESSIBLE - 3m MAXIMUM				
MEASURED	-	-	-	-
INDICATED	-	-	-	-
TOTAL	-	-	-	-
MINEABLE - 3m MAXIMUM				
MEASURED	-	-	-	-
INDICATED	-	-	-	-
TOTAL	-	-	-	-
WASHED PRODUCT - 3m MAXIMUM				
MEASURED	-	-	-	-
INDICATED	-	-	-	-
TOTAL	-	-	-	-

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5.4 Middle II Seam

Within the Mount Nicholas deposit the Middle II seam is less than 1.50m thick over most of its extent. Adoption of a 1.00m minimum seam thickness exclusion criterion would have approximately doubled the reserves set out in Table 8. The required minimum of 10m of unweathered roof has also had a significant impact on the Middle II seam, particularly in the area to the north of GY46, where the seam is developed just beneath the base of the scree.

A washery yield of 88% has been applied in the estimation of washed coal production, but it should be borne in mind that the quality of the raw coal from the Middle II seam is comparable with the washed coal of the other seams.

TABLE 8

MIDDLE II SEAM RESERVES AND PRODUCTION ESTIMATES

(TONNES x 10^6)

		BLOCK A	BLOCK B	BLOCK C	TOTAL
IN SITU - 3M MAXIMUM					
	MEASURED	0.824	3.552	0.577	4.953
	INDICATED	-	-	-	-
	TOTAL	0.824	3.552	0.577	4.953
IN SITU - NO MAXIMUM					
	MEASURED	0.824	3.587	0.577	4.988
	INDICATED	-	-	-	-
	TOTAL	0.824	3.587	0.577	4.988
ACCESSIBLE - 3M MAXIMUM					
	MEASURED	0.824	3.552	-	4.376
	INDICATED	-	-	-	-
	TOTAL	0.824	3.552	-	4.376
MINEABLE - 3M MAXIMUM					
	MEASURED	0.398	1.705	-	2.103
	INDICATED	-	-	-	-
	TOTAL	0.398	1.705	-	2.103
WASHED PRODUCT - 3M MINIMUM					
	MEASURED	0.350	1.500	-	1.850
	INDICATED	-	-	-	-
	TOTAL	0.350	1.500	-	1.850

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5.5 Middle I Seam

In terms of the size of its reserves the Middle I seam is the second most important of the deposit (Table 9). Even after sizeable exclusions are made for possible mining interaction with the better quality Middle II seam (Enclosure 1/34), the Middle I washed product reserves still make up a quarter of the total for all seams. The Middle I seam is also the only one of the four seams suffering a reduction of reserves as a result of extraction in the old Mount Nicholas mine.

A washery yield of 71.4% has been applied to the estimation of potential production. It must be noted that the quality distribution in this seam is based on analyses from only 4 drill holes, and the quality cut-off for in situ reserves estimation is therefore the largest potential source of error.

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TABLE 9

MIDDLE I SEAM RESERVES AND PRODUCTION ESTIMATES

(TONNES x 10^6)

	BLOCK A	BLOCK B	BLOCK C	TOTAL
IN SITU - 3M MAXIMUM				
MEASURED	4.196	3.366	-	7.562
INDICATED	1.691	2.819	0.551	5.061
TOTAL	5.857	6.185	0.551	12.623
IN SITU - NO MAXIMUM				
MEASURES	4.428	3.383	-	7.811
INDICATED	1.766	2.966	0.551	5.823
TOTL	6.194	6.349	0.551	13.094
ACCESSIBLE - 3M MAXIMUM				
MEASURED	4.196	1.641	-	5.837
INDICATED	1.691	2.819	-	4.510
TOTAL	5.887	4.460	-	10.347
MINEABLE - 3M MAXIMUM				
MEASURED	2.014	0.788	-	2.802
INDICATED	0.812	1.353	-	2.165
TOTAL	2.826	2.141	-	4.967
WASHED PRODUCT - 3M MAXIMUM				
MEASURED	1.438	0.563	-	2.001
INDICATED	0.580	0.966	-	1.546
TOTAL	2.018	1.529	-	3.547

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5.6 Reserves Summary

The reserves summarised in Table 10 are basically constrained by geological limits and tenement boundaries rather than by drill-hole area of influence. There is therefore little prospect of significantly increasing reserves by further drilling. Clearly the reserves will limit the level of production to no greater than 750,000 tonnes per year for an acceptable mine life.

TABLE 10

MOUNT NICHOLAS RESERVES - MEASURED AND INDICATED

(TONNES X 10^6)

	LOWER II	LOWER I	MIDDLE II	MIDDLE I	TOTAL
IN SITU	26.503	1.399	4.953	12.623	45.478
ACCESSIBLE	25.327	-	4.376	10.347	40.050
MINEABLE	12.157	-	2.103	4.967	19.227
PRODUCT A*	9.349	-	2.103	3.547	14.999
PRODUCT B**	9.349	-	1.850	3.547	14.746

	MEASURED	INDICATED	TOTAL
IN SITU	39.453	6.025	45.478
ACCESSIBLE	34.749	5.301	40.050
MINEABLE	16.680	2.547	19.227
PRODUCT A*	13.160	1.839	14.999
PRODUCT B*	12.907	1.839	14.746

* includes MIDDLE II Raw Coal

** includes MIDDLE II Washed Coal

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6. CONCLUSIONS

- The deposit is located in a region of traditional coal mining activity, and is well served by community and transport infrastructure.

- Four coal seams of significant thickness are developed, of which three (Lower II, Middle II and Middle I) are likely to be mineable.

- All seams are adit accessable, but the distribution of coal reserves and surfacial scree is such that access will be significantly easier in the northern side of the deposit.

- Total in situ reserves are 45.7 million tonnes (measured and indicated) from which it should be possible to produce approximately 14.7 million tonnes of washed coal. For an acceptable mine life maximum annual production will be restricted to 750,000 tonnes or less.

- The delineation of reserves in the Lower II and Middle II seams is satisfactorily precise, but the Middle I reserves are based on a relatively small number of data points and are of a lower order of precision.

- The present spacing of drill-holes is inadequate for the delineation of small displacement faults and washouts. Closer drill-hole spacing will be required for the planning of a mine. Any mining system will have to be sufficiently flexible to cope with unexpected faults and washouts.

- Erficient wash plant partitioning will be more readily obtainable with the M seams than with the Lower II seam which contains a relatively high separation of near density coal.

- An "as sold" quality speficiation of 9% moisture, 20% ash and specific energy of 23.3 MJ/kg should be obtainable at overall yields of between 67.5% and 80%.

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APPENDIX 1

BOREHOLE AND SEAM SUMMARY DATA

EL 5/61 GRAY

MOUNT NICHOLAS

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LIST OF TABLES

Locations
Lower II seam
Inter Lower seam Dirt Parting
Lower I seam
Middle II seam
Middle I seam
Scree and Weathering

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BOREHOLE DATA - MOUNT NICHOLAS

LOCATIONS

BOREHOLE	NORTHING (m)	EASTING (m)	REDUCED LEVEL (m)	PETROPHYSICAL LOGGED DEPTH (m)	TOTAL DEPTH (m)
GY24	5401075	592494	603.80		366.50
GY26	5400770	591245	610.60		340.80
GY28	5399594	590901	593.48		335.00
GY31	5402186	590323	417.57	109.5	119.96
GY33	5398687	590405	467.17	135.41	132.90
GY34	5402273	591235	480.51	111.91	114.75
GY35	5397935	591705	356.05		56.70
GY36	5401347	590318	486.23	117.03	117.82
GY37	5301522	591155	527.45		43.29
GY38	5398123	591191	391.36		75.00
GY39	5400516	590298	590.46	221	225.85
GY40	5399561	590299	583.78	160.90	229.50
GY41	5398606	591199	448.84	117.83	118.00
GY42	5401381	591764	579.68		236.10
GY43	5399255	591512	559.08	236.54	238.30
GY44	5401648	592774	506.38		166.86
GY45*	5401240	593413	510.90	110.60	115.60
GY46	5301522	591155	527.41		199.57
DOM 8	5399675	589785	559.87		250.70
DOM 13	5401972	591972	537.38		228.50

* wedge redrill GY45A from 96.31 to 118.44

855074

BOREHOLE DATA - MOUNT NICHOLAS

LOWER II SEAM

BOREHOLE	DEPTH TOP (m)	RL TOP (m)	DEPTH BASE (m)	THICK A (m)	THICK B (m)
GY24	246.26	357.54	249.28	3.02	
GY26	252.54	358.06	255.02	2.48	2.20
GY28	238.83	354.65	240.87	2.04	
GY31	22.45	395.12	24.41	1.96	
GY33	120.82	346.35	122.53	1.71	
GY34	102.76	377.75	104.81	2.05	
GY35	-	-	-	-	
GY36	105.60	380.63	107.17	1.57	
GY37	-	-	-	-	
GY38	-	-	-	-	
GY39	216.22	374.24	218.12	1.90	
GY40	220.54	363.24	222.65	2.11	
GY41	105.11	343.73	106.66	1.55	
GY42	213.81	365.87	215.87	2.06	
GY43	212.41	346.67	214.19	1.78	
GY44	141.22	365.16	144.18	2.96	
GY45	107.44	403.46	109.64	2.20	
GY46	-	-	-	-	
DOM 8	126.87	433.00	129.16	2.29	
DOM 13	162.65	374.73	166.05	3.40	

855075

BOREHOLE DATA - MOUNT NICHOLAS

INTER LOWER SEAM DIRT PARTING

BOREHOLE	DEPTH TOP (m)	RL TOP (m)	DEPTH BASE (m)	THICK A (m)	THICK B (m)
GY24	-	-	-	-	
GY26	251.60	359.00	252.54	0.94	
GY28	237.57	355.91	238.83	1.26	
GY31	-	-	-	-	
GY33	119.35	347.82	120.82	1.47	
GY34	-	-	-	-	
GY35	-	-	-	-	
GY36	-	-	-	-	
GY37	-	-	-	-	
GY38	-	-	-	-	
GY39	215.54	374.92	216.22	0.68	
GY40	219.42	364.36	220.54	1.12	
GY41	101.86	346.98	105.11	3.25	
GY42	-	-	-	-	
GY43	-	-	-	-	
GY44	-	-	-	-	
GY45	-	-	-	-	
GY46	-	-	-	-	
DOM 8	125.88	433.99	126.87	0.99	
DOM 13	-	-	-	-	

855076

BOREHOLE DATA - MOUNT NICHOLAS

LOWER I SEAM

BOREHOLE	DEPTH TOP (m)	RL TOP (m)	DEPTH BASE (m)	THICK A (m)	THICK B (m)
GY24	-	-	-		
GY26	250.29	360.31	251.60	1.31	1.22
GY28	234.93	358.55	237.57	2.64	
GY31	-	-	-	-	
GY33	116.86	350.31	119.35	2.49	
GY34	-	-	-	-	
GY35	-	-	-	-	
GY36	-	-	-	-	
GY37	-	-	-	-	
GY38	-	-	-	-	
GY39	213.82	376.64	215.54	1.72	
GY40	217.22	366.56	219.42	2.20	
GY41	99.41	349.43	101.86	2.45	
GY42	-	-	-	-	
GY43	-	-	-	-	
GY44	-	-	-	-	
GY45	-	-	-	-	
GY46	-	-	-	-	
DOM 8	124.05	435.82	125.88	1.83	
DOM 13	-	-	-	-	

855077

BOREHOLE DATA - MOUNT NICHOLAS

MIDDLE II SEAM

BOREHOLE	DEPTH TOP (m)	RL TOP (m)	DEPTH BASE (m)	THICK A (m)	THICK B (m)
GY24 *	171.10	432.60	172.13	1.03	
GY26	176.83	433.77	178.05	1.22	
GY28	163.87	429.61	164.62	0.75	
GY31	-	-	-	-	
GY33	45.96	421.21	46.52	0.56	
GY34	29.36	451.15	31.50	2.14	
GY35	-	-	-	-	
GY36	26.72	459.51	28.25	1.53	
GY37	-	-	-	-	
GY38	-	-	-	-	
GY39	138.68	450.78	139.88	1.20	
GY40 *	145.18	438.60	146.14	0.96	
GY41	-	-	-	-	
GY42	134.87	444.83	136.01	1.16	
GY43	142.82	416.26	143.54	0.66	
GY44	72.38	434.00	75.12	2.74	
GY45	29.33	481.57	32.15	2.82	
GY46	76.67	450.74	78.03	1.36	
DOM 8	45.14	514.73	45.82	0.68	
DOM 13	85.50	451.88	87.68	2.18	

* Thickest split

855078

BOREHOLE DATA - MOUNT NICHOLAS

MIDDLE I SEAM

BOREHOLE	DEPTH TOP (m)	RL TOP (m)	DEPTH BASE (m)	THICK A (m)	THICK B (m)
GY24	160.15	443.65	163.34	3.19	1.69
GY26	160.38	450.22	161.83	1.45	
GY28	138.73	454.75	140.81	2.08	
GY31	-	-	-	-	
GY33	17.99	449.18	19.05	1.06	
GY34	-	-	-	-	
GY35	-	-	-	-	
GY36	-	-	-	-	
GY37	-	-	-	-	
GY38	-	-	-	-	
GY39 *	125.02	465.44	125.65	0.63	
GY40	119.40	464.38	119.89	0.49	
GY41	-	-	-	-	
GY42 *	124.12	455.56	124.81	0.63	
GY43	119.42	439.66	122.71	3.29	
GY44	60.40	445.98	64.48	4.08	
GY45	-	-	-	-	
GY46	-	-	-	-	
DOM 8	23.32	536.55	23.57	0.25	
DOM 13	73.84	463.54	74.79	0.95	

* Thickest split

855079

BOREHOLE DATA - MOUNT NICHOLAS

SCREE AND WEATHERING

BOREHOLE	DEPTH BASE SCREE (m)	RL BASE SCREE (m)	DEPTH BASE W. (m)	RL BASE W (m)
GY24	106.30	497.50	106.83	496.79
GY26	109.14	501.46	109.55	501.05
GY28	65.57	527.91	65.64	527.84
GY31	9.11	408.46	21.31	396.26
GY33	0.00	467.17	8.40	458.77
GY34	17.60	449.57	20.60	459.91
GY35	+56.70	<229.35	>56.70	<299.35
GY36	11.23	475.00	13.11	472.43
GY37	+43.00	<484.55	>43.00	<484.35
GY38	+75.00	<316.36	>75.00	<316.36
GY39	6.90	583.56	20.08	570.38
GY40	31.00	552.78	35.01	548.79
GY41	58.00	390.84	58.00	390.86
GY42	21.70	557.98	45.99	533.76
GY43	43.30	515.78	65.31	493.78
GY44	6.00	500.38	11.06	495.32
GY45	5.00	505.90	10.00	500.90
GY46	68.00	459.41	72.92	454.49
DOM 8	0.00	559.87	*8.5	551.37
DOM 13	0.00	537.38	*8.5	528.88

* Assumed value

APPENDIX 2

WASHABILITY RESULTS

EL 5/61 GRAY

MOUNT NICHOLAS

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LIST OF TABLES

Lower II seam - GY24
GY26
GY28
GY31
GY33
GY34
GY36
GY39
GY40
GY41
GY42
GY43
GY44
GY45
DOM 8
DOM13

Lower I seam GY26
GY28
GY33
GY39
GY40
GY41
DOM 8

Middle II seam GY34
GY36
GY42
GY44
GY45
GY46
DOM 13

Middle I seam GY24
GY28
GY43
GY44

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LEGEND

SEAM SECTIONS REFERENCE

- COAL - UNDIFFERENTIATED
- COAL - BRIGHT
- COAL - BRIGHT WITH DULL BANDS
- COAL - INTERBANDED DULL AND BRIGHT
- COAL - MAINLY DULL FREQ. BRIGHT BANDS
- COAL - DULL WITH MINOR BRIGHT BANDS
- COAL - DULL
- COAL - WEATHERED
- COAL - CINDERED
- COAL - STONY

LEGEND

LITHOLOGY REFERENCE

- SOIL
- SILT
- SHALE
- SILTSTONE
- CLAYSTONE
- MUDSTONE
- SANDSTONE
- INTERBEDDED SEDIMENTS (SANDST/MUDST 50:50)
- CONGLOMERATE
- TONSTEIN
- COAL
- COAL CINDERED
- COAL STONY
- NOT CORED/CORE LOSS
- CLAYSTONE
- CLAY
- INTRA. CONGLOM.
- COAL WEATHERED
- IRONSTONE
- CARBONACEOUS MUDSTONE
- ARKOSE
- OIL SHALE
- DOLERITE TALUS
- BRECCIA
- COAL(UNDIFF)
- COAL SOOTY

SEAM SECTION

1 : 20

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METRES

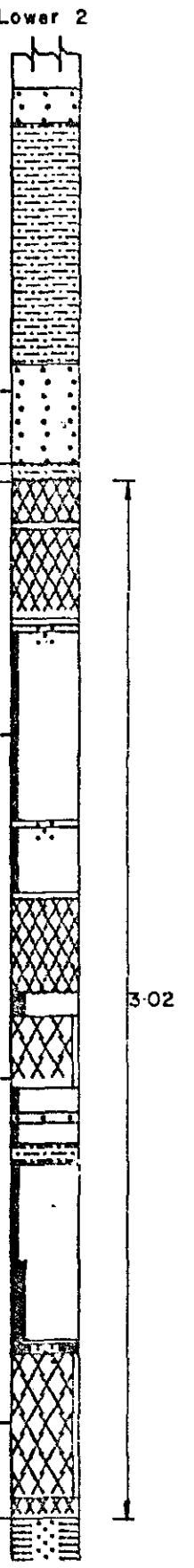
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GY 24

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
						86.6	2.32	0.05	24/4
		72.1	19.1	81.5	21.8	31.2	1.56	3.02	24/5

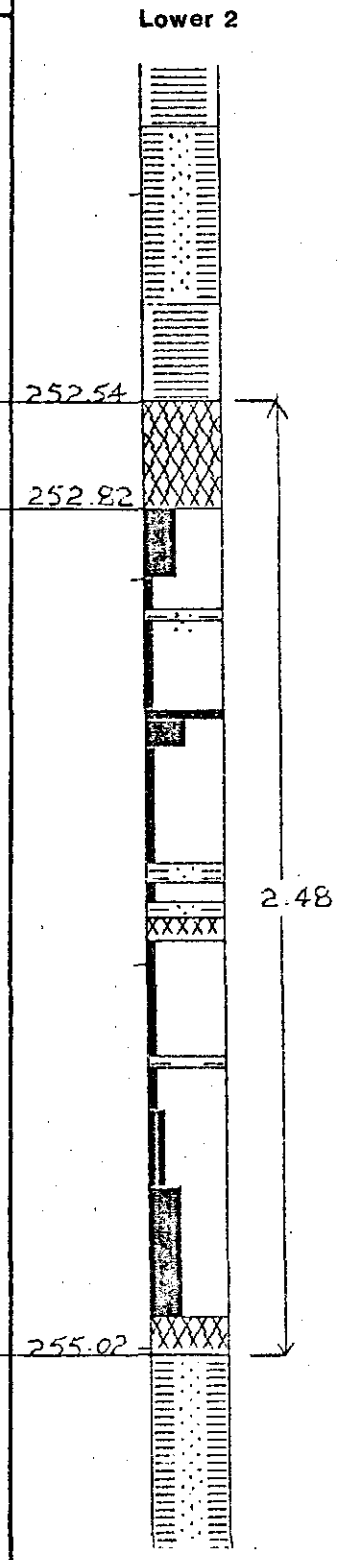


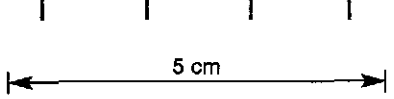
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GY 26

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
		22.8	26.3			46.5	1.79	0.28	26/3
		74.3	15.8	79.5	17.3	27.5	1.52	2.20	26/4



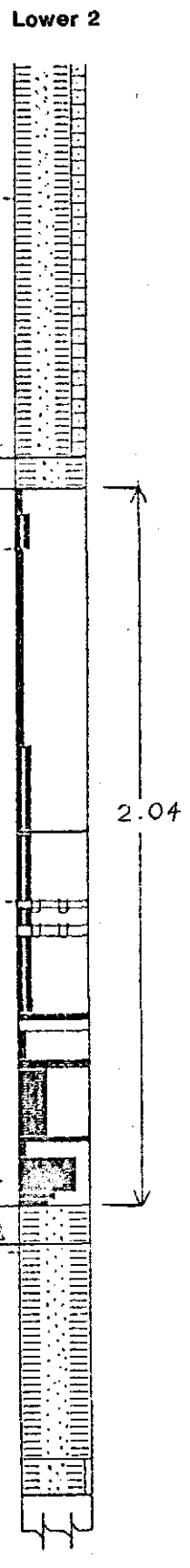


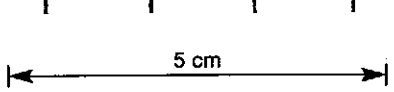
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GY 28

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
						82.0	2.22	0.09	28/2
		81.8	21.1					2.04	28/3
						84.3	2.44	0.11	28/4

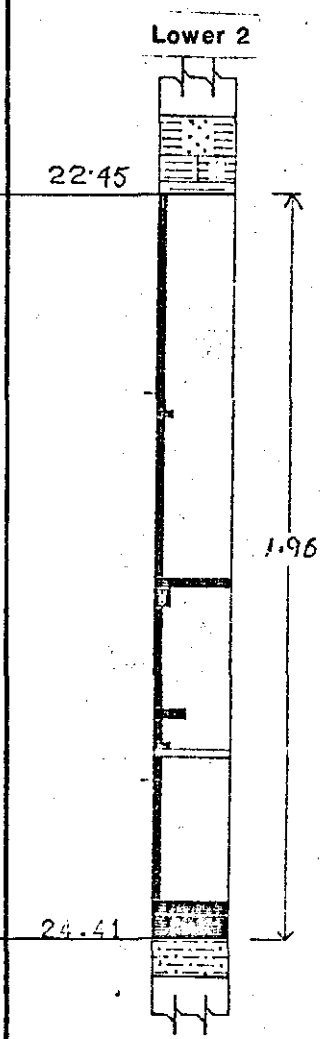




855086
GY 31

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
		79.1	25.2			32.8	1.47	1.96	31/1



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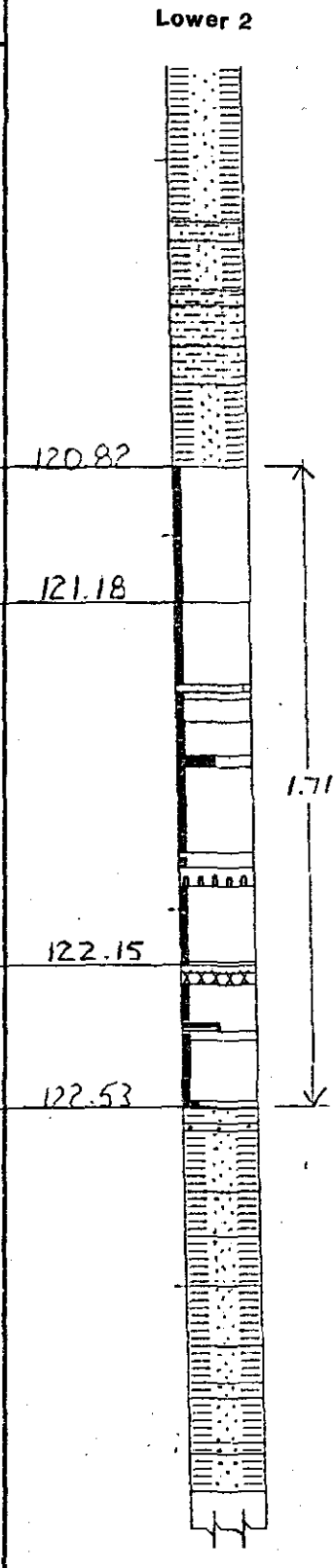
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GY 33

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
70.8	21.4	88.2	23.9	99.6	26.2	26.3	1.58	0.36	33A05
59.2	21.2	68.6	23.0	79.2	26.0	34.7	1.68	0.97	33A06
76.7	18.2	77.0	18.3	79.7	19.2	29.4	1.56	0.38	33A07

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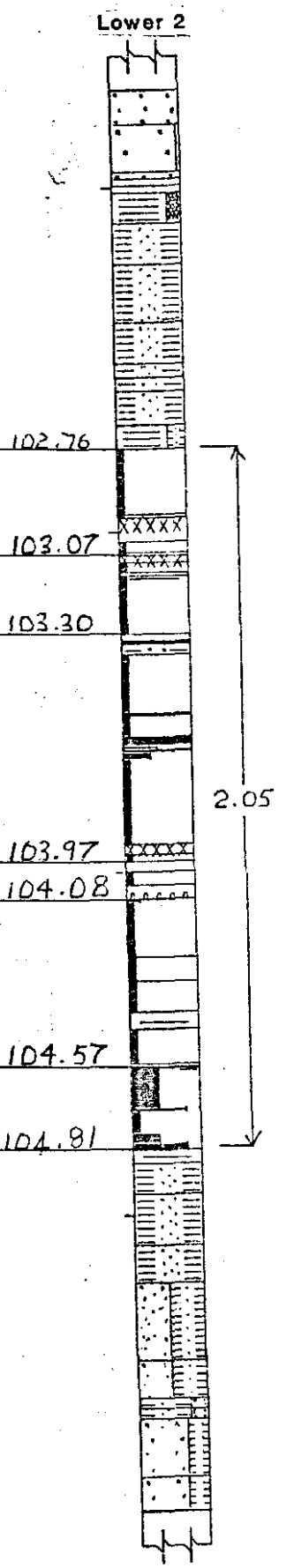
Lower 2



855088
GY 34

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
64.9	21.8	88.3	25.4	96.0	27.1	28.2	1.62	0.31	34A06
51.1	18.2	67.4	22.4	75.9	25.0	35.9	1.69	0.23	34A07
84.4	14.5	92.8	16.6	97.9	18.0	18.8	1.51	0.67	34A08
29.1	19.2	34.0	21.9	34.8	22.5	57.1	1.96	0.11	34A09
73.9	17.3	82.6	19.6	86.9	21.1	27.7	1.61	0.49	34A10
89.3	18.5	93.1	19.4	96.8	20.5	22.1	1.48	0.24	34A11



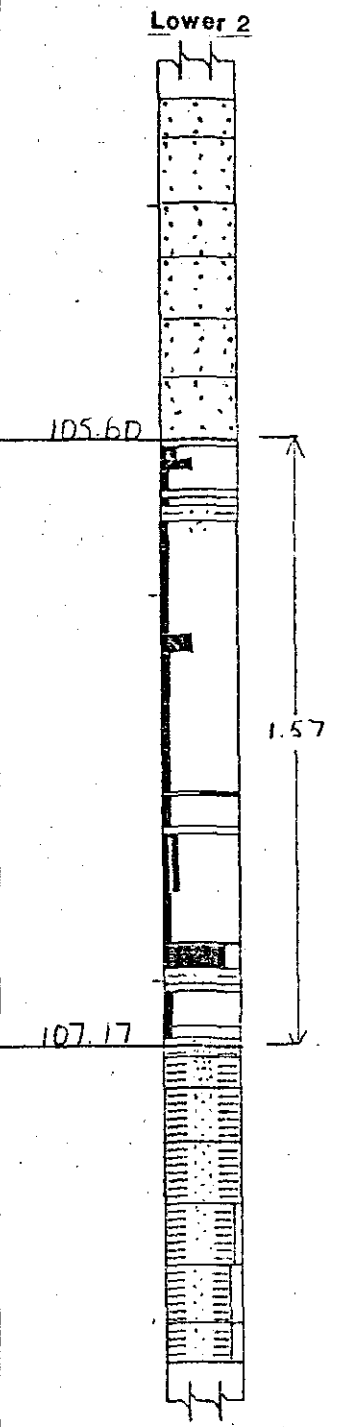
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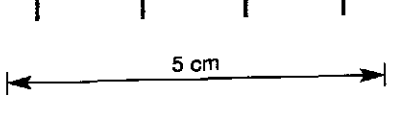
855089

GY 36

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
69.7	15.9	79.8	18.8	84.0	20.2	28.3	1.54	1.57	36A02



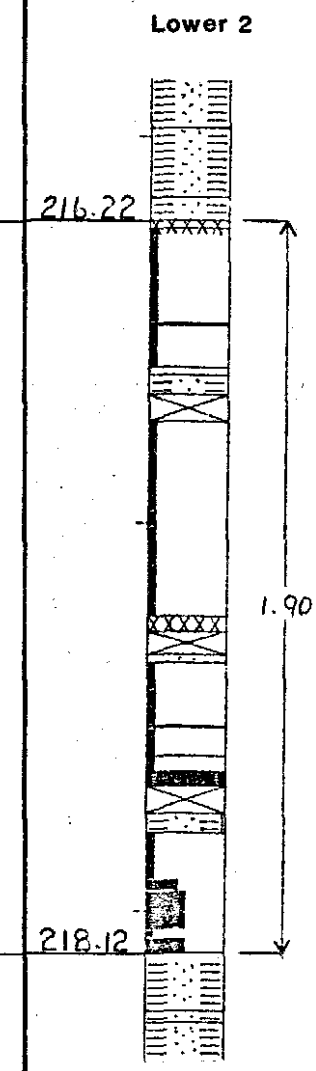


855090

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

GY 39

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
				0.2	1.80	98.6	2.45	0.67	39A02
74.6	15.1	83.5	17.4	85.8	18.1	25.9	1.52	1.90	39A03



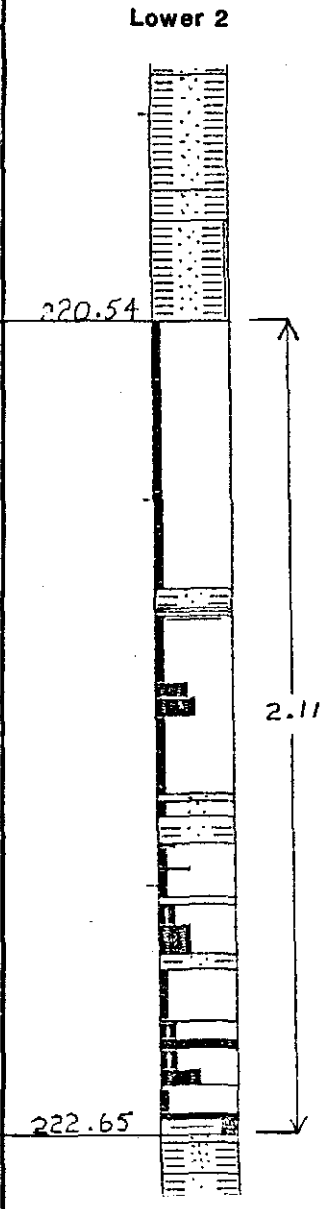
5 cm

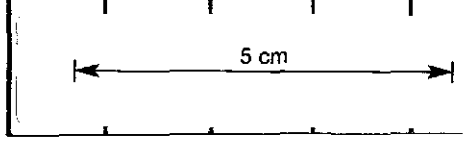
855091

GY 40

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

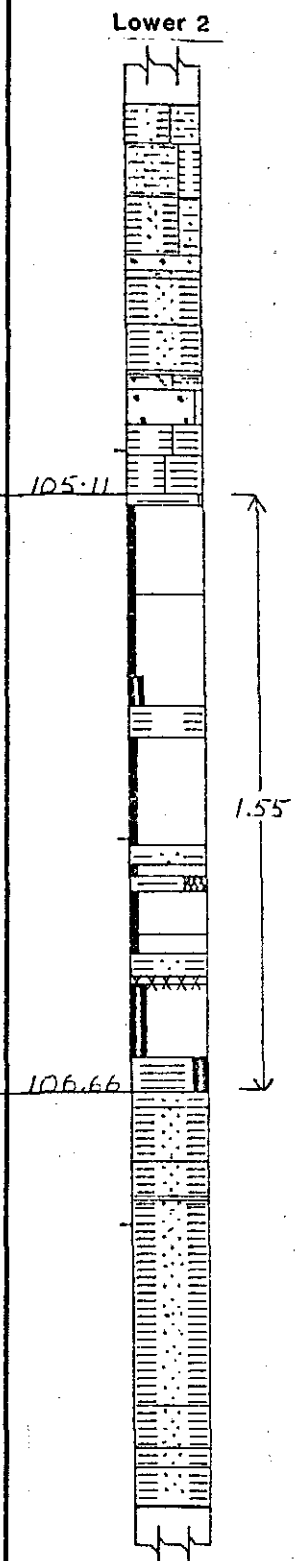
CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
				0.6	19.2	88.6	2.44	1.12	40A02
70.9	17.8	80.1	20.1	80.2	20.1	30.8	1.57	2.11	40A03





EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
29.2	26.3	56.8	31.4	68.8	34.0	44.8	1.72	1.55	41A03

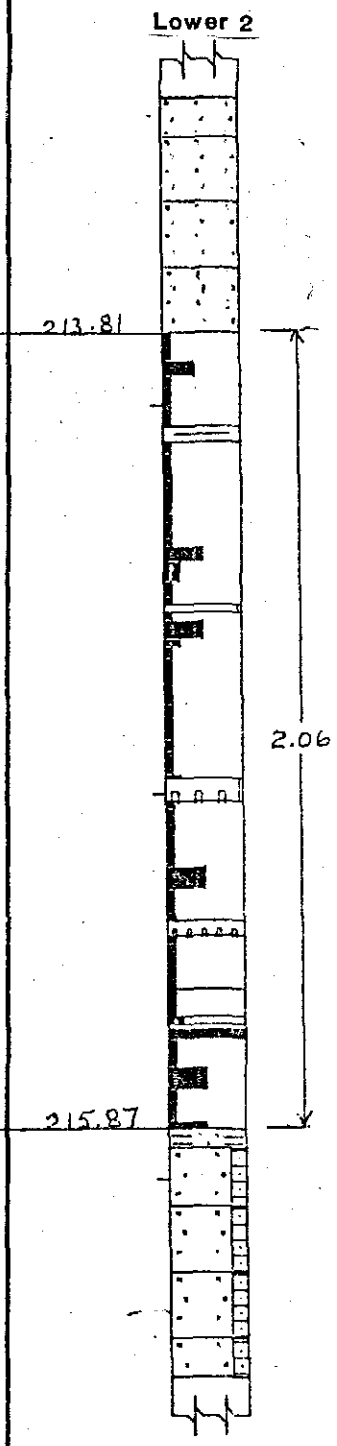


5 cm

855093
GY 42

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
75.7	15.4	81.9	17.1	83.8	17.8	26.5	1.49	2.06	42A01



5 cm

855094

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS GY 43

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
---	---	0.1	37.4	0.2	49.9	82.0	2.27	1.11	43A01
6.7	26.2	27.6	30.7	34.9	32.2	51.9	1.92	1.78	43A02

Lower 2

211.30

212.41

214.19

1.78

5 cm

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

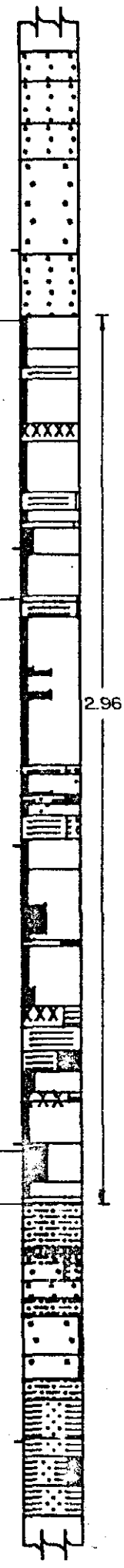
855095

GY44

LOWER 2.

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
69.9	19.7	80.4	22.0	88.9	24.5	29.1	1.54	0.94	44A08
74.3	14.4	75.3	14.8	80.0	16.7	26.1	1.52	1.85	44A09
94.6	9.2	98.2	9.9	99.1	10.2	10.7	1.34	0.17	44A10

5 cm

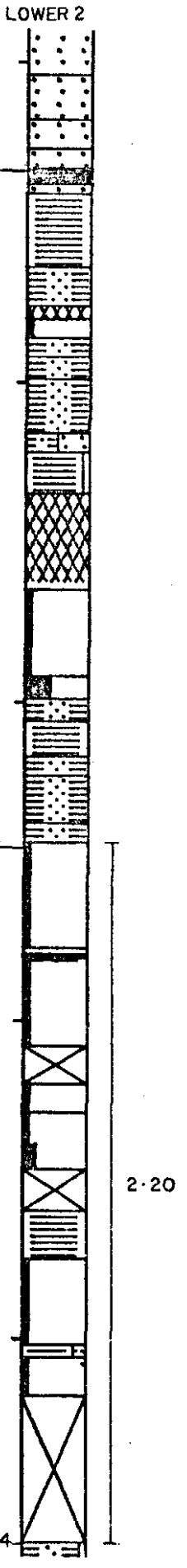


EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

855096

GY45

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
1.65	21.1	18.2	22.6	19.8	24.0	68.2	2.00	2.03	45A04
51.6	16.2	63.8	19.5	70.5	21.7	36.1	1.69	2.20	45A05



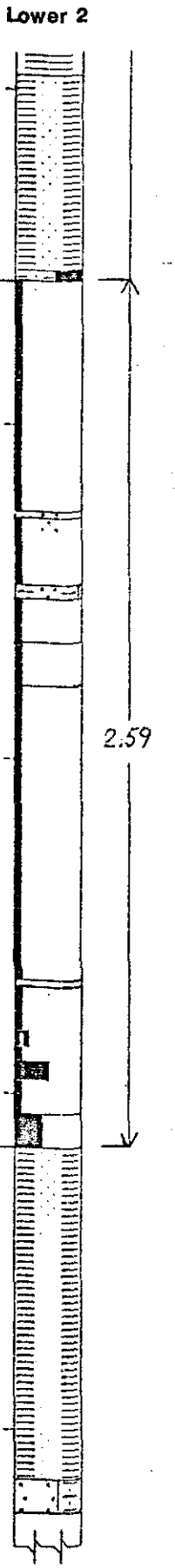
5 cm

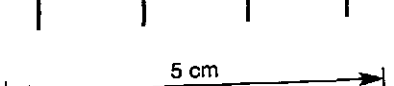
855097

DOM 8

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
72.8	15.7	80.9	17.6	84.1	18.5	26.7	1.43	2.59	DM8A2

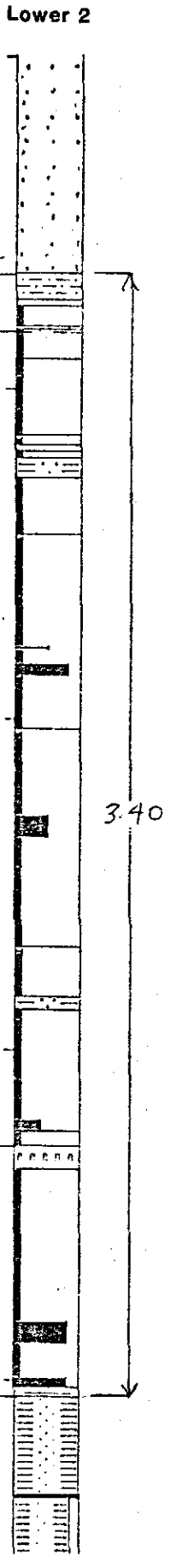


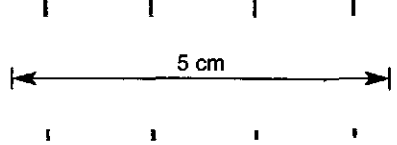


855098
DOM 13

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

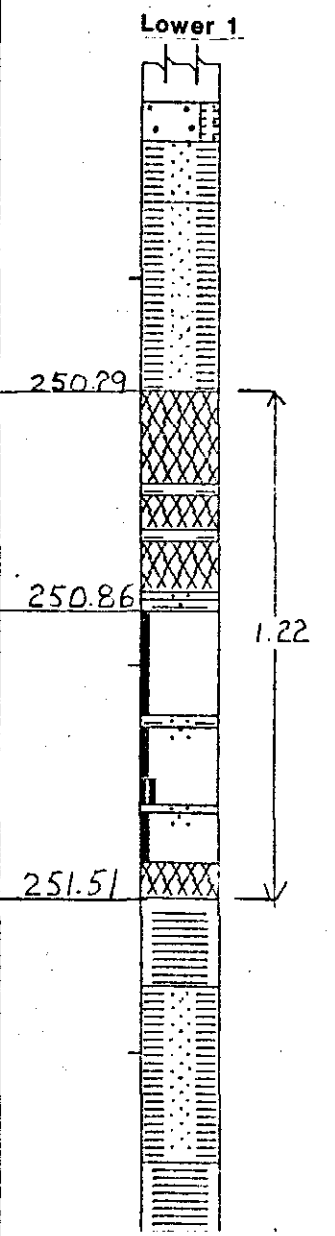
CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
---	---	10.5	38.8	10.6	38.9	72.1	2.07	0.17	D13A2
57.7	17.6	65.2	19.7	69.1	21.2	35.9	1.52	2.47	D13A3
60.9	13.2	68.1	15.6	77.8	19.1	30.4	1.48	0.76	D13A4





EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
						49.4	1.82	0.57	26/1
		53.3	27.7			42.8	1.69	0.65	26/2



5 cm

855100
GY 28

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
		58.9	24.6			39.0	1.67	3.64	28/1

5 cm

Lower 1

234.93

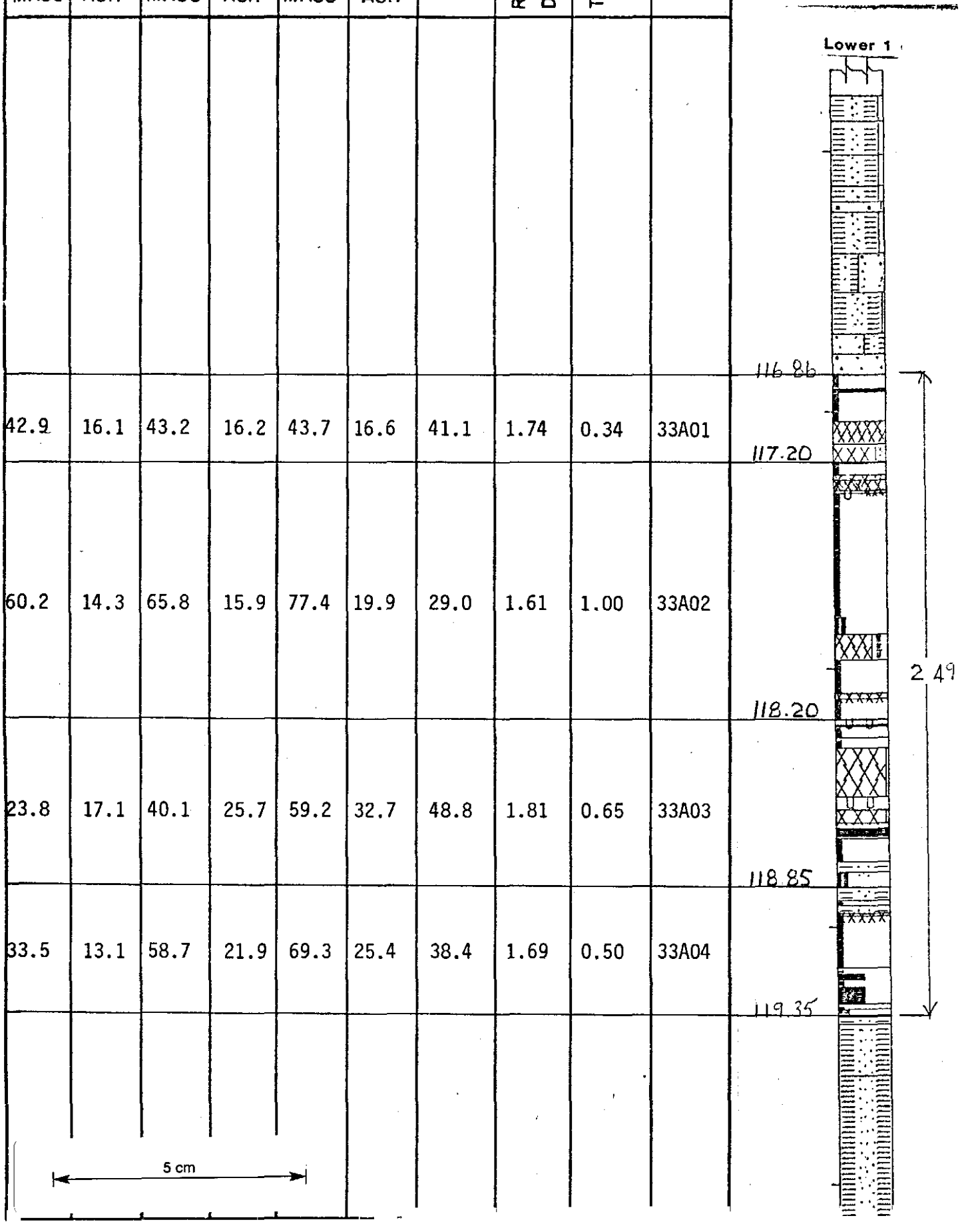
237.57

2.64

855101
GY 33

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
42.9	16.1	43.2	16.2	43.7	16.6	41.1	1.74	0.34	33A01
60.2	14.3	65.8	15.9	77.4	19.9	29.0	1.61	1.00	33A02
23.8	17.1	40.1	25.7	59.2	32.7	48.8	1.81	0.65	33A03
33.5	13.1	58.7	21.9	69.3	25.4	38.4	1.69	0.50	33A04

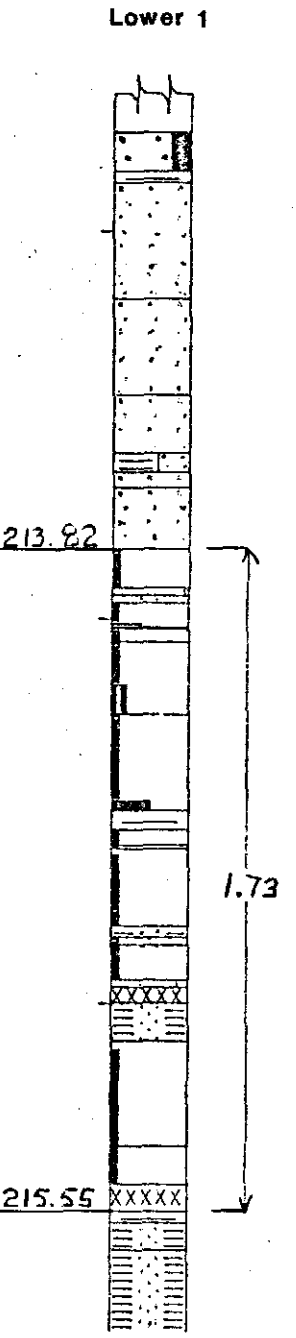


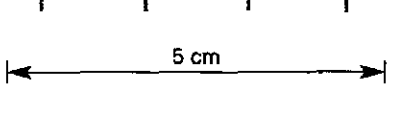
855102

GY 39

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
41.3	19.8	48.7	22.7	57.5	26.8	46.1	1.75	1.73	39A01
									39A02

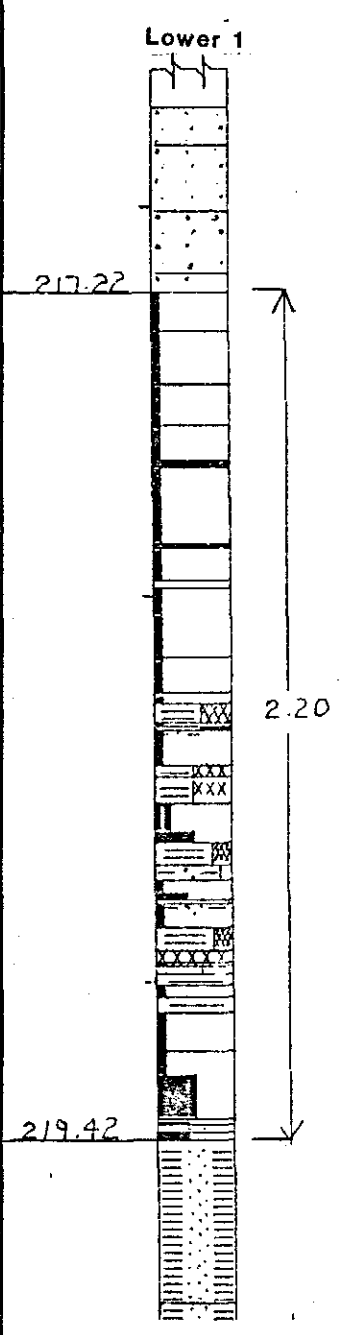


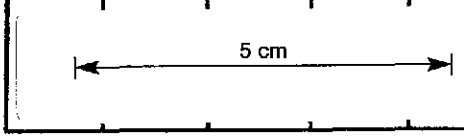


855103
GY 40

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
57.1	17.6	66.0	20.6	74.1	23.6	35.7	1.63	2.20	40A01
									40A02

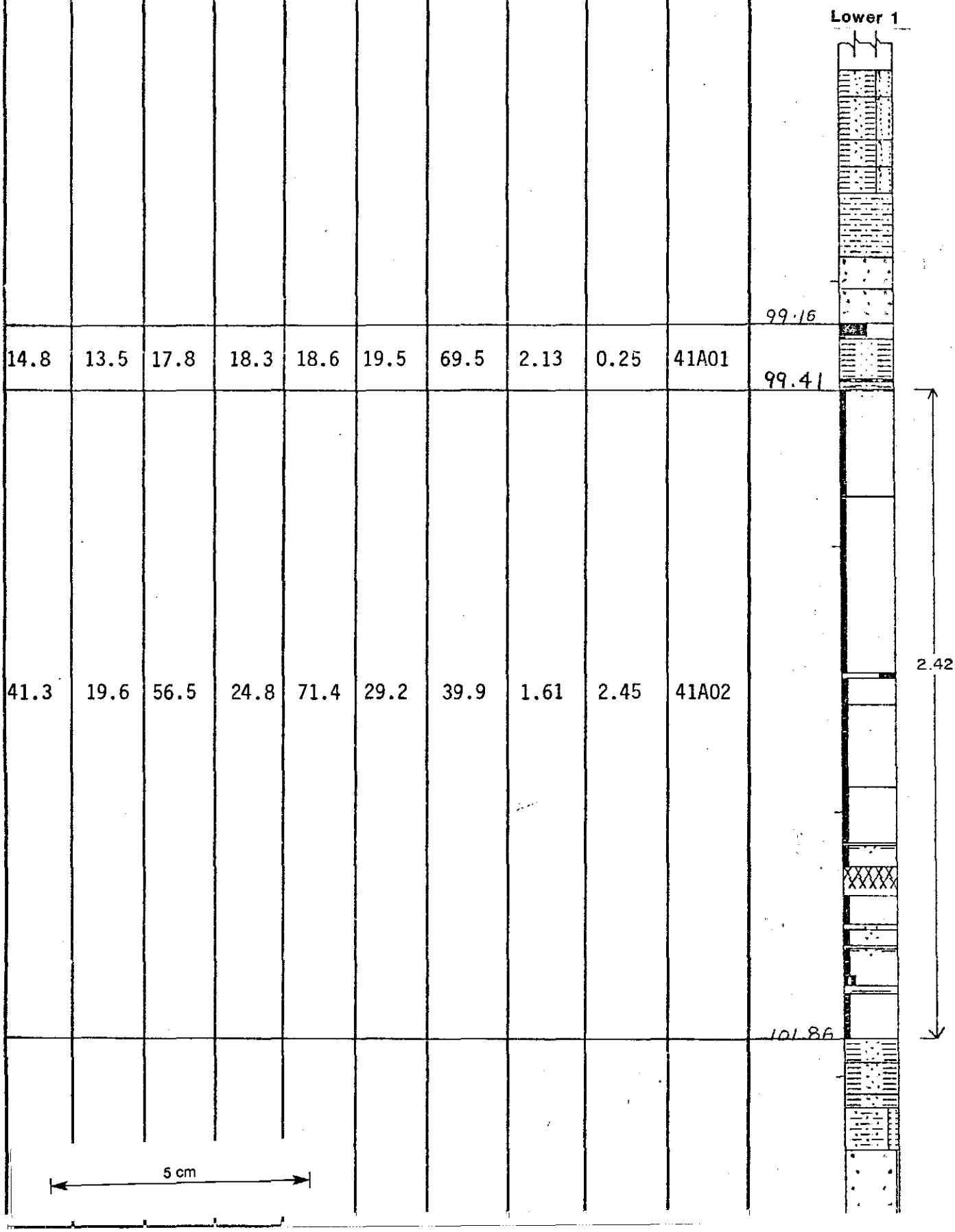




855104
GY 41

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

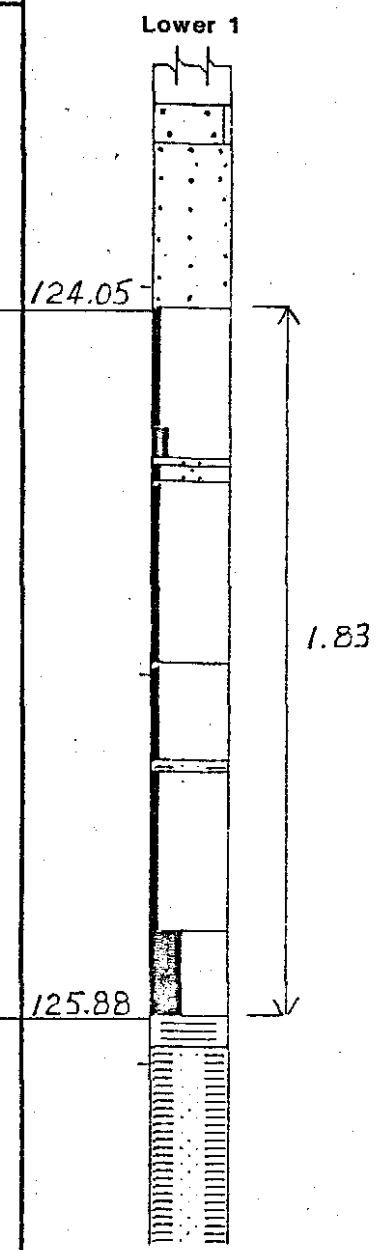
CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
14.8	13.5	17.8	18.3	18.6	19.5	69.5	2.13	0.25	41A01
41.3	19.6	56.5	24.8	71.4	29.2	39.9	1.61	2.45	41A02



855105
DOM 8

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
52.7	21.8	67.1	25.8	79.5	30.1	38.1	1.55	1.83	DM8A1

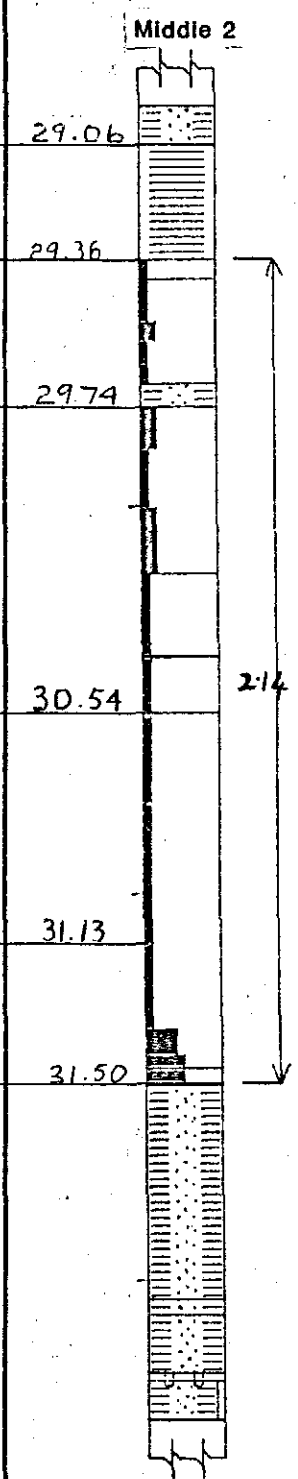


5 cm

855106
GY 34

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

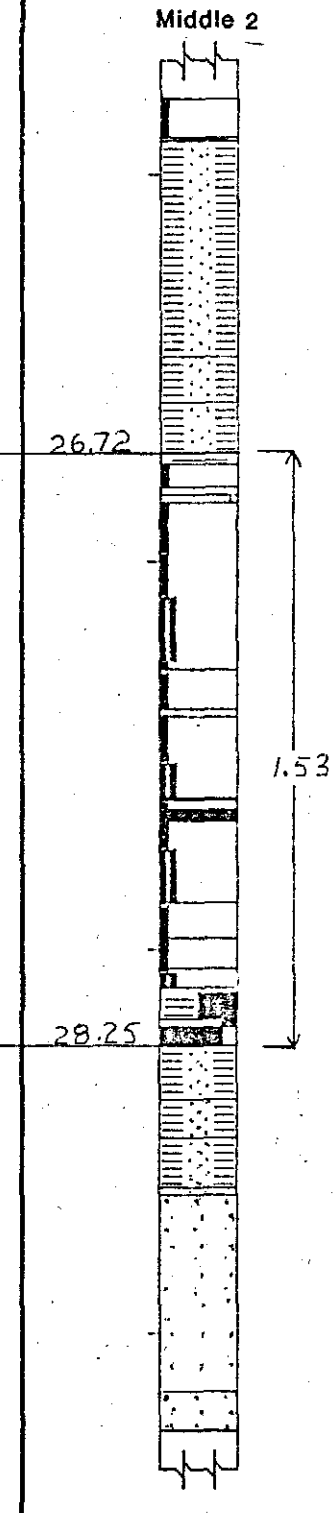
CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
0.6	26.8	1.2	40.6	1.7	46.7	63.9	2.02	0.30	34A01
61.7	12.0	63.2	12.7	68.7	15.8	33.4	1.64	0.38	34A02
94.5	13.9	96.9	14.5	98.1	14.8	15.6	1.48	0.80	34A03
93.4	14.6	97.1	15.4	98.2	15.8	16.4	1.50	0.59	43A04
93.0	13.1	96.2	14.1	98.3	14.8	15.6	1.46	0.37	34A05

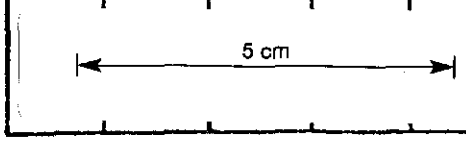


5 cm

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
83.0	10.9	86.4	11.9	89.1	13.0	19.7	1.43	1.53	36A01



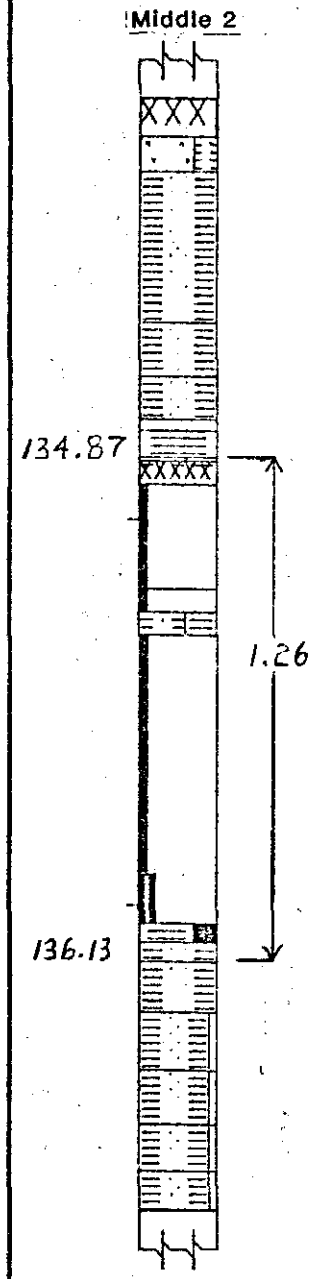


855108
GY 42

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
74.5	13.1	77.1	13.8	79.2	14.8	28.2	1.49	1.26	42A02

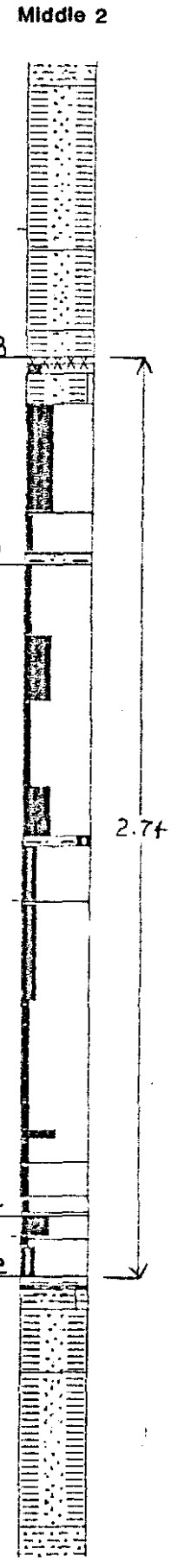
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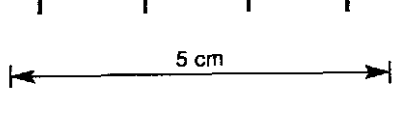


855109
GY 44

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
85.7	10.1	85.8	10.1	86.3	10.3	18.9	1.35	0.62	44A05
85.8	15.5	87.4	15.8	90.8	16.8	20.9	1.39	1.94	44A06
45.6	28.0	76.3	33.5	87.7	35.3	38.3	1.59	0.18	44A07



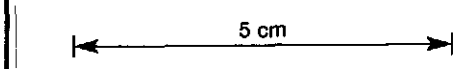


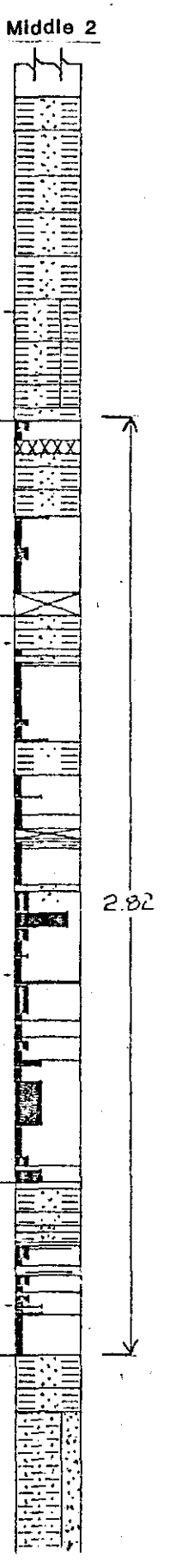
855110

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

GY 45

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
45.6	23.3	58.0	26.3	59.0	26.5	48.0	1.67	0.59	45A01
69.2	19.2	76.4	21.0	80.1	22.3	32.5	1.52	1.71	45A02
33.0	19.8	36.6	22.0	44.8	27.0	54.9	1.79	0.52	45A03

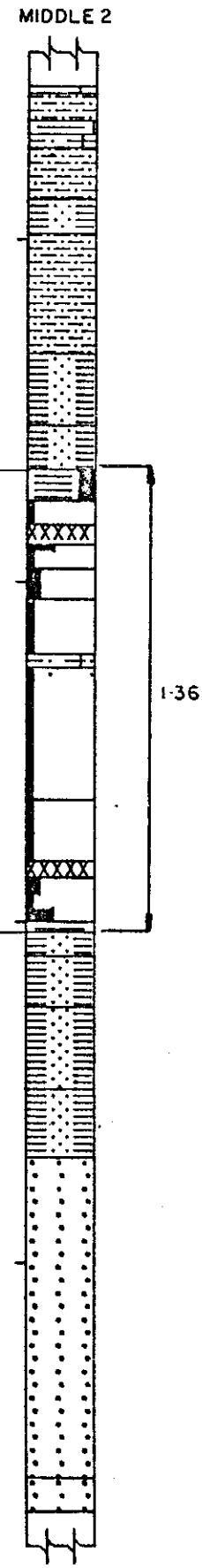




EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

GY46

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
80.0	12.7	80.7	12.9	87.6	15.1	21.5	1.45	1.36	46A01

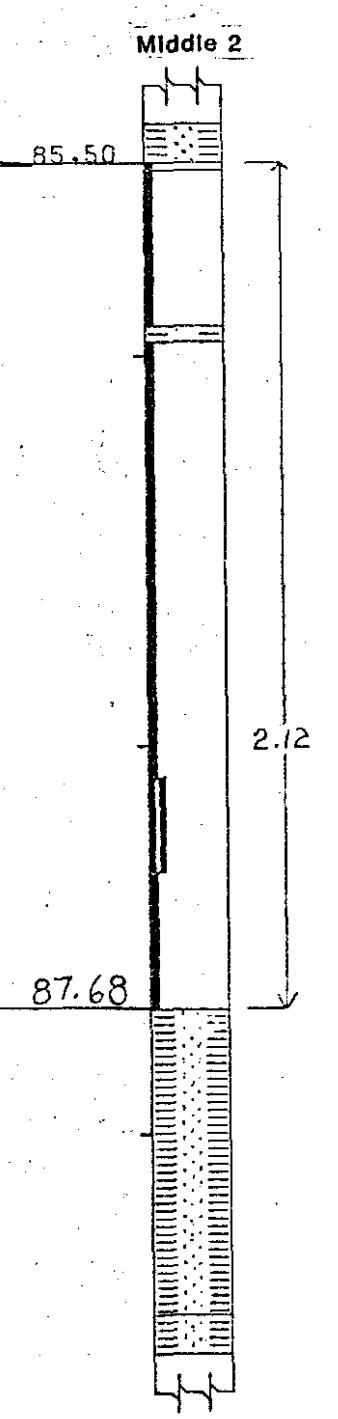


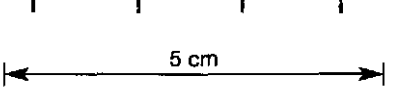
5 cm

855112
DOM 13

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

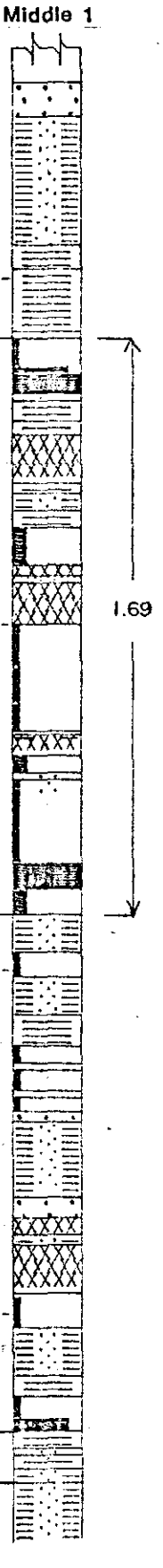
CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
86.2	13.6	98.7	14.4	90.2	14.6	20.4	1.42	2.18	D13A1





EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

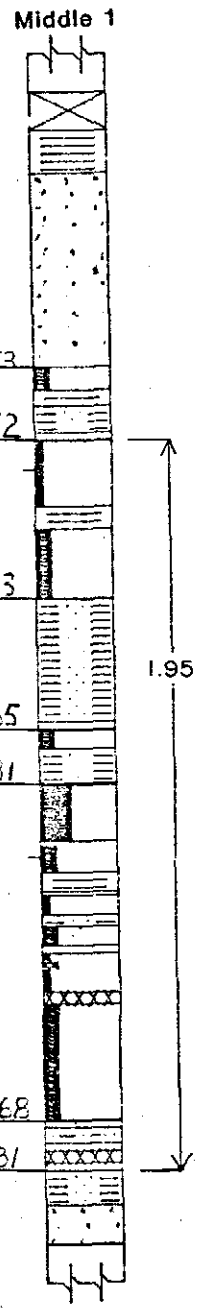
CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
		71.2	17.0	79.4	19.9	30.5	1.56	1.69	24/1
		35.4	20.7			57.4	1.81	1.50	24/2
						63.5	1.86	0.15	24/3



5 cm

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
32.9	22.7	36.9	24.7	41.5	27.5	57.6	1.98	0.19	28/5
91.8	18.3	95.2	19.0	97.3	19.7	21.0	1.52	0.41	28/6
0.3	18.5					90.9	2.50	0.32	28/7
33.8	21.6	34.6	22.2	35.0	22.6	58.3	1.92	0.16	28/8
71.5	15.2	76.7	17.1	78.0	17.6	28.6	1.58	0.87	28/9
6.0	36.6	12.3	43.7	14.8	45.7	65.3	1.97	0.13	28/10

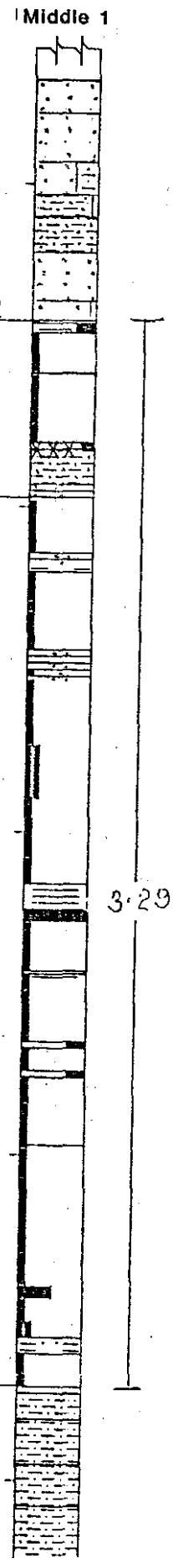


5 cm

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
47.8	11.1	50.6	12.5	54.8	15.1	46.0	1.67	0.55	43A03
75.6	20.2	81.8	21.7	84.9	22.7	30.2	1.47	2.74	43A04

5 cm



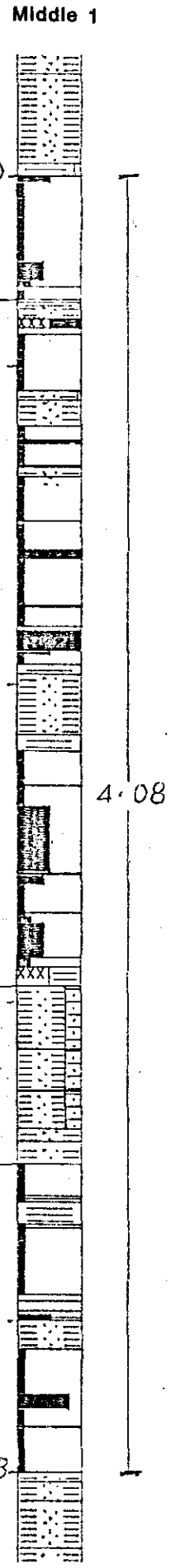
855116

GY 44

EL 5/61 GRAY MOUNT NICHOLAS WASHABILITY RESULTS

CUMULATIVE %						RAW ASH%	RELATIVE DENSITY	THICKNESS (m)	SAMPLE NO.
FLOATS 1.60		FLOATS 1.70		FLOATS 1.80					
MASS	ASH	MASS	ASH	MASS	ASH				
92.5	15.6	93.4	15.8	95.8	16.6	18.4	1.43	0.40	44A01
50.5	22.7	62.5	25.9	66.4	27.2	44.8	1.56	2.15	44A02
								0.56	
65.3	18.5	73.3	20.2	77.5	21.6	30.2	1.47	0.97	44A03

5 cm



855117

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN 5402000mN 5401000mN 5400000mN 5399000mN 5398000mN

HUNTSMANS CAP

MT NICHOLAS

Haslemere Road

Huntsmans Avenue

Huntsmans No.1

Avenue No.2

Avenue No.1

Nicholas Road

Lohreys Road

GY31 GY34 DOM13 GY44 GY46 GY37 GY42 GY36 GY45 GY24 GY26 GY39 GY40 GY28 GY43 GY33 GY41 GY38 GY35 DOM8 DOM33 DOM36

O/C 1 O/C 3 O/C 4 O/C 5 O/C 6 O/C 8

PART OF UNDERGROUND WORKINGS

THE CORNWALL COAL CO. N.L.

MT. NICHOLAS COLLIERY

20 m

TASMANIA

FALMOUTH

St Marys

HIGHWAY

BICHENO

EL 5/61

GY31 Drill Hole

O/C 4 Surveyed Outcrop

5 cm

SCALE

0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

TOPOGRAPHIC MAP

Scale 1 20,000

Author . Coal Division	Date . June 1981	Encl 1/1
Report No CEPR 11/81	Drawing No 1925	

855118

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

EL 5/61

THE CORNWALL COAL CO N L

THE CORNWALL COAL CO. N.L.

F

GY31 GY34 GY36 GY46 GY37 GY42 GY44 GY45 GY24 GY26 GY39 GY40 GY28 GY43 GY33 GY41 GY38 GY35

O/C 1 O/C 3 O/C 4 O/C 5 O/C 6 O/C 7 O/C 8

DOM 8 DOM 13

M1 Mt

L1 Lt

5 cm

TASMANIA

FALMOUTH
St Marys
HIGHWAY
BICHENO
EL5/61

In Situ Dolerite
Coal Measure Outcrop
GY41 Drill Hole
O/C 8 Surveyed Outcrop
Adit Portal
Major Joint Directions
Fault
Bedding

SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

OUTCROP MAP

Scale 1 20,000

Author Coal Division	Date June 1981	Encl. 1/2
Report No CEPR 11/81	Drawing No 2172	

855119

EL 5/61

THE CORNWALL COAL CO. N.L.

GY31 395.12
GY34 377.75
DOM13 374.73
GY46 GY37
GY44 365.16
GY36 380.63
GY42 365.87
GY45 405.18
GY24 357.54
GY26 358.06
GY39 374.24
DOM8 433.00
GY40 363.24
GY28 354.65
GY43 346.67
GY33 346.35
GY41 343.73
GY38
GY35

395 390 385 380 375 370 365 360 355 350 345 340
415 410 405 400
470 465 460 455 450 445 440 435 430 425 420 415

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5 cm

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
BICHENO
EL5/61

LEGEND
Subcrop
Washout
Split
Fault
Dolerite
Joint orientation

SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

COAL MEASURE STRUCTURE (TOP OF L II SEAM) INTERPRETATION A - with no faulting

Scale 1 20,000

Author Coal Division	Date June 1981
Report No CEPR 11/81	Drawing No 2176

Encl. 1/3a

EL 5/61

THE CORNWALL COAL CO. N.L.

GY31 395.12
GY34 377.75
DOM13 374.73
GY46
GY37
GY44 365.16
GY36 380.63
GY42 365.87
GY45 405.18
GY24 357.54
GY26 358.06
GY39 374.29
DOM8 433.00
GY40 363.24
GY28 354.65
GY43 346.67
GY33 346.35
GY41 343.73
GY38
GY35

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN 5402000mN 5401000mN 5400000mN 5399000mN 5398000mN

5 cm

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL 5/61
BICHENO

LEGEND

Subcrop
Washout
Split
Fault
Dolerite
Joint orientation

SCALE

0 500 1000 1500 m

855120

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

COAL MEASURE STRUCTURE (TOP OF L II SEAM)

INTERPRETATION B - with faulting

Scale 1 20,000

Author Coal Division	Date June 1981	Encl. 1/3b
Report No CEPR 11/81	Drawing No 2385	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN 5402000mN 5401000mN 5400000mN 5399000mN 5398000mN

EL 5/61

GY34 377.75
GY31 395.12
DOM13 374.73
GY46
GY37 371 (?)
GY44 405.18
GY36 380.63
GY42 365.87
GY45 405.18
GY24 357.54
GY26 358.06
GY39 374.24
DOM8 433.00
GY40 363.24
GY28 354.65
GY43 346.67
GY33 346.35
GY41 343.73
GY38
GY35

THE CORNWALL COAL CO. N.L.

5 cm

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
BICHENO
EL5/61

LEGEND

- Subcrop
- Washout
- Split
- Fault
- Dolerite
- Joint orientation

SCALE

0 500 1000 1500m

855121

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

COAL MEASURE STRUCTURE
(TOP OF L II SEAM)
INTERPRETATION C - with faulting

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl.1/3c
Report No: CEPR 11/81	Drawing No: 2386	

EL 5/61

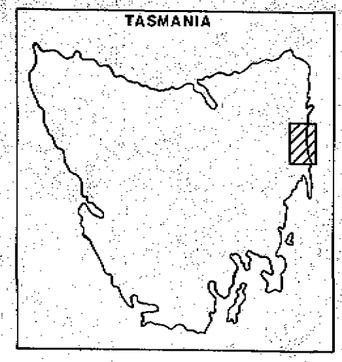
THE CORNWALL COAL CO. N.L.

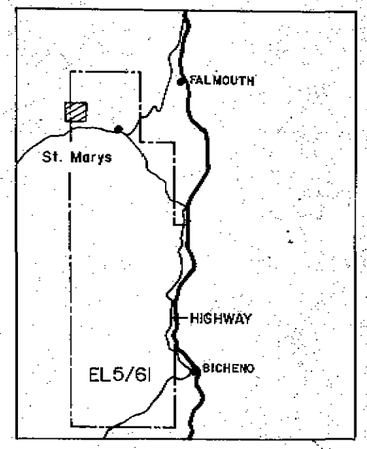
THE CORNWALL COAL CO. N.L.

GY31 9.11
GY34 17.60
DOM13 0
GY44 6.00
GY48
GY37 68.0
GY36 11.23
GY42 21.70
GY45 5.00
GY24 106.30
GY26 109.14
GY39 6.90
DOM8 0
GY40 31.00
GY28 65.57
GY43 43.30
GY 33 0
GY41 58.00
GY38 75.00+
GY35 56.70+

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN





LEGEND
Subcrop
Washout
Split
Coal Measure Outcrop
Dolerite

5 cm

SCALE
0 500 1000 1500m

855122

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

BASE OF SCREE - DEPTH (m)

Scale 1:20,000

Author : Coal Division	Date : June 1981	Encl.1/4
Report No: CEPR.11/81	Drawing No: 2169	

GY43
R.L. 559·08m
0m
43·90
87·29
88·01
119·42
120·71
142·82
211·41
214·19
218·90
220·48
232·91
234·77
297·92
298·90m

GY28
R.L. 593·48m
0m
65·57
80·57
83·50
85·56
87·27
89·35
99·57
UPPER VIII
135·33
140·61
MIDDLE II
145·67
MIDDLE III
176·25
254·55
LOWER II
258·85
LOWER III
266·88
550·60
TRIASSIC
PERMIAN
555·00m

GY41
R.L. 448·84m
0m
98·0
118·00m

GY33
R.L. 467·17m
0m
17·99
19·09
29·91
24·79
45·96
46·92
145·18
116·84
119·99
120·83
122·55
192·90m

GY40
R.L. 583·78m
0m
31·00
86·21
87·54
91·29
92·59
93·78
94·80
119·30
217·22
219·92
220·54
222·05
229·90m

DOM8
R.L. 559·87m
0m
6·40
23·32
5·60
45·14
162·70
166·32
169·84
223·48
350·70m

GY39
R.L. 590·46m
0m
6·50
72·46
125·09
129·68
133·80
187·16
190·09
191·61
193·79
229·89m

GY26
R.L. 610·60m
0m
109·14
106·38
171·71
176·83
339·20
340·80m

GY36
R.L. 486·23m
0m
11·29
24·72
28·25
40·79
69·87
81·96
105·60
107·17
117·82m

GY31
R.L. 417·57m
0m
11
22·45
24·40
76·47
119·36m

GY34
R.L. 480·51m
0m
17·60
29·94
31·90
33·29
60·00
80·00
102·76
104·81
114·79m

GY34

GY46
R.L. 527·41m
0m
68·00
76·67
78·03
199·57

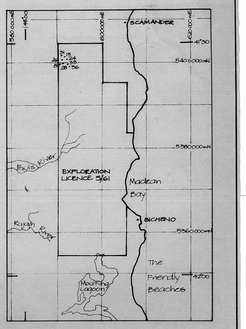
DOM13
R.L. 537·38m
0m
1·52
7·43
14·46
38·46
42·42
43·48
43·84
55·50
57·28
162·65
164·05
180·80
226·50m

GY42
R.L. 579·68m
0m
21·70
58·61
90·90
124·12
126·60
132·83
134·09
219·81
221·87
296·10m

GY24
R.L. 603·80m
0m
106·80
UPPER VIII
160·15
163·54
MIDDLE II
171·10
246·26
249·28
LOWER II
327·89
560·50m

GY44
R.L. 506·38m
0m
6·0
60·40
64·48
70·00
72·38
75·12
81·36
82·00
141·22
144·18
166·86

GY45
R.L. 510·90m
0m
5·0
29·33
32·15
107·44
109·64
115·60m



LEGEND

- SURFICIAL DEPOSITS
- DOLERITE SCREE
- CONGLOMERATE, PEBBLY SANDSTONE
- SANDSTONE
- SANDSTONE WITH MUDSTONE BANDS
- SANDSTONE WITH COAL FRAGMENTS, STREAKS AND BANDS
- SILTSTONE
- MUDSTONE
- MUDSTONE WITH SANDSTONE BANDS
- MUDSTONE WITH COAL BANDS
- CARBONACEOUS MUDSTONE
- COAL
- CORE LOSS

0 10 20 30 40 metres

5 cm

81-1648

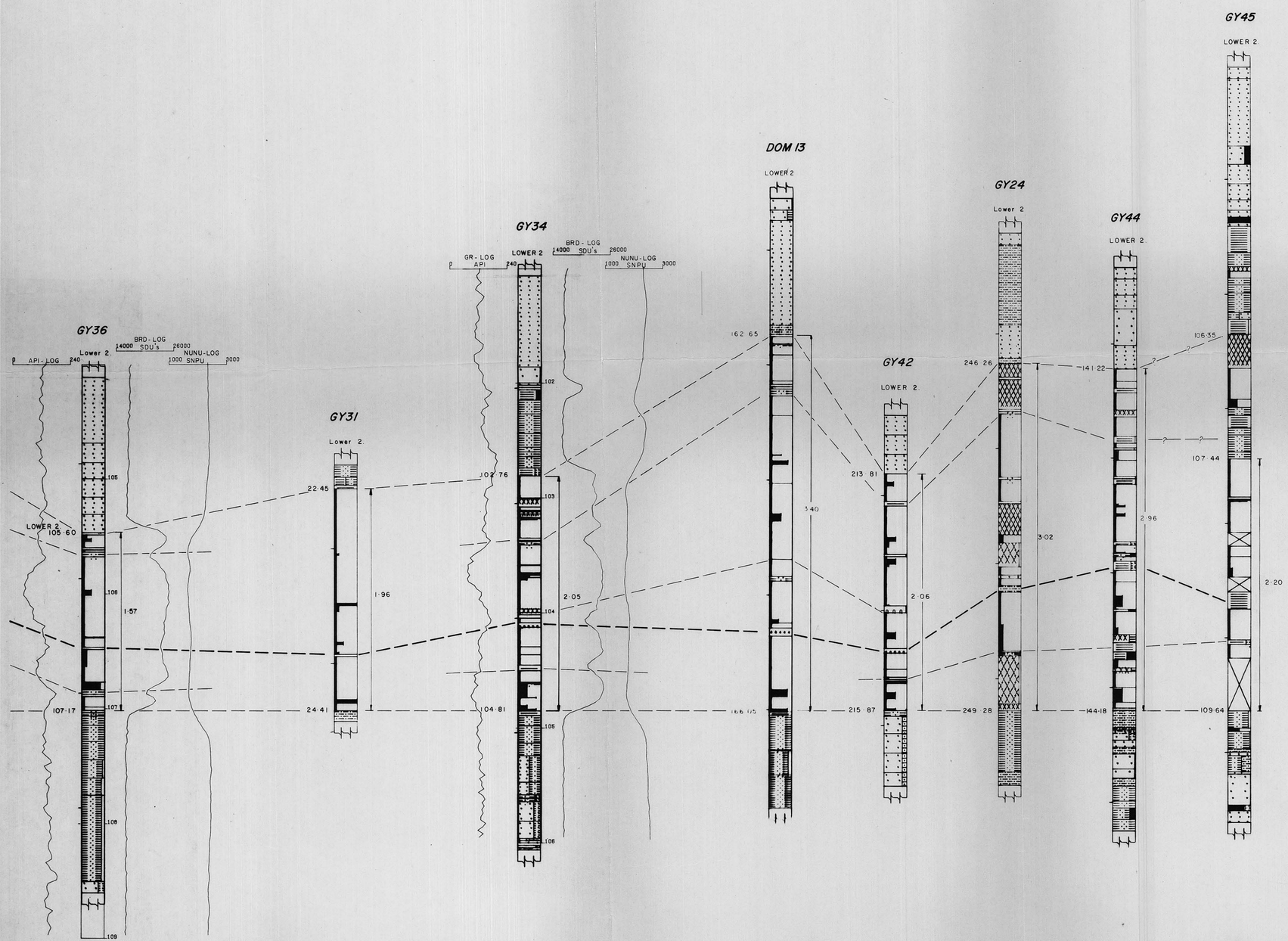
THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA - GRAY EL 5/81
MT NICHOLAS AREA

GENERALISED BOREHOLE LOGS & COAL SEAM CORRELATIONS

Vert. Scale 1:500

Author: Coal Division	Date: August 1981	Encl.1/5
Report No: CEPR 11/81	Drawing No: 2345	



LEGEND

SEAM SECTIONS REFERENCE

- COAL - UNDIFFERENTIATED
- COAL - BRIGHT
- COAL - BRIGHT WITH DULL BANDS
- COAL - INTERBANDED DULL AND BRIGHT
- COAL - MAINLY DULL FREQ. BRIGHT BANDS
- COAL - DULL WITH MINOR BRIGHT BANDS
- COAL - DULL
- COAL - WEATHERED
- COAL - CINDERED
- COAL - STONY

LEGEND

LITHOLOGY REFERENCE

- SOIL
- SILT
- SHALE
- SILTSTONE
- CLAYSTONE
- MUDSTONE
- SANDSTONE
- INTERBEDDED SEDIMENTS (SANDST/MUDST 50:50)
- CONGLOMERATE
- TONSTEIN
- COAL
- COAL CINDERED
- COAL STONY
- NOT CORED/CORE LOSS
- CLAYSTONE
- CLAY
- INTRA. CONGLOM.
- COAL WEATHERED
- IRONSTONE
- CARBONACEOUS MUDSTONE
- ARKOSE
- OIL SHALE
- DOLERITE TALUS
- BRECCIA
- COAL(UNDIFF)
- COAL SOOTY

5 cm

SEAM SECTION

0.40 0.20 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

METRES

102·76 *Drillers depth (m)*

103 *Petrophysical log depth (m)*

2·05 *Workable seam thickness adjusted to petrophysical log*

Correlation levels

855124

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

TASMANIA - GRAY EL 5/61
MT NICHOLAS AREA

L II

DETAIL SEAM PROFILES

Vert. Scale 1:20

AUTHOR: Coal Division	DATE: August 1981
REPORT No: CEPR 11/81	DRAWING No: 2343

Encl.1/6A

GY41

GR-LOG API 0 240 | BRD-LOG 14000 SDU's 26000 | NUNU-LOG 1000 SNPU 3000

99·16
99·46
101·86
LOWER 1
89
100
101
105
103
2·70

GY43

GR-LOG API 0 240 | BRD-LOG 14000 SDU's 26000 | NUNU-LOG 1000 SNPU 3000

LOWER 2 212·41
212
219
214
214·19
216
1·78

GY41

GR-LOG API 0 240 | BRD-LOG 14000 SDU's 26000 | NUNU-LOG 1000 SNPU 3000

LOWER 2 105·11
106
107
108
1·55
106·66

GY28

Lower 1
234·93
2·64
Lower 2. 238·83
2·04
240·87

GY33

GR-LOG API 0 240 | BRD-LOG 14000 SDU's 26000 | NUNU-LOG 1000 SNPU 3000

LOWER 1
116·86
116
117
118
119
2·49
120
1·26
237·57
121
1·47
LOWER 2. 120·82
1·71
122
122·53
123
124

GY40

GR-LOG API 0 240 | LOWER 1 | BRD-LOG 14000 SDU's 26000 | NUNU LOG 1000 SNPU 3000

217·22
217
218
219
2·20
219·42
220
1·26
LOWER 2 220·54
221
2·11
222
222·65
223
224

DOM 8

Lower 1
124·05
1·83
125·88
0·69
Lower 2 126·57
2·59
129·16

GY39

GR-LOG API 0 240 | BRD-LOG 14000 SDU's 26000 | NUNU-LOG 1000 SNPU 3000

212
212
213
214
LOWER 1 213·82
215
1·72
215·54
216
0·68
LOWER 2. 216·22
217
1·90
218
218·12
219
218
220

GY26

Lower 1
250·29
1·22
251·51
1·03
Lower 2. 252·54
2·48
255·02

LEGEND

SEAM SECTIONS REFERENCE

- COAL - UNDIFFERENTIATED
- COAL - BRIGHT
- COAL - BRIGHT WITH DULL BANDS
- COAL - INTERBANDED DULL AND BRIGHT
- COAL - MAINLY DULL , FREQ. BRIGHT BANDS
- COAL - DULL WITH MINOR BRIGHT BANDS
- COAL - DULL
- COAL - WEATHERED
- COAL - CINDERED
- COAL - STONY

LEGEND

LITHOLOGY REFERENCE

- SOIL
- SILT
- SHALE
- SILTSTONE
- CLAYSTONE
- MUDSTONE
- SANDSTONE
- INTERBEDDED SEDIMENTS (SANDST/MUDST 50:50)
- CONGLOMERATE
- TONSTEIN
- COAL
- COAL CINDERED
- COAL STONY
- NOT CORED/CORE LOSS
- CLAYSTONE
- CLAY
- INTRA. CONGLOM.
- COAL WEATHERED
- IRONSTONE
- CARBONACEOUS MUDSTONE
- ARKOSE
- OIL SHALE
- DOLERITE TALUS
- BRECCIA
- COAL(UNDIFF)
- COAL SOOTY

5 cm

SEAM SECTION 1:20

0.40 0.20 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

METRES

212·41 *Drillers depth (m)*

212 *Petrophysical log depth (m)*

1·78 *Workable seam thickness adjusted to petrophysical log*

Correlation levels

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA - GRAY EL 5/6I
MT NICHOLAS AREA

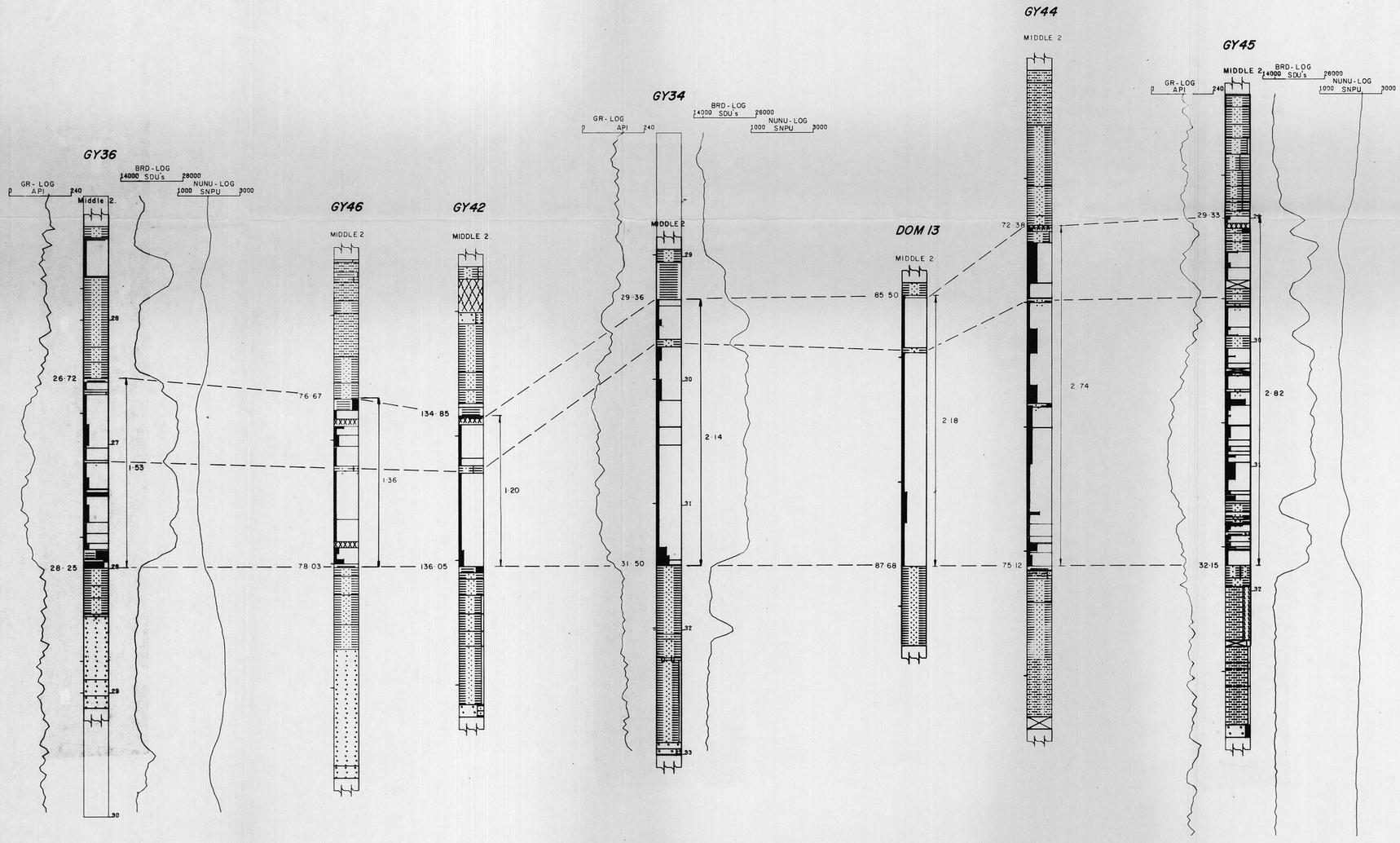
LI & II

DETAIL SEAM PROFILES

Vert. Scale 1:20

Author: Coal Division	Date: August 1981	Encl.1/68
Report No. CEPR 11/81	Drawing No: 2344	

855125



LEGEND

SEAM SECTIONS REFERENCE

- COAL - UNDIFFERENTIATED
- COAL - BRIGHT
- COAL - BRIGHT WITH DULL BANDS
- COAL - INTERBANDED DULL AND BRIGHT
- COAL - MAINLY DULL , FREQ. BRIGHT BANDS
- COAL - DULL WITH MINOR BRIGHT BANDS
- COAL - DULL
- COAL - WEATHERED
- COAL - CINDERED
- COAL - STONY

LEGEND

LITHOLOGY REFERENCE

- SOIL
- SILT
- SHALE
- SILTSTONE
- CLAYSTONE
- MUDSTONE
- SANDSTONE
- INTERBEDDED SEDIMENTS (SANDST/MUDST 50:50)
- CONGLOMERATE
- TONSTEIN
- COAL
- COAL CINDERED
- COAL STONY
- NOT CORED/CORE LOSS
- CLAYSTONE
- CLAY
- INTRA. CONGLOM.
- COAL WEATHERED
- IRONSTONE
- CARBONACEOUS MUDSTONE
- ARKOSE
- OIL SHALE
- DOLERITE TALUS
- BRECCIA
- COAL(UNDIFF)
- COAL SOOTY

5 cm

SEAM SECTION

1 : 20

0.40 0.20 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

METRES

29·36 *Drillers depth (m)*

30 *Petrophysical log depth (m)*

2·14 *Workable seam thickness adjusted to petrophysical log*

Correlation levels

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA - GRAY EL 5/61
MT NICHOLAS AREA

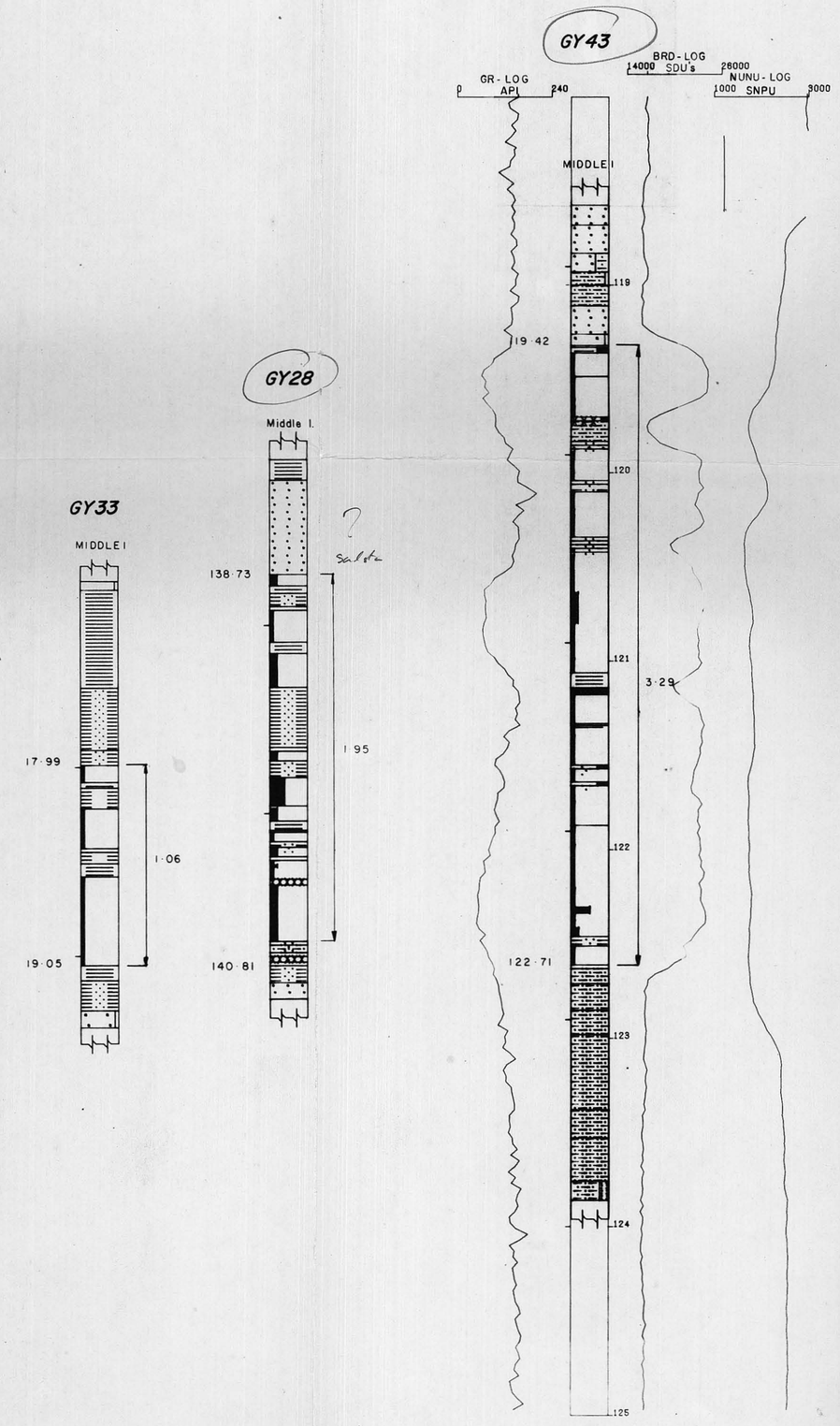
M II

DETAIL SEAM PROFILES

Vert. Scale 1 : 20

Author : Coal Division	Date : August 1981	Encl.1/7
Report No: CEPR 11/81	Drawing No: 2342	

855126



LEGEND

SEAM SECTIONS REFERENCE

- COAL - UNDIFFERENTIATED
- COAL - BRIGHT
- COAL - BRIGHT WITH DULL BANDS
- COAL - INTERBANDED DULL AND BRIGHT
- COAL - MAINLY DULL FREQ. BRIGHT BANDS
- COAL - DULL WITH MINOR BRIGHT BANDS
- COAL - DULL
- COAL - WEATHERED
- COAL - CINDERED
- COAL - STONY

LEGEND

LITHOLOGY REFERENCE

- SOIL
- SILT
- SHALE
- SILTSTONE
- CLAYSTONE
- MUDSTONE
- SANDSTONE
- INTERBEDDED SEDIMENTS (SANDST/MUDST 50:50)
- CONGLOMERATE
- TONSTEIN
- COAL
- COAL CINDERED
- COAL STONY
- NOT CORED/CORE LOSS
- CLAYSTONE
- CLAY
- INTRA. CONGLOM.
- COAL WEATHERED
- IRONSTONE
- CARBONACEOUS MUDSTONE
- ARKOSE
- OIL SHALE
- DOLERITE TALUS
- BRECCIA
- COAL(UNDIFF)
- COAL SOOTY

5 cm

SEAM SECTION

1 20

0.40 0.20 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

METRES

119·42 *Drillers depth (m)*

119 *Petrophysical log depth (m)*

3·29 *Workable seam thickness adjusted to petrophysical log*

855127

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA - GRAY EL 5/61
MT NICHOLAS AREA

M I

DETAIL SEAM PROFILES

Vert. Scale 1 : 20

Author : Coal Division	Date : August 1981	Encl.1/8
Report No: CEPR 11/81	Drawing No: 2341	

855128

EL 5/61

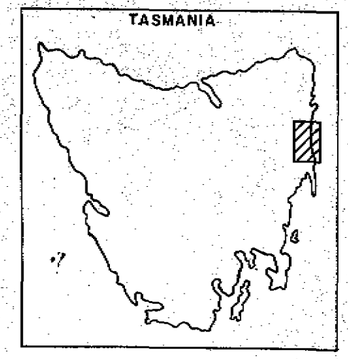
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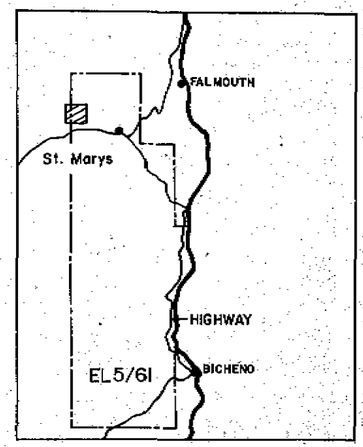
5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31 1.96
GY34 2.05
DOM13 3.40
GY46 GY37
GY36 1.59
GY42 2.08
GY44 2.96
GY24 3.02
GY45 2·20
GY26 2.48
GY39 1.90
DOM8 2·59
GY40 2.11
GY28 2.04
GY43 1.78
GY33 1.71
GY41 1.55
GY38
GY35

4.25 4.00 3.75 3.50 3.25 3.00 2.75 2.50 2.25 2.00 1.75 1.50 1.25 1.75 2.0 2.50 2.25 2.00 1.75 1.50

THE CORNWALL COAL CO. N.L.





LEGEND
Subcrop
Washout
Split
Fault
Dolerite

5 cm

SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L II SEAM - THICKNESS (M)
(WORKABLE SECTION)

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/9
Report No: CEPR 11/81	Drawing No: 2155	

855129

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN 5402000mN 5401000mN 5400000mN 5399000mN 5398000mN

395 390 385 380 375 370 365 360 355 350 345 340

415 410 405

GY31 395.12
GY34 377.75
DOM13 374.73
GY46 GY37
GY44 365.16
GY36 380.63
GY42 365.87
GY45 405.18
GY24 357.54
GY26 358.06
GY39 374.24
DOM8 433.00
GY40 363.24
GY28 354.65
GY43 346.67
GY33 346.35
GY41 343.73
GY38
GY35

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO

LEGEND
Subcrop
Washout
Split
Fault
Dolerite

5 cm
SCALE
0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L II SEAM - STRUCTURE TOP (M)
INTERPRETATION A

Scale 1:20,000

Author Coal Division	Date June 1981	Encl. 1/10
Report No. CEPR 11/81	Drawing No. 2151	

855130

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN 5402000mN 5401000mN 5400000mN 5399000mN 5398000mN

EL 5/61

GY31 22.45
GY34 102.76
DOM13 162.65
GY44
GY37
GY36 105.60
GY42 213.81
GY45 105.72
GY24 246.26
GY26 252.54
GY39 216.22
DOM8 126.87
GY40 220.54
GY28 238.83
GY43 212.41
GY33 120.82
GY41 105.11
GY38
GY35

20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 400

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
BICHENO
EL 5/61

LEGEND

- Subcrop
- Washout
- Split
- Fault
- Dolerite

5 cm

SCALE

0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

LII TOP DEPTH FROM SURFACE (m)

Scale 1 20,000

Author Coal Division	Date June 1981	Encl. I/II
Report No CEPR 11/81	Drawing No 2147	

855131

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN 5402000mN 5401000mN 5400000mN 5399000mN 5398000mN

GY31 GY34 DOM13 GY44 GY46 GY37 GY36 GY42 GY45 GY24 GY26 1.21 GY39 1.72 DOM8 1.83 GY40 2.20 GY28 2.64 GY43 GY33 2.49 GY41 2.45 GY38 GY35

1.00 1.25 1.50 1.75 2.00 2.25 2.50

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH St. Marys HIGHWAY EL5/61 BICHENO

LEGEND

Subcrop
Washout
Split
Fault
Dolerite

5 cm

SCALE

0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L I SEAM = THICKNESS (M)
(WORKABLE SECTION)

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/12
Report No: CEPR 11/81	Drawing No: 2154	

855132

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY44
GY46
GY37
GY36
GY42
GY45
GY24
GY26
360.31
GY39
376.64
DOM8
435.82
GY40
366.56
GY28
356.55
GY43
GY33
350.31
GY41
349.43
GY38
GY35

380 375 370 365 360 355 350 345

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
BICHENO
EL5/61

LEGEND
Subcrop
Washout
Split
Fault
Dolerite

5 cm
SCALE
0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L I SEAM - STRUCTURE TOP (M)
INTERPRETATION A

Scale 1:20,000

Author : Coal Division	Date : June 1981	Encl. 1/13
Report No: CEPR 11/81	Drawing No: 2150	

855133

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY44
GY46
GY37
GY36
GY42
GY45
GY24
GY26 250.86
GY39 213.82
DOM8 124.00
GY40 217.22
GY28 234.93
GY43
GY33 116.86
GY41 99.16
GY38
GY35

140 160 180 200 220 240 260 280 300 400
300 280 260 240 220 200 180 160 140 120 100 80 60 40 20

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
BICHENO
EL5/61

LEGEND
Subcrop
Washout
Split
Fault
Dolerite

5 cm
SCALE
0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L I SEAM - DEPTH FROM SURFACE

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/14
Report No: CEPR 11/81	Drawing No: 2146	

855134

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

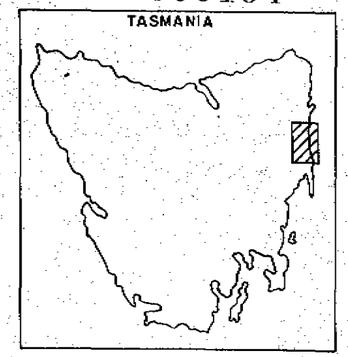
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5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

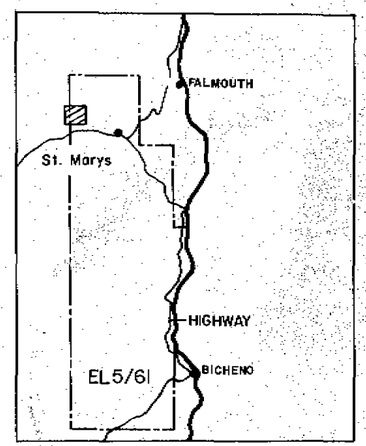
EL 5/61

GY31
GY34
DOM13
GY44
GY46
GY37
GY36
GY42
GY45
GY24
GY26 0.94
GY39 0.68
DOM8 0.69
GY40 1.12
GY28 1.26
GY43
GY33 1.17
GY41 3.25
GY38
GY35

0.60 0.70 0.80 0.90 1.00 1.10 1.20 1.30 1.40 1.50 2.00 2.50 3.00

THE CORNWALL COAL CO. N.L.





LEGEND

- Subcrop
- Washout
- Split
- Fault
- Dolerite

5 cm

SCALE

0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L I - L II

INTERSEAM THICKNESS (M)

Scale 1:20,000

Author Coal Division	Date June 1981	Encl. 1/15
Report No. CEPR 11/81	Drawing No. 2165	

855135

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN 5402000mN 5401000mN 5400000mN 5399000mN 5398000mN

GY31
GY34 2.14
DOM13 2.18
GY44 2.74
GY45 2.82
GY46
GY37 1.36
GY36 1.53
GY42 1.20
GY24 1.03*
GY26 1.22
GY39 1.20
DOM8 0.69
GY40 0.96
GY28 0.75
GY43 0.66
GY33 0.56
GY41
GY38
GY35

2.00 1.75 1.50 1.25 1.00 0.75 0.50 2.25 2.50 2.75 3.00 3.25 3.50 3.75 4.00

THE CORNWALL COAL CO. N.L.

5 cm

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO

LEGEND
Subcrop
Washout
Split
Fault
Dolerite

1·03* Thickest split

SCALE
0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

M II SEAM - THICKNESS (M)
(WORKABLE SECTION)

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/16
Report No: CEPR 11/81	Drawing No: 2153	

855136

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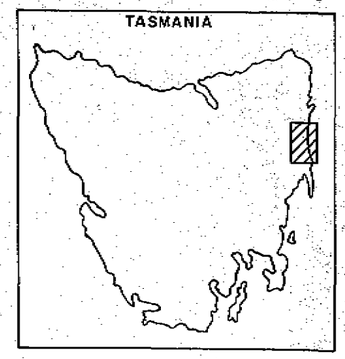
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5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

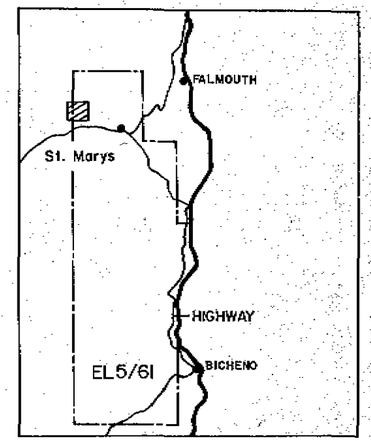
EL 5/61

GY31
GY34 451.15
DOM13 451.88
GY46
GY37 450.74
GY36 459.51
GY42 444.83
GY44 434.00
GY45 481.57
GY24 432.60
GY26 433.77
GY39 450.78
DOM8 514.73
GY40 436.60
GY28 429.61
GY43 416.26
GY33 421.21
GY41
GY38
GY35

460 455 450 445 440 435 430 425 420 415 480 475 470

THE CORNWALL COAL CO. N.L.





LEGEND
Subcrop
Washout
Split
Fault
Dolerite

5 cm
SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

M II SEAM – STRUCTURE TOP (M)
INTERPRETATION A

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/17
Report No: CEPR 11/81	Drawing No: 2149	

855137

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34 29.36
DOM13 85.50
GY44 72.38
GY46
GY37 76.67
GY36 26.72
GY42 134.85
GY45 29.33
GY24 171.10
GY26 176.83
GY39 139.68
DOM8 23·32
GY40 145.18
GY28 176.25
GY43 142.82
GY33 45.96
GY41
GY38
GY35

20 40 60 80 100 120 140 160 180 200 300

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO

LEGEND
Subcrop
Washout
Split
Fault
Dolerite

5 cm

SCALE
0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MII SEAM - DEPTH FROM SURFACE (M)

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/18
Report No: CEPR 11/81	Drawing No: 2145	

855138

EL 5/61

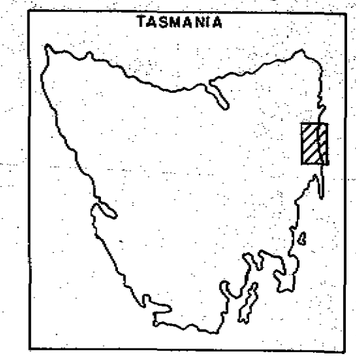
589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

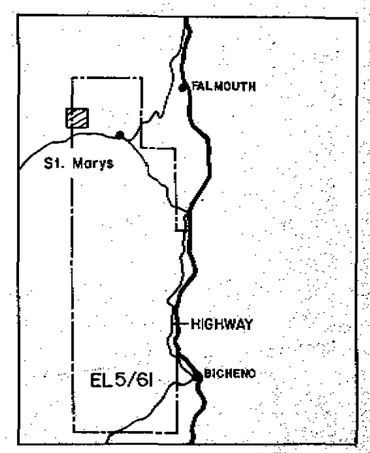
5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34 7.09
DOM13 77
GY46
GY37 3.77
GY36 12.98
GY42 88.86
GY44 61.35
GY45 19.33
GY24 64.23
GY26 67·28
GY39 119·60
DOM8 15
GY40 110·18
GY28 110·61
GY43 77·51
GY33 37·56
GY41
GY38
GY35

0 10 20 30 40 50

THE CORNWALL COAL CO. N.L.





LEGEND
Subcrop
Washout
Split
Fault
Dolerite

5 cm
SCALE
0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA
M II SEAM –
FRESH ROOF ISOPACH (M)

Scale 1:20,000

Author : Coal Division	Date : June 1981	Encl. 1/19
Report No: CEPR 11/81	Drawing No: 2167	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

EL 5/61

5403000mN — 5402000mN — 5401000mN — 5400000mN — 5399000mN — 5398000mN

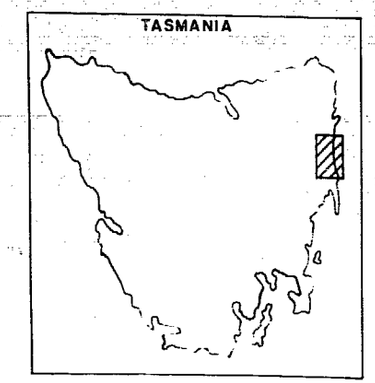
GY31 GY34 DOM13 0.95* GY44 2.55 GY46 GY37 GY36 GY42 0.63* GY45 GY24 1.69 GY26 1.45 GY39 0.63 DOM8 0.25 GY40 0.49 GY28 1.95 GY43 3.29 GY33 1.06 GY41 GY38 GY35

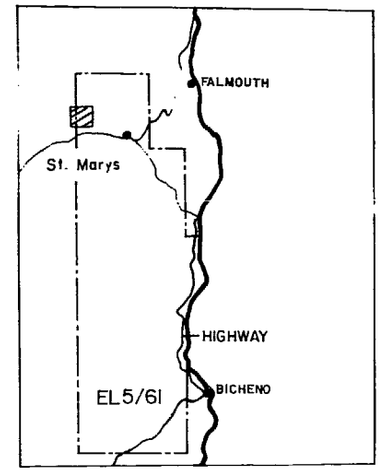
0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.00 3.25 3.50

THE CORNWALL COAL CO. N.L.

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

TASMANIA





LEGEND

- Subcrop
- Washout
- Split
- Fault
- Dolerite
- 0·95* Thickest Split

SCALE

0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MI SEAM - THICKNESS (M)
(Workable Section)

Scale 1 20,000

Author Coal Division	Date June 1981	Encl. 1/20
Report No CEPR 11/81	Drawing No 2152	

855140

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN 5402000mN 5401000mN 5400000mN 5399000mN 5398000mN

GY31
GY34
DOM13 463.54
GY46
GY37
GY44 445.98
GY36
GY42 455.56
GY45
GY24 443.65
GY26 450.22
GY39 465.44
DOM8 536·55
GY40 464.38
GY28 454.75
GY43 439.66
GY33 449.18
GY41
GY38
GY35

470 465 460 455 450 445 440 435 430

380 375 370

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
BICHENO
EL5/61

LEGEND
Subcrop
Washout
Split
Fault
Dolerite

5 cm
SCALE
0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MI SEAM–STRUCTURE TOP (m)

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/21
Report No: CEPR 11/81	Drawing No: 2148	

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13 73.18
GY46
GY37
GY36
GY42 124.12
GY44 60.40
GY45
GY24 160.15
GY26 160.38
GY39 125.02
DOM8 536.55
GY40 119.40
GY28 138.73
GY43 119.42
GY33 17.99
GY41
GY38
GY35

20 40 60 80 100 120 140 160 180 200 300

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO

LEGEND
Subcrop
Washout
Split
Fault
Dolerite

SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

M I SEAM - DEPTH FROM SURFACE

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/22
Report No: CEPR 11/81	Drawing No: 2144	

855141

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

EL 5/61

GY31
GY34
DOM13 463·54
GY46
GY37
GY36
GY42 78.13
GY44 49.37
GY45
GY24 443·65
GY26 50.83
GY39 104.94
DOM8 536·55
GY40 84.4
GY28 73.09
GY43 73.09
GY33 9.95
GY41
GY38
GY35

0 10 20 30 40 50

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
BICHENO
EL5/61

LEGEND
Subcrop
Washout
Split
Fault
Dolerite

5 cm

SCALE
0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA - GRAY EL 5/61
MT NICHOLAS AREA

MI SEAM - FRESH ROOF ISOPACH

Scale 1:20,000

Author : Coal Division	Date : June 1981	Encl.1/23
Report No: CEPR 11/81	Drawing No: 2166	

855142

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13 10·71
GY46
GY37
GY36
GY42 10·04
GY44 7·90
GY45
GY24 7·86
GY26 15·0
GY39 14·03
DOM8 536·55
GY40 25·29
GY28 23·06
GY43 20·11
GY33 26·91
GY41
GY38
GY35

2 4 6 8 10 12 14 16 18 20 22 24 26 28

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO

LEGEND
Subcrop
Washout
Split
Fault
Dolerite

5 cm

SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MI - MII INTERSEAM THICKNESS (M)

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/24
Report No: CEPR 11/81	Drawing No: 2164	

855143

EL 5/61

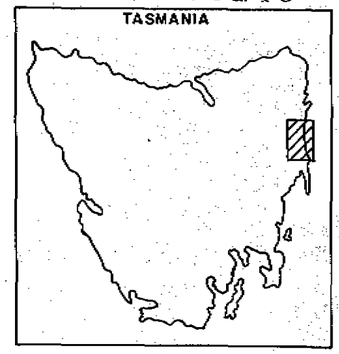
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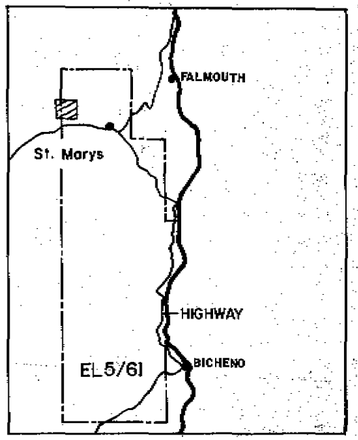
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5401000mN
5400000mN
5399000mN
5398000mN

GY31 79.1
GY34 82.7
DOM13 62.1
GY44 77.6
GY46 GY37
GY36 79.8
GY42 81.9
GY45 58.7
GY24 72.1
GY26 67.6
GY39 83.5
DOM8 80.9
GY40 80.1
GY28 81.8
GY43 27.6
GY33 74.4
GY41 56.8
GY38
GY35

80 75 70 65 60 55 50 45 40 35 30

THE CORNWALL COAL CO. N.L.





LEGEND

Subcrop
Washout
Split
Fault
Dolerite

5 cm

SCALE

0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L II SEAM ISO-YIELD FLOATS 1.70

Scale 1:20,000

Author : Coal Division	Date : June 1981	Encl. 1/25
Report No: CEPR 11/81	Drawing No: 2163	

855144

EL 5/61

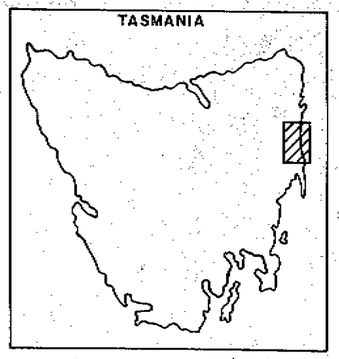
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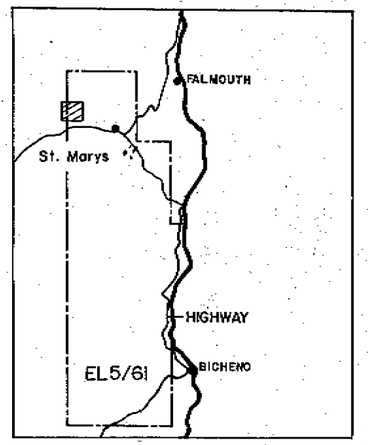
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5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31 25.2
GY34 19.7
DOM13 19.0
GY44 17.3
GY46 GY37
GY36 18.8
GY42 17.1
GY45 20.9
GY24 19.1
GY26 16.3
GY39 17.4
DOM8 17.6
GY40 20.1
GY28 21.1
GY43 30.1
GY33 22.4
GY41 31.4
GY38
GY35

25
20
20
25
30

THE CORNWALL COAL CO. N.L.





LEGEND

Subcrop
Washout
Split
Fault
Dolerite

5 cm

SCALE

0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L II SEAM ISO-ASH FLOATS 1.70

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/26
Report No: CEPR 11/81	Drawing No: 2159	

855145

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY44
GY46
GY37
GY36
GY42
GY45
GY24
GY26
GY39
48.7
46
48
50
52
54
56
58
60
DOM8
67.1
GY40
66.0
GY28
58.9
64
62
60
58
56
54
52
50
GY43
GY33
54.0
GY41
56.5
GY38
GY35

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO

LEGEND
Subcrop
Washout
Split
Fault
Dolerite

5 cm

SCALE
0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L I SEAM
ISO-YIELD FLOATS 1.70

Scale 1:20,000

Author : Coal Division	Date : June 1981	Encl. 1/27
Report No: CEPR 11/81	Drawing No: 2162	

855146

EL 5/61

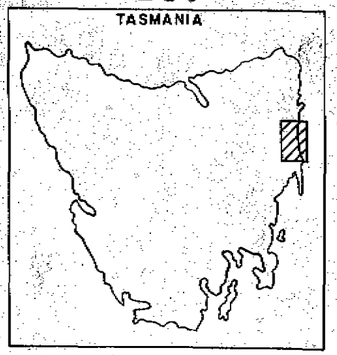
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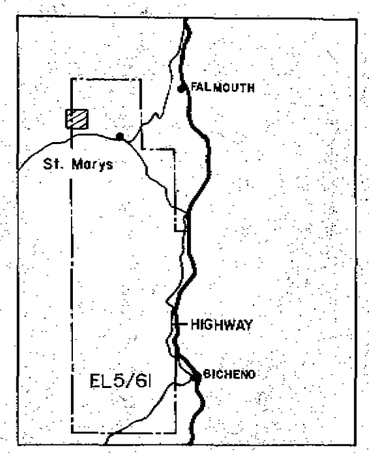
5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY44
GY46
GY37
GY36
GY42
GY45
GY24
GY26
GY39 22.7
DOM8 25.8
GY40 20.6
GY28 24.6
GY43
GY33 19.9
GY41 24.8
GY38
GY35

22 23 24 25 26 27 28 29

THE CORNWALL COAL CO. N.L.





LEGEND

Subcrop
Washout
Split
Fault
Dolerite

5 cm

SCALE

0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L I SEAM ISO-ASH FLOATS 1.70

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/28
Report No: CEPR 11/81	Drawing No: 2156	

855147

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34 90.3
DOM13 89.7
90
85
GY44 86.2
GY46 80.7
GY37
80
GY36 86.4
GY42 77.1
75
70
65
GY45 64.2
60
55
50
GY24 NA
GY26 NA
GY39 NA
DOM8
GY40 NA
GY28 NA
GY43 NA
GY33 NA
GY41
GY38
GY35

THE CORNWALL COAL CO. N.L.

5 cm

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO

LEGEND

Subcrop
Washout
Split
Fault
Dolerite

NA Not Analysed

SCALE

0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

M II SEAM ISO-YIELD FLOATS 1.70

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/29
Report No: CEPR 11/81	Drawing No: 2161	

855148

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34 14.5
DOM13 14.4
GY46
GY37
GY36 11.9
GY42 13.8
GY24 NA
GY44 15.7
GY45
GY26 NA
GY39 NA
DOM8 NA
GY40 NA
GY28 NA
GY43 NA
GY33 NA
GY41
GY38
GY35

12 13 14 15 16 17 18 20 22 24

THE CORNWALL COAL CO. N.L.

5 cm

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO

LEGEND
Subcrop
Washout
Split
Fault
Dolerite

NA Not Analysed

SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

M II SEAM ISO-ASH FLOATS 1.70

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/30
Report No: CEPR 11/81	Drawing No: 2157	

855149

EL 5/61

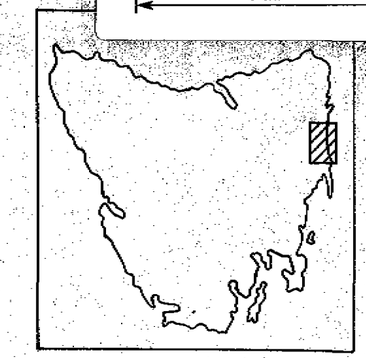
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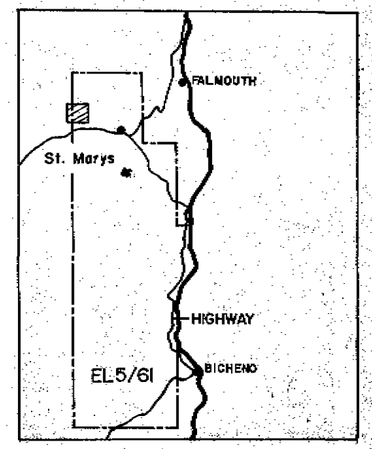
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5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13 NA
GY46
GY37
GY36
GY42 NA
GY44 67.0
GY45
GY24 71.2
GY26 NA
GY39 NA
DOM8
GY40 NA
GY28 60.9
GY43 76.0
GY33 NA
GY41
GY38
GY35

30 35 40 45 50 55 60 65 70 75 80 85 90 95

THE CORNWALL COAL CO. N.L.





LEGEND

Subcrop
Washout
Split
Fault
Dolerite

NA Not Analysed

SCALE

0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MI SEAM ISO-YIELD FLOATS 1.70
(WORKABLE SECTION)

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/31
Report No: CEPR 11/81	Drawing No. 2160	

855150

5 cm

EL 5/61

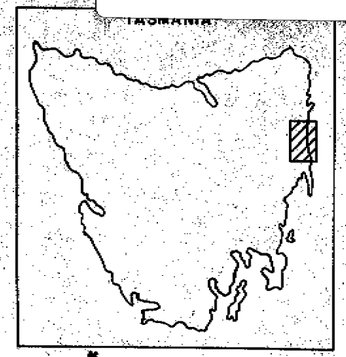
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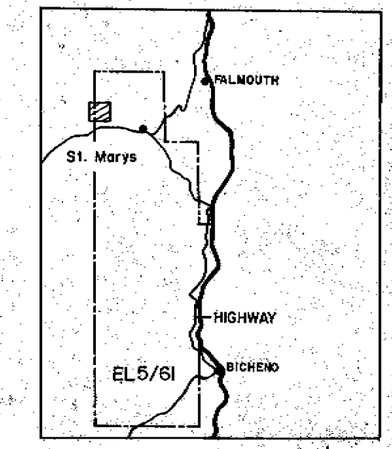
5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13 NA
GY44 23.8
GY46
GY37
GY36
GY42 NA
GY45
GY24 17.0
GY26 NA
GY39 NA
DOM8 NA
GY40 NA
GY28 18.4
GY43 20.6
GY33 NA
GY41
GY38
GY35

17.0
18.0
19.0
20.0
21.0

THE CORNWALL COAL CO. N.L.





LEGEND

- Subcrop
- Washout
- Split
- Fault
- Dolerite

NA Not Analysed

SCALE

0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MI SEAM ISO-ASH FLOATS 1·70
(Workable Section)

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/32
Report No: CEPR 11/81	Drawing No: 2156	

855151

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

A
B
C

GY31 GY34 DOM 13 GY44 GY46 GY37 GY36 GY42 GY45 GY24 GY26 GY39 GY40 GY28 DOM 8 GY43 GY33 GY41 GY38 GY35

MEASURED RESERVES (L II)

INDICATED RESERVES (L II)

MEASURED RESERVES (L II)

MEASURED RESERVES (L I)

THE CORNWALL COAL CO. N.L.

5 cm

FALMOUTH
St. Marys
HIGHWAY
BICHENO
EL5/61

LEGEND
Subcrop L II
Subcrop L I
Washout
Split
Fault
Dolerite

SCALE
0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L I AND L II SEAMS RESERVE DISTRIBUTION

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/33
Report No: CEPR 11/81	Drawing No: 2170	

855152

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY46
GY37
GY36
GY42
GY44
GY45
GY24
GY26
GY39
DOM8
GY40
GY28
GY43
GY33
GY41
GY38
GY35

A
B
C

MEASURED RESERVES (MII)

INDICATED RESERVES (MI)

MEASURED RESERVES (MI)

UNDERGROUND WORKINGS
MT. NICHOLAS COLLIERY

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO

LEGEND
Subcrop MII
Subcrop MI
Washout
Split
Fault
Dolerite

5 cm
SCALE
0 500 1000 1500 m

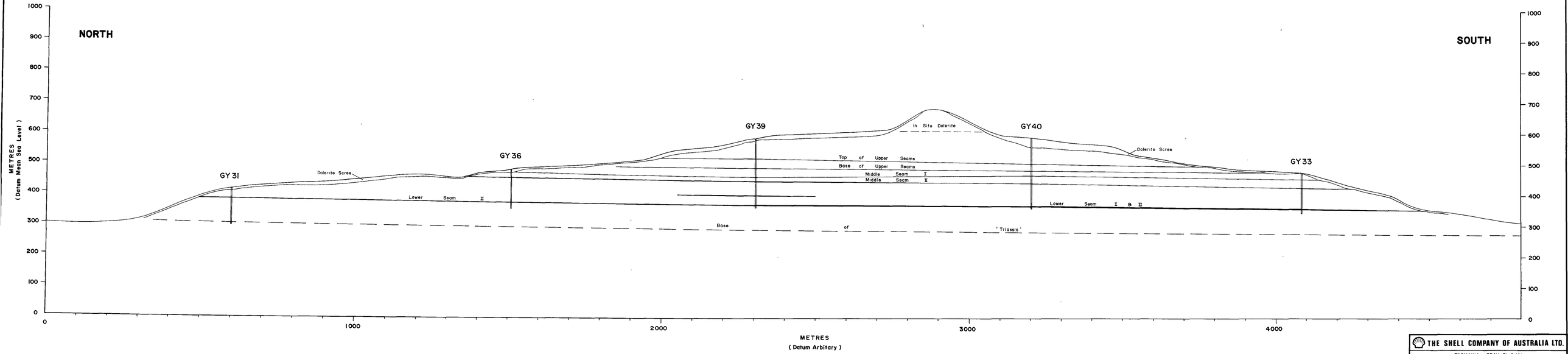
THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MI AND MII SEAMS
RESERVE DISTRIBUTION

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 1/34
Report No: CEPR 11/81	Drawing No: 2168	



855153

5 cm

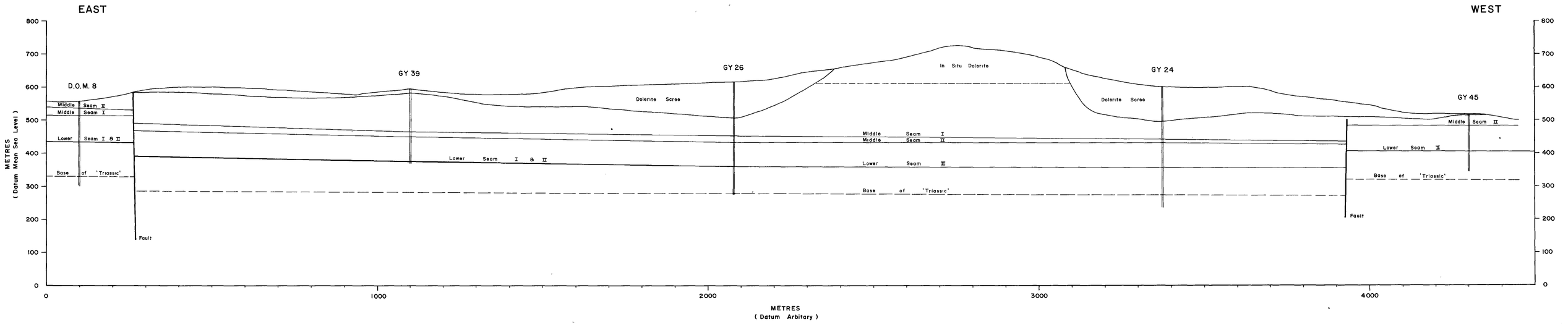
THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA - GRAY EL 5/61
MT. NICHOLAS AREA
AMG LINE 590300 mE

GEOLOGICAL CROSS SECTION
N – S
Vertical & Horizontal Scale 1: 5000

Author Coal Division	Date June 1981
Report No. CEPR 11/81	Drawing No C-2135

Encl. 1/35



THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA - GRAY EL 5/61
MT. NICHOLAS AREA

GEOLOGICAL CROSS - SECTION
STRUCTURAL INTERPERATION 1
E - W

Vertical & Horizontal Scale 1: 5000

Author Coal Division	Date July 1981	Encl. 1/36
Report No CEPR 11/81	Drawing No C-2284	

055154

LEGEND

SEAM SECTIONS REFERENCE

- COAL - UNDIFFERENTIATED
- COAL - BRIGHT
- COAL - BRIGHT WITH DULL BANDS
- COAL - INTERBANDED DULL AND BRIGHT
- COAL - MAINLY DULL , FREQ. BRIGHT BANDS
- COAL - DULL WITH MINOR BRIGHT BANDS
- COAL - DULL
- COAL - WEATHERED
- COAL - CINDERED
- COAL - STONY

LEGEND

LITHOLOGY REFERENCE

- SOIL
- SILT
- SHALE
- SILTSTONE
- CLAYSTONE
- MUDSTONE
- SANDSTONE
- INTERBEDDED SEDIMENTS (SANDST/MUDST 50:50)
- CONGLOMERATE
- TONSTEIN
- COAL
- COAL CINDERED
- COAL STONY
- NOT CORED/CORE LOSS
- CLAYSTONE
- CLAY
- INTRA. CONGLOM.
- COAL WEATHERED
- IRONSTONE
- CARBONACEOUS MUDSTONE
- ARKOSE
- OIL SHALE
- DOLERITE TALUS
- BRECCIA
- COAL(UNDIFF)
- COAL SOOTY

BORE LOG

1:200

4.0 2.0 0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0

METRES

SEAM SECTION

1:20

0.40 0.20 0.00 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

METRES

855155

5 cm

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT NICHOLAS — EL 5/61
TASMANIA

REFERENCE LEGEND (FOR ENCLOSURES 1/38-56

AUTHOR: Coal Division	DATE: June 1981	Encl. 1/37
REPORT NO: CEPR 11/81	DRAWING NO: 2173	

GY 24

See Encl. 1/37 for Legend Reference and Status

655166

THE SHELL COMPANY OF AUSTRALIA LTD.

MT. NICHOLAS — E.L. 5/81
TASMANIA

GY24

DRILL HOLE LITHOLOGY
WITH EXPANDED SEAM SECTIONS

Author: Coal Division	Date: June 1981	Encl. 1/38
Report No.: CCPR 11/81	Drawing No.: 2264	

1 cm

R.L. 603.780

497.500

M1 463.34

M2 172.13

L2 249.28

T.D. 305.49

Middle 1

160.15

3.19

163.34

Middle 2

171.10

1.63

172.13

Lower 2

246.26

3.01

249.28

GY 26

See Encl 1/27 for Legend Reference and Status

85557

THE SHELL COMPANY OF AUSTRALIA LTD.

MT NICHOLAS — EL 5/81
TASMANIA

GY26

DRILL HOLE LITHOLOGY
WITH EXPANDED SEAM SECTIONS

Author: Coal Division	Date: June 1981	Encl 1/31
Report No. CEPR 11/81	Drawing No. 2245	

R.L. 610.690

DEPTH

R.L. 340.800

501.460

MI 161.83

M2 178.05

MODULE 1

160.38

161.83

1.45

178.83

178.05

Middle 2

1.22

Lower 1.

250.29

251.51

1.22

1.03

Lower 2. 252.54

2.48

255.02

GY 28

See Encl 1/21 for Legend Reference and Scales

SSEIRS

THE SHELL COMPANY OF AUSTRALIA LTD.

MT. MONGARLOWE
EXPLORANCE L.L.5/61

GY28

DRILL HOLE LITHOLOGY
WITH EXPANDED SEAM SECTIONS

Author: Coal Division	Date: June 1981
Report No. CEPR 1178	Drawing No. 2286

Encl 1/60

5 cm

E.L. 530.47 m

DEPTH m

E.L. 530.47m

527.90

MI 140.81

M2 164.62

LE 240.97

336.00

Middle 1

158.73

2.08

140.81

Middle 2.

163.87

0.75

164.62

Lower 1

234.93

2.64

237.57

1.26

Lower 2. 238.83

2.04

240.87

GY 31

See Encl. 1/37 for Legend Reference and Scales.

855159

THE SHELL COMPANY OF AUSTRALIA LTD.

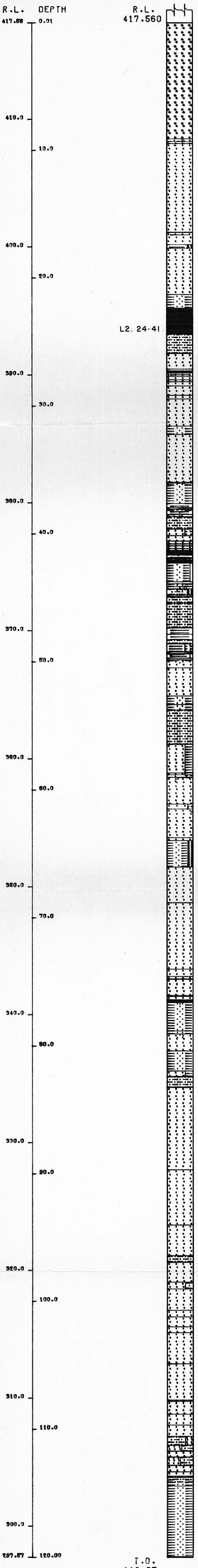
MT. NICHOLAS — E.L. 5/61
TASMANIA

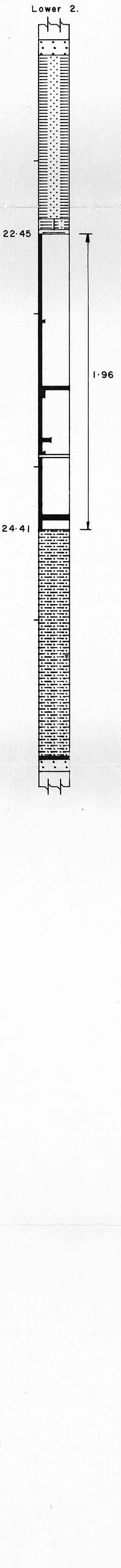
GY31

DRILL HOLE LITHOLOGY
WITH EXPANDED SEAM SECTIONS

Author : Coal Division	Date : June 1981	Encl. 1/41
Report No: CEPR 11/81	Drawing No: 2247	

5 cm





GY 33

See Encl. 1/37 for Legend Reference and Scales.

855160

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TASMANIA

GY33

DRILL HOLE LITHOLOGY WITH EXPANDED SEAM SECTIONS

Author: Coal Division	Date: June 1981	Encl. 1/43
Report No: CEPR 11/81	Drawing No: 2248	

5 cm

R.L. 487.18 | DEPTH 0.31

R.L. 487.160

1500 SSNN-LOG SSNP01 2800

BRD-LOG 14500 SDU's 25500

M1 19·05

CASING BOTTOM

WATER LEVEL

M2 46·52

T.D. 132.89

MIDDLE 1

17·99

1·06

19·05

MIDDLE 2.

MIDDLE 2 45·96

0·58

46·52

LOWER 1

116·86

2·49

119·35

1·47

LOWER 2. 120·82

1·71

122·53

GY 34

See Encl. 1/37 for Legend Reference and Scales.

855161

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TASMANIA

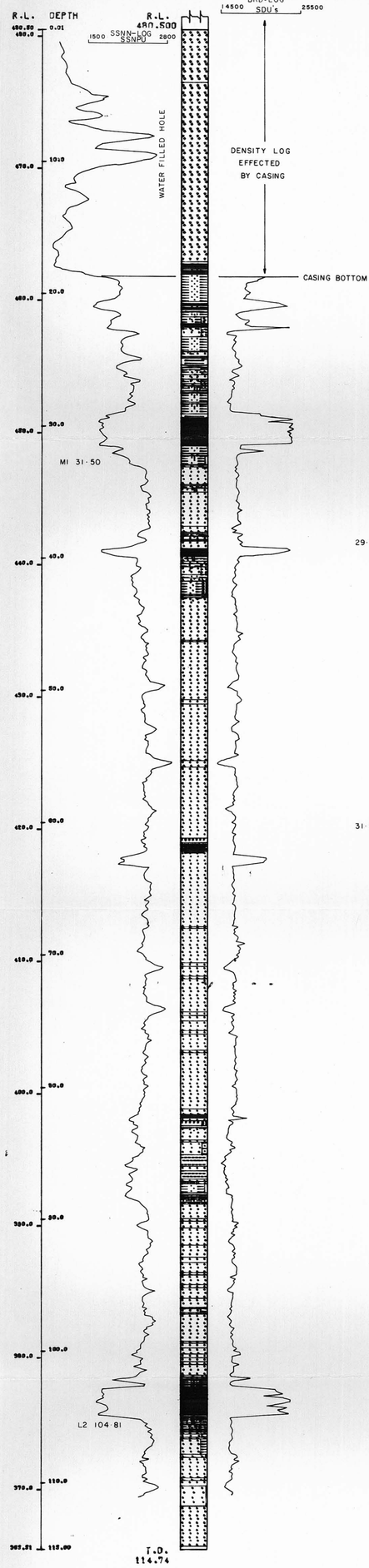
GY34

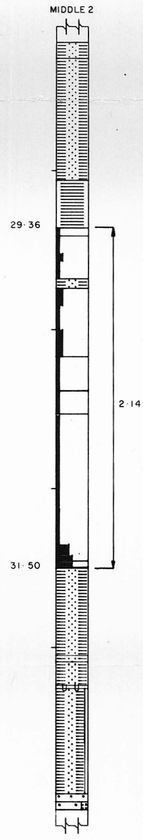
DRILL HOLE LITHOLOGY WITH EXPANDED SEAM SECTIONS

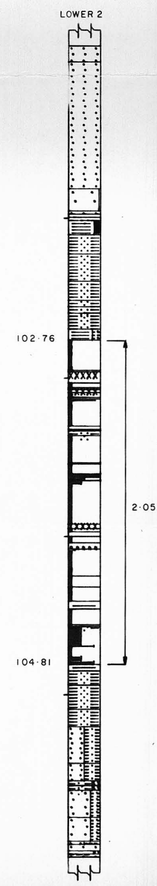
Author: Coal Division	Date: June 1981
Report No. CEPR 11/81	Drawing No. 2249

Encl. 1/44

5 cm







GY 35

See Encl 1/37 for Legend Reference and Scales.

855162

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MT NICHOLAS — E L.5/61
TASMANIA

DRILL HOLE LITHOLOGY

GY 35

Author Coal Division	Date June 1981	Encl.1/45
Report No CEPR 11/81	Drawing No 2338	

5 cm

R.L. DEPTH

356.04 — 0.01
350.0 — 10.0
340.0 — 20.0
330.0 — 30.0
320.0 — 40.0
310.0 — 50.0
300.0
299.05 — 57.00

R.L. 356.040

COAL IN SCREE

T.D. 56.69

36 GY

See Encl. 1/31 for Legend Reference and Scales.

855163

THE SHELL COMPANY OF AUSTRALIA LTD.

MT. NICHOLAS — E.L. 5/61
TASMANIA

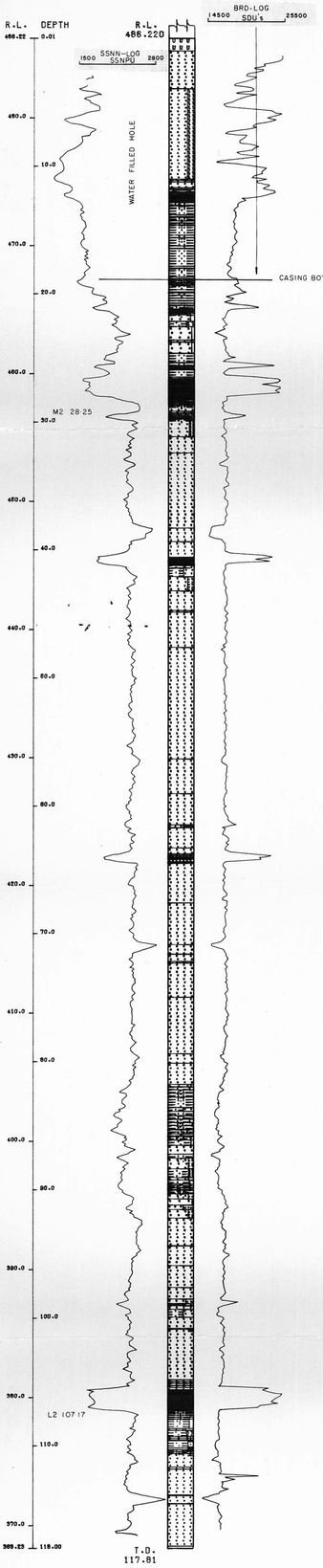
GY36

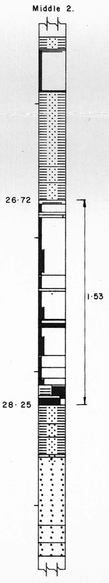
DRILL HOLE LITHOLOGY WITH EXPANDED SEAM SECTIONS

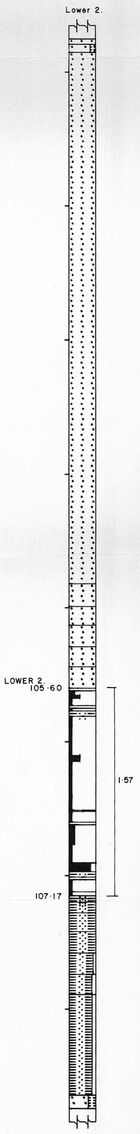
Author: Coal Division	Date: June 1981
Report No: CEPR 11/81	Drawing No: 2250

Encl. 1/46

5 cm



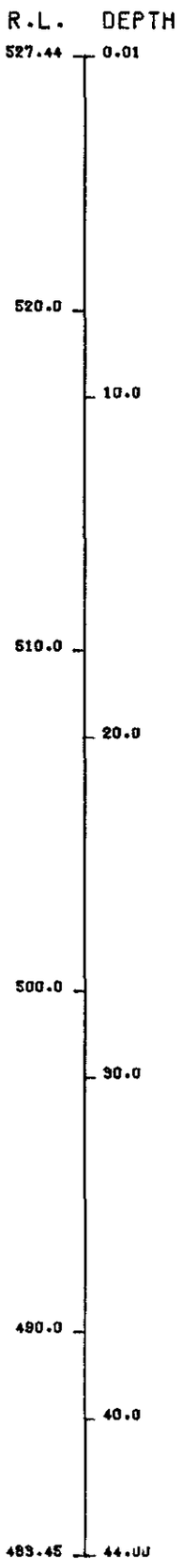


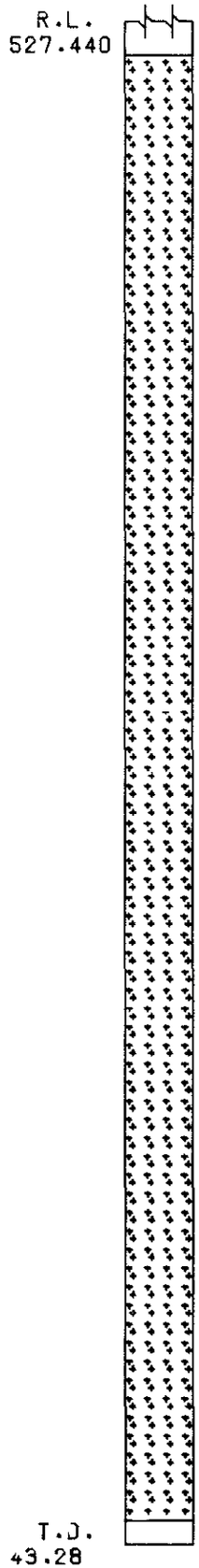


GY 37

See Encl 1/37 for Legend Reference and Scales

855164





THE SHELL COMPANY OF AUSTRALIA LTD.

MT NICHOLAS — E.L. 5/61
TASMANIA

DRILL HOLE LITHOLOGY

GY 37

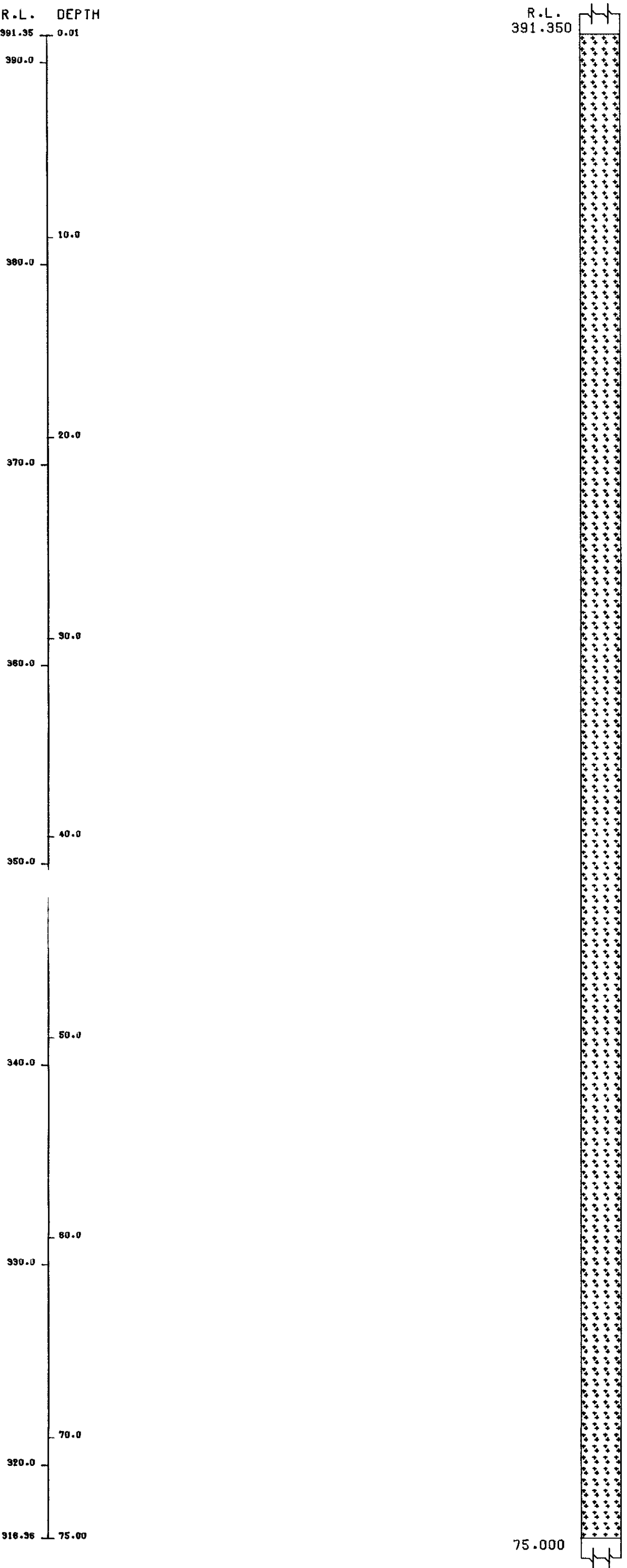
Author Coal Division	Date June 1981	Encl. 1/47
Report No CEPR 11/81	Drawing No 2339	

5 cm

GY 38

See Encl. 1/37 for Legend Reference and Scales.

855165



THE SHELL COMPANY OF AUSTRALIA LTD.

MT NICHOLAS — E L. 5/61
TASMANIA

DRILL HOLE LITHOLOGY

GY 38

Author Coal Division	Date June 1981	Encl. 1/48
Report No CEPR 11/81	Drawing No 2340	

5 cm

39 GY

See Encl 1737 for Legend Reference and Scales

855166

THE SHELL COMPANY OF AUSTRALIA LTD.

MT NICHOLAS — E.L.5/61
TASMANIA

GY 39

DRILL HOLE LITHOLOGY
WITH EXPANDED SEAM SECTIONS

Author Coal Division	Date June 1981	Encl.1489
Report No. CEPR 11/81	Drawing No. 2251	

5 cm

R.L. DEPTH

R.L. 590.450

BRD-LOG
+4600 500 k 28800

CASING BOTTOM

WATER LEVEL

125.65

159.88

218.12

T.D. 228.54

MIDDLE 1

125.02

0.63

125.65

MIDDLE 2

158.68

1.20

159.24

159.88

LOWER 1
213.82

1.72

215.54

0.68

LOWER 2 216.22

1.90

LOWER 2 218.12

40 GY

See Encl 1/2 for Legend Reference and Scales

355167

THE SHELL COMPANY OF AUSTRALIA LTD.

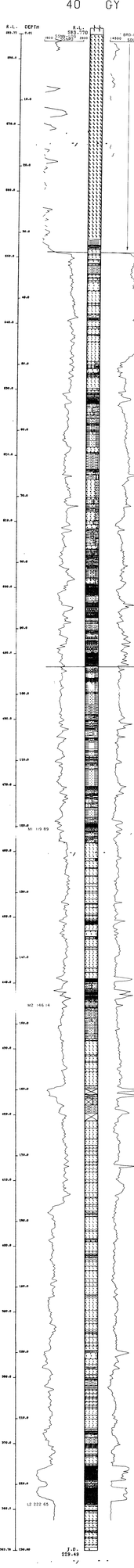
MT NICHOLAS — E.L.5/61
TASMANIA

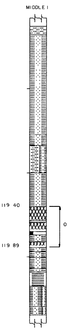
GY 40

DRILL HOLE LITHOLOGY
WITH EXPANDED SEAM SECTIONS

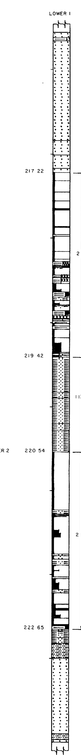
Author Coal Division	Date June 1981	Encl 1/50
Report No. CEPR 11/81	Drawing No. 2252	

5cm









41 GY

See Encl 1/37 for Legend Reference and Scales.

855168

THE SHELL COMPANY OF AUSTRALIA LTD.

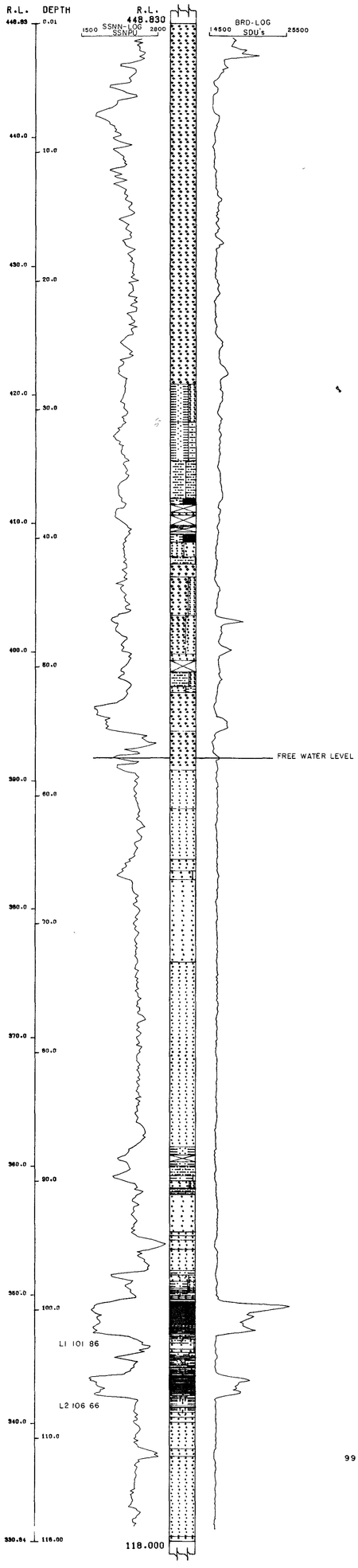
MT NICHOLAS — E.L. 5/61
TASMANIA

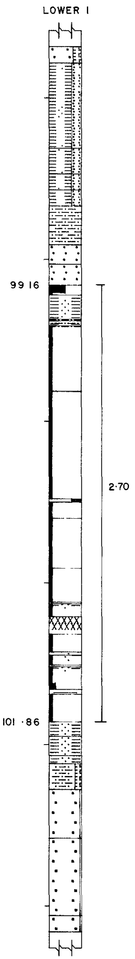
GY 41

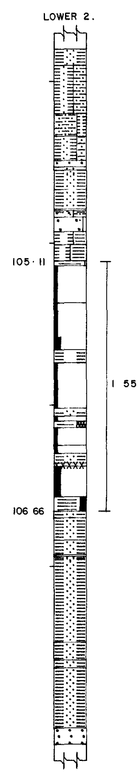
DRILL HOLE LITHOLOGY WITH EXPANDED SEAM SECTIONS

Author Coal Division	Date June 1981	Encl. 1/51
Report No CEPR 11/81	Drawing No 2253	

5 cm







See Encl 1/20 for Legend Reference and Scales

855169

THE SHELL COMPANY OF AUSTRALIA LTD.

MT NICHOLAS — E.L. 5/61
TASMANIA

GY 42

DRILL HOLE LITHOLOGY
WITH EXPANDED SEAM SECTIONS

Author Coal Division	Date June 1981	Encl 1/52
Report No CEPR 11/81	Drawing No 2254	

5 cm

R.L. 579.970

M1 124.81

M2 136.05

T.D. 296.03

MIDDLE 1

124.12

0.69

124.81

MIDDLE 2

134.85

1.20

136.05

LOWER 2

215.81

2.06

215.87

43 GY

See Encl I/37 for Legend Reference and Scales

855170

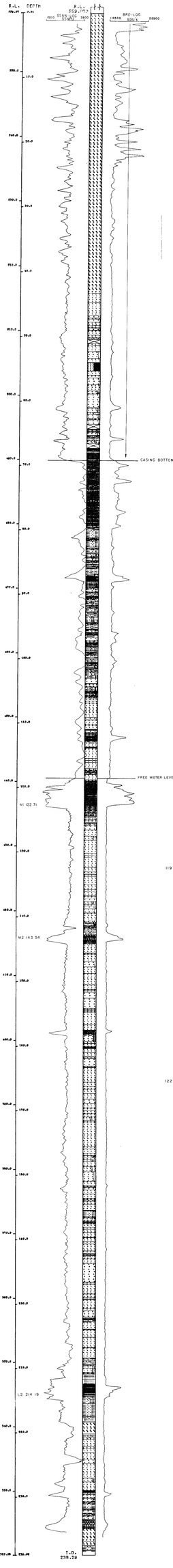
THE SHELL COMPANY OF AUSTRALIA LTD.

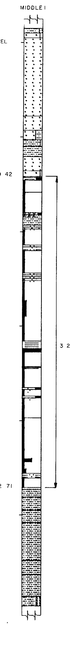
MT NICHOLAS — E.L.5/81
TASMANIA

GY 43
DRILL HOLE LITHOLOGY
WITH EXPANDED SEAM SECTIONS

Author Coal Division	Date June 1981	Encl I/53
Report No CEPR 11/81	Drawing No 2255	

5 cm









GY 44

See Encl. 1/371 for Legend Reference and Scales

855171

THE SHELL COMPANY OF AUSTRALIA LTD.

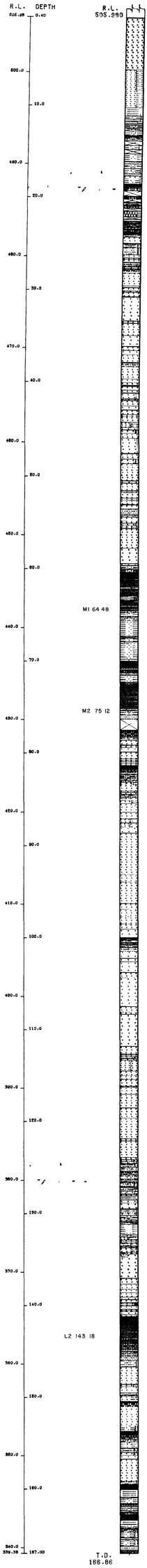
MT NICHOLAS — E.L. 5/61
TASMANIA

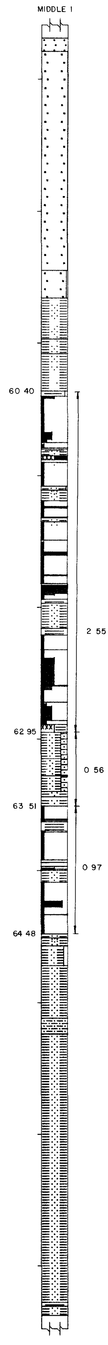
GY 44

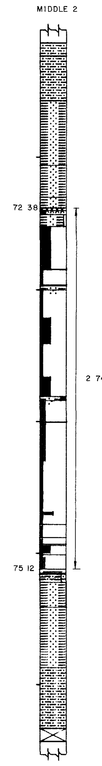
DRILL HOLE LITHOLOGY
WITH EXPANDED SEAM SECTIONS

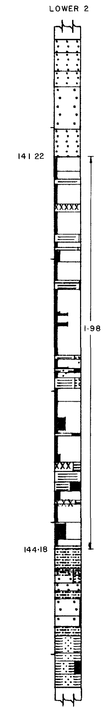
Author Coal Division	Date June 1981	Encl. 1/54
Report No CEPR 11/81	Drawing No 2256	

5 cm









GY 45

See Encl. 1/37 for Legend Reference and Scales.

855172

THE SHELL COMPANY OF AUSTRALIA LTD.

MT. NICHOLAS — E.L. 5/61
TASMANIA

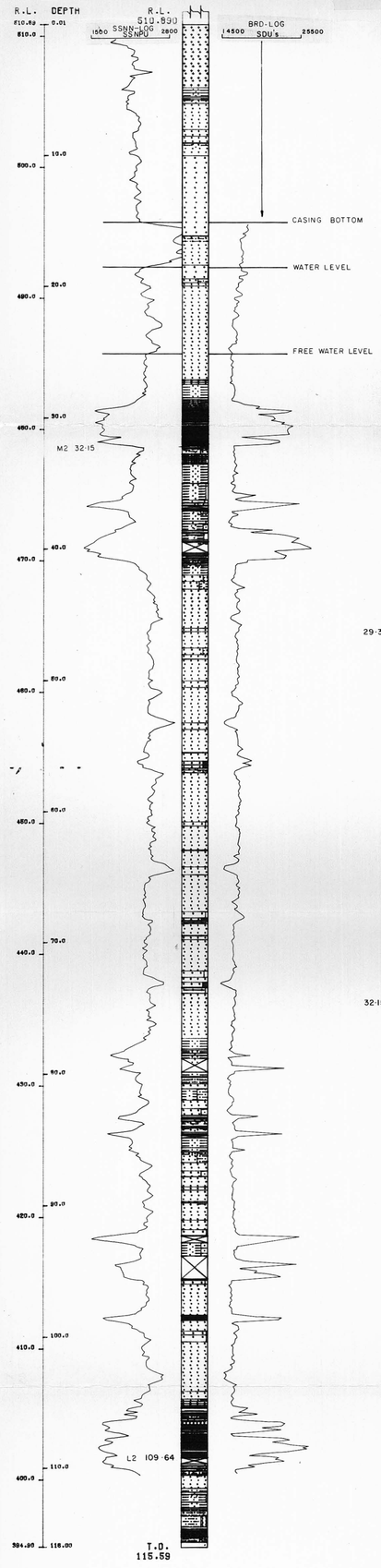
GY 45

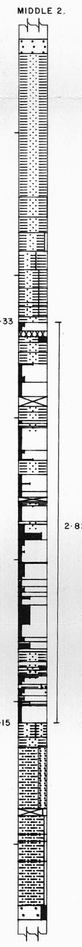
DRILL HOLE LITHOLOGY WITH EXPANDED SEAM SECTIONS

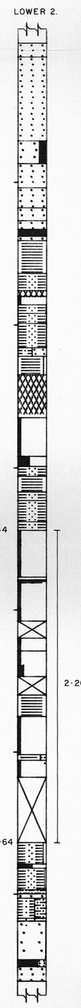
Author: Coal Division	Date: June 1981
Report No: CEPR 11/81	Drawing No: 2257

Encl. 1/55

5 cm







GY 46

See Encl 1/37 for Legend Reference and Scales

855173

THE SHELL COMPANY OF AUSTRALIA LTD.

MT NICHOLAS — E.L. 5/81
TASMANIA

GY 46

DRILL HOLE LITHOLOGY
WITH EXPANDED SEAM SECTIONS

Author Coal Division		Date June 1981	Encl. 1/56
Report No. CEPR 11/81		Drawing No. 2258	

5 cm

R.L. 527.40 | DEPTH 0.01

R.L. 527.400

620.0 — 10.0
610.0 — 20.0
600.0 — 30.0
490.0 — 40.0
480.0 — 50.0
470.0 — 60.0
460.0 — 70.0
450.0 — 80.0
440.0 — 90.0
430.0 — 100.0
420.0 — 110.0
410.0 — 120.0
400.0 — 130.0
390.0 — 140.0
380.0 — 150.0
370.0 — 160.0
360.0 — 170.0
350.0 — 180.0
340.0 — 190.0
330.0 — 200.00

327.41

T.D. 199.56

MIDDLE 2

76.67

1.36

78.03

855174

Dir. M. | A.O. | C.G. | E.O. | D.S.M.
Received 30 NOV 1981 | E & IL
Answered
DEPT. OF MINES
REF. No. 10,345 /81

THE SHELL COMPANY OF AUSTRALIA LIMITED

EXPLORATION LICENCE EL 5/61
TASMANIA

AN ASSESSMENT OF THE MOUNT NICHOLAS COAL DEPOSIT

BY

I.M. WOLLFF

VOLUME 2A - MINING GEOLOGY TEXT

CEPR 11/81

SEP. 1981

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LIST OF ENCLOSURES VOLUME 2B

Reference Legend (For Enclosures 2/1-66) 2/0
(Abbreviations used on Enclosures: L = Lower, M = Middle)

Lithology and Mechanical Properties

GY24 LII Floor	2/1
GY26 LII Floor	2/2
GY28 LII Floor	2/3
GY31 LII Floor	2/4
GY33 LII Floor	2/5
GY34 LII Floor	2/6
GY36 LII Floor	2/7
GY39 LII Floor	2/8
GY40 LII Floor	2/9
GY41 LII Floor	2/10
GY42 LII Floor	2/11
GY43 LII Floor	2/12
GY44 LII Floor	2/13
GY45 LII Floor	2/14
DOM 8 LII Floor	2/15
DOM 13 LII Floor	2/16
GY24 LII Roof	2/17
GY26 LII Roof	2/18
GY28 LII Roof	2/19
GY31 LII Roof	2/20
GY33 LII Roof	2/21
GY34 LII Roof	2/22
GY36 LII Roof	2/23
GY39 LII Roof	2/24
GY40 LII Roof	2/25
GY41 LII Roof	2/26
GY42 LII Roof	2/27
GY43 LII Roof	2/28
GY44 LII Roof	2/29
GY45 LII Roof	2/30
DOM 8 LII Roof	2/31
DOM 13 LII Roof	2/32

GY26	LI Floor	2/33
GY28	LI Floor	2/34
GY33	LI Floor	2/35
GY39	LI Floor	2/36
GY40	LI Floor	2/37
GY41	LI Floor	2/38
DOM I	LI Floor	2/39
GY26	LI Roof	2/40
GY28	LI Roof	2/41
GY28	LI Roof	2/42
GY39	LI Roof	2/43
GY40	LI Roof	2/44
GY41	LI Roof	2/45
DOM 8	LI Roof	2/46
GY34	MII Floor	2/47
GY36	MII Floor	2/48
GY44	MII Floor	2/49
GY45	MII Floor	2/50
GY46	MII Floor	2/51
DOM 13	MII Floor	2/52
GY34	MII Roof	2/53
GY36	MII Roof	2/54
GY44	MII Roof	2/55
GY45	MII Roof	2/56
GY46	MII Roof	2/57
DOM 13	MII Roof	2/58
GY24	MI Floor	2/59
GY28	MI Floor	2/60
GY43	MI Floor	2/61
GY44	MI Floor	2/62
GY24	MI Roof	2/63
GY28	MI Roof	2/64
GY43	MI Roof	2/65
GY44	MI Roof	2/66

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Mudstone Isopach

LII Roof	2/67
LI Roof	2/68
MII Roof	2/69
MI Roof	2/70
LII Floor	2/71
LI Floor	2/72
MII Floor	2/73
MI Floor	2/74

Mechanical Properties over 2m Interval

LII Roof	2/75
LI Roof	2/76
MII Roof	2/77
MI Roof	2/78
LII Floor	2/79
LI Floor	2/80
MII Floor	2/81
MI Floor	2/82

Quality

LII Roof	2/83
LI Roof	2/84
MII Roof	2/85
MI Roof	2/86
LII Floor	2/87
LI Floor	2/88
MII Floor	2/89
MI Floor	2/90

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MOUNT NICHOLAS PRE-FEASABILITY REPORTS

SHELL REPORTS :

Tasmania EL 5/81. An Assessment of the Mount Nicholas Coal Deposit

Geology and Reserve Estimation	:	Text Vol. 1A	CEPR 11/81
Geology and Reserve Estimation	:	Enclosure Vol. 1B	CEPR 11/81
*Mining Geology	:	Text Vol. 2A	CEPR 11/81
Mining Geology	:	Enclosures Vol 2B	CEPR 11/81
Physical and Chemical Properties of Coal Vol 3			CEPR 11/81

Preliminary Coal Transportation Study. Mount Nicholas - Tas CEPR 19/81

A Marketing Feasability Study for the Prospective Mount Nicholas Coal Mine CEPR 20/81

ASSOCIATED REPORTS

Dames & Moore Pre-Feasability Study.
Proposed Underground Coal Mine, Mount Nicholas, Tasmania.
Volume I (Text)
Volume II (Enclosures).

Report to the Shell Company of Australia Limited - Coal Division.
Geotechnical Assessment of Mining Conditions, Nicholas Range - Tasmania.
Prepared by P.G. Fuller; May 1981.

Report to The Shell Company of Australia Limited - Coal Division
Tunnelling for Mine Access, Nicholas Range - Tasmania.
Prepared for P.G. Fuller, June 1981 by F.J. Marshall, Consulting Engineer.

*This volume

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1.0 SCOPE

This volume presents and discusses geological data that are significant to mining. As such it serves to bridge the gap between the assessment of geology and resources in Volume 1, and the geotechnical assessment of mining conditions prepared for Shell by Barrett, Fuller and Partners (Fuller, 1981).

2.0 INTRODUCTION

Throughout the Fingal Valley region of northeast Tasmania numerous underground coal mines have been developed in coal measures preserved under dolerite sills. Traditional exploration and development of these mines relied on the location of suitable outcrops from which adits were driven into the coal seam, blindly or with very little drill hole information. Poor mine planning and the lack of understanding of the mine geology resulted in mine stability problems of roof fall, floor heave, guttering and coal mining problems related to faulting, roof and floor rolls, washouts and, in some cases, water ingress. These encounters were combatted as each situation arose. When mining conditions became too arduous the working place was abandoned and a new extraction area opened up elsewhere. This practice of abandoning large areas of partially worked reserves with the subsequent sterilisation of coal resources still exists in the operating Tasmanian coal mines.

The exploration program conducted by Shell on the Mount Nicholas deposit was radically different to the historic approach of Tasmanian coal development, and conformed with accepted modern evaluation techniques. Fully cored drill holes were regularly spaced over the deposit to accurately gauge coal parameters and to examine the potential mine roof and floor conditions so that the largest possible proportion of the useful reserves of Mount Nicholas can be extracted in a safe planned manner. To this end the assessment of Mount Nicholas is comprised of several reports of which this report reviews the potential mine geology. The report is presented in a form which will allow a ready re-appraisal of the significance of individual parameters during mining operations.

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3.0 DATA BASE

The data dealt with in this assessment include drill penetration rates, geotechnical core logs, field point-load tests and slaking tests. The laboratory test regime is outlined, and the results used in conjunction with the field results to define the various rock properties. The laboratory test results have also been used by Fuller (1981) to define the rock mechanics aspects of mine design.

Information has been drawn from holes drilled in the course of three separate programmes. Two holes (DOM 8, 13) were drilled in the early 1970's by the Department of Mines, four holes (GY 24, 26, 28, 31) were drilled in 1980 by Shell, and fourteen holes were drilled in the 1981 Shell programme (GY 33 - 46). Detailed geotechnical logging of roof and floor strata has been carried out only on the 1981 holes. Petrophysical logging, including detailed seam, roof and floor logs have been run on nine of the Shell holes.

4.0 GEOLOGICAL FRAMEWORK

The Triassic coal measure sediments contain three main coal horizons as shown in Figure 1. Only the Middle I & II and Lower I & II seams are of sufficient quality, thickness and consistency to be of economic interest. The interburden sediments consist essentially of feldspathic sandstone and mudstone, with some facies variation between each of these rock types.

The coal seams dip at about one degree to the south east and have variable roof and floor lithologies. Tensional faulting has preserved these sediments in a north south graben that controls the eastern and western limits of the coal deposit. The northern and southern limits of the deposit are bounded by the eroded flanks of Mount Nicholas which has a Quaternary scree cover derived from an overlying Jurassic dolerite sill. The coal seams are locally affected by small scale faulting and washouts. Coal quality (ash content) varies inherently and with the number of included stone bands.

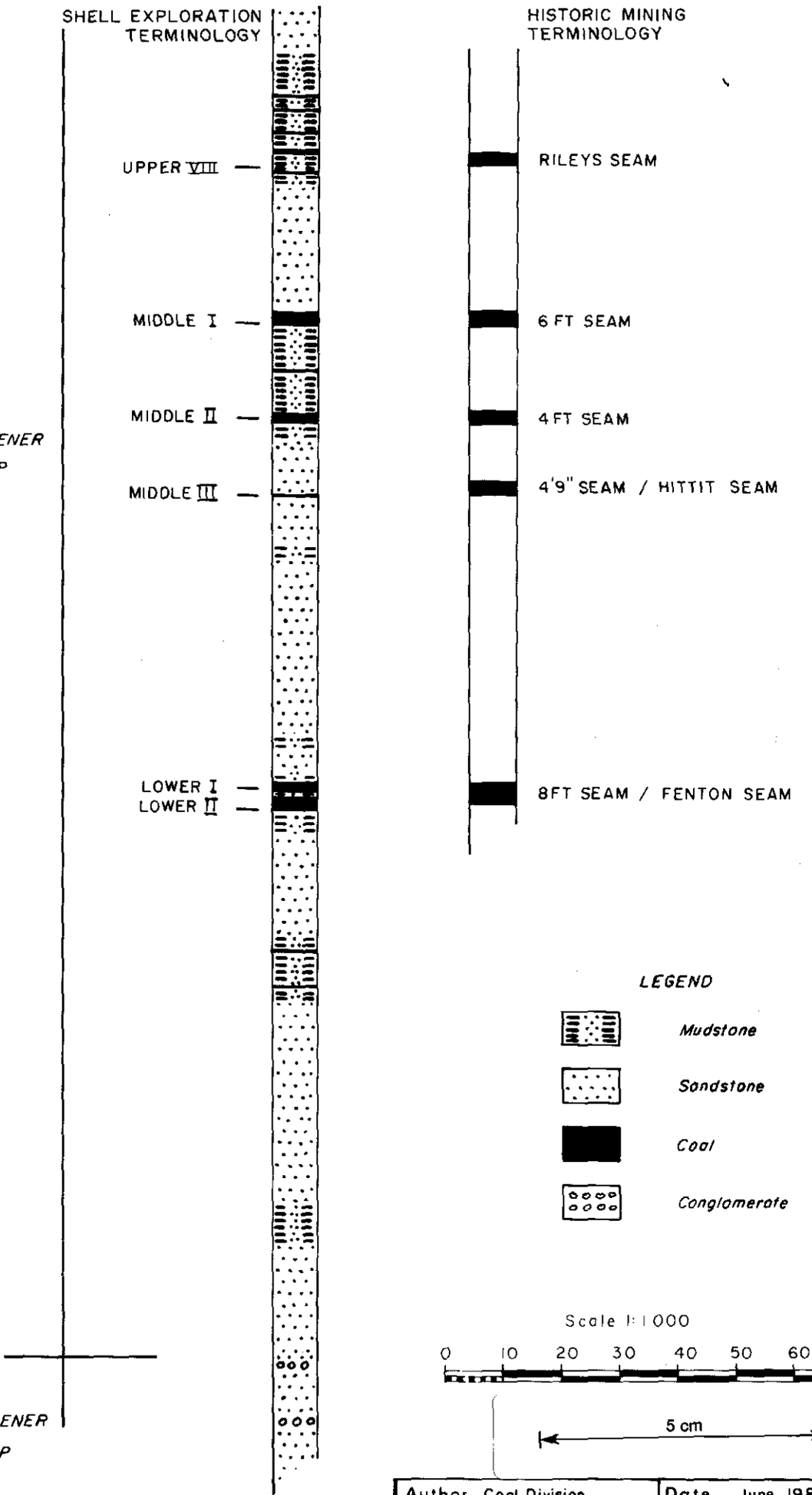
A full assessment of the geological parameters of the Mount Nicholas coal deposit is contained in Volume 1 of this report.

TASMANIA - EL 5/61 - MT NICHOLAS

GENERAL COAL SEQUENCE

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MT NICHOLAS (drilled intersections) | MT NICHOLAS COLLIERY (coal seams mined)



Author Coal Division	Date June 1981
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Fig. 1

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5. SCREE AND TALUS CHARACTERISTICS

5.1 General

Erosion of the Mount Nicholas dolerite cap has resulted in the formation of a thick and extensive scree talus slope covering the Triassic coal measures. The scree varies in observed thickness from 0m on outcrop to about 110m against the dolerite escarpment. Localised and non-systematic thickening occurs which may represent palaeo-drainage channels. Furthermore, scree-filled channels may cut deep into the coal measures decreasing the thickness of stable roof above the seams.

The scree is composed mainly of dolerite boulders of ± 0.5m diameter, though blocks up to 30m across have been noted. The basal section of the scree consists of highly weathered dolerite boulders set in a clay matrix. The scree may contain significant amounts of water, as indicated by the perennial streams that emanate from it.

5.2 Drill Penetration

A variety of drilling techniques were used to penetrate the scree. Percussion and rotary drilling failed due to caving as these methods left a part of the talus unsupported, as did the drilling technique of withdrawing rods to case the hole. Slow rotation diamond drilling with thick mud failed, due to the viscous mud permeating out of the hole and disrupting the scree column. The most successful method used was that of diamond coring using fast rotation, light drilling mud, and a sequence of successively smaller bits in a spiling action.

5.3 Excavation

Previous adits excavated through the scree profile all advanced with difficulty and experienced roof falls. A detailed assessment of tunnelling for mine access has been prepared by Marshall (1981).

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6. COAL MEASURE CHARACTERISTICS

6.1 Lithological

6.1.1 General

Following a review of the known mine stability problems encountered in the coal mines of Tasmania (Fuller, 1981), a regime of testing was chosen to examine the lithological rock characteristics that may contribute to such problems.

A small number of samples were taken for laboratory testing in order to define their specific strength characteristics. Tests were conducted to ascertain strengths of rock strata with regard to potential roof fall, floor heave and pillar burst.

Of the samples taken, a small proportion was sent for laboratory testing by Dr. W. Bamford, Senior Mining Engineer at Melbourne University. These samples were selected on the basis of their lithology, position in the lithogical sequence and proximity to potential early mining alternatives. The remainder of the geotechnical samples are stored as a reserve for any further testing that may be required. Records of all geotechnical samples are entered on the core hole lithology logs.

Geotechnical samples that were included in the coal section, including coal, were sent to Australian Coal Industrial Research Laboratories Ltd. (ACIRL) for testing prior to inclusion in their respective coal analysis samples.

The results and conclusions drawn from these tests are listed and discussed from an engineering point of view by Fuller (1981).

An extensive field testing programme was conducted to further define rock character, provide a comparison for future petrophysical estimations of rock strengths and provide statistical correlation for laboratory test results.

6.1.2 Rock Fabric

An examination of the drillers records and general observations of drill performance, reflects some aspects of the rock fabric which reflect the engineering properties of the various rock types. Thus it is possible to indicate some of the machine wear and operational problems that might be encountered at the various stages of mine development and operation.

Penetration rates of wireline coring using flat-faced diamond impregnated bits were generally 20 to 40m per 10 hour shift in sandstone, slightly less in calcified sandstone and up to 73m per shift in slightly weathered sandstone. The low proportion of quartz within the sandstone contributed to average bit life of 150m.

Penetration rates within the mudstones were generally half those of the sandstones. Drilling fluid pressure at the bit face is about four times higher for mudstones than sandstone, reflecting a difference of cutting characteristics (attrition). This comparison of drilling rates will relate to the performance of continuous miners when advancing through washouts, roof and floor roll areas and mudstone splits within the coal.

Core slipping out of the lifters was rare as the sediments were not greasy (Lean Plasticity). In several instances smooth arcuate spinning cones across the core indicated weak bedding plane strengths.

Penetration rates within the coal were generally comparable to that of sandstone, though dull stony coal (C8) was slightly slower. Thus, greater machine wear and slower rate of extraction will be encountered in the dull stony coal (C8) areas. Flush returns were often markedly reduced when coal seams were intersected close to the surface. Deeply buried coal seams generally showed no change in flush returns, and no increase in flush returns were recorded throughout the area in any formation. The coal is not likely to contain areas that are excessively wet or dry.

Penetration rates for small fresh dolerite dykes were only slightly slower than that of mudstone, but resulted in a relatively high wear rate on the flat faced diamond impregnated bits. Conventional drill and blast methods should cope with such dykes.

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6.1.3 Tensile Strength

The Brazilian Disc Tensile Test was carried out in the roof samples, usually immediately above those taken for the Duncan Free Swell test. Rocks in this position would suffer the greatest roof sagging tensile stress and have a direct bearing on the width of mine roadways, and on retreat mining techniques. The results of these tests are presented in Table 1 and discussed in full by Fuller (1981).

These tests indicated the specific minimum thickness (0.60m for mudstone and 0.43m for sandstone) required of the different lithological beds to form a suitable boltable roof anchor. By imposing these limitations on the known roof lithologies it was possible to define areas of safe, intermediate and poor roof.

6.1.4 Compressive Strength

The Unconfined Compressive Strength (U.C.S.) tests were carried out in the roof, coal and floor rocks to gauge the bearing strength of the sequence, to indicate the pillar size, and contribute to an assessment of roof bolt anchoring requirements.

The Triaxial Compressive Tests were carried out predominantly in the floor sediments to indicate if pillar punching will occur and induce floor heave. The results of these tests are presented in Table 1 and discussed in full by Fuller (1981).

6.1.5 Point Load Strength

Field testing of Point Load Strengths was conducted on representative samples from the full stratigraphic column within each hole of the recent drilling program. Testing was conducted axially to relate to the bearing capacity of the rocks. An initial experimental computer program has been used to compare 885 test results from 11 drill holes.

Summaries of the statistical results are presented in Table II and III, with detailed histograms of the various rock parameters strength properties included as Appendix II.

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TABLE I

SUMMARY OF GEOTECHNICAL LABORATORY RESULTS

VARIABLE		NUMBER OF SAMPLES	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
COAL						
Density	kg/m^3	3	1343.6	56.5	1280	1388
U.C.S.	MPa	3	36.00	6.24	29.0	41.0
Elastic Modulus	GPa	3	4.19	1.95	2.59	6.36
Poisson's Ratio	V	3	0.32	0.01	0.31	0.32
MUDSTONE						
Density	kg/m^3	9	2382	84.0	2210	2511
U.C.S.	MPa	8	23.88	11.69	3.4	41.0
Elastic Modulus	GPa	8	3.60	2.00	0.09	5.88
Poisson's Ratio	V	8	0.36	0.13	0.16	0.55
Brazilian Tensile Strength	MPa	8	2.31	1.44	5.3	0.14
Duncan Free-Swelling Coefficient	%	5	2.82	1.54	4.75	0.61
Cohesion	MPa	3	2.82	1.11	1.8	4.0
Friction Angle	Deg.	3	27.33	2.52	25	30
U.C.S. (After full swell)	MPa	1	15.00			
SANDSTONE						
Density	kg/m^3	3	2416	58.00	2358	2474
U.C.S.	MPa	3	24.87	14.60	15.6	41.7
Elastic Modulus	GPa	3	4.62	3.76	2.13	8.95
Poisson's Ratio	V	3	0.33	0.02	0.31	0.35
Brazilian Tensile Strength	MPa	3	2.37	0.97	1.3	3.2
Duncan Free-Swelling Coefficient	%	1	1.77			
U.C.S. (After full swell)	MPa	1	11.2			

TABLE II

SUMMARY OF POINT LOAD TEST RESULTS

GENERAL ROCK PROPERTIES (MPa)

VARIABLE	NUMBER OF VALUES (IS50)	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	COEFFICIENT OF VARIANCE
DRY	571	0.86	1.00	0	7.30	0.04	490.2	0.99	115.9
MOIST	247	0.62	0.73	0	5.15	0.05	152.0	0.53	118.8
WET	55	0.63	0.59	0.02	2.30	0.08	34.6	0.35	94.2
GOOD FAILURE	638	0.85	0.99	0	7.30	0.04	541.6	0.97	116.1
PARTIAL FAILURE	235	0.57	0.63	0.01	3.75	0.04	135.1	0.40	110.0
FRESH SAMPLES	873	0.78	0.91	0	7.30	0.03	676.7	0.83	117.7
WEATHERED SAMPLES	12	0.58	0.62	0.04	1.64	0.18	6.94	0.38	106.6
COAL	48	0.53	0.58	0	1.82	0.08	25.3	0.33	109.5
CALCAREOUS SANDSTONE	34	2.58	2.10	0.09	7.30	0.36	87.8	4.42	81.4
MUDSTONE	284	0.55	0.63	0	2.95	0.04	155.3	0.40	115.0
SILTSTONE	101	0.55	0.62	0.01	2.43	0.06	55.4	0.39	113.6
SANDSTONE	406	0.87	0.83	0	3.75	0.04	352.9	0.68	95.0

TABLE III
Summary of Point Load Test Results
Specific Rock Type Properties (MPa)

VARIABLE	NUMBER OF VALUES (IS50)	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	COEFFICIENT OF VARIANCE
COAL									
DRY G.F.	19	0.59	0.63	0	1.81	0.15	11.2	0.40	107.0
DRY P.F.	12	0.29	0.26	0.01	0.84	0.07	3.5	0.07	89.6
MOIST G.F.	8	0.57	0.63	0.01	1.69	0.22	4.6	0.39	109.3
MOIST P.F.	8	0.75	0.72	1.06	1.82	0.25	6.0	0.52	96.5
WET G.F.	1	0.07	-	0.07	0.07	-	0.07	-	-
WET P.P.	0	-	-	-	-	-	-	-	-
CALCAREOUS SANDSTONE									
DRY G.F.	25	3.06	2.09	0.09	7.30	0.42	76.6	4.35	68.1
DRY P.F.	2	0.23	0.12	0.15	0.32	0.08	0.5	0.01	51.2
MOIST G.F.	4	2.33	1.89	1.20	5.15	0.95	9.3	3.58	81.3
MOIST P.F.	3	0.48	0.37	0.09	0.82	0.21	1.4	0.13	77.0
WET G.F.	0	-	-	-	-	-	-	-	-
WET P.F.	0	-	-	-	-	-	-	-	-
MUDSTONE									
DRY G.F.	129	0.58	0.67	0	2.55	0.06	74.5	0.44	115.4
DRY P.F.	79	0.52	0.60	0.01	2.90	0.07	40.8	0.36	116.6
MOIST G.F.	46	0.57	0.67	0.01	2.95	0.10	26.1	0.45	117.7
MOIST P.F.	16	0.33	0.27	0.02	0.97	0.07	5.3	0.07	82.2
WET G.F.	9	0.42	0.45	0.02	1.20	0.15	3.7	0.20	107.4
WET P.F.	5	0.98	0.70	0.06	1.95	0.31	4.9	0.49	71.4
SILTSTONE									
DRY G.F.	49	0.60	0.64	0.03	2.43	0.09	29.2	0.41	107.0
DRY P.F.	19	0.37	0.57	0.01	1.95	0.13	7.1	0.32	151.8
MOIST G.F.	21	0.78	0.71	0.02	2.35	0.15	16.3	0.50	91.2
MOIST P.F.	9	0.19	0.14	0.04	0.43	0.05	1.7	0.02	71.3
WET G.F.	1	0.52	-	0.52	0.52	-	0.52	-	-
WET P.F.	2	0.21	0.11	0.14	0.29	0.07	0.4	0.01	49.3
SANDSTONE									
DRY G.F.	179	1.08	0.90	0.02	3.60	0.07	192.5	0.82	84.1
DRY P.F.	58	0.94	0.75	0.04	3.75	0.10	54.3	0.56	79.9
MOIST G.F.	111	0.65	0.74	0	3.60	0.07	71.9	0.55	114.4
MOIST P.F.	21	0.44	0.54	0.01	1.98	0.12	9.2	0.29	122.7
WET G.F.	36	0.69	0.61	0.03	2.30	0.10	24.9	0.38	88.9
WET P.F.	1	0.05	-	0.05	0.05	-	0.05	-	-

* P.F. PARTIAL FAILURE
* G.F. GOOD FAILURE

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A variety of sample parameters were recorded in conjunction with each test result. These have been analysed to compare the general properties of the rock and further subdivided to compare the individual rock component properties.

6.1.5.1 Sample Parameters and General Rock Properties

The moisture content of the rock samples was recorded as dry, moist or wet. From the results it appears that moisture reduces the overall rock strength.

The state of failure was recorded as good (in that the sample failed with a fissure from end to end) and partial (in that the sample crumbled or broke only at one end). Good failures reflect sample homogeneity while partial failures reflect sample inhomogeneity, which is generally related to bedding plane features and mud pellets. Three quarters of the samples tested experienced good failure, reflecting the overall rock homogeneity. By comparing the bulk rock properties (Table II) of good and partial failure mean values, it can be seen that inhomogeneity reduces the rock strength by 33%.

The weathered state of the sample was recorded as fresh or weathered. The results indicate that the weathered rocks are weaker than fresh rocks.

The rock type of each sample was recorded and grouped by the computer into the catagories of coal, calcareous sandstone, mudstone, siltstone and sandstone. The results indicate that the strongest rock type is calcareous sandstone, and that sandstone is stronger than mudstone and siltstone, while the maximum point load strength of coal is less than that of the interburden sediments.

The depth of each sample was also recorded, although a comparison of rock strength with depth and lateral location within Mount Nicholas has not been investigated as it is assumed that these variables will not directly affect rock strength.

6.1.5.2 Properties of Specific Rock Types

Within each rock lithology the affect of moisture content and failure state were compared to gauge their contribution to the rock strength properties, (Table III).

The reduction of strength due to failure state varied significantly with calcareous sandstone (90% reduction in dry strength) being the most marked, with coal (50%) and siltstone (40%) having a moderate reduction, while sandstone (15%) and mudstone (10%) have a slight reduction. Thus the direct contribution of inhomogenity to rock stability will be least in the most common rock types of sandstone and mudstone.

The reduction of strength due to moisture content was most marked in the sandstone (36% reduction from dry to wet strength) with a significant reduction in mudstone (28%) and a lesser reduction in siltstone (13%). Thus observed laboratory tests of significant reductions of strength in wet swollen sediments (Table V) are reflected in the Point Load Test results. Conversly sandstone showed a dry strength (1.08 MPa) of twice that of mudstones dry strength (0.58 MPa) while their moist strength comparisons were similar (reflecting laboratory U.C.S. values) emphasising that the lack of moisture dramatically increases the strength of sandstone relative to mudstone.

The histograms of these rock properties versus test results are often bimodal, indicating a further subdivision of the rock fabric or test conditions. Identification of these strength sensitive details may require extensive examination beyond the scope of this report.

6.1.5.3 Strength Comparisons and Forecasts

A direct comparison of the various strength tests was undertaken to relate the few highly controlled laboratory results with the large number of field (Point Load Test) results. The field results have a greater lateral extent, statistical validity and diversity of sample type. The compatability of the strength tests is confirmed by the similar trends of rock properties. The few exceptions serve to

indicate further subtle strength characteristics. By using the relationships between the laboratory and field test of specific rock types, forecasts of other rock type laboratory values have been made from their field test results.

The laboratory samples had a test mode of "moist" and "good failure", which reflects in the compatability with the moist good failure Point Load Test results. The general Point Load Test results did not correlate with the laboratory results indicating the importance of test mode on strength characteristics.

The ratio of U.C.S. to Point Load Strength is approximately 40 and the ratio of Brazilian Tensile Strength to Point Load Strength is approximately 3.8. Laboratory tests have been conducted on only coal, mudstone and sandstone, while point load tests have been recorded (on the computer files) in many different lithologies and sublithologies. For example the lithology of mudstone may be subdivided into carbonaceous mudstone, silty mudstone, laminated mudstone etc. By using these ratios it is possible to predict the laboratory test strengths from the point load test results. Thus calcareous sandstone can be predicted to have a U.C.S. of 93 MPa and a Brazilian Tensile Strength of 8.8 MPa and that siltstone will have a U.C.S. of 31 MPa and a Brazilian Tensile Strength of 3.0 MPa.

Furthermore, many sublithologies may be extracted as required from the computer data and their strength properties calculated. In turn these values can be used to more accurately gauge the mechanical behaviour of the various rock types in underground mine openings.

The strength of coal when measured by Point Load Test is weaker relative to the clastic rocks, though its U.C.S. is much stronger relative to the clastic rocks. This distinction is attributable to the susceptability of the coal to brittle failure.

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TABLE IV

COMPARISON OF STRENGTH TESTS

TEST	COAL	MUDSTONE	SANDSTONE
Unconfined Compressive Strength (U.C.S.) Mpa	36.00	23.88	24.87
Brazilian Tensile Strength (B.T.S.) Mpa		2.31	2.37
Point Load Test, Bulk Rock Properties (P.L.T.B) MPa	0.53	0.55	0.87
Point Load Test, Moist Good Failure (P.L.T.M) MPa	0.57	0.57	0.65
U.C.S./P.L.T.B.	67.9	43.6	28.6
B.T.S./P.L.T.B.		4.3	2.7
U.C.S./P.L.T.M.	63.2	41.9	38.3
B.T.S./P.L.T.M.		4.0	3.6

6.1.6 Swelling

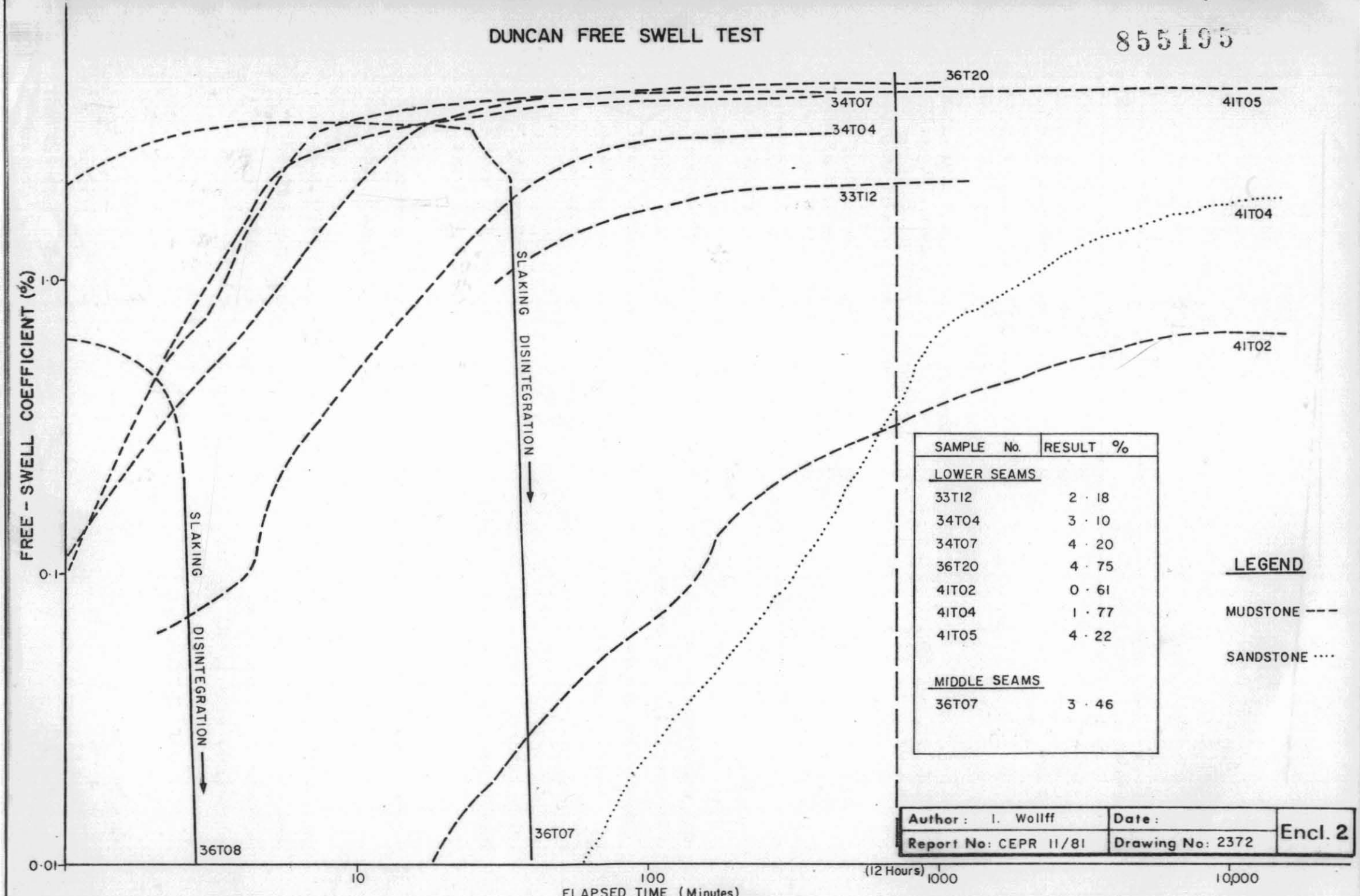
The Duncan Free Swell Test was carried out on the immediate roof and floor of each coal seam which would be exposed on mining, and thus most prone to contact with free water. Swell in these rocks would result in poor roof and floor conditions.

The results of these tests are presented on Figure 2 and Table I. The initial rapid swelling rate will contribute to the compilation of the ground reaction curve, which in turn will reflect on the timing of the support installation.

The swelling properties of the sediments have an adverse affect on the inherent rock strength (Table V). From a comparison of the strength loss encountered in Point Load Test values (Table II) it may be possible to anticipate the U.C.S. and Brazilian Tensile Strength loss of other lithologies. Thus for siltstone with a 13% reduction in point load strength, the Brasilian Tensile and U.C.S. reductions may be 4%.

DUNCAN FREE SWELL TEST

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SAMPLE No.	RESULT %
LOWER SEAMS	
33T12	2 · 18
34T04	3 · 10
34T07	4 · 20
36T20	4 · 75
41T02	0 · 61
41T04	1 · 77
41T05	4 · 22
MIDDLE SEAMS	
36T07	3 · 46

LEGEND

MUDSTONE ---

SANDSTONE ····

Author : I. Wollff	Date :	Encl. 2
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TABLE V

MOISTURE AFFECT ON ROCK STRENGTH

TEST		MUDSTONE	SANDSTONE
U.C.S. (After full swell)	MPa	15.0	11.2
U.C.S. Adjacent rock sample	MPa	27.3	41.7
U.C.S. Average rock properties	MPa	23.88	24.87
U.C.S. Strength loss (Adjacent)	%	45	74
U.C.S. Strength loss (Average)	%	37	55
Estimated Brazilian Tensile Strength (After full swell)	MPa	1.50	1.12
Average Brazilian Tensile Strength	MPa	2.31	2.37
Brazilian Tensile Strength loss	%	35	53
Point Load Strength Dry G.F.	MPa	0.58	1.08
Point Load Strength Wet G.F.	MPa	0.42	0.69
Point Load Strength-Strength Loss	%	28	36

6.1.7 Slaking

A number of simple field tests were carried out on representative rock types from various depths within each hole of the 1981 drill programme. Pure mudstones, those without appreciable silt or carbonaceous content, tended to be slow slaking, with some instances of rapid slaking. The clay matrix of material was rapid slaking.

The results of these tests are included in the computer records of the core lithology, and presented in the geomechanical graphic logs of roof and floor details (Enclosures 2/1 - 66).

A slaking durability test conducted by A.C.I.R.L on a mudstone (sample 45T12) had a result of 96.25%.

Drying was found to be the critical factor in the slaking cycle, as none of the rock types would slake (in or out of water) unless they were first dried. It is recommended that if wet conditions are encountered in parts of the mine with mudstone roof or floor, then these areas should be kept damp.

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6.2 Sedimentation

The measured strength of a rock type reflects to a large extent its sedimentational and diagenetic history. Apart from tectonically super imposed structural features, and the compostion, fabric and cementation of the rocks, the nature and extent of sedimentary structures may have a significant influence on strength. The influence of sedimentary structures on Point Load Test results has already been noted in terms of their contribution to good and partial failure.

The coal measure sedimentary sequence at Mount Nicholas consist basically of coal seams associated with argillaceous rocks and a major interseam strata of sandstone. The vertical aspects of the sedimentary sequence can be observed directly from drill cores, but in general the lateral aspects can only be inferred. A study of exposures in the Duncan Mine (Kind, 1980) does however provide useful details of lateral variation which should be applicable to the Mount Nicholas sequence.

From drill cores it is evident that the floor to coal sequence is usually a transition from sandstone to siltstone to mudstone to coal. The coal to roof transition comprises alternating coal to mudstone oscillations which may be disrupted by erosional sandstones resulting from channel migration. Generally the roof lithology of the coal seams is mudstone, except where subsequent channel activity has superimposed a sandstone roof. It can be inferred that seam washouts will be relatively common where sandstone constitutes the immediate roof to a seam (Volume 1; 3.3.6, 3.4.6, 3.5.6, 3.6.6.).

The interseam sandstones are light grey, medium to coarse grained, lithic labile, with large scale cross-stratification. The matrix is usually clay, but in some instances there has been calcite replacement of matrix resulting in a hard calcareous sandstone. Local concentrations of coaly fragments and laminae on foresets are the main source of rock inhomogeneity. The siltstones range from massive to finely laminated, and may contain mica on bedding planes. Mudstones are generally massive to poorly bedded, but occasionally grade into well laminated shales. They are generally grey, and light brown to cream when thinly interbedded with coal seams.

855198

In describing exposures in the Duncan Mine, Kind (1980) was restricted mainly to exposures in the vicinity of the roof. Furthermore, because of an apparent inability to mine beneath a mudstone roof, almost all exposures studied were sandstone.

The roof of most of the workings in the Duncan Mine is a medium to coarse grained labile sandstone body. The edge of this body is well exposed along the periphery of the workings where there are numerous large roof falls. Differential compaction along this zone, where the sandstone facies changes to a mustone and coal facies, has caused locally extensive squeezing of clay and coal, slickensides, fractures and faults which usually originate and terminate within the seam.

The basal member of the roof sandstone of the mine workings is usually massive, either unstratified or with wide spaced faint horizontal lamination. This unit may locally exceed 3m in thickness. Where it is thick, its base is often undulating and shows channels and scours with pebble lag conglomerates, but the roof is stable. (Where the basal sandstone is thin, the roof can be almost perfectly flat with no evidence of erosion over as much as 100m).

The basal member of the roof sandstone is followed upwards by laminated and ripple cross bedded units, followed again in turn by low angle cross-bedded sandstones with an erosional base.

Channels, which are the most conspicuous erosional features, are roughly parallel and are generally oriented parrallel to the long axis of the sandstone body as a whole. Some protrude as much as 1m from the roof, have a width of 10-20m and a length of 100-200m. Differential compaction has resulted in some squeezing of the underlying coal and slickensiding along the channel flanks. In old mine plans of the Duncan Mine most of these slickensided channels were interpreted as faults.

Small scours of 0.5-2m width, 3-10m length and 0.1-0.5m depth are locally common.

Other sedimentary structures include current lineations such as flute marks and furrows, tool marks, tree logs (inclined and upright) branches and reed type plants. Sandstone dykes protrude from the roof, with a

width of 3-10cm and a length of up to 100m metres. The dykes are often straight and roughly parallel to the edge of the basal sandstone body. There are also some local small folds. These structures may have an influence on roof guttering.

The features discribed by Kind (1980) are likely to occur at Mount Nicholas were sandstone forms the roof of the coal seams. That is, in the northern part of the Lower II seam reserves and the eastern part of the Middle II seam reserves. By analogy roof conditions there are likely to be good, although there will probably be numerous channels and scours. Compactional deformation along the margins of roof sandstone bodies may provide difficult roof conditions. Similarly many small faults shown on old mine plans of the old Mount Nicholas workings may in fact be channels.

6.3 Structure

The main portion of the coal deposit at Mount Nicholas lies within a North-South graben. The western fault has a displacement of approximately 72m and strikes between DOM8 and GY40. The eastern fault has a displacement of approximately 48m and strikes between GY44 and GY45. Numerous small scale faults are recorded on mine layout plans in the Mount Nicholas area, though few indicate that displacement was sufficient to terminate the workings. These faults show no recognisable pattern other than being subparallel to the main north south trend, which is also reflected in regional mapping and joint analysis. The strike length of these minor faults is generally less than 500m, with a lateral spacing frequency of between one and three per kilometre, although the mapping accuracy of these structures may be very poor. The Mount Nicholas drilling program has indicated that the elevation of the seams varies in relation to the anticipated regional dip. Numerous structural interpretations are possible involving a variety of tentative fault configurations. A complete and accurate picture of the Mount Nicholas structure would require such a large number of drill holes as to be prohibitively expensive. Using the information available the most likely faults are shown on the structure maps of Volume 1, Enclosure 3, B & C.

Surface exposures indicate that jointing is much closer spaced on the downthrown rather than the upthrown blocks of minor faults (Plate 1).



North of GY34 - Mt. Nicholas

JOINT CHARACTER

Plate 1

855200

The direction of mine drive advance relative to the fault strike (N-S) and dip directions will be an important feature in planning and mining the Mount Nicholas deposit. Thus drives should approach the faults from an obtuse angle to minimise the length of drive affected by the fault, and approach faults from the downthrown block to the upthrown block. Entry into the affected area will be marked by a gradual increase in jointing forewarning the presence of a fault of shear zone. Assuming a symmetrical graben structure, then the faults will dip into the centre of the deposit, implying that the safest advance direction will be from the centre to the east and west.

Outcrop mapping has shown that jointing has a major north south strike with secondary jointing dispersed about an east-west axis. (Volume 1, Fig. 4, 5 & 6). Joint types in all lithologies are composed of a major joint set with a tight, planar penetrating aspect, while secondary joints are generally tight, accurate, and non-penetrating.

Joint spacing in sandstones is broad (1m - 3m), with joint sets intersecting nearly perpendicularly. Joint spacing in mudstones is close spaced (50mm - 220mm), and in addition to the major and secondary sets there is often a third set of joints which gives the mudstone a hexagonal fracture pattern. Clearly the potential for joint induced strata failure is much greater in the mudstones than the sandstones.

Slickensides are commonly developed in the argillaceous sediments, expecially at contacts with coal seams and sandstone bodies. Most dip at around 60° to 70° with an inferred movement generally parallel to the maximum dip direction. Coal cleat is not well developed in outcrops but appears to trend north-east and north-west. In cores, cleat intensity increases with coal brightness.

6.4 Rock Type and Strata Stability

Although all clastic rock types have similar strength characteristics it is evident that sandstone and siltstone with a lower joint frequency, an absent to low occurrence of slickensides, and greater resistance to atmospheric degradation, will form a more competent roof and floor strata than mudstone. Bedding discontinuities within sandstones are generally limited to carbonaceous laminae on cross stratified foresets. The lamination of siltstones and to a lesser extent mudstones and shales can be expected to contribute to roof sag and falls.

855202

The susceptability of mudstones to slaking can be expected to contribute to roof and floor squeeze, particularly where the mudstone is subjected to wetting and drying cycles.

In general sandstone will provide the best roof conditions with a minimum of joint and bedding failures. However a sandstone roof will have associated with it channel washouts, which will constitute partial or complete mining barriers. The historical review of mining conditions, (Fuller, 1981), confirms that most mines favoured a sandstone roof, and that thin 'clod backs' (overlying carbonaceous mudstone) were difficult to support.

855203

7.0 ROOF AND FLOOR LITHOLOGY

7.1 Lithological

The lithological pattern of the various coal seams roof and floor sediments will influence a number of mine planning and engineering considerations. An isopach map of the immediate roof and floor mudstone content of each coal seam has been prepared to identify areas of best and worst roof and floor conditions, and possible mine water areas (Enclosure 2/67-74).

The isopachs were prepared from the drill results of Tasmanian Department of Mines holes, and Shell Company holes. All mudstones, (including carbonaceous mudstone), were assumed to have similar properties and are thus included in the contouring as the one rock type. Mudstones with a high proportion of interbedded coarser material, siltstone, coal and sandstone were assumed to have similar properties of competency greater than that of mudstone. Where such competent beds were less than 0.40 to 0.60m thick, they were included as part of the mudstone sequence for they were estimated to be of insufficient supportive thickness to contribute to overall strata competence or provide a suitable bolt anchoring horizon (Fuller, 1981). The rock types encountered in the drill holes were assumed to be representative of the regional facies variations, and thus the isopachs do not take into account small scale local facies variation and sedimentary structures.

A brief description of each seams roof and floor lithologies is outlined below to indicate the nature of the assumed competent material behind the mudstone.

Lower II Roof (Enclosure 2/67)

The mudstone is thickest in the south, and has a moderately thin ridge extending to the north west. In the north of the area there is a large area of good sandstone roof. In the northwest (GY 31 and GY 34) the mudstone is overlain by sandstone; south of this area (GY 36) the overlying material is siltstone. In the southwest the mudstone is overlain by coal which comprises the Lower I seam. In the south of the area (GY

41 and GY 43), sandstone overlies the moderately thick mudstone. In the northeast (GY 45) the mudstone is overlain by coal and several minor mudstone beds, which are in turn overlain by sandstone, thus providing a choice of stable roof situations.

Best roof : North sandstone area, DOM 13, GY 24, GY 37, GY 42, GY 44.

Worst roof : Geometric shape of mudstone ridge between GY 26 and GY 36 may compound roof flaking on the northern thin flank of the ridge.

Potential wet areas : The sandstone roof area adjacent to the mudstone, between Huntsmans Cap and GY 37.

Lower I Roof (Enclosure 2/68)

The mudstone thickens gradually to the northeast (GY 26) and markedly to the south (GY 33 and GY 41) and is overlain by sandstone. Most of the area has a good sandstone roof. The thick mudstone sequence at GY 41 includes some thin sandstone beds which may indicate a coarse grained facies variation towards the southeast.

Best roof : Central sandstone area GY 28, 39, 40 and 43

Worst roof : Thick potentially weathered mudstone in the south, GY 33 and GY 41

Potential wet areas : Sandstone roof north of GY 39.

Middle II Roof (Enclosure 2/69)

The mudstone thickens to the north and is generally overlain by sandstone. The two areas of good sandstone roof (DOM 8 and GY 2) to the south are divided by an interbedded sequence of mudstone, sandstone and coal (GY 39 and GY 40) which extends north to GY 46. The basal portion of this sequence is that of a moderately thin mudstone overlain by siltstone. In the central northern area (DOM 13 and GY 44) the mudstone is overlain by coal.

855205

Best roof : Southern sandstone area, GY 28

Worst roof : Geometric shape of mudstone ridge between GY 39 and GY 40 which may compound roof flaking and disrupt interbedded sequences behind the stable roof layer.

Potential wet areas : The sandstone area south of GY 26.

Middle I Roof (Enclosure 2/70)

The mudstone forms a northeast to southwest ridge that is thickest in the southwest. There is one area in the southeast (GY 43) that has a sandstone roof. The southern area of mudstone is overlain by sandstone, whereas the remainder of the area is overlain by sandstone with some interbeds of siltstone and mudstone.

Best roof : Southeast sandstone area, GY 43

Worst roof : Thin potentially flaking mudstone roof in the northwest, GY 39.

Potential wet areas : Sandstone in contact with the mudstone north of GY 43.

Lower I Floor (Enclosure 2/71)

The mudstone thickens to the southeast and is generally overlain by sandstone. A sandstone floor area exists in the northwest of the area. A local north-south inverted trough in the mudstone is located in the southwest of the area. The sandstone floor in this region has a number of siltstone and mudstone beds which probably represents an incursion of mudstone on to a sandstone tongue. Other interbeds within the sandstone are found at GY 24, 26, 34.

Best floor : Northwest sandstone area GY 31, 36, 46

Worst floor : Squeezing along the flanks of the geometric shape of the underlying sandstone between GY 39 and GY 40

Thick mudstone floor in the southeast, GY 43.

Potential wet areas : The mudstone area adjacent to the sandstone north of GY 26 and GY 39.

Lower I Floor (Enclosure 2/72)

The mudstone displays a northeast - southwest trend that broadens and thickens to the southwest. The mudstone is underlain by coal (the Lower II seam) except in the southeast (GY 41) where the lower seam split has developed a substantial sandstone bed.

Best floor : The thin mudstone on the east of the area.

Worst floor : Squeezing around the northern end, GY 26, and along the eastern flank of thenorth south mudstone trough.

Potential wet areas : Possibly around the northern seam limit area.

Middle II Floor (Enclosure 2/73)

The mudstone thickens to the south and to the north and is generally underlain by sandstone. An area of sandstone and siltstone floor is located in the west of the area (GY 39 and GY 40). Siltstone is also found immediately underlying the mudstone at GY 44.

Best floor : The western sandstone area, GY 39 and GY 40

Worst floor : The northern thick mudstone, DOM 13, may be weakened by the Huntsmans Cap intrusive.

855207

Potential wet areas : The mudstone area adjacent to the sandstone north of GY 33.

Middle I Floor (Enclosure 2/74)

The mudstone has a northeast to southwest trend with localised thickening at each end and a particular thick mudstone occurrence was recorded in GY 26, which typifies the general floor sequence that includes underlying horizons of sandstone, siltstone and coal throughout the remainder of the area.

Best floor : Shallow mudstone in the southeast between GY 28, 33 and 43.

Worst floor : Thick mudstone floor at GY 26

: Geometric shape of sandstone lense between GY 28 and 39 producing squeezing on its flanks.

Potential wet areas : The sandstone area at GY 39.

7.2 Geomechanical

Roof and floor geological character will vary according to the combined properties of lithology, fabric strength, and the nature of discontinuities. A series of enclosures (Vol. 2/1-66) graphically displays these recorded features in a useful manner. The computer drawn graphs display all drill intersections of each seams roof and floor situations. They also display depth, lithology, geotechnical samples, rock quality density (R.Q.D.), rock strength, durability, plasticity, bedding character, jointing character, and a combined graph of all these geochemical properties. The values displayed on these graphs represents the geologists assessment of those properties. Within each lithological unit the geomechanical properties have been assigned weighted values according to their estimated relative hazardous nature (Appendix 1). The combined graph is derived from the addition of all the geomechanical values and shows the total hazard influence of each lithological unit.

The graphs are displaced to the right with an increase in adverse rock conditions and they have been produced at the same vertical scale as the detailed petrophysical logs.

A typical example can be seen in the Lower II roof, GY 34, where a mudstone roof has a particularly thin well jointed bed 0.8m above the roof. If this roof is not properly supported, then the mudstone roof may separate along this weakness.

To complement these logs an experimental computer program has been written to record the averages of each of the graph mechanical properties at a variety of designated roof and floor intervals (Table VI). This will allow iso-lines to be drawn for the values of the various properties at different intervals in the roof and floor. Thus zones or trends of particular features will be outlined over the mine area and enable a large number of variables to be examined. The averages presented on Table VI are over the one metre interval to gauge the immediate roof and floor stability, and over a two metre interval for a broader stability assessment. The combined values have been contoured on Enclosures 2/75-90. The numerical values referred to on Table VI and the associated enclosures, refer to the assigned weightings as listed in Appendix I. The greater the geomechanical number, the greater the potential hazard. Thus on a comparative basis areas less than 5 (Combined Values) are good stability areas, while values greater than 15 (Combined Values) are bad stability areas. A review of each seams roof and floor combined geochemical properties highlights the main contributing adverse geomechanical components. A description of each seams roof and floor relative character is summarised in Table VII.

TABLE VI - AVERAGE MECHANICAL PROPERTIES

LOWER 2 SEAM																	
ROOF									FLOOR								
HOLE NO.	DISTANCE M.	R.Q.D.	STRENGTH	DURABILITY	PLASTICITY	BEDDING	JOINTS	COMBINATION	HOLE NO.	DISTANCE M.	R.Q.D.	STRENGTH	DURABILITY	PLASTICITY	BEDDING	JOINTS	COMBINATION
GY24	1	-	-	-	-	2.4	17.8	20.2	GY24	1	-	-	-	-	2.9	-	2.9
	2	-	-	-	-	1.7	9.1	10.8		2	-	-	-	-	2.9	-	2.9
GY26	1	4.5	2.1	-	-	-	-	6.6	GY26	1	4.6	2.9	-	-	-	-	7.6
	2	2.2	1.0	0.1	0.1	-	-	3.4		2	2.3	2.8	-	-	-	-	5.2
GY28	1	2.7	2.0	6.4	-	0.4	-	11.6	GY28	1	2.4	2.8	-	-	5.1	2.4	12.8
	2	1.7	1.2	4.1	0.1	0.2	-	7.3		2	1.2	2.6	-	-	5.1	3.5	12.6
GY31	1	2.8	2.0	7.0	-	0	12.2	24.0	GY31	1	1.9	-	-	-	-	-	1.9
	2	2.4	2.0	4.3	-	-	14.3	23.2		2	1.7	0.4	-	-	-	-	2.2
GY33	1	2.6	2.9	5.2	1.0	4.2	5.7	21.7	GY33	1	2.0	3.0	6.8	1.0	3.2	0.4	16.5
	2	2.4	2.9	4.2	1.0	4.5	6.9	22.1		2	1.6	3.0	4.6	1.0	4.1	0.2	14.9
GY34	1	1.0	3.0	-	-	4.7	0.2	9.0	GY34	1	1.0	3.0	0.1	0.1	4.6	0.2	9.1
	2	1.0	3.0	-	-	5.8	0.4	10.3		2	1.0	3.0	0.1	0.1	5.7	0.1	9.9
GY36	1	1.0	3.0	1.0	1.0	2.0	-	8.0	GY36	1	1.0	3.0	0.1	0.9	4.6	2.2	11.9
	2	1.0	3.0	1.0	1.0	2.0	-	8.0		2	1.0	3.0	0.1	0.9	5.5	1.1	11.6
GY39	1	0.7	3.0	1.0	-	-	8.2	13.0	GY39	1	1.0	3.0	2.9	1.0	4.0	-	12.0
	2	0.3	3.0	0.5	-	-	6.7	10.6		2	1.0	3.0	2.7	1.0	4.0	-	11.7
GY40	1	1.0	3.0	-	-	-	4.7	8.7	GY40	1	1.0	3.0	-	-	5.3	-	9.3
	2	1.0	3.0	-	-	-	2.7	6.7		2	1.0	3.0	-	-	4.9	-	8.9
GY41	1	1.0	3.0	1.0	1.0	5.5	-	11.5	GY41	1	1.0	3.0	1.0	1.0	4.2	0.7	11.0
	2	1.0	3.0	1.0	1.0	5.2	-	11.2		2	1.0	3.0	1.0	1.0	4.8	0.4	11.2
GY42	1	1.0	3.0	1.0	1.0	5.0	-	11.0	GY42	1	1.2	3.0	1.1	1.0	2.6	-	8.9
	2	1.0	3.0	1.0	1.0	5.1	-	11.1		2	1.1	3.0	1.1	1.0	2.8	-	8.9
GY43	1	4.0	3.0	1.0	1.0	3.3	15.6	28.0	GY43	1	3.1	3.0	0.01	1.0	6.7	13.6	27.4
	2	2.6	3.0	0.5	1.0	3.5	11.7	22.4		2	3.0	3.0	0.01	1.0	5.7	14.7	27.5
GY44	1	1.0	3.0	-	-	6.4	7.7	18.2	GY44	1	1.2	3.0	0.1	-	6.1	2.1	12.6
	2	1.2	3.0	-	-	6.1	10.8	21.2		2	1.1	3.0	0.1	-	5.7	2.5	12.4
GY45	1	2.0	3.0	-	-	4.8	4.9	14.7	GY45	1	1.4	3.0	-	-	4.6	4.0	13.1
	2	2.0	3.0	0.05	-	5.0	6.5	16.6		2	1.2	3.0	-	-	3.9	2.1	10.3
DOM8	1	-	1.2	-	-	-	-	1.2	DOM8	1	-	0.1	-	-	-	-	0.1
	2	-	2.1	-	-	-	-	2.1		2	-	0.1	-	-	-	-	0.1
DOM13	1	1.0	3.0	-	-	-	-	4.0	DOM13	1	1.0	3.0	2.7	-	-	0.1	6.9
	2	1.0	3.0	-	-	-	-	4.0		2	1.0	3.0	1.4	-	-	0.1	5.4

TABLE VI CONTINUED

LOWER 1 SEAM																	
ROOF									FLOOR								
HOLE NO.	DISTANCE M.	R.Q.D.	STRENGTH	DURABILITY	PLASTICITY	BEDDING	JOINTS	COMBINATION	HOLE NO.	DISTANCE M.	R.Q.D.	STRENGTH	DURABILITY	PLASTICITY	BEDDING	JOINTS	COMBINATION
GY26	1	-	2.6	-	-	-	-	2.6	GY26	1	4.4	3.0	-	-	-	-	6.4
	2	-	2.6	-	-	-	-	2.6		2	2.3	1.1	-	-	-	-	3.3
GY28	1	2.0	2.0	-	-	5.4	-	9.4	GY28	1	2.9	1.9	6.9	-	-	-	11.8
	2	2.0	2.0	0.2	-	5.4	0.5	10.2		2	1.7	1.2	4.0	-	0.2	-	7.3
GY33	1	1.0	2.9	2.6	1.0	6.5	0.9	15.0	GY33	1	3.5	2.9	6.6	1.0	4.3	10.1	28.5
	2	1.0	2.9	2.4	1.0	7.0	0.4	14.9		2	2.7	2.9	4.2	1.0	4.3	8.2	23.5
GY39	1	1.0	3.0	1.0	1.0	5.0	-	11.0	GY39	1	1.1	3.0	1.0	-	-	8.3	13.4
	2	1.0	3.0	1.0	1.0	5.3	-	11.3		2	0.9	2.8	0.5	-	-	5.6	9.9
GY40	1	1.0	3.0	-	-	4.8	-	8.8	GY40	1	1.0	3.0	-	-	-	2.4	6.4
	2	1.0	3.0	-	-	4.9	-	8.9		2	1.0	3.0	-	-	-	2.4	6.4
GY41	1	1.0	3.0	1.0	1.0	5.2	-	11.2	GY41	1	1.0	3.0	1.0	1.0	4.8	-	10.8
	2	1.0	3.0	1.0	1.0	5.2	-	11.2		2	1.0	3.0	1.0	1.0	4.9	-	10.9
DOM8	1	-	1.2	-	-	-	-	1.2	DOM8	1	-	1.2	-	-	-	-	1.2
	2	-	0.6	-	-	-	-	0.6		2	-	2.1	-	-	-	-	2.1

TABLE VI CONTINUED

MIDDLE 2 SEAM

ROOF									FLOOR								
HOLE NO.	DISTANCE M.	R.Q.D.	STRENGTH	DURABILITY	PLASTICITY	BEDDING	JOINTS	COMBINATION	HOLE NO.	DISTANCE M.	R.Q.D.	STRENGTH	DURABILITY	PLASTICITY	BEDDING	JOINTS	COMBINATION
GY24	1	-	0.6	-	-	-	-	0.6	GY24	1	-	0.06	-	-	-	-	0.06
	2	-	0.8	-	-	-	-	0.8		2	-	0.03	-	-	-	-	0.03
GY26	1	-	2.0	-	-	5.8	-	7.8	GY26	1	-	2.6	-	-	-	-	2.6
	2	-	2.1	-	-	5.3	-	7.4		2	-	2.3	-	-	-	-	2.3
GY28	1	-	2.7	-	-	-	-	2.7	GY28	1	-	2.2	-	-	-	-	2.2
	2	-	2.4	-	-	-	-	2.4		2	-	2.1	-	-	-	-	2.1
GY33	1	1.3	3.0	-	1.0	-	-	5.3	GY33	1	3.0	3.0	-	1.0	-	17.8	24.8
	2	1.1	3.0	-	1.0	-	-	5.2		2	2.0	3.0		1.0	-	9.0	15.0
GY39	1	1.0	3.0	-	-	1.1	4.9	9.9	GY39	1	0.3	3.0	-	-	-	-	3.3
	2	1.0	3.0	-	-	0.5	2.5	7.1		2	0.6	3.0	-	-	-	-	3.6
GY43	1	1.1	3.0	-	-	3.6	0.9	8.6	GY43	1	1.7	3.0	-	-	0.4	0.1	5.3
	2	1.0	3.0	-	-	2.4	5.4	11.9		2	1.4	3.0	-	-	0.7	0.1	5.1
GY34	1	1.0	3.0	4.9	-	-	-	8.9	GY34	1	1.8	3.0	2.3	-	-	8.4	15.6
	2	1.0	3.0	2.6	-	-	6.2	12.9		2	1.4	3.0	1.8	-	-	4.2	10.4
GY36	2	1.1	3.0	2.5	1.0	1.3	9.8	19.0	GY36	1	1.0	3.3	0.6	1.4	-	1.8	8.2
	2	1.1	3.0	2.6	1.0	2.9	5.9	16.7		2	1.6	3.2	1.6	1.2	2.2	0.9	10.9
GY40	1	1.0	3.0	-	-	2.0	0.6	6.7	GY40	1	1.0	4.0	-	-	1.3	1.9	8.2
	2	1.7	3.0	-	-	1.5	5.3	11.6		2	1.0	3.7	-	-	0.6	2.2	7.5
GY42	1	1.0	3.0	-	-	-	-	4.0	GY42	1	1.0	3.0	0.9	-	-	2.6	7.3
	2	1.0	3.0	0.4	-	3.5	5.7	13.7		2	1.0	3.0	0.7	-	2.1	1.3	8.1
GY44	1	1.2	3.0	0.7	-	5.1	12.1	21.6	GY44	1	3.9	3.0	-	-	6.3	0.1	13.4
	2	1.2	3.0	0.1	-	4.4	7.3	16.0		2	2.3	1.8	-	-	3.7	0.1	7.9
GY45	1	1.3	3.0	1.0	1.0	4.2	5.2	15.8	GY45	1	1.2	3.0	0.9	0.9	4.8	8.9	19.8
	2	1.1	3.0	1.0	1.0	4.1	2.6	12.9		2	1.1	3.0	0.9	0.9	3.8	13.5	23.5
GY46	1	4.5	3.0	-	-	4.7	9.3	21.5	GY46	1	1.0	3.0	0.7	-	6.7	8.4	19.9
	2	4.2	3.0	-	-	4.7	4.7	16.8		2	1.0	3.0	0.3	-	6.7	6.9	17.9
DOM8	1	-	-	-	-	6.0	-	6.0	DOM8	1	-	-	-	-	-	-	-
	2	-	-	-	-	6.0	-	6.0		2	-	-	-	-	-	-	-
DOM13	1	-	-	-	-	-	-	-	DOM13	1	-	0.1	-	-	-	-	0.1
	2	-	-	-	-	-	-	-		2	-	0.1	-	-	-	-	0.1

TABLE VI CONTINUED

MIDDLE 1 SEAM																	
ROOF									FLOOR								
HOLE NO.	DISTANCE M.	R.Q.D.	STRENGTH	DURABILITY	PLASTICITY	BEDDING	JOINTS	COMBINATION	HOLE NO.	DISTANCE M.	R.Q.D.	STRENGTH	DURABILITY	PLASTICITY	BEDDING	JOINTS	COMBINATION
GY24	1	-	2.1	-	-	-	-	2.1	GY24	1	-	1.1	-	-	-	1.0	2.1
	2	-	2.3	-	-	-	-	2.3		2	-	1.3	-	-	-	6.0	7.4
GY26	1	-	2.8	-	-	-	-	2.7	GY26	1	-	3.0	-	-	-	-	3.0
	2	-	2.6	-	-	1.2	-	3.8		2	-	3.0	-	-	-	-	3.0
GY28	1	-	1.3	-	-	-	-	1.3	GY28	1	0.1	2.1	0.6	-	-	-	2.8
	2	-	1.2	-	-	-	-	1.2		2	0.1	2.3	0.3	-	0.5	-	3.1
GY33	1	2.3	3.0	-	1.0	6.6	0.6	13.5	GY33	1	1.3	3.0	1.1	1.0	0.07	0.2	6.7
	2	1.6	3.0	-	1.0	5.3	4.3	15.3		2	0.7	1.7	0.6	0.6	0.03	0.08	3.7
GY39	1	4.1	3.0	-	-	0.3	7.7	15.2	GY39	1	1.0	3.0	-	-	-	14.1	18.1
	2	2.6	3.0	-	-	4.6	8.9	19.2		2	1.0	3.0	-	-	-	16.5	20.7
GY40	1	1.0	3.0	-	-	-	11.4	15.4	GY40	1	1.0	3.0	-	0.08	0.5	-	4.6
	2	1.0	3.0	-	-	-	15.7	19.7		2	1.5	3.0	-	0.04	0.2	3.0	7.8
GY42	1	1.0	3.0	0.4	-	4.9	6.2	15.3	GY42	1	1.6	3.0	-	-	-	3.2	7.8
	2	1.0	3.0	0.2	-	3.1	3.4	10.8		2	1.3	3.0	-	-	1.7	1.8	7.8
GY43	1	1.6	3.0	1.0	1.0	4.6	3.0	14.3	GY43	1	1.0	3.0	1.0	1.0	3.0	-	9.1
	2	1.3	3.0	1.0	1.0	4.7	5.3	16.4		2	1.0	3.0	1.0	1.0	4.0	1.5	11.5
GY44	1	1.0	3.0	1.0	0.3	5.3	-	10.7	GY44	1	1.0	3.0	0.1	-	5.3	1.8	11.2
	2	1.0	3.0	0.5	0.1	4.6	-	9.3		2	1.0	3.0	0.0	-	6.1	0.9	11.1
DOM8	1	-	-	-	-	-	-	-	DOM8	1	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-		2	-	-	-	-	-	-	-
DOM13	1	-	-	-	-	-	-	-	DOM13	2	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-		2	-	-	-	-	-	-	-

TABLE VII

Geomechanical Conditions

Regional Summary

SEAM	ROOF			FLOOR		
	Region	Hole Ref	Main Adversity	Region	Hole Ref	Main Adversity
Lower II						
Best	Central	GY26		Nth East	GY24	
	Nth Central	DOM13		Nth West	GY31	
				West	DOM8	
Worst	Nth West	GY31	Jointing	North	GY46	Bedding & Jointing
	Sth West	GY43	Jointing	Sth East	GY43	Bedding & Jointing
	South	GY33	*			
Lower I						
Best	North	GY26		Nth East	GY26	
	West	DOM8				
Worst	Remainder with intermediate conditions only			Sth West	GY33	Joint & Durability
Middle II						
Best	Central	GY28		Central	GY24,26,28,29 + DOM13	
	East	GY24				
Worst	Nth East	GY44	Jointing & Bedding	Nth East	GY45	Jointing
	Nth West	GY36 + 46	*	Nth West	GY46	Bedding & Jointing
Middle I						
Best	Central	GY24,26 + 28		Central	GY26,28 + 33	
Worst	West	GY33,39 + 40	Jointing	West	GY39	Jointing
	East	GY43 + 45	Jointing & *			

* All adversity factors relatively high.

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7.3 Combined Characteristics

Having examined the component properties of lithology and geomechanics that contribute to the inate roof and floor stablity, a series of quality maps (Enclosures 2/83-90) have been compiled to indicate the relative "best", "intermediate" and "worst" stability areas for each seam. The various categories are assessed as:

Best
- Sandstone with up to 15 combined values of geomechanical properties
- Mudstone with up to 5 combined values of geomechanical properties

Intermediate
- Sandstone with from 15 to 20 combined values of geomechanical properties
- Mudstone with from 5 to 15 combined values of geomechanical properties

Worst
- Sandstone with more than 20 combined values of geomechanical properties
- Mudstone with more than 15 combined values of geomechanical properties

Superimposed on these categories for roof areas are the limitations encountered in mine height relative to the height of roof that is boltable. Thus, the best roof conditions are converted to intermediate where the thickness of the seam less 0.5m, is less than the overlying mudstone. Similarly intermediate conditions are converted to worst where the thickness of the seam less 0.5m, is less than the overlying mudstone. The 0.5m interval difference is due to the amount of stable anchoring required by the roof bolt and the limit of manouverability in mine space.

From this detailed assessment of the roof and floor areas the choice of support and opening maintenance systems can be ascertained to reflect an accurate forecast of the mine stability cost.

This assesment is based upon computer stored data and can be modified as mining experience in this area becomes available. Similarly the logical technique for assessing this data can be modified with mine experience.

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8. GROUND WATER

All of the mine workings on the Nicholas Range have been reported to be relatively dry except for the Silkstone mine which extracted coal at very shallow depth and within the weathering profile (Fuller, 1981). Primary porosity of all interseam sediments is low. Jointing in sandstones may be open and in some instances has resulted in drilling fluid loss. Jointing in the argillaceous rocks is relatively tight and is unlikely to provide significant permeability. Breccia zones associated with minor faulting do not have significant fracture permeability and are not volumetrically significant. The coal seams themselves are likely to be the only significant aquifers in the coal measures, but ingress of water into them is restricted to the subcrops zones. During the drilling of the coal measures there was no significant ingress of water into the holes, and it is concluded that mining conditions should in general be dry.

While the coal measures are essentially aquacludes, the overlying scree and talus does represent a significant ground water reservoir which feeds small perennial streams on both sides of the Nicholas Range. Ingress of water into the workings could therefore be expected in the scree and talus itself, and in seams developed at shallow depths beneath the base of the talus and scree.

The major affect of water on mine stability will be to reduce rock strength through swelling. This will be a major contribution to floor heave, thus an up dip advancing mine development would be favoured. Moisture will also affect the roof through slaking and lubricating of joint and shear areas. The effect of water on the coal mining operations will be related to the dust and coal loading operations at the mechanised face.

9. DOLERITE DYKES

Dolerite has rarely been intersected in the history of Tasmanian coal mining. Its thermal aureole is relatively small with a maximum recorded visual alteration of about one metre. Following the intersection of small dolerite dykes in the south east of the Mount Nicholas area (GY43), analytical and structural alterations were measured up to 6m

above the upper 2m dyke, which dipped at 60 degrees. High angle rough calcite filled joints indicate the mobilization of calcite to the thermal shrinkage cracks of both the sediments and the dolerite dyke itself. Thus the presence or marked increase of such calcite filled joints may forewarn the advancing mine face of the impending dolerite dyke. The frequency of occurrence of dykes is thought to be rare as indicated by their notable absence in adjacent Nicholas Range Mine plans. The strike direction is unknown, though it is expected that such dykes will follow the regional north south structural trends.

Drill penetration rates for small dolerite dykes were only slightly slower than that of mudstone, but resulted in a relatively high wear rate on the flat faced diamond impregnated bits. Conventional drill and blast methods should cope with such dykes.

10. SUMMARY

The history of the Tasmanian coal mines indicates a variety of potential mining problems which may be minimised by a thorough understanding of the mine geology and good mine practice.

Adit entry through scree and weathered rock will be difficult. Adits should be located close to areas of stable coal measure outcrop or subcrop.

Sandstone provides the best roof stability conditions, with a deterioration in conditions generally corresponding to an increase in mudstone content. Virtually all the coal seam floors are composed of mudstone which may cause some heave in roadways. Both roof and floor conditions will be affected by jointing, bedding spacing and a variety of inherent mechanical rock properties.In particular the major joint sets and small scale shears may influence the direction of workings. Ground water inflow is not anticipated to occur beyond the subcrop zone. If groundwater inflow is encountered in areas of the mine workings it will lead to significant support problems through its affect on slaking, rock swell and strength loss.

The roof and floor data have been reproduced in great detail and in a variety of readily useable ways to facilitate the ready re-appraisal of various parameters during mining operations.

855218

II REFERENCES

KIND, H.D. 1980 SHELL MELBOURNE
Sedimentation Pattern in the Triassic at Fingal Colliery North Eastern Tasmania. Unpublished.

Other references quoted in text are Shell Reports and Associated Reports which form part of the Mount Nicholas pre-feasibility study (see list on Page 7).

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APPENDIX I

Weightings Assigned to Rock Mechanical Properties for Computer graph and average programmes.

R.Q.D. PERCENTAGE

Linear % of Core recovered in lengths greater than 10 cm., to total length of core recovered.

1. 100% R.Q.D.
2. 81 - 99%
3. 51 - 80%
4. 11 - 50%
5. 0 - 10%

WEIGHTINGS FOR ROCK STRENGTH

These tests apply to core.

4 Very weak rock (or hard soil): Brittle or tough; may be broken in hand with difficulty. Fingernail scratches it easily.

3 Weak rock : material crumbles under pick blows. Cuts easily with knife.

3 Moderately weak rock : Knife makes shallow cuts. Pick indents easily.

2 Moderately strong rock : Scratches slightly with knife. Pick indents to 5mm.

2 Strong rock : Requireds one hammer blow to break hand held sample.

1 Very strong rock : Requires several hammer blows to break sample.

1 Extremely strong rock :

WEIGHTINGS FOR COHESIVE SOIL STRENGTH (Incl. Brown Coal)

7 Very soft : Exudes between fingers when squeezed.

7 Soft : Easily moulded between fingers.

6 Firm : Moulded by strong pressure of fingers.

6 Stiff : Cannot be moulded by fingers.

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WEIGHTINGS FOR NON-COHESIVE SOIL STRENGTH (GRANULAR)

7 Very Loose : Hand penetrates easily.

7 Loose : Could be excavated with spade

6 Compact : Would require pick for excavation

6 Weakly cemented : Lumps of soil can be abraded with thumb.

WEIGHTINGS FOR DURABILITY

1 Non Slaking

3 Slow Slaking : Air dried dehydration cracks form after 10 mins. Breaks into <10mm fragments after 3-10 minutes soaking.

7 Rapid Slking : Air dried dehydration cracks form readily. Break into <10 mm fragments within 3 minutes soaking.

WEIGHTINGS FOR PLASTICITY

1 Non-sticky : Silty and/or non-sticky when wet, usually kaolin rich.

2 Moderately sticky : Intermediate; usually illitic clays.

5 Very sticky : Very sticky clays; usually swelling.

BEDDING

WEIGHTINGS FOR SEPARATION SURFACES

9 Shearing at Bedding separation surfaces

6 Some separation along bedding surfaces

7 Separation on all/most bedding surfaces

1 Transitional Basal contact

2 Abrupt basal contact

3 Erosional Basal contact

4 Deformed Basal contact

WEIGHTINGS FOR SPACING

1	Extremely thick bedding	<200cm
2	Very thick bedding	60cm - 200cm
3	Thick bedding	20cm - 60cm
4	Moderately thick bedding	6cm - 20cm

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5	Moderately thin bedding	2cm - 6cm
6	Thin bedding	0.6cm - 2cm
7	Very thin bedding	<0.6cm

JOINTS

WEIGHTINGS FOR JOINT/DISCONTINUITY PREFIX

5	With slickensides
1	Infilled with calcite
1	Infilld with Quartz
9	Infilled with Clay ' Talc

WEIGHTINGS FOR SPACING

1	Extremely wide joint spacing	>200cm
2	Very wide joint spacing	60cm - 200cm
3	Wide joint spacing	20cm - 60cm
4	Moderately wide joint spacing	6cm - 20cm
5	Moderately close joint spacing	2cm - 6cm
6	Close joint spacing	0.6cm - 2cm
7	Very close joint spacing	<0.6cm

WEIGHTINGS FOR DESCRIPTION

9	Discontinuities infilled with soil	(>10mm)
8	Discontinuities infilled with soil	(<10mm)
6	Open, planar, smooth discontinuities	
5	Open, planar, rough discontinuities	
4	Open, non-planar discountinuities	
1	Tight, planar, smooth discontinuities	
2	Tight, plannar, rough discountinuities	
3	Tight, non planar	

WEIGHTING EVALUATION OF BEDDING OR JOINTING ANGLE

1	0 - 3 Degrees
2	4 - 6 "
3	7 - 12 "
4	13 - 25 "
6	26 - 45 "
9	45 - 90 "

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APPENDIX II

HISTOGRAM OF POINT LOAD TESTS WITH ROCK PARAMETERS

LIST OF POINT LOAD TEST HISTOGRAMS

Number of point load tests from each core hole

Depth range of all samples

Moisture range of all samples

Number of tests conducted on each rock type

Distribution of all rock type strengths for dry samples

" " " " " " " moist samples

" " " " " " with good failures

" " " " " " with partial failures

" " " " " " for fresh rocks

" " " " " " for weathered rocks

Strength distribution for all coal samples

" " " calcareous sandstone samples

" " " mudstone samples

" " " siltstone samples

" " " sandstone samples

Strength distribution of coal, dry with good failure

" " " " " partial failure

" " " moist with good failure

" " " " " partial failure

Strength distribution for calcareous sandstone, dry with good failure

" " " mudstone, dry with good failure

" " " " " " partial failure

" " " " wet with good failure

" " " " " " partial failure

" " " siltstone, dry with good failure

" " " " " " partial failure

" " " " moist with good failure

" " " " " " partial failure

" " " sandstone, dry with good failure

" " " " " " partial failure

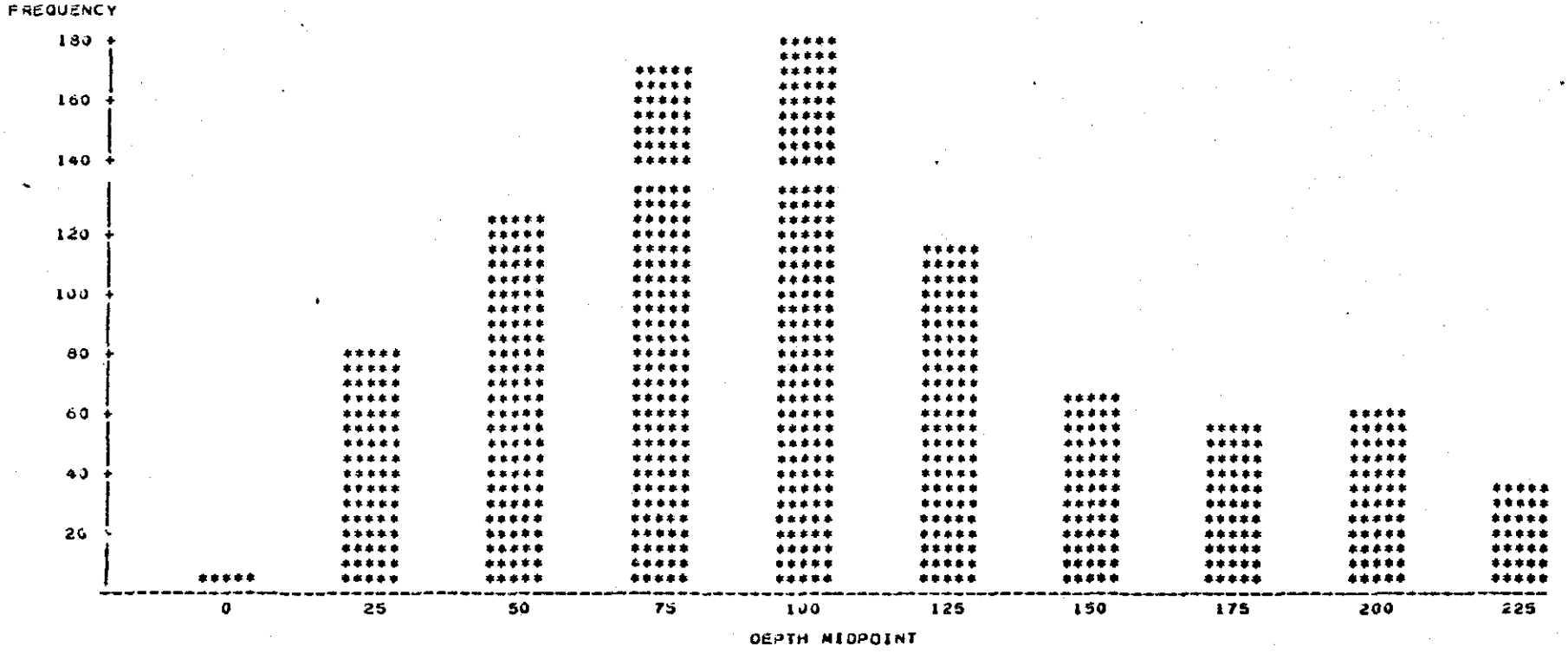
" " " " moist with good failure

" " " " " " partial failure

" " " " wet with good failure

HISTOGRAM: RANGE AND FREQUENCY OF DEPTH FOR ALL SAMPLES 10:12 FRIDAY, AUGUST 7, 1981 2

FREQUENCY BAR CHART

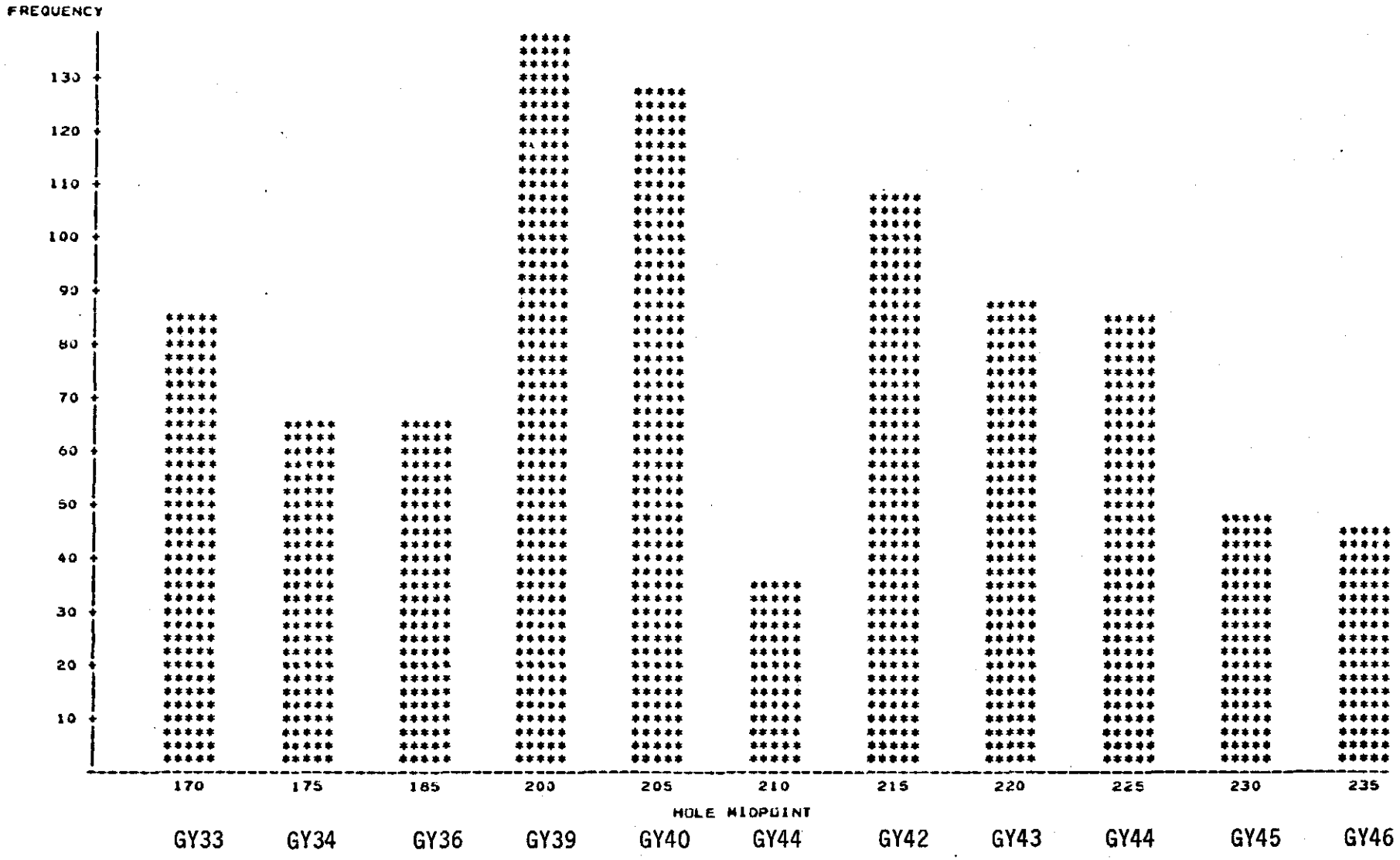


DEPTH RANGE OF ALL SAMPLES

8552323

HISTOGRAM: FREQUENCY OF POINT LOAD TESTS FOR EACH BOREHOLE 10:12 FRIDAY, AUGUST 7, 1981 1

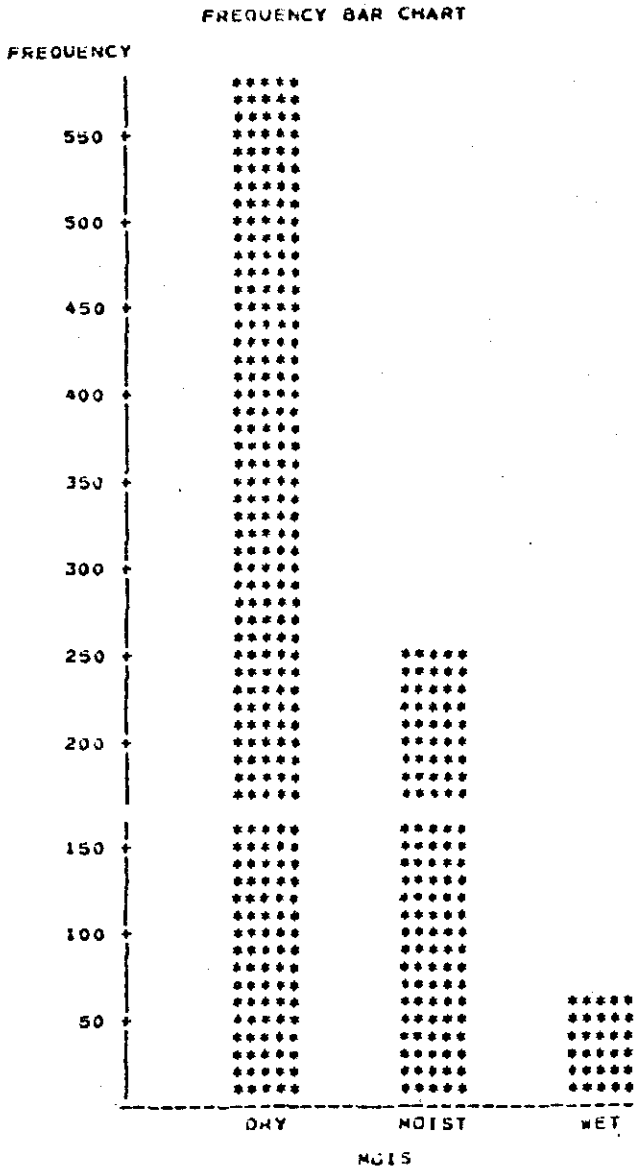
FREQUENCY BAR CHART



NUMBER OF POINT LOAD TESTS FROM EACH CORE HOLE

855926

HISTOGRAM: FREQUENCY OF TESTS CONDUCTED FOR DIFFERENT TYPES OF MOISTURE CONTENT
10:12 FRIDAY, AUGUST 7, 1981



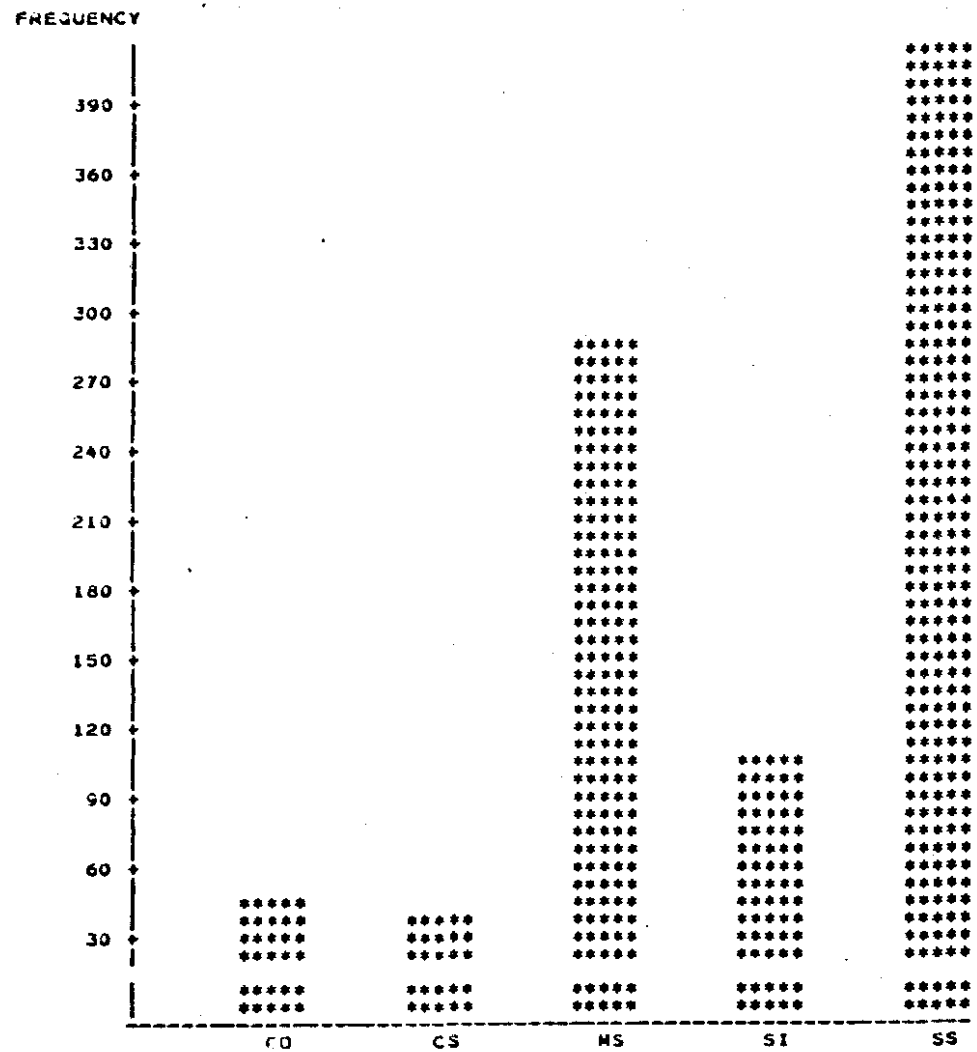
MOISTURE RANGE OF ALL SAMPLES

85229

HISTOGRAM: FREQUENCY OF TESTS CONDUCTED FOR DIFFERENT ROCK TYPES

10:12 FRIDAY, AUGUST 7, 1981

FREQUENCY BAR CHART



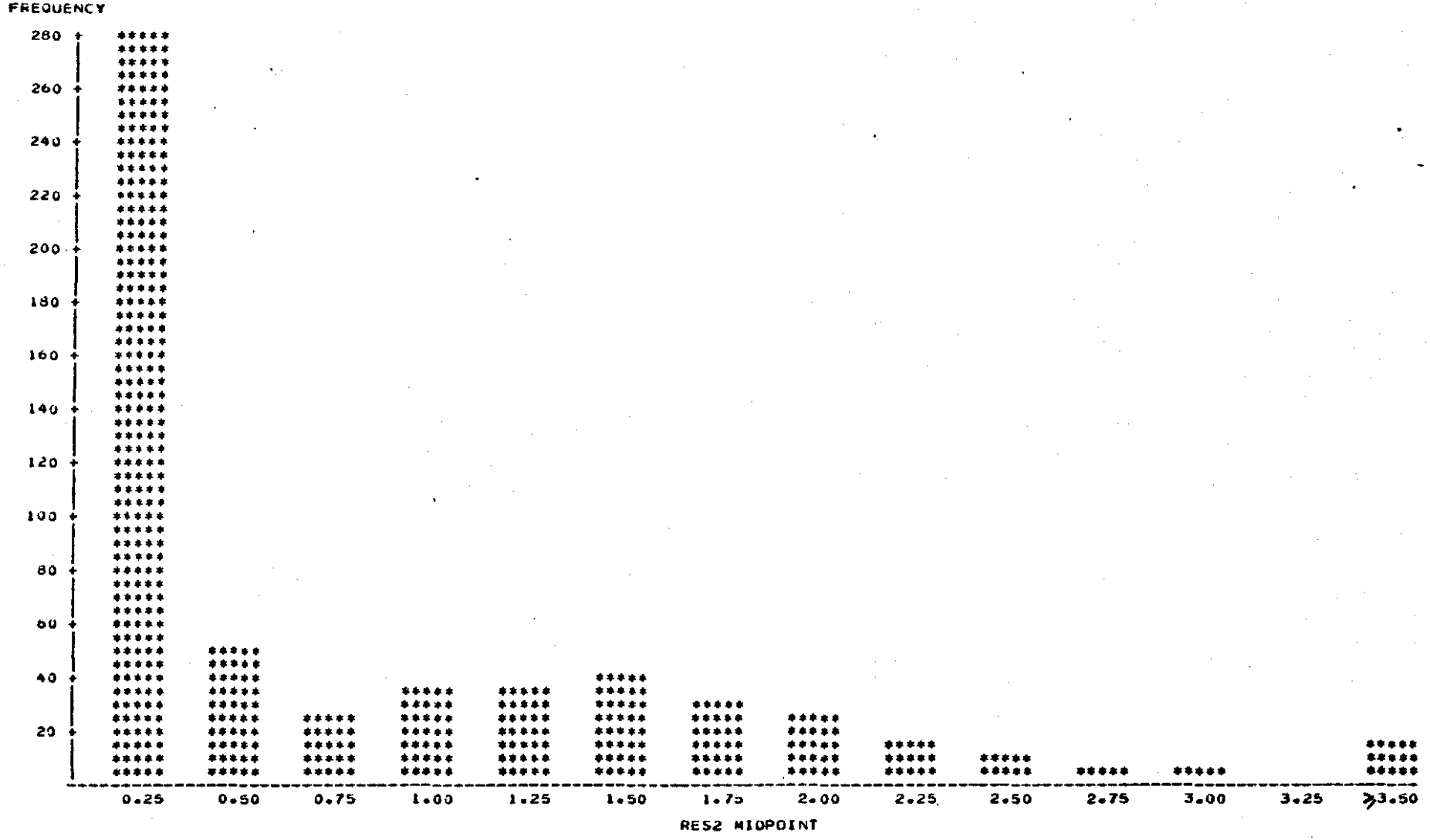
NUMBER OF TESTS CONDUCTED IN EACH ROCK TYPE

85 52 99

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT MOISTURE CONTENTS
MOIS=DRY

10:12 FRIDAY, AUGUST 7, 1981 8

FREQUENCY BAR CHART



DISTRIBUTION OF ALL ROCK TYPE STRENGTHS FOR DRY SAMPLES

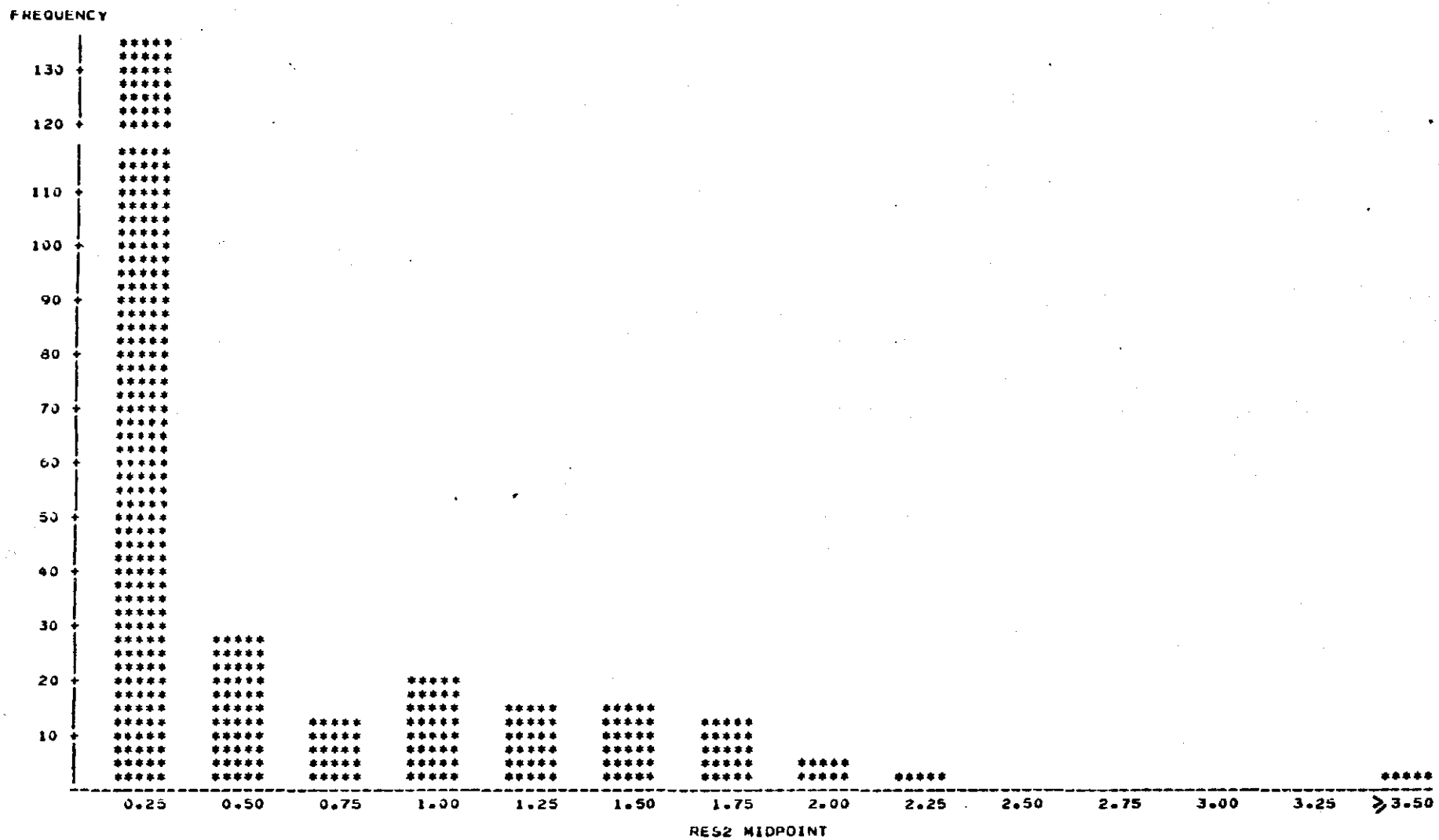
C22358

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT MOISTURE CONTENTS

MOIS=MOIST

FREQUENCY BAR CHART

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DISTRIBUTION OF ALL ROCK TYPE STRENTHS FOR MOIST SAMPLES

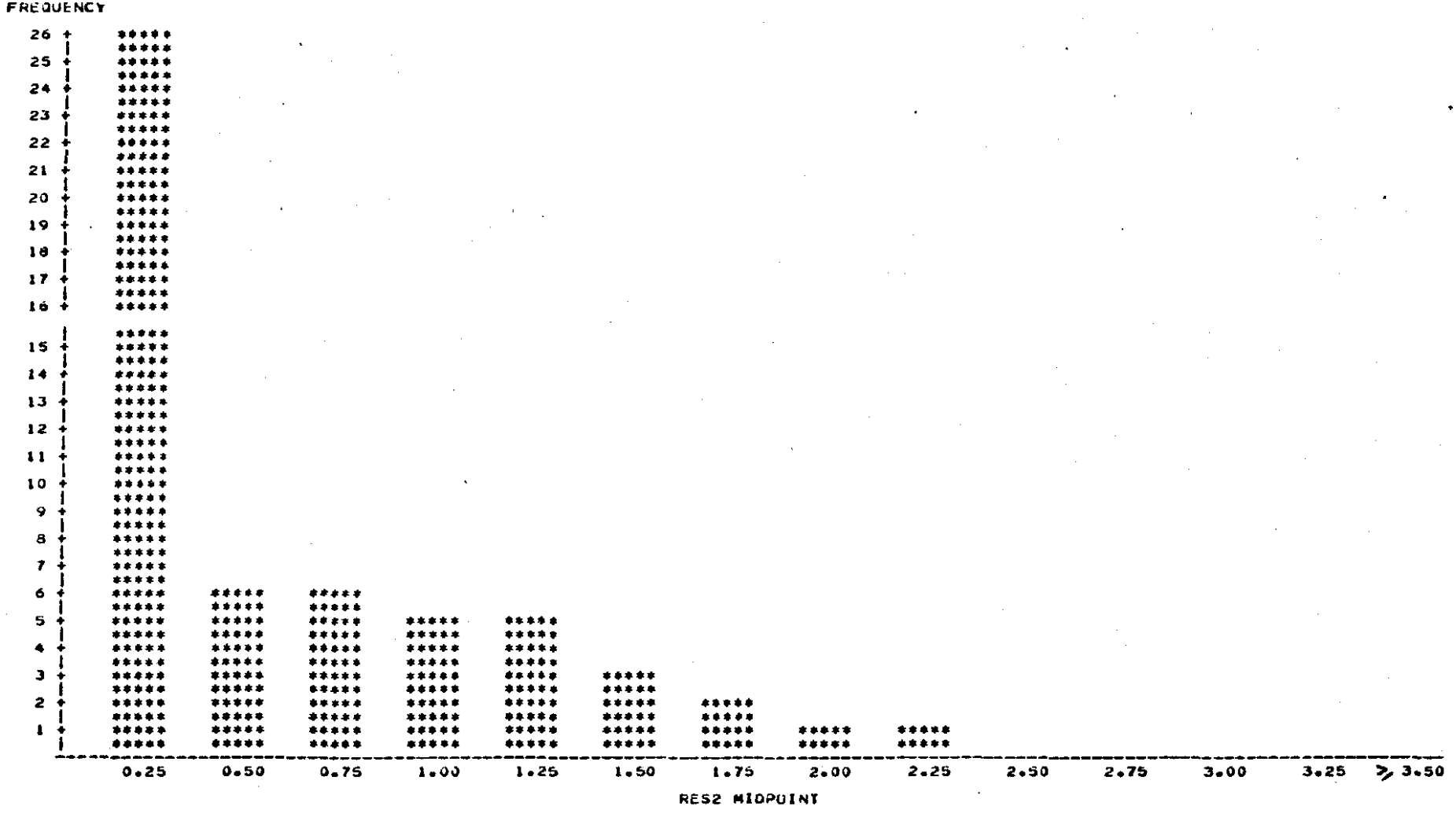
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HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT MOISTURE CONTENTS

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MOIS=WET

FREQUENCY BAR CHART

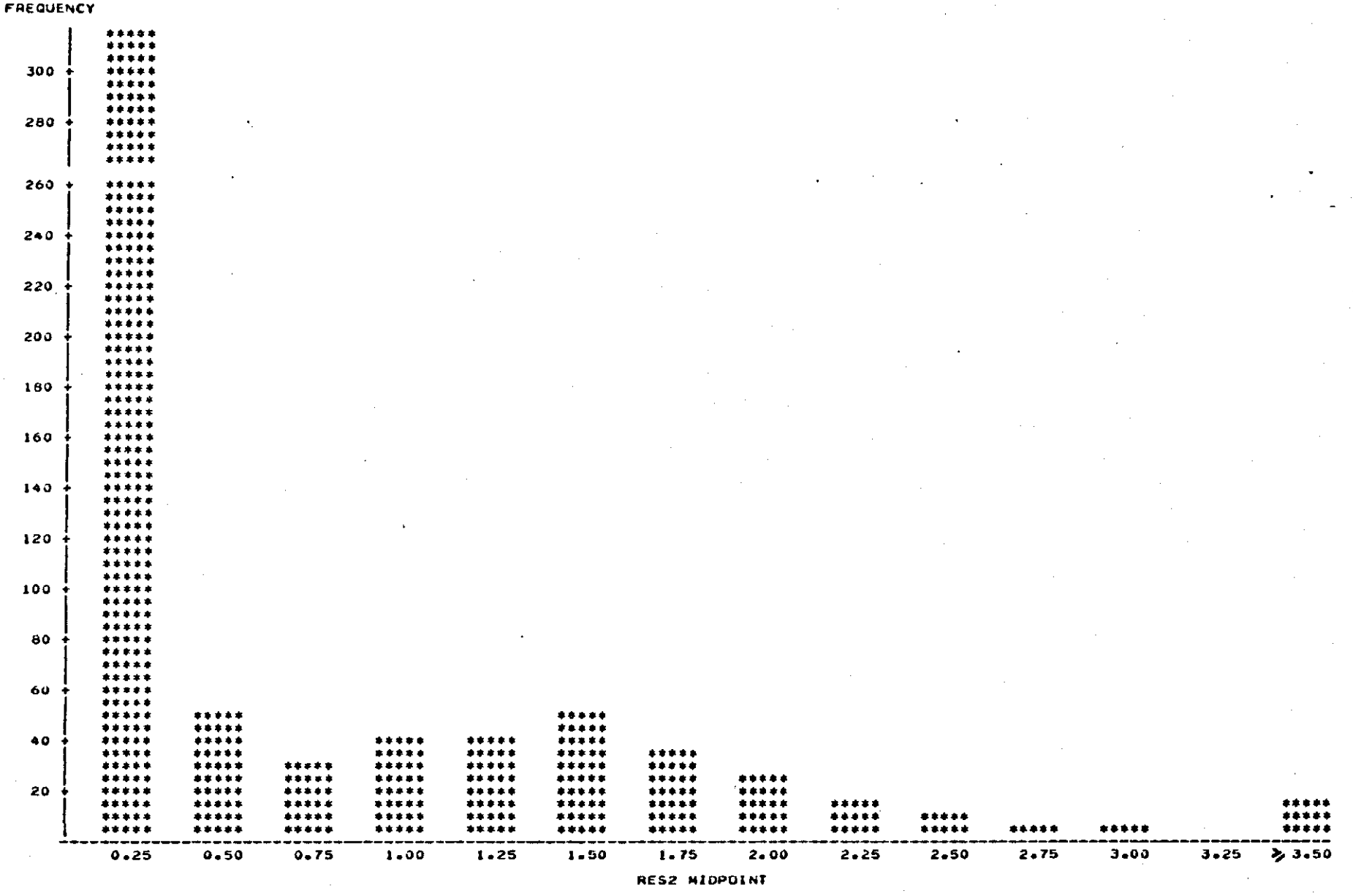


DISTRIBUTION OF ALL ROCK TYPE STRENGTHS FOR WET SAMPLES

8552234

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PARF=NF

FREQUENCY BAR CHART

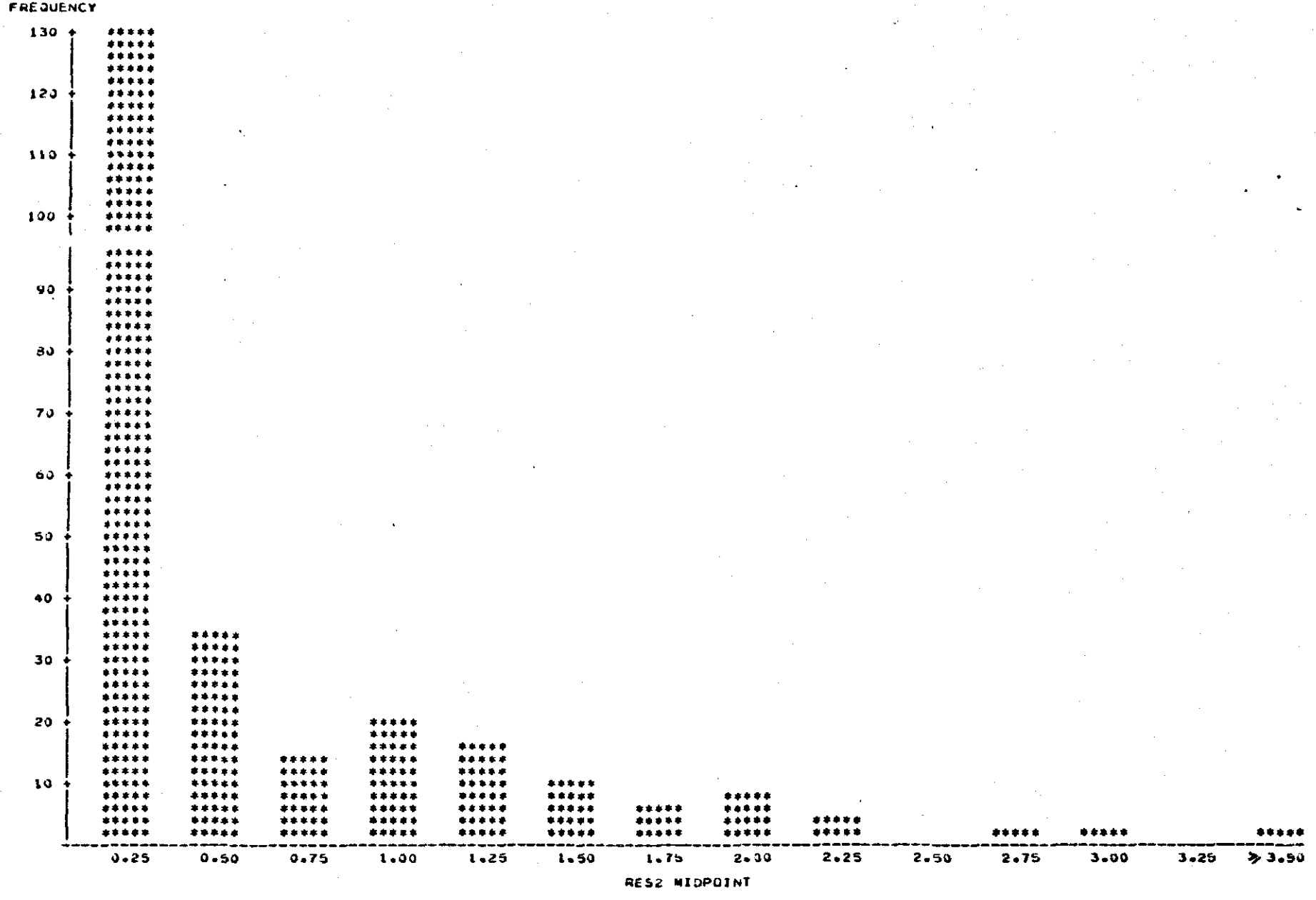


DISTRIBUTION OF ALL ROCK TYPE STRENGTHS WITH GOOD FAILURES

8552232

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FREQUENCY BAR CHART

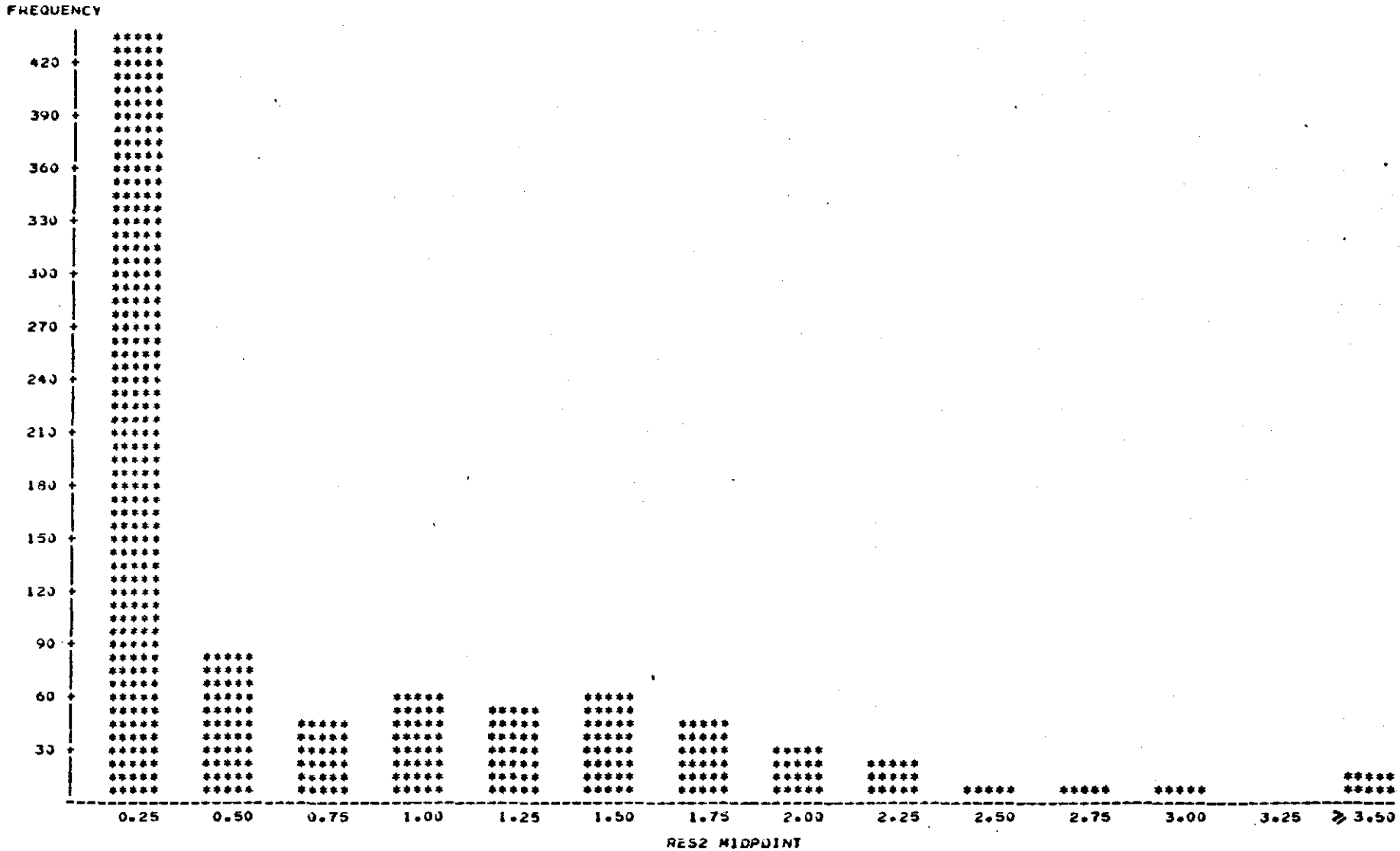


DISTRIBUTION OF ALL ROCK TYPE STRENGTHS WITH PARTIAL FAILURES

8952233

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT WEATHERING 10:12 FRIDAY, AUGUST 7, 1981 17
WEA=N8

FREQUENCY BAR CHART

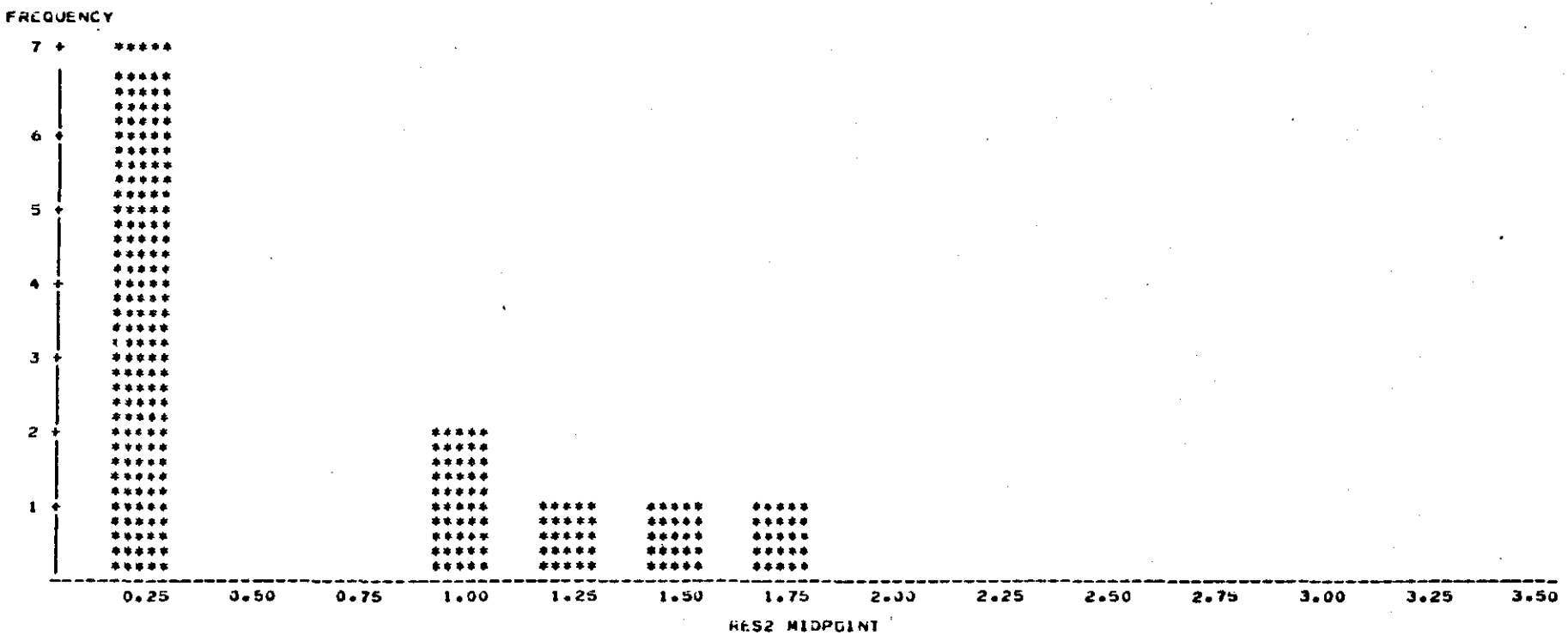


DISTRIBUTION OF ALL ROCK TYPE STRENGTHS FOR FRESH ROCKS

8552334

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MEAN=X

FREQUENCY BAR CHART

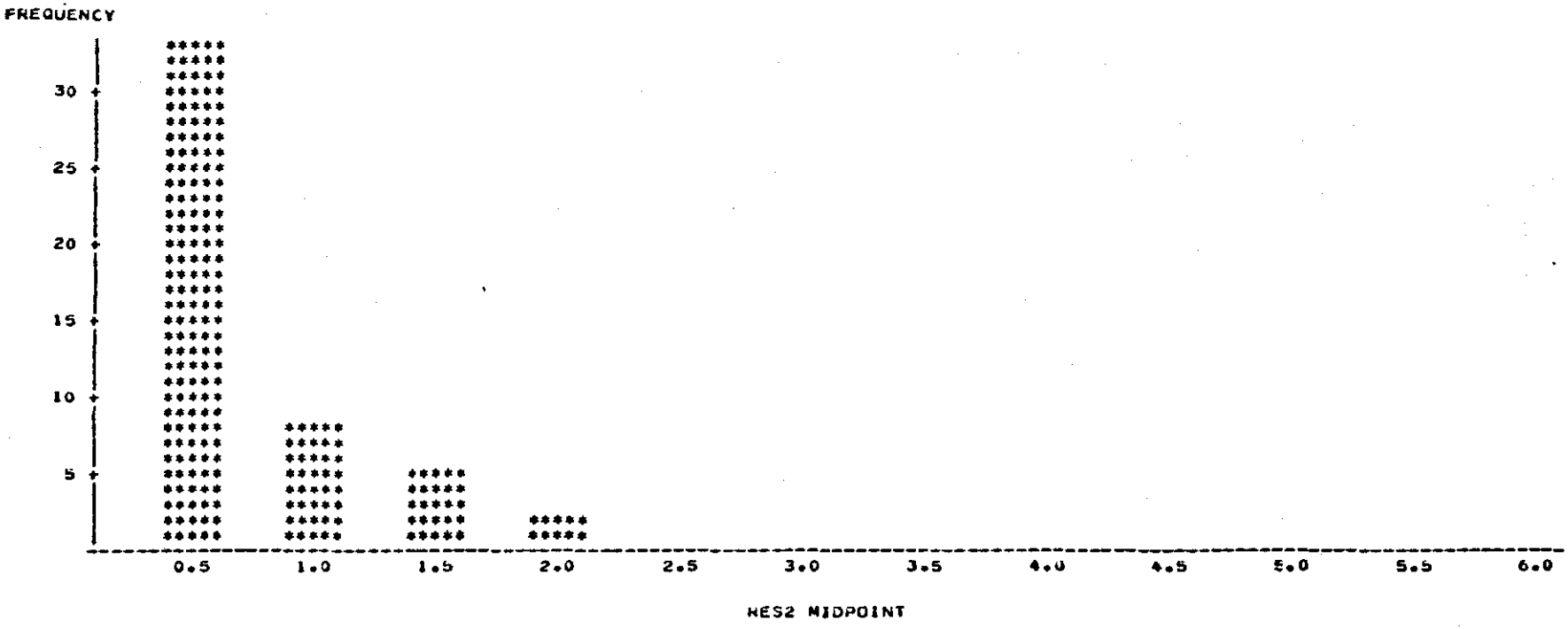


DISTRIBUTION OF ALL ROCK STRENGTHS FOR WEATHERED ROCKS

8552303

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LITH=CO

FREQUENCY BAR CHART

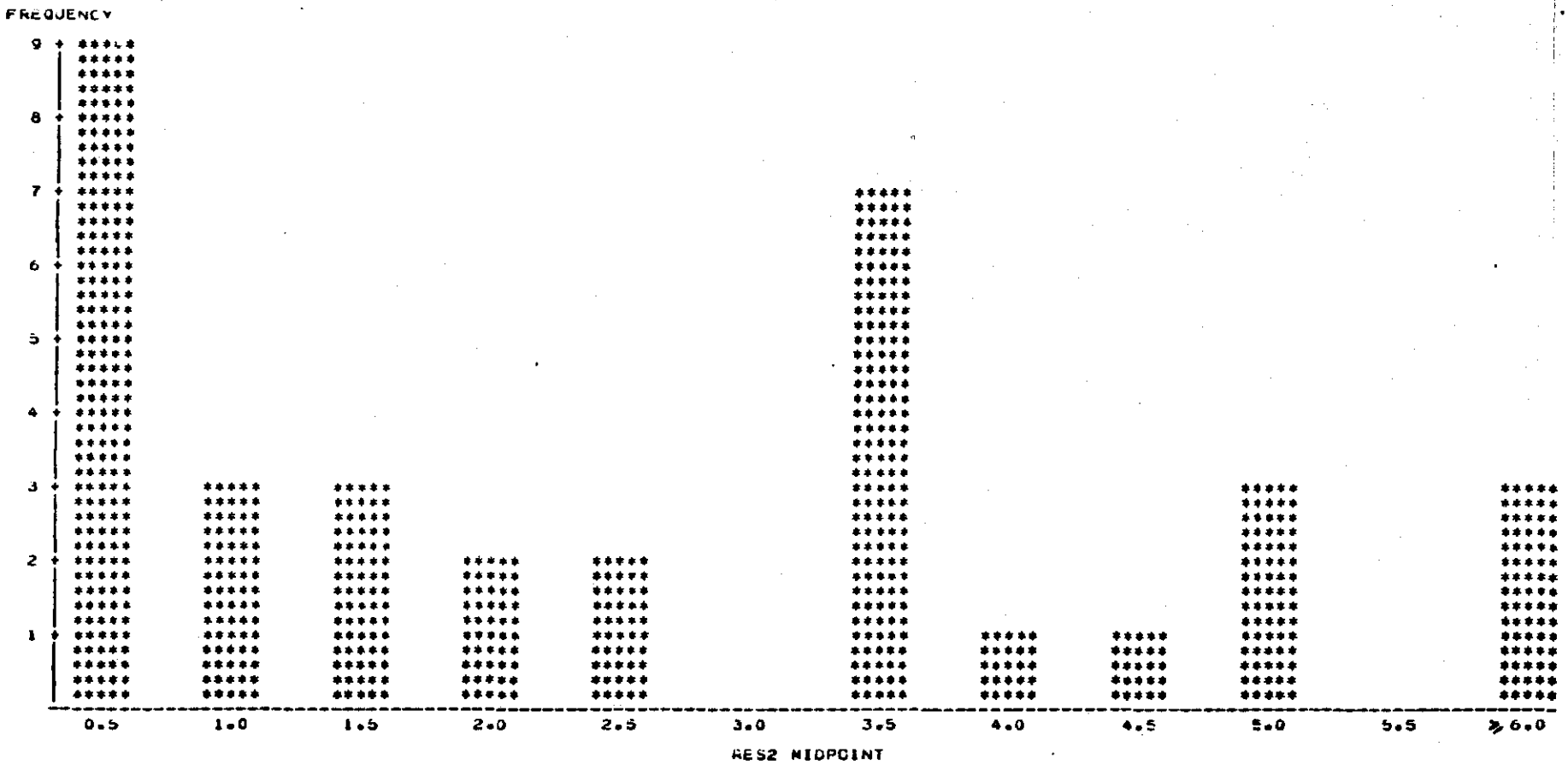


STRENGTH DISTRIBUTION FOR ALL COAL SAMPLES

8552936

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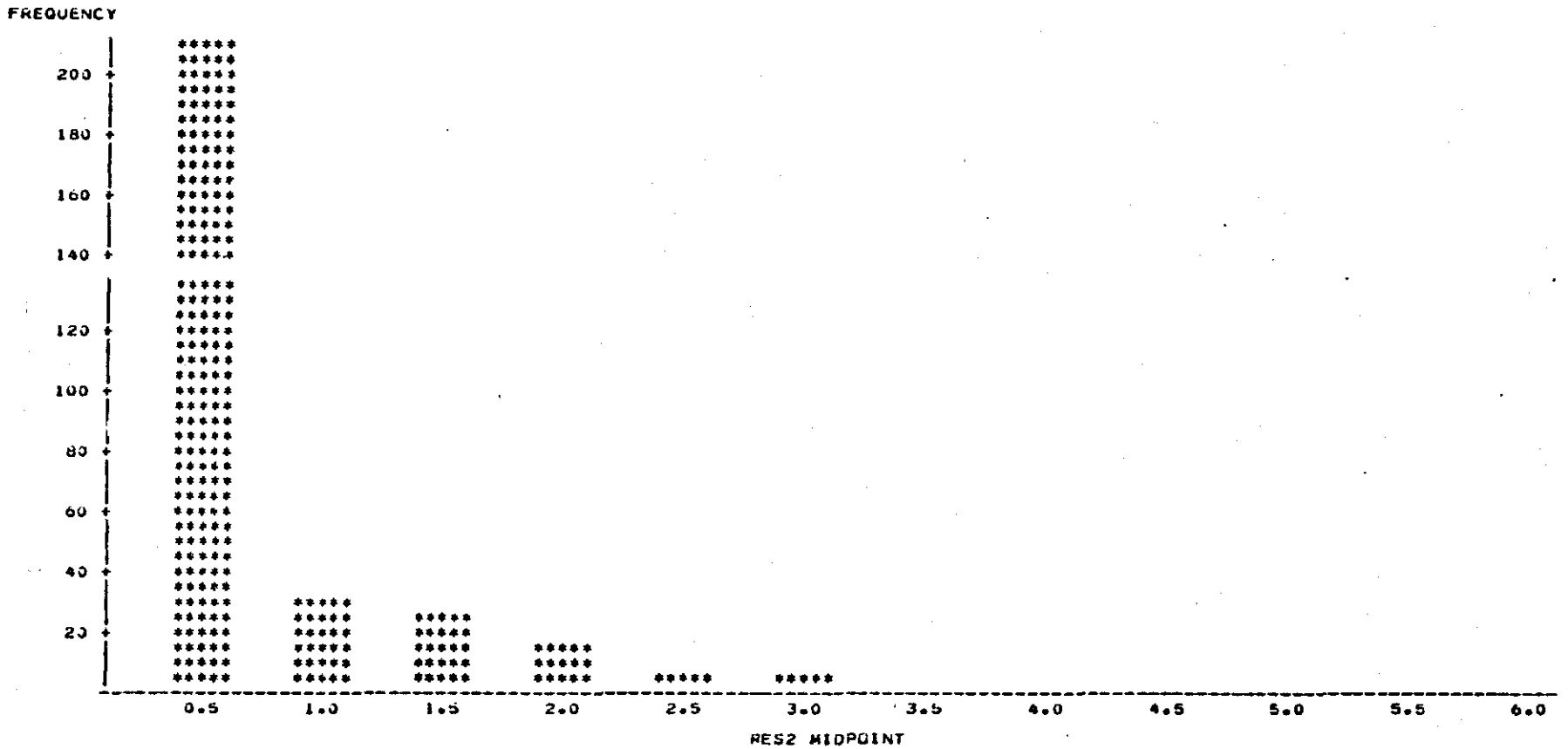


STRENGTH DISTRIBUTION OF ALL CALCAREOUS SANDSTONE SAMPLES

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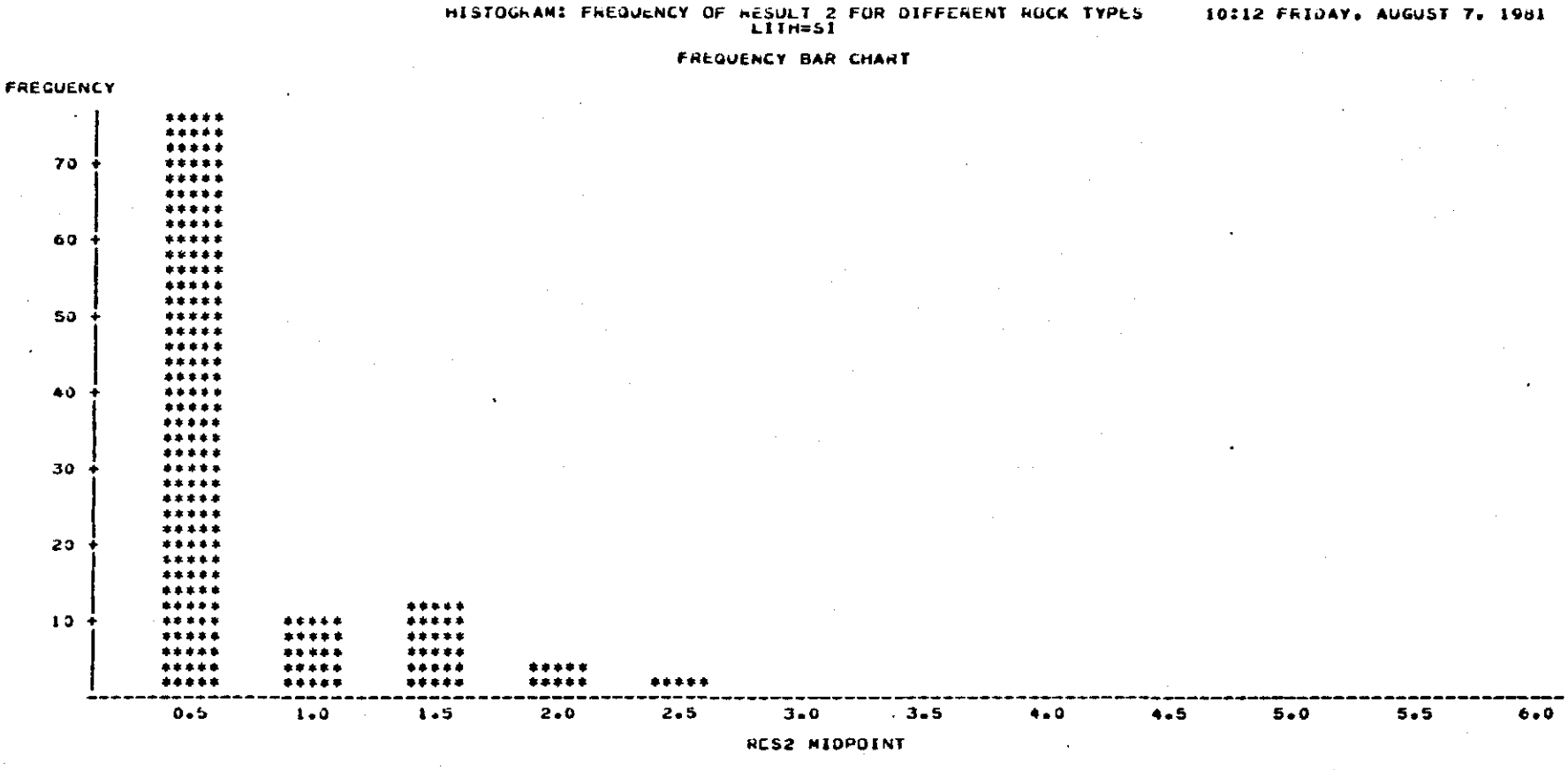
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LITH=MS

FREQUENCY BAR CHART



STRENGTH DISTRIBUTION FOR ALL MUDSTONE SAMPLES

8 5 5 2 3 3

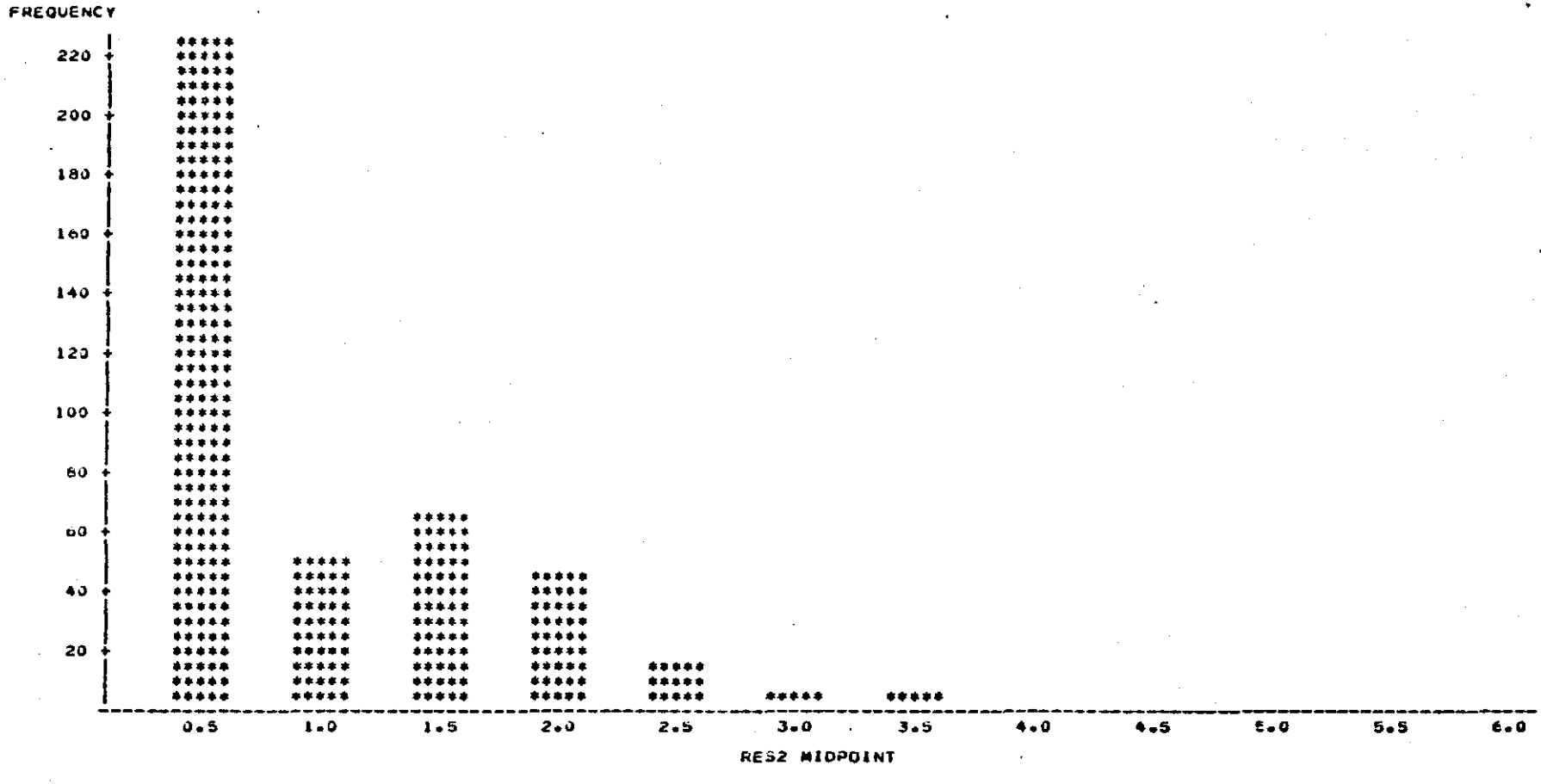


STRENGTH DISTRIBUTION FOR ALL SILTSTONE SAMPLES

6 2 3 3 5 8

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK TYPES 10:12 FRIDAY, AUGUST 7, 1981 23
LITH=SS

FREQUENCY BAR CHART



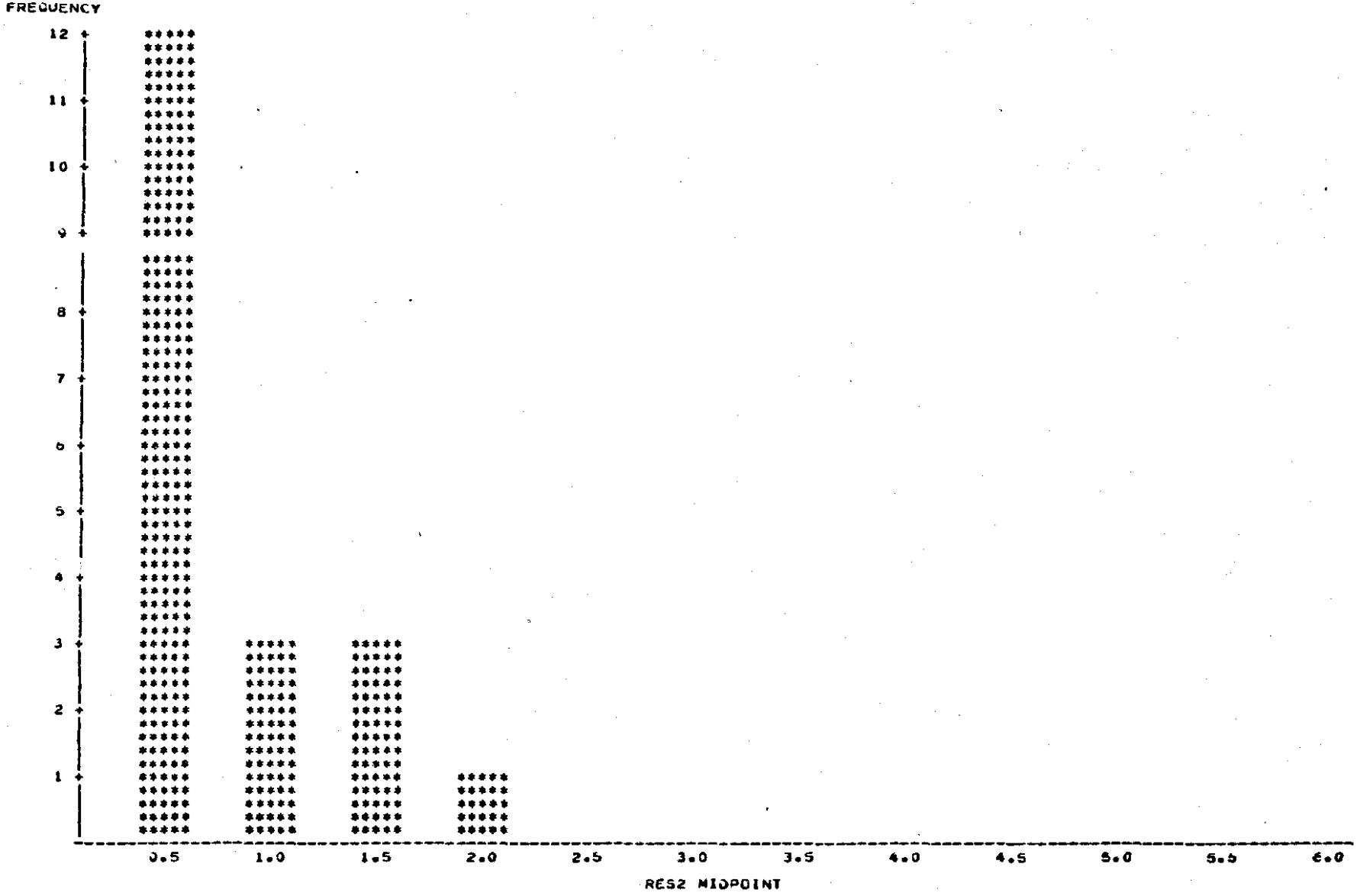
STRENGTH DISTRIBUTION FOR ALL SANDSTONE SAMPLES

0 E 2 3 7 8

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 24
10:12 FRIDAY, AUGUST 7, 1981

LITH=CO MOIS=DRY PARF=NF

FREQUENCY BAR CHART



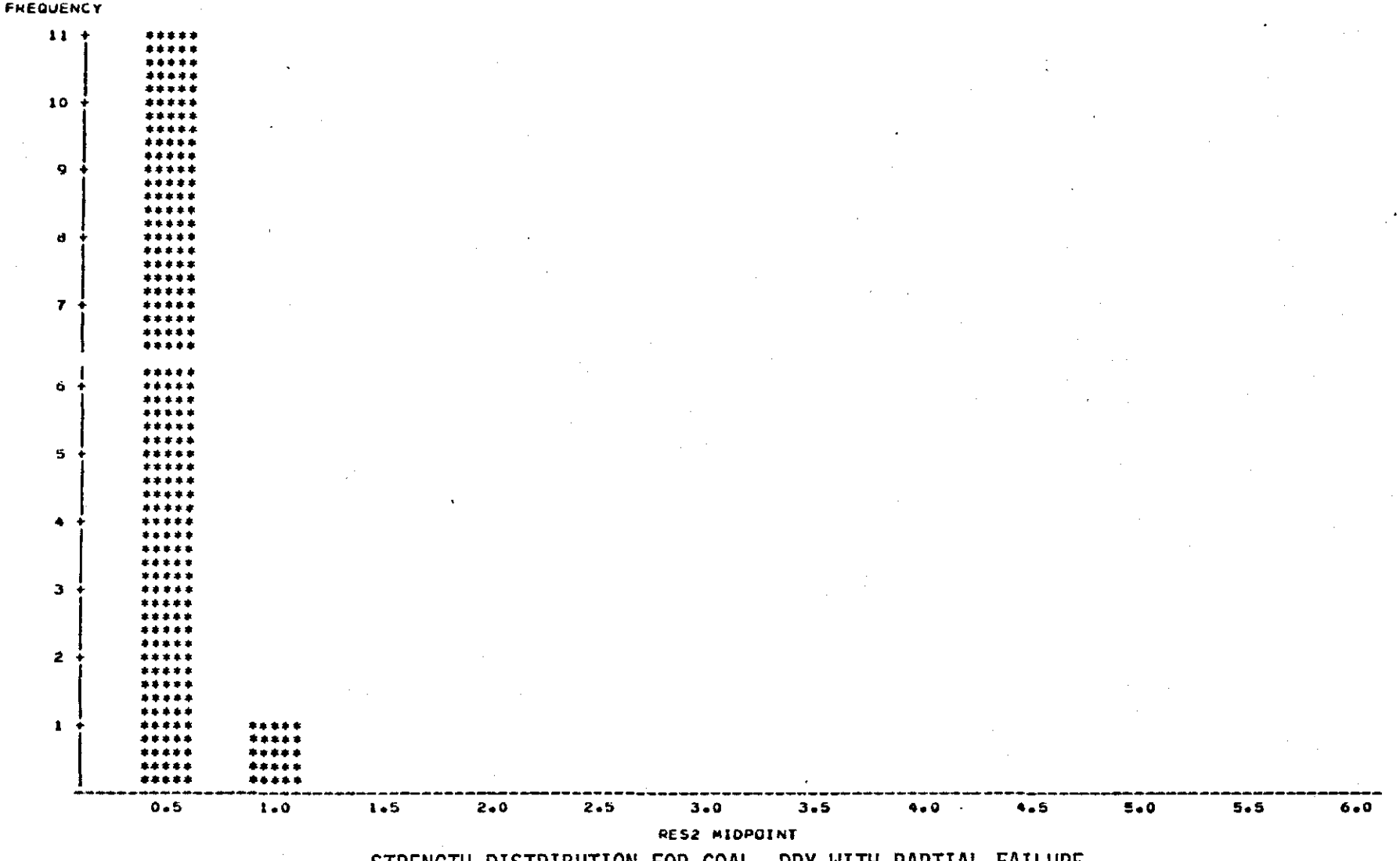
STRENGTH DISTRIBUTION OF COAL, DRY WITH GOOD FAILURE

8552411

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 25
10:12 FRIDAY, AUGUST 7, 1981

LITH=CO MOIS=DRY PARF=PF

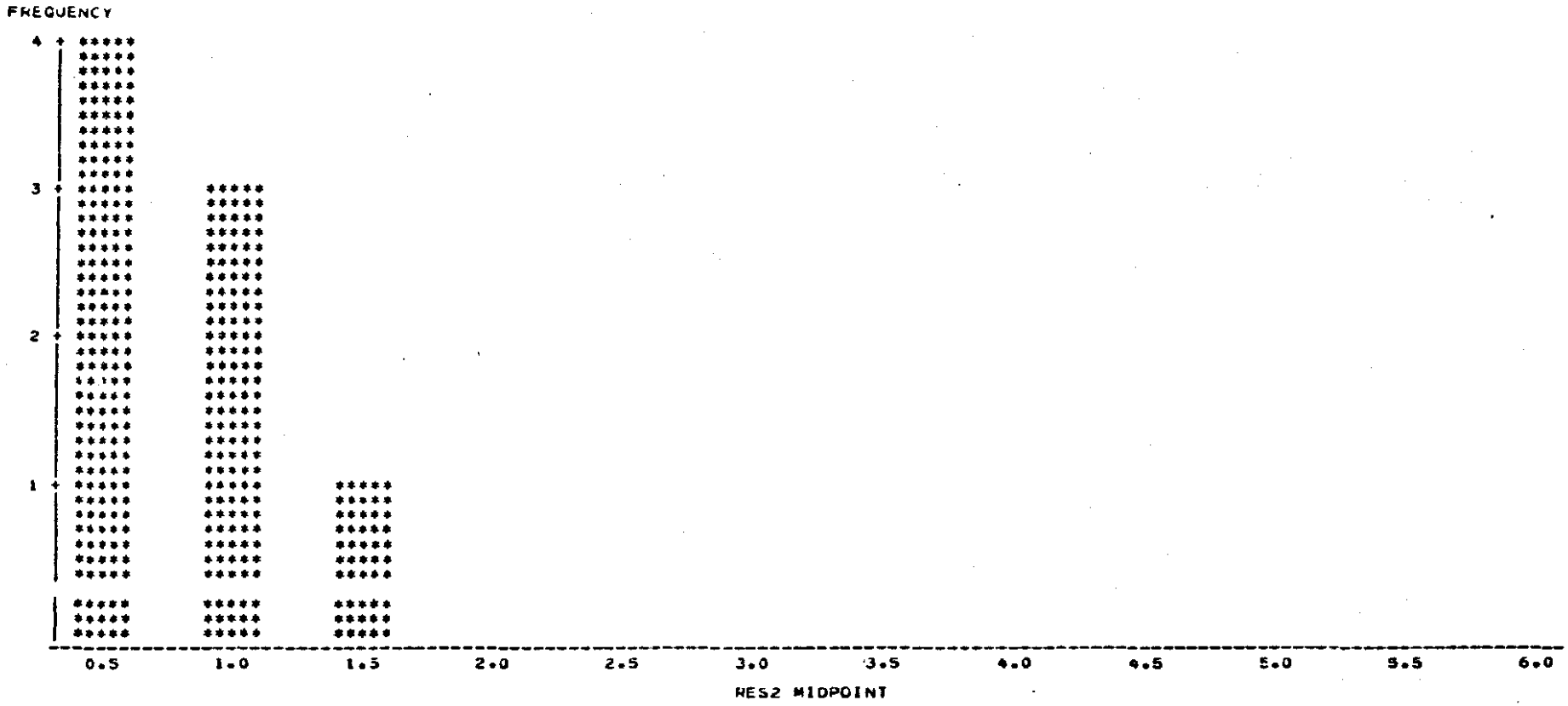
FREQUENCY BAR CHART



STRENGTH DISTRIBUTION FOR COAL, DRY WITH PARTIAL FAILURE

8552412

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS
LITH=CO MOIS=MOIST PARF=NF
FREQUENCY BAR CHART



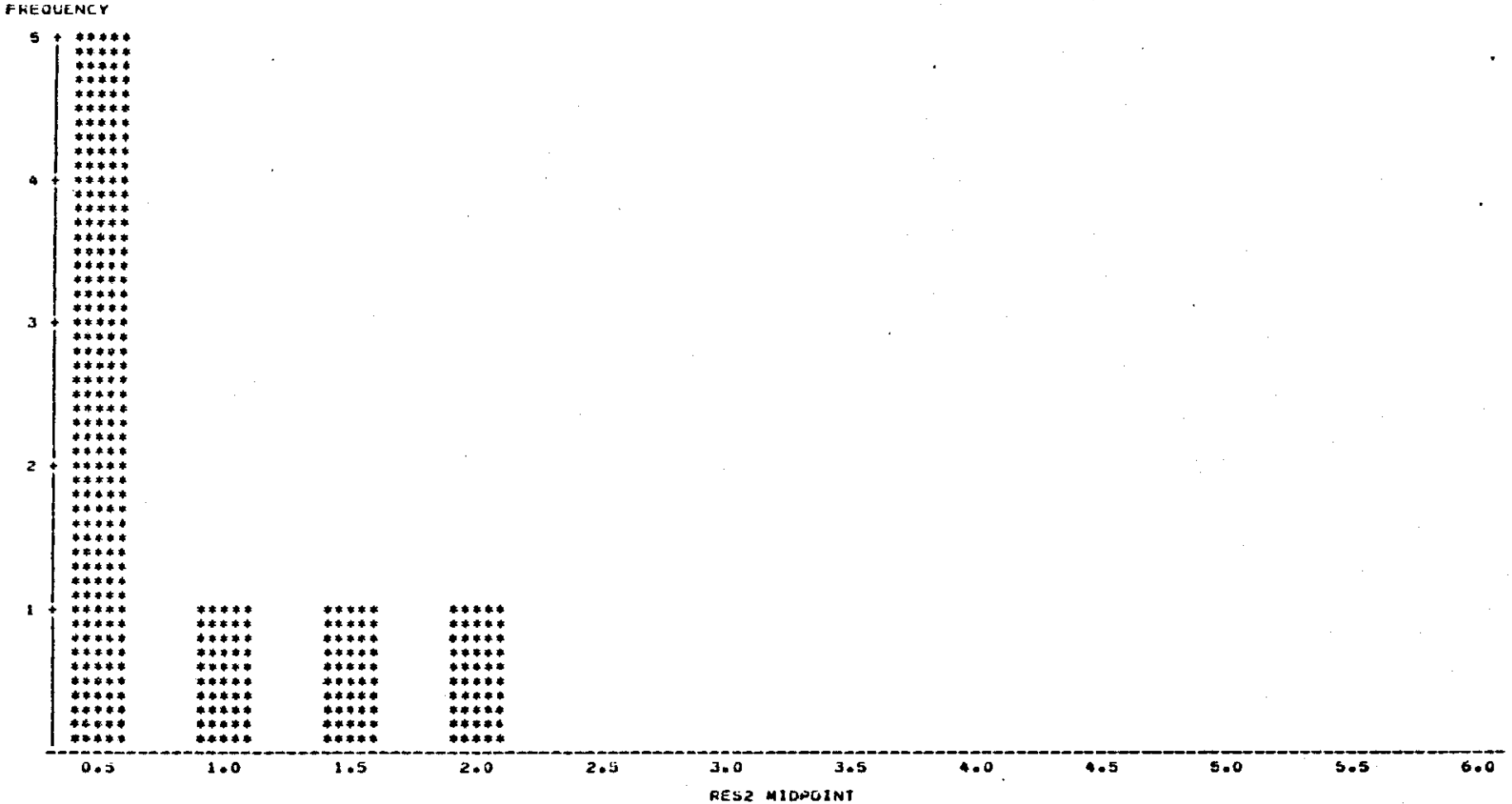
STRENGTH DISTKIBUTION FOR COAL, MOIST WITH GOOD FAILURE

8529413

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 27
10:12 FRIDAY, AUGUST 7, 1981

LITH=CO MOIS=MOIST PARF=PF

FREQUENCY BAR CHART

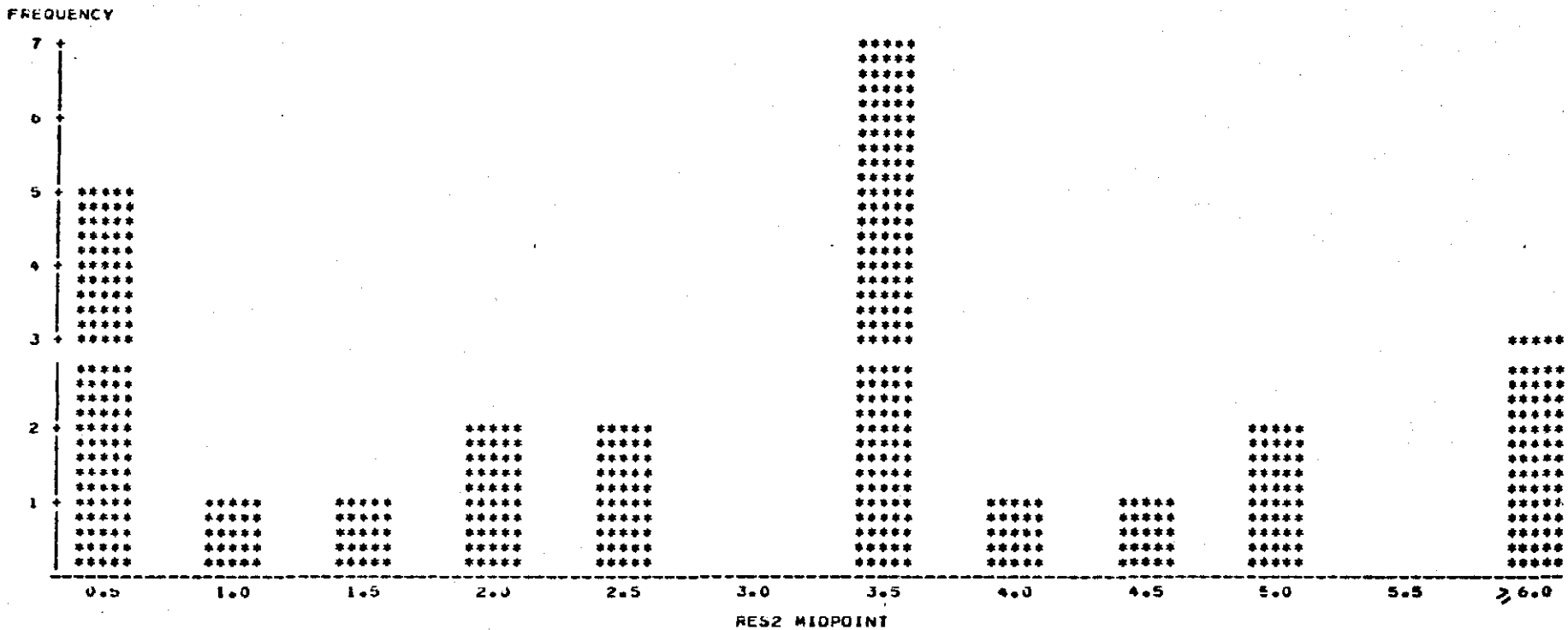


STRENGTH DISTRIBUTION FOR COAL, MOIST WITH PARTIAL FAILURE

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 29
10:12 FRIDAY, AUGUST 7, 1981

LITH=CS MOIS=DRY PARF=NF

FREQUENCY BAR CHART



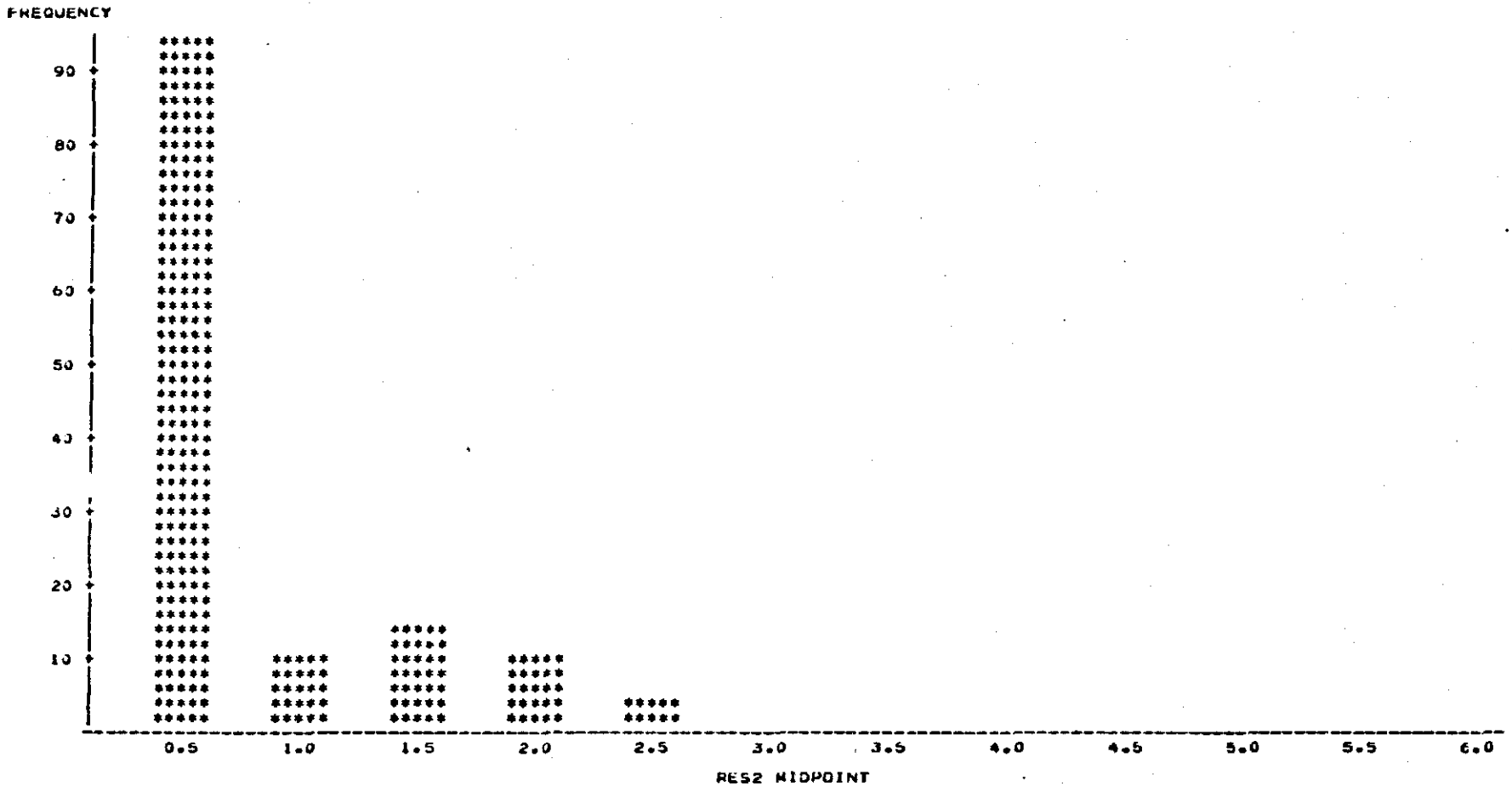
STRENGTH DISTRIBUTION FOR CALCAREOUS SANDSTONE, DRY WITH GOOD FAILURE

85 82 45

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 33
10:12 FRIDAY, AUGUST 7, 1981

LITH=MS MOIS=DRY PARF=NF

FREQUENCY BAR CHART



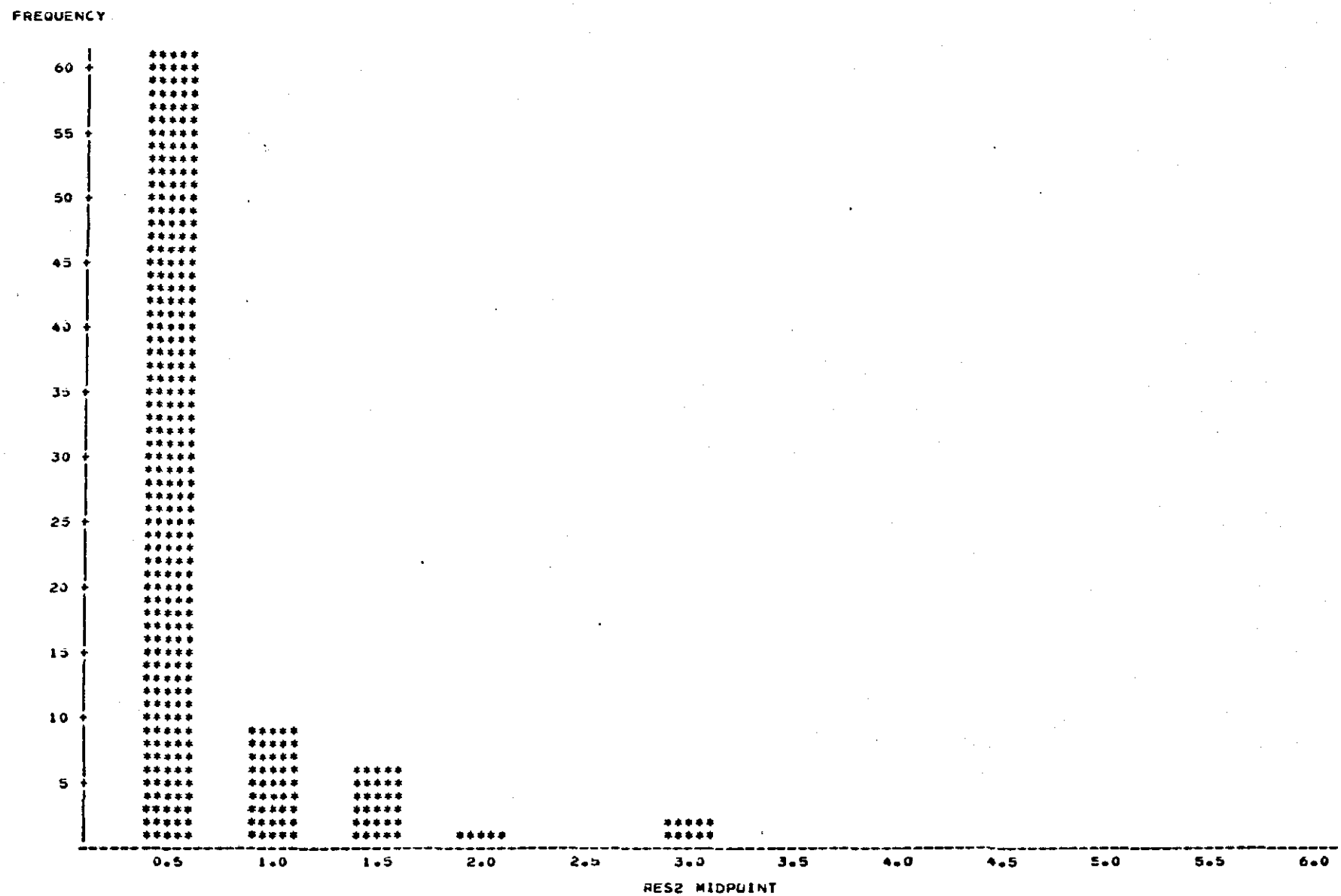
STRENGTH DISTRIBUTION FOR MUDSTONE, DRY WITH GOOD FAILURE

9 2 7 6 8 5 5

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 34
10:12 FRIDAY, AUGUST 7, 1981

LITH=MS MOIS=DRY PARF=PF

FREQUENCY BAR CHART



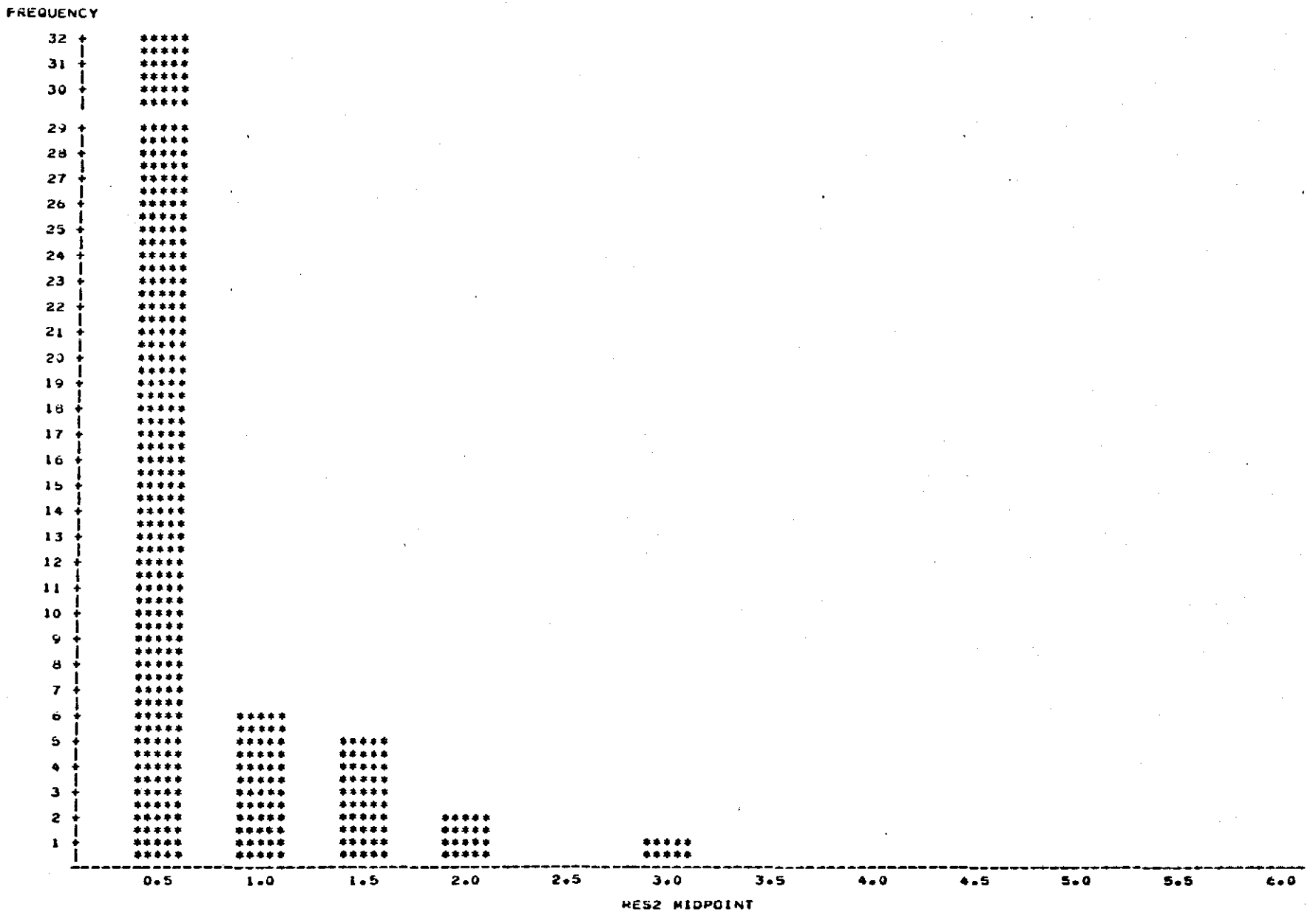
STRENGTH DISTRIBUTION FOR MUDSTONE, DRY WITH PARTIAL FAILURE

8552-1

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 35
10:12 FRIDAY, AUGUST 7, 1981

LITH=MS MOIS=MOIST PARF=NF

FREQUENCY BAR CHART



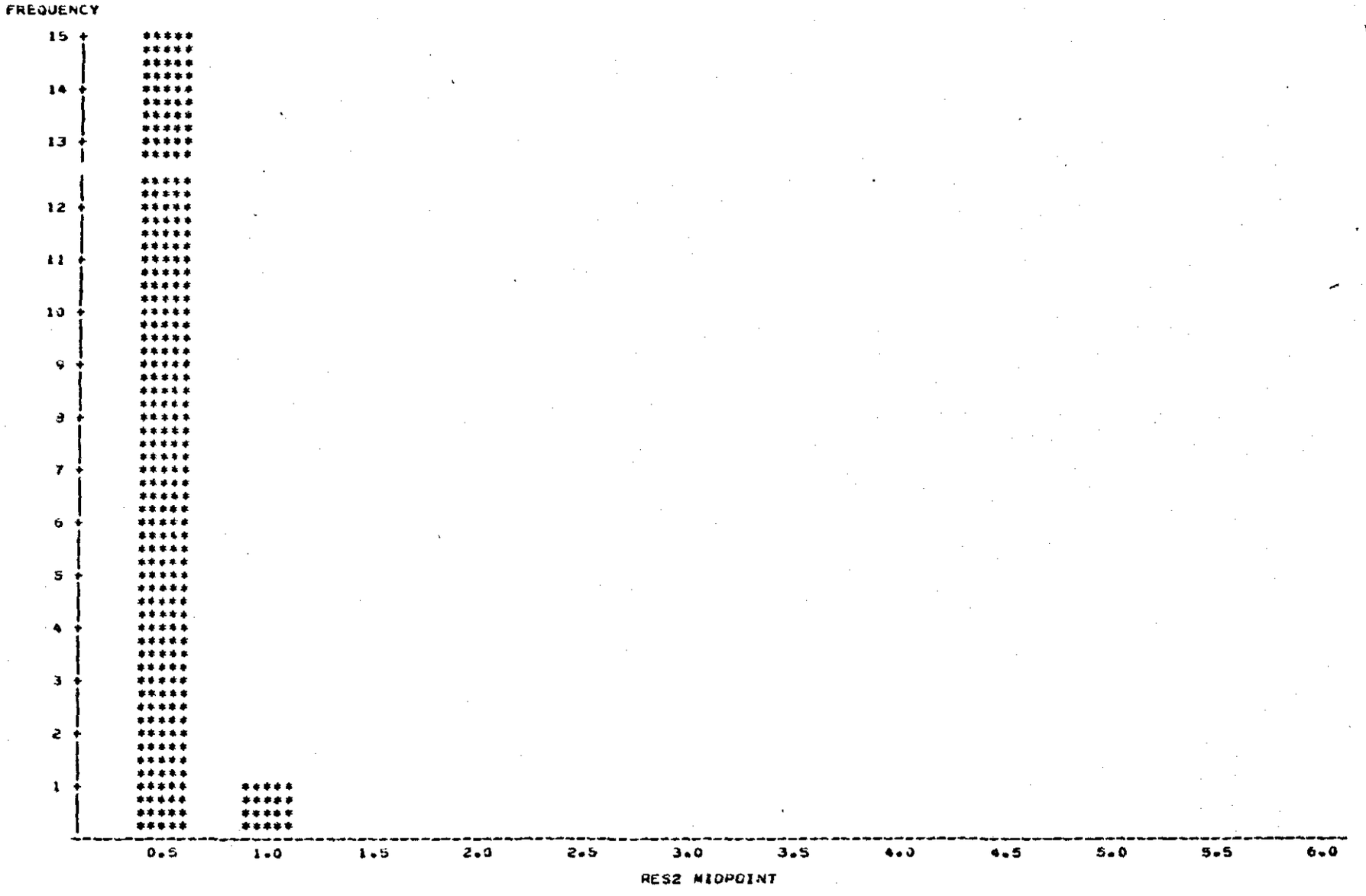
STRENGTH DISTRIBUTION FOR MUDSTONE, MOIST WITH GOOD FAILURE

8 5 5 2 6 3

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 36
10:12 FRIDAY, AUGUST 7, 1981

LITH=MS MOIS=MOIST PARF=PF

FREQUENCY BAR CHART



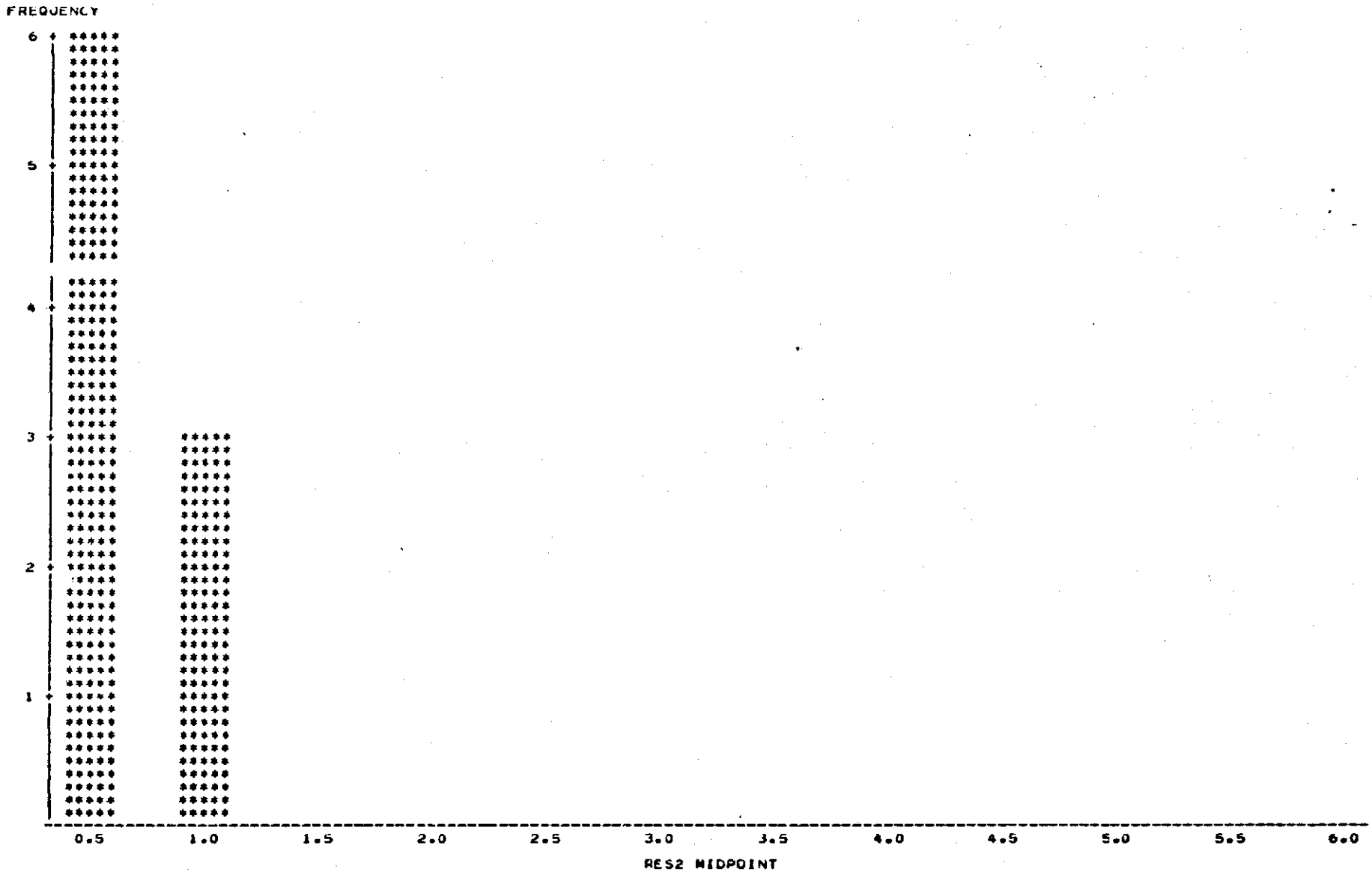
STRENGTH DISTRIBUTION FOR MUDSTONE, MOIST WITH PARTIAL FAILURE

012658

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 37
10:12 FRIDAY, AUGUST 7, 1981

LITH=MS MOIS=WET PARF=NF

FREQUENCY BAR CHART



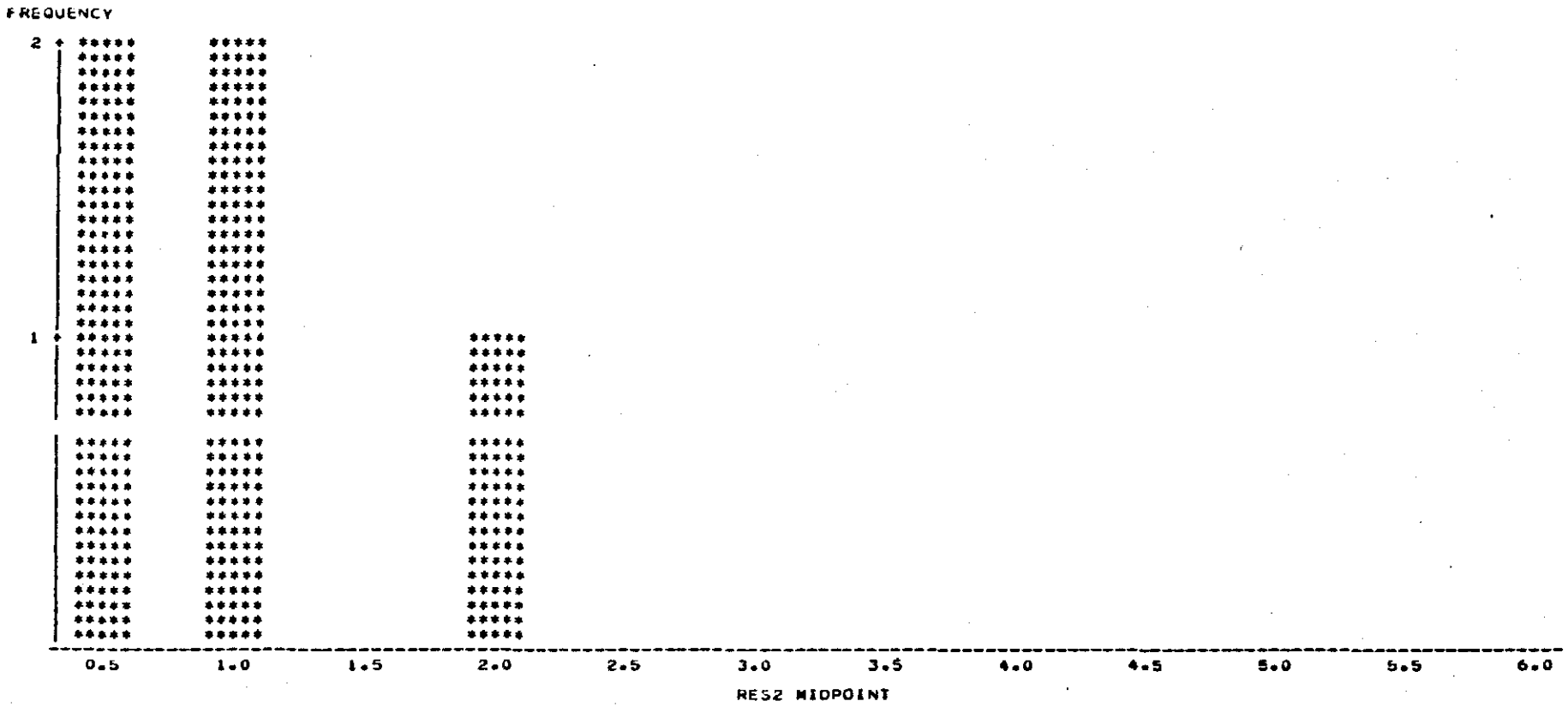
STRENGTH DISTRIBUTION FOR MUDSTONE, WET WITH GOOD FAILURE

0 2 5 5 5 8

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 38
10:12 FRIDAY, AUGUST 7, 1981.

LITH=MS MOIS=WET PARF=PF

FREQUENCY BAR CHART



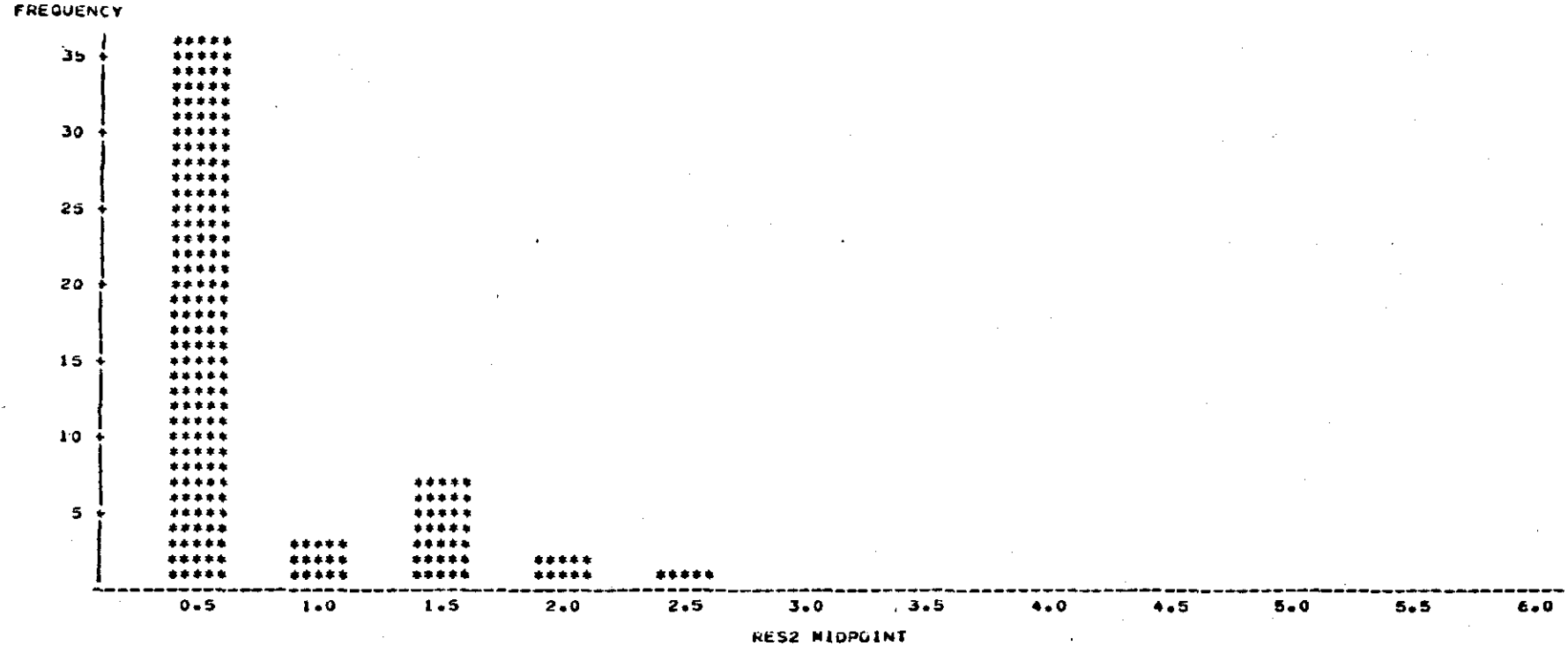
STRENGTH DISTRIBUTION FOR MUDSTONE, WET WITH PARTIAL FAILURE

8552551

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 39
10:12 FRIDAY, AUGUST 7, 1981

LITH=SI MOIS=DRY PARF=NF

FREQUENCY BAR CHART



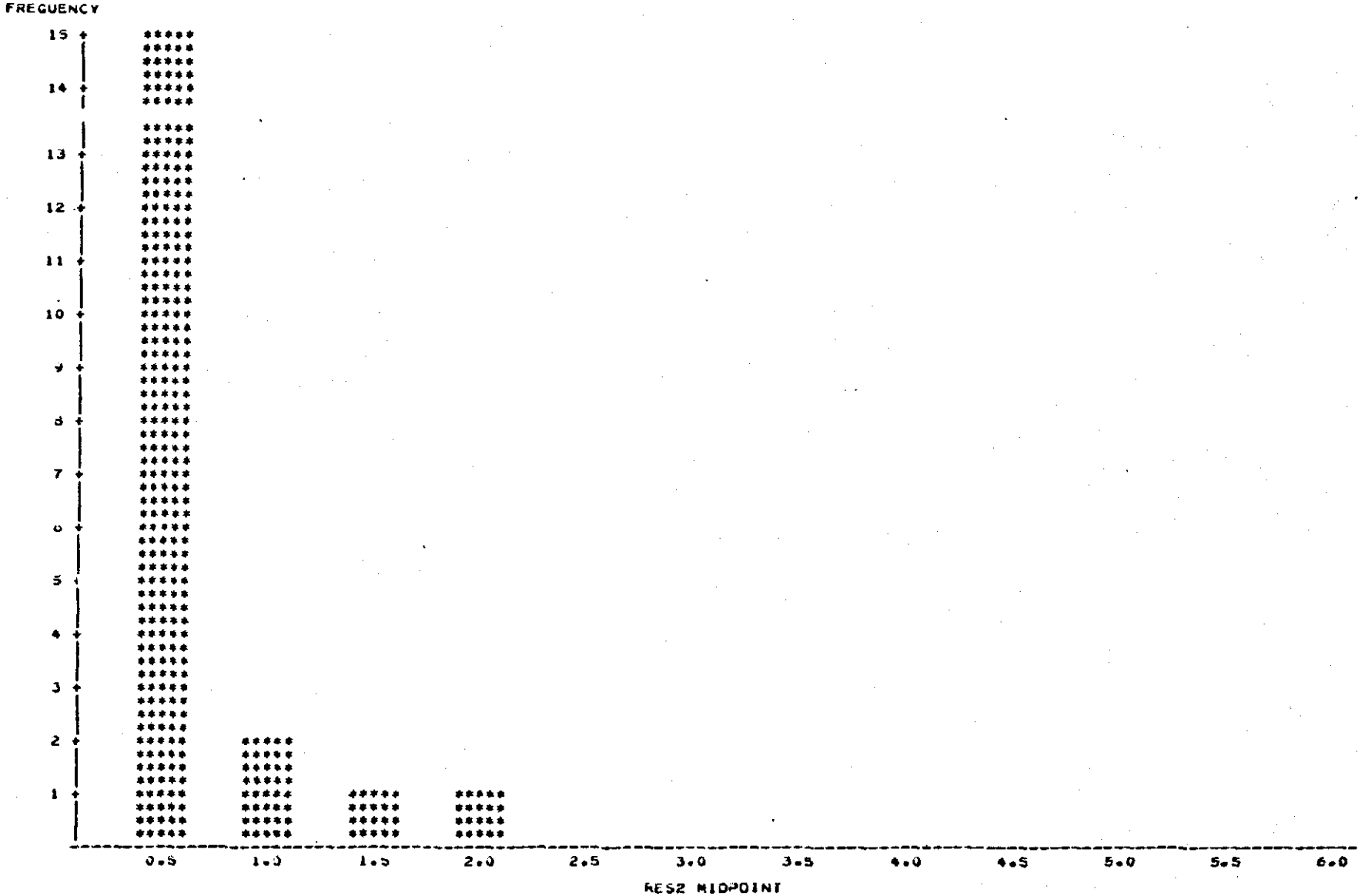
STRENGTH DISTRIBUTION FOR SILTSTONE, DRY WITH GOOD FAILURE

8555252

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT RUCK, MOISTURE AND FAILURE COMBINATIONS 40
10:12 FRIDAY, AUGUST 7, 1981

LITH=SI MOIS=DRY PARF=PF

FREQUENCY BAR CHART



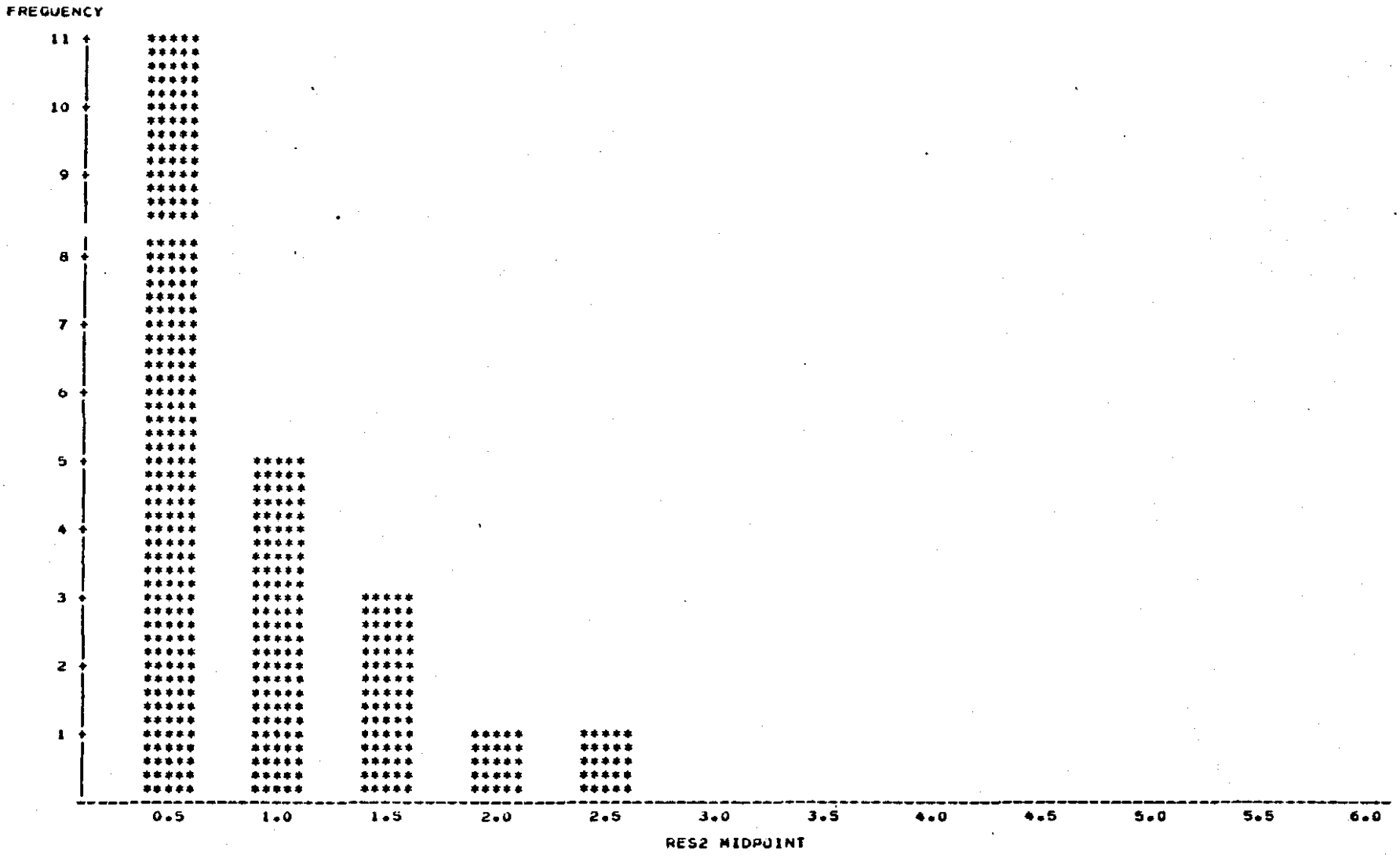
STRENGTH DISTRIBUTION FOR SILTSTONE, DRY WITH PARTIAL FAILURE

8552252

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 41
10:12 FRIDAY, AUGUST 7, 1981

LITH=SI MOIS=MOIST FAIL=NF

FREQUENCY BAR CHART



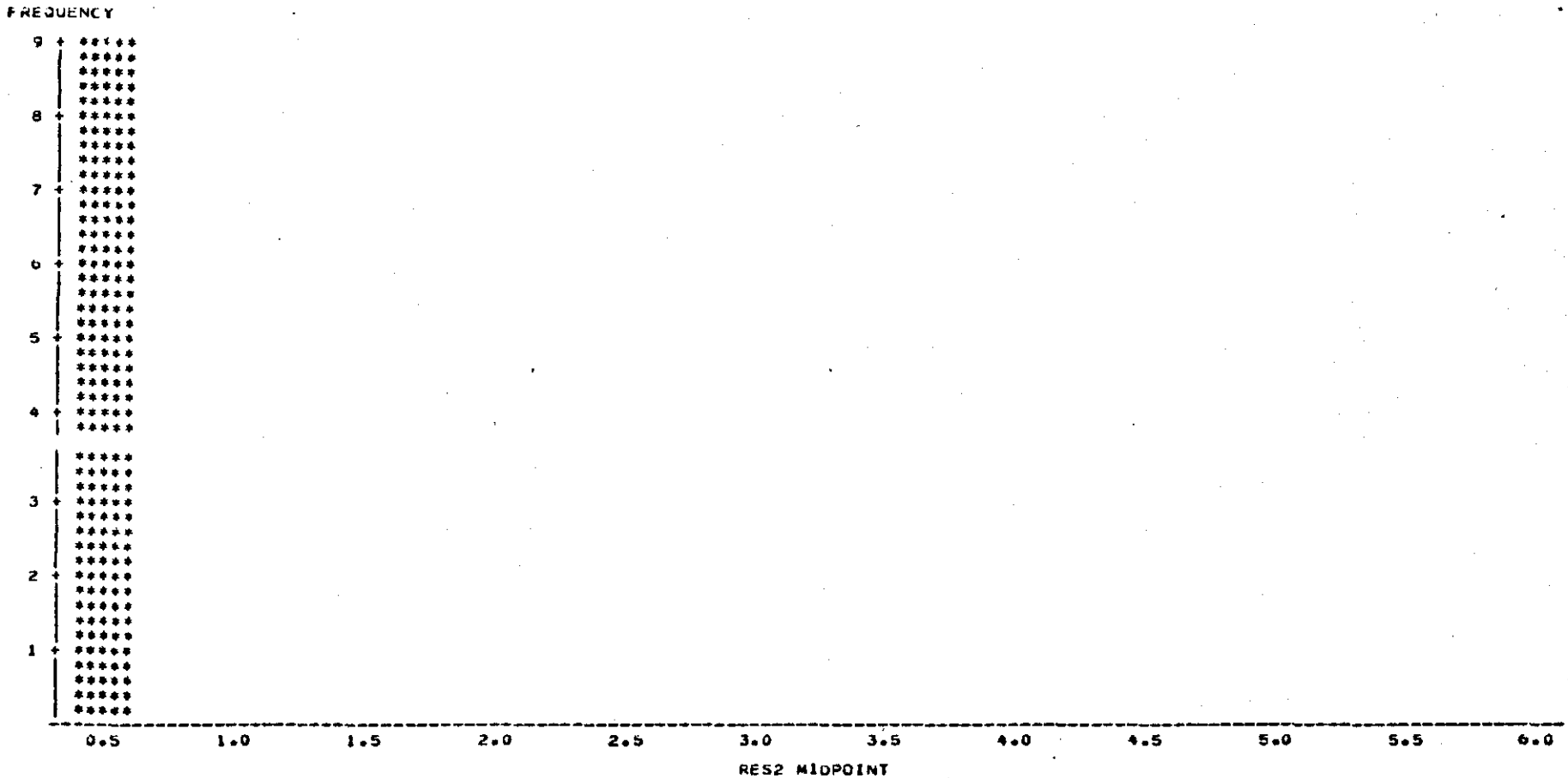
STRENGTH DISTRIBUTION FOR SILTSTONE, MOIST WITH GOOD FAILURE

ACSC 8525

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 42
10:12 FRIDAY, AUGUST 7, 1981

LITH=SI MOIS=MOIST PARF=PF

FREQUENCY BAR CHART



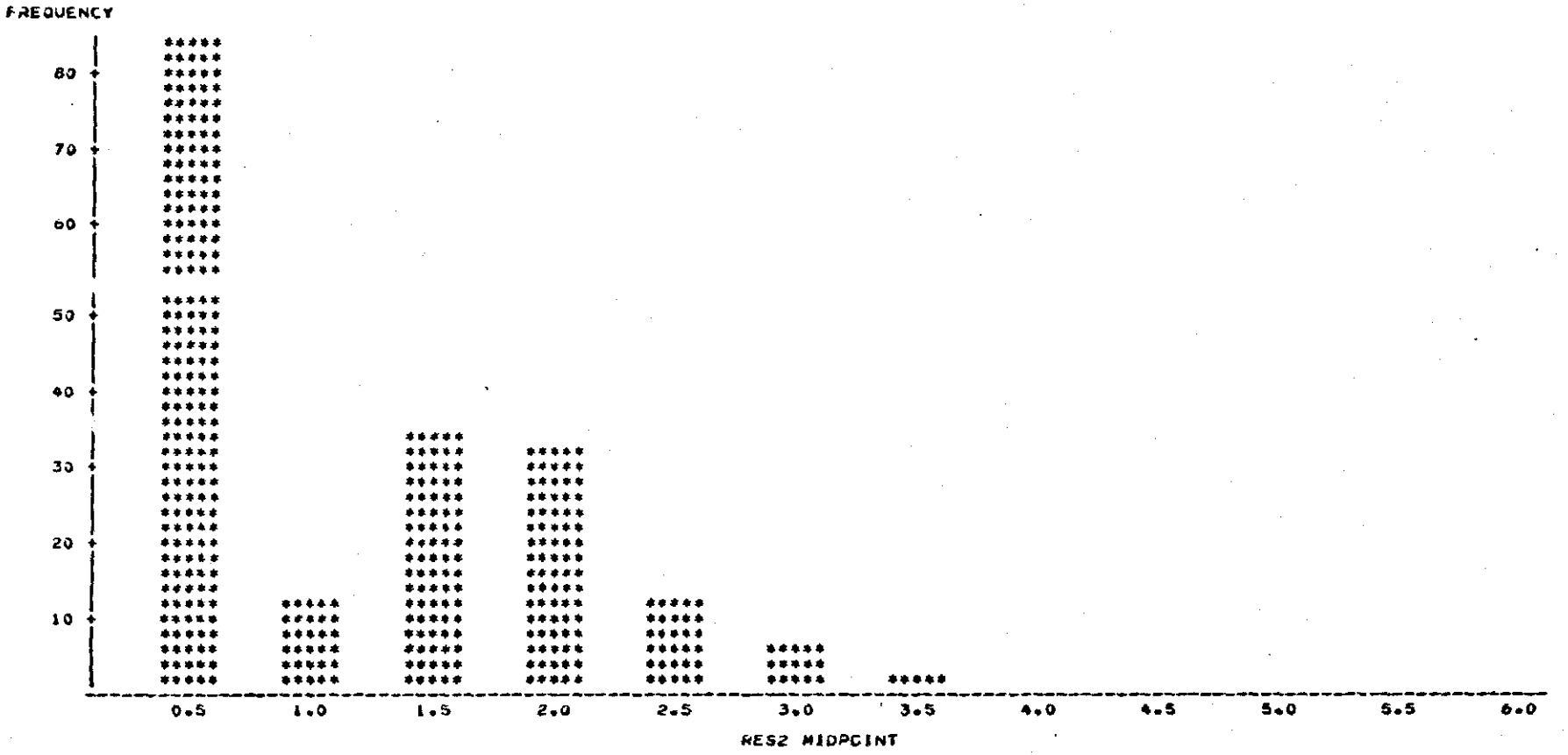
STRENGTH DISTRIBUTION FOR SILTSTONE, MOIST WITH PARTIAL FAILURE

8 5 5 2 5 3

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 45
10:12 FRIDAY, AUGUST 7, 1981

LITH=SS MOIS=DRY PARF=NF

FREQUENCY BAR CHART



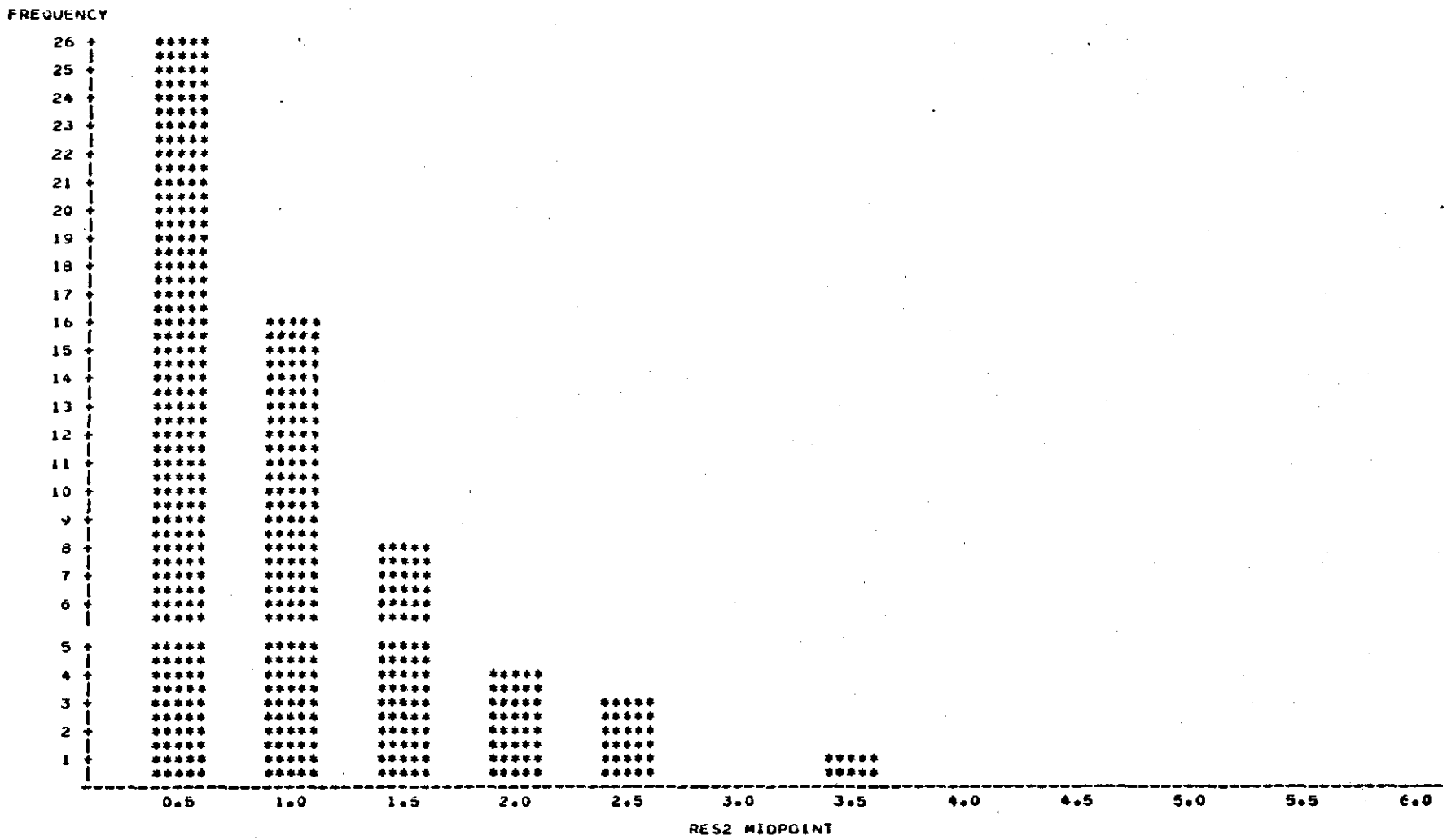
STRENGTH DISTRIBUTION FOR SANDSTONE, DRY WITH GOOD FAILURE

8 5 5 2 9 5 6

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 46
10:12 FRIDAY, AUGUST 7, 1981

LITH=SS MOIS=DRY PARF=PF

FREQUENCY BAR CHART



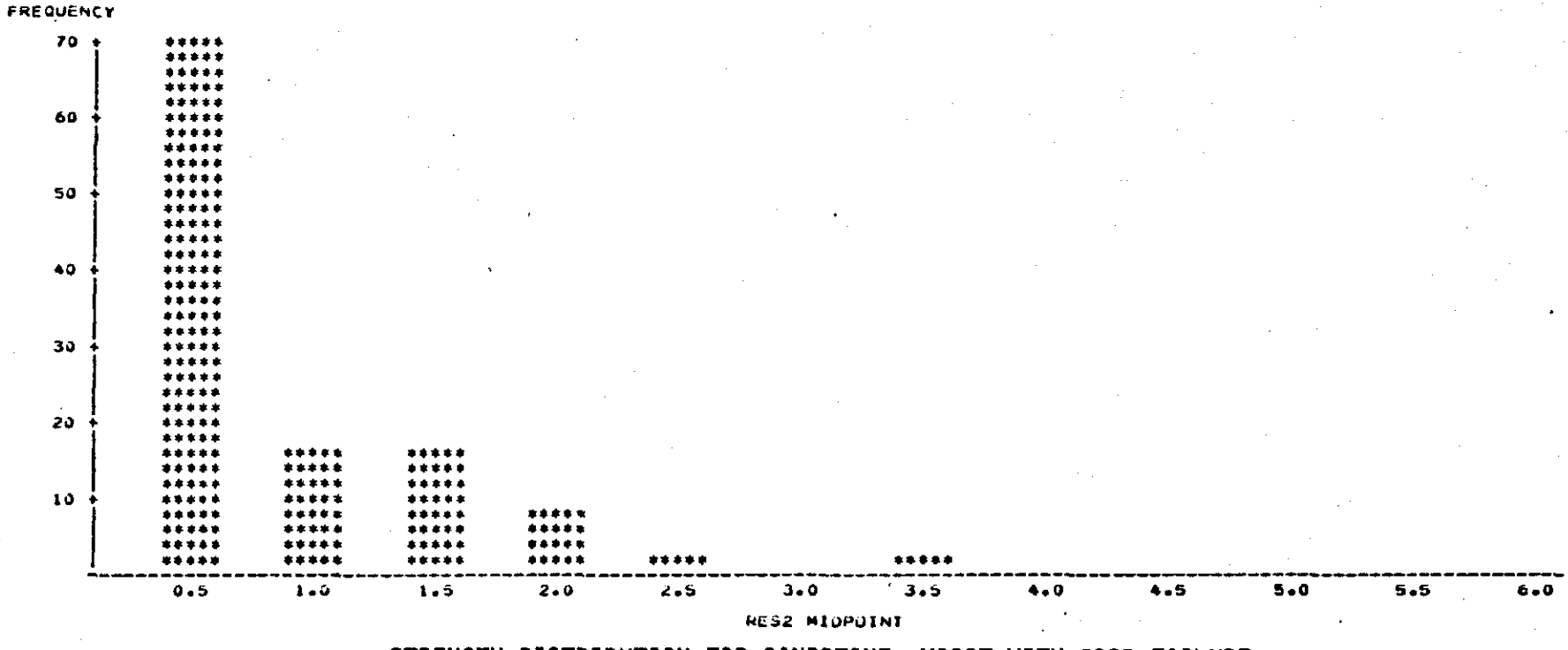
STRENGTH DISTRIBUTION FOR SANDSTONE, DRY WITH PARTIAL FAILURE

8 5 5 2 5 5 -1

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 47
10:12 FRIDAY, AUGUST 7, 1981

LITH=SS MOIS=MOIST PARF=NF

FREQUENCY BAR CHART



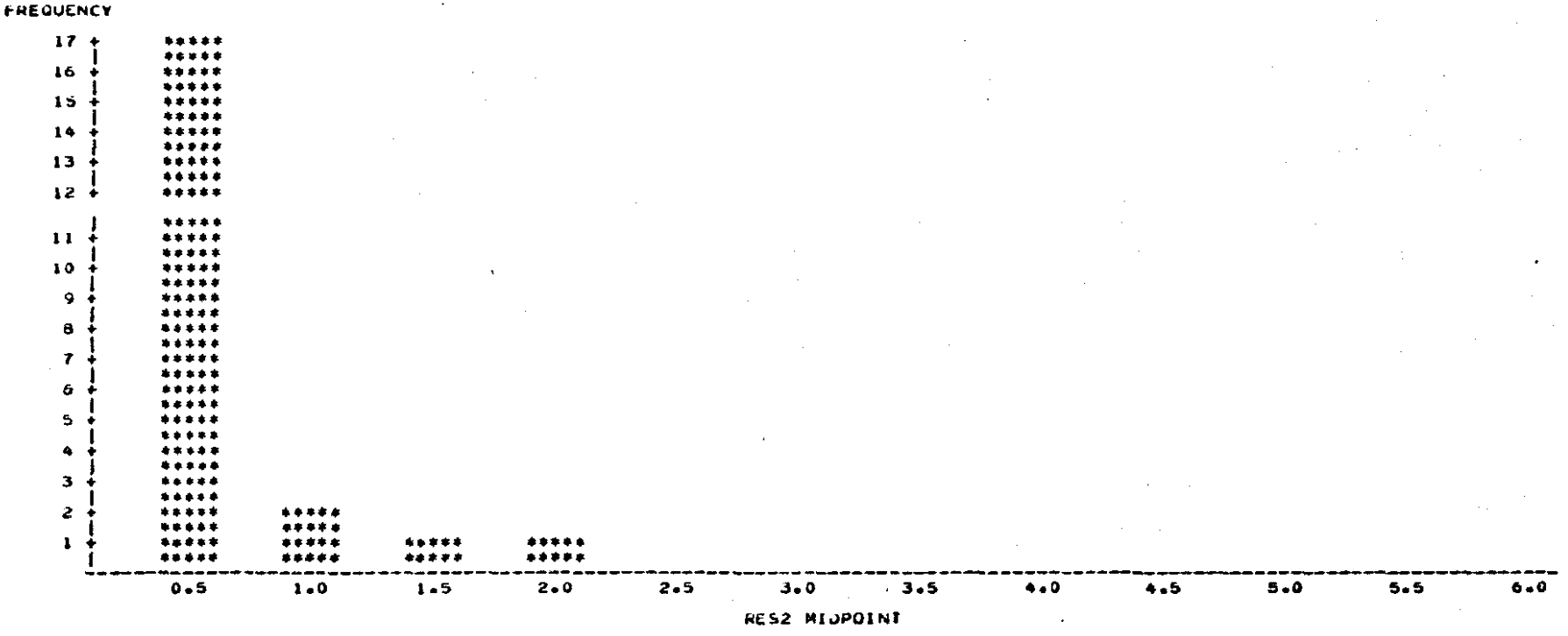
STRENGTH DISTRIBUTION FOR SANDSTONE, MOIST WITH GOOD FAILURE

8052

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 48
10:12 FRIDAY, AUGUST 7, 1981

LITH=SS MOIS=MOIST PARF=PF

FREQUENCY BAR CHART



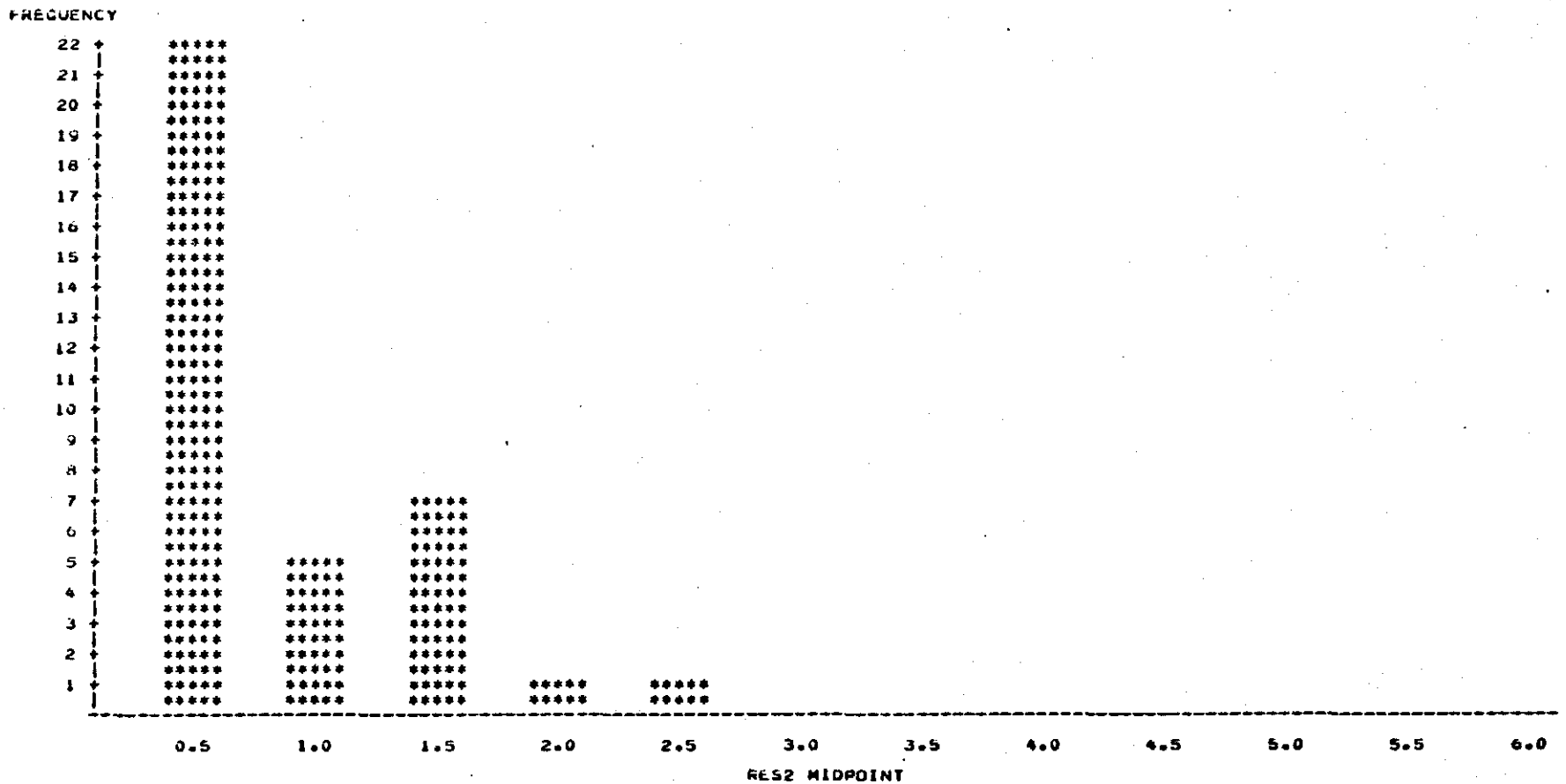
STRENGTH DISTRIBUTION FOR SANDSTONE, MOIST WITH PARTIAL FAILURE

8552959

HISTOGRAM: FREQUENCY OF RESULT 2 FOR DIFFERENT ROCK, MOISTURE AND FAILURE COMBINATIONS 49
10:12 FRIDAY, AUGUST 7, 1981

LITH=SS MOIS=WET PARF=NF

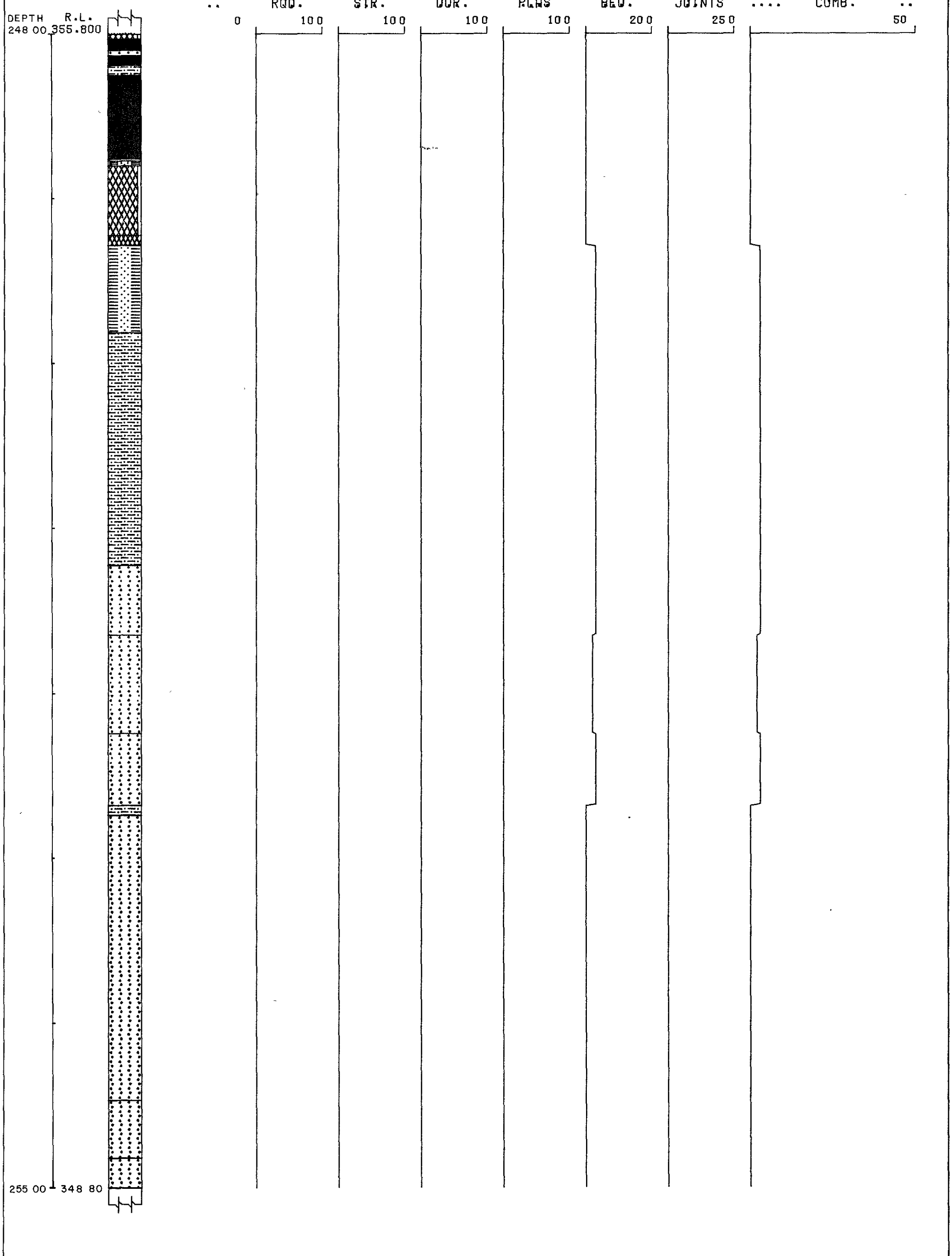
FREQUENCY BAR CHART



STRENGTH DISTRIBUTION FOR SANDSTONE, WET WITH GOOD FAILURE

0 9 2 6 0 8 5 5

GY 24



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855261

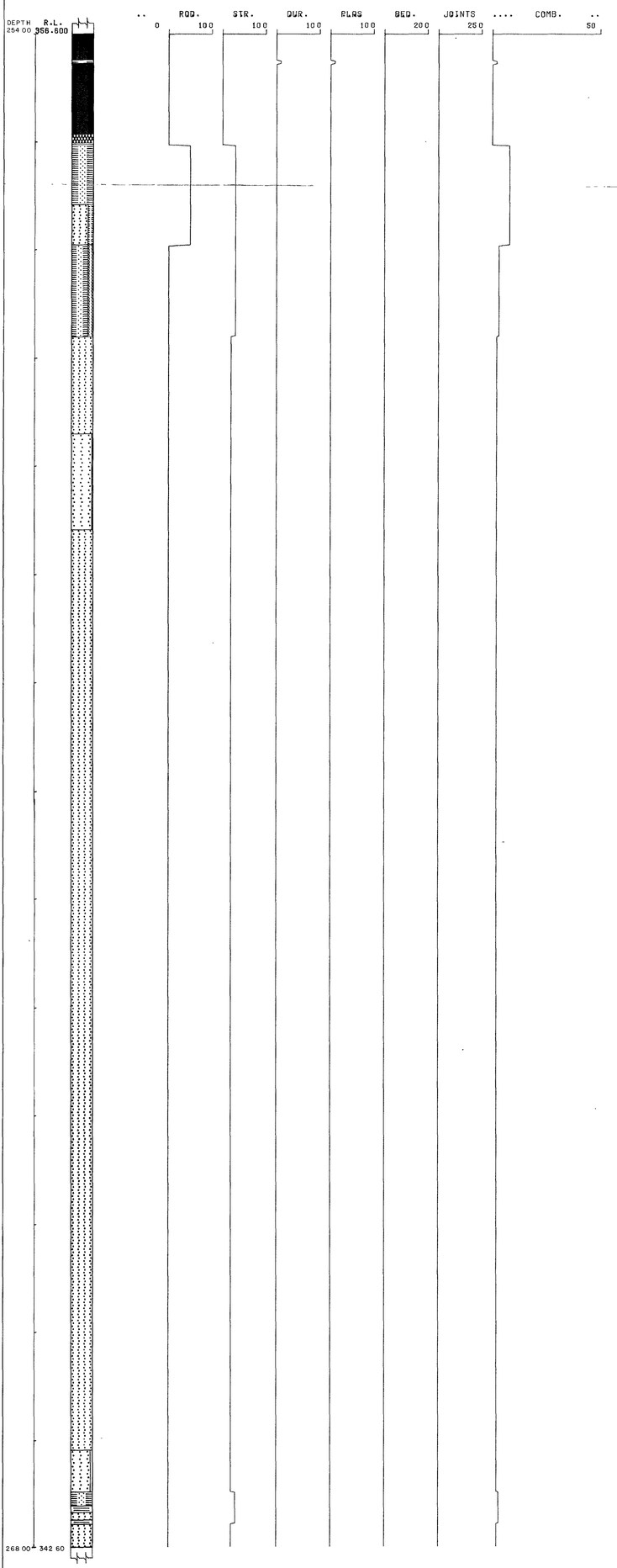
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS. — E L 5/61
TASMANIA

GY 24 LII FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl. 2/1
REPORT NO: CEPR 11/81	DRAWING NO: 2177	

GY 26



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5cm

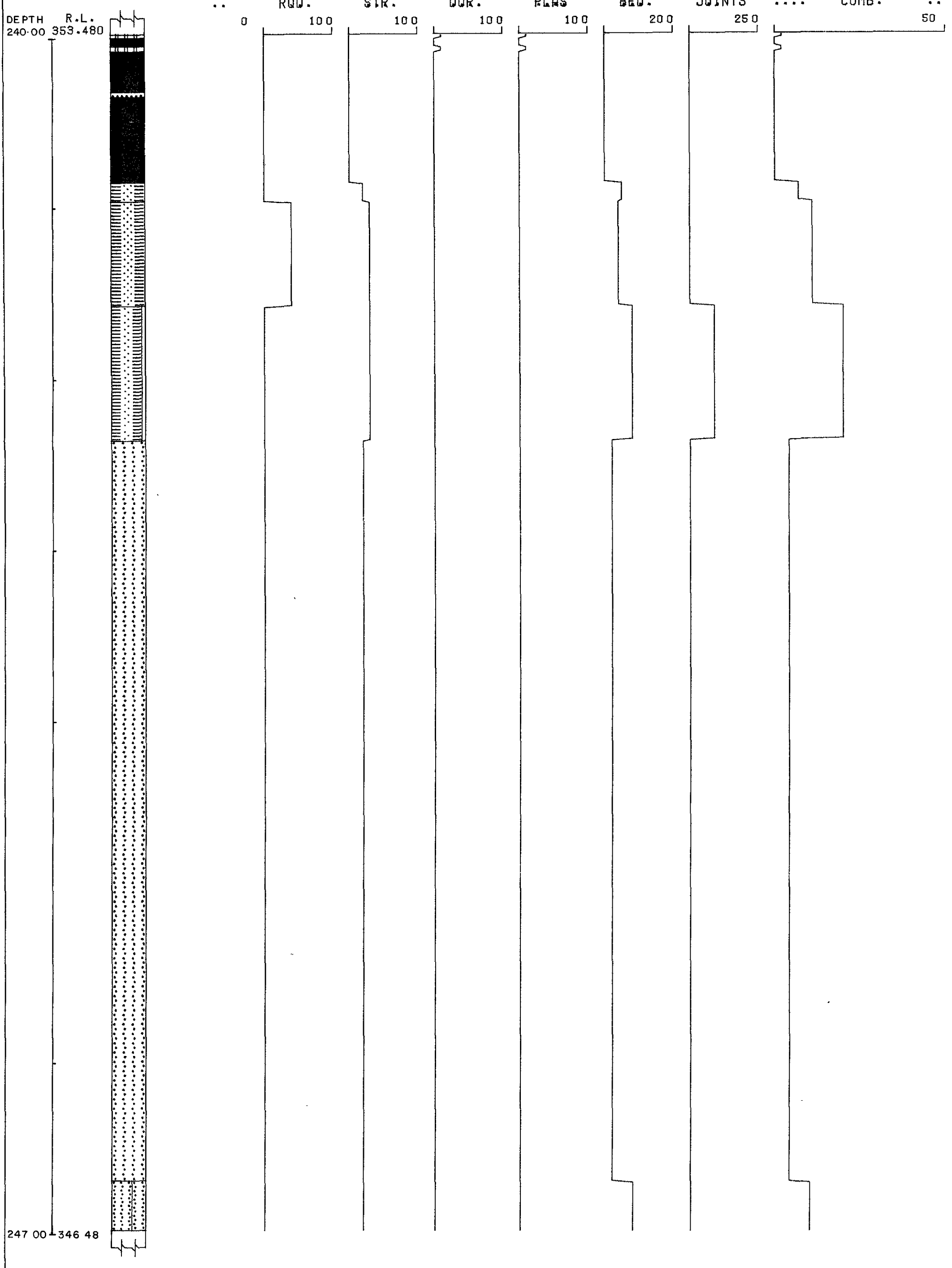
855262

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E L 5/61
TASMANIA
GY 26 L II FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl. 2/2
REPORT NO: CEPR 11/81	DRAWING NO: 2178	

GY 28



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855263

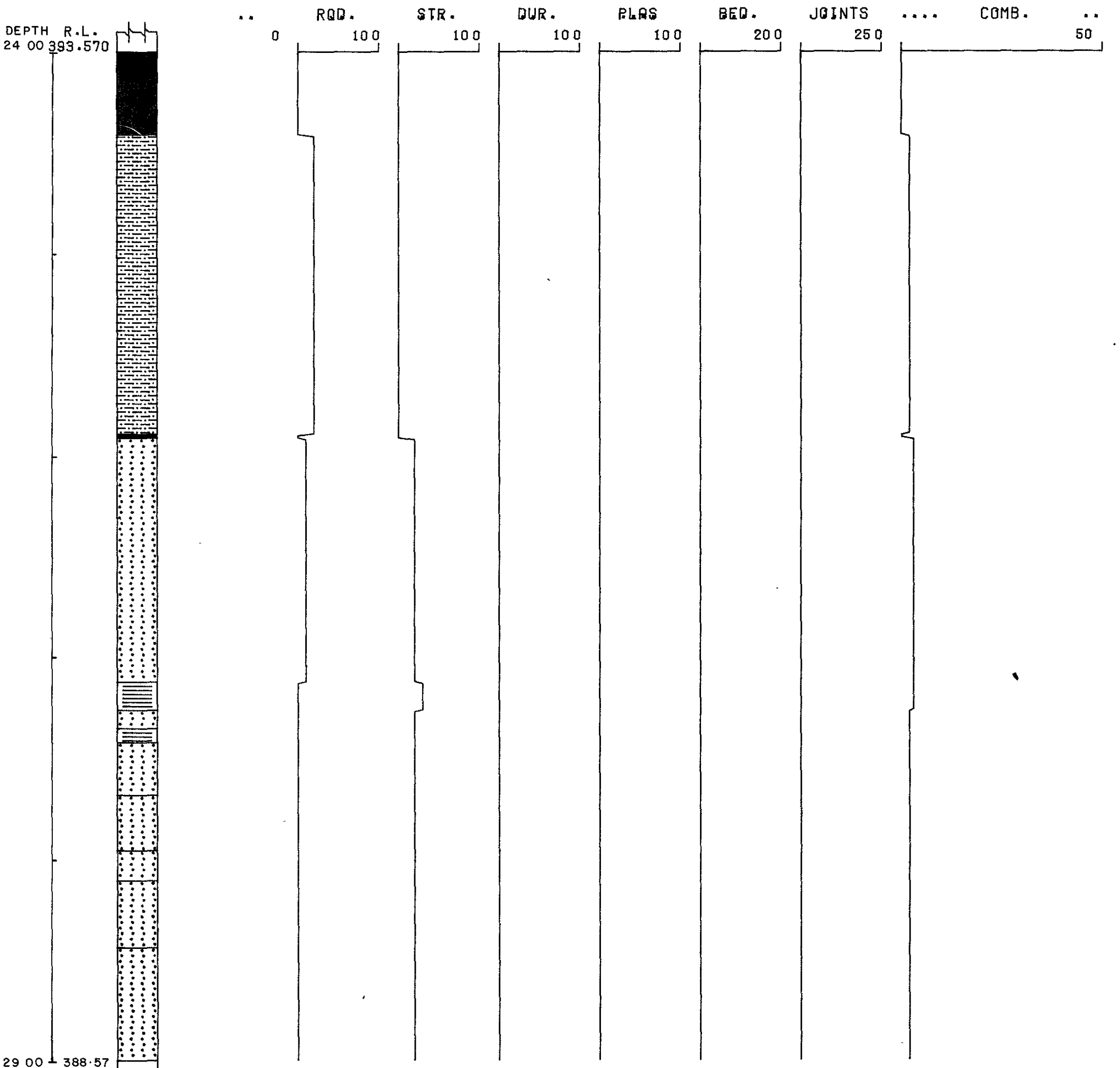
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E L 5/61
TASMANIA

GY 28 L II FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl. 2/3
REPORT NO: CEPR 11/81	DRAWING NO: 2179	

GY 31



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855264

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

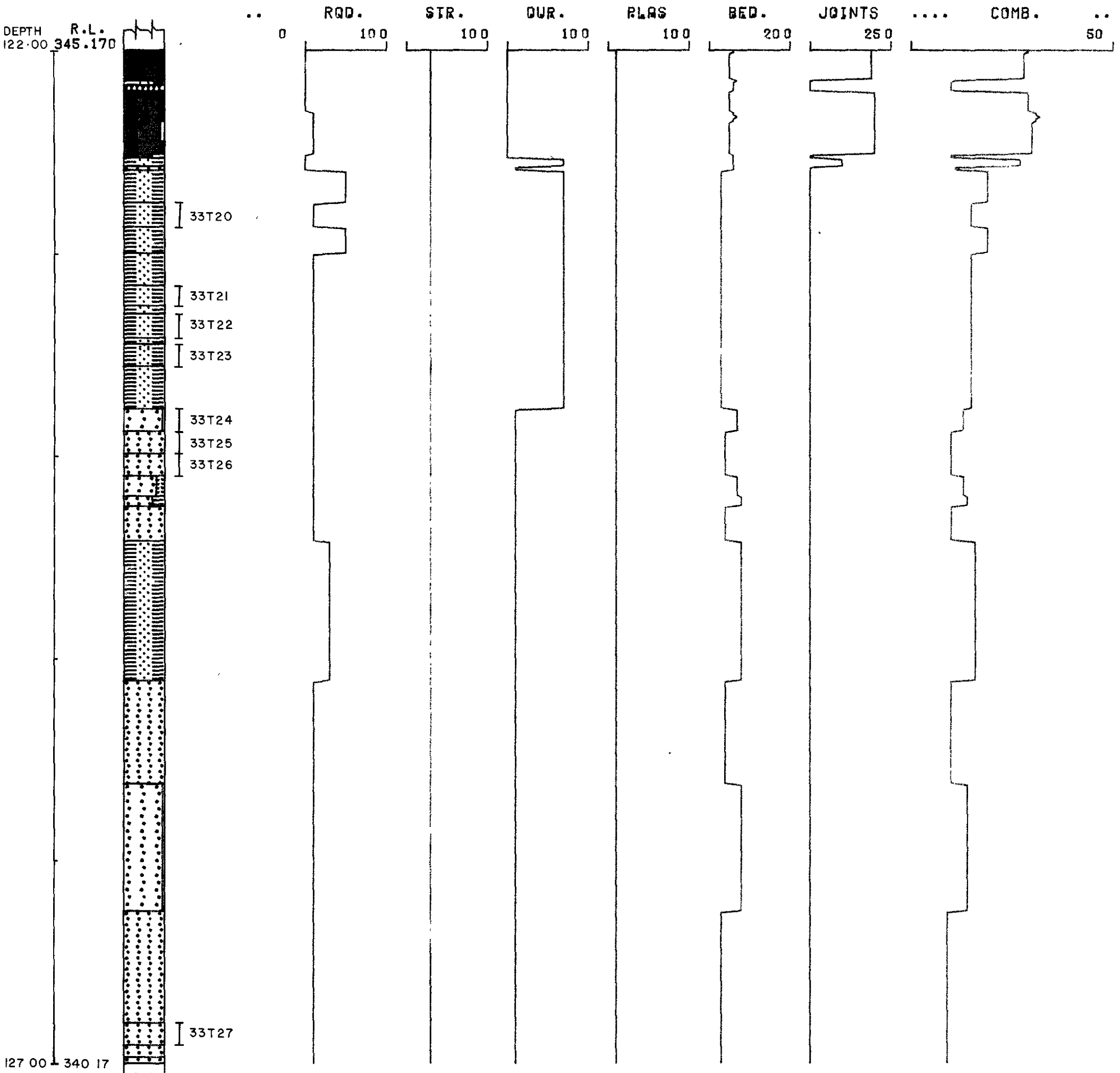
MT NICHOLAS — E L 5/61
TASMANIA

GY 31 LII FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981
REPORT NO: CEPR 11/81	DRAWING NO: 2180

Encl. 2/4

GY 33



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855265

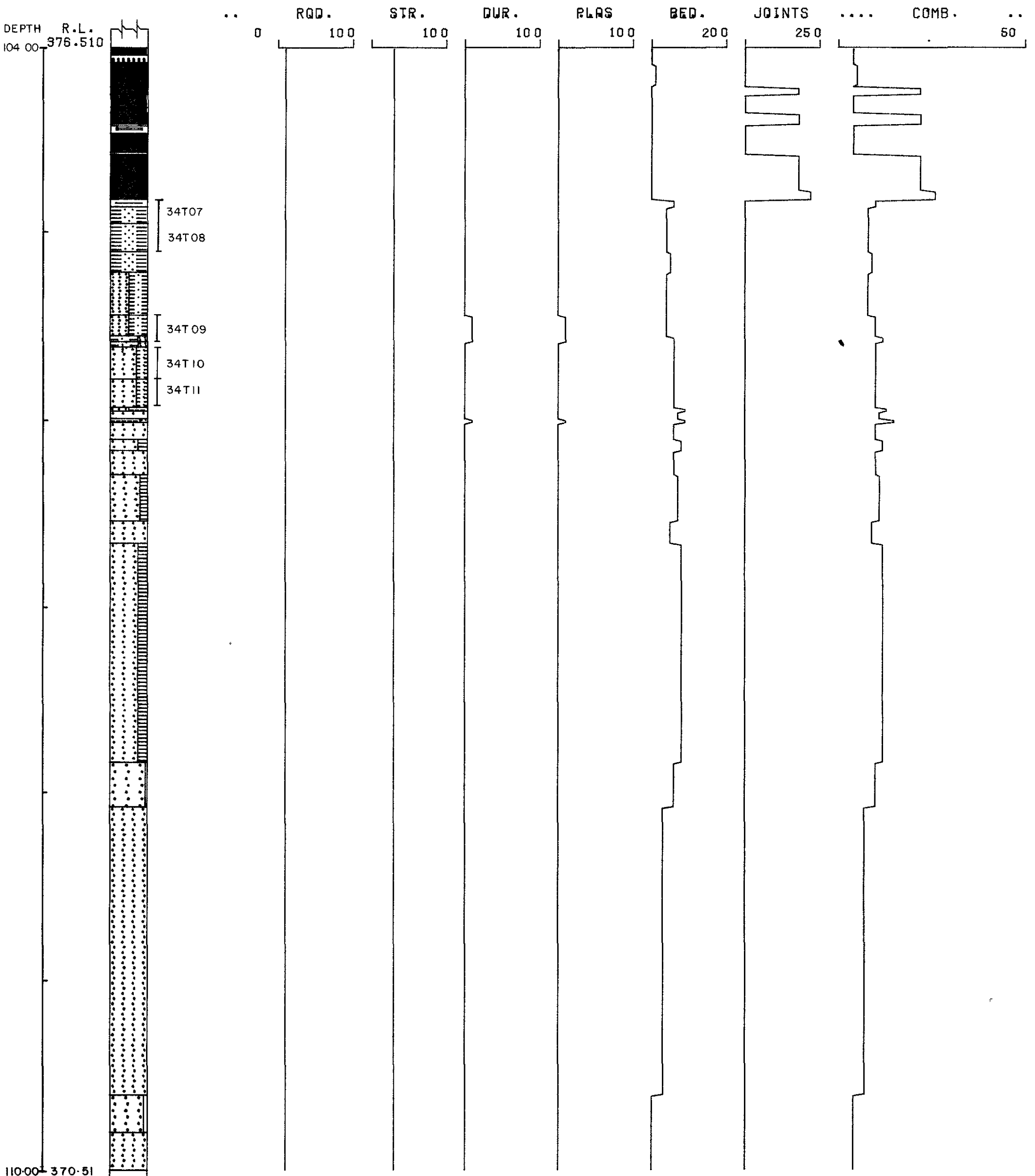
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E L 5/61
TASMANIA

GY 33 LII FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl. 2/5
REPORT NO: CEPR 11/81	DRAWING NO: 2181	

GY 34



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855266

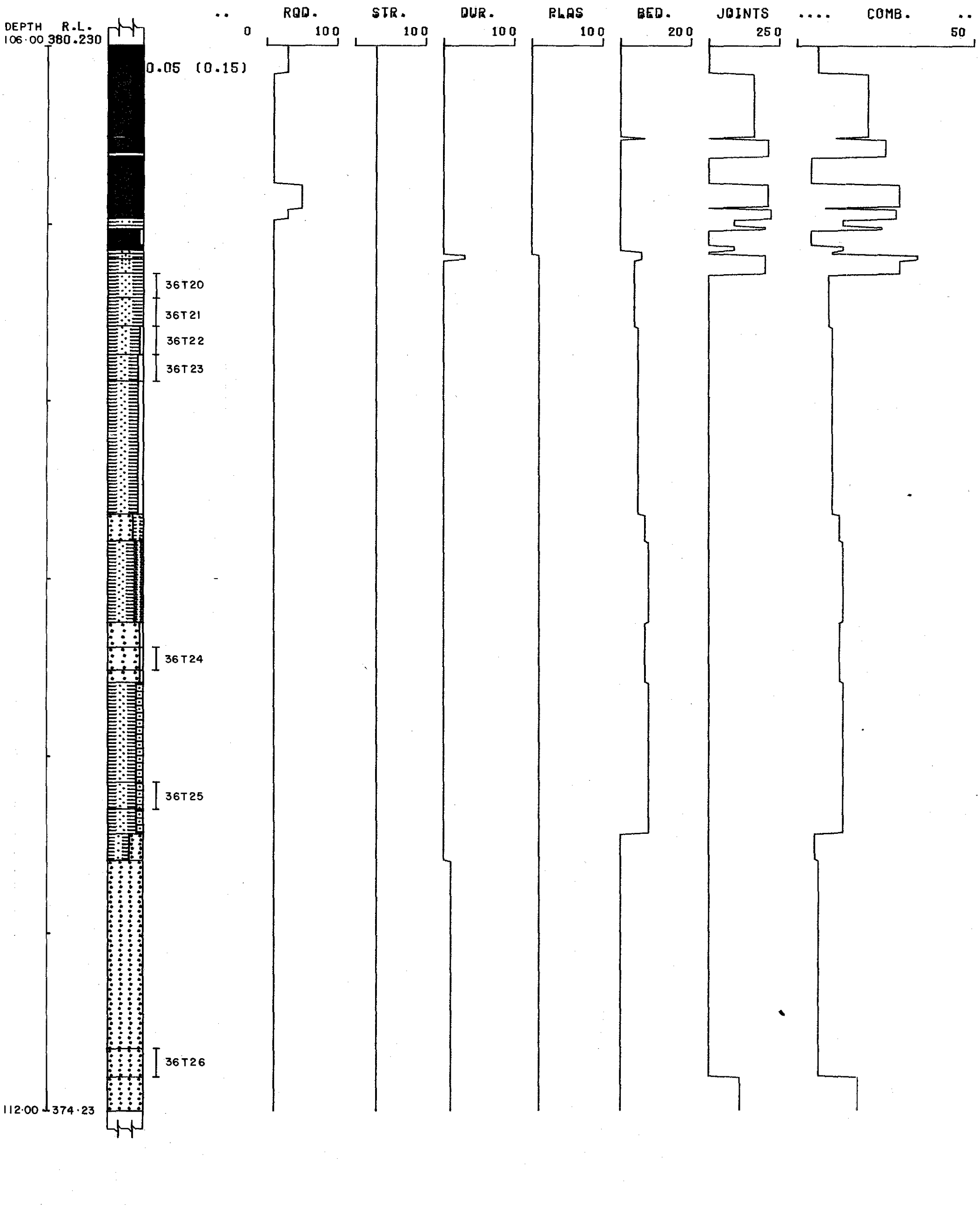
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E L.5/61
TASMANIA

GY 34 LII FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl. 2/6
REPORT N.: CEPR 11/81	DRAWING NO: 2182	

36 GY



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855267

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

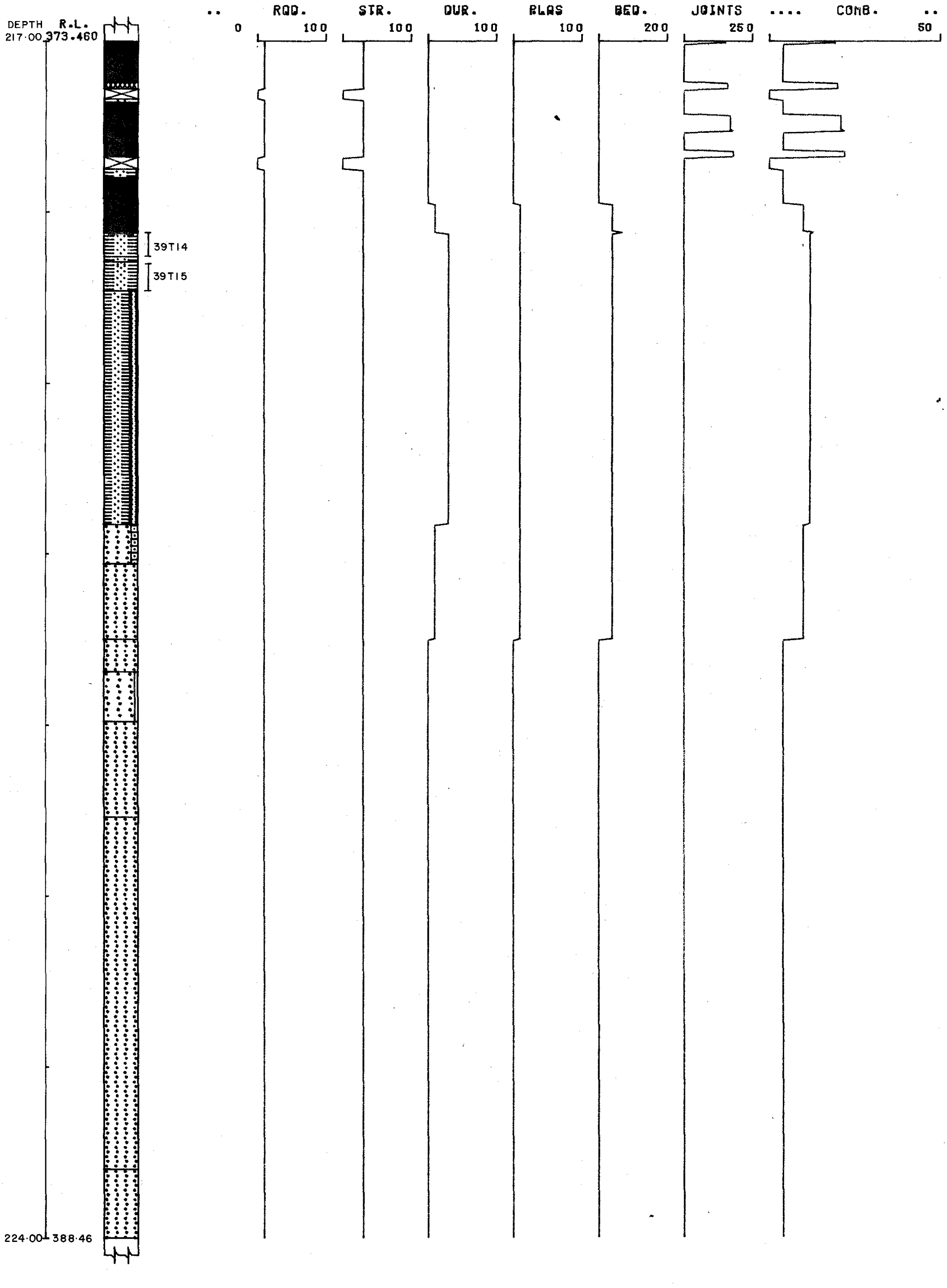
MT. NICHOLAS — E.L.5/61

TASMANIA

GY 36 LII FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl. 2/7
REPORT NO: CEPR 11/81	DRAWING NO: 2183	

39 GY



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

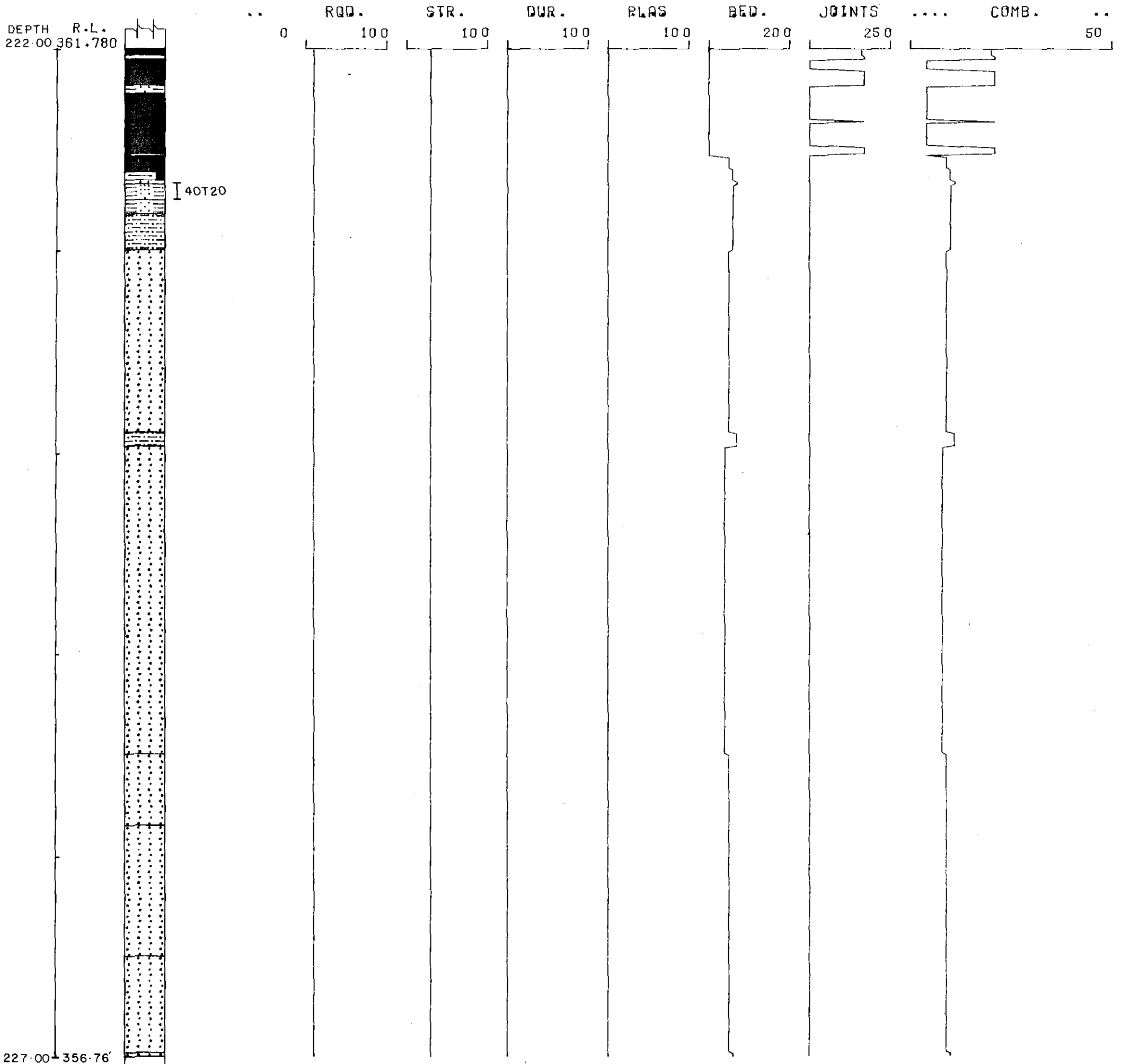
855268

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA
L II FLOOR GY39
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl. 2/8
REPORT NO: CEPR 11/81	DRAWING NO: 2184	

40 GY



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855269

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT. NICHOLAS — E.L 5/61

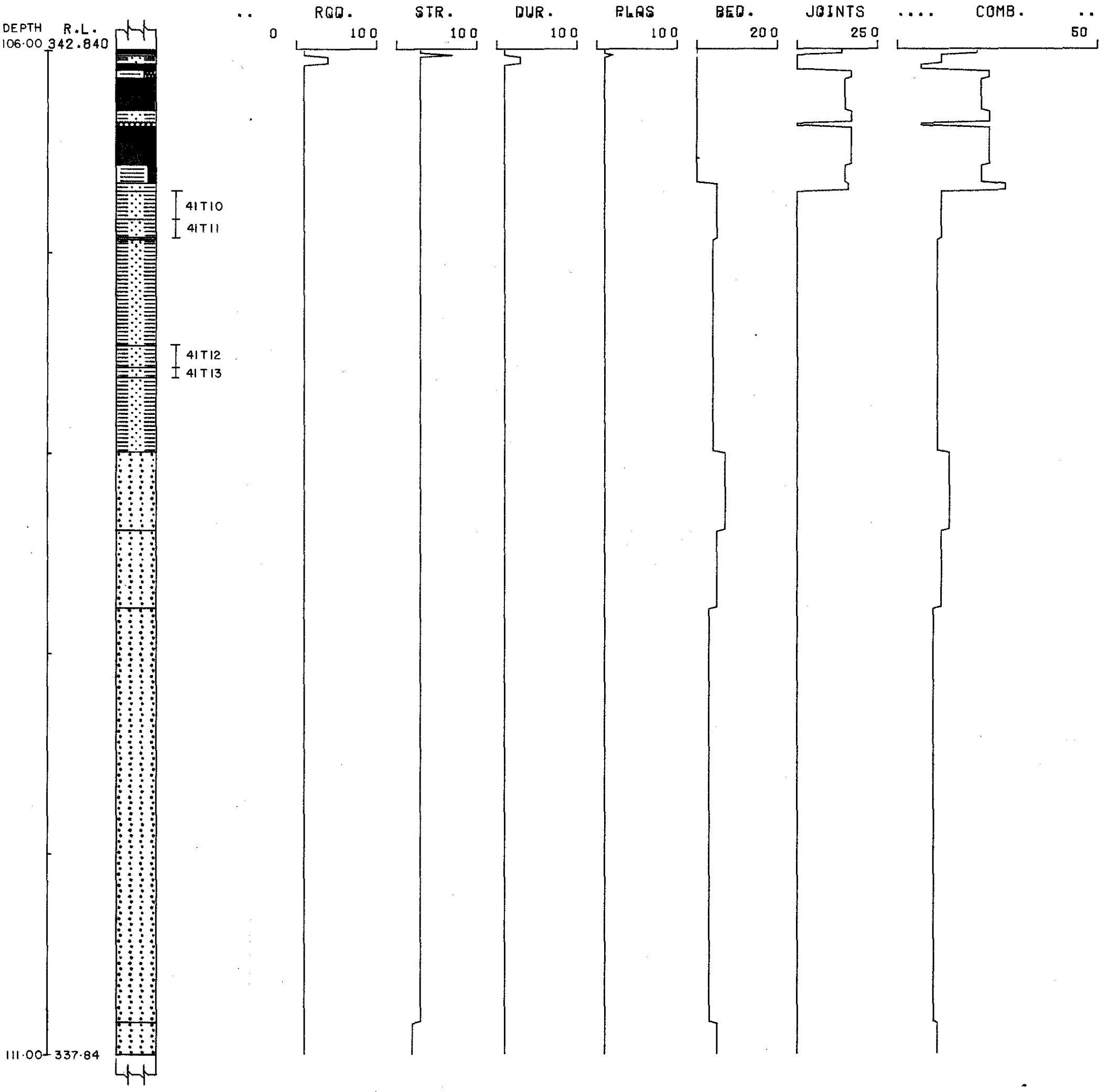
TASMANIA

GY 40 LII FLOOR

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl. 2/9
REPORT NO: CEPR 11/81	DRAWING NO: 2185	

41 GY



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855270

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT. NICHOLAS — E.L.5/61

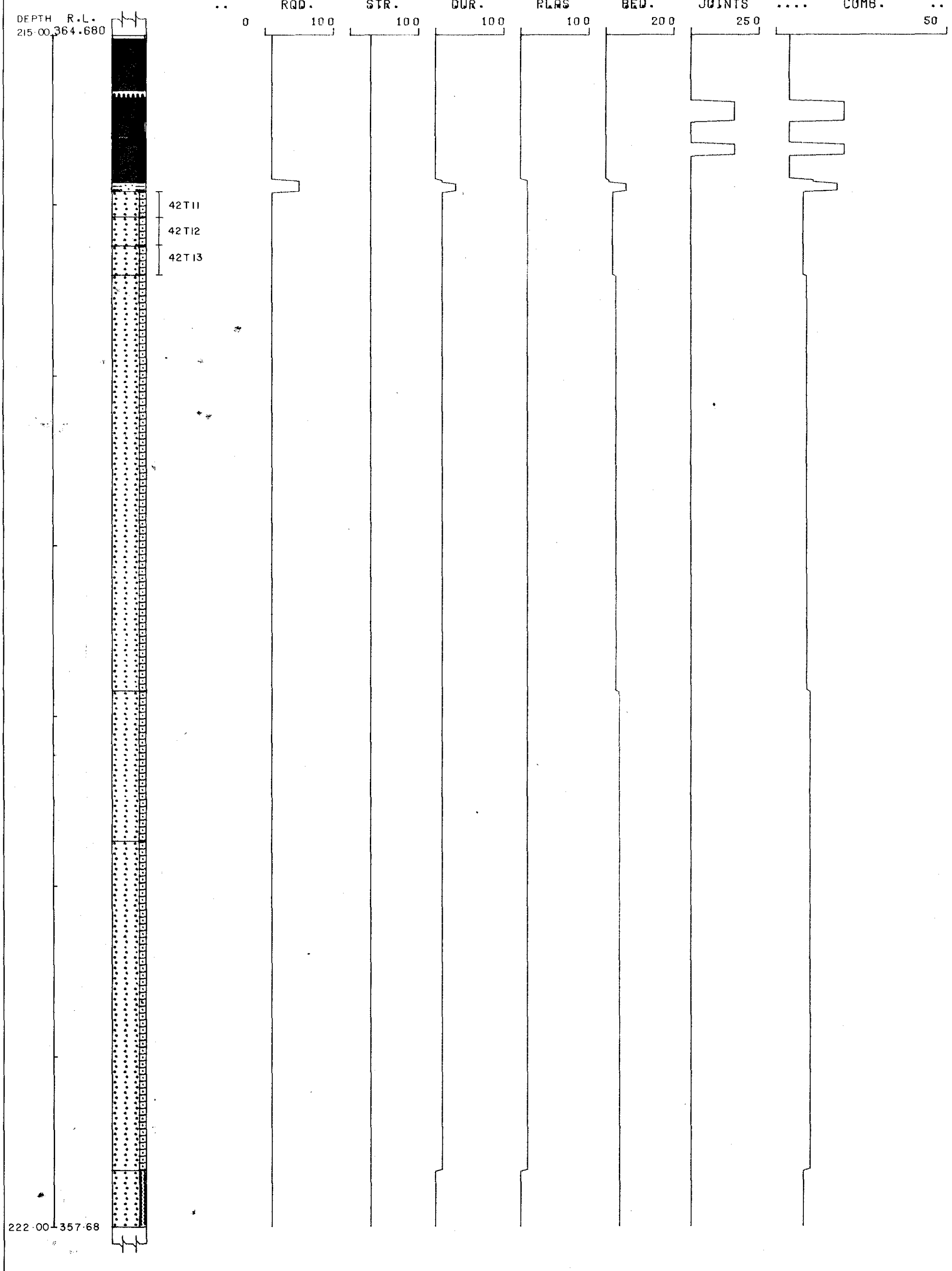
TASMANIA

LII FLOOR GY41

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/10
REPORT NO: CEPR 11/81	DRAWING NO: 2186	

42 GY



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

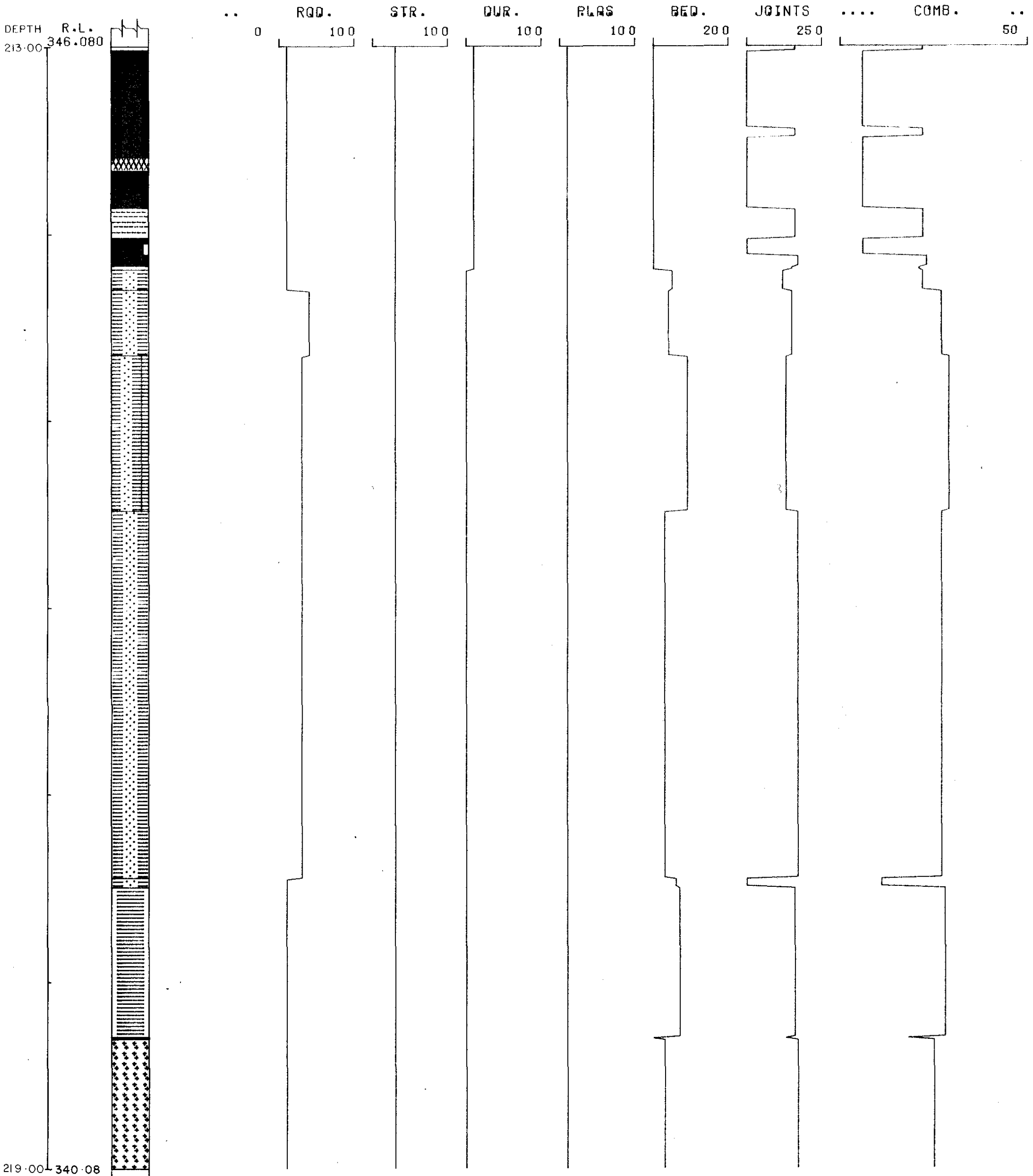
855271

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA
GY 42 LII FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl. 2/11
REPORT NO: CEPR 11/81	DRAWING NO: 2187 ·	

43 GY



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855272

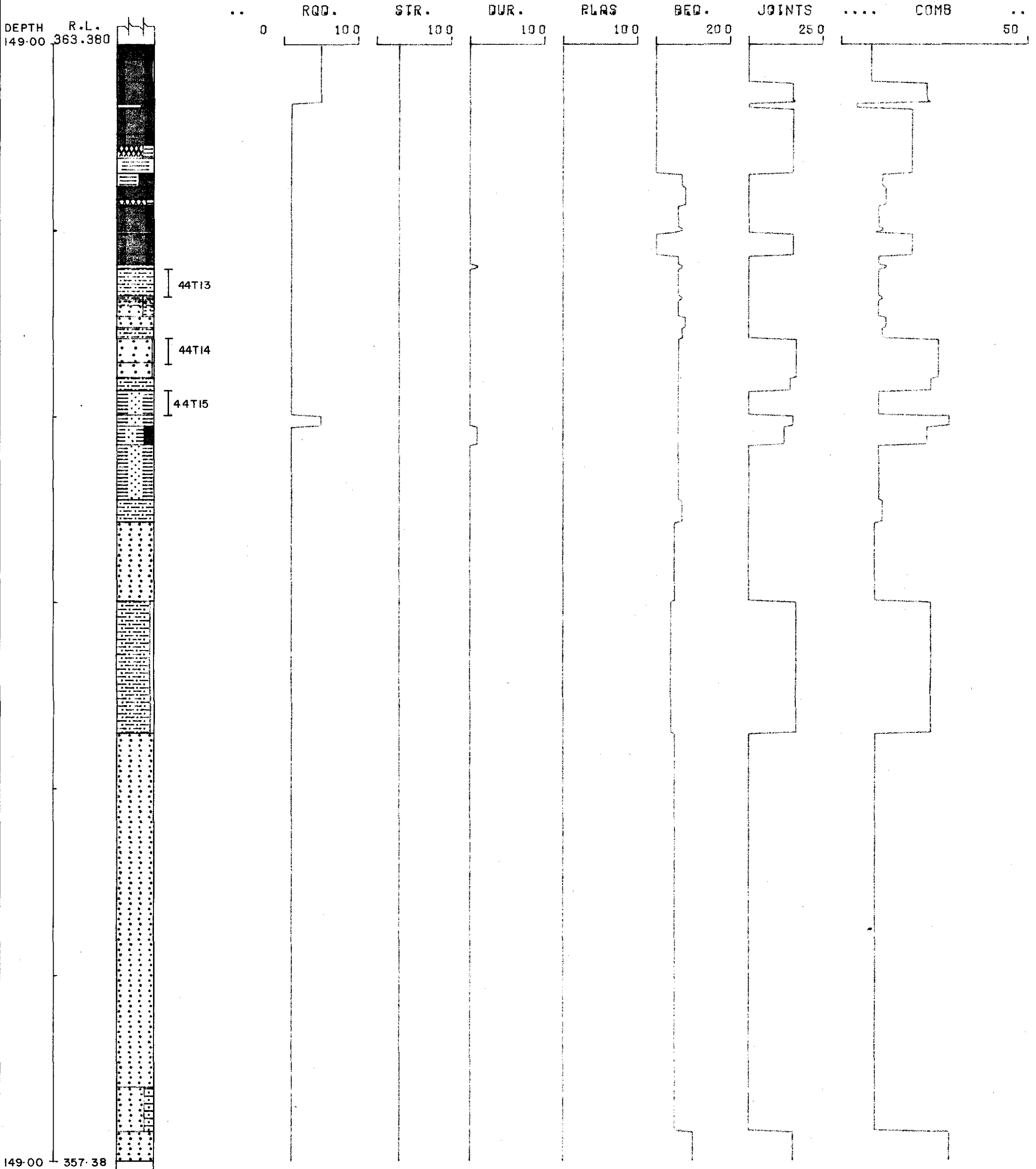
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA

GY 43 LII FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/12
REPORT NO: CEPR 11/81	DRAWING NO: 2188	

GY 44



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855273

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COAL DIVISION

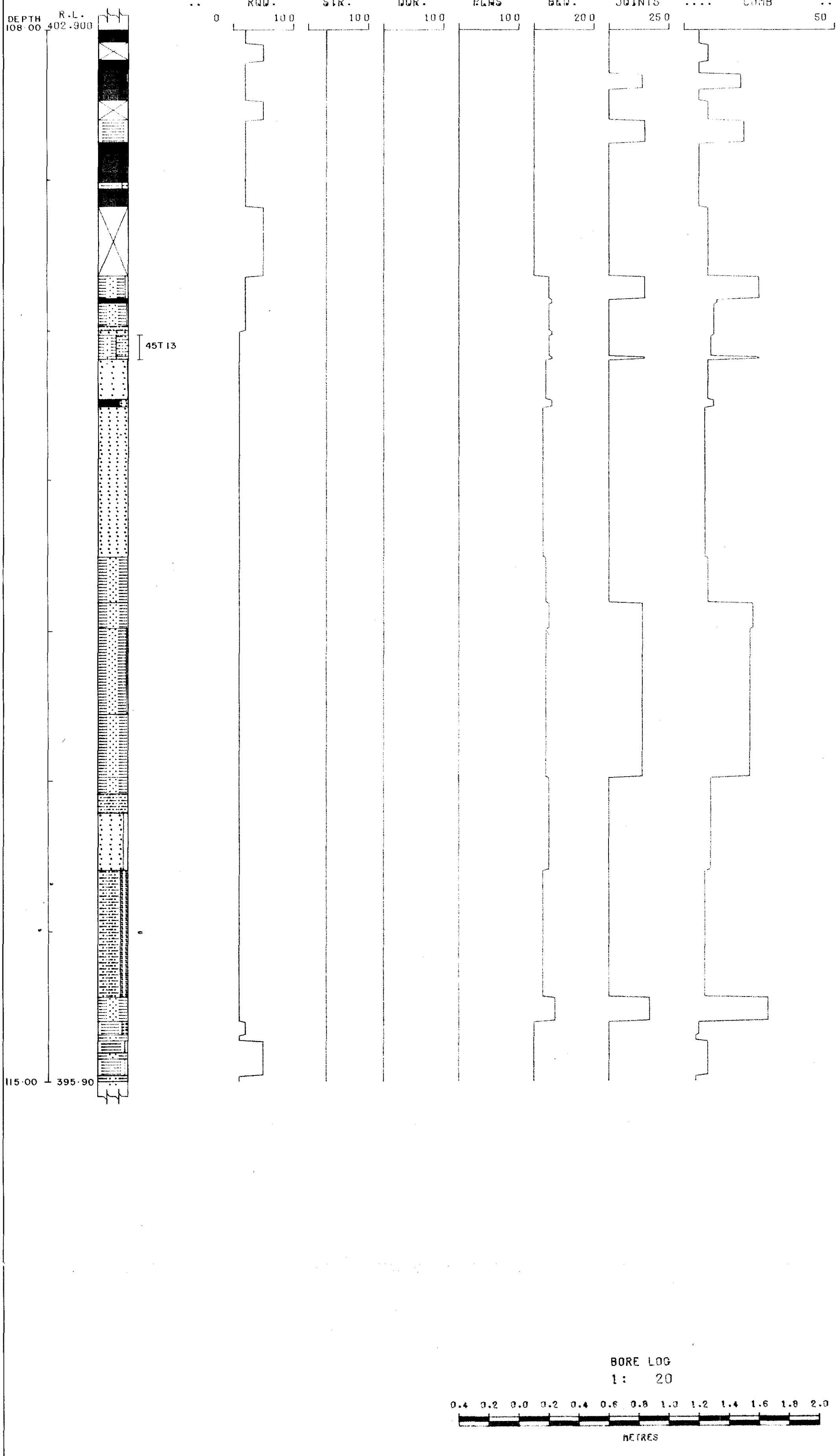
MT. NICHOLAS — E.L.5/61
TASMANIA

GY44 L II FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR:	Coal Division	DATE:	June 1981
REPORT NO:	CEPR 11/81	DRAWING NO:	2189

Encl. 2/13

GY 45



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855274

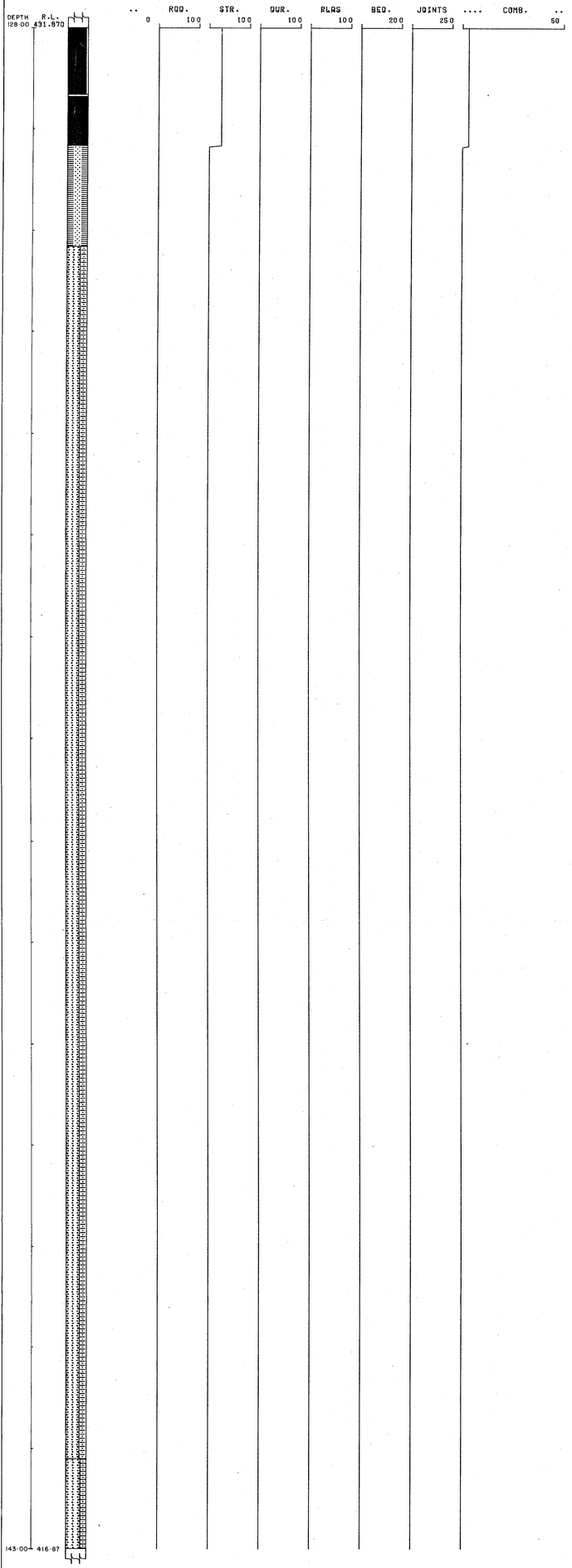
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L 5/61
TASMANIA

GY45 LII FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR:	Coal Division	DATE:	June 1981	Encl. 2/14
REPORT NO:	CEPR 11/81	DRAWING NO:	2190	

DOM8



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cms

855275

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

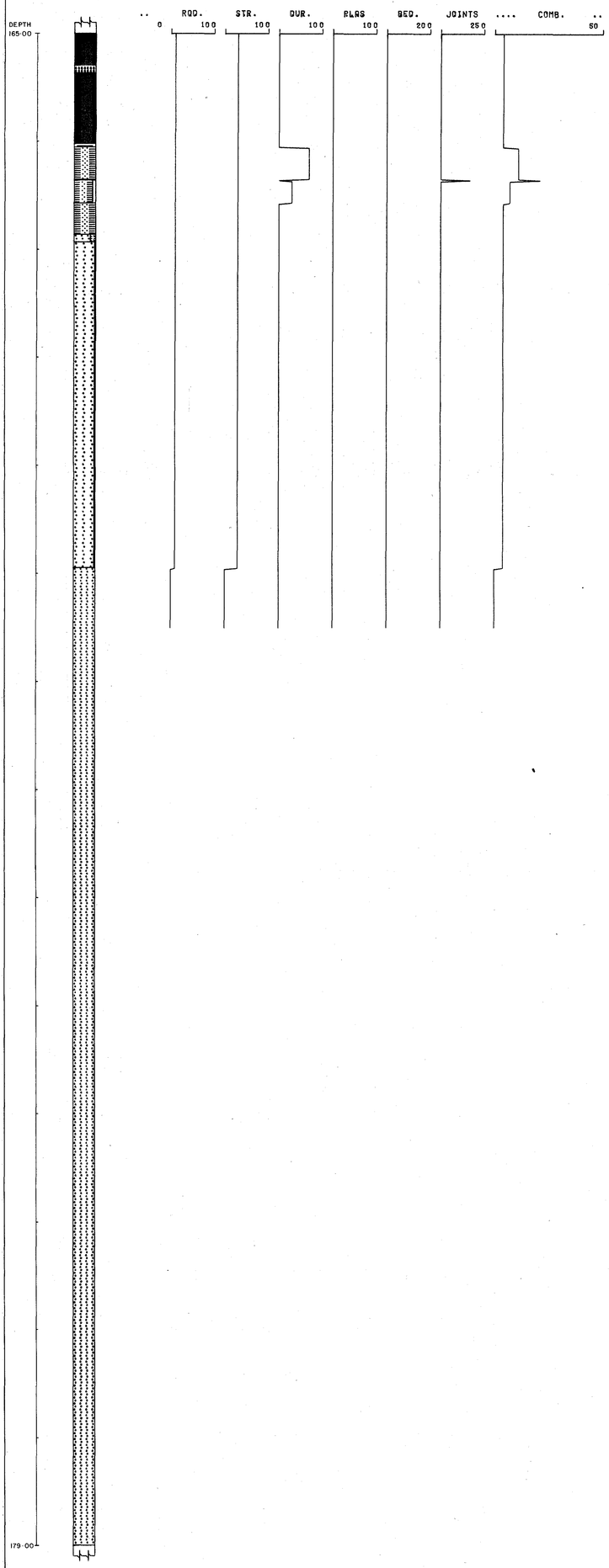
MT. NICHOLAS — E.L.5/61
- TASMANIA

DOM 8 LII FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981
REPORT NO: CEPR 11/81	DRAWING NO: 2191

Encl.2/15

DOM 13



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

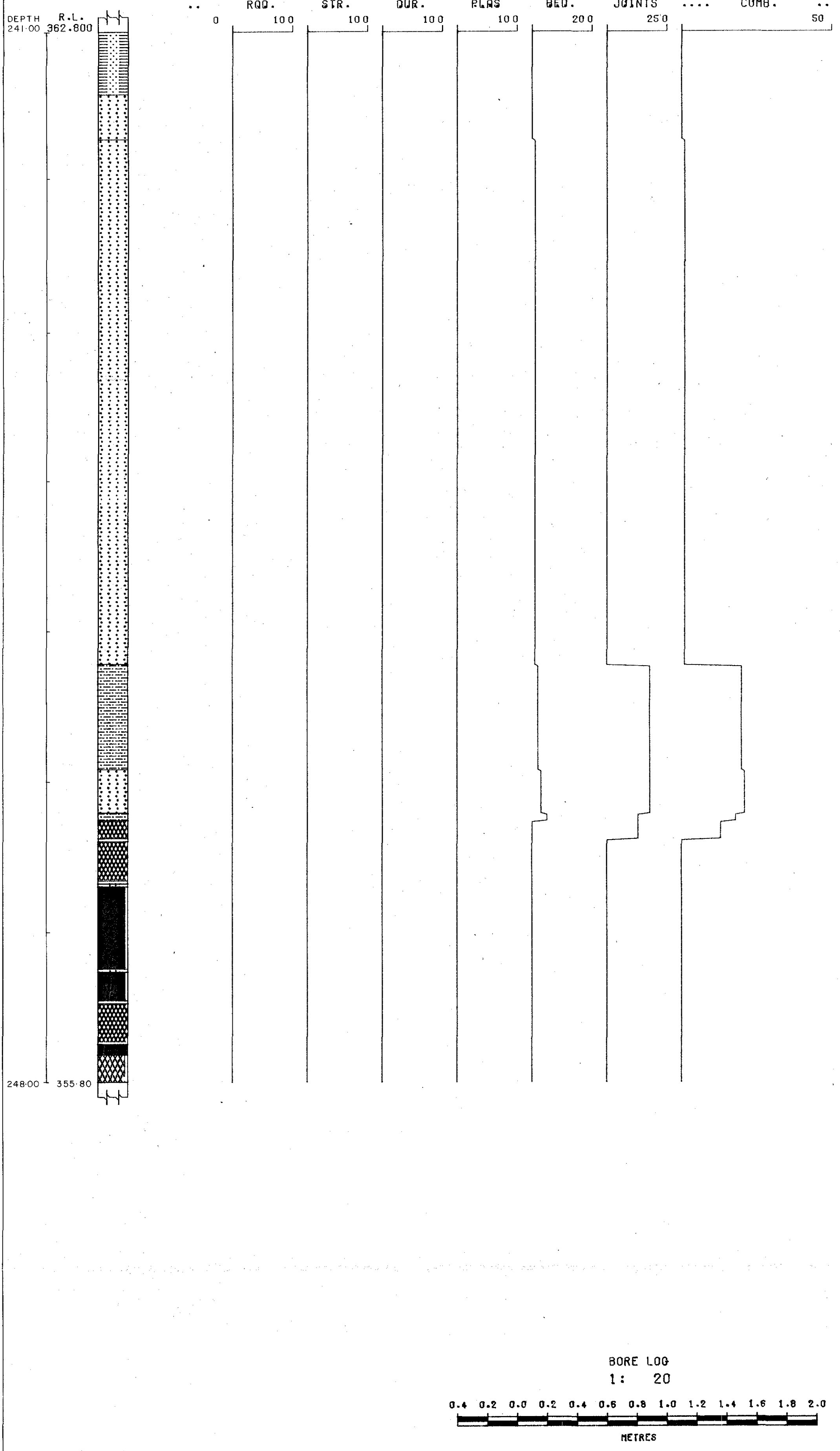
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THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E.L 5/61
TASMANIA
DOM 13 LII FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/16
REPORT NO: CEPR 11/81	DRAWING NO: 2192	

GY 24



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855277

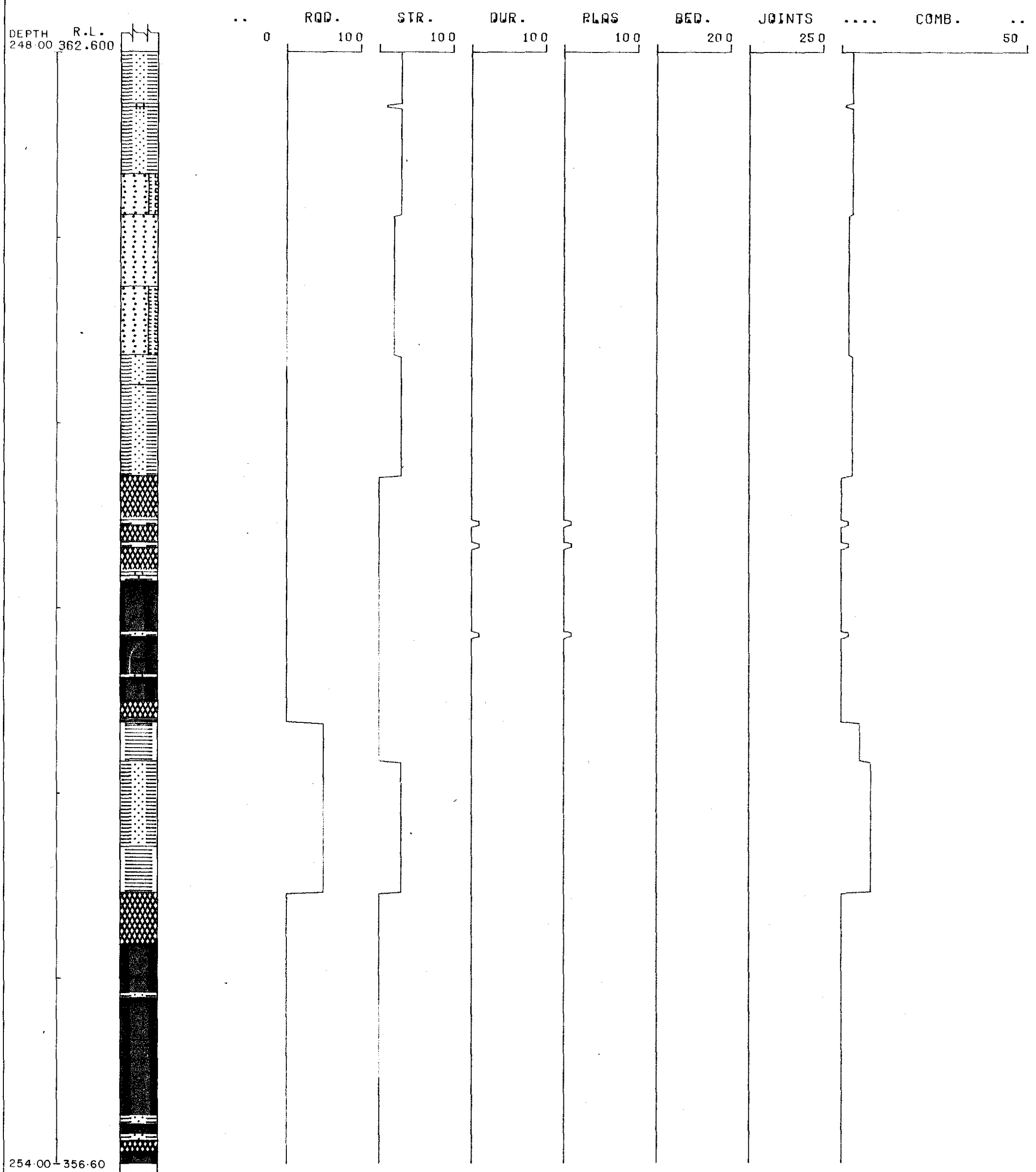
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA

LII ROOF GY24
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/17
REPORT NO: CEPR 11/81	DRAWING NO: 2193	

GY 26



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855278

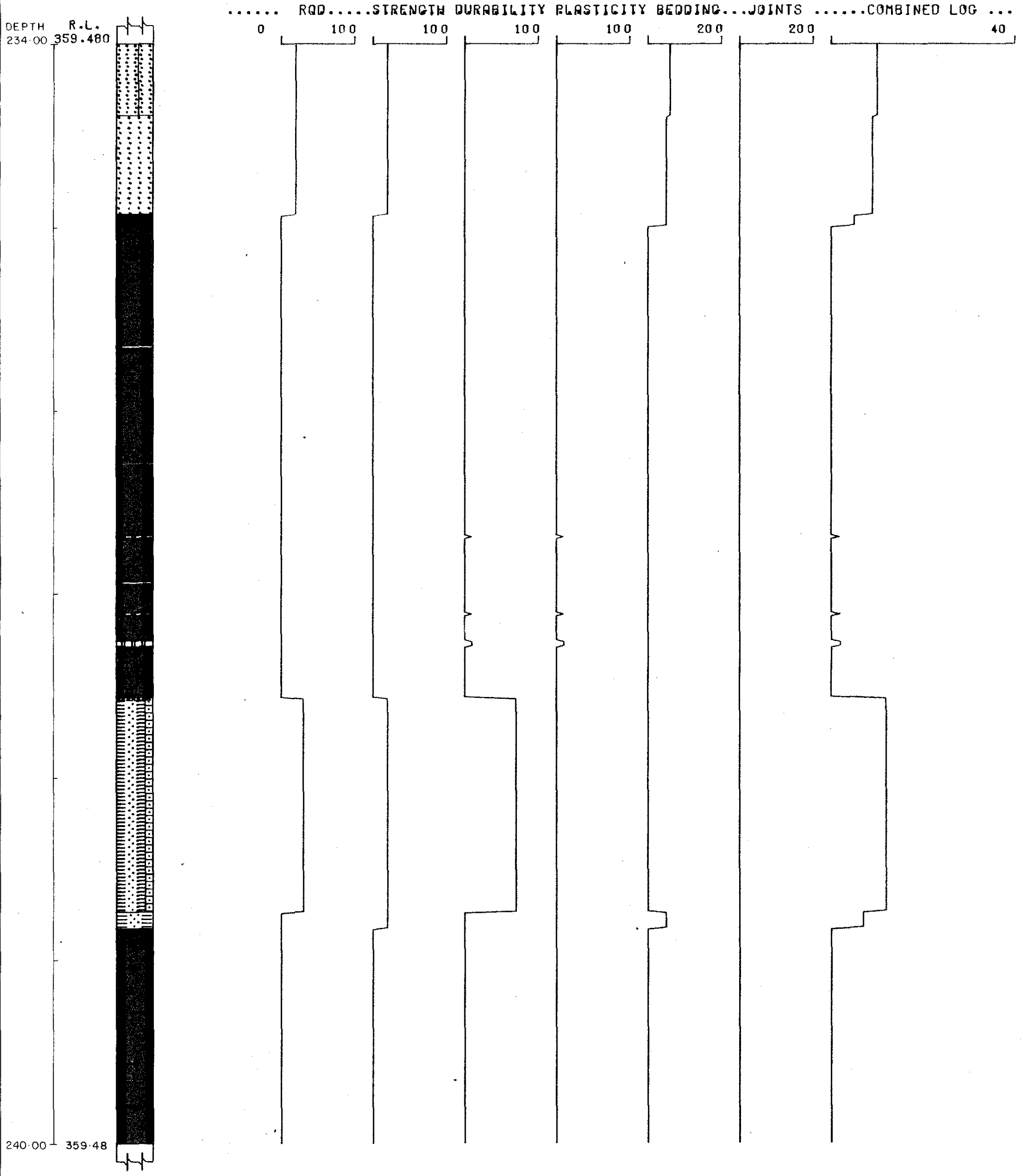
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA

LII ROOF GY26
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/18
REPORT NO: CEPR 11/81	DRAWING NO: 2194	

GY 28



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855279

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COAL DIVISION

MT. NICHOLAS — E.L 5/61

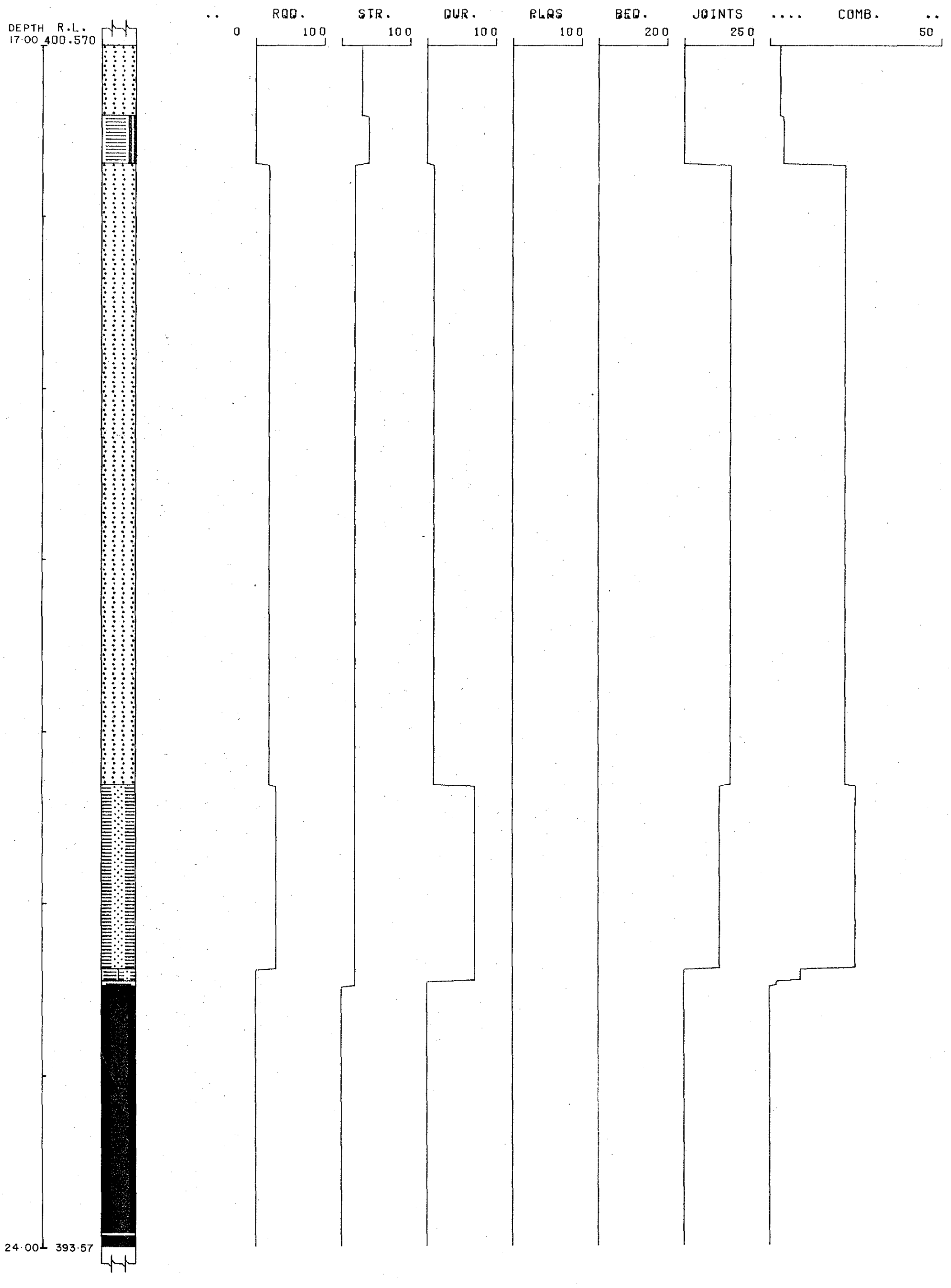
TASMANIA

LII ROOF GY28

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl. 2/19
REPORT NO: CEPR 11/81	DRAWING NO: 2195	

GY 31



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855280

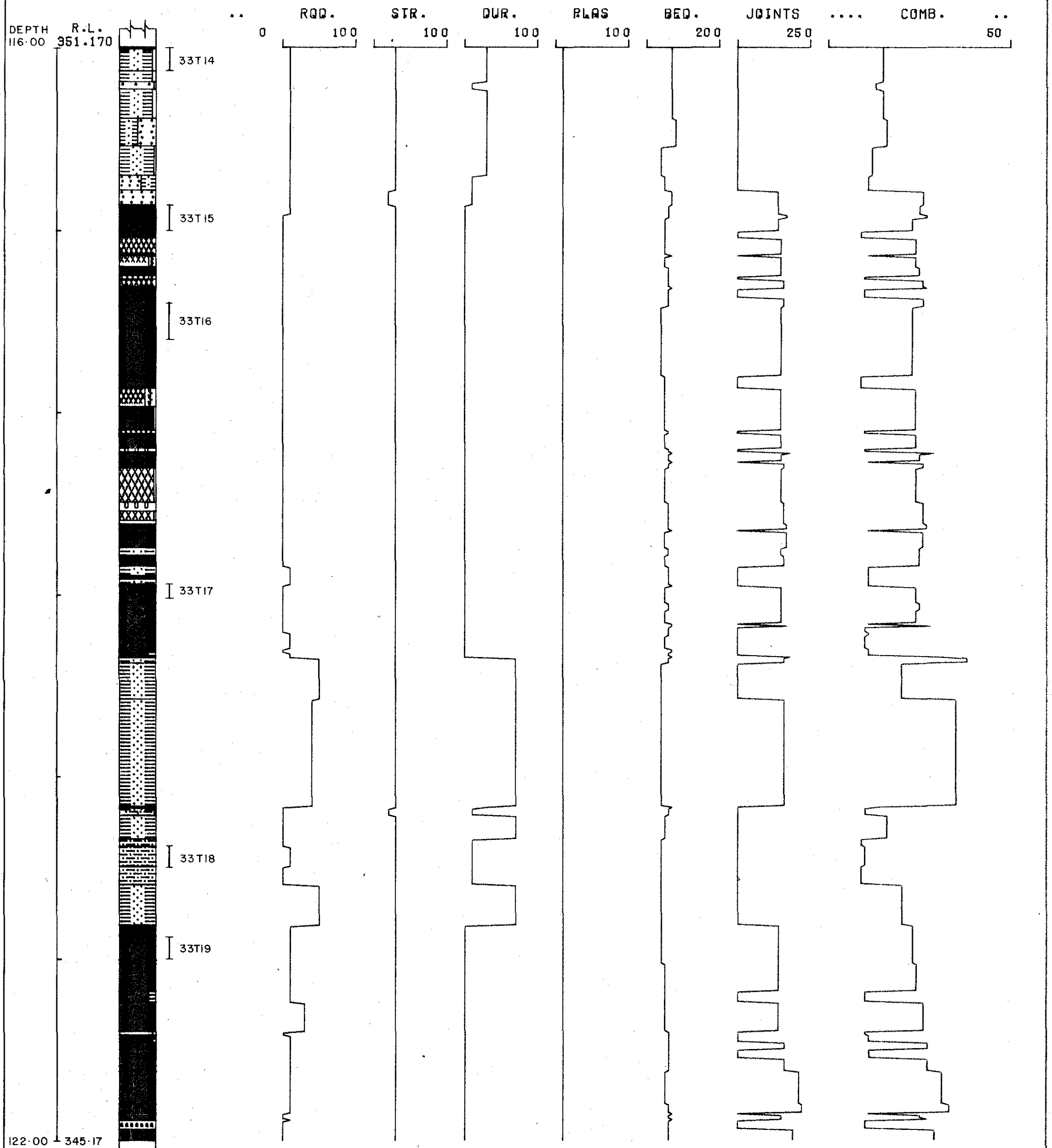
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA

L II ROOF GY31
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/20
REPORT NO: CEPR 11/81	DRAWING NO: 2196	

GY 33



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

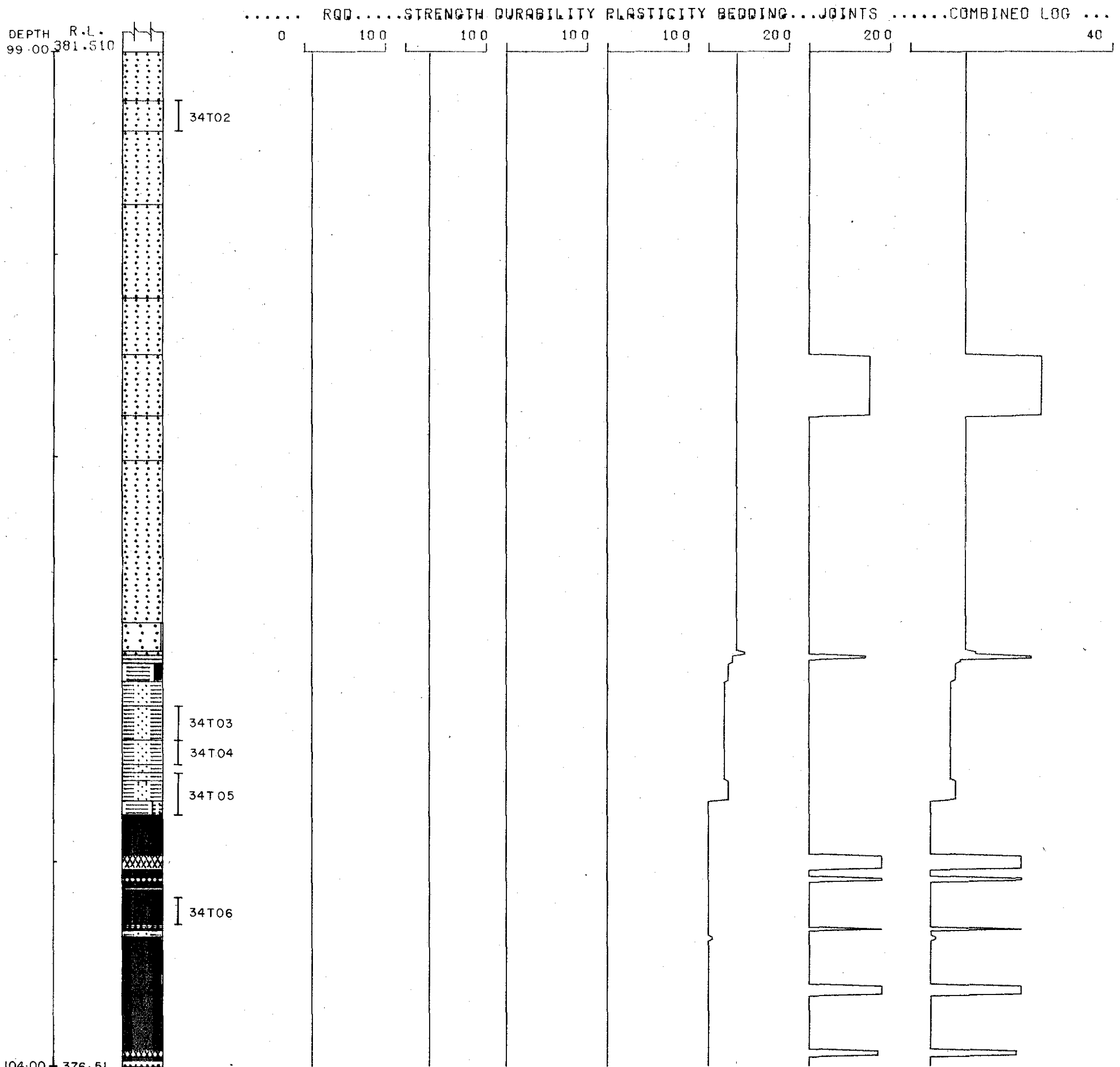
855281

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA
LII ROOF GY 33
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/21
REPORT NO: CEPR 11/81	DRAWING NO: 2197	

GY 34



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855282

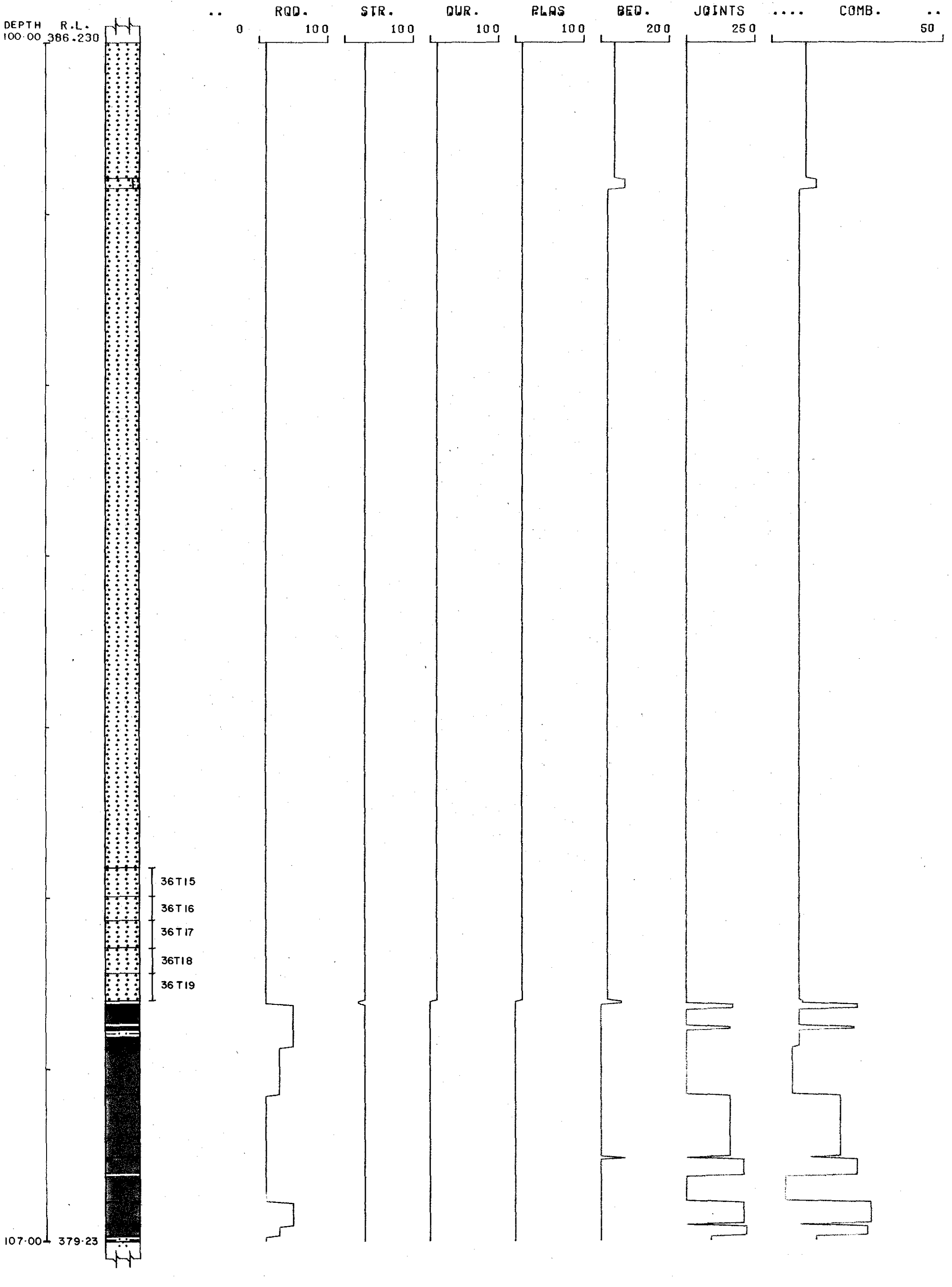
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA

GY 34 LII ROOF
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR:	Coal Division	DATE:	June 1981	Encl.2/22
REPORT NO:	CEPR 11/81	DRAWING NO:	2198	

36 GY



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

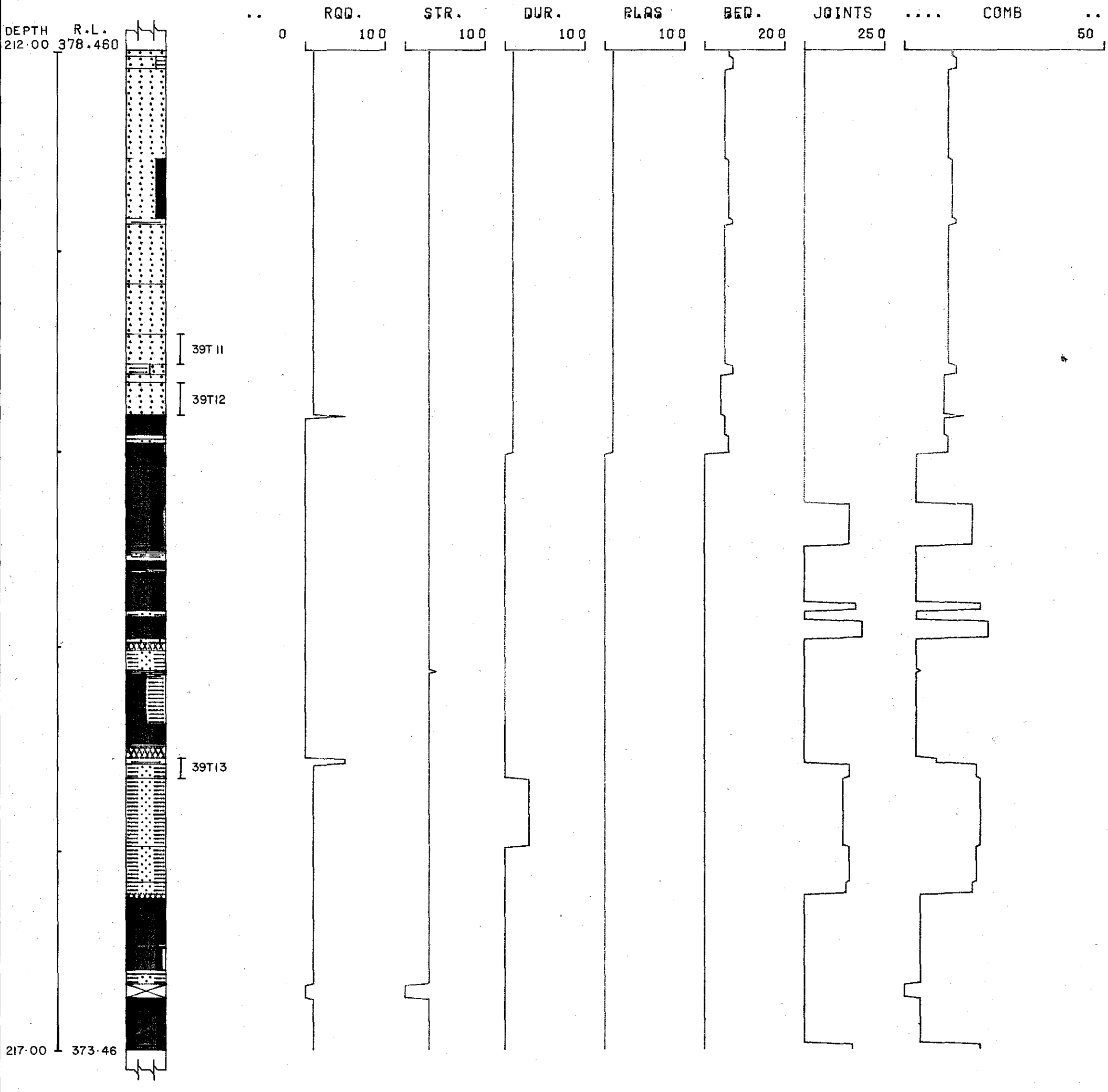
855283

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA
L II ROOF GY36
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/23
REPORT NO: CEPR 11/81	DRAWING NO: 2199	

GY 39



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855284

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L 5/61
TASMANIA

L II ROOF GY 39
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981
REPORT NO: CEPR 11/81	DRAWING NO: 2200

Encl. 2/24

GY 40



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5cm

855285

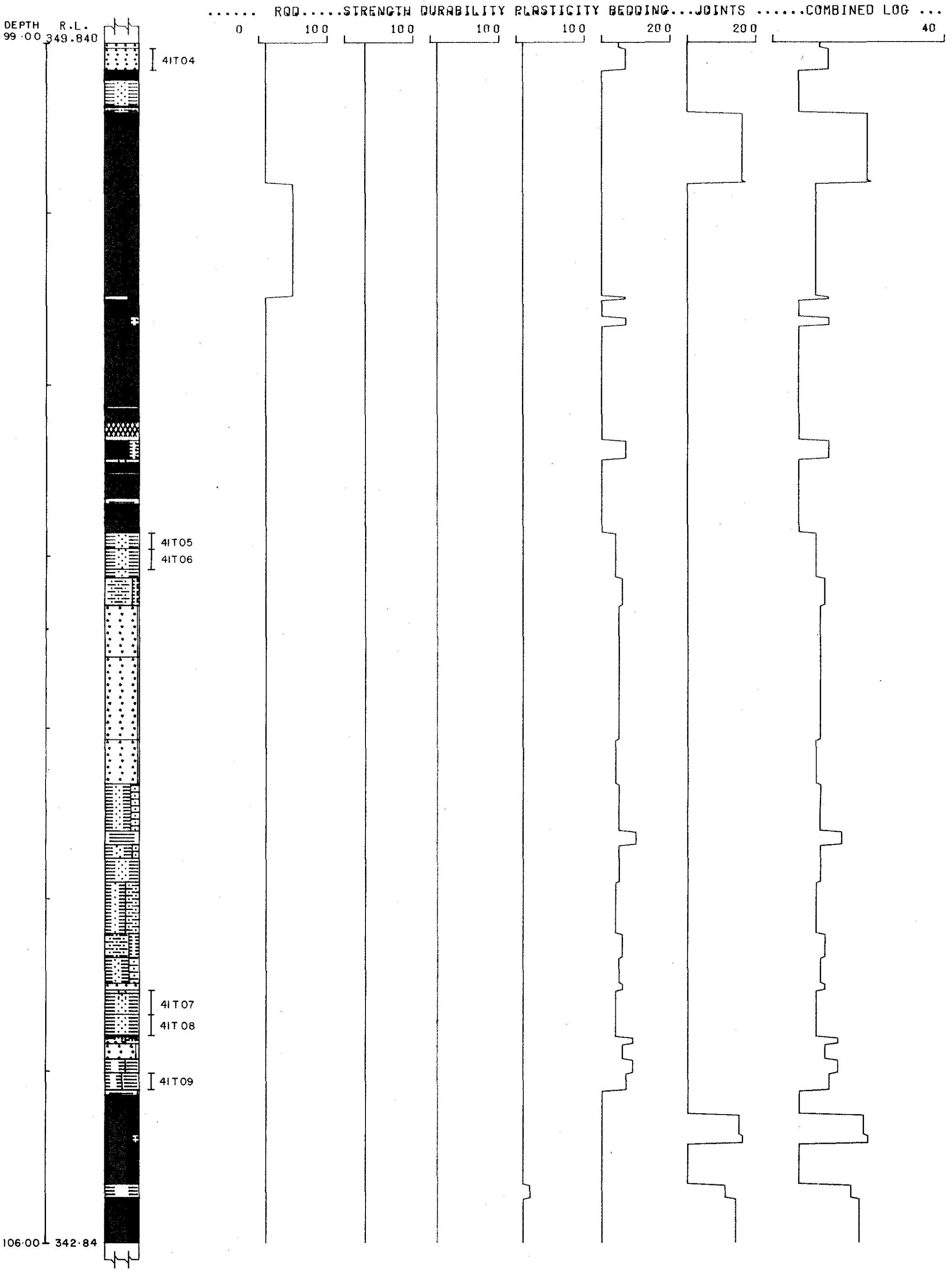
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA

GY 40 L II ROOF
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/25
REPORT NO: CEPR 11/81	DRAWING NO: 2201	

41 GY



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855286

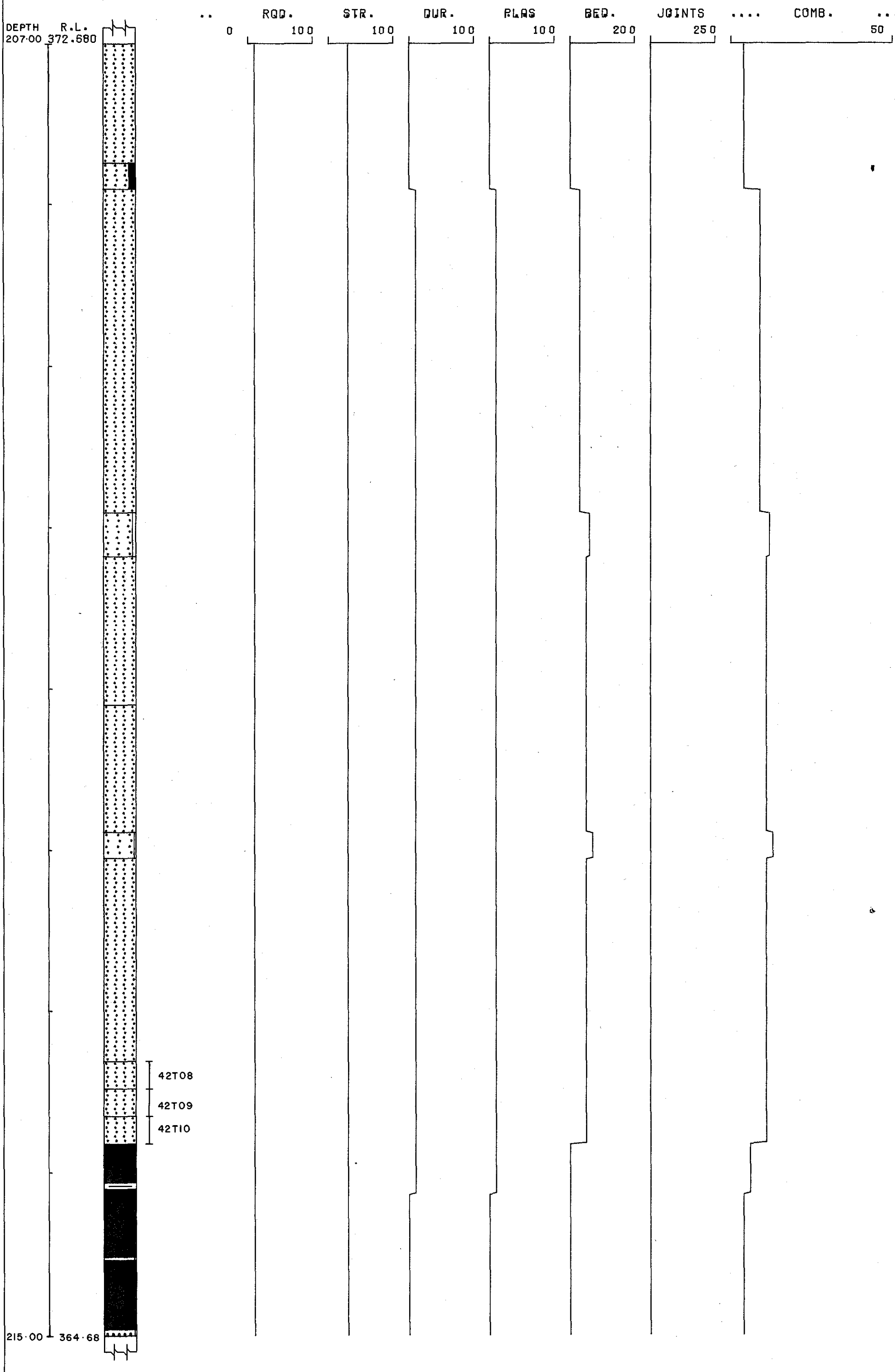
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA

LII ROOF GY41
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/26
REPORT NO: CEPR 11/81	DRAWING NO: 2202	

42 GY



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

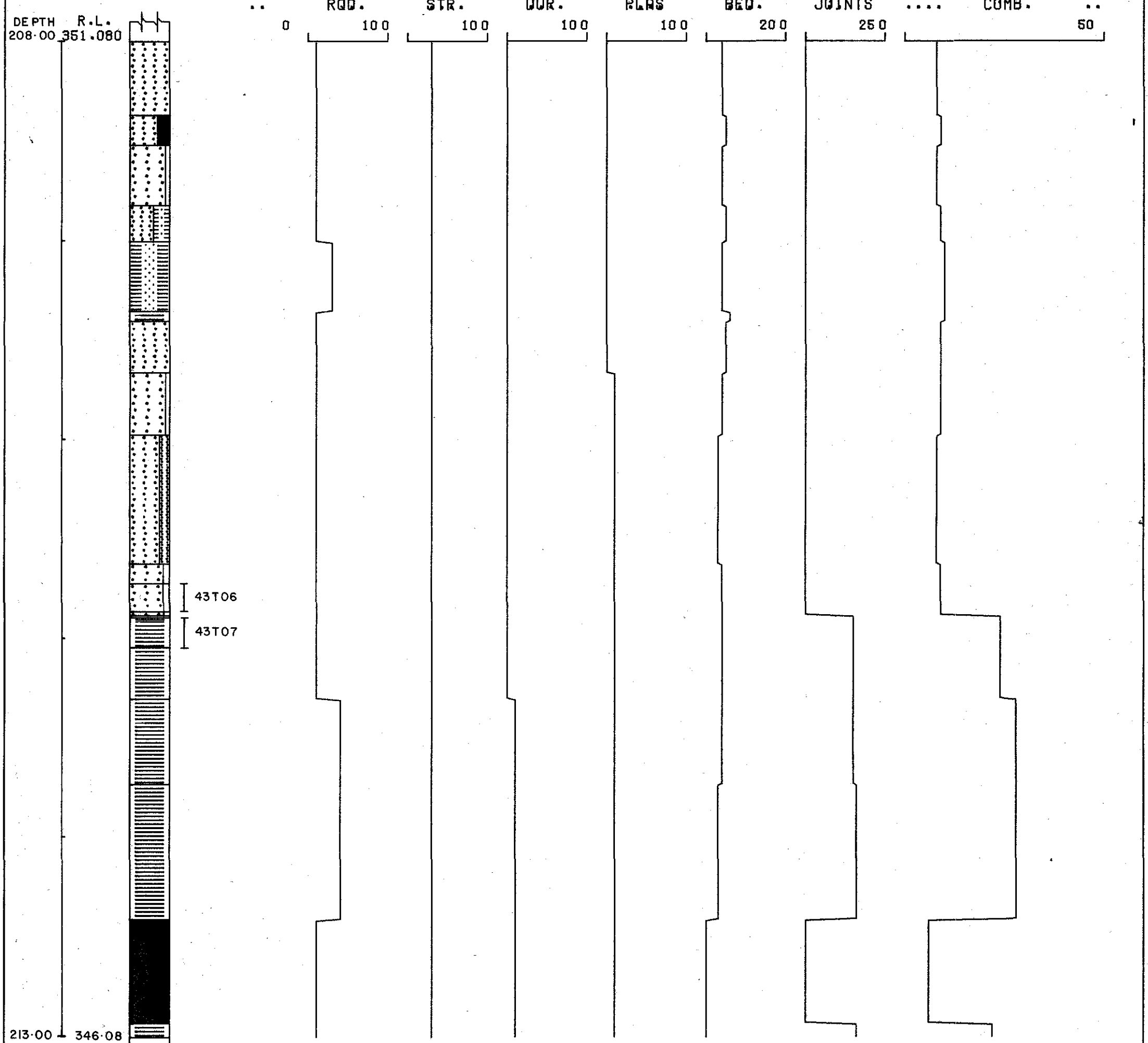
855287

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA
L II ROOF GY42
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/27
REPORT NO: CEPR 11/81	DRAWING NO: 2203	

43 GY



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855288

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COAL DIVISION

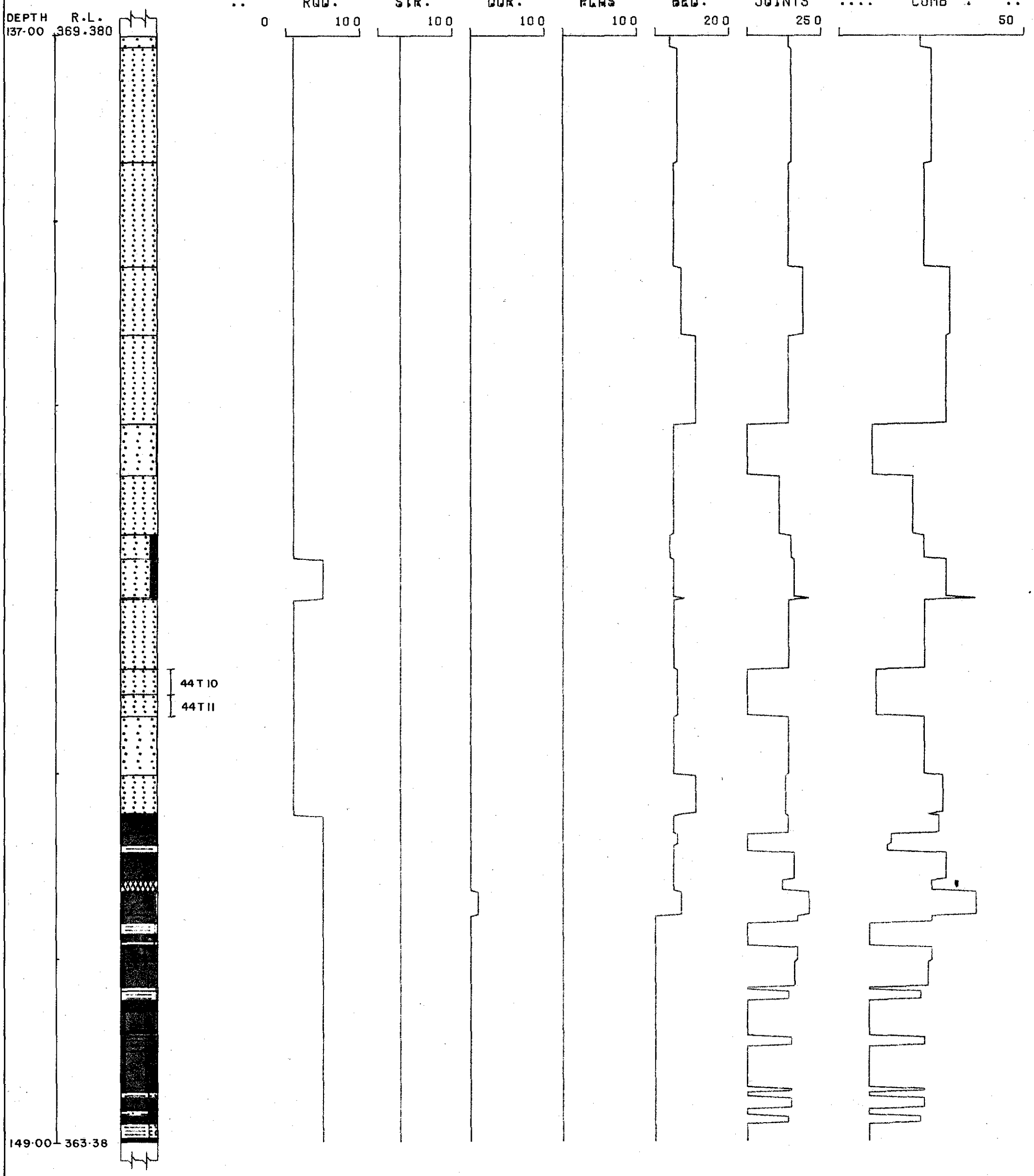
MT. NICHOLAS — E.L.5/61
TASMANIA

GY 43 LII ROOF
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981
REPORT NO: CEPR 11/81	DRAWING NO: 2204

Encl.2/28

GY 44



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855289

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT. NICHOLAS — E.L.5/61

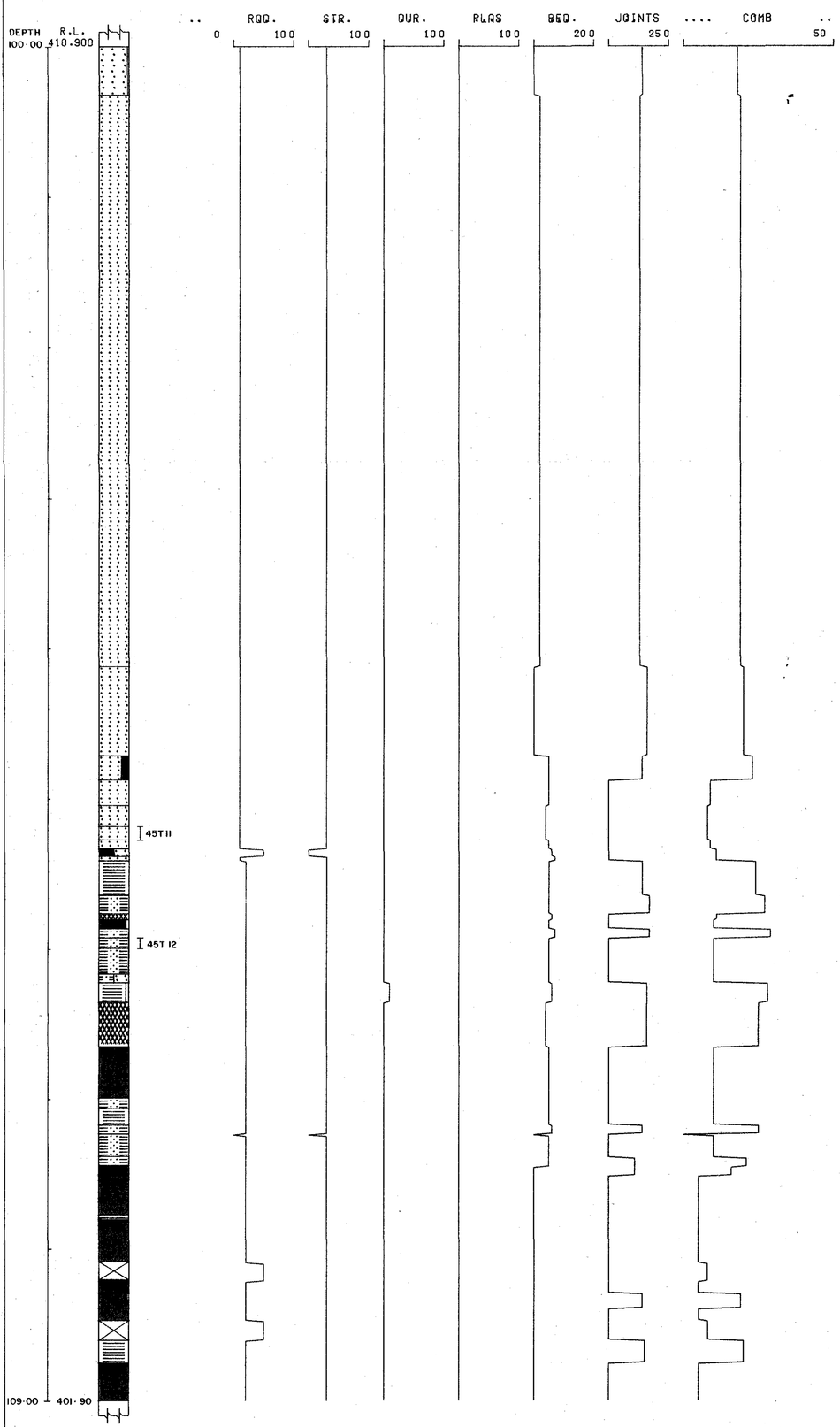
TASMANIA

GY44 L II ROOF

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/29
REPORT NO: CEPR 11/81	DRAWING NO: 2205	

GY 45



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5cm

855290

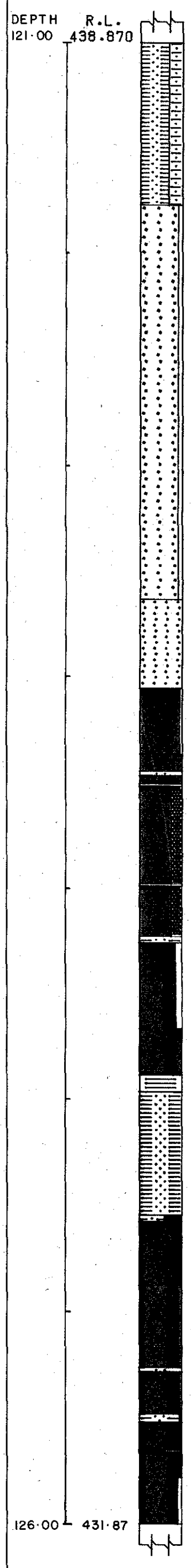
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

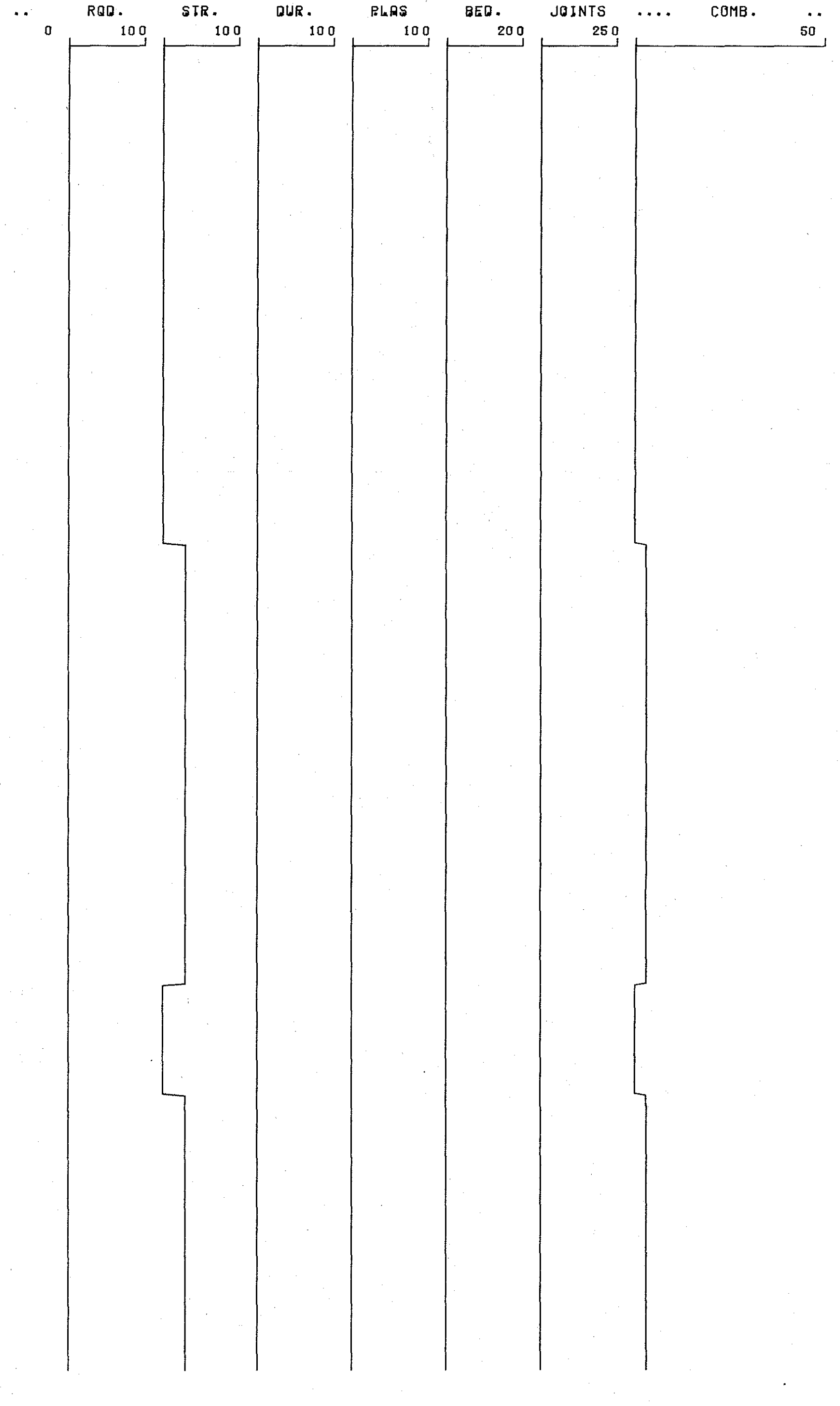
MT. NICHOLAS — E.L.5/61
TASMANIA

GY45 L II ROOF
LITHOLOGY & MECHANICAL
PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/30
REPORT NO: CEPR 11/81	DRAWING NO: 2206	

DOM8





BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855291

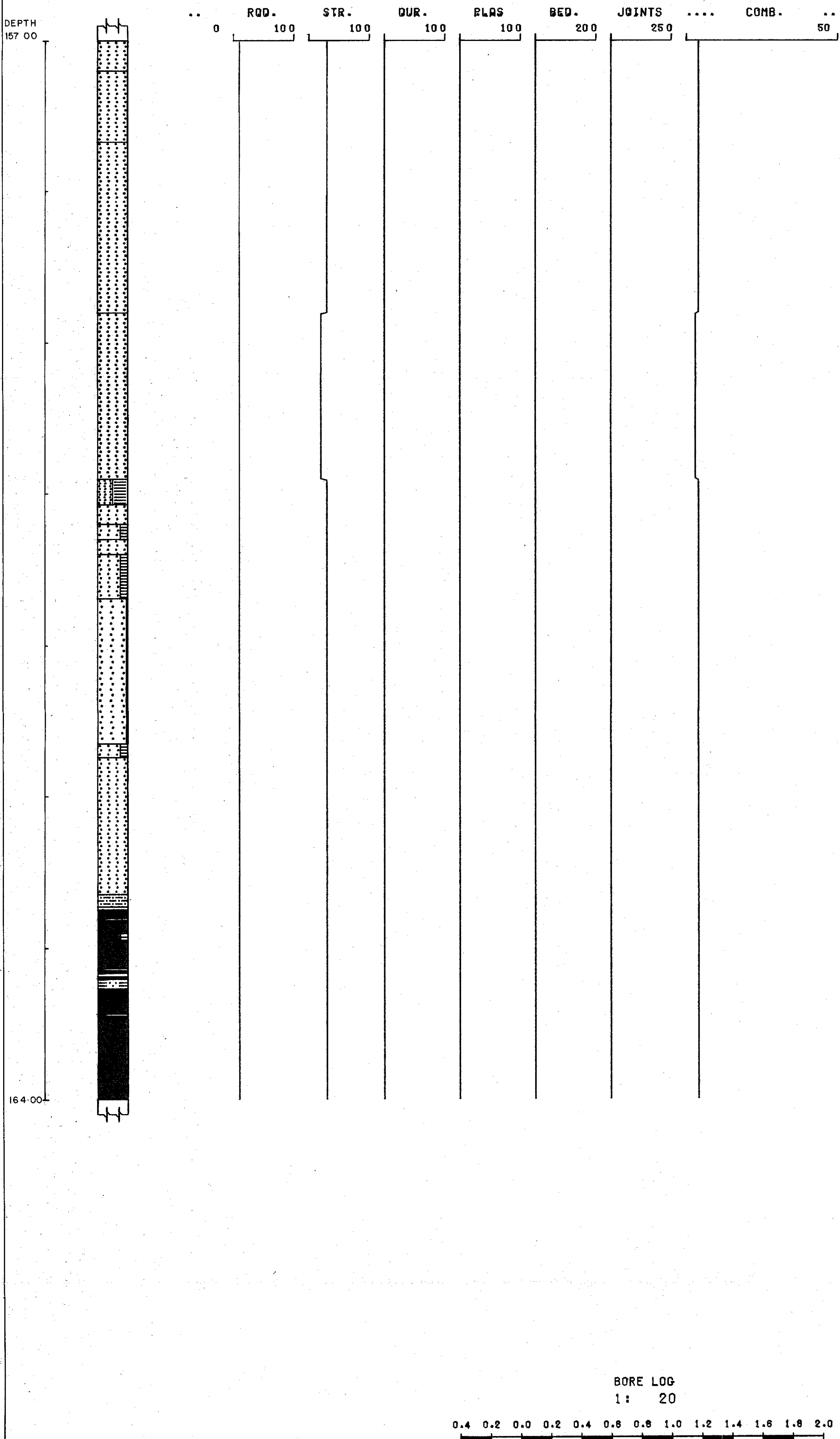
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA
DOM 8 LIIROOF
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981
REPORT NO: CEPR 11/81	DRAWING NO: 2207

Encl.2/31

DOM 13



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855292

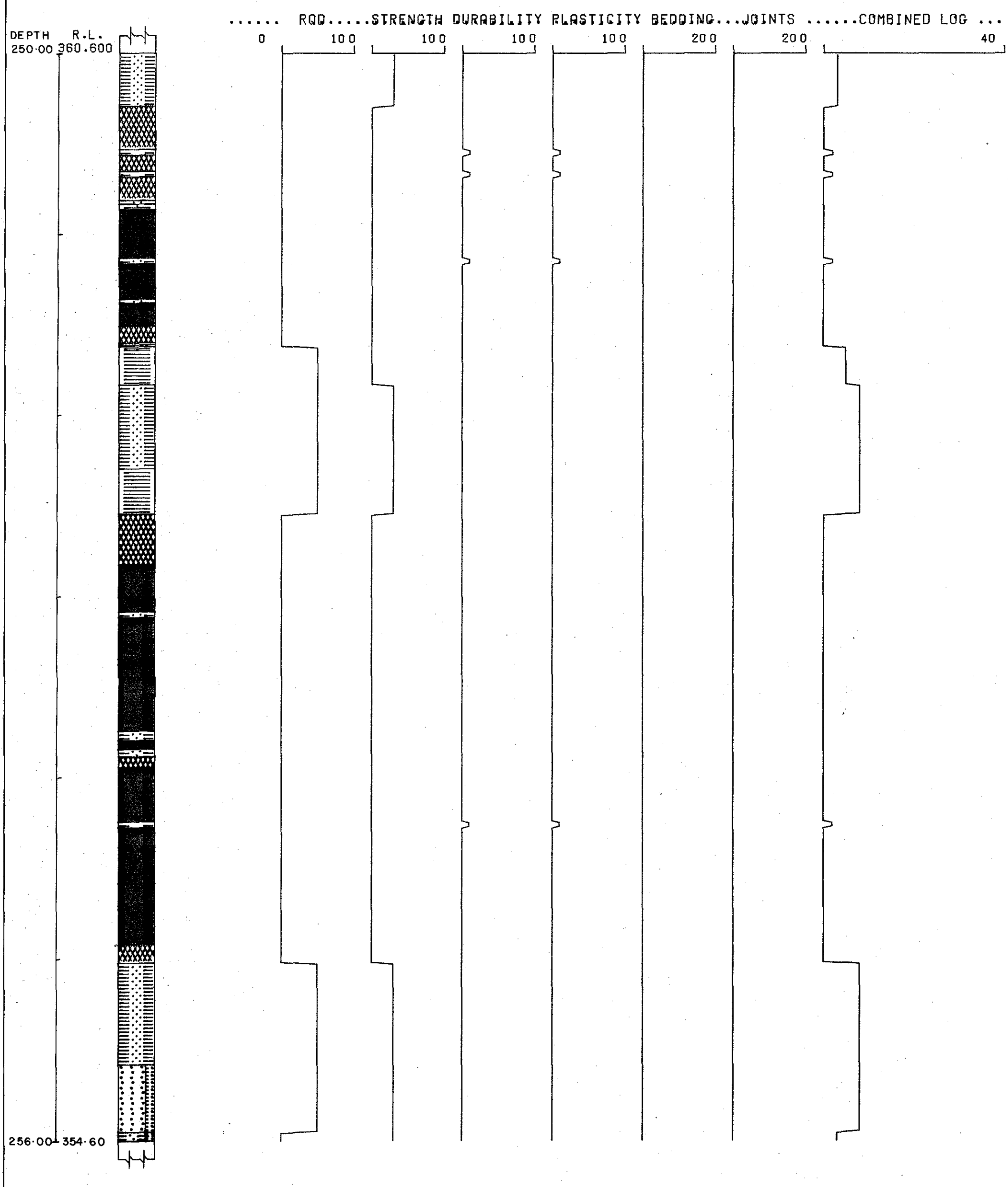
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA

DOM 13 LII ROOF
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/32
REPORT NO: CEPR 11/81	DRAWING NO: 2208	

GY 26



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855293

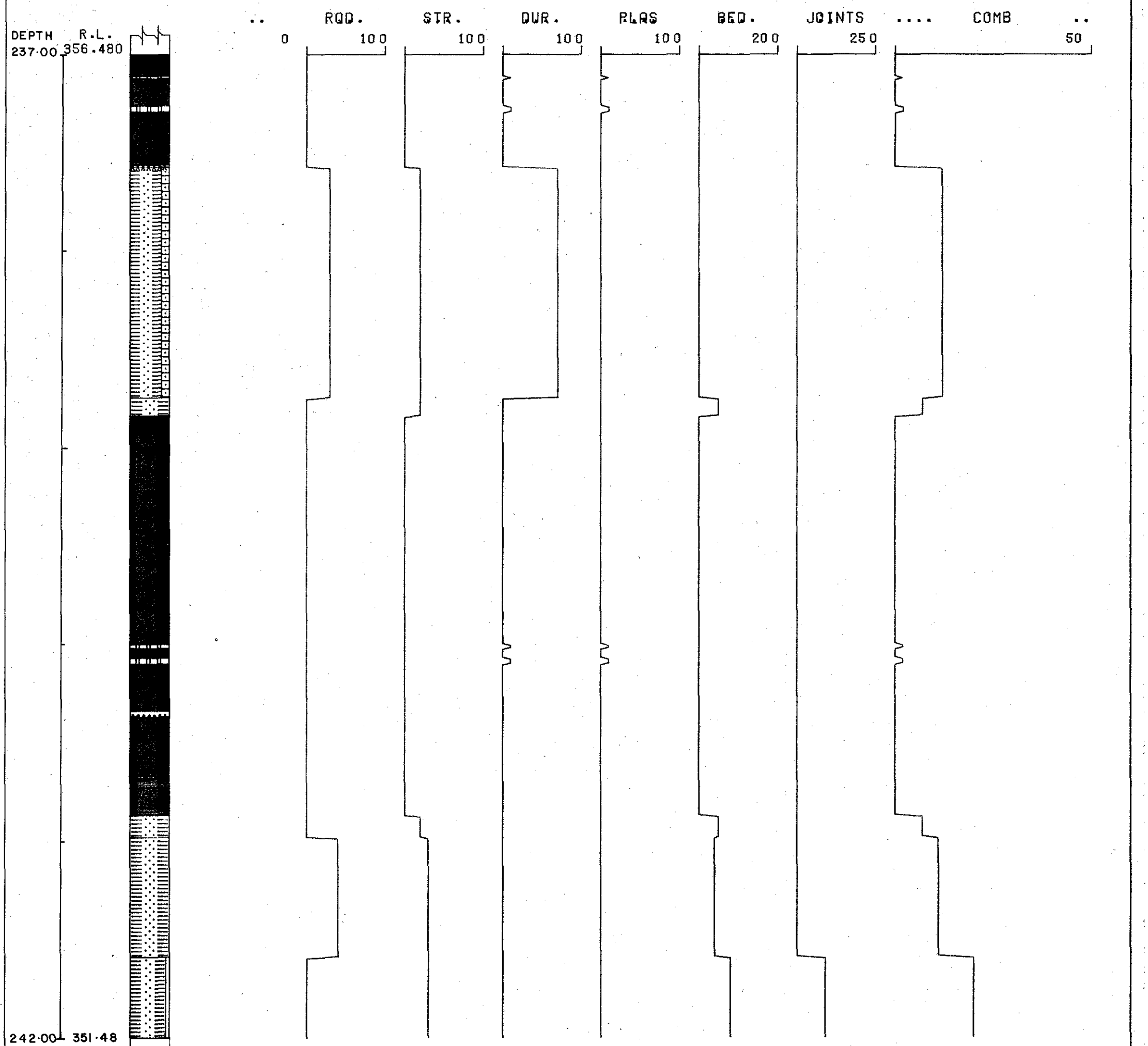
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA

GY 26 LI FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/33
REPORT NO: CEPR 11/81	DRAWING NO: 2209	

GY 28



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855294

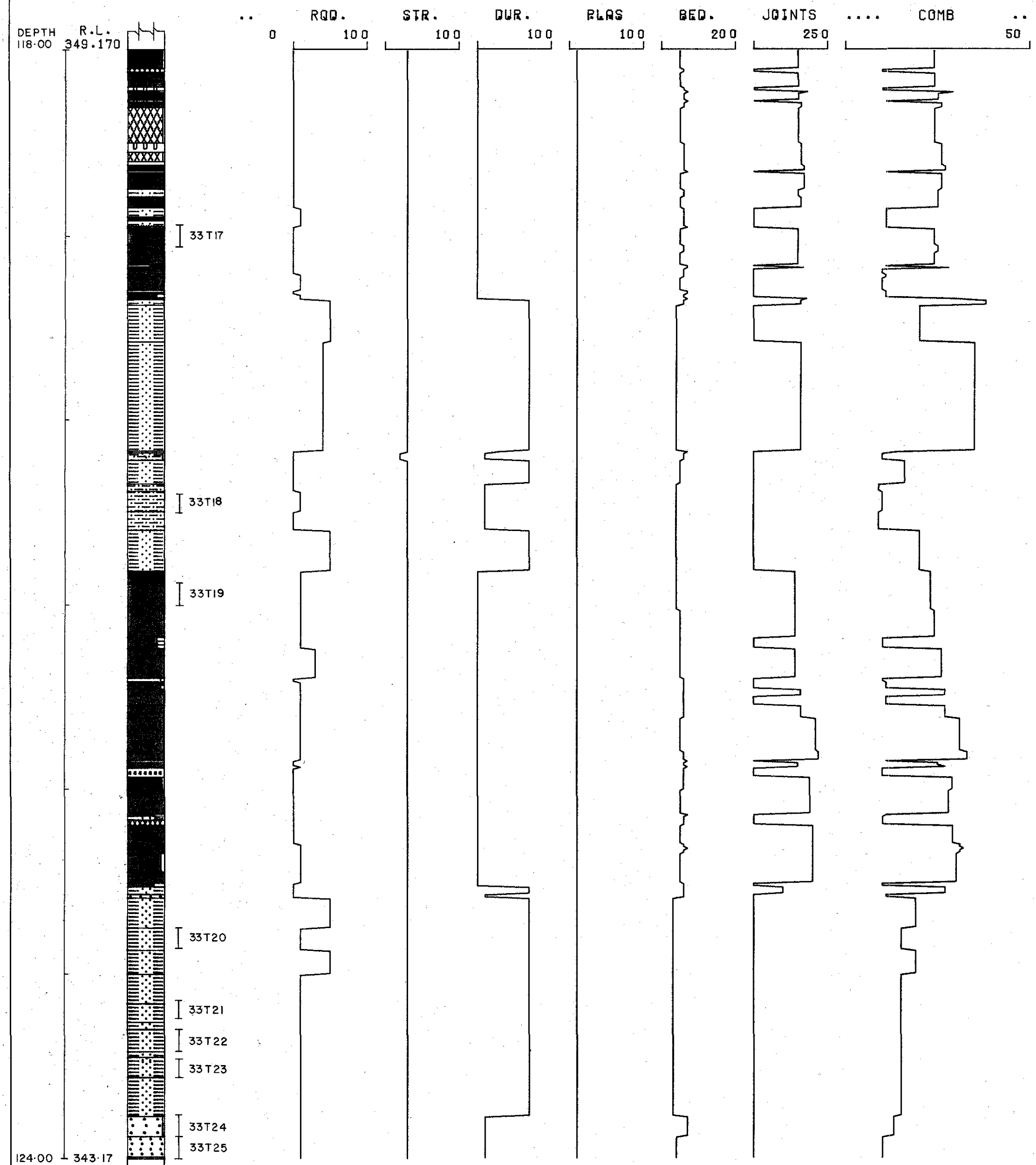
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E.L.5/61
TASMANIA

GY 28 LI FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/34
REPORT NO: CEPR 11/81	DRAWING NO: 2210	

GY 33



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855295

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

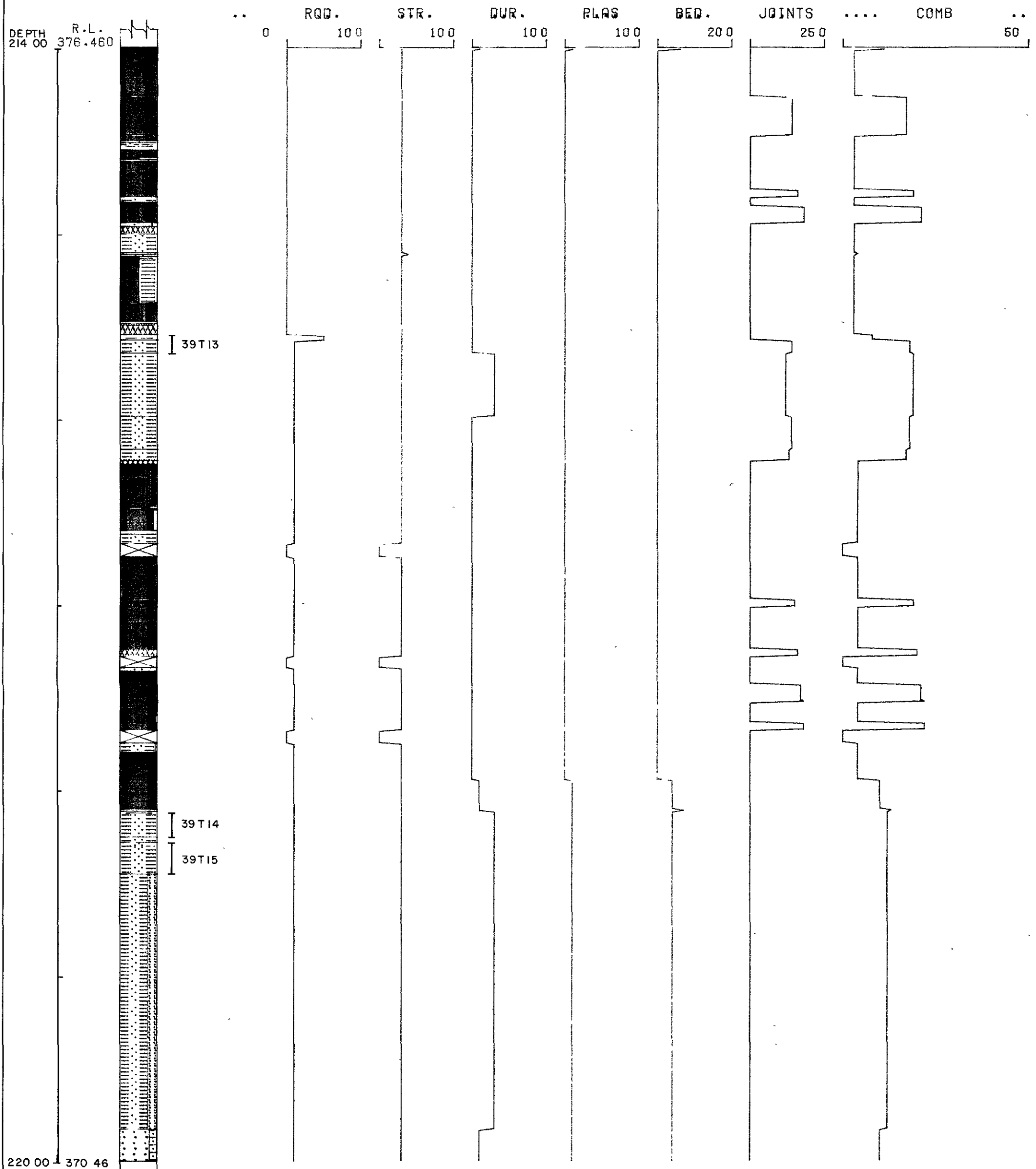
MT. NICHOLAS — E.L.5/61
TASMANIA

GY 33 LI FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR:	Coal Division	DATE:	June 1981
REPORT NO:	CEPR 11/81	DRAWING NO:	2211

Encl.2/35

GY 39



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.6 2.0

METRES

5 cm

855206

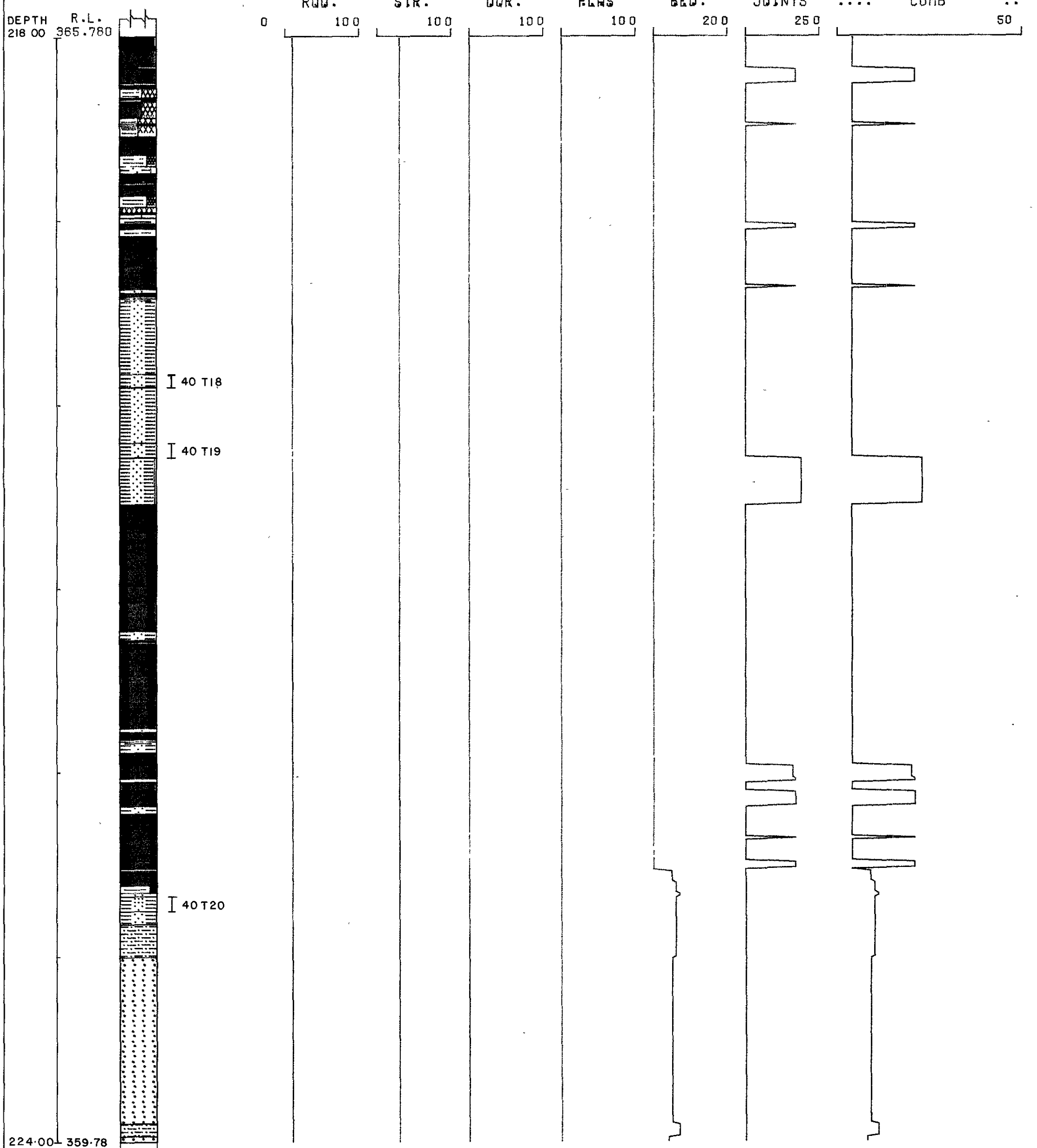
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS — E L 5/61
TASMANIA

GY 39 LI FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl 2/36
REPORT NO: CEPR 11/81	DRAWING NO: 2212	

GY 40



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855297

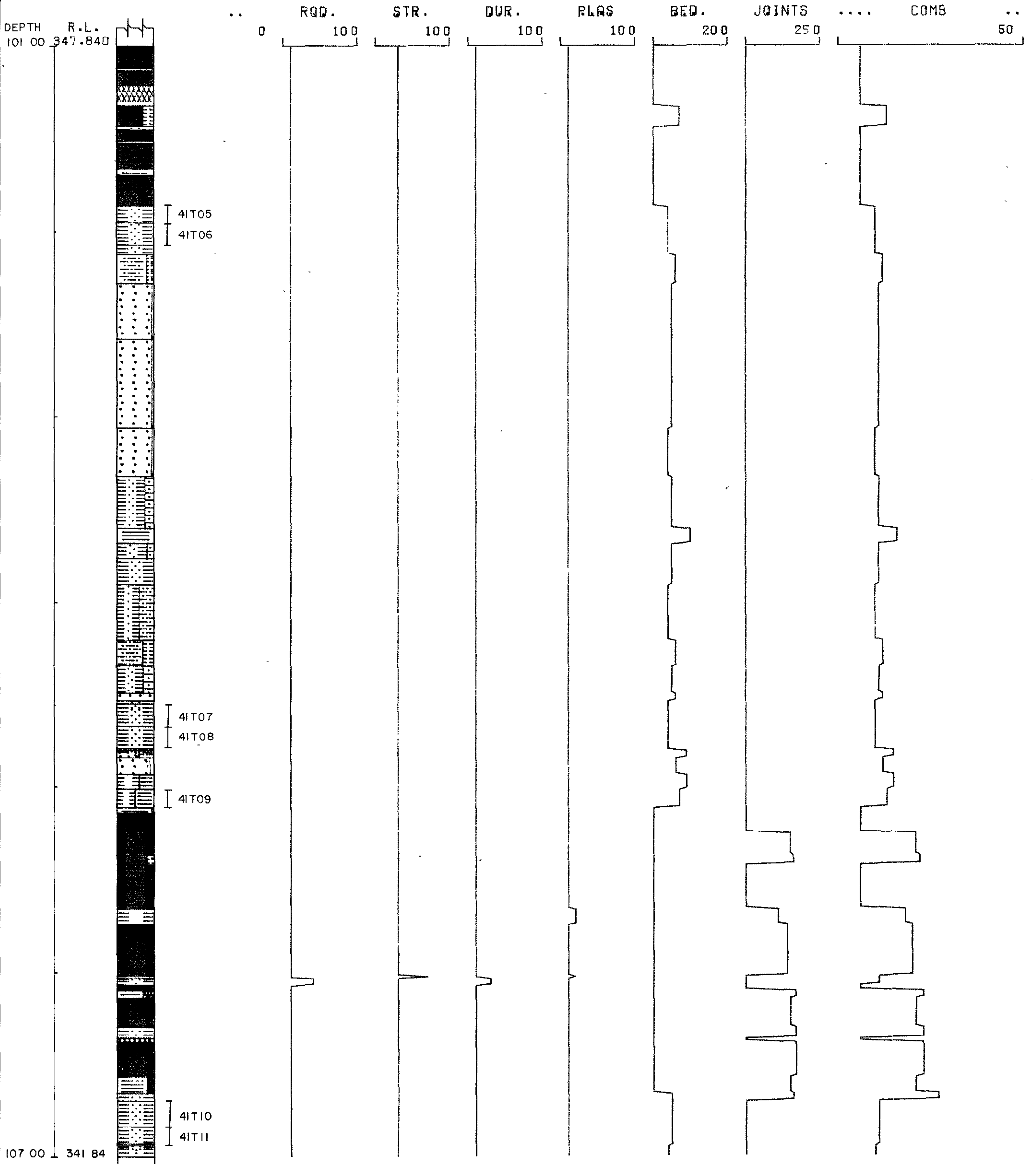
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E L 5/61
TASMANIA

GY 40 · LI FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/37
REPORT NO: CEPR 11/81	DRAWING NO: 2213	

GY 41



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855298

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT NICHOLAS — E L 5/61

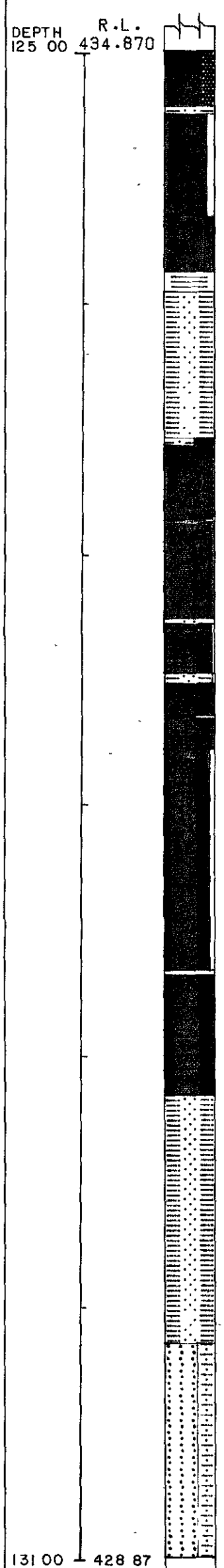
TASMANIA

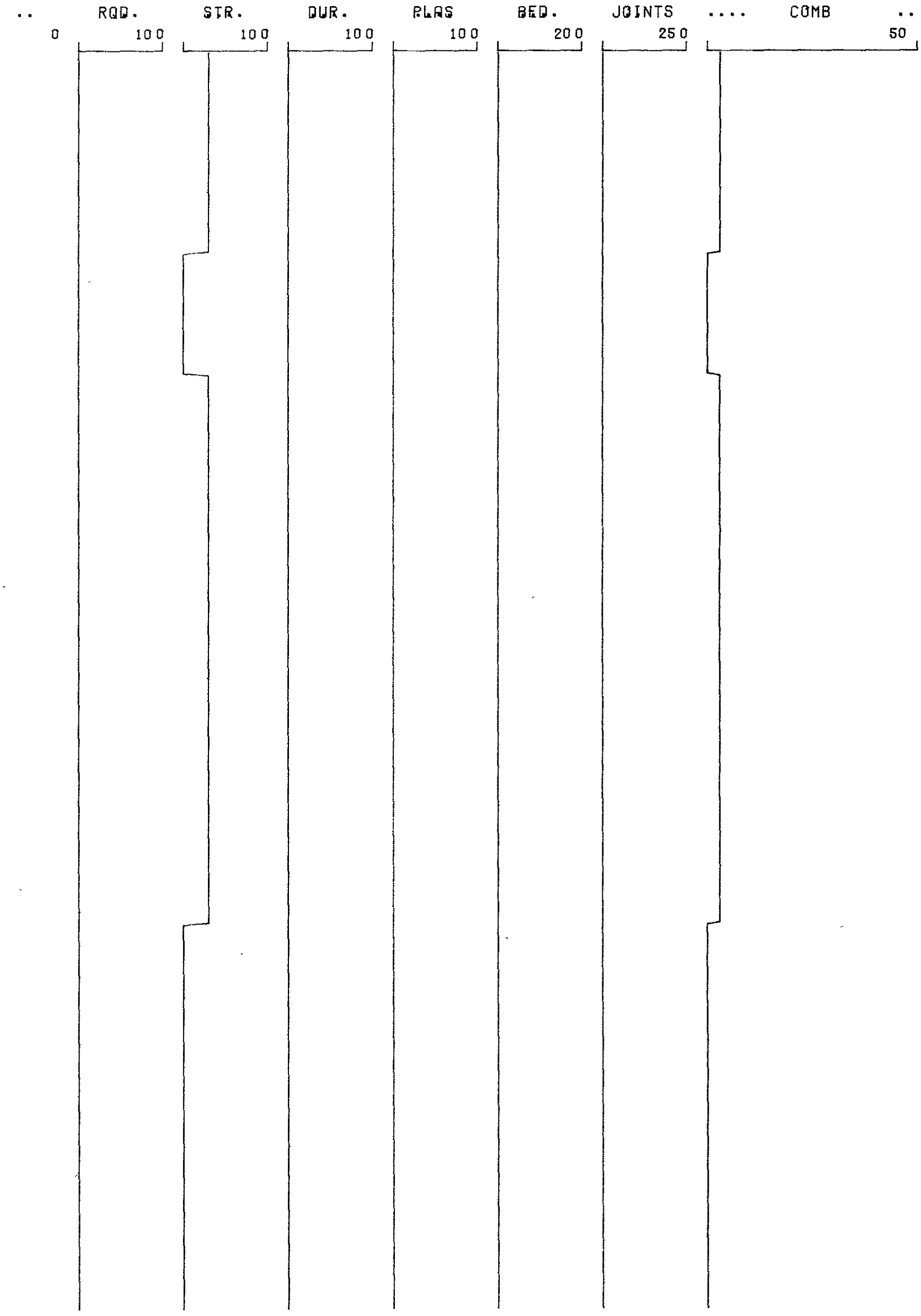
GY41 LI FLOOR

LITHOLOGY & MECHANICAL PROPERTIES

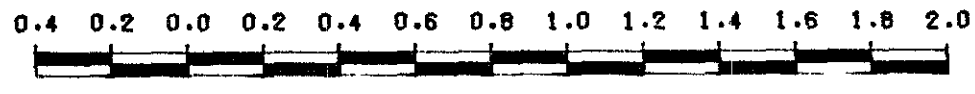
AUTHOR: Coal Division	DATE: June 1981	Encl.2/38
REPORT NO: CEPR 11/81	DRAWING NO: 2214	

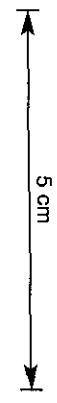
DOM8





BORE LOG
1: 20





855299

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT NICHOLAS — E L 5/61

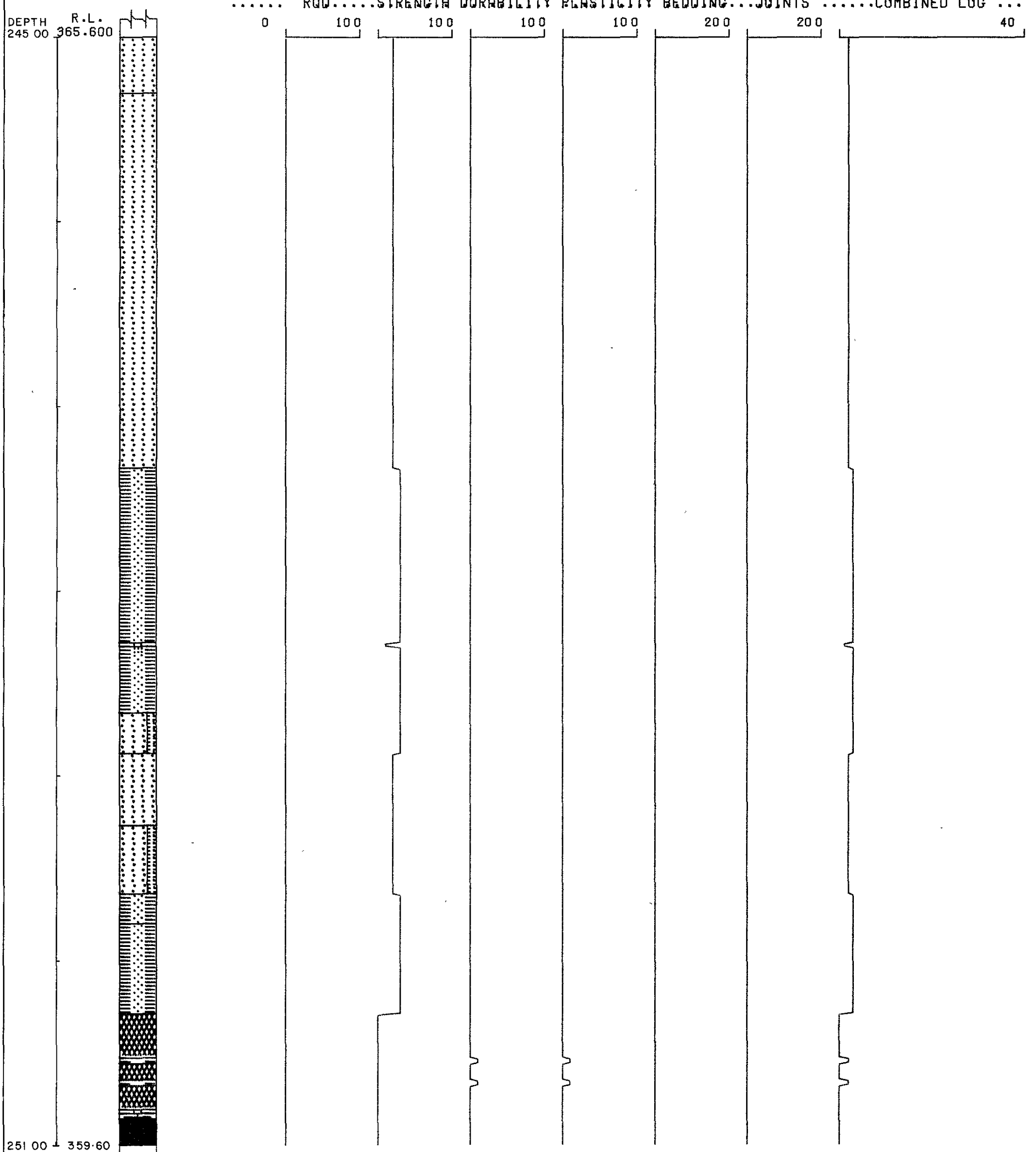
TASMANIA

DOM 8 LI FLOOR

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division		DATE: June 1981	Encl.2/39
REPORT NO: CEPR 11/81		DRAWING NO: 2215	

GY 26



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855300

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT NICHOLAS — E L 5/61

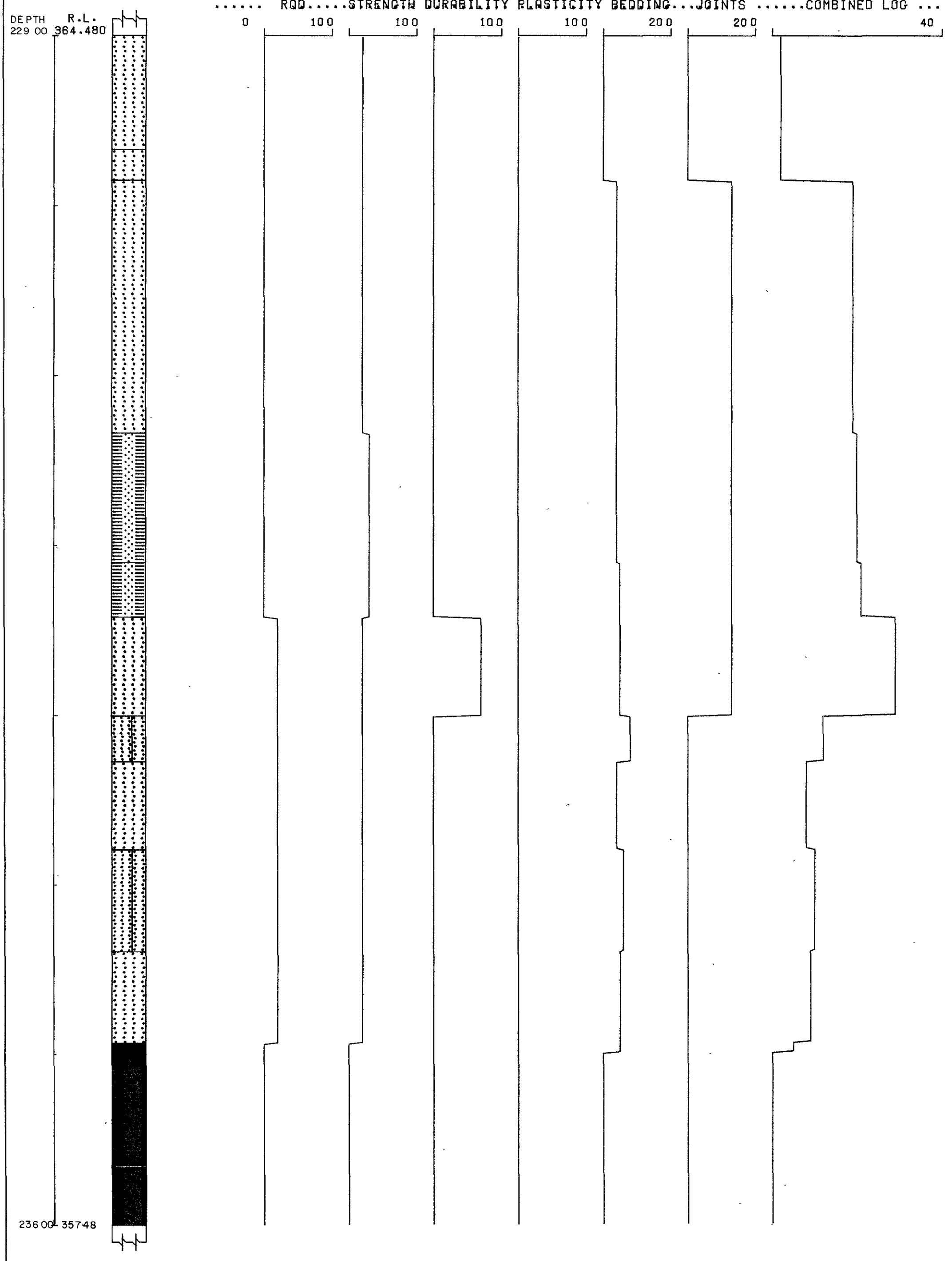
TASMANIA

GY 26 LI ROOF

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: Jura 1981	Encl.2/40
REPORT NO: CEPR 11/81	DRAWING NO: 2216	

GY 28



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855301

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

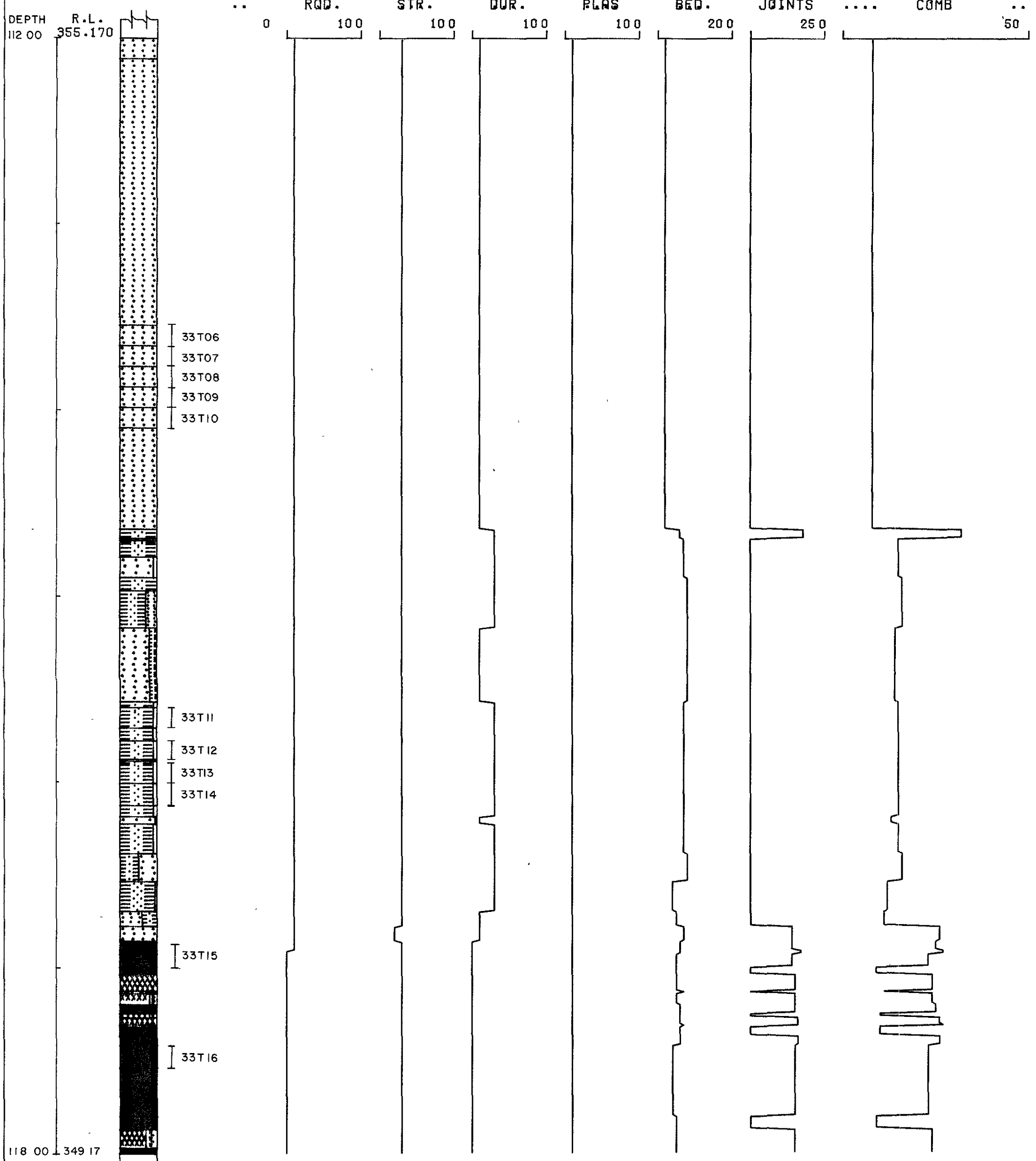
MT NICHOLAS — E L 5/61
TASMANIA

GY 28 LI ROOF

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/41
REPORT NO: CEPR 11/81	DRAWING NO: 2217	

GY 33



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855302

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT NICHOLAS — E L 5/61

TASMANIA

GY 33 LI ROOF

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/42
REPORT NO: CEPR 11/81	DRAWING NO: 2218	

GY 39



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855303

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT NICHOLAS — E L 5/61

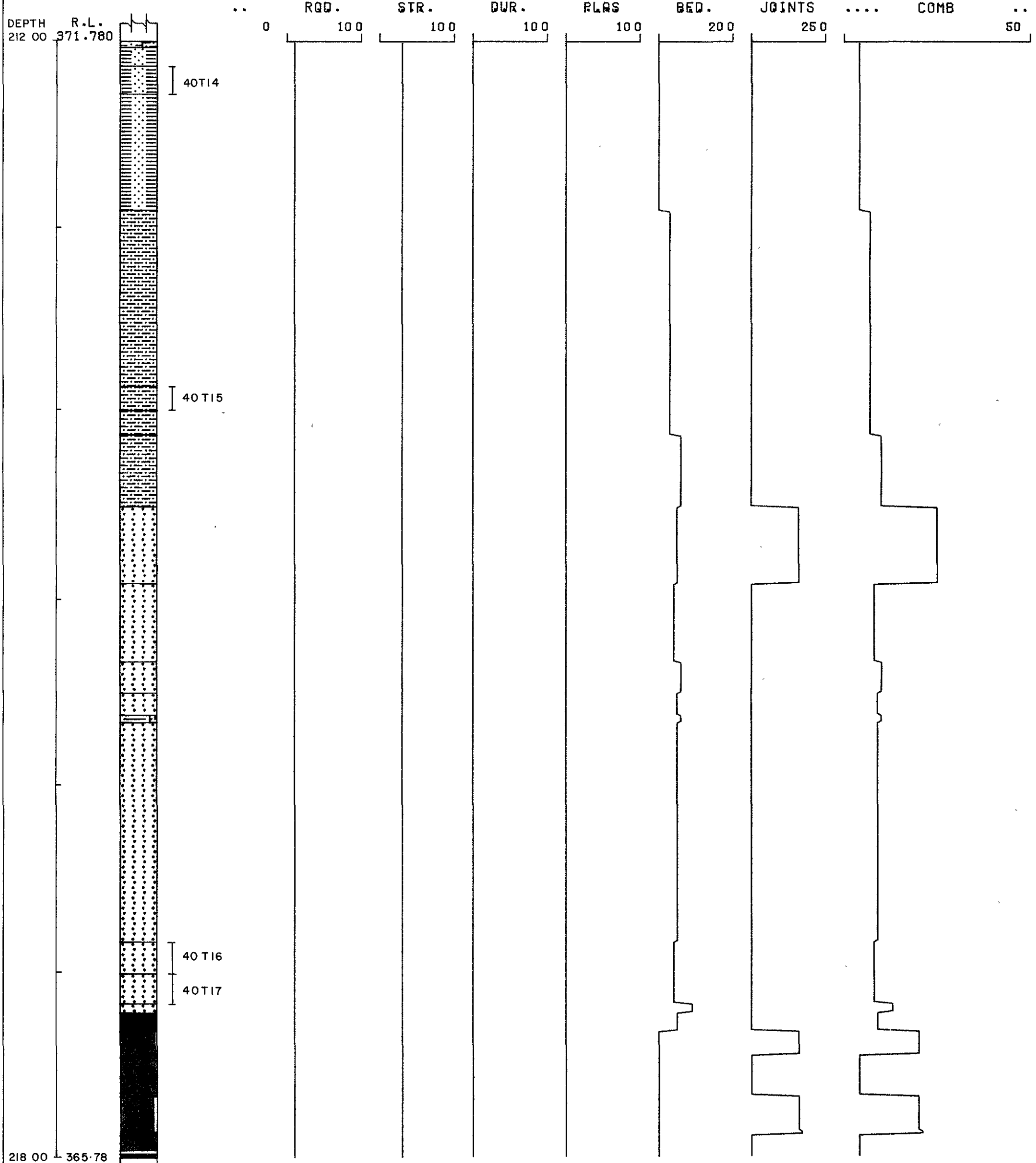
TASMANIA

GY 39 LI ROOF

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/43
REPORT NO: CEPR 11/81	DRAWING NO: 2219	

GY 40



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855304

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

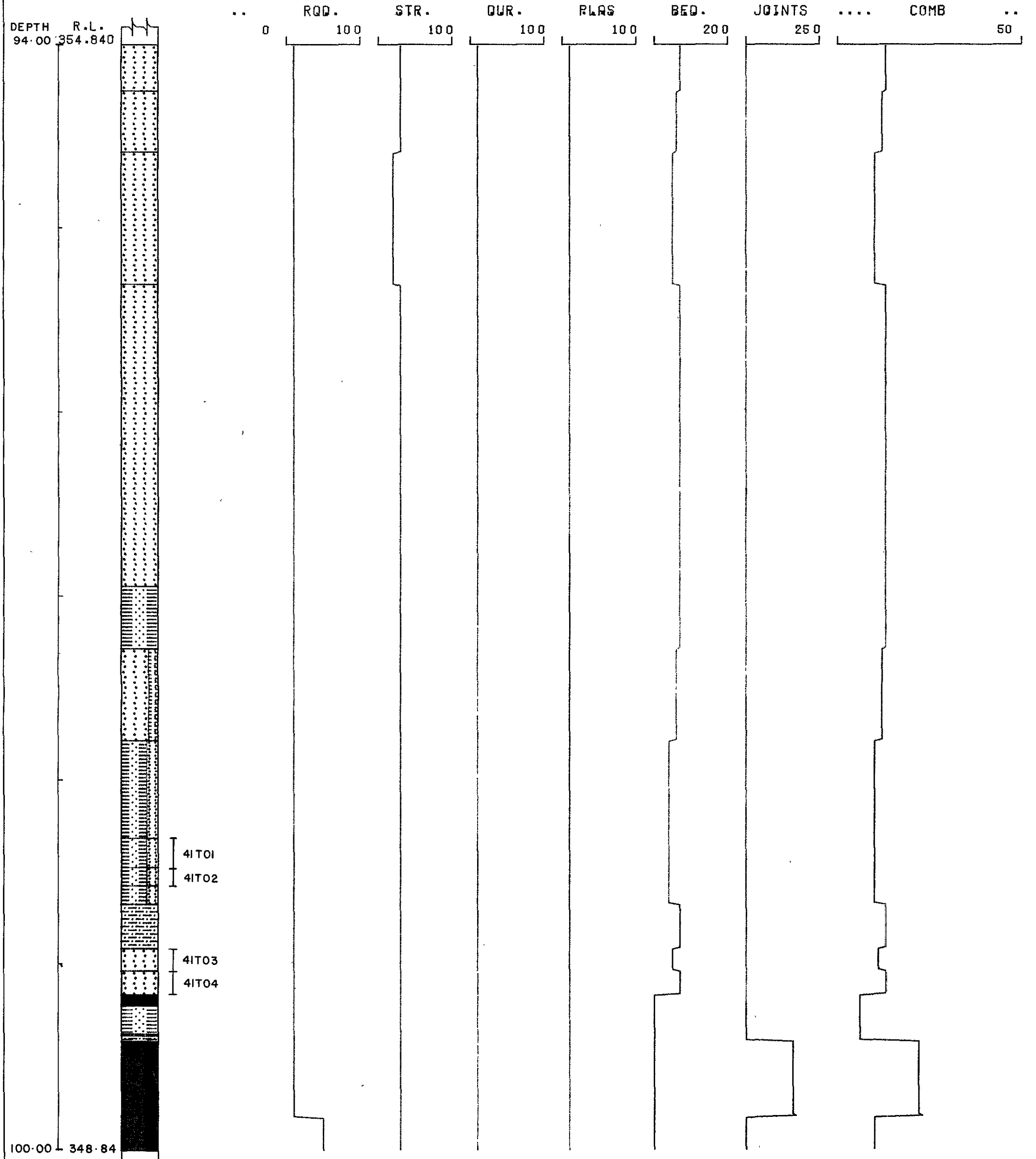
MT NICHOLAS — E L 5/61
TASMANIA

GY 40 LIROOF

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl. 2/44
REPORT NO: CEPR 11/81	DRAWING NO: 2220	

GY 41



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855305

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT NICHOLAS — E L 5/61

TASMANIA

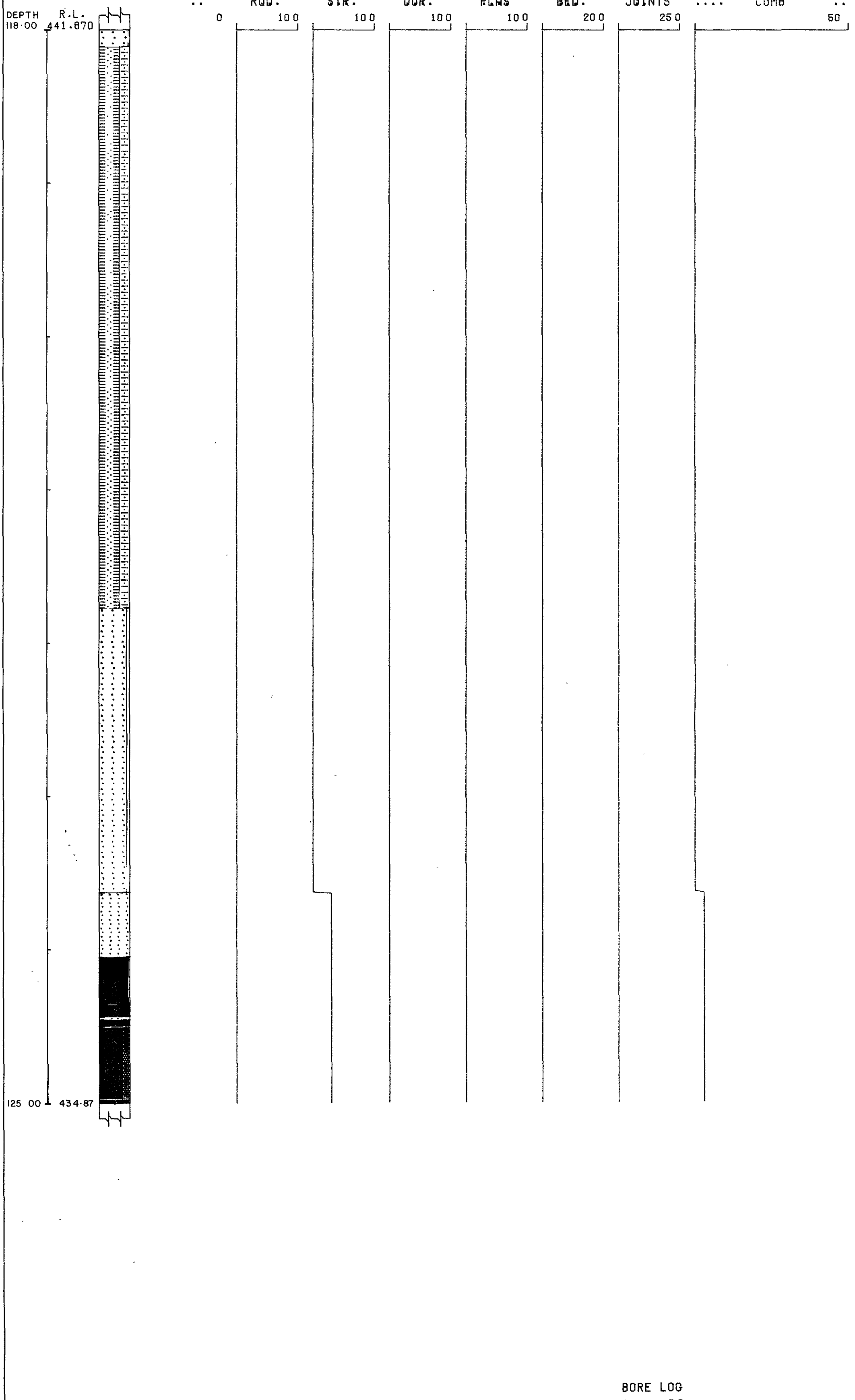
GY 41 LI ROOF

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981
REPORT NO: CEPR 11/81	DRAWING NO: 2221

Encl.2/45

DOM8



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855306

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT NICHOLAS — E L 5/61

TASMANIA

DOM 8 LI ROOF

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/46
REPORT NO: CEPR 11/81	DRAWING NO: 2222	

GY 34



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855307

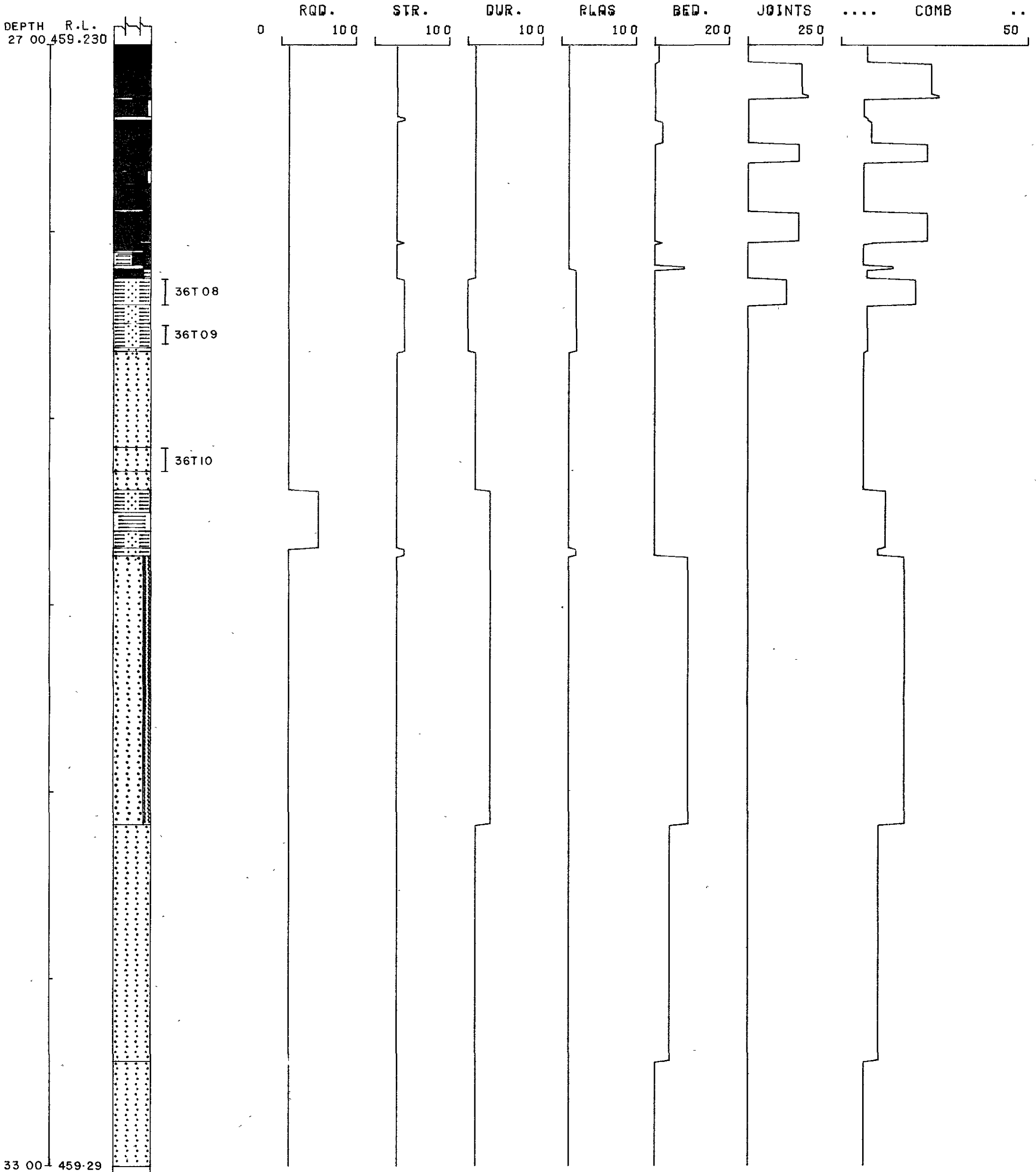
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E L 5/61
TASMANIA

GY 34 M II FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/47
REPORT NO: CEPR 11/81	DRAWING NO: 2223	

GY 36



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855308

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT NICHOLAS — E L 5/61

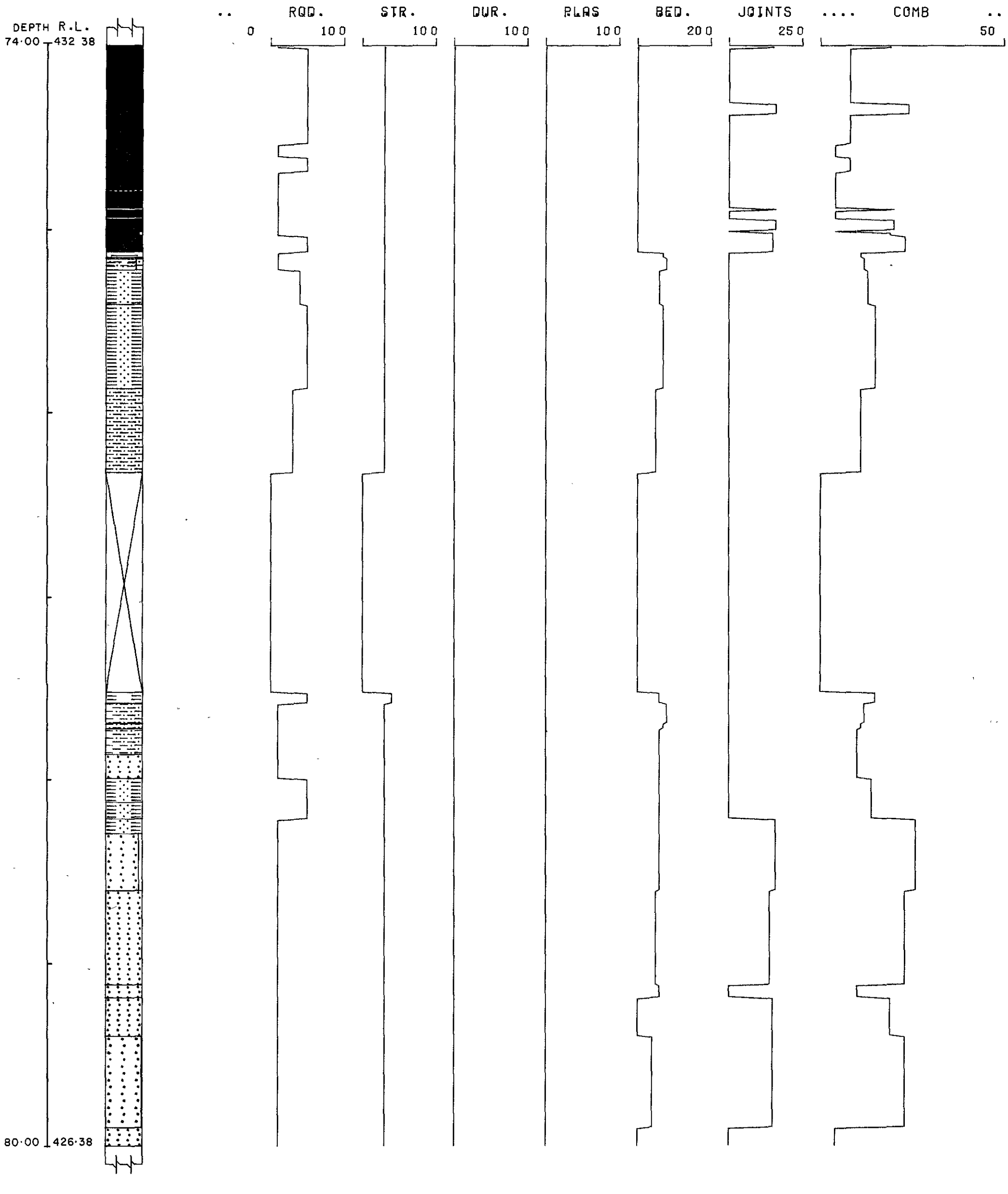
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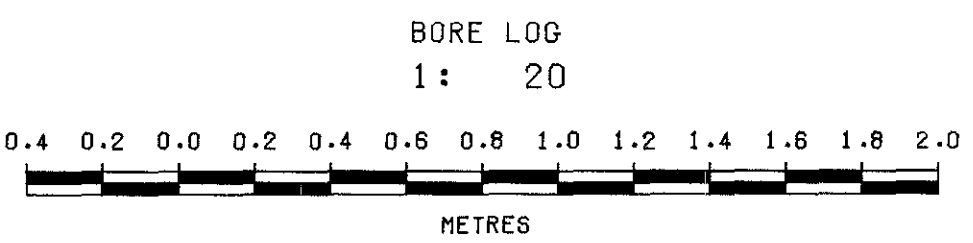
GY 36 MII FLOOR

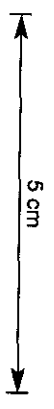
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/48
REPORT NO: CEPR 11/81	DRAWING NO: 2224	

GY 44







855309

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

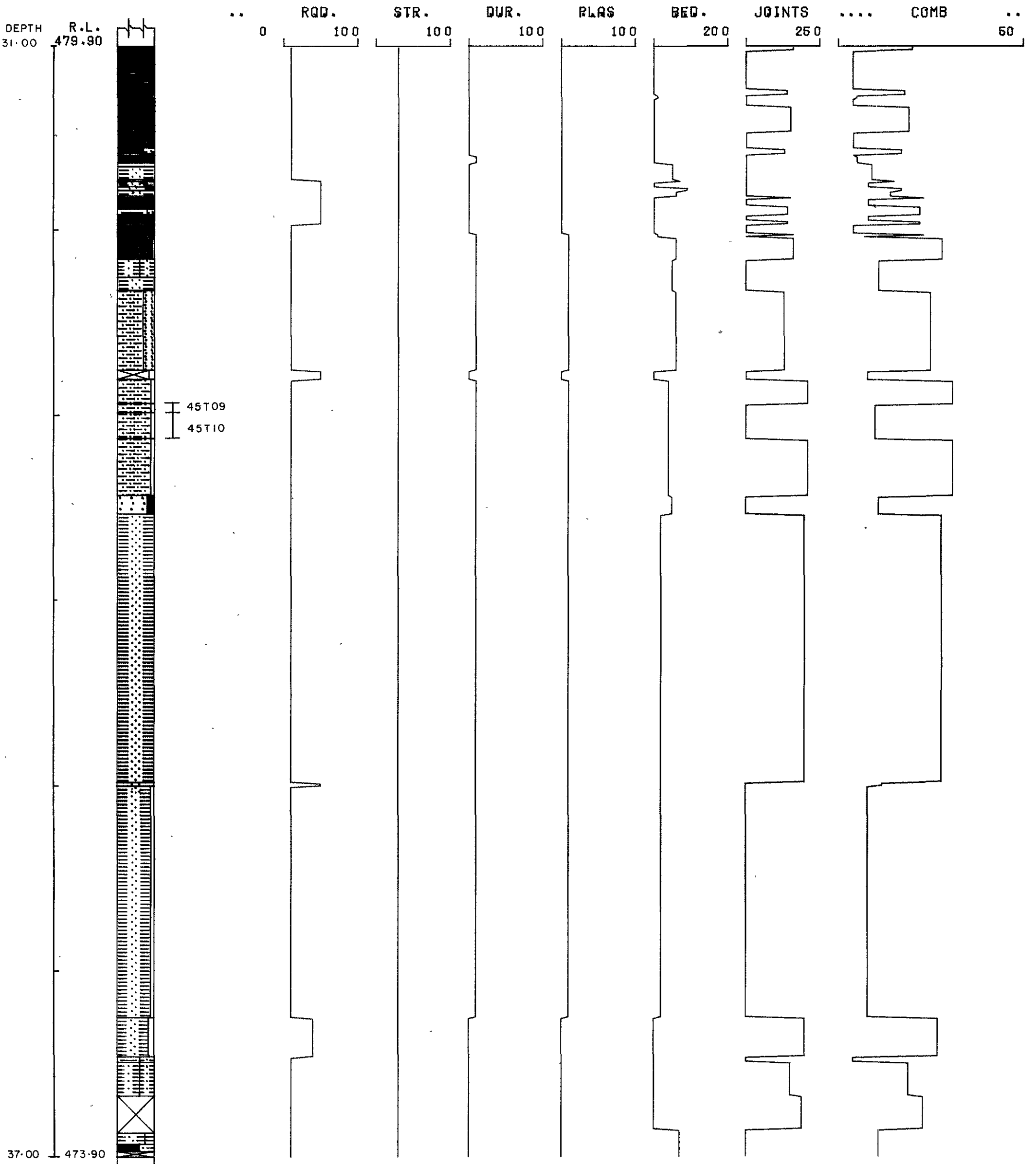
MT NICHOLAS – EL 5/61
TASMANIA

GY 44 MII FLOOR

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: JUNE 1981	Encl.2/49
REPORT NO: CEPR 11/81	DRAWING NO: 2225	

GY 45



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855310

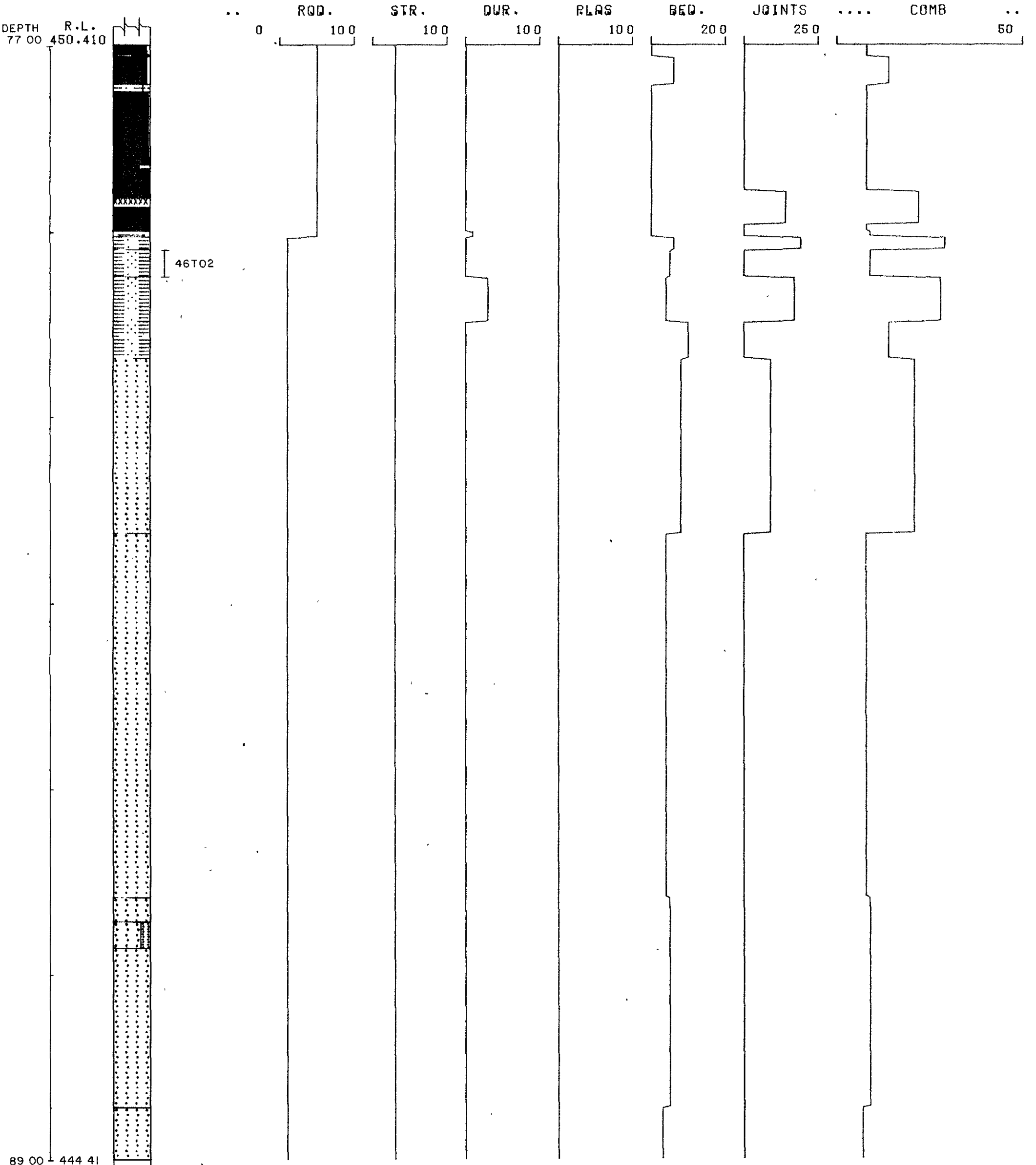
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT. NICHOLAS – EL 5/61
TASMANIA

GY45 MII FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: JUNE 1981	Encl.2/50
REPORT NO: CEPR 11/81	DRAWING NO: 2226	

GY 46



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855311

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT NICHOLAS — E L 5/61

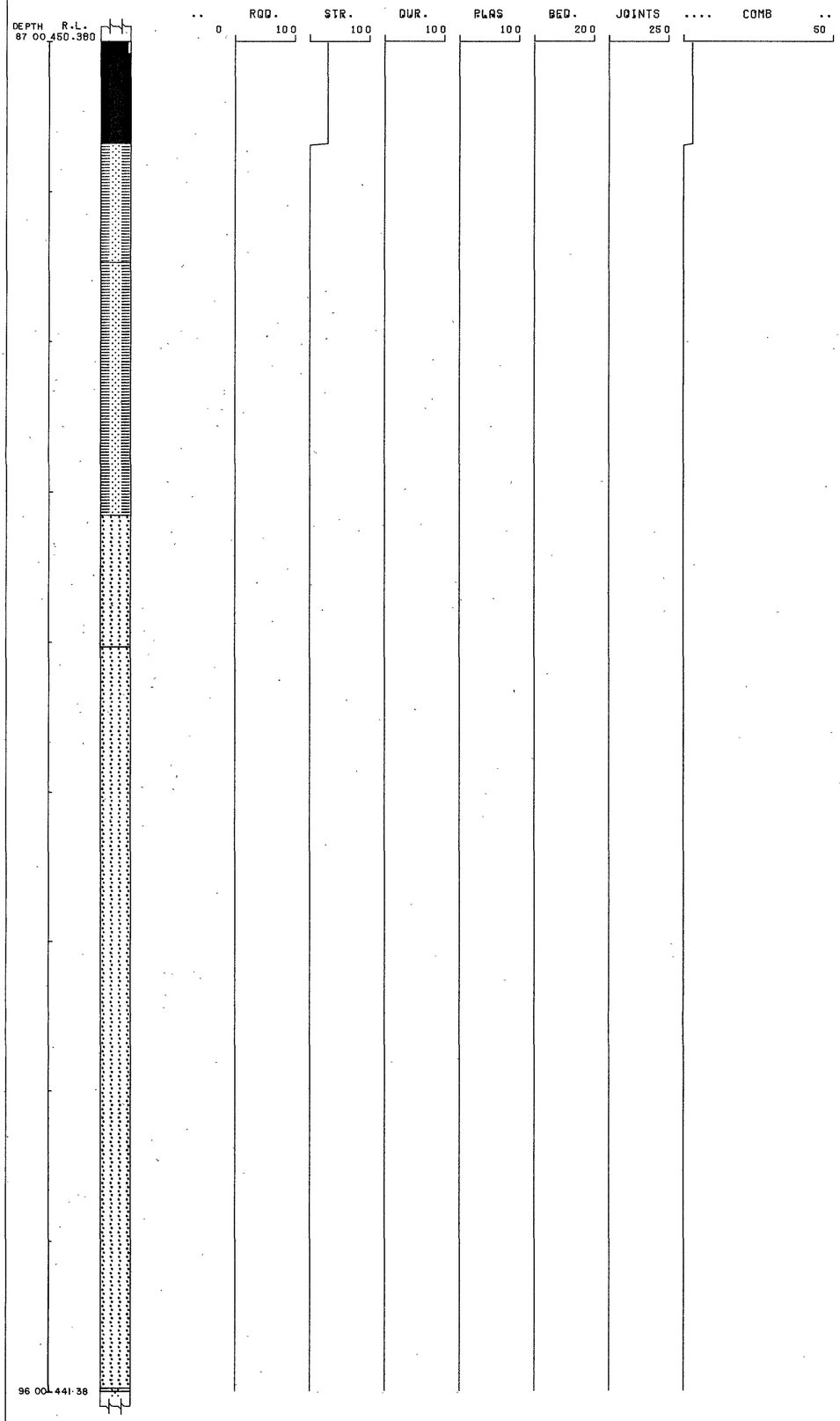
TASMANIA

GY 46 M II FLOOR

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl. 2/51
REPORT NO: CEPR 11/81	DRAWING NO: 2227	

DOM13



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5cm

855812

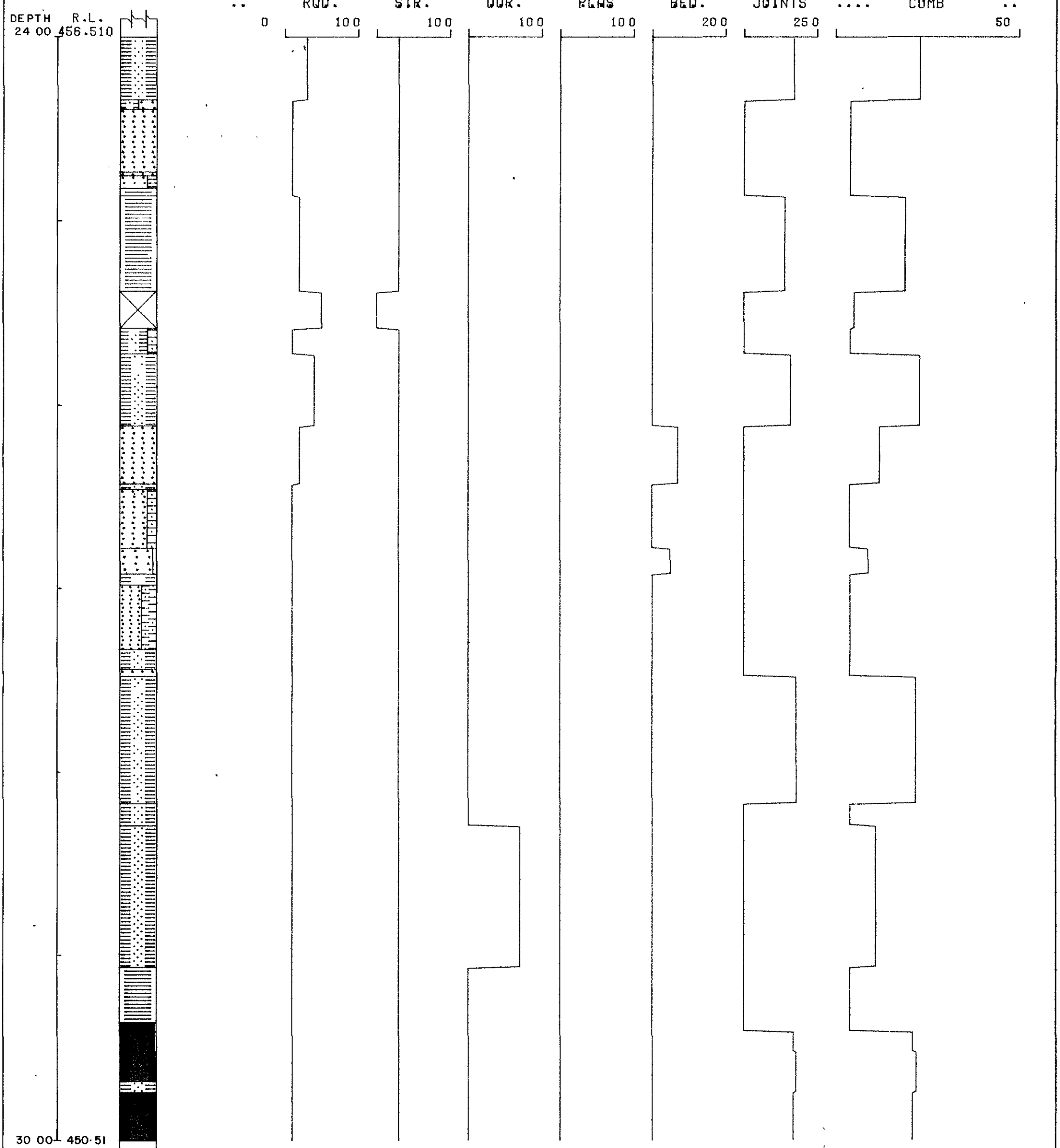
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E L 5/61
TASMANIA
DOM 13 MII FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR:	Coal Division	DATE:	June 1981
REPORT NO:	CEPR 11/81	DRAWING NO:	2228

Encl.2/52

GY 34



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855513

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT NICHOLAS — E L 5/61

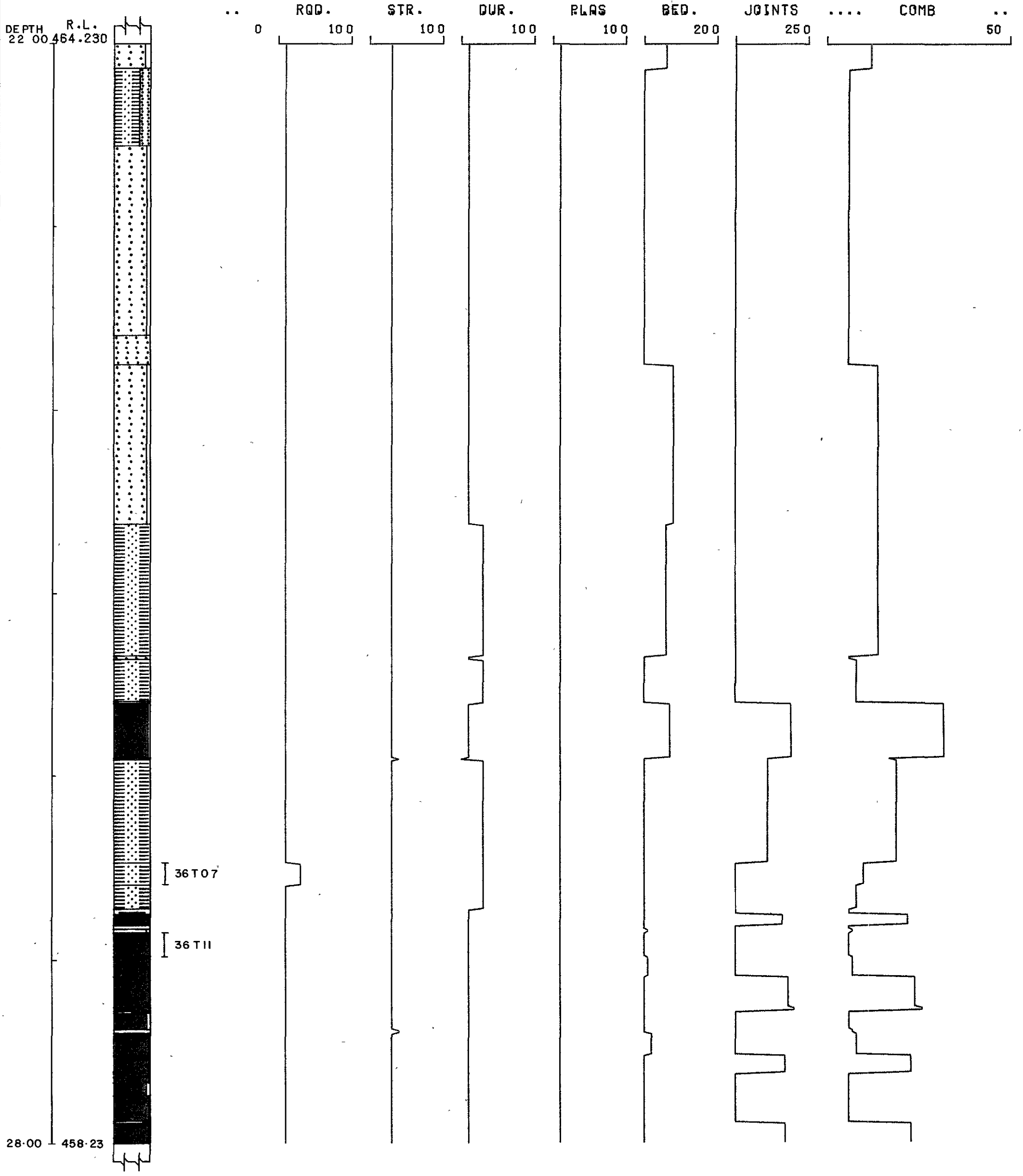
TASMANIA

MII ROOF GY34

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl2/53
REPORT NO: CEPR 11/81	DRAWING NO: 2229	

GY 36



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855314

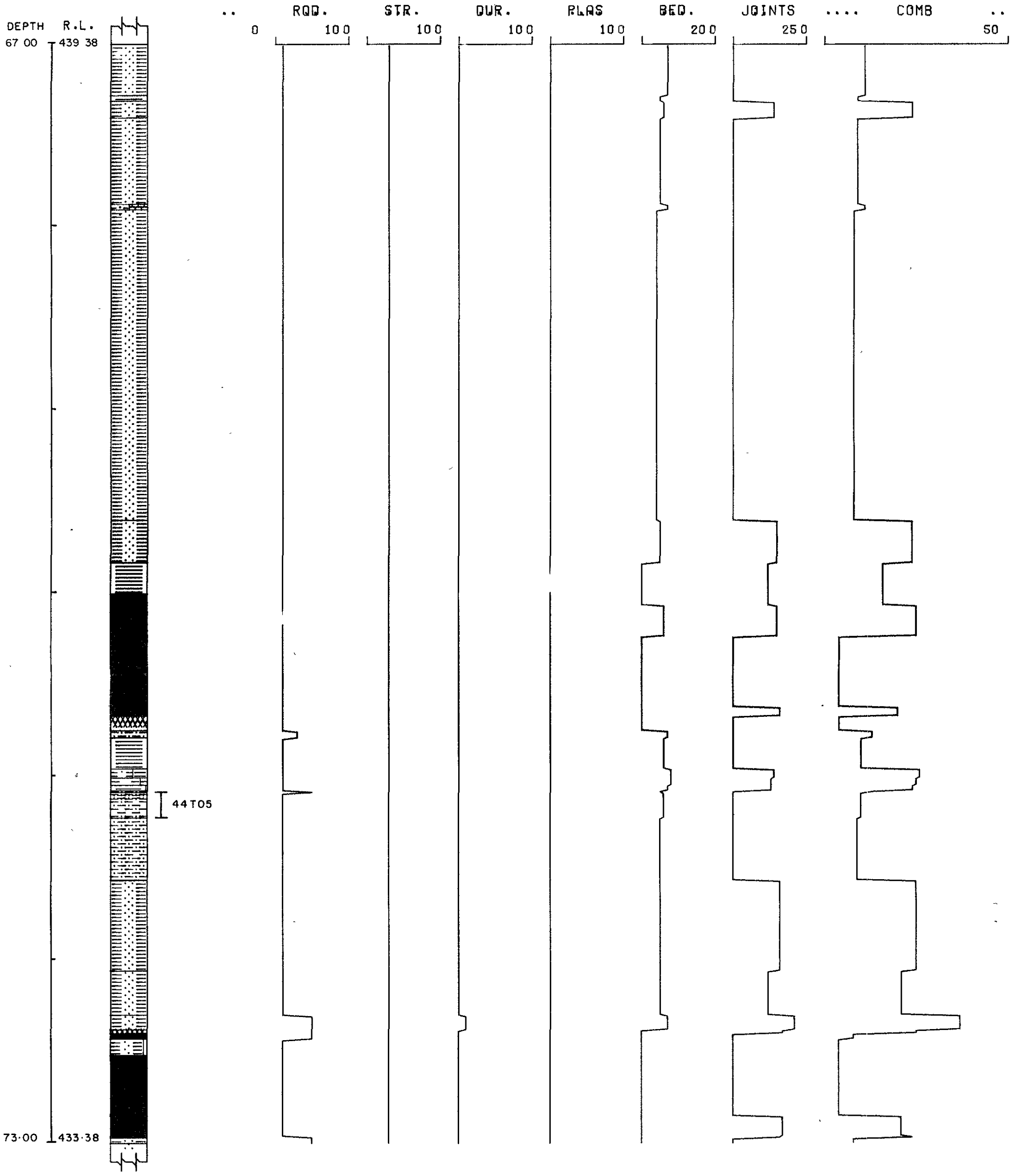
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E L 5/61
TASMANIA

M II ROOF GY 36
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/54
REPORT NO: CEPR 11/81	DRAWING NO: 2230	

GY 44



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855315

THE SHELL COMPANY OF AUSTRALIA LTD.

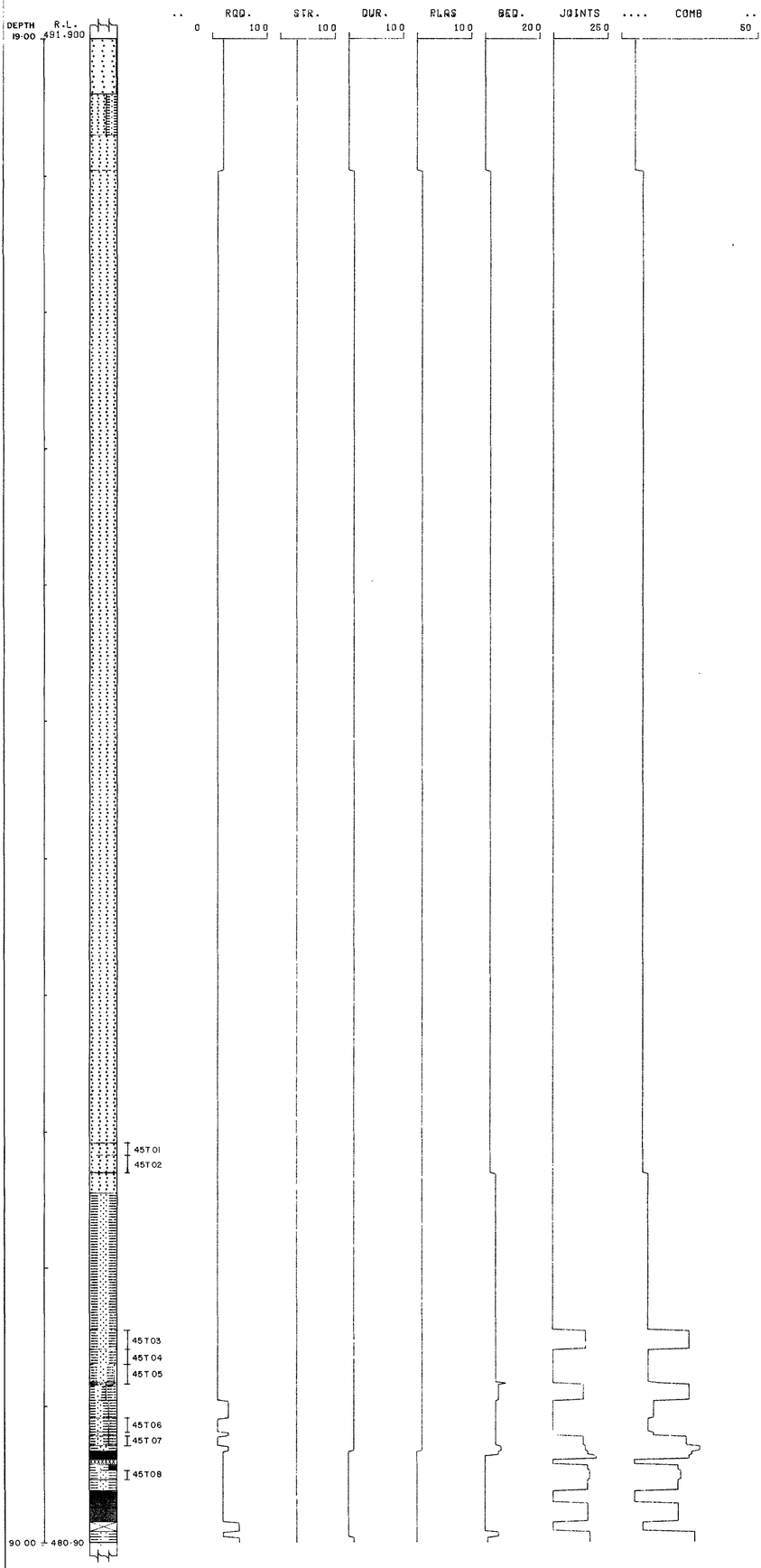
COAL DIVISION

MT. NICHOLAS — EL 5/61
TASMANIA

GY 44 MII ROOF
LITHOLOGY & MECHANICAL
PROPERTIES

AUTHOR: Coal Division	DATE: JUNE 1981	Encl. 2/55
REPORT NO: CEPR 11/81	DRAWING NO: 2231	

GY 45



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5cm

855316

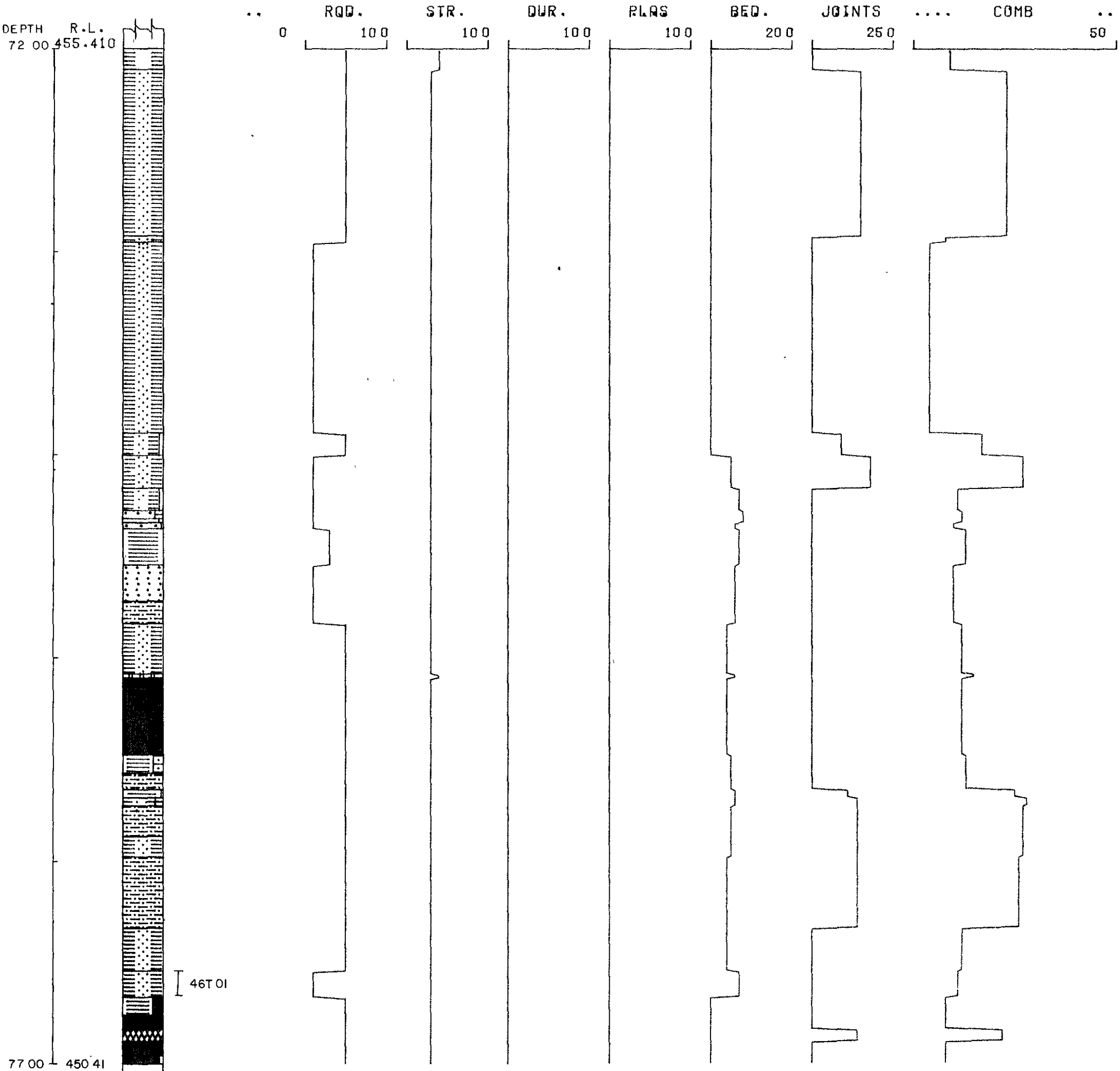
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E L 5/61
TASMANIA

GY45 M II ROOF
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/56
REPORT NO: CEPR 11/81	DRAWING NO: 2232	

GY 46



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855317

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT NICHOLAS — E L 5/61

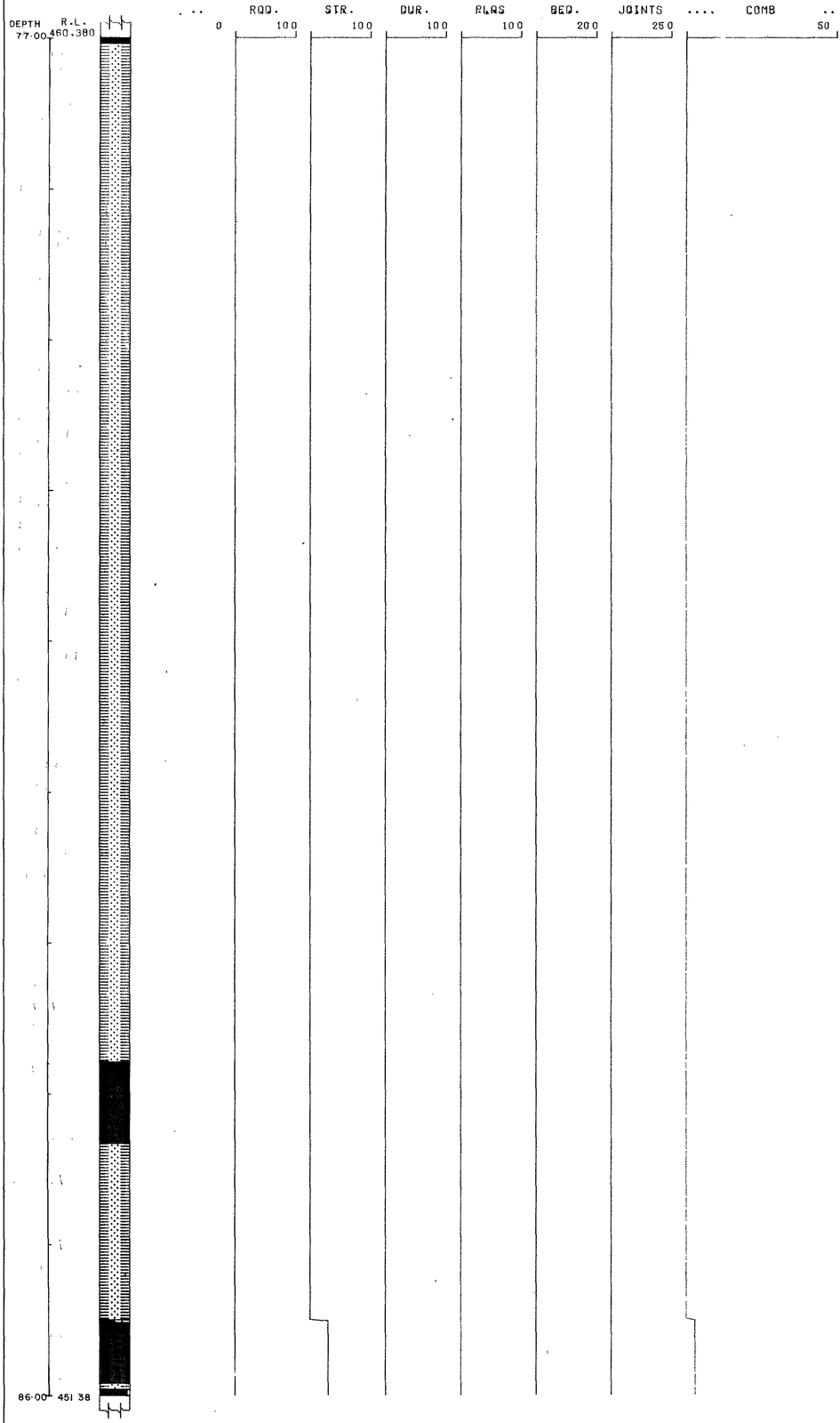
TASMANIA

M III ROOF GY46

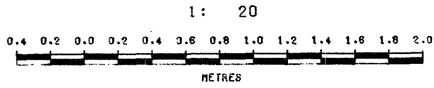
LITHOLOGY & MECHANICAL PROPERTIES

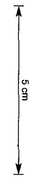
AUTHOR: Coal Division	DATE: June 1981	Encl.2/57
REPORT NO: CEPR 11/81	DRAWING NO: 2233	

DOM13



BORE LOG
1: 20



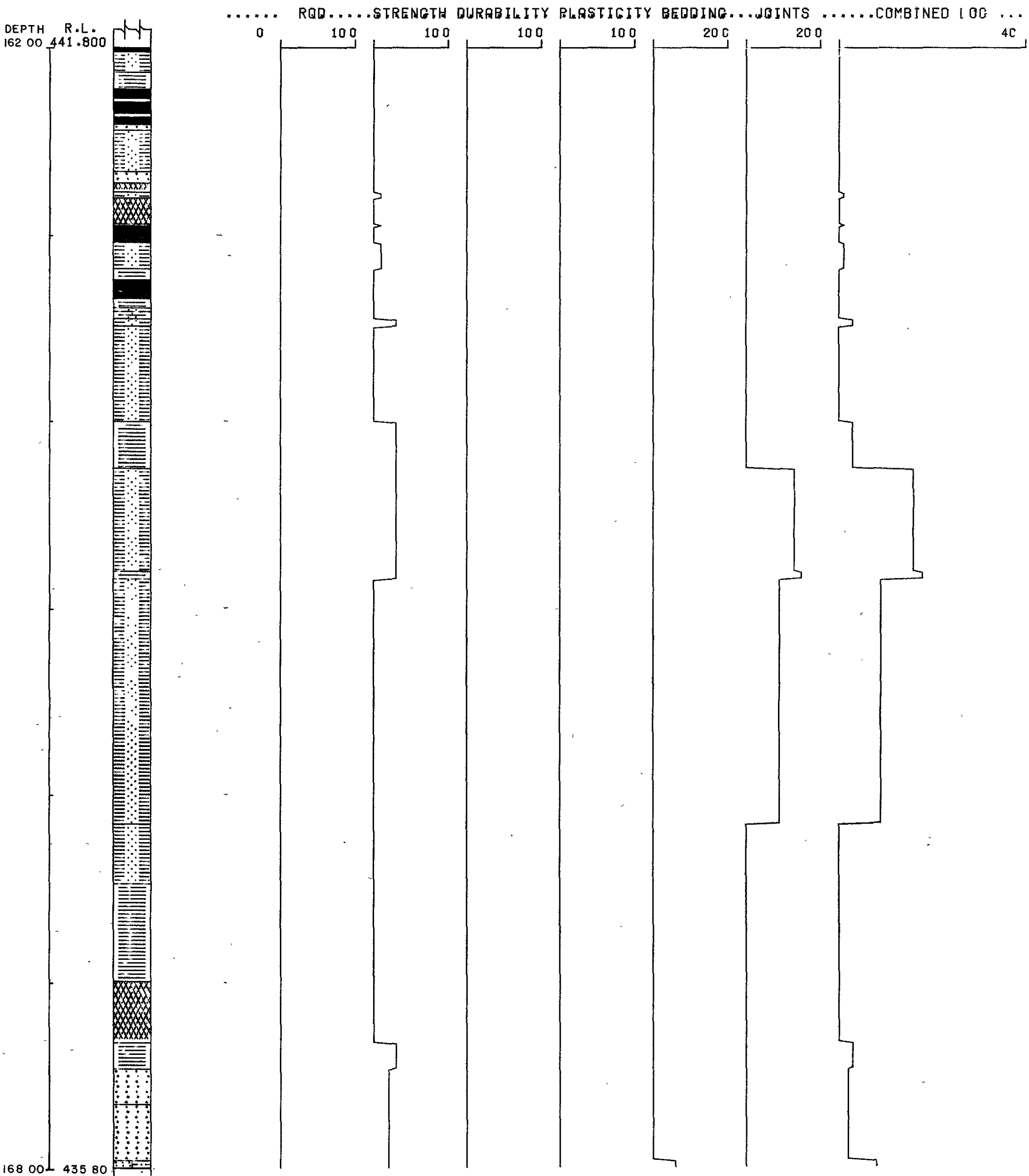


855318

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION
MT NICHOLAS — E L 5/61
TASMANIA
M II ROOF DOM13
LITHOLOGY & MECHANICAL PROPERTIES

AUTHORS: Coal Division		DATE: June 1981	Encl.2/58
REPORT NO: CEPR 11/81		DRAWING NO: 2234	

GY 24



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855319

THE SHELL COMPANY OF AUSTRALIA LTD.

COAL DIVISION

MT. NICHOLAS — E L 5/61

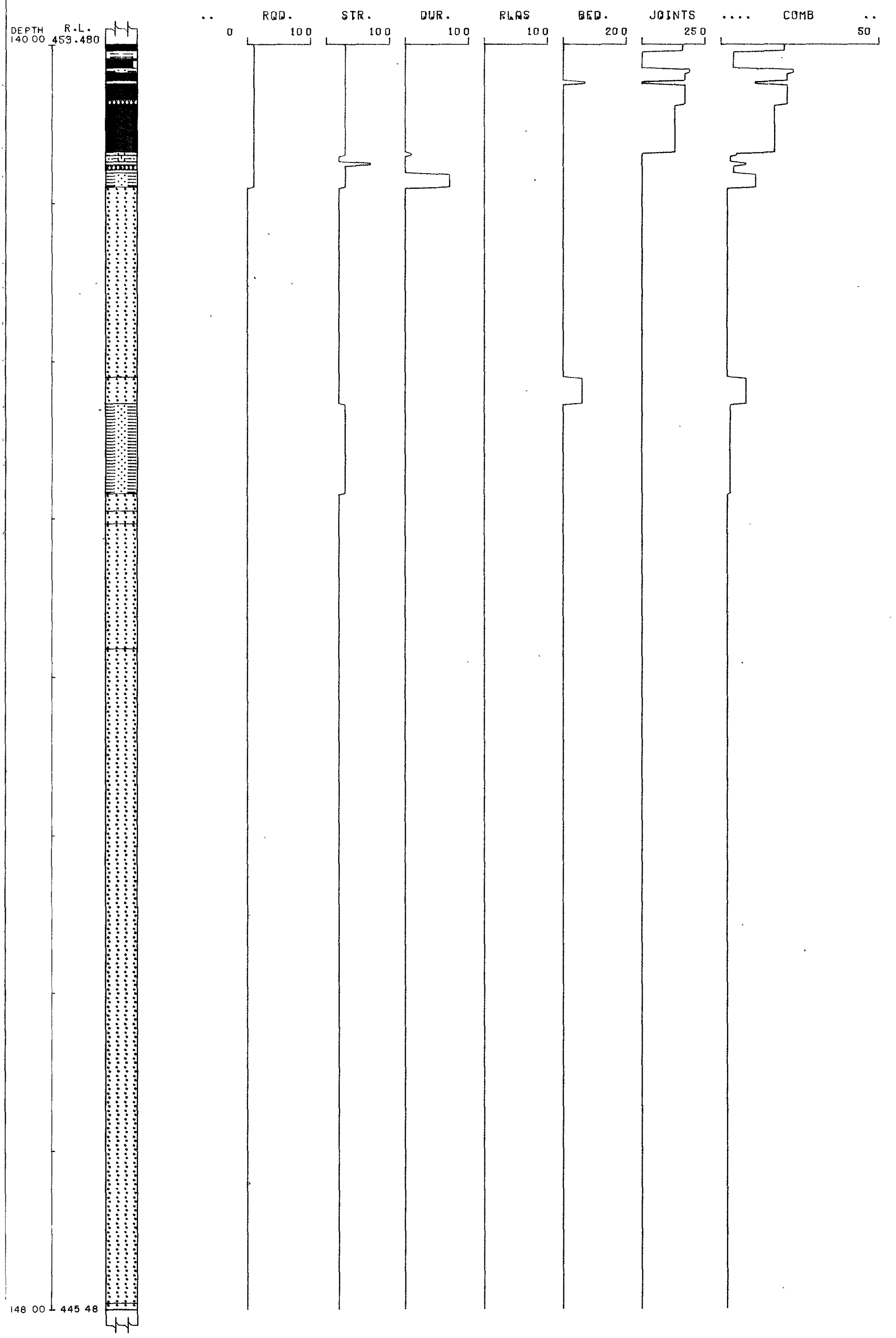
TASMANIA

M I FLOOR GY 24

LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division		DATE: June 1981	Encl. 2/59
REPORT NO: CEPR 11/81		DRAWING NO: 2235	

GY 28



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5cm

855320

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

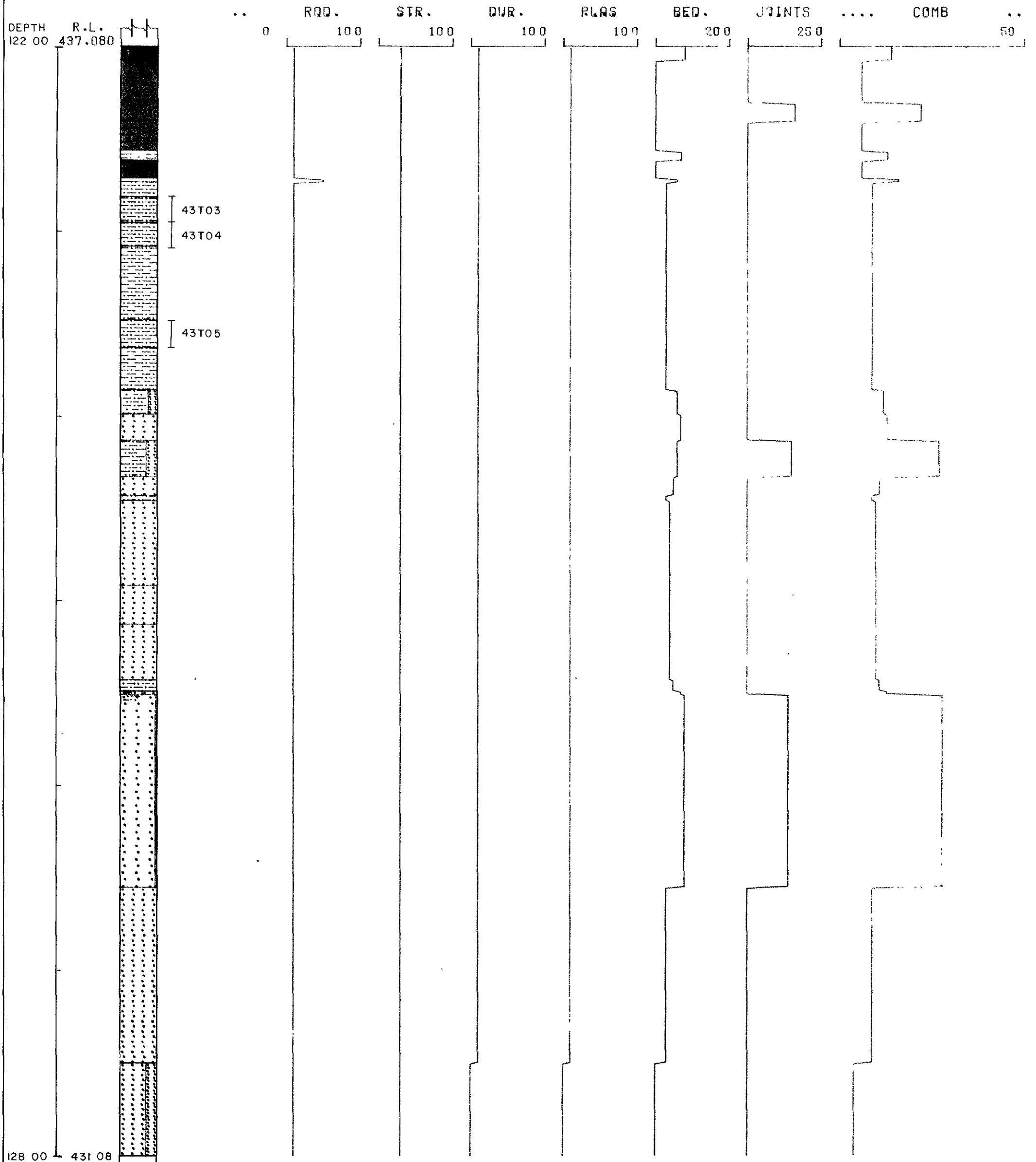
MT NICHOLAS — E.L. 5/61
TASMANIA

MI FLOOR GY28
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981
REPORT NO: CEPR 11/81	DRAWING NO: 2236

Encl. 2/60

GY 43



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855321

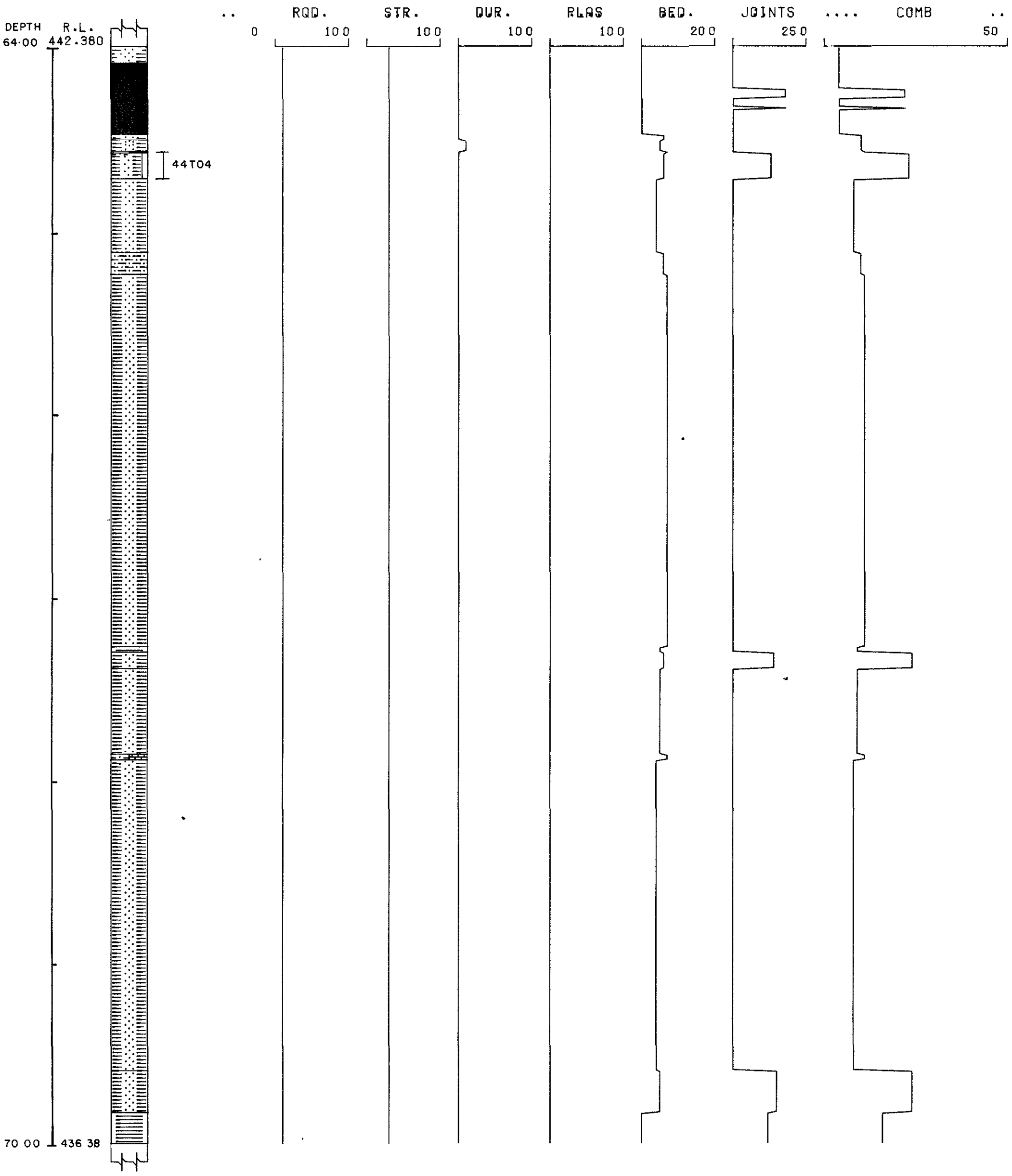
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E L 5/61
TASMANIA

MI FLOOR GY43
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl .2/61
REPORT NO: CEPR 11/81	DRAWING NO: 2237	

GY 44



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855322

THE SHELL COMPANY OF AUSTRALIA LTD.

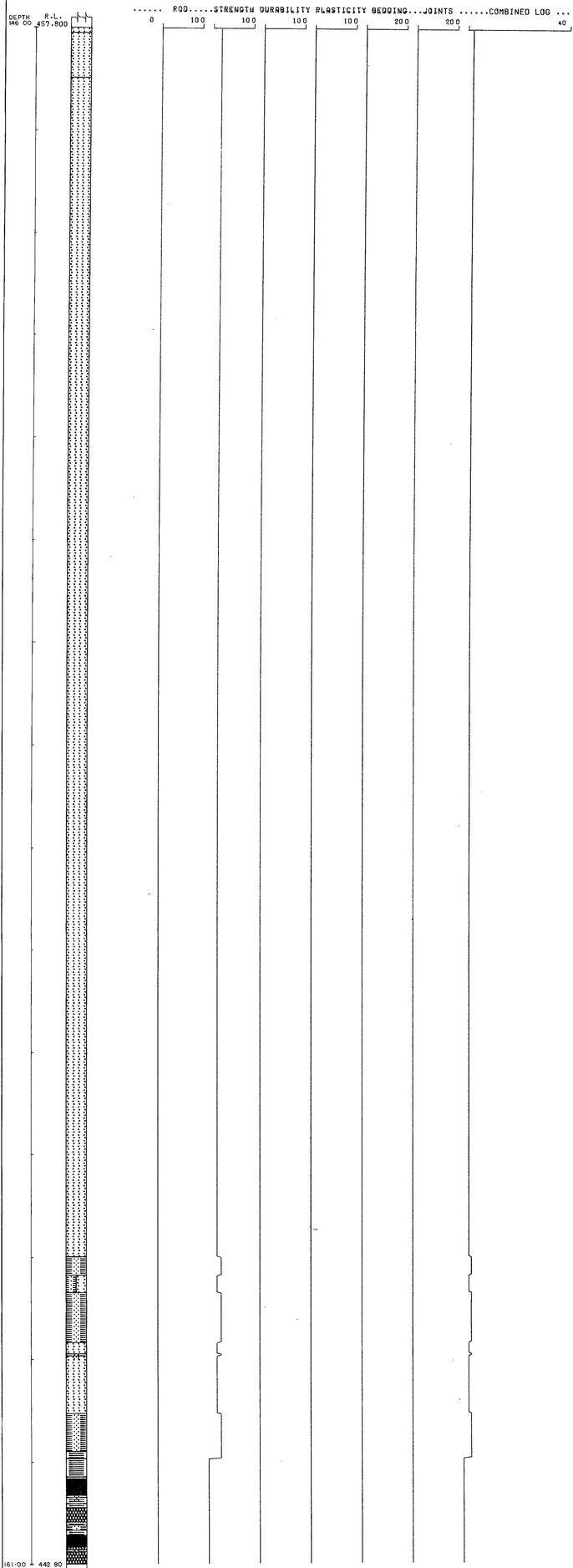
COAL DIVISION

MT NICHOLAS – EL 5/61
TASMANIA

GY44 MI FLOOR
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: JUNE 1981	Encl.2/62
REPORT NO: CEPR 11/81	DRAWING NO: 2305	

GY 24



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5cm

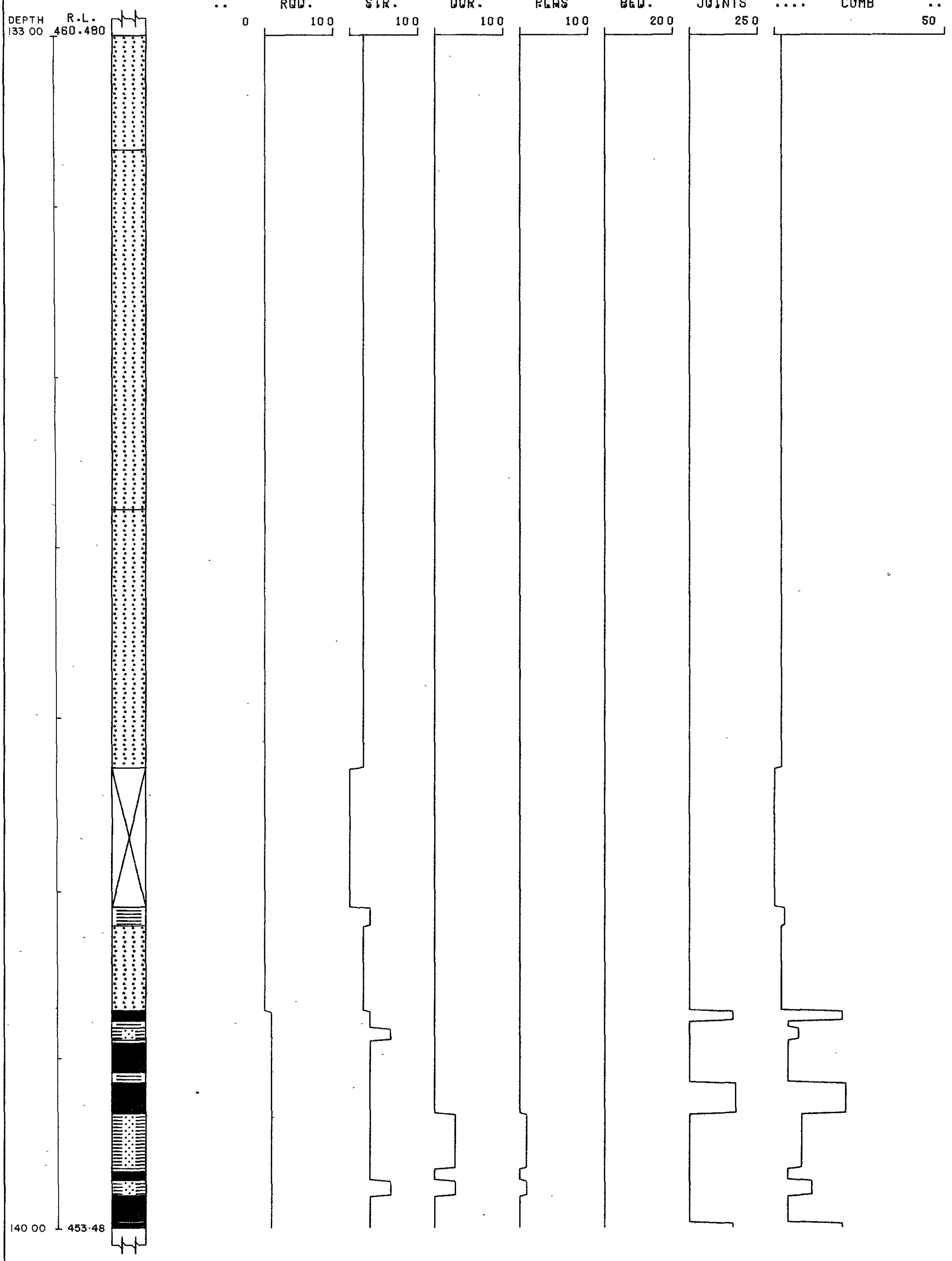
855323

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E L 5/61
TASMANIA
M I ROOF GY24
LITHOLOGY & MECHANICAL PROPERTIES.

AUTHOR: Coal Division	DATE: June 1981	Encl 2/63
REPORT NO: CEPR 11/81	DRAWING NO: 2239	

GY 28



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855324

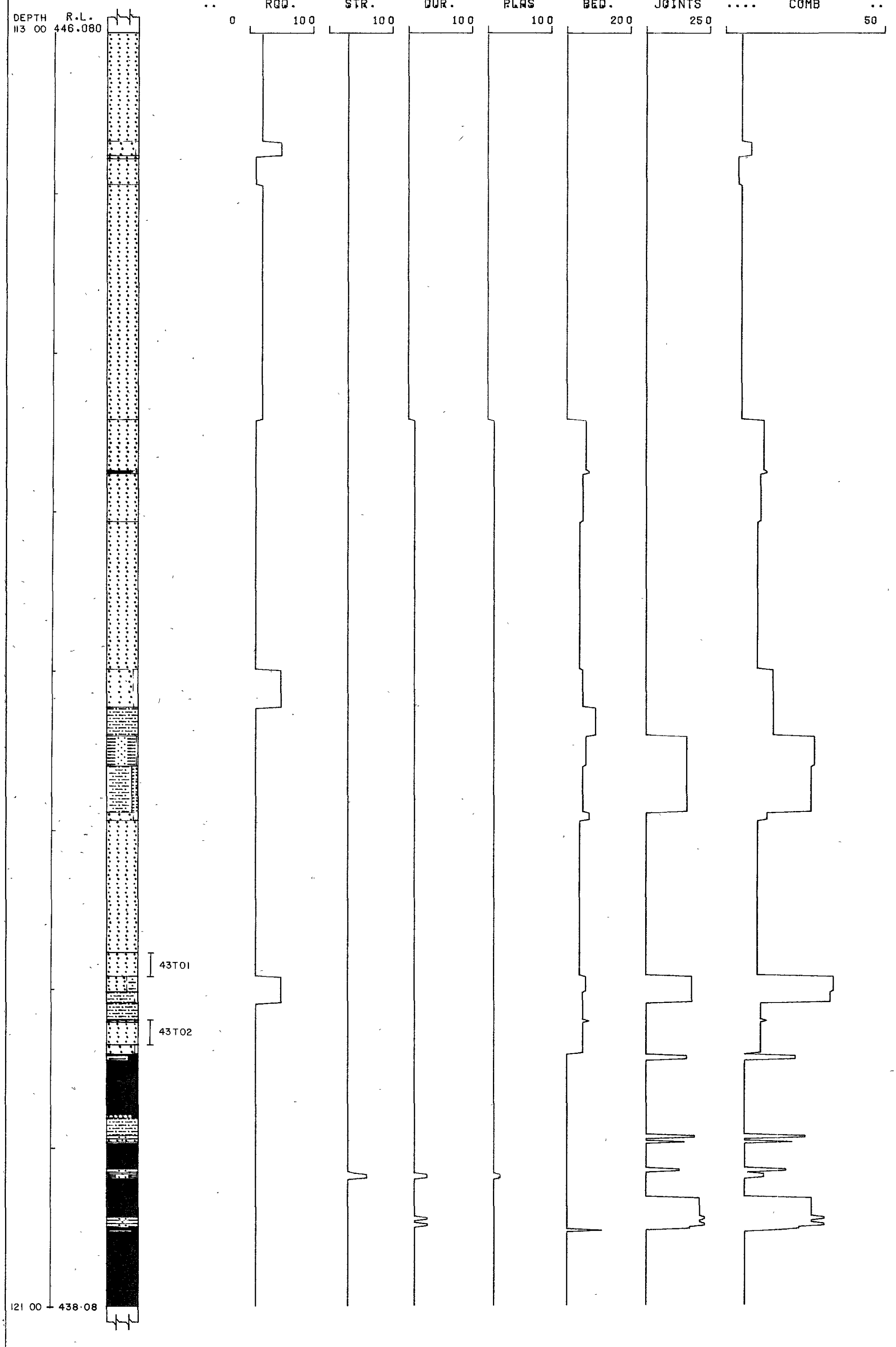
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS. — E L 5/61
TASMANIA

M I ROOF GY28
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: Jura 1981	Encl.2/64
REPORT NO: C E P R 11/81	DRAWING NO: 2240	

GY 43



BORE LOG
1 : 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

METRES

5 cm

855325

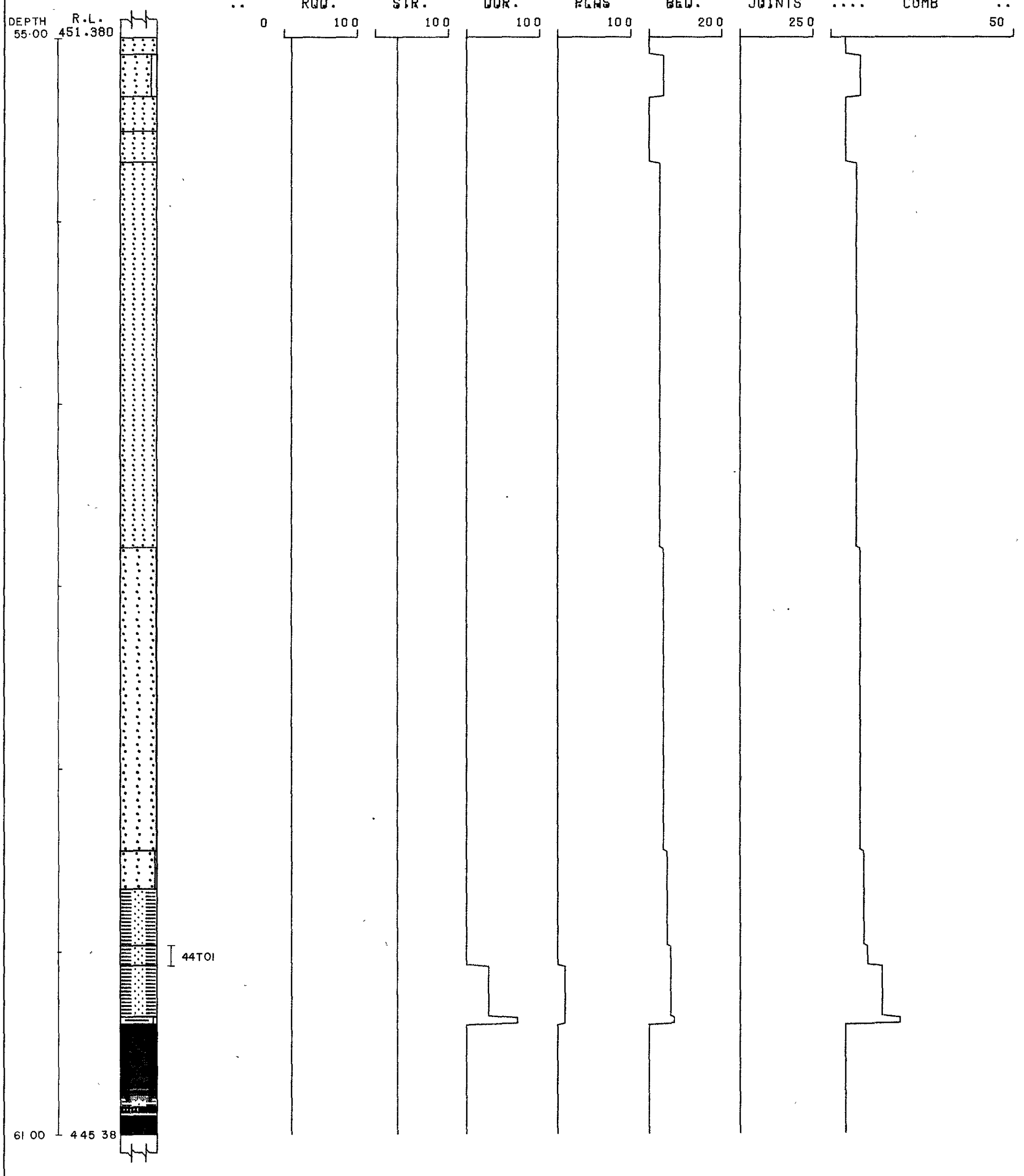
THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E L 5/61
TASMANIA

GY 43 M I ROOF
LITHOLOGY & MECHANICAL PROPERTIES

AUTHOR: Coal Division	DATE: June 1981	Encl.2/65
REPORT NO: CEPR 11/81	DRAWING NO: 2241	

GY 44



BORE LOG
1: 20

0.4 0.2 0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0
METRES

5 cm

855326

THE SHELL COMPANY OF AUSTRALIA LTD.
COAL DIVISION

MT NICHOLAS — E.L 5/61
TASMANIA
MI ROOF GY44
LITHOLOGY & MECHANICAL PROPERTIES

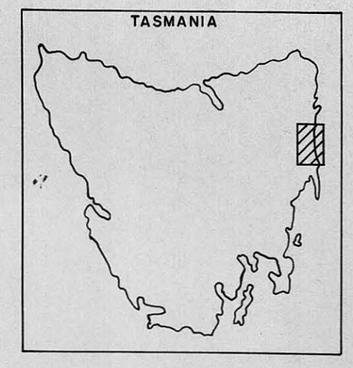
AUTHOR: Coal Division	DATE: June 1981	Encl. 2/66
REPORT NO: CEPR 11/81	DRAWING NO: 2242	

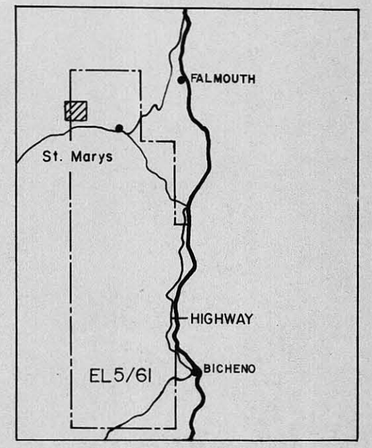
589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

EL 5/61

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY44
GY46
GY37
GY36
GY42
GY45
GY24
GY26
0.65
0.5
GY39
0
0.0
DOM8
0
GY40
0
GY28
0
GY43
THE CORNWALL COAL CO. N.L.
0.0
0.5
1.0
1.5
2.0
GY33
2.22
GY41
2.20
GY38
GY35





LEGEND

Subcrop

Washout

Sandstone

8553238

5 cm

SCALE

0 500 1000 1500m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L I ROOF - MUDSTONE ISOPACH

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 2/68
Report No: CEPR 11/81	Drawing No: 2261	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

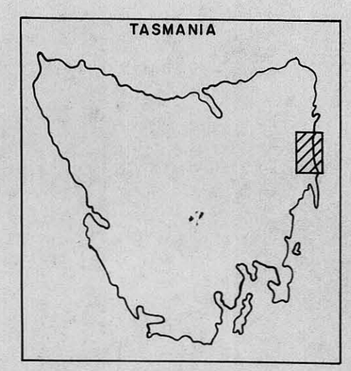
5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

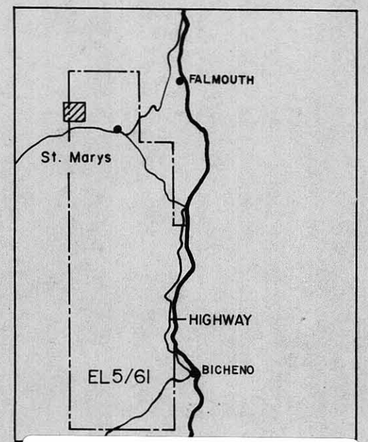
EL 5/61

GY31 1.14
GY34 0.79
DOM13 0
GY44 0
GY46 GY37 0
GY36 0
GY42 0
GY45 0.45
GY24 0
GY26 1.03
GY39 0.68
DOM8 0.69
GY40 1.12
GY28 1.26
GY43 1.53
GY33 1.47
GY41 1.79
GY38
GY35

1.0
0.5
0.0
0.5
0.5
1.0
1.5

THE CORNWALL COAL CO. N.L.





5 cm

LEGEND
Subcrop
Fault
Dolerite
Sandstone

855327

SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L II ROOF - MUDSTONE ISOPACH

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 2/67
Report No: CEPR 11/81	Drawing No: 2262	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

EL 5/61

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34 2.03
DOM13 1.17
GY46
GY37 1.81
GY36 2.10
GY42 2.58
GY44 1.59
GY45 1.89
GY24 0.35
GY26 0.05
GY39 0.57
GY40 0.54
GY28 0
DOM8 0
GY43 0.65
GY33 0.18
GY41
GY38
GY35

1.50
2.50
2.00
1.50
1.00
0.05
0.0
0.0
0.50

THE CORNWALL COAL CO. N.L.

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
BICHENO
EL 5/61

5 cm

LEGEND
Subcrop
Fault
Dolerite
Sandstone

85329

SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MII ROOF - MUDSTONE ISOPACH

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 2/69
Report No: CEPR 11/81	Drawing No: 2260	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

EL 5/61

GY31
GY34
DOM13 0.71
GY44 0.74
GY46
GY37
GY36
GY42 1.15
GY45
GY24 0.62
GY26 1.06
GY39 0.18
0.5
1.0
1.0
0.5
0.0
1.5
DOM8 1.53
GY40 2.0 2.04
GY28 1.43
GY43 0
GY33 0.93
GY41
GY38
GY35

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
BICHENO
EL5/61

LEGEND
Subcrop
Fault
Dolerite
Sandstone

5 cm

SCALE
0 500 1000 1500 m

85330

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MI ROOF - MUDSTONE ISOPACH

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 2/70
Report No: CEPR 11/81	Drawing No: 2259	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

EL 5/61

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31 0
GY34 0.35
DOM13 0.59
GY44
GY46
GY37
GY36 0
GY42 0.05
GY45 0.72
GY24 0.53
0.0
0.5
GY26 0.56
GY39 0.34
1.0
1.5
2.0
2.5
3.0
3.5
DOM8 0.99
GY40 0.17
GY28 1.51
GY43 4.12
GY33 1.24
GY41 1.34
GY38
GY35

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
BICHENO
EL5/61

5 cm

85531

LEGEND
Subcrop
Fault
Dolerite
Sandstone

SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L II FLOOR MUDSTONE ISOPACH

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 2/71
Report No: CEPR 11/81	Drawing No: 2266	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

EL 5/61

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY44
GY46
GY37
GY36
GY42
GY45
GY24
GY26
1.03
GY39
0.68
DOM8
0.69
GY40
1.12
GY28
1.26
1.0
0.5
THE CORNWALL COAL CO. N.L.
GY43
GY33
1.47
GY41
0.26
GY38
GY35

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO

LEGEND
Subcrop
Washout

855332

5 cm

SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L I FLOOR - MUDSTONE ISOPACH

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 2/72
Report No: CEPR 11/81	Drawing No: 2265	

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN 5402000mN 5401000mN 5400000mN 5399000mN 5398000mN

GY31

GY34 1.42

DOM13 2.47

GY46 GY37 0.66

GY36 0.25

GY42 1.06

GY44 0.72

GY45 0.17

GY24 0.74

GY26 0.49

GY39 0

DOM8 0.18

GY40 0

GY28 0.26

GY43 0.45

GY33 1.48

GY41

GY38

GY35

2.0 1.5 1.0 0.5 0.5 0.0 0.5 1.0

THE CORNWALL COAL CO. N.L.

TASMANIA

EL5/61

FALMOUTH

St. Marys

HIGHWAY

BICHENO

5 cm

LEGEND

Subcrop

Fault

Dolerite

Sandstone

SCALE

0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

M II FLOOR-MUDSTONE ISOPACH

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 2/73
Report No: CEPR 11/81	Drawing No: 2264	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

EL 5/61

GY31
GY34
DOM13 1.92
GY46
GY37
GY36
GY42 1.01
GY44 5.28
GY45
GY24 3.41
GY26 13.03
GY39
DDM8 3.3
GY40 2.53
GY28 0.09
GY43 0.02
GY33 0.16
GY41
GY38
GY35

0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO

5 cm

LEGEND
Subcrop
Fault
Dolerite
Sandstone

85534

SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA — GRAY EL 5/61
MT NICHOLAS AREA

MI FLOOR-MUDSTONE ISOPACH

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 2/74
Report No: CEPR 11/81	Drawing No: 2263	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

EL 5/61

GY31 23.2
GY34 10.3
DOM13 (4.0)
GY46 GY37
GY36 8.0
GY42 11.2
GY44 21.2
GY45 16.6
GY24 10.8
GY26 3.4
GY39 10.6
DOM8 (2.1)
GY40 6.7
GY28 7.3
GY43 22.5
GY33 22.2
GY41 11.3
GY38
GY35

20 15 10 5 10 15 20 15 20

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO

LEGEND

Subcrop
Washout
Dolerite
— 10 — Isoline
16.6 Combined Value (see Text 7.2)

5 cm

SCALE

0 500 1000 1500 m

85535

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L II ROOF MECHANICAL PROPERTIES OVER 2m INTERVAL

Scale 1:20,000

Author: Coal Division	Date: June 1981	Encl. 2/75
Report No: CEPR 11/81	Drawing No: 2270	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

EL 5/61

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY44
GY46
GY37
GY36
GY42
GY45
GY24
GY26
2.6
GY39
11.3
5
10
DOM8
0.6
GY40
8.9
GY28
10.2
10
5
GY43
GY33
14.9
GY41
11.2
GY38
GY35

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL 5/61
BICHENO

5 cm

8553536

LEGEND

- Subcrop
- Washout
- 10 — Isoline
- Dolerite
- 2.6 Combined Value (see Text 7.2)

SCALE

0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA — GRAY EL 5/61
MT NICHOLAS AREA

LI ROOF
MECHANICAL PROPERTIES
OVER 2m INTERVALS

Scale 1 20,000

Author Coal Division	Date June 1981	Encl. 2/76
Report No CEPR 11/81	Drawing No 2387	

EL 5/61

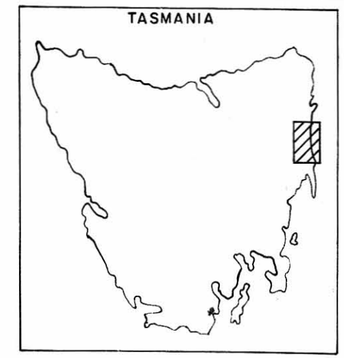
589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

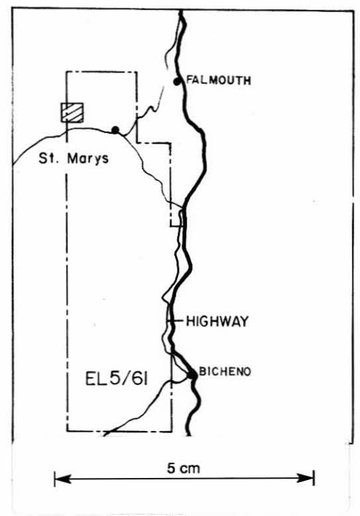
5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34 12.9
DOM13
GY44 16.0
GY46
GY37 16.8
GY36 16.7
GY42 13.7
GY45 12.9
GY24 0.8
GY26 7.4
GY39 7.1
DOM8 6.0
GY40 11.6
GY28 2.4
GY43 11.9
GY33 5.2
GY41
GY38
GY35

15
10
5

THE CORNWALL COAL CO. N.L.





LEGEND

- Subcrop
- Washout
- 10 — Isoline
- Dolerite
- 0.8 Combined Value (see Text 7.2)

SCALE 0 500 1000 1500 m

85533?

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA
MII ROOF
MECHANICAL PROPERTIES
OVER 2m INTERVALS
Scale 1 20,000

Author Coal Division	Date June 1981	Encl. 2/77
Report No. CEPR 11/81	Drawing No. 2388	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

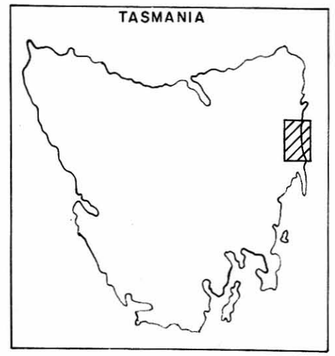
EL 5/61

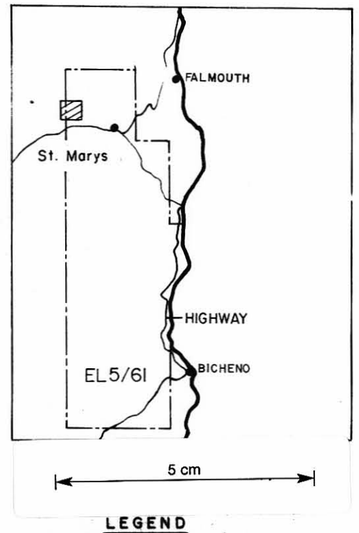
5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY46
GY37
GY44
9.3
GY42
10.8
GY36
9.4
GY45
GY24
2.3
GY26
3.8
GY39
19.2
GY40
19.7
GY28
1.2
DOM8
GY43
16.4
GY33
15.3
GY41
GY38
GY35

10
15
5
10
15

THE CORNWALL COAL CO. N.L.





LEGEND

- Subcrop
- Washout
- 10 — Isoline
- Dolerite
- 2.3 Combined Value (see Text 7.2)

SCALE

0 500 1000 1500 m

85333

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MI ROOF
MEHANICAL PROPERTIES
OVER 2m INTERVAL

Scale 1: 20,000

Author: Coal Division	Date: June 1981	Encl. 2/78
Report No: CEPR 11/81	Drawing No: 2389	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

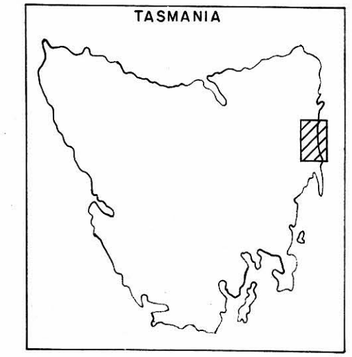
5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

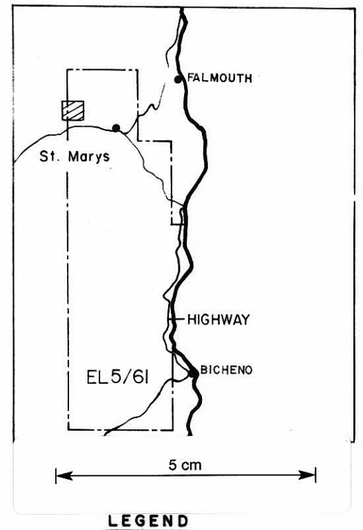
EL 5/61

GY31 2.2
GY34 9.9
DOM13 5.4
GY44 12.4
GY46 GY37
GY36 11.6
GY42 8.9
GY45 10.3
GY24 2.9
GY26 5.2
GY39 11.7
DOM8 0.1
GY40 8.9
GY28 12.6
GY43 27.5
GY33 14.9
GY41 11.2
GY38
GY35

5 10 10 10 15 20 25 5 5

THE CORNWALL COAL CO. N.L.





LEGEND

- Subcrop
- Washout
- 10 — Isoline
- Dolerite
- 2.9 Combined Value (see Text 7.2)

85339

SCALE
0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L II FLOOR
MECHANICAL PROPERTIES
OVER 2m INTERVAL

Scale 1 20,000

Author Coal Division	Date June 1981	Encl. 2/79
Report No CEPR 11/81	Drawing No 2390	

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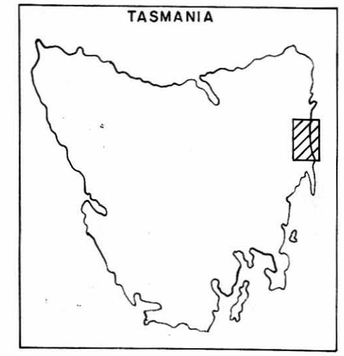
EL 5/61

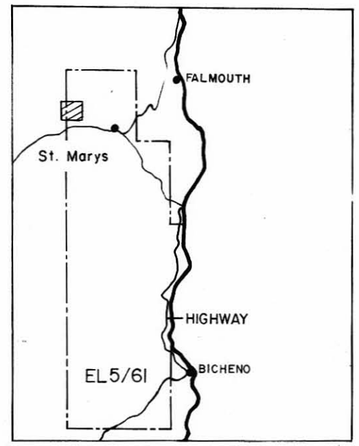
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5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY44
GY46
GY37
GY36
GY42
GY45
GY24
GY26
3.3
GY39
9.9
DOM8
2.1
GY40
6.4
GY28
7.3
GY43
GY33
23.5
GY41
10.9
GY38
GY35

5
10
20

THE CORNWALL COAL CO. N.L.





5 cm

LEGEND

- Subcrop
- Washout
- 10 — Isoline
- Dolerite
- 7.3 Combined Value (see Text 7.2)

SCALE

0 500 1000 1500 m

85340

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

LI FLOOR
MECHANICAL PROPERTIES
OVER 2m INTERVAL

Scale 1 20,000

Author : Coal Division	Date June 1981	Encl. 2/80
Report No : CEPR 11/81	Drawing No. 2391	

EL 5/61

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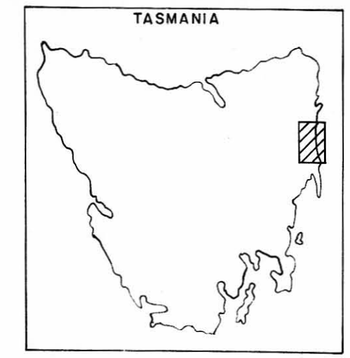
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5401000mN
5400000mN
5399000mN
5398000mN

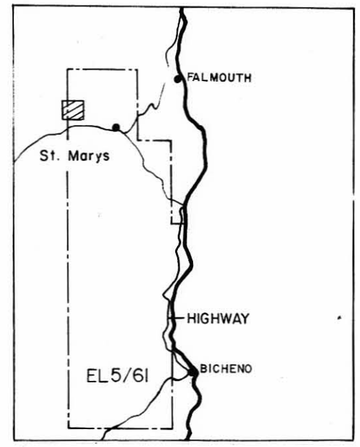
GY31
GY34 10.4
DOM13 0.1
GY46
GY37 17.9
GY36 10.9
GY42 8.1
GY44 7.9
GY45 23.5
GY24 0.03
GY26 2.3
GY39
DOM8
GY40 7.5
GY28 2.1
GY43 5.1
GY33 15.0
GY41
GY38
GY35

5 10 15 20

THE CORNWALL COAL CO. N.L.

TASMANIA





5 cm

855341

LEGEND

- Subcrop
- Washout
- 10 — Isoline
- Dolerite
- 5.1 Combined Value (see Text 7.2)

SCALE

0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

M II FLOOR
MECHANICAL PROPERTIES
OVER 2m INTERVAL

Scale 1 20,000

Author Coal Division	Date June 1981	Encl. 2/81
Report No CEPR 11/81	Drawing No 2392	

EL 5/61

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY44 11.1
GY46
GY37
GY36 8.5
GY42 7.8
GY45
GY24 7.4
GY26 3.0
GY39 20.7
20
15
10
5
10
DOM8
GY40 7.8
GY28 3.1
GY43 11.5
GY33 3.7
GY41
GY38
GY35

THE CORNWALL COAL CO. N.L.

TASMANIA

FALMOUTH
St. Marys
HIGHWAY
EL5/61
BICHENO
5 cm

LEGEND

- Subcrop
- Washout
- 10 — Isoline
- Dolerite
- 3.1 Combined Value (see Text 7.2)

SCALE
0 500 1000 1500 m

85342

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MI FLOOR
MECHANICAL PROPERTIES
OVER 2m INTERVAL

Scale 1:20,000

Author Coal Division	Date June 1981	Encl. 2/82
Report No CEPR 11/81	Drawing No. 2393	

589000mE 590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

EL 5/61

GY31
GY34
DOM13
GY46
GY37
GY36
GY42
GY44
GY45
GY24
GY26
GY39
DOM8
GY40
GY28
GY43
GY33
GY41
GY38
GY35

THE CORNWALL COAL CO N.L.

5 cm

FALMOUTH
St Marys
HIGHWAY
EL 5/61
BICHENO

LEGEND

- Subcrop
- Washout
- Dolerite
- Best Area
- Intermediate Area
- Worst Area
- Reserve

SCALE
0 500 1000 1500 m

8253243

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L II
ROOF QUALITY

Scale 1 20,000

Author Coal Division	Date June 1981	Encl 2/83
Report No CEPR 11/81	Drawing No 2394	

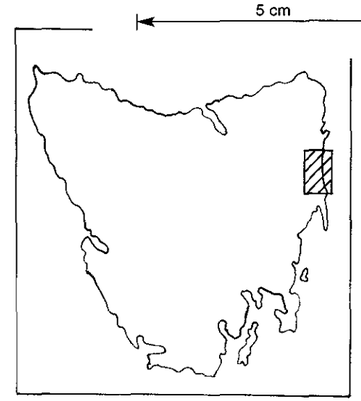
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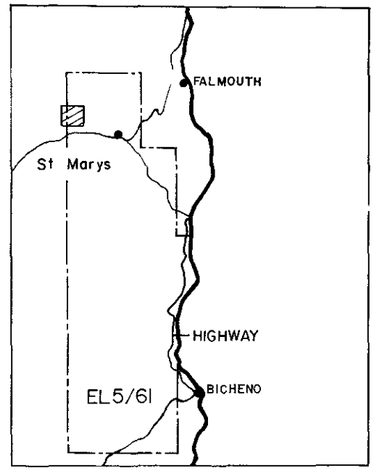
EL 5/61

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY44
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GY36
GY42
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GY24
GY26
GY39
DOM8
GY40
GY28
GY43
GY33
GY41
GY38
GY35

THE CORNWALL COAL CO. N.L.





LEGEND

- Subcrop
- Washout
- Dolerite
- Best Area
- Intermediate Area
- Worst Area
- Reserve

SCALE

0 500 1000 1500m

8553414

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

LI

ROOF QUALITY

Scale 1 20,000

Author Coal Division	Date June 1981	Encl. 2/84
Report No CEPR 11/81	Drawing No 2395	

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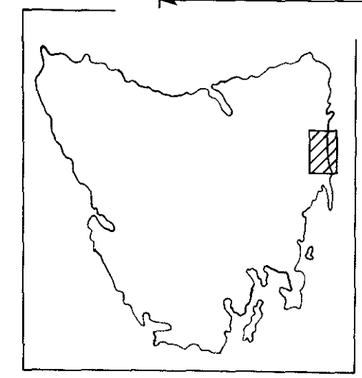
EL 5/61

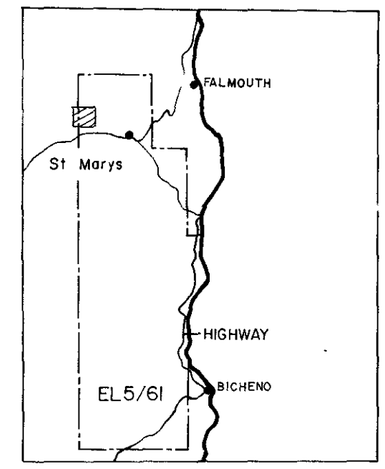
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5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31 GY34 DOM13 GY44 GY46 GY37 GY36 GY42 GY45 GY24 GY26 GY39 DOM8 GY40 GY28 GY43 GY33 GY41 GY38 GY35

THE CORNWALL COAL CO. N.L.

5 cm





855345

LEGEND

- Subcrop
- Washout
- Dolerite
- Best Area
- Intermediate Area
- Worst Area
- Reserve

SCALE

0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MII

ROOF QUALITY

Scale 1 20,000

Author Coal Division	Date June 1981	Encl. 2/85
Report No CEPR 11/81	Drawing No 2396	

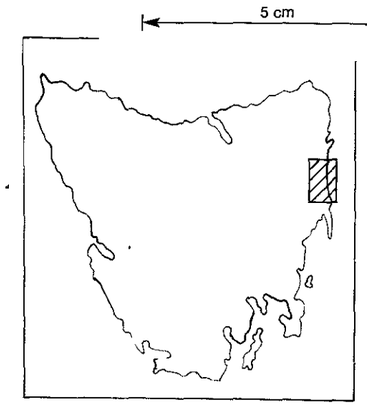
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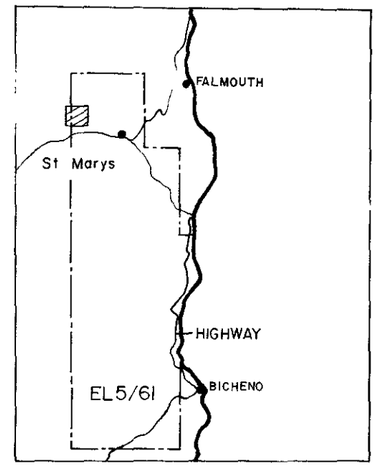
EL 5/61

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
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GY39
DOM8
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GY28
GY43
GY33
GY41
GY38
GY35

THE CORNWALL COAL CO. N.L.





LEGEND

- Subcrop
- Washout
- Dolerite
- Best Area
- Intermediate Area
- Worst Area
- Reserve

SCALE

0 500 1000 1500m

855346

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MI

ROOF QUALITY

Scale 1 20,000

Author Coal Division	Date June 1981	Encl 2/86
Report No CEPR 11/81	Drawing No 2397	

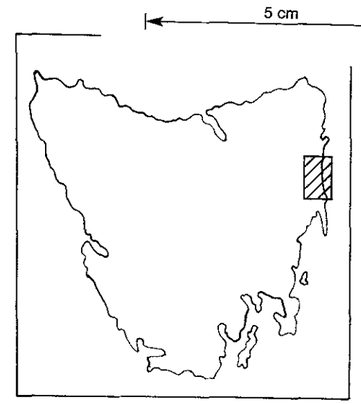
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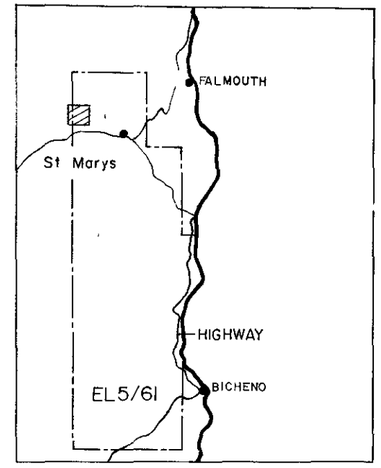
5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

EL 5/61

GY31
GY34
DOM13
GY44
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GY36
GY42
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GY26
GY39
DOM8
GY40
GY28
GY43
GY33
GY41
GY38
GY35

THE CORNWALL COAL CO. N.L.





LEGEND

- Subcrop
- Washout
- Dolerite
- Best Area
- Intermediate Area
- Worst Area
- Reserve

SCALE

0 500 1000 1500 m

25341
8

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L II
FLOOR QUALITY

Scale 1 20,000

Author Coal Division	Date June 1981	Encl. 2/87
Report No CEPR 11/81	Drawing No 2398	

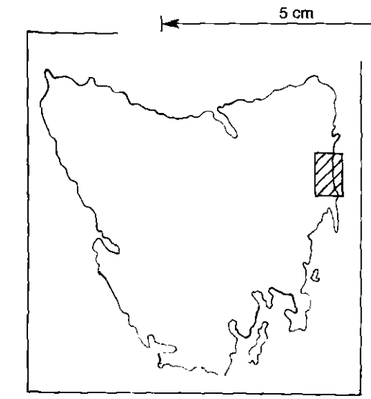
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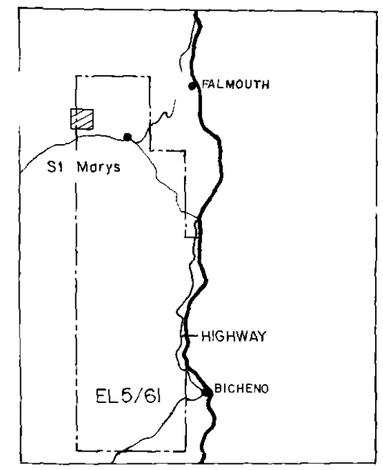
EL 5/61

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

GY31
GY34
DOM13
GY44
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GY42
GY45
GY24
GY26
GY39
DOM8
GY40
GY28
GY43
GY33
GY41
GY38
GY35

THE CORNWALL COAL CO. N.L.





LEGEND

- Subcrop
- Washout
- Dolerite
- Best Area
- Intermediate Area
- Worst Area
- Reserve

SCALE

0 500 1000 1500 m

855348

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

L I
FLOOR QUALITY

Scale 1:20,000

Author Coal Division	Date June 1981	Encl 2/88
Report No CEPR 11/81	Drawing No 2399	

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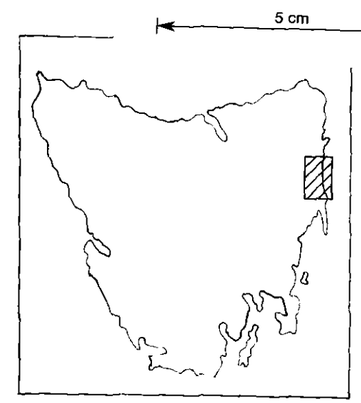
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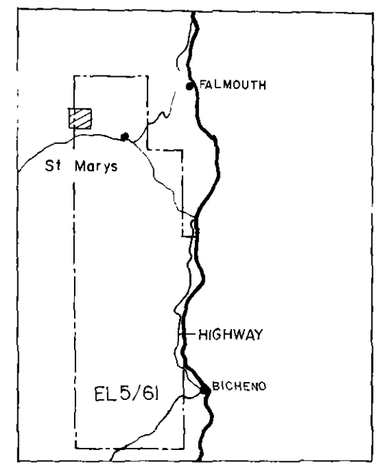
EL 5/61

GY31
GY34
DOM13
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GY24
GY26
GY39
DOM8
GY40
GY28
GY43
GY33
GY41
GY38
GY35

THE CORNWALL COAL CO. N.L.

5 cm





85349

LEGEND

- Subcrop
- Washout
- Dolerite
- Best Area
- Intermediate Area
- Worst Area
- Reserve

SCALE

0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

M II

FLOOR QUALITY

Scale 1 20,000

Author Coal Division	Date June 1981	Encl. 2/89
Report No CEPR 11/81	Drawing No 2400	

590000mE 591000mE 592000mE 593000mE 594000mE 595000mE

5403000mN
5402000mN
5401000mN
5400000mN
5399000mN
5398000mN

EL 5/61

GY31
GY34
DOM13
GY44
GY46
GY37
GY36
GY42
GY45
GY24
GY26
GY39
DOM8
GY40
GY28
GY43
GY33
GY41
GY38
GY35

THE CORNWALL COAL CO. N.L.

5 cm

FALMOUTH
St Marys
HIGHWAY
BICHENO
EL5/61

LEGEND

- Subcrop
- Washout
- Dolerite
- Best Area
- Intermediate Area
- Worst Area
- Reserve

SCALE

0 500 1000 1500 m

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA – GRAY EL 5/61
MT NICHOLAS AREA

MI
FLOOR QUALITY

Scale 1 20,000

Author Coal Division	Date June 1981	Encl 2/9[illegible]
Report No CEPR 11/81	Drawing No 2401	