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GEOLOGY & COAL RESOURCES

N.E. TASMANIA

A PRELIMINARY REVIEW

OF EXPLORATION LICENCES

5/61 GRAY AND 18/77 AVOCA

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COAL EXPLORATION AND PRODUCTION DEPARTMENT

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A PRELIMINARY REVIEW OF THE GEOLOGY AND COAL RESOURCES OF EXPLORATION LICENSES 5/61 GRAY AND 18/77 AVOCA

Compiled from information available prior to commencement of Shell's drilling operations in May, 1978.

CONTENTS

602

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THE SHELL COMPANY OF AUSTRALIA LIMITED

COAL EXPLORATION AND PRODUCTION DEPARTMENT

A PRELIMINARY REVIEW OF THE GEOLOGY AND COAL RESOURCES OF EXPLORATION LICENCE 5/61, GRAY

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May, 1978

SECTION 1

MT. NICHOLAS RANGE AREA

by

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A PRELIMINARY REVIEW OF THE GEOLOGY AND COAL RESOURCES OF EXPLORATION LICENCE 5/61 GRAY - MT. NICHOLAS RANGE AREA

CONTENTS

LIST OF ENCLOSURES

Enclosure No.		
1	Geological Sketch Map of Mt. Nicholas Range Area	1:100,000 (approx)
2	Abandoned underground Mine Workings, Mt. Nicholas Range Area	1:20,000
3	Geological Map, North East Tasmania Coalfields	1:100,000
4	Generalised Borehole Logs & Coal Seam Correlations, Mt. Nicholas Range Area	1:500
5	Detailed Seam Sections, Mt. Nicholas Range Area	1:10

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1. SUMMARY

This report collates available information on coal occurrences in the Mt. Nicholas Range area of Exploration Licence 5/61.

Mining and drilling in the area has indicated the presence of at least 8 main coal seam intervals (Alpha, Beta, Gamma, Delta, Eta, Theta, Iota and Kappa). The Delta seam is by far the most important seam in the area and all mining operations were carried out on this seam. The Eta, Theta and Iota seams are worthy of further investigation.

2. INTRODUCTION

2.1 SCOPE

This report summarises available information on the Mt. Nicholas Range area of Exploration Licence 5/61. All information was renewed in the light of results from drilling, mining and outcrop investigations and the report will form the basis of our future investigations of this area.

2.2 LOCATION AND ACCESS

The Mt. Nicholas Range area occupies about 130 square kms of country, and is situated in the north-eastern part of Tasmania. The nearest township to the area is St. Marys, from which the area extends in a north-westerly direction for a distance of from 11 to 13 km. The Mt. Nicholas Range occupies a central position in the area and forms a fairly high narrow ridge, with a general NE-SW direction.

The main coal mines and leases occur on the southern fall of this range, at an elevation of some 200 to 250 m above the Break O' Day Plain, which covers the southern part of the area.

The area is served by the Esk Highway from the west and the Tasman Highway from the south via the east coast.

The North East railway runs from Launceston via Conara to St. Marys, a distance of 128 km.

Access to the Mt. Nicholas area can be gained by sealed roads to Cornwall township and thence by unsealed roads and tracks. (Encl. 1)

2.3 TOPOGRAPHY AND CLIMATE

The Break O' Day Plain, occupies the area between the Mt. Nicholas Range and the Fingal Range to the south. The Break O' Day River flows through the plain in a westerly direction from St. Marys till its junction with the South Esk River near Fingal.

The Mt. Nicholas Range rises fairly abruptly from the Plain to a height of from 750 m to 850 m above sea level. The range has a general north-east to south-west trend and is in the form of a comparatively narrow ridge of mesozoic sediments, capped by dolerite.

The range forms a divide between a number of small water courses some of which flow northwards to empty into the Scamander River whilst the remainder flow south into the Break O' Day River. The northerly flowing streams which flow against the dip of the strata, have as a general rule worn more pronounced courses than the southerly flowing streams.

The climate is classified as temperate marine. On the coast daily temperature range, averages almost $8^{o}C$ rising to almost $12^{o}C$ further inland.

Summers are mild (20^{o}-$23^{o}C$) and charactirised by greatly lengthened days with almost 15 hours daylight in mid-summer. In mid-winter (0^{o}-$2^{o}C$) the shortest day consists of almost 9 hours daylight.

2.3 TOPOGRAPHY AND CLIMATE (Cont'd)

There is a strong gradation in rainfall from west coast to east coast because of topography, with a distinct rain shadow east of the Central Plateau. In winter the rainfall is greatest, but it is fairly evenly distributed averaging 1038 mm (40 inches) per annum in the St. Marys area.

The South Esk River system of which the Break O' Day River is part, is the river most affected by flooding in Tasmania. The Esk catchment includes most of the northeastern highlands where annual rainfall averages almost 1300 mm. As many rivers in the South Esk system flow through the Break O' Day Plain flooding is widespread, disruptive, and frequent on this plain.

3. PREVIOUS EXPLORATION

In 1861 Gould submitted a report on the Fingal and East Coast Coalfield in which he described the occurrences of coal in the Mt. Nicholas Range area. Gould located outcrops of the Triassic coal measures in the area and estimated a thickness of 275 m. The coal seams appeared to exist in the upper part of the section.

Gould found two outcrops of the "thick" seam upon the southern fall of the Mt. Nicholas range. The seam outcropped in the bed of two creeks descending the range about a half kilometre apart (location 1, Encl 1). In the easternmost of these 2 creeks, it occurred at an elevation of 152 m above the plain and dipped 3° at W7°N (353°) and was described as

Coal	1.00'	(30.4 cm)
White Clay)		
Coal)	0.33'	(10.1)
White Clay)		
Coal	2.42'	(73.8)
White Clay	0.20'	(6.1)
Coal	0.75'	(22.9)
Sandstone	0.04'	(1.2)
Coal	3.58'	(109.1)
Clay Parting	-	
Coal	0.25'	(7.6)
Clay Parting 0.33'	(10.1)	
Coal	1.33'	(40.5)
Fire Clay	1.33'	(40.5)
Fire Clay	0.75'	(22.9)
Coal	1.25'	(38.1)

Nearly 18 m below it was a layer of bituminous shale 30 cm thick and at a further 75 m below, a thin bed of bituminous shale, sandstone and coal. The interseam interval is occupied by grey and yellow sandstone and clay.

In a creek in the east (location 2, Encl. 1) about 180 m of coal measures were examined consisting principally of sandstone and containing the outcrop of 3 or 4 coal seams varying in thickness from 20 cm to 1.2 m. The lowest seam was dipping 9° at S20° W (200°). The section was described as follows.

Shale	4.00'	(122 cm)
Soft sandstone	1.00	(30.5)
Carb. Shale	0.50	(15.3)
Soft feldspathic Sandstone	1.00	(30.5)
Carb. Shale	0.67	(20.4)
Claystone	0.67	(20.4)
Coal	2.17	(66.2)

Two seams about 20 cm apart and 1 m to 1.2 m thick, outcropped in the creek about 75 mm above. They were reported to be horizontally lying.

These outcrops occurred above the level of the Plain and tended to show the productive section of the coal measures was about 30 m above the plain.

3. PREVIOUS EXPLORATION (Cont'd)

Other outcrops have been recorded at much lower levels (location 3, Encl 1). In the branch of a creek about 3 kms north of Killymoor H.S., a 1 m seam was exposed at several points, associated with sandstone. It was succeeded by a second seam, 1.8 m of which was exposed, a few hundred metres up the creek almost at Plain level. In several small creeks descending the western portion of the range, coal seams also outcropped at low levels.

Thureau (1883) examined one outcrop at 200 m above datum in the Mt. Nicholas area. The "Main or Killymoor" seam was not less than 4 m thick and its outcrop formed quite a bold cliff at the surface. A tunnel was driven about 15 m into solid coal. The seam had a sandstone roof and shale floor, and was split by many bands.

The northern face of the Mt. Nicholas Range is heavily timbered, however Gould reported several coal outcrops, which proved the existence of the coal measures in this area. Midway between the Trig Station and "The Sisters" (location 4, Encl. 1) two seams outcropped in several branches of creeks. One was poorly exposed, and rather earthy, the other some 8 m below was 1.5 m thick of shaly coal. The creek flowing northwards from the saddle (location 5, Encl. 1) showed evidence of coal measures in this area. Two seams 1.2 m and 1.5 m thick outcropped in a creek flowing north-westerly between Huntsman Cap and the Main Range.

Several coal outcrops are shown on the northern slopes of the Mt. Nicholas Range (Encl. 1) and recent Forestry Commission roads through the Mt. Nicholas gap have revealed a coal outcrop near the highest point.

In 1878, two boreholes (Harefield B.H. & Killymoon B.H.) were drilled to the south of the Mt. Nicholas Range on the Break O' Day Plain. These bores penetrated predominantly Permian sediments and Lower Triassic coal measures. No economic coal measures were penetrated.

In 1971-2 the Mines Department drilled one hole, MD13 in the Mt. Nicholas Range area in the saddle between Huntsmans Cap and Mt. Nicholas and north of the Mt. Nicholas workings (Encl. 1). Four seams of coal were intersected, three of good quality.

Mining in the Mt. Nicholas Range has been carried out at the Silkstone, Jubilee, Cornwall, and Mt. Nicholas Mines. (Encl. 2)

(1) THE MT. NICHOLAS COAL MINING COMPANY, NO LIABILITY

(a) Number and Area of Leases

This company held 6.7 sq km of leases, which were situated on the southern fall of the range at a distance of, approximately 6.5 km from the township of St. Marys.

3. PREVIOUS EXPLORATION (Cont'd)

(b) Extent and Method of Mining Operations

The extensive workings (Encl. 2) of the Mt. Nicholas Coal Mining Company were the result of the operations of upwards of 30 years. The main tunnels were driven for over a kilometre, and coal from 0.4 sq km won. For a long time, under the management of J. Birrell, the mine was worked on the long-wall system. In an endeavour to safeguard the workings the method of operation was modified, and the "Step Long-Wall" method used. In this method the face took the form of an irregular curve, with rectangular blocks of coal left protruding like a series of steps. It was hoped that these steps would lend additional support to the faulted roof, but it was doubtful whether any advantage was gained. The working face was in faulted country, and the roof insecure.

(c) Quality of Coal

A study of the section of the Mt. Nicholas seam revealed the presence of a considerable number of bands of varying thickness. Though attempts were made to remove these bands by screening, a considerable amount of foreign matter was left in the coal as marketed. The samples taken for analysis represented the grade of the material marketed.

(2) THE CORNWALL COAL COMPANY

(a) Number and Area of Leases

This company operated in the Mt. Nicholas Range, and leased 6.2 sq km of land. (Encl. 1 & 2). The leases were to the east of and adjoining leases of the Mt. Nicholas Company. About 4.5 sq km were coal-bearing.

(b) Extent and Method of Mining Operations

The tunnels were situated near the centre of the property, and the workings were driven in a northerly direction. The company had been operating for upwards of 30 years, and, approximately, 0.3 sq km of coal had been removed (Encl. 2). The method adopted in the mine was the bord and pillar, and results show it to be quite successful. In the winning of the coal a fair amount of slack was formed, and most of this was retained inside the mine as filling behind the timbers. The seam was 1.8 m in thickness, and lended itself admirably to the system adopted. Minor faults were of frequent occurrence, and interfered with operations underground.

(c) Quality of Coal

The quality of the coal from the Cornwall mine showed only a slight variation from that produced by the Mt. Nicholas Company. Analyses revealed the presence of the usual high percentage of ash, with a comparatively low percentage of volatile matter. These analyses represented the quality of the coal as it was broken in the mine. It was possible that the quality of the coal placed on the market was not so high as that indicated in these analyses. The only treatment the coal received was screening before being placed in the railway trucks.

3. PREVIOUS EXPLORATION (Cont'd)

(3) JUBILEE COAL COMPANY

(a) Number and Area of Leases

The Jubilee Coal Mining Company held one lease of 1.7 sq km situated about 5 km due north of St. Marys. This lease comprised portions of those held previously by the former Jubilee Company, together with the old Cardiff lease. On both these former properties mining operations had been carried out to a slight extent. On the former Jubilee lease there was no apparent reason why operations should have ceased, but in the Cardiff workings Gould Fault was encountered, and the workings were abandoned. (Encl. 2)

(b) Extent and Method of Mining Operations

Upwards of 10 years ago operations were carried out on both the Jubilee and Cardiff leases. The Cardiff workings were opened on the bord and pillar system, and work was carried out till Gould Fault was encountered. A winze was sunk on this fault to a depth of 23 m without meeting coal.

On the former Jubilee lease a tunnel had been driven for upwards of 120 m, whereas crosscuts were driven to the right and left. No further work was done, but it is probable that the long-wall system would have been chosen to work the mine.

(c) Quality of Coal

The quality of the coal from the Jubilee mine showed a slight variation from that produced from the Cronwall and Mt. Nicholas mines. Analyses show a slight increase in the percentage of volatile matter. This increase in volatile matter was responsible for the slightly better burning qualities of the Jubilee coal, but whether the quality is constant is problematical, for with the natural variation in the seam conditions may alter, and the volatile constituents may fluctuate between limits. It may be safely stated, however, that the coal of the Mt. Nicholas Range will prove to be of an average quality, with but little variation from one end of the range to the other. This seam would also lend itself to washing, for most of the bands would without difficulty be washed away from the coal, with a consequent reduction of the ash content.

(4) SILKSTONE COLLIERIES

(a) Number and Area of Leases

Under the heading of the "Silkstone Colleries" were included those leases held in the names of G. L. Meredith and B. H. Whittle. These leases were 3 in number and totalled 4 sq km in area. Of this 4 sq km, approximately 3 sq km were found to be productive for most seams. In the case of the Delta seam an area of 1.5 sq km only was allowed, as the result of uncertainty as to the continuation of the seam on the eastern portion of the lease.

3. PREVIOUS EXPLORATION (Cont'd)

(b) Extent and Method of Mining Operations

The mining operations carried out on the Silkstone properties (Encl.1) were only of a prospecting nature. On the Delta seam three tunnels were driven upwards of 30 m each. In two of these tunnels the full thickness of the seam was revealed. In the third tunnel only 75 cm of the bottom portion of the seam was exposed.

A tunnel was driven on the Theta seam to a length of about 75 m. This seam has shown full thickness throughout the whole distance.

On the Eta seam a few short prospecting tunnels were driven prove its thickness. Solid unweathered coal was not in any case reached.

(c) Quality of Coal

The quality of the Silkstone coal agreed in every way with that from the Mt. Nicholas and Cornwall Mines. The percentage of ash was, as in other cases, high, due largely to the presence of the bands occurring in the seams.

Theta seam is naturally a stony coal, and it is doubtful if the ash content could be reduced to any great extent by treatment.

At the Mt. Nicholas Mine four seams were worked. These are the top seam of 1.83 m with a 1.22 m seam 12 m below. These may correspond to the "Blue" seam as mined at Cornwall. A third seam 1.45 m thick occurs about 12 m below that (= Hitit seam) and a 2.44 m seam some 49 m below that (= Fenton seam). It is thought that the seam in the downfaulted block between the old Mt. Nicholas and Cornwall workings is the Blue seam. The seam worked on the Mt. Nicholas and Cornwall sides of this block was the Hitit seam. The Mt. Nicholas Mine was closed in 1958 and over the life of the mine produced 1.7 m tons with typical analysis of -

M	4.9%
VM	26.8%
A	20.6%
S	0.48%
CV	9742 BTU/lb

At the Cornwall Mine, three seams locally called the Hitit (1.45 m), the Fenton approximately 53 m below and the Blue seam (3.25 m) approximately 10 m above the Hitit were found. In 1957 the Cornwall Coal Company drilled two boreholes to the east of their workings at Cornwall (Encl.2) and the three seams were present. The coal and mudstone interval approximately 82m above the Hitit seam may correspond to Hills' Beta seam. The Cornwall Mine closed in 1963 and over the life of the mine produced about 4 m tons of coal with typical analysis of -

M	3.8%
VM	21.7%
A	20.2%
S	0.36%
CV	10,007 BTU/lb.

3. PREVIOUS EXPLORATION (Cont'd)

It is not known what seam was worked at Jubilee, but one hole (Encl.2) drilled in the area penetrated a number of seams.

The mine closed in 1960 and produced about 650,000 tons of coal with typical analysis -

M	3.9%
VM	28.5%
A	20.1%
S	0.60%
CV	9653 BTU/lb

The Cornwall Coal Company which worked the eastern leases in the Mt. Nicholas area (Encl. 1) is currently mining in the Fingal area. It still retains several coal leases around the Mt. Nicholas area (Encl. 2) and is currently engaged in opening a new mine in the downfaulted block between the old Mt. Nicholas and Cornwall mines. A 3m thick seam has been exposed behind the apron of scree and equipment is already engaged in opening up the headings and access roadways.

Approximately 20 sq.km. of coal measure sediments could exist in the Mt. Nicholas Range west of the Cornwall Fault. The Cornwall Coal Company currently holds approximately 4.5 sq.km. of this ground as Coal Mining Leases, and a further 5 sq.km. has been worked out by underground mining at the Cornwall and Mt. Nicholas mines (Encl.2).

Mining at Cornwall has proved the existence of the working seam on the northern slopes of the range and several coal outcrops confirm coal measure sediments in other parts of the range. Therefore a potential 10 sq.km. (4 sq.mls.) of coal bearing sediments could still exist within this part of EL5/61. Assuming that the working seam exists throughout the area, a potential 25 million tonnes of insitu coal would still be available in the Mt. Nicholas Range area and could be amenable to early development, following the example of Cornwall Coal Company.

4. GEOLOGY OF THE MT. NICHOLAS AREA

Keid (in Hills, 1922) mapped the area and Threader (1968) covered the area north of Bicheno (Encls. 1 & 3). Apart from relocation of the Cornwall Fault and the outlining of the areas of Triassic sandstone covered by dolerite scree, the geological maps are practically indentical.

4.1 STRATIGRAPHY

In the eastern part of the area, the basement rocks are strongly folded Silurian sediments known as the Mathinna Beds. These sediments are folded along a general NNE-SSW axis and consist of sandstones, mudstones, siltstones, slates and phyllites. On the east, these sediments are intruded by Devonian granites from the eastern edge of St. Marys to the eastern coastline.

On the granites and slates have been deposited the Permian-Trassic strata which outcrop throughout the area. Very briefly the Permian sediments are freshwater and marine sandstones, arkoses, siltstones, conglomerates and limestones. No complete sections of the Permian have been observed. In 1878, two trial bores intersected 427 feet (130 m) of Permian sediments at Harefield, and 500 feet (152.4 m) at Killymoor.

Conformably overlying the Permian, are Triassic sediments consisting of feldspathic sandstones, sandstones, mudstones and carbonaceous mudstones. The economic coal measures are located within the top 660 ft (200 m) of the succession, within the feldspathic sandstone member. From the Harefield bore drilled on the Break O' Day Plain to the south of Mt. Nicholas, the drill penetrated 264 feet (81 m) of Triassic sandstones and then through 427 feet (130 m) of Permian sediments before striking Siluran slates (Encl.4). From this we know the Triassics descend nearly 300 ft (100 m) below the plain and as they ascend Mt. Nicholas about 800 ft (240 m), therefore in the Mt. Nicholas area the thickness of Triassic is somewhere near 1100 feet (335 m). This is supported by MD 6 drilled to the west near Fingal, where the Triassic succession has a measured thickness of 1055 feet (321.5 m).

The Permo-Triassic section is fairly consistant in thickness throughout the whole of the Mt. Nicholas Range area. The greatest variation is caused by the appearance in the eastern half of the area of a dolerite sill between the Permian and Triassic sediments. This sill is approximately 45 m thick (Hills, 1922).

The Mt. Nicholas Range has a capping of from 100-150 m of dolerite extending, except for three small saddles, continuously from one extremity to the other. Evidence suggests this dolerite is in the form of a sill from which the overlying strata has been removed by erosion. Dolerite also occurs as isolated outcrops on the flanks of the ranges and in valley floors.

Basalt occurs north and at the western approach to St. Marys. These outpourings which are about 10 m thick, are confirmed to valley infillings and hill top residuals, but do not appear to occur in coal bearings areas. Edwards (1938) considers them to be Upper Pliocene basalts.

4.2 STRUCTURE

The Permian sediments rest unconformably on the Silurian slates. The contact is nearly planar and dips 1^{0} or less to the south. The Permian-Triassic contact is thought to be conformable within the area. The general dip of the Triassic is 0^{0}-3^{0} to the south east; however local variations occur due to rolls and faults.

Major faults in the Mt. Nicholas area are the Cornwall Fault and Gould Fault (Encl. 3). The Cornwall Fault crosses the range at the saddle between the old workings at Cornwall and Jubilee, and has a throw of approximately 60 m, down thrown to the west. The Jubilee coalfield is isolated by the Cornwall Fault on the west and the Gould Fault on the east. The Gould Fault trends NNE, is down thrown to the west with a maximum throw of about 90 m. Where it joins the Cornwall Fault, the displacement is approximately 150 m to the west.

Along the Nicholas Range, the Cornwall and Mt. Nicholas mine workings terminated at, or near, axial faults. Information on these faults is lacking, but it is thought by the Mines Department that a downthrown block, containing coal, occurs between the Mt. Nicholas and Cornwall workings (Encl.2). It is thought that the Cornwall Mine terminated on its western boundary after intersecting a fault with a downthrow of 11.28 metres (37 feet) to the west. It is thought that the Mt. Nicholas workings terminated on their eastern boundary on intersecting a fault with a downthrow of 24.38 metres (80 feet). The throw of these two faults is based upon possible seam correlation between the two mines. The fault that forms the eastern boundary of the Mt. Nicholas workings may well extend to the north and form the eastern boundary of any development on the northern slopes of the Nicholas Range.

There is little information available that would indicate the density of faulting that might be encountered in any new mine working. Fault throws of up to 8 metres are known to have occurred in the workings of Mt. Nicholas and Cornwall, therefore it is not unlikely that faults of this magnitude would occur within any new working.

Keid (in Hills 1922) postulated a fault on the western side of the range between the Mt. Nicholas and the Silkstone mines. This fault, the 'Silkstone', was postulated to have a throw of about 60 m, and roughly parallel the Cornwall Fault. The existence of the Silkstone Fault has been refuted by Threader (1968) on the basis of miscorrelation of coal seams by Keid.

5. COAL RESOURCES OF THE AREA

5.1 COAL SEAM

The task of correlation of the seams of the area was comparatively simple (Encl. 4). Variations occurred in the several seams, both as regards thickness and altitude. The larger variations in altitude of each portion of the many seams was accounted for in practically every case by the presence of major faults already discussed. Slight variations were due in most cases to minor faulting, together with the dip of the seam. Slight rolls in the strata were responsible for some of the variations in thickness of seams. The thickness of the smallest seam recorded in the area was 20 cm, whilst the thickest seam was 5.3 m. Considerable variation in thickness of individual seams was found. In the case of the Mt. Nicholas mine, the seam that was worked had a thickness of approximately 1.8 m, whereas when first met it was 5 m in thickness. Thickness of seam could therefore not be relied upon to any great extent for purposes of correlation. Certain seams throughout short distances show constant characteristics, which were useful for purposes of correlation. The prevalence of a stratum of shale throughout practically the whole length of the range has been extremely useful in correlating the outcrops of at least one seam. The five mines which operated in this district all worked the one seam, viz., the Delta seam. In every case a stratum of shale immediately underlies this seam, whilst a sandstone roof is the rule. The seam as shown in the different workings (Encl. 5) varies in thickness, and in places a few cms of clod occurs between the coal and the sandstone roof. The clod is found to be variable both as to thickness and occurrence. The stratum of shale underlying the seam is also found to vary considerably in thickness, and has been found to thicken sufficiently so as to eliminate the lower seam over a short distance along the range. The average thickness of this stratum is about 3 m but in places a thickness of 10.7 m has been proved to exist.

Immediately below the shale stratum the Eta seam (Encl. 4 & 5) is met, and is as permanent as the main or Delta seam. Variation in thickness is again characteristic, and the seam has been shown to actually peter out towards the eastern portion of the area. On the extreme east, however, it again reappears. The maximum thickness recorded for this seam is 1.6 m.

There can be no doubt as to the identification of these two seams over the greater portion of the area, and their positions have been used as datum points for the correlation of the remaining seams. Little difficulty was experienced in correlating the various outcrops, worked or unworked, that were located, and the conclusion was reached that eight seams of coal (Alpha, Beta, Gamma, Delta, Eta, Theta, Iota and Kappa) exist throughout the greater portion of the Mt. Nicholas Range area. Only one of these seams was exploited to any great extent. Two others have been worked sufficiently to enable sections of the seams to be recorded.

The limited amount of prospecting carried out in the area has not exposed the full thickness of the lowest seams of the series.

The full thickness of the Iota seam was exposed on the northern fall at the western end of the range. This was the only position where a section of this seam was available (Encl. 5). The seam was sampled, and the analyses indicated on the seam profile. The altitude of this seam on the northern side of the range is 460 m above the sea, while the corresponding outcrop on the southern fall of the range is at an altitude of 395m above the sea.

5.1 COAL SEAM (Cont'd)

The Theta seam occurs on the southern fall of the range at an altitude of 422 m above the sea. A short tunnel has been driven on this seam, and shows a section from roof to floor, as shown in Encl. 5.

This seam was sampled, and the analyses indicated on the seam profile.

The Eta seam has had one or two prospecting tunnels driven on it. Sufficient work has been done to show that the seam is divided into four sections by clay partings. A section of this seam is shown in Encl. 5. The tunnels into this seam have not been driven far enough to reach the solid, unaltered coal. The coal showed signs of weathering, but it is probable that the two upper sections at least will ultimately be worthy of attention.

The Delta seam is by far the most important. All the mines of the Mt. Nicholas Range operated on this seam, with the result that sections have been obtained in many places from east to west (Encl. 5).

The sections are sufficient to show that a fair amount of agreement exists between the sections, and indicate that the various mines undoubtedly worked on the same seams.

No sections are available of the Gamma and Beta seams, however the following section of the Alpha seam (Encl. 5) has been quoted (Keid, 1922) -

Coal	0.75 ft	(25 m)
Penny band	-	(-)
Bright Coal	0.50	(15 m)
Dull Coal	2.00	(61 m)
Band	0.75	(23 m)
Coal	2.50	(76 m)
Band	0.33	(10 m)
Coal	1.25	(38 m)
Clod	3.00	(91 m)
Coal	5.00	(152 m)

A tunnel was driven at one time on this seam, but at this time no trace of it exists. It is improbable that the large thicknesses of coal as indicated, would be free of stone partings. At an horizon corresponding with the above, Keid (1920) observed a very thick seam consisting of banded coal and shale. The total thickness was approximately 18 feet (5.5 m), but in no case did the coal bands exceed 6 inches (15 cm) in thickness, and the clay bands were 1 inch (2.5 cm) or more.

Gould (1861) located a thick seam in the bed of two creeks descending the southern fall of the Mt. Nicholas Range; north of Killymoon Homestead. (location 1, Encl. 1). Thureau (1883) also located this seam and referred to it as the "Main or Killymoon" seam. It is considered that this thick seam (Encl. 5) is the Alpha seam referred to above.

Several other seam outcrops have been reported in the area (Huntsmans Cap, Goulds' Fault Encl. 5) however no indication as to their relationship with the main seams in the area has been obtained.

5.1 COAL SEAM (Cont'd)

From the above sections it is seen that the Theta and Delta seams are worthy of a attention, and it is expected that the Eta seam will prove of value. The Iota seam has only been opened at one place on the northern side of the range, however it has proved to be of fair average quality and thickness on the southern fall of the range.

5.2 COAL QUALITY

Limited data is available for coal samples taken from the various mines in the Mt. Nicholas Range area. The samples used for these analyses were sampled according to the following method (Hills 1922).

Before any samples were taken a preliminary examination was made of the mine to enable the sampler to determine what portion of the seam was excluded in mining, and where best to take the samples so that they would represent the coal mined in that part of the colliery.

The sampling was carried out in a systematic manner with the object of obtaining representative samples of the coal seams.

The haphazard way in which samples have been taken in the past by mine-owners and others has been such as to render the analyses misleading, and of little or no value to the public.

At the place selected the face was squared up, and all loose coal from roof to floor removed for a width of 1.8 m. A careful examination was made of the roof, and any pieces likely to fall and contaminate the sample were taken down.

A sampling cloth was then placed on the floor and close up to the seam. In the middle of the cleared area a perpendicular cut, 7 cm deep and 20 cm wide, was made from roof to floor. The bands of slaty coal, shale, etc., discarded by the miners in the ordinary operations of the mine were omitted from the samples also. This method was followed closely, as it was desired to obtain samples that represented the coal produced commercially from the mine under examination.

As soon as the cutting of the sample was completed it was crushed and passed through a half-inch screen.

The sample was then thoroughly mixed, and reduced by quartering, and the opposite quarters rejected. The remaining quarters were mixed, heaped into a cone-shape, and the pile again flattened and quartered. The opposite quarters were discarded and the process of mixing and quartering was continued until the sample weighed about 5 lb. The material finally remaining was put into a receptacle provided for the purpose.

When it was found necessary to ascertain the maximum purity of output, all stone partings 6 mm thick and over were omitted from the samples. When the impurity to be rejected did not show distinctly, it was outlined with chalk before cutting the sample.

The method of cutting the sample, quartering, etc., was carried out as described above.

5.2 COAL QUALITY (Cont'd)

The coal from the Jubilee mine was black clean with a dull lustre. The coal was dense had cubical fracture, and burned well in the open grate leaving a fairly clean ash. The quality was fairly similar to other coals from this range, however volatile matter shows a slight increase. (Table 1, samples 319, 320, 322, 323, 235).

The seam mined at the Mt. Nicholas mine had present a considerable number of bands of varying thickness, which was reflected in the generally higher ash contents (Table 1, samples 384, 385, 627, 628.)

The coal from the Cornwall mine is very similar to that from Mt. Nicholas and Jubilee mines. (Table 1, samples 382, 383, 629, 630.)

The coal analysed from the Silkstone mine agrees in every way with the coal from the Mt. Nicholas Range area; although the slightly higher ash content was due to the presence of stone bands. (Table 1, samples 386, 387, 388.)

TABLE I - CHARACTER, ANALYSES, AND HEAT VALUES OF COAL SAMPLES

Registered Number	Name of Mine or Locality of Exposure	Nature of Coal	PROXIMATE				ULTIMATE					HEAT VALUES			Specific Gravity
			Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Hydrogen	Carbon	Oxygen	Nitrogen	Calories	British Thermal Units	Evaporative Power	
319	Cardiff	Non-caking Humic	3.20	28.98	48.90	18.92	0.56	-	-	-	-	-	-	-	-
320	Cardiff	" "	4.80	27.08	51.42	17.20	0.47	-	-	-	-	-	-	-	-
322	Cardiff	" "	3.88	26.70	50.51	18.91	0.60	4.46	55.03	19.77	1.23	5486	9874	10.20	1.37
323	Jubilee	" "	5.00	22.18	50.51	22.31	0.40	-	-	-	-	-	-	-	-
325	Jubilee	" "	3.92	28.52	47.46	20.10	0.60	4.50	55.69	17.78	1.33	5363	9653	9.98	1.47
384	Mt. Nicholas	" "	4.40	27.78	46.01	21.81	0.44	-	-	-	-	-	-	-	-
385	Mt. Nicholas	" "	4.20	26.64	45.96	23.20	0.40	-	-	-	-	-	-	-	-
627	Mt. Nicholas	" "	4.54	27.52	50.04	17.90	0.45	-	-	-	-	-	-	-	-
628	Mt. Nicholas	" "	4.88	26.82	47.68	20.62	0.48	4.46	50.59	22.75	1.10	5412	9742	10.07	1.52
382	Cornwall	" "	3.72	23.16	56.76	16.36	0.41	-	-	-	-	-	-	-	-
383	Cornwall	" "	3.00	24.80	55.75	16.45	0.38	-	-	-	-	-	-	-	-
629	Cornwall	" "	3.80	21.74	54.38	20.18	0.36	4.02	58.63	15.66	1.15	5560	10,007	10.34	1.43
630	Cornwall	" "	3.98	22.48	55.22	18.32	0.36	-	-	-	-	-	-	-	-
386	Silkstone	" "	3.14	19.02	56.36	21.48	0.45	4.21	57.24	15.49	1.13	5486	9374	10.20	1.51
387	Silkstone	" "	4.90	23.38	51.44	20.28	0.33	-	-	-	-	-	-	-	-
388	Silkstone	" "	3.30	23.48	48.52	24.70	0.48	-	-	-	-	-	-	-	-

6. REFERENCES

BUREAU OF METEOROLOGY, 1977 : Climate of Tasmania. Extract from Tasmanian Year Book No. 11, 1977 Edition.

EDYVEAN, M.D., 1977 : Report on the Coal Occurences and Potential of Exploration Licence 5/61, East Coast, Tasmania (unpubl.)

GOULD, C., 1861 : Coalfields Fingal and East Coast. Old Series Report No. 7. (Geol. Survey Office, Hobart Town.)

HILLS, L., et al, 1922 : Coal Resources of Tasmania Mineral Resources, No. 7, Tas. Mines Depart.(p28-45.)

KEID, A.G.W., 1920 : Preliminary Report on Mount Nicholas Coalfield. (unpubl. Report)

THREADER, V.M., 1968 : Interim Report on the Geology and Coal Resources of the North East Coalfields of Tasmania. (unpubl. Tas. Mines Dept.)

THUREAU, G., 1883 : Report on Fingal & Mount Nicholas Coal Deposits. Old Series Report No. 43 (Geol. Surv. office, Launceston).

TWELVETREES, W.H., 1901 : Report on Coal Seams at Thornedale, via Thompson's marshes, and the Jubilee Colliery, near St. Marys. Old Series Report No. 183 (Tas. Geologists Office, Launceston).

LEGEND

SEDIMENTARY

RECENT	Alluvium	
TRIASSIC	Sandstones and Shales	
PERMIAN	Limestones and Mudstones	
SILURIAN	Slates	

IGNEOUS

JURASSIC	Diabase	
DEVONIAN	Granite	

CHARACTERISTICS

- Main Roads
- Roads
- Tracks
- Contours
- Geological Boundaries
- Railways
- Tunnels
- Strike and Dip of Strata
- Fault
- Bore Hole
- Coal Outcrops
- Mines Dept Bore 13 (Approx. location)
- Former Mining Property

SCALE (1:100,000 APPROX.)

(DO NOT SCALE)

83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA BASIN, TASMANIA
SHELL I.M.I. EL 5/61 GRAY

GEOLOGICAL SKETCH MAP OF MOUNT NICHOLAS RANGE AREA

Scale 1:100,000 (APPROX.)

Author: Reid et al (1969) Shell Hobart (1978)	Date: APRIL '78	Encl. 1
Report No: CEPR 16/78	Drawing No: C-1176	

590 000 mE

595 000 mE

600 000 mE

5400 000 mN

5395 000 mN

MOUNT NICHOLAS RANGE

MT. NICHOLAS MINE

CORNWALL MINE

CORNWALL No. 1.

CORNWALL No. 2.

CORNWALL FAULT

GOULD'S FAULT

SOUTH SISTER

JUBILEE & CARDIFF MINES

JUBILEE No. 1.

GERMAN TOWN RD.

CORNWALL

MT. NICHOLAS RD.

CORNWALL RD.

ESK HIGHWAY

KILLYMOON BORE HOLE

ST. MARYS

LEGEND

- HIGHWAY
- ROADS AND TRACKS
- EXPLORATION LICENCE BOUNDARY
- CORNWALL COAL COMPANY'S MINING LEASES
- 300 TOPOGRAPHIC CONTOUR (M, ASL)
- DRILL HOLES.
- FAULT LINE.
- MINE WORKINGS (1972)
- MINE WORKINGS (1972) PILLARS EXTRACTED
- TOWNSHIPS

5 cm

SCALE (1:20,000)

1Km 0.5Km 0 1Km 2Km

83-203

023

522024

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA BASIN, TASMANIA
SHELL I.M.I. EL 5/61 GRAY

ABANDONED UNDERGROUND MINE WORKINGS MOUNT NICHOLAS RANGE AREA

Scale 1:20,000

Author: D.A.T.	Date: MAY 1978	Encl. 2
Report No: CEPR 16/78	Drawing No: C-1177	

To Mathinna

TOWER HILL

MANGANA

CASTLE CARRY FAULT

To Stieglitz Green and Rossarden

Basalt

SOUTH ESK RIVER

Jurassic Dolerite

BREAK

FINGAL

AVOCA

ST PAULS DOME

ST PAULS RIVER

MERRYWOOD

To Cranbrook

SILKSTONE

MT NICHOLAS

NICHOLAS

CORNWALL

Cornwall B.H.1

Jubilee B.H.1

Killymoon B.H.

To Falmouth

ST MARYS

DUNCAN

YATES

VALLEY

Harefield B.H.

ST PATRICKS HEAD

DALMAYNE

CORNWALL

PICCANINNY POINT

SEYMOUR

LONG POINT

DOUGLAS RIVER

DENISON RIV

APSLEY RIVER

SWAN RIVER

BICHENO

FAULT

Magnetic

True

QUATERNARY	*Recent Alluvium*	
	Dolerite Talus	
	Terrace deposits	
TRIASSIC	*Sandstone Coal Measures*	
	Ross Sandstone	
PERMIAN	*Ferntree Mudstone*	
	Berriedale Limestone	
	Undifferentiated	
SILURIAN	*Mathinna Group sandstone, shale*	
IGNEOUS ROCKS		
TERTIARY	*Basalt*	
JURASSIC	*Dolerite*	
DEVONIAN	*Granite*	

Fault
Fault inferred
Geological boundary
Boreholes
Road
Railway
A A' *Section Line*
Coal workings

AVOCA *Township*
DUNCAN *Coal mine*
(1) *Recommended drilling site*

522025

5 cm

83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA BASIN, TASMANIA
SHELL I.M.I. E L 5/61 GRAY

024

GEOLOGICAL MAP
NORTH EAST TASMANIA COALFIELDS

Scale 1 : 100,000 APPROX.

Author : V.M. THREADER (1968) SHELL HOBART (1978)	Date : APRIL '78	Encl. 3
Report No: CEPR 16/78	Drawing No: C-1178	

MINES DEPART. (TAS)
B.H. N°13

COBNWALL
B.H. N°1

COBNWALL
B.H. N°2

JUBILEE
B.H. N°1

METRES

0
25
50
75
100
125
150
175
200
225

Soil & clay
Coal & clay

100' (30·5 m)

MUDSTONE & COAL

BETA SEAM
(KEID. 1922)

BLUE SEAM
(GAMMA)

HITIT SEAM
(DELTA)

(ETA)

FENTON SEAM

605' (184·4 m)

655' (199·6 m)

(114·5 m)

LEGEND

- DOLERITE
- SOIL CLAY
- SANDSTONE
- SANDSTONE & COAL BANDS
- SILTSTONE
- CARBONACEOUS SHALE
- MUDSTONE
- COAL (UNDIFFERENTIATED)

522026

0 10 20 30 m
SCALE
5 cm

83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

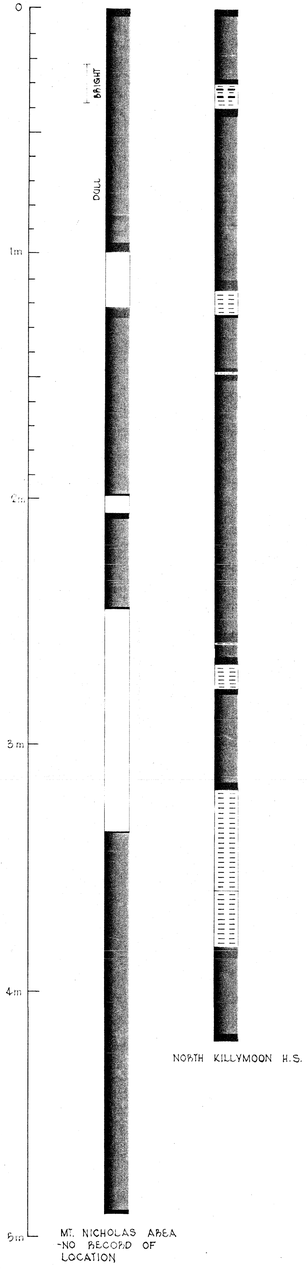
TASMANIA BASIN, TASMANIA
SHELL I.M.I. EL 5/61 GRAY

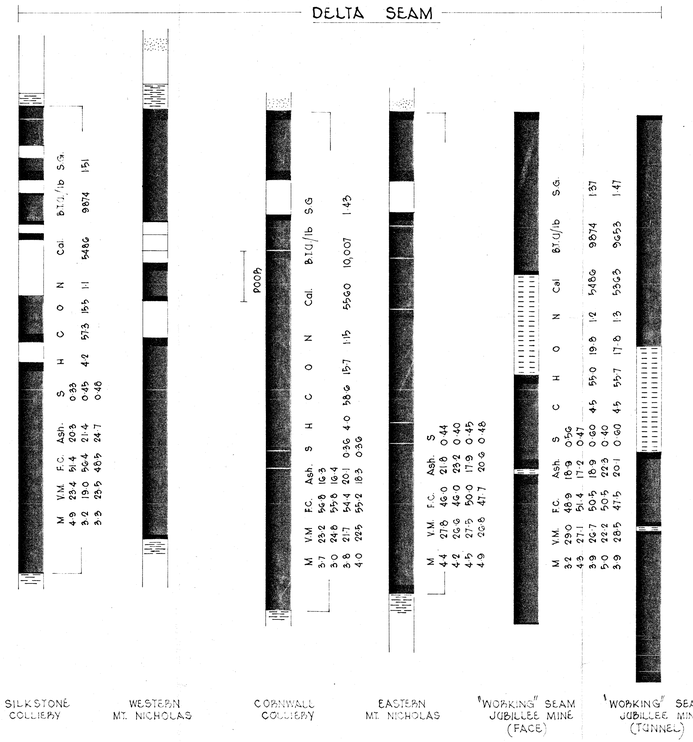
025

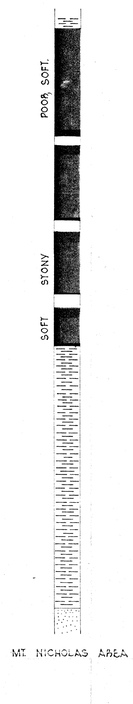
GENERALIZED BOREHOLE LOGS & COAL SEAM CORRELATIONS MT. NICHOLAS RANGE AREA

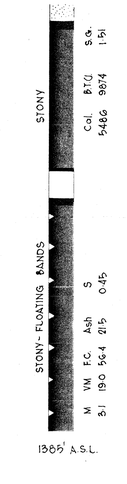
Scale 1:500

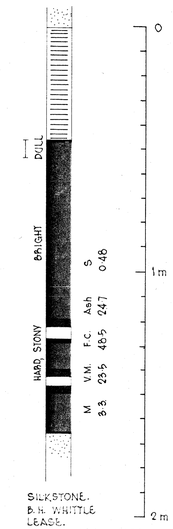
Author: SHELL, HOBART	Date: APRIL '78	Encl. 4
Report No: CEPR '16/78	Drawing No: C-1179	

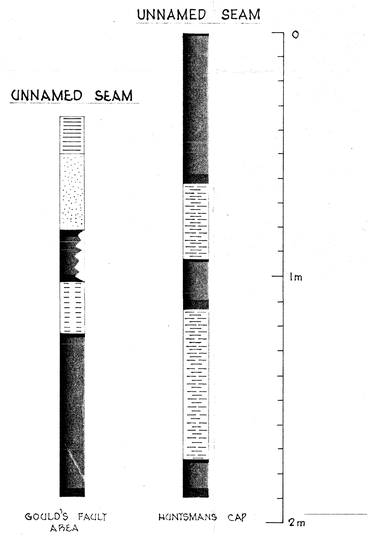












LEGEND

- SANDSTONE
- SHALE
- CARBONACEOUS SHALE
- MUDSTONE / CLAYSTONE
- PARTING (UNDIFFERENTIATED)
- COAL (UNDIFFERENTIATED)
- SHALY COAL

0 0.2 0.4 0.6 0.8 m

SCALE 1:10

ANALYSIS DATA FROM PIT/OUTCROP SAMPLES, AND NOT ACTUAL SEAMS SHOWN.

522027

5 cm

83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA BASIN, TASMANIA
SHELL I.M.I. E.L. 5/61 GRAY 026

DETAILED SEAM SECTIONS
MT. NICHOLAS RANGE AREA

Scale 1:10

Author: SHELL, HOBART	Date: APRIL '78.	Encl. 5
Report No: CEPR 16/78	Drawing No. C-1180	

027

522028

SECTION II

DALMAYNE AREA

by

D.A. TAYLOR

028

E22029

A PRELIMINARY REVIEW OF THE GEOLOGY AND COAL RESOURCES OF EXPLORATION LICENCE 5/61, GRAY - DALMAYNE AREA

CONTENTS

LIST OF ENCLOSURES

Enclosure No.		
1.	Topographic Map Showing Infrastructure, drillhole locations, Coal outcrops and faults	1:100,000
2.	Geological Map of Mt. Elephant - Piccaninny Point (Dalmayne) Area	1:20,000
3.	General Stratigraphic Correlation and Seam Sections, Dalmayne Area	1:500/1:10
4.	Abandoned Underground Mine Workings, Dalmayne Coalfield	1:10,000

1. SUMMARY

This report collates available information on the coal occurrences of the Dalmayne Area, E.L. 5/61.

Drilling has indicated the presence of up to seven coal seams (Dalmayne A, B, C, D, E, F, G) of which B, C & D seams are of significance. It was on the B seam that bord and pillar mining operations were carried out by the Dalmayne Coal Company in the early part of this century.

Limited analytical data on raw coal samples indicate a high ash (20 - 30%), low sulphur coal is present in situ. No beneficiation of the coal in this area has been attempted. Results from the nearby Cornwall mine indicate a significant improvement in quality on washing.

2. INTRODUCTION

2.1 SCOPE

This report collates available data on the coal resources of the Dalmayne area, E.L. 5/61. All previous information is reviewed in the light of the results from two diamond core holes drilled in 1974, and the data (maps, logs) presented at suitable standard metric scales. The information will form the basis for our future drilling programmes.

2.2 LOCATION & ACCESS

The Dalmayne area is situated between the east coast and the eastern margin of the Fingal Tier; and extends from the township of Gray in the north to the township of Seymour in the south. The area comprises some 76 square kilometres. (Encl. 1).

The Dalmayne coalfield is some 14 km by track and road from the railhead at St. Marys.

The area is served in the north by the Esk Highway and in the east by the Tasman Highway which passes from St. Marys in the north via the coast to Swansea in the south.

The lack of adequate access has been the main factor retarding development in this area. A poorly made, narrow road leads from Gray to the Dalmayne mine a distance of about 10 km, and thence a 2 km dozed bush track connects this mine road to a 7 km unsealed formed road to join the Tasman Highway near Piccaninny Point. Encl. 1.

During the operation of the mine (1939-54) an aerial ropeway was maintained from the mine to the coast at Piccaninny Point, a distance of about 5 km.

The North East railway runs from St. Marys in the east to Launceston a distance of 128 km.

2.3 TOPOGRAPHY AND CLIMATE

The area is the most rugged in the east coast district and with the exception of the narrow coastal plain and the upper part of the Break 'O' Day Plain, is of strong relief. Mt. Elephant is the highest point rising from sea level to 720 m above sea level; and the hills west of the coastal plain rise to over 600 m.

Great variations occur in the topography of the area and the geomorphological units can be classified as:

- Dolerite Plateau & Monadnocks
- East Coast Ranges
- Coastal Plain & Lowlands.

In the east coast region, many small creeks and rivers descend rapidly through deep gorges with steep slopes, to the coast. In the Plateau region many creeks and rivers have their origin in marshes (Thompsons Marsh near Dalmayne) which occur in the depressions of the dolerite.

2.3 TOPOGRAPHY AND CLIMATE (Cont'd)

The climate is classified as temperate marine. On the coast daily temperature range, averages about 8°C rising to about 12°C further inland.

Summers are mild and characterised by greatly lengthened days with about 15 hours daylight in mid-summer. In mid-winter, the shortest day consists of about 9 hours daylight.

There is a strong gradation in rainfall from west coast to east coast because of topography, with a distinct rain shadow east of the Central Plateau. In winter the rainfall is greatest but is fairly evenly distributed averaging 800 mm (30 inches) per annum in the Dalmayne area.

Average rainfall in the area varies from 1038 mm (100 rain days) at St. Marys and 1278 mm (138 rain days) at Gray on the East Coast Range to 680 mm (not avail.) at Bicheno on the coast.

The South Esk River system is the most affected by flooding in Tasminia. The Esk catchment includes most of the north-eastern highlands where annual rainfall averages about 1300 mm. As many rivers in the South Esk system flow through flat country, flooding is widespread, disruptive and frequent.

3. PREVIOUS INVESTIGATIONS

The area has been mapped by McNeil (1965) and part of the area had previously been mapped by Keid (1922), Voisey (1938) and Everard (1957).

In 1949-52 the Mines Department drilled 8 holes in the Dalmayne area to intersect the main working seam. None of these holes penetrated the full coal measure sequence.

In 1974, Industrial & Mining Investigations Pty. Ltd. (I.M.I.) drilled a further 2 holes to penetrate the overlying dolerite and coal measure sequence. A seam, thought to be equivalent to the seam mined at Mt. Nicholas in the north, was intersected 200-250 mm below the surface.

In 1915 the Dalmayne Coal Company drove a tunnel into a seam outcrop which was about 4m thick at an elevation of 325 m above sea level. The amount of coal produced at this time was insignificant.

During 1939-1954, the Transport Commission reopened the old workings and extracted some 35,000 tonnes of coal. The coal was trucked to the rail-head at St. Marys. The mine was closed in 1954 due to a lack of markets and technical problems associated with faulting.

The work had been carried out on the bord and pillar system in a faulted wedgeshaped block. (Encl. 2).

4. GEOLOGY OF THE AREA

The geology of the Dalmayne Area is outlined in Enclosure 2.

4.1 STRATIGRAPHY

The rock types of the area are briefly described below, chronologically, from oldest to youngest.

The basement rocks of the area are strongly folded Silurian sediments known as the Mathinna Beds. These sediments are folded along a general NNE-SSW axis and consist of sandstones, mudstones, siltstones, slates and phyllites. These sediments are intruded by Devonian granites which have no bearing on the coal prospects of the area.

The Silurian is overlain unconformably by Permian sediments. Very broadly, these sediments are freshwater and marine, and consist of sandstones, arkoses, siltstones, conglomerates and limestones. No complete sections of the Permian have been observed. In 1878, 427 feet (130 metres) of Permian sediments were observed in the Harefield bore and 500 feet (152.40 metres) in the Killymoon bore. (Encl. 3).

Conformably overlying the Permian are Triassic sediments consisting of feldspathic sandstones, sandstones, mudstones and carbonaceous mudstones. The economic coal measures are located within the top 660 feet (200 metres) of the succession, within the feldspathic sandstone member. The succession has a measured maximum thickness of 1055 feet (321.5 metres) which was revealed in Mines Department borehole No. 6 (near Fingal). At present there is no satisfactory basis for correlation of Triassic beds.

A dolerite sheet of Jurassic Age, which may be over 1,000 feet (305m) thick in parts, overlies the Triassic sediments. It is roughly conformable with the sediments and has acted as a vast protective covering for them, preventing their removal by erosion. Dolerite scree is widespread and generally covers the contact between the dolerite and the underlying sediments. This scree causes difficulty in interpreting the form of the dolerite intrusion and in locating coal outcrops.

Recent (Cainozoic) fluviatiles overlie the Triassic sediments within valleys and areas lacking dolerite.

Rocks likely to be encountered in mine workings are sandstone, mudstone and minor clay partings. Information obtained from the operating Duncan Mine at Fingal to the west of EL5/61, indicates that generally the sandstone is competent and stands up to mining. Occasional sandstone areas containing fine laminations of coal are present and are unstable. Mudstone, is the minor rock type, and where intersected, it is generally unstable.

4.2 STRUCTURE

The Permian sediments rest unconformably on the Silurian. The contact is nearly planar and dips at 1^0 or less to the south. The Permian-Triassic contact is thought to be conformable within the area of interest. Where the Permian and Triassic are disconformable, they are separated by a conglomerate of a few cms which grades upwards into a clean creamy sandstone.

4.2 STRUCTURE (Cont'd)

The general dip of the Triassic is thought to be 2^{o} to 4^{o} to the southeast. However, rolls and faults increase this dip in some areas.

The main dolerite sheet shelves to the west with respect to the Triassic beds. West of Fingal the dolerite is in contact with lower Triassic beds, i.e. no economic coal measures. East of Fingal, the dolerite is in contact with Triassic beds above the economic coal workings. Overall, the sheet has a dip to the southeast roughly conformable with the sediments. It is presumed that coal is present beneath the dolerite, if the dolerite is a roughly concordant sheet. This main sheet of dolerite is in the form of a plateau, almost unbroken from St. Marys to the Tasman Peninsula and fringed by old coal workings. Dolerite also occurs as a capping to the Nicholas Range, Mt. Peter and Mt. Paul, (Encl. 1) and as isolated outcrops on the flanks of the ranges and in valley floors. The relationship of these occurrences to the main dolerite mass is unknown.

According to Keid (in Hills, 1922) the major faults, namely the Cornwall and Dalmayne Faults occur mainly to the east of the coal bearing country (Encl.2). McNeil (1965) places the Cornwall Fault west of the Dalmayne Coalfield, a separate fault, the Lagoon Fault, following the eastern coastline. NcNeil also omits the Douglas and Siltstone Faults of Keid on the basis that they were formulated upon dubious coal seam correlation.

It is thought that the Cornwall Fault passes approximately 3 to 4 kilometres west of the Dalmayne Colliery, where the throw becomes less as the fault moves south. The throw in the vicinity of Dalmayne is about 120 m to the west. Any coal seams west of this fault would have to be worked from the northern slopes of the Fingal Tier.

The Lagoon Fault has a maximum throw of some 150 metres to the west. This fault runs in close proximity to the eastern coastline.

The Dalmayne Colliery workings occur within a wedge-shaped faulted block (Encl. 2 & 4). Mines Dapartment drilling around the workings suggest a maximum throw on these faults of less than 10 metres.

There is little information available that would indicate the density of faulting that might be encountered in any new mine workings. Fault throws of up to 8 metres are known to have occurred in the workings of Mt. Nicholas and Cornwall, therefore it is not unlikely that faults of this magnitude would occur within any new workings.

5. COAL RESOURCES OF THE AREA

5.1 COAL SEAMS

Only seven seams have been located with certainty in the Dalmayne area (Hills, 1922). Sections of the Dalmayne (Delta) seam, as found at the mine, are shown in Encl. 3. Numerous outcrops have been observed and the following exposures are worthy of mention:

- At an elevation of 304 m (ASL) the Dalmayne (Delta) seam is found, and it is on this seam that the Dalmayne Mine tunnel was driven. A total seam thickness of 4.15 m was measured (Encl. 3).
- About 1600 m to the south of the mine entrance at an elevation of 330m, a second seam was located, showing a total thickness of 5.10m of banded coal. It is not considered this seam is equivalent to the seam mined at Dalmayne. (Encl. 3).
- At an elevation of 285 m a tunnel was driven on a seam considered equivalent to the '4 feet' (1.22 m) seam at Mt. Nicholas.
- At an elevation of 225 m a seam estimated at 2.7 m thick was observed in outcrop.

The Dalmayne (Delta) seam shows the greatest thickness and at least 2.5 m of coal can be mined. It is the only seam on which work has so far been done.

To avoid further confusion in seam nomenclature, it is proposed at this time to refer to seams intersected in holes drilled in the Dalmayne Area as 'Dalmayne A' 'Dalmayne B' ... etc.

Eight of the nine Mines Department holes drilled around the mine workings penetrated the working seam (Dalmayne B). The other hole, MD4, was not drilled deep enough to intersect the working seam (Encl. 3).

The two I.M.I. holes -DDH1, DDH2, intersected seven recognisable seams, Dalmayne A .... G., of which Dalmayne B, C & D were of significance. The characteristics of these three major seams are generally consistent between the two holes. (Encl. 3). The Dalmayne B seam is a banded seam of coal, mudstone, carbonaceous mudstone, carbonaceous shale, and claystone. The lower metre or so of the seam is of better quality (Edyvean 1977).

The Dalmayne C seam is a poor quality seam, banded and containing little good quality coal. The Dalmayne D seam contains good quality coal approximately 4 m thick, although in DDH2 this seam interval is split by a major stone band 1.53 m thick.

5.2 COAL QUALITY

Five mine samples (411-415) and the Dalmayne B & D seams from DDH1 and DDH2 were analysed (Table 1). The exact locations of the mine samples are not available, nor are the sections sampled. The seams from DDH1 & 2 are exclusive of dirt bands over 7 mm thick.

5.2 COAL QUALITY (Cont'd)

TABLE 1

Character, Analyses and Heat Values of Coal Samples

Hole Location	Seam	Thickness (m)	Proximate Analysis (% a.d.) M	VM	FC	ASH	% S	Ultimate Analysis (% a.d.) H	C	O	N	C.V. BTU/lb	S.G.
MINE	'B'	-	4.5	22.2	55.3	18.0	0.69						
MINE	'B'	-	3.6	21.1	54.8	20.5	0.41	4.17	52.50	21.47	0.91	9431	1.68
MINE	'B'	-	4.8	20.5	50.5	24.2	0.41						
MINE	'B'	-	4.5	18.7	51.4	25.4	0.33						
MINE	'B'	-	5.1	18.5	49.0	27.4	0.34	3.94	49.06	18.42	0.90	9243	
DDH1	'B'	1.25	5.4	28.8	40.1	27.7	0.42					10193	1.47
DDH2	'B'	1.09	3.1	26.9	41.1	28.9	0.54					9290	1.49
DDH1	'D'	(1.55	3.9	21.7	43.4	31.0	0.23					-	1.56
		(4.56	3.3	23.3	38.4	35.0	0.30					-	1.56
		(1.56	3.5	24.1	47.1	25.3	0.33					10753	1.49
DDH2	'D'	(0.92	3.2	25.6	52.0	19.2	0.46					10882	1.42
		(0.90	2.3	28.0	49.7	20.0	0.28					10968	1.43

037

522038.

6. REFERENCES

BEATSON, K.A., 1952 : Report on the Appreciations of the Results of the Boring at Dalmayne Colliery. (Unpubl.)

BUREAU OF METEOROLOGY, 1977: Climate of Tasmania. Extract from Tasmanian Year Book No. 11, 1977 Edition.

EDYVEAN, M.D., 1977 : Report on the Coal Occurrences and Potential of Exploration Licence 5/61, East Coast; Tasmania. (Unpubl.)

HILLS, L. et al, 1922 : Coal Resources of Tasmania, Mineral Resources No. 7, Tas. Mines Depart. Published (p53-60).

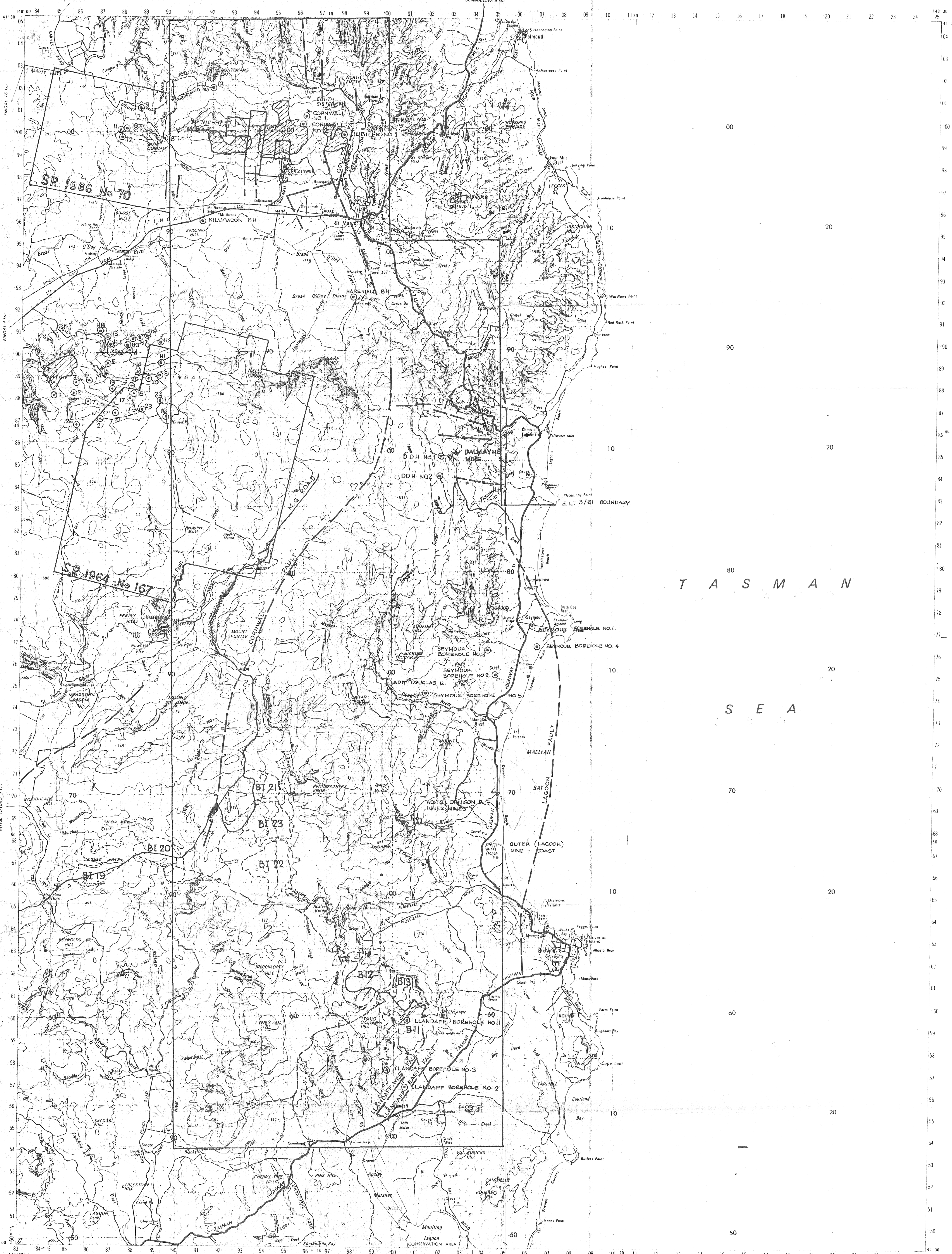
McNEIL, R.D., 1965 : The Geology of the Mt. Elephant - Piccaninny Point Area, Tasmania. Pap. Roy. Soc. Tasm., Vol. 99 p27-49.

TWELVETREES, W.H., 1901 : Report on Coal Seams at Thornedale via Thompson's marsh. Old Series Report No. 183. (Tas Geologists Office, Launceston)

TOPOGRAPHIC SURVEY

BREAK O'DAY

REFER TO THIS MAP AS: SHEET 8514 (EDITION 1)
NATIONAL TOPOGRAPHIC MAP SERIES



SCALE 1:100000

Kilometres 2 1 0 2 4 6 8 10 12 Kilometres

PRODUCED by the Survey Branch Lands Department Hobart under the direction of the Minister for Minerals and Energy as part of the national mapping programme
PRINTED by authority of the Minister for Minerals and Energy 1975
DISTRIBUTED by the Department of Minerals and Energy. A state edition is available from the Lands Department Hobart
MAP ACCURACY The average accuracy of this map is ± 25 metres in the horizontal position of well defined detail and ± 5 metres in elevation
MAP RELIABILITY Topographic information shown on this map is correct to 1975
ROAD CLASSIFICATION Roads are classified according to their intended function as part of the national road system

BLACK NUMBERED GRID LINES ARE 1000 METRE INTERVALS OF THE AUSTRALIAN MAP GRID ZONE 55
GRID VALUES ARE SHOWN IN FULL ONLY AT THE SOUTH WEST CORNER OF THE MAP
HORIZONTAL DATUM AUSTRALIAN GEODETIC DATUM 1966
VERTICAL DATUM AUSTRALIAN HEIGHT DATUM
TRANSVERSE MERCATOR PROJECTION
CONTOUR INTERVAL 20 METRES
ELEVATIONS IN METRES

GRID REFERENCE

TO GIVE A UNIQUE REFERENCE ON THIS SHEET TO NEAREST 100 METRES

IGNORE the SMALLER figures of any grid number these are for finding the full co-ordinates. Use ONLY the LARGER figures of the grid number e.g. 84

SAMPLE POINT 778 ∆ MOUNT ST JOHN

1 Quote this 1:100000 map sheet	8514
2 Locate first VERTICAL grid line to LEFT of point and read LARGE figures labelling the line either in the top or bottom margin or on the line itself	90
3 Estimate tenths from grid line to point	2
4 Locate first HORIZONTAL grid line BELOW point and read LARGE figures labelling the line in either the left or right margin, or on the line itself	73
5 Estimate tenths from grid line to point	9
SAMPLE REFERENCE	8514-902739

Built-up area; National route marker
Principal road and highway; Cutting
Secondary road; Embankment
Minor road; Road bridge
Vehicular track
Gate; Cattle grid
Railway, multiple track; Station; Railway bridge
Railway, single track; Railway tunnel
Light railway or tramway
Power transmission line

Fence; Levee or bank
Mine; Windmill; Yard; Quarry
Building/s; Church; Ruin; Drive-in theatre
Trig station; Bench mark; Spot elevation · BM 306 · 220
Cliff; Contour with value; Depression contour
⊙ Drillhole locations (various programmes)
● Coal outcrop
Mine Adit
Mine Shaft
Abandoned mine workings
Fault
Exploration licence & State Reserve Boundary

GN TN MN
GRID CONVERGENCE 0.8°
GRID/MAGNETIC ANGLE 14.6°

TRUE NORTH, GRID NORTH AND MAGNETIC NORTH ARE SHOWN DIAGRAMMATICALLY FOR THE CENTRE OF THE MAP. MAGNETIC NORTH IS CORRECT FOR 1975 AND MOVES EASTERLY BY 0.1° IN ABOUT TWO YEARS.

INDEX TO ADJOINING MAPS

FORESTER 8415	GEORGES BAY 8515	SEA
ST PAULS 8414	BREAK O'DAY 8514	TASMAN
LITTLE SWANPORT 8413	FREYCINET 8513	

522039

5 cm

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA BASIN, TASMANIA
SHELL - IMI EL 5/61 GRAY

039

TOPOGRAPHIC MAP

Showing Infrastructure, Drillhole Locations
Coal Outcrops & Faults

Scale 1: 100,000

Author: HOBART	Date: MAY 1978	Encl. I
Report No: CEPR 16/78	Drawing No: C 1181	

ST MARYS 16KM.

FOUR MILE CREEK

335·28m

594·36m

MT ELEPHANT

716·28m

GRAY

GRAY FAULT

CORNWALL FAULT

U(15) D

U(30m) D

D(120m) U

U(30m) D

D(60m) U

WARDLAW FAULT

DALMAYNE FAULT U(30m) D

WARDLAW CREEK

DALMAYNE

D.D.H.1.

D.D.H.2.

PICCANINNY FAULT (GOM)

PICCANINNY CREEK

PICCANINNY POINT

GY.1.

PLATEAU REGION

400 METRES ABOVE SEA LEVEL

LAGOON FAULT

TASMAN HIGHWAY

U(150m) D

TASMAN

QUATERNARY SYSTEM

ALLUVIUM

DOLERITE TALUS (5)

TERTIARY SYSTEM

BASALT (8)

JURASSIC SYSTEM

DOLERITE (11)

TRIASSIC SYSTEM

FELDSPATHIC SANDSTONE (41)

PERMIAN SYSTEM

FERNTREE MUDSTONE

BERRIEDALE LIMESTONE

GRAY SILTSTONE + SANDSTONE

MT ELEPHANT SANDSTONE

UNDIFFERENTIATED

SILURIAN SYSTEM

MATHINNA BEDS (26)

DEVONIAN SYSTEM

ST MARYS PORPHYRY (21)

ADAMELLITE

GRANODIORITE

TRACK

ROAD

FOLD AXIS

FAULT

FAULT INFERRED

BOUNDARY

BOUNDARY INFERRED

30° STRIKE AND DIP

COAL OUTCROP

U/G WORKINGS

DRILLHOLE

0 160CM 320CM

N

522040

5 cm

1:20,000

040

83-2031

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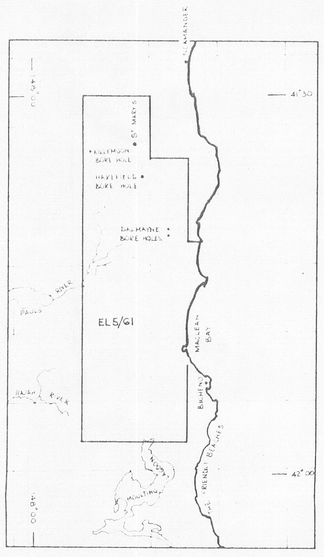
TASMANIA BASIN, TASMANIA

SHELL I.M.I. EL 5/G1 GRAY

GEOLOGICAL MAP OF MT ELEPHANT PICCANINNY POINT (DALMAYNE) AREA

Scale 1: 20,000

Author: M. Neil 1965	Date: APRIL '78	Encl. 2
Report No: CEPR 16/78	Drawing No: C 182	



I.M.I. DDH 2.

RL 412·1 m

I.M.I. DDH 1

RL 416·4 m

DALMAYNE BORE N°8

RL ~ 368 m

DALMAYNE BORE N°9

RL ~ 355 m

DALMAYNE BORE N°5

RL ~ 355 m

DALMAYNE BORE N°7

RL ~ 395 m

DALMAYNE BORE N°6

RL ~ 386 m

DALMAYNE BORE N°2

RL ~ 381 m

DALMAYNE BORE N°1

RL ~ 380 m

DALMAYNE BORE N°3

RL ~ 407 m

DALMAYNE BORE N°4

RL ~ 421 m

DALMAYNE A

DALMAYNE B

Delta

DALMAYNE C

DALMAYNE D

DALMAYNE E

DALMAYNE F

DALMAYNE G

DIRTY

HAREFIELD BORE

RL ~ 256 m

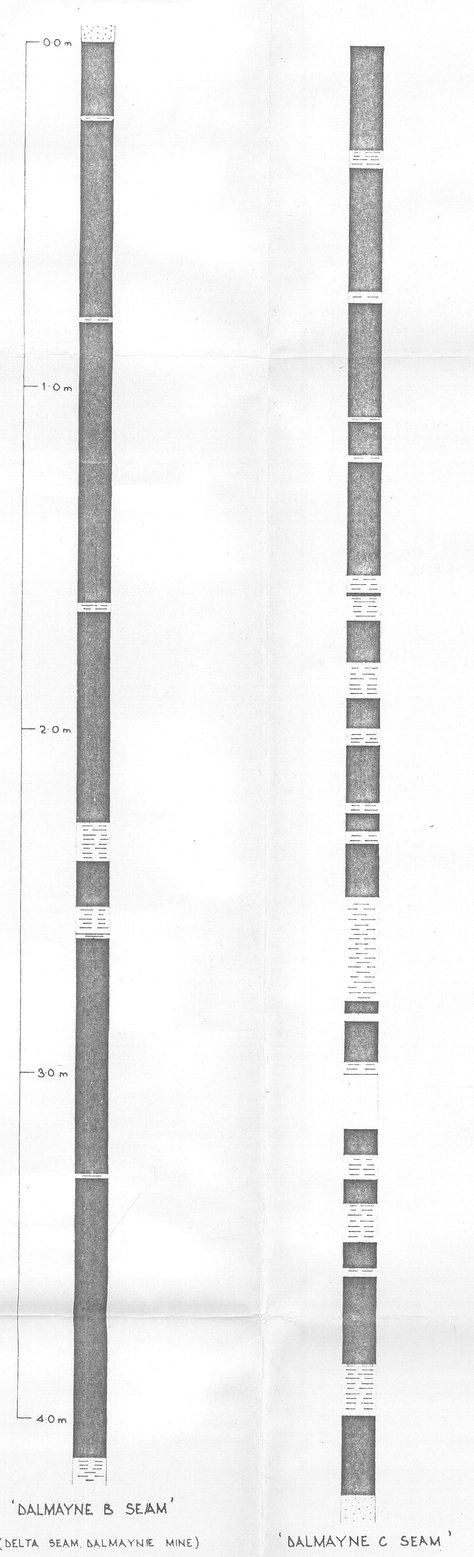
KILLYMOON BORE

RL ~ 239 m

TRIASSIC FORMATIONS

PERMIAN FORMATIONS

DETAILED SEAM SECTIONS



'DALMAYNE B SEAM'

(DELTA SEAM, DALMAYNE MINE)

'DALMAYNE C SEAM'

(1 MILE SOUTH OF DALMAYNE MINE.)

LEGEND

- ALLIVIUM
- GRAVEL, DETRITUS, RUBBLE, SHINGLE CONGLOMERATE
- DETRITUS AND SAND
- SANDSTONE
- SILTSTONE
- SANDSTONE AND BANDS OF MUDSTONE ETC.
- SANDSTONE, COAL TRACES, COAL VEINS, COAL BANDS
- MUDSTONE
- MUDSTONE AND SANDSTONE BANDS
- MUDSTONE, COAL BANDS ETC.
- SHALE
- CARBONACEOUS SHALE
- BANDED COAL
- COAL
- LIMESTONE
- DOLERITE
- METAMORPHOSED SHALES ETC.

VERTICAL SCALE OF METRES

BOREHOLE COLUMNS 1:500 — 10 0 10 20 m.

SEAM SECTIONS 1:10 — 0·20 0·10 0·0 0·20 0·40 m.

522041

5 cm

THE SHELL COMPANY OF AUSTRALIA LTD.

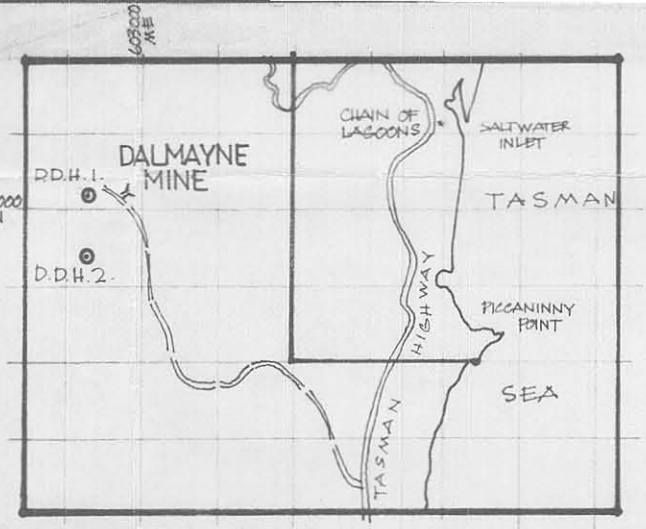
TASMANIA BASIN TASMANIA
SHELL I.M.I. EL 5/81 (GSA) 041

GENERAL STRATIGRAPHIC CORRELATION AND SEAM SECTIONS - DALMAYNE

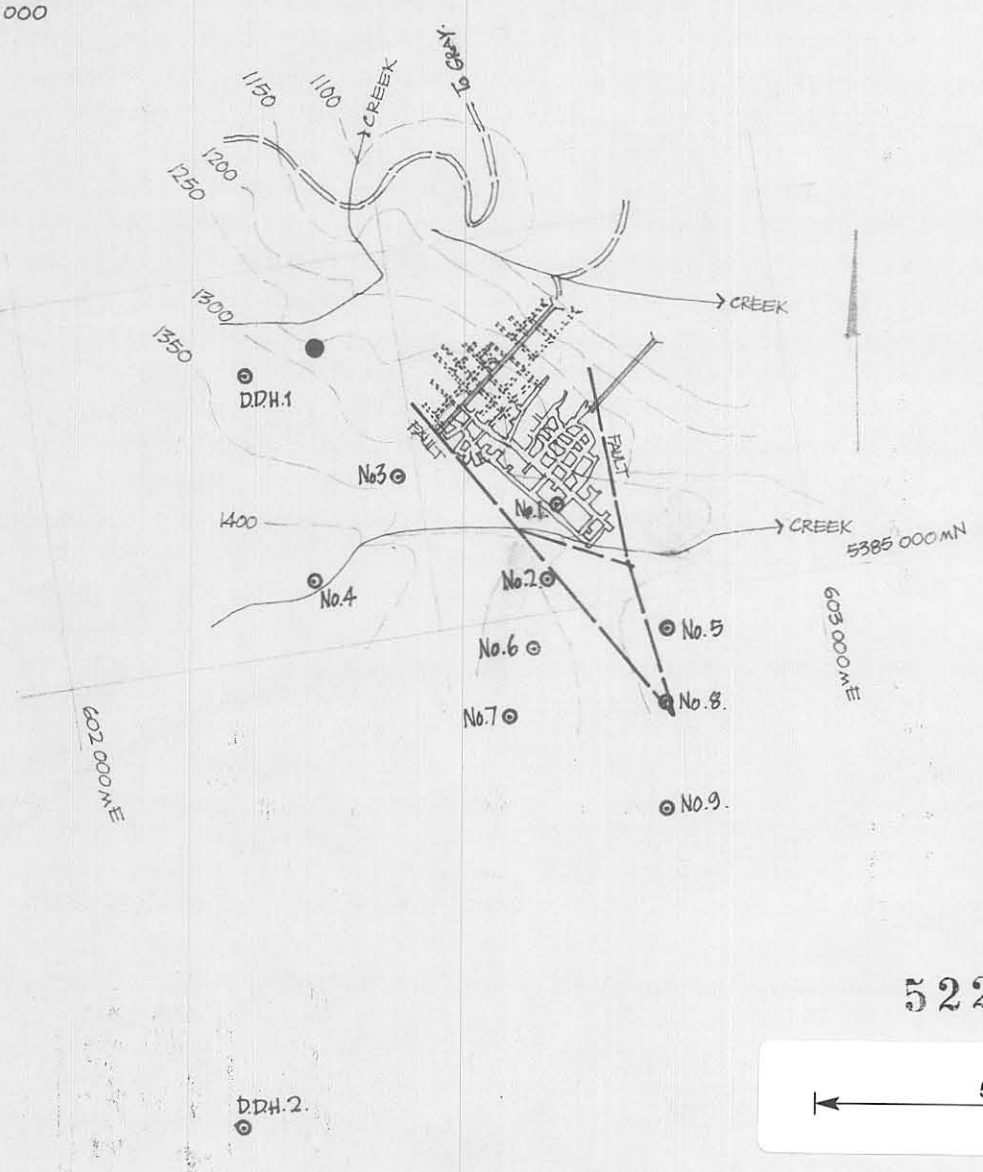
Scale 1:500 1:10

Author: Shell Hobart	Date APRIL '78	Encl 3
Report No: CEPR 16/78	Drawing No.: 1183	

83-2031



LOCALITY PLAN
SCALE : 1:100,000



522042

5 cm

LEGEND

- TOPOGRAPHIC CONTOUR (FT ASL)
- DRILL HOLE LOCATION
- FAULT LINE
- TRACK
- MINE TUNNEL
- MINE WORKINGS
- PROPOSED MINE WORKINGS.
- COAL OUTCROP.

83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA BASIN TASMANIA
SHELL I.M.I. E.L. 5/61 GRAY
ABANDONED UNDERGROUND MINE WORKINGS
DALMAYNE COALFIELD
Scale 1:10,000

Author : D.A.T.	Date : MAY 1978	Encl. 4
Report No: C.E.P.R 16/78	Drawing No: C-1184	

SECTION III

EAST COAST AREA (SEYMOUR - BICHENO)

by

P. SENINI

043

522044

A PRELIMINARY REVIEW OF THE GEOLOGY AND COAL RESOURCES OF EXPLORATION LICENCE 5/61, GRAY, EAST COAST AREA

CONTENTS

LIST OF ENCLOSURES

1. SUMMARY

The East Coast area occupies the coastal strip between Seymour and Bicheno and extends inland up to 10 km.

The area consists of a flat coastal plain of Mesozoic sandstones, and the eastern margin of the coastal range comprising sandstone and dolerite which forms a youthful topography rising to 600 m. Plateau marshes have developed at the origins of the Douglas and Denison rivers with tracks of flat land along the middle and lower reaches of the Apsley river.

A number of mines existed between 1850-1930 but they were mainly of an exploratory nature and most ceased operations in the early 1900's. This exploration showed two or three main seams and several minor ones. Numerous coal outcrops have been observed, and some recorded, basically in the precipitous cliffs and beds that the rivers and creeks have developed in the east coast range.

The whole outcrop area consists predominantly of Triassic coal measure sandstones and Jurassic dolerite. The Permian does exist subsurface as shown by the 75 m of Permian limestone intersected in Seymour borehole No. 4. (Encl. 2).

The area contains few observed major faults and although extensive minor faulting occurs, their effect in regard to mining is unknown.

The coal seams generally dip at less than 5^{0} in a southerly direction, but this is variable depending on the proximity of faulting and dolerite intrusion.

Two seams, one 2.44 m thick and the other 1.52 m thick have been correlated as the Delta and Gamma seams of the Dalmayne area. Many coal outcrops are reported in the area and seams have been described in detail in the Seymour, Douglas River, Denison River, St. Albans and Steep (Lynes) Creek areas.

2. INTRODUCTION

2.1 LOCATION AND ACCESS

The area covered in this report is situated on the central-east coast of Tasmania (Encl. 1). The only town of any significance at present is Bicheno which lies on the coast near the southern edge of the area. The former towns of Seymour and Llandaff are situated on the north and south extremities respectively.

The sealed Tasman highway is the major access route and follows within 1 km of the coast. Access otherwise is limited to a few homestead tracks and logging tracks which during winter months can be inaccessible.

Population is limited and is confined almost exclusively to the coast, around Bicheno.

Macleans Bay occupies much of the coast and it is into this bay that the Douglas and Denison rivers flow while the Apsley river empties into Moulting Lagoon to the south. (Encl. 1). These three rivers, together with their tributaries, represent the complete river system of the area.

The overall area is divided into a number of coal areas on the basis of previous coal outcrop observations. (Encl. 1). These areas are -

(1) The Steep Creek area located due north of the old township of Llandaff,

(2) the Combend area which adjoins the Steep Creek area to the south-west,

(3) the St. Albans (St. Albyn) area, is situated midway between the source and mouth of the Apsley River about 11 km due west of Bicheno,

(4) the Denison River area occurs along several km's of the Denison River,

(5) the Douglas River area, occurs along the Douglas River and

(6) the Seymour area, around the past township of Seymour and several km's inland.

The Steep Creek, Combend, and Seymour areas are within a couple of km of the Tasman highway while access to the St. Albans area is by unsealed homestead tracks and virtually no prepared access exists to the Denison and Douglas River areas at present.

2.2 TOPOGRAPHY

The topography varies from very low relief along the coastal plain to high relief in the plateau which parallels the coast. The coastal plain ranges in width from 1 to 3 km with an average elevation of around 40 m ASL. Another low lying tract of land occurs in the middle reaches of the Apsley River (St. Albans area) at 60 - 120 m ASL.

2.2 TOPOGRAPHY (Cont'd)

The Douglas and Denison Rivers which have their origins in the plateau marshes, have produced youthful topography, with precipitous cliffs and gorges occuring along the majority of their length. The Apsley River is similar in its initial stages but runs through flatter country in its middle reaches and empties into a broad marsh region known as Moulting Lagoon.

The country rises gently at first from the coastal plain then more steeply until the plateau is reached. On the plateau elevations range from 370 m ASL in the southern portion and up to 600 m ASL in the northern part of the area.

2.3 CLIMATE AND RAINFALL

In mid summer the east coast has 15 hours daylight which decreases to 9 hours in winter. The maximum average temperature in January is around 20°C on the east coast while the average minimum temperature in July is around 4°C.

The incidence of frost is affected markedly by topography, the valleys acting as natural channels for drainage of cold air at night. In the east there are few frosts after early October.

Total rainfall averages 829 mm annually for the east coast but is up to 1000 mm on exposed slopes.

Rainfall is least reliable in the east and is driest when westerlies are relatively absent or at their strongest - in late summer and late winter respectively. Highest rainfall tends to occur in autumn and spring, under the influence of small cyclonic depressions off the east coast.

The short fast flowing rivers of the east coast flood and fall rapidly, but can cause damage and disruption of road systems.

Rainfall - East Coast - 1975 (mm)

January	115
February	8
March	113
April	32
May	100
June	94
July	198
August	145
September	121
October	153
November	248
December	36

3. PREVIOUS EXPLORATION

All previous work in the area never really proceeded past the prospecting stage although numerous bores, adits and shafts were put down. However, of all this early exploratory work only 8 complete borehole records are available, 5 from around Seymour and 3 near Llandaff.

Numerous seam sections were recorded from shafts, adits and outcrops. The majority of this exploration took place between 1850-1900 with further reports by Keid (1921), Hills (1922), Nye (1927) and Cundy (1931). However these later authors generally summarised the earlier knowledge while inspecting and recording some further field outcrops.

The mining companies that operated in this area, were, Seymour Coal Mines (Seymour), Mt. John Coal Company (Douglas River, Steep Creek), Douglas River Coal Company (Denison River) and the Morning Star Company (Denison River).

A number of seams were intersected with the possible correlation of two of these, as the Delta and Gamma seams as found at the Dalmayne Area to the north.

The location of this previous work and observed outcrops are shown on Encl. 1.

4. GEOLOGY OF THE EAST COAST AREA (Encl. 2.)

4.1 STRATIGRAPHY

The only available stratigraphic sequences of any detail are from the Seymour bores 1-5, in particular No. 4, and Llandaff bores 1-3. The land along the coast consists principally of Mesozoic sandstones with Devonian granite outcrops forming more resistant coastal points near Seymour and Bicheno. The relation between the granite and the Triassic rocks is thought to be a faulted contact. Permian sediments are not observed as outcrop anywhere in the area with a possible exception near Llandaff where a small outcrop of shale and grit, exposed in a creek, was considered to be Permian.

The dolerite is considered transgressive and surmounts the whole coastal range.

The Triassic rocks of the area consists of coal measure feldspathic sandstones representing the middle - upper Triassic sequence.

The apparent excessive thickness of these sandstones (up to 600 m elevation ASL) is probably due to faulting which has taken place throughout the area.

The sandstones along the coast are yellowish-brown to greenish-grey and interbedded with mudstones, shales and coal seams. Variations in the sandstones are caused by the intermixing of irregular patches of arenaceous clay which contain wood, partly silicified and partially converted into a substance resembling coal. Also occurring are beds varying from a few centimetres to several metres in thickness and composed of rounded pebbles of greenish micaceous sandstone, claystone and less frequently quartz. At many localities and horizons the sandstone contains impressions of plants and thin streaks or layers of coal.

The only area of lower Triassic sandstone noted was a small area on the eastern side of the St. Albans area.

North of Seymour, near Thompsons Marsh (elevation 460 m ASL) pebbles of quartz, quartzite and granite occur and the same formation occurs at Harmans Creek at 90 m ASL. The absence of dolerite pebbles negates it being a later marine terrace.

The feldspathic sandstones are often locally indurated by the dolerite intrusions.

The dolerite occurs as a transgressive mass with respect to the Triassic sediments. This is in contrast to its sill-like form in areas to the north and west. Several dolerite dykes occur, and two observed on the Douglas River area were nearly 5 m in width.

The dolerite forms the capping of the ranges but has been noted down to elevations of 100 m ASL, and its proximity to the coast may in fact be self determined by its influence over the formation of the coastal plain.

The thickness of the dolerite is variable but may be up to 120 m.

River gravels and alluvium occur along the courses of present streams especially the Apsley River in the St. Albans area.

4.2 STRUCTURE

A major fault - the Lagoon Fault was indicated by Hills (1922) to pass through Seymour and to run roughly parallel to the coast some 2 km off-shore and then to strike the coast again just west of Bicheno (Encl.1). The 1:250,000 geological maps (Oatlands, Launcestan) do not incidate the existence of this fault in this area.

A number of other faults have been postulated for the area from seam elevation differences, and a fault was recorded in the Seymour area as mine workings progressed westward. (Encl.1)

In the Douglas river region a fault, the Douglas River Fault, trending north-south with a throw of at least 75 m was observed, and extends almost to the Apsley River.

A possible fault has been mentioned east of St. Albans which from enclosure 1 would appear to be a continuation of the Douglas River Fault.

Two other faults of significance, the Llandaff East and West Faults, run parallel to each other and pass through the Steep Creek area. (Encl. 1)

Although not recorded in much of the area, minor faulting is considered to be prevalent. However, this minor faulting has not occurred with any regularity of direction, and faults have been recorded with trends all around the compass.

An example of this minor faulting was observed in a tunnel along the Douglas River (near the Mt. John Coal Co. main tunnel) where the seam has been faulted by a series of step faults, each with an approximate downthrow of 1.5 m to the east.

A fault was also reported to have been observed in the workings of the Inner Mines (Denison River).

The general dip of the coal seams in the area is around 3^{o} in a southerly direction. Variations in dip do occur, with a maximum dip of 10^{o}, but these can usually be related directly to the proximity of faulting or the dolerite intrusion.

An anticline was reported, from a section along the Douglas River due to the seam dipping in opposite directions over a distance of 200 m on what appears to be a continuous seam. However this record is rather vague and since there is no other record of folding in the area, then the suggestion concerning folding is rather dubious.

5. COAL RESOURCES OF THE EAST COAST AREA

5.1 COAL SEAMS

A number of seams have been observed in outcrop, old workings, prospecting tunnels, and shafts. No overall picture of seam correlation and continuity could be produced for the area as a whole due to faulting and the fact that the available data is restricted to small isolated areas. Therefore the areas will be discussed separately.

Three seams were intersected in the Seymour area, the No. 1 at 10.7 m, No. 2 at 50.3 m and No. 3 at 56.4 m below surface level. The No. 1 seam (1.37 m thick) had its value discounted by a band of shale and mudstone, however there is some evidence that this band may disappear towards the north-west and west.

The No. 2 seam varies in thickness from 1.14 m to 1.68 m and averages 1.47 m. The floor and roof are of hard sandstone and the floor has a slight rise in a westerly direction. A main heading was driven for a distance of 205 m along this seam. No data is available for the No. 3 seam.

Around 1900, two seams 0.76 m and 1.30 m thick were intersected in a bore drilled near Seymour at depths of 9.1 m and 30.5 m respectively below the surface. Along the coast, 1.6 km south of Seymour two outcrops of the lower seam were reported to be 1.68 m thick and both practically at sea level.

The best indication of the seams in the Seymour area are shown in Seymour boreholes 1-5, Enclosure 3.

In the Douglas River area four seams have been confirmed and of these, two are recorded in detail (Encl. 5). Along the Douglas River at 75 m ASL a seam 2.44 m (8') thick occurs which has numerous clay partings, reducing the coal fraction to around 1.83 m. A tunnel was driven on this seam for 50 m by the Mt. John Coal Co. and it was considered that this seam corresponded to the Delta seam mined at Dalmayne. This seam extended up to 2.60 m, and it was possible to mine 1.22-1.52 m. A second seam observed at the above location is 1.52 m (5') thick and represents the Gamma seam of the series. Outcrops of this seam are found at altitudes varying up to 198 m ASL, (155 m ASL at Mt. John main tunnel). Two hard blackstone bands near the base of this seam, considered characteristic of the Gamma seam, reduce it to around 0.61 m of workable coal.

Coal seams have been observed along the Douglas River as far as the Mayson River junction and several coal outcrops have been noted in Coal Creek at various elevations. (Enclosure 5)

In the Denison River area, the Douglas River Coal company began two prospective mines, the Inner mine (1.6 km from the river mouth) and the Outer or Lagoon Mine (1861) (on the coast slightly south of the Denison River).

At the Inner Mine two seams were intersected at 28 m and 50 m below the surface, but due to partings of shale less than 1.22 m of the top seam could be extracted profitably. This 1.22 m consisted of two layers of coal, 0.79 m and 0.43 m thick. The top seam was 2.44 m thick while the second seam was 1.52 m thick. The upper seam finally proved unworkable due to the numerous splits.

5.1 COAL SEAMS (Cont'd)

At the Outer (Lagoon) Mine, a shaft intersected two seams. The second, at 32 m ASL, was 2.44 m thick, and thought to correspond with the Delta seam. Further shafts encountered two seams at 28 m and 59 m below the surface. The lower seam was 1.5-2.1 m thick, but with only 0.50 m of coal suitable for working. Another shaft reportedly passed through five or six layers of coal but all were insignificant.

The Morning Star Company, situated 3.2 km upstream on the Denison River, encountered three seams. These were named the B1, B2, and B3 and occurred in the same greenish sandstones as the seams intersected in the Inner Mine. The B2 seam had no more than 0.71 m of workable coal while the B3 seam had 0.76 m of workable coal. A little above the B3 is another seam approximately 0.30 m thick.

A number of coal outcrops also occur along the Denison River, one which was reported as 0.86 m thick including thin partings.

In the St. Albans area much of the coal is hard and stony. On the western portion of the St. Albans area the Gamma seam (1.52 m) occurs at 237 m ASL. This Gamma seam outcrop is characterised by two hard blackstone bands. Numerous outcrops have been observed in creeks in the area and a number of these have been plotted as accurately as the information allows. Enclosure 1).

In the Steep Creek area, just north of the old township of Llandaff, a number of outcrops occur in what is now known as Lynes Creek (originally Steep Creek). These outcrops range from 60 m to 200 m ASL with two major seams at 158 m (the A1 seam) and 198 m ASL. Three bores, Llandaff 1-3, were drilled in this area and are shown in enclosure 4.

H.W. Twelvetrees (1901) states that he located eight seams in the Steep Creek area, however this has not been confirmed.

At 180 m ASL in Steep Creek a large outcrop of sandstone, shale and coal was observed but none of the seams were thick enough to warrant development.

Three seams are recorded from Combend, south-west of the Steep Creek area, one of which was correlated as the Delta seam by Keid (1921).

It is thought possible that the seams of the Steep Creek area may continue through the range to the St. Albans area.

5.2 COAL QUALITY

Overall, the coals of the east coast are bituminous to sub bituminous coals and like most Tasmanian coals percentage ash is high. The quality may be seriously effected locally by the intrusive dolerite. Analyses for some east coast coals are shown in table 1.

TABLE 1 CHARACTER ANALYSIS OF COAL SAMPLES

LOCALITY	COAL STATE	MOISTURE %	ASH %	VOLATILE MATTER %	FIXED CARBON %	C.V. (BTU/LB)	SULPHUR %
MORNING STAR) Seam B1	RAW	5.6	6.0	32.4	54.8	-	0.6
COMPANY) Seam B1	"	5.0	6.8	33.0	55.2	-	-
) Seam B2	"	6.3	5.6	33.5	54.0	-	0.6
) Seam B3	"	4.9	13.1	-	53.1	-	-
DOUGLAS RIVER) 2.44m	RAW	-	14.5	-	70.4	-	0.70
COAL COMPANY) (Delta)	"	-	16.4	-	-	-	-
) Seam	"	-	17.2	-	-	-	-
SEYMOUR COAL MINE) No.2 Seam)	RAW	1.99	11.58	33.0	52.65	12620	0.82
SEYMOUR (624)	RAW	3.14	23.40	22.91	50.55	9919	0.56
" (625)	"	3.14	27.90	19.10	49.86	-	0.49
" (626)	"	3.14	16.12	26.40	54.34	-	0.59
DOUGLAS RIVER (417)	RAW	3.40	30.30	24.08	42.22	8500	0.48
" " (418)	"	4.26	23.65	23.58	48.51	9564	0.56
DENISON RIVER (419)	"	4.40	17.30	24.80	53.50	10273	0.62
STEEP CREEK (416)	"	5.80	29.20	23.42	41.58	-	0.44
" "		1.60	24.50	25.60	48.30	-	-
" " A1 Seam		4.30	5.80	5.80	57.30	-	0.70

6. REFERENCES

BUREAU OF METEOROLOGY 1977 : Climate of Tasmania
Extract from Tasmanian Year Book No. 11, 1977 Edition.

CUNDY, W.H., 1931 : Seymour Coal Mines Report. Tas. Mines Depart. Report 49/3.

GOULD, C., 1861 : Coalfields Fingal & East Coast. Old Series Report No. 7.
(Geol. Surv. Office, Hobart, Tasm.)

HILLS, L., et al., 1922 : Coal Resources of Tasmania. Mineral Resources No. 7, Tas. Mines Depart. (pp. 61-92).

KEID, K.G.W., 1921 : Preliminary report on the Douglas River Coal Area. (Unpubl. report).

NYE, P.B., 1927 : Report on the Coal in the Bicheno and St. Albyns districts. (Unpubl. report).

TWELVETREES, W.H., 1901 : Report on the Coalfields of Douglas River. Old Series Report No. 180. (Tas. Geologist Office).

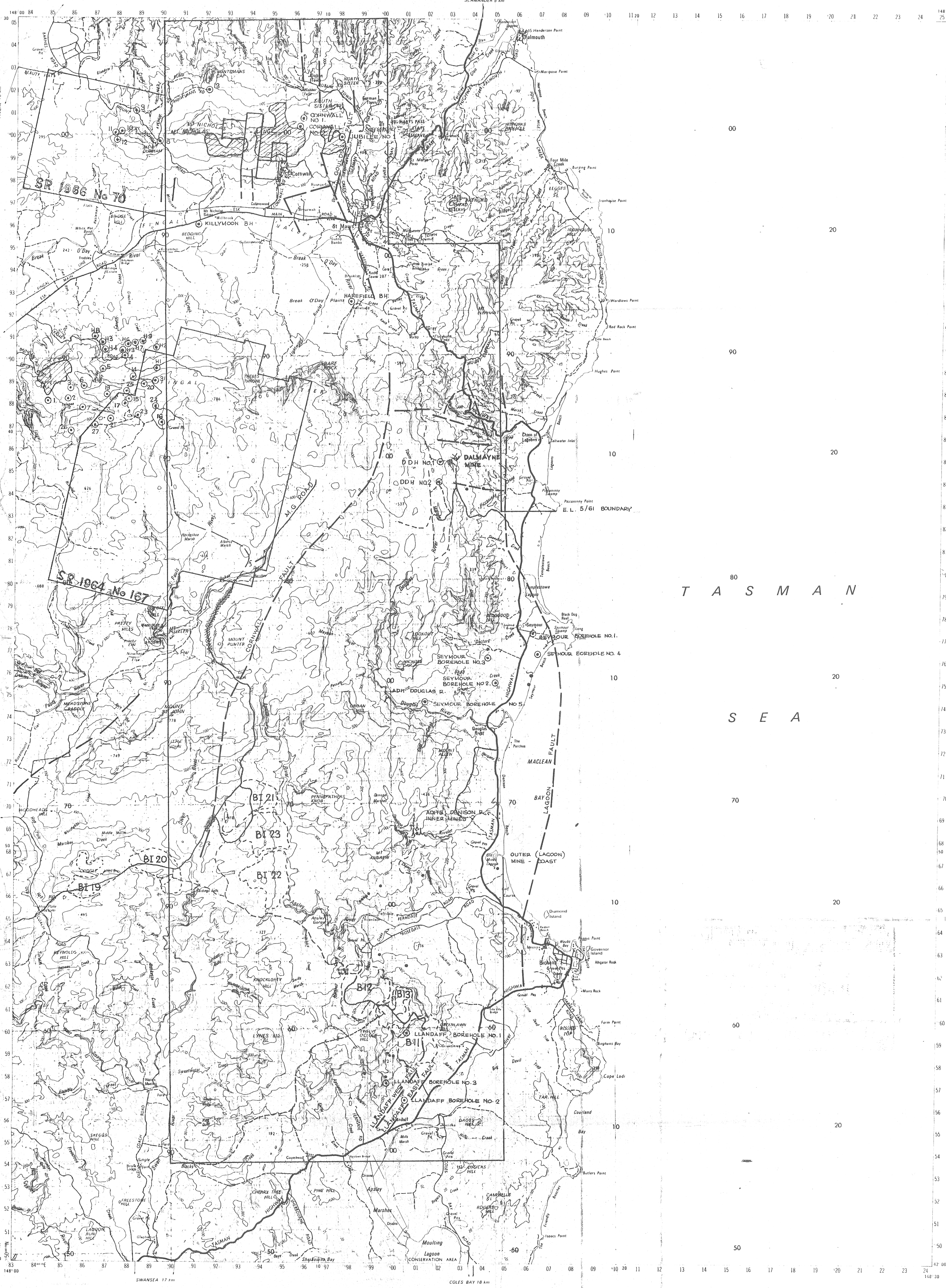
., 1901 : Report on the coalfield of Denison River. Old Series Report No. 180 (Tas. Geologist Office).

., 1901 : Report on the coalfield of Llandaff. Old Series Report No. 180. (Tas. Geologist Office).

TOPOGRAPHIC SURVEY

BREAK O'DAY

REFER TO THIS MAP AS SHEET 8514 (EDITION 1)
NATIONAL TOPOGRAPHIC MAP SERIES



SCALE 1 : 100000

PRODUCED by the Survey Branch Lands Department Hobart under the direction of the Minister for Minerals and Energy as part of the national mapping programme
PRINTED by authority of the Minister for Minerals and Energy 1975
DISTRIBUTED by the Department of Minerals and Energy. A state edition is available from the Lands Department, Hobart
MAP ACCURACY. The average accuracy of this map is ± 25 metres in the horizontal position of well defined detail and ± 5 metres in elevation
MAP RELIABILITY. Topographic information shown on this map is correct to 1975
ROAD CLASSIFICATION. Roads are classified according to their intended function as part of the national road system

BLACK NUMBERED GRID LINES ARE 1000 METRE INTERVALS OF THE AUSTRALIAN MAP GRID, ZONE 55
GRID VALUES ARE SHOWN IN FULL ONLY AT THE SOUTH WEST CORNER OF THE MAP
HORIZONTAL DATUM AUSTRALIAN GEODETIC DATUM 1966
VERTICAL DATUM AUSTRALIAN HEIGHT DATUM
TRANSVERSE MERCATOR PROJECTION
CONTOUR INTERVAL 20 METRES
ELEVATIONS IN METRES

GRID REFERENCE

TO GIVE A UNIQUE REFERENCE ON THIS SHEET TO NEAREST 100 METRES

IGNORE the SMALLER figures of any grid number; these are for finding the full co-ordinates. Use ONLY the LARGER figures of the grid number, e.g. 84

SAMPLE POINT 778 ⊿ MOUNT ST JOHN

1	Quote this 1:100 000 map sheet	8514
2	Locate first VERTICAL grid line to LEFT of point and read LARGE figures labelling the line either in the top or bottom margin, or on the line itself	90
3	Estimate tenths from grid line to point	2
4	Locate first HORIZONTAL grid line BELOW point and read LARGE figures labelling the line in either the left or right margin, or on the line itself	73
5	Estimate tenths from grid line to point	9
	SAMPLE REFERENCE	8514-902739

Built up area; National route marker
Principal road and highway; Cutting
Secondary road; Embankment
Minor road; Road bridge
Vehicular track
Gate; Cattle grid
Railway, multiple track; Station; Railway bridge
Railway, single track; Railway tunnel
Light railway or tramway
Power transmission line
Fence; Levee or bank
Mine; Windmill; Yard; Quarry
Building/s; Church; Ruin; Drive-in theatre
Trig station; Bench mark; Spot elevation — BM 306 · 220
Cliff; Contour with value; Depression contour
⊙ Drillhole locations (various programmes)
● Coal outcrop
Mine Adit
Mine Shaft
Abandoned mine workings.
Fault
Exploration licence & State Reserve Boundary

GRID CONVERGENCE 0.8°
GRID/MAGNETIC ANGLE 14.6°

TRUE NORTH, GRID NORTH AND MAGNETIC NORTH ARE SHOWN DIAGRAMMATICALLY FOR THE CENTRE OF THE MAP. MAGNETIC NORTH IS CORRECT FOR 1975 AND MOVES EASTERLY BY 0.1° IN ABOUT TWO YEARS.

INDEX TO ADJOINING MAPS

522055

5 cm

83-2081

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA BASIN, TASMANIA
SHELL - IMI EL 5/61 GRAY

054

TOPOGRAPHIC MAP

Showing Infrastructure, Drillhole Locations
Coal Outcrops & Faults

Scale 1: 100,000

Author: HOBART	Date: MAY 1978	Encl. 1
Report No: CEPR 16/78	Drawing No: C 1181	

148°00' 148°10' 148°20'

590000 600000 610000

41°30

54 00000

53 90000

41°40'

53 80 000

53 70 000

41°50'

53 60000

53 50000

42°00'

5340000

CORNWALL

MT. NICHOLAS

CARDIFF

SILKSTONE

SR 1966 No 70

FINGAL LINE

St Marys

ESK

BREAK O'DAY

TASMAN HIGHWAY

FALMOUTH

VALLEY

FINGAL

DALMAYNE

PICCANINNY POINT

ST PAULS RIVER

SR 1964 No 161

DUKES RIVER

DOUGLAS RIVER

SEYMOUR

DENISON RIVER

FUTURE RAILROAD

Bicheno

SWAN RIVER

LLANDAFF

EL 5/61

MOULTING LAGOON

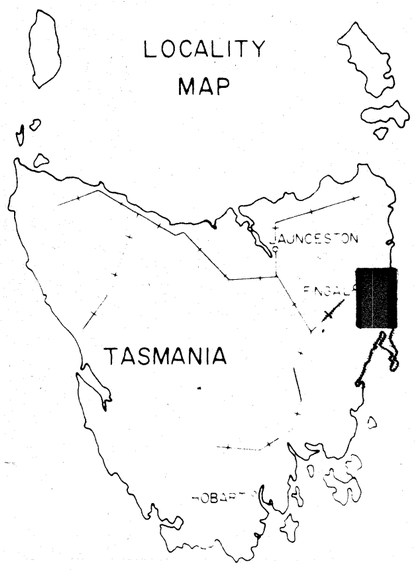
MACLEAN BAY

MT. PAUL

1:100 000 SHEET INDEX

Currie	Lara Coopa					Killiecrankie	Babel Island
Pearshape	Grassy					Goose Island	Lady Barron
Three Hummocks							
Welcome	Circular Head	Table Cape			Ninth Island	Cape Portland	Swan Island
Sandy Cape	Arthur River	Hellyer	Forth	Tamar	St Patricks	Forester	Georges Bay
Conica Rocks	Pieman	Sophia	Mersey	Meander	South Esk	St Pauls	Break O'Day
	Cape Sorell	Franklin	Nive	Shannon	Lake Sorell	Little Swanport	Freycinet
	Spero	Olga	Wedge	Tyenna	Derwent	Prosser	Maria
		Port Davey	Old River	Huon	Dentre Casteaux	Storm Bay	
			South West Cape	South East Cape			

LOCALITY MAP



LEGEND

Alluvium, sand	RECENT
Dolerite scree	RECENT
Basalt	TERTIARY
Dolerite	JURASSIC
Coal measures	TRIASSIC
Undifferentiated	TRIASSIC
Undifferentiated	PERMIAN
Granite	L. CARBONIFEROUS - U. DEVONIAN
Undifferentiated greywackes	L DEVONIAN & L PALAEOZOIC

Fault (downthrow marked)

Exploration License and State Reserve boundaries

Coal mine (all defunct except Fingal)

522056

5 cm

SCALE 1 : 100 000

KM. 2 1 0 2 4 6 8 10 12 KM

NOTE : 1. BLACK NUMBERED GRID LINES (5340000) ARE 1000 METRE INTERVALS OF THE AUSTRALIAN MAP GRID, ZONE 55
2. HORIZONTAL DATUM AUSTRALIAN GEODETIC DATUM 1966
3. VERTICAL DATUM AUSTRALIAN HEIGHT DATUM
4. TRANSVERSE MERCATOR PROJECTION

83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA-TASMANIA BASIN

SHELL-IMI E.L.5/61 GRAY 055

GEOLOGICAL MAP EAST COAST AREA

Author: N.H.K.	Date: June 1978	Encl. 2
Report No: CEPR 16/78	Drawing No: 1165	

SEYMOUR NO. 5 BORE
DOUGLAS RIVER

RL ~ 100 m

SHAFT

169·0 m
0·46 m

186·88 m
1·30 m

196·63 m

SEYMOUR NO. 2 BORE

RL ~ 25 m

32·16 m
0·43 m

70·55 m
0·91 m

78·06 m
0·40 m

93·96 m

SEYMOUR NO. 3 BORE

RL ~ 40 m

25·20 m
0·50 m

60·50 m
0·75 m

75·33 m

SEYMOUR NO. 4 BORE

RL ~ 5 m

59·13 m
0·15 m

85·18 m
0·50 m

271·96 m

SEYMOUR NO. 1 BORE

RL ~ 5 m

80·25 m
0·43 m

43·97 m
0·93 m

51·65 m

LEGEND

- ALLUVIUM
- GRAVEL, DETRITUS, RUBBLE, SHINGLE CONGLOMERATE
- DETRITUS & SAND
- SANDSTONE
- SILTSTONE
- SANDSTONE & MUDSTONE
  SANDSTONE, BANDS OF MUDSTONE, ETC.
- SANDSTONE, COAL TRACES, COAL VEINS ETC.
- MUDSTONE & SANDSTONE
  MUDSTONE, BANDS OF SANDSTONE ETC.
- MUDSTONE
- MUDSTONE, COAL BANDS, VEINS ETC.
- COAL & MUDSTONE
- SHALE
- CARBONACEOUS SHALE
  MUDDY COAL, CARBONACEOUS
- BANDED COAL
- COAL
- LIMESTONE
- IRONSTONE
- DOLERITE
- GRANITE

522057

50 0 50 100 150 200 250

SCALE 1:500

5 cm

83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

EAST COAST AREA, TASMANIA
GRAY EL 5/61

056

SEYMOUR BOREHOLES 1-5
LITHOLOGICAL PLOTS
POSSIBLE CORRELATION

Scale 1: 500

Author: P. SENINI	Date: APRIL '78	Encl. 3
Report No: CEPR 31/79	Drawing No: C 1167	

METRES A.S.L.

100

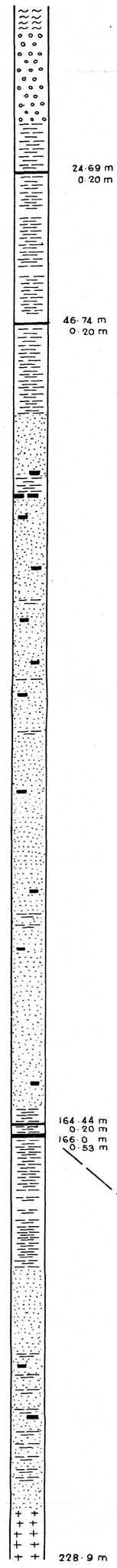
50

0

-50

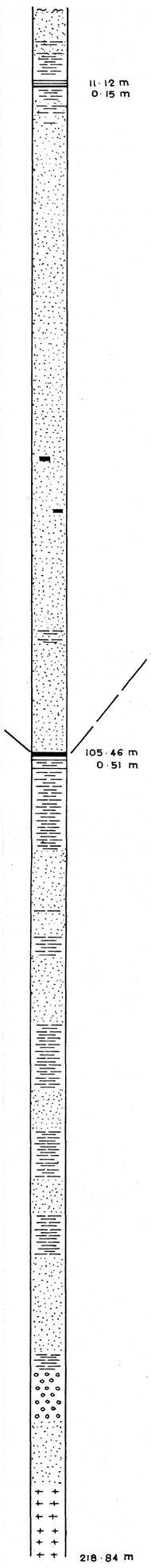
LLANDAFF BORE NO. 3

115·8 m A.S.L.



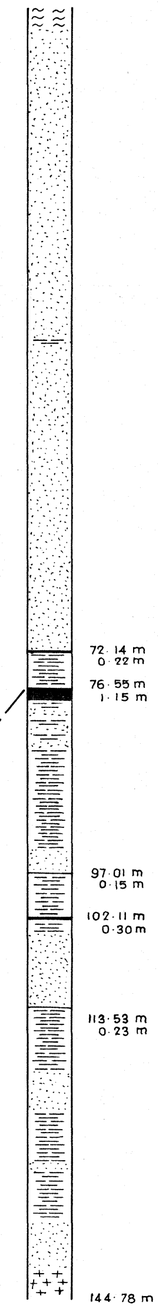
LLANDAFF BORE NO. 2

15·2 m A.S.L.



LLANDAFF BORE NO. 1

45 m A.S.L.



LEGEND

- ALLUVIUM
- GRAVEL, DETRITUS, RUBBLE, SHINGLE CONGLOMERATE
- DETRITUS & SAND
- SANDSTONE
- SILTSTONE
- SANDSTONE & MUDSTONE SANDSTONE, BANDS OF MUDSTONE, ETC.
- SANDSTONE COAL TRACES, COAL VEINS ETC.
- MUDSTONE & SANDSTONE MUDSTONE, BANDS OF SANDSTONE ETC.
- MUDSTONE
- MUDSTONE, COAL BANDS, VEINS ETC.
- COAL & MUDSTONE
- SHALE
- CARBONACEOUS SHALE MUDDY COAL, CARBONACEOUS
- BANDED COAL
- COAL
- LIMESTONE
- IRONSTONE
- DOLERITE
- GRANITE

522058

5 cm

50 0 50 100 150 200 250

SCALE 1: 500

83-2031

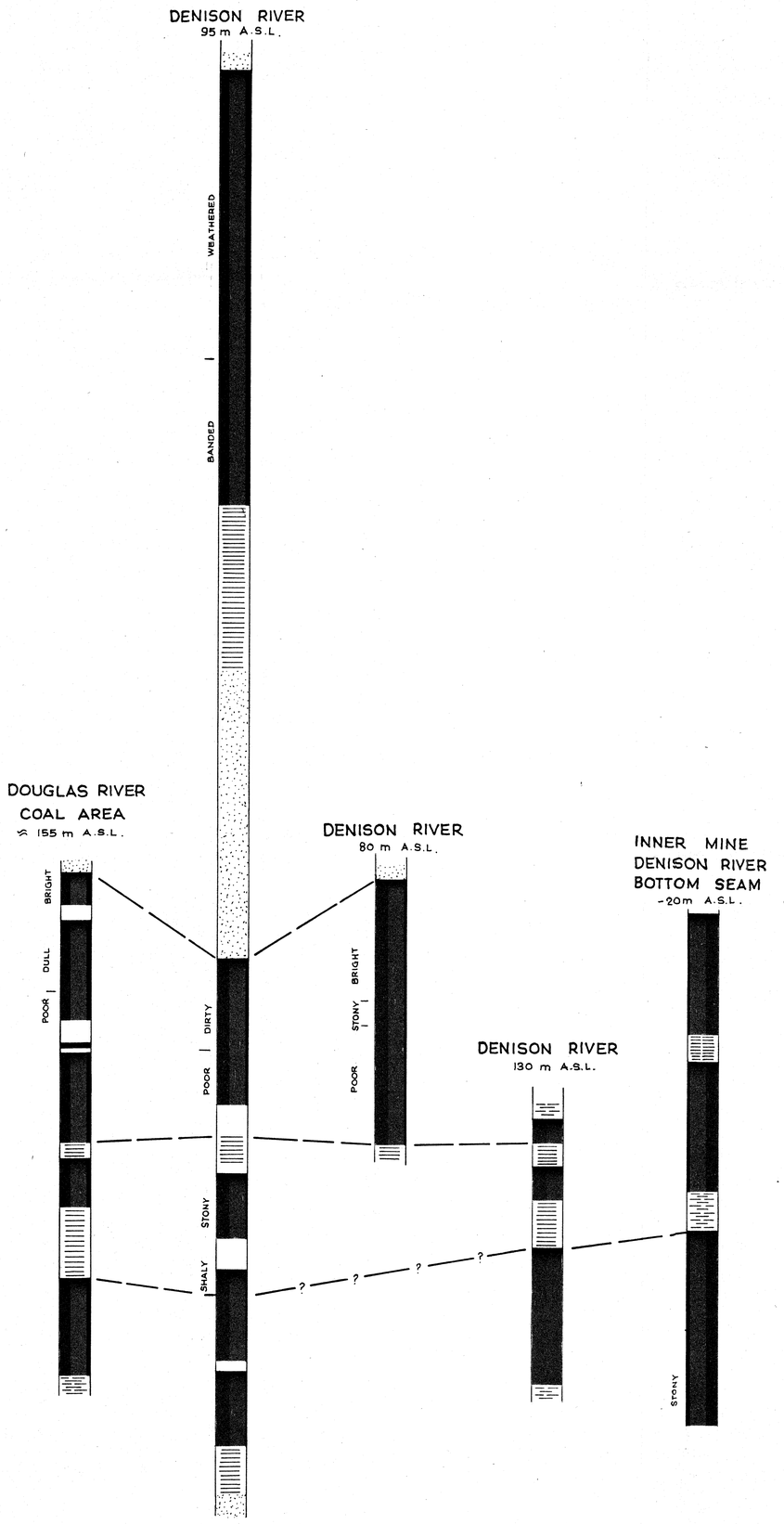
THE SHELL COMPANY OF AUSTRALIA LTD.

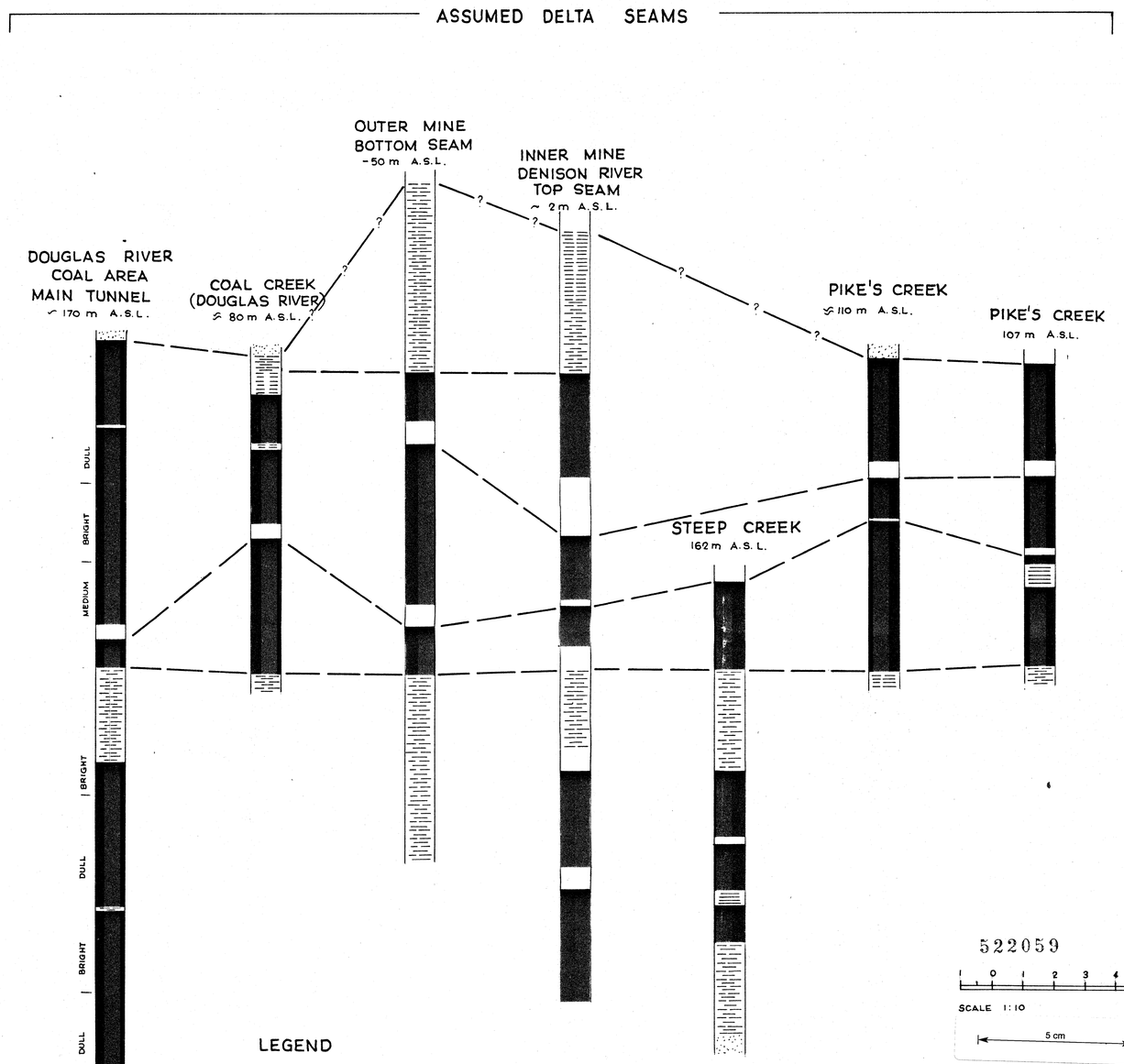
EAST COAST AREA, TASMANIA
GRAY EL 5/61 057

LLANDAFF BOREHOLES 1-3
LITHOLOGICAL PLOTS

REDUCED LEVEL (m A.S.L.) POSSIBLE CORRELATION
Scale 1: 500

Author: P. Senini	Date: APRIL '78	Encl. 4
Report No: CEPR 16/78	Drawing No: 1168	





522059

SCALE 1:10

5 cm

LEGEND

- ALLUVIUM
- GRAVEL, DETRITUS, RUBBLE, SHINGLE CONGLOMERATE
- DETRITUS & SAND
- SANDSTONE
- SILTSTONE
- SANDSTONE & MUDSTONE SANDSTONE, BANDS OF MUDSTONE, ETC.
- SANDSTONE, COAL TRACES, COAL VEINS ETC.
- MUDSTONE & SANDSTONE MUDSTONE, BANDS OF SANDSTONE ETC.
- MUDSTONE
- MUDSTONE, COAL BANDS, VEINS ETC.
- COAL & MUDSTONE
- SHALE
- CARBONACEOUS SHALE MUDDY COAL, CARBONACEOUS
- BANDED COAL
- COAL
- LIMESTONE
- IRONSTONE
- DOLERITE
- GRANITE

83-2081

THE SHELL COMPANY OF AUSTRALIA LTD.

EAST COAST AREA, TASMANIA 058
GRAY EL 5/61

DETAILED SEAM SECTIONS EAST COAST AREA

Scale 1: 10

Author: P. SENINI	Date: APRIL '78	Encl. 5
Report No: CEPR 16/78	Drawing No: C-1169	

059

522060

SECTION IV

MT. PAUL AREA

by

J.S. BRUNTON

060

522061

A PRELIMINARY REVIEW OF THE GEOLOGY AND COAL RESOURCES OF E.L. 5/61, GRAY - MT. PAUL AREA

CONTENTS

ENCLOSURES

Enclosure No.		
1.	Location, Infrastructure and Geology, Mt. Paul Area.	1:100,000
2.	Coal Seam, Mt. Paul Adit	1:10

SUMMARY

The Mt. Paul area contains a small coalfield isolated from the major coalfields to the north, by the Apsley River.

The coal bearing strata appears to have been preserved in a down faulted trough.

No boreholes have been drilled in the area however an adit has been driven for 180 m along the main seam. This tunnel revealed a seam 3.0 m thick containing about 2.5 m of coal and of apparently similar quality to the main seam at Dalmayne. Only about 2.6 sq.km of coal bearing strata are present in the area which restricts possible reserves to 4.7 million tonnes. The potential of this area therefore appears to be very limited.

1. INTRODUCTION

1.1 SCOPE

This report collates data on the geology and coal resources of the Mt. Paul area of Exploration Licence 5/61. Information available at present is very limited due possibly to the minor potential of the Mt. Paul field relative to other areas within the lease.

1.2 LOCATION & ACCESS

The Mt. Paul area is situated at the northern end of Freycinet Peninsula. The area is covered by a separate EL block of 48 sq.km. between Moulting Lagoon and the coast, some 5 km to the south of the major part of the lease area. (Encl. 1).

Access within the area is poor, however the Tasman Highway is about 8 km to the north of the lease and the deepwater part of Coles Bay is about 6 km to the south. A good road linking the highway and Coles Bay runs along the western boundary of the E.L. An east-west 4 wheel drive track traverses the area.

1.3 TOPOGRAPHY AND CLIMATE

The topography of the area is dominated by the comparatively short and narrow ridge formed by Mts. Paul and Peter which rise rapidly to over 260 m A.S.L. A saddle occurs between the two peaks. The whole area is characterised by the absence of notable drainage channels. The comparatively few creeks that do occur are small, and for the most part are continually dry.

In mid summer the east coast has 15 hours daylight which decreases to 9 hours in winter. On the east coast the maximum average temperature in January is around 20^{o}C, while the average minimum temperature in July is around 4^{o}C.

Total rainfall averages 829 mm annually for the coast, but up to 1000 mm occur on exposed slopes. Highest rainfall tends to occur in Autumn and Spring, under the influence of small cyclonic depressions off the east coast.

2. PREVIOUS INVESTIGATIONS

The only report on the area is included in Hills (1922). At that time the Mount Paul Coal Mining Syndicate held a lease of 240 acres situated on the southern and western flanks of Mt. Paul. The syndicate had driven a dip tunnel on the main seam for a distance of approximately 180 m. The tunnel revealed a banded seam about 3.0 m thick. This seam was considered equivalent to that worked at the Dalmayne Colliery to the north. Production was restricted to a few bulk samples for testing purposes.

3. GEOLOGY

3.1 STRATIGRAPHY

The western, southern and eastern boundaries of the Mt. Paul area are characterised by the presence of granites, which form the coast-line of practically the whole of the Freycinet Peninsula, and extend westward along the northern shore of Coles Bay. Centrally situated with regard to the granites, the Triassic and Permian strata occur as a roughly triangular mass, the apex of which points to the south.

The Triassic and Permian sediments are conformable and are similar lithologically to those described in the Dalmayne area. Mt. Paul and Mt. Peter are both capped with dolerite. The saddle between the two peaks is about 3 km long and is not covered with dolerite. The dolerite in the area is similar to that occurring in the Mt. Nicholas Range area.

3.2 STRUCTURE

According to Keid (in Hill, 1922), the coal bearing sediments of the area are preserved in a graben-like structure, bounded by two major axial faults-Lagoon Fault and Mt. Paul Fault. The average distance between the faults is 3 to 4 km. (Encl. 1). The 1:250,000 Geological map (Oatlands SK55-6) of the Mt. Paul Area does not support the existance of the Lagoon Fault on the east.

The dip of the coal seams in the Mt. Paul area differs from the south-easterly dip encountered in other parts of the E.L. to the north. The Mt. Paul seam dips toward the north at an angle of 40^{0}. This change in dip has been attributed to the close proximity of major faults.

4. COAL RESOURCES OF THE AREA

4.1 COAL SEAMS

Coal seam outcrops in the area have been interpreted as indicating the presence of four seams equivalent to the Alpha, Beta, Gamma and Delta seams (Hills, 1922). However the only definite evidence of a significant coal seam is from the Mt. Paul adit which was driven along a seam about 3.0 m thick containing about 2.5 m of coal (Encl. 2). This seam was correlated with the main seam mined at Dalmayne, however the quality (Table 1) does differ to some extend from that of the coal mined at Dalmayne.

Table 1: CHARACTER & ANALYSES OF COAL FROM MT. PAUL

	PROXIMATE ANALYSIS (a.d.)					ULTIMATE ANALYSIS (a.d.)					
AREA	M%	VM%	FC%	Ash%	S%	H%	C%	O%	N%	BTU/lb	SG
Mt. Paul	1.6	15.3	49.3	33.8	0.37						
Mt. Paul	1.0	20.8	51.7	26.5	0.44	4.1	56.5	11.6	0.9	9963	1.36

Approximately 2.6 sq. km of the coal bearing feldspathic sandstone sequence exists in the Mt. Paul area. Assuming a clean coal thickness of about 2.0 m available in the main seam, this represents an in situ reserve of about 4.7 million 10^6 tonnes (Hills, 1922).

5. REFERENCES

BUREAU OF METEOROLOGY, 1977 : Climate of Tasmania
Extract from Tasmanian Year Book No. 11, 1977 Edition.

EDYVEAN, M.D., 1977 : Report on the Coal Occurrences and Potential of Exploration Licence 5/61, East Coast, Tasmanian (unpubl.)

HILLS, L., et al., 1922 : Coal Resources of Tasmania, Mineral Resources No. 7 Tas. Mines Dept. Publ. (p.92).

690

SWAN RIVER

MAIN ROAD SWANSEA TO ST. MARYS

CISKEY RIVER

RYE RIVER

SWAN RIVER

RING BAY

PELICAN BAY

GREAT SWANPORT BAY

OYSTER BAY

SABINAS ISLAND

MOULTING LAGOON

APSLEY RIVER

ROUTE OF PROPOSED RAILWAY

Hook's Point

Amended State Boundary (1977)

MT. PETER

MT. PAUL

COAL

MT. PAUL

AREA

15 M

Mount Paul Fault

F.

Hamlyn's Point

BLUESTONE

MAGNETIC NORTH

LEGEND

SEDIMENTARY

RECENT	Alluvium
TRIASSIC	Sandstones and Shales
PERMIAN	Limestones and Mudstones
SILURIAN	Slates

IGNEOUS

JURASSIC	Diabase
DEVONIAN	Granite

CHARACTERISTICS

- Main Roads
- Roads
- Tracks
- Contours
- Geological Boundaries
- Railways
- Tunnels
- Strike and Dip of Strata
- Fault
- Bore Hole
- Coal Outcrops
- Mines Dept. Bore 13 (Approx. location)
- Former Mining Property

SCALE 1:100,000 (APPROX.)

CHAINS 60 40 0 1 2 3 MILES

METRES 1000 0 1 2 3 4 5 KILOMETERS

522068

5 cm

83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

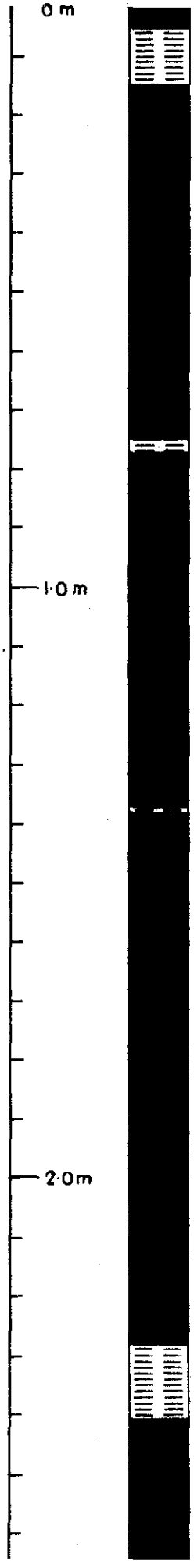
TASMANIA BASIN, TASMANIA
SHELL I.M.I. E L 5/61 GRAY

LOCATION, INFRASTRUCTURE & GEOLOGY (1922) MT. PAUL AREA

Scale 1:100,000 (APPROX.)

Author: Hobart-Shell	Date: APRIL '78	Encl. 1
Report No: CEPR 16/78	Drawing No: C-1171	

068



522069

5 cm

83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA BASIN, TASMANIA
SHELL I.M.I. E L 5/61, GRAY

COAL SEAM, MT. PAUL ADIT.

Scale 1:10

Author: J.S.B	Date: APRIL '78
Report No CEPR 16/78	Drawing No C-1170

Encl 2

THE SHELL COMPANY OF AUSTRALIA LIMITED

COAL EXPLORATION AND PRODUCTION DEPARTMENT

A PRELIMINARY REVIEW OF THE GEOLOGY AND COAL RESOURCES OF EXPLORATION LICENCE 18/77, AVOCA

by

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Hobart
May, 1978

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A PRELIMINARY REVIEW OF THE GEOLOGY AND COAL RESOURCES OF EXPLORATION LICENCE 18/77, AVOCA

CONTENTS

Enclosures

1.	Topographic Map, showing infrastructure, drillhole locations, coal outcrops and faults.	1:100,000
2.	Drillhole Plots - Possible Correlation	1:500
3.	Geological Map - EL 18/77	1:100,000
4.	Possible Correlation Beta (B) Seam	1:10
5.	Possible Correlation Delta Seam	1:10

1. SUMMARY

This section presents a summary of the available literature on E.L.18/77, Avoca. The greater part of the area, particularly the southern and eastern portions has had little or no exploratory work done. The major exploration, and therefore the small amount of known information, is concentrated in the northern part of the E.L. around Avoca.

The coal measures generally occur in the upper part of the Triassic sequence, and except in the deeply dissected river valleys, they are obscured by a dolerite capping.

Five seams have been reported in the area but correlation of seams between localities is difficult due to variation of thickness and lithology over short distances. Faulting is common throughout the area.

A minimum amount of work on coal quality has been undertaken and most assumptions have been based on analyses from nearby areas, mainly Fingal and Stanhope.

The deep dissection of the coal bearing measures by the South Esk and St. Pauls Rivers, has exposed the productive measures, and outcrops can be traced along the valley sides.

2. INTRODUCTION

2.1 SCOPE

This report presents a review of all available information on the coal resources of E.L. 18/77, however the majority of data refers only to the Avoca, Mt. Christie and Ben Lomond areas situated in the north of the E.L. No reports are available on the remainder of the area, which, as shown on the Launceston and Oatlands 1:250,000 geological maps, is almost completely covered by dolerite.

2.2 LOCATION AND ACCESS

E.L. 18/77 is situated in the central-eastern portion of Tasmania and lies within the AMG Co-ordinates 550,000 mE - 590,000 mE and 5390,000 mN - 5340,000 mN. The area is basically "L" shaped and covers approximately 1100 square km. (Enclosure 1).

Avoca is the only major town within the area while Campbell Town lies slightly outside the western boundary and Swansea is situated on the coast to the south-east.

The major roads through the area are the Avoca - Fingal road (Esk Highway) running along the South Esk (Fingal) River valley and the main east coast (Tasman) highway which intersects a small coastal portion of the area. A railway used primarily for freight, runs adjacent to the Avoca - Fingal road.

The Lake Leake road which is unsealed for most of its length, is the major access road in the south of the area and is roughly parallel to the southern border of the prospect. All other access in the area consists of unsealed homestead tracks, logging roads and property tracks. (Encl. 1). It is possible to traverse the area from Benham H.S. in the north, south to Windfalls H.S. on the Lake Leake road. During wet periods this track may become impassable, even to 4 wheel drive vehicles.

Benham Estates, near Avoca, controls the major part of the private land within the lease area and includes the homesteads of Benham, Windfalls, Harrimount (unoccupied) and Stonehouse.

The main rivers traversing the area are in the north, St. Pauls, South Esk and Buffalo Brook Creek, in the south and south-west the Elizabeth River and in the south-east the Cygnet and Swan Rivers.

2.3 TOPOGRAPHY

The highest point (800 m) occurs in the northern tip of the area and apart from the valleys, the altitude shows a general decrease to the south (660-650 m) and from the south to the coast (100-150 m). Thus the area viewed as a whole slopes south-eastward towards the sea.

The northern part consists of dissected topography varying from plateau country up to 800 m A.S.L. to major valleys 200 m A.S.L. As a rule the highest mountains are crowned with igneous rocks from which the sedimentary rocks have been denuded.

The South Esk and St. Pauls are the major rivers in the area and flow in a westerly direction. All drainage is tributary to these rivers which have formed wide valleys. Subsidence in the late Tertiary has lead to the deposition of 15-20 m of sediments which now occupy the old flood plains of the broad valleys. Flowing into the main streams are numerous mountain streams which have carved sharply incised valleys in the softer formations. These streams, follow as a general rule, lines of contact between sedimentary and igneous rocks. Tertiary uplift rejuvenated these streams which are now actively engaged in cutting through their old beds. The resultant topography is one of extremely high relief.

The principal valleys (Break O' Day Plain) are due to erosion rather than tectonic movements.

Enclosure 1 shows topography and general infrastructure of the area.

2.4 CLIMATE AND RAINFALL

The combination of mountainous terrain in the western half of Tasmania and the prevailing westerly winds produce a marked west-east variation of climate and especially of rainfall.

The prevailing winds are north-west to south-west with greatest strength and persistence during the late winter. In summer months when westerlies are weak, afternoon seas breezes become the predominant wind in coastal areas.

Mid-summer provides 15 hours daylight while this drops to approximately 9 hours on the shortest day. In January daily averages of sunshine are around 9 hours per day, while in mid winter the average daily sunshine is down to a maximum of 3 hours on the east coast.

Relative humidity is generally higher in the morning than in the afternoon and higher in coastal regions than inland. In the east, warm dry winds from a west or north-west direction occasionally may produce a relative humidity as low as 10 per cent.

The incidence of frost is affected markedly by topography, the valleys acting as natural channels for drainage of cold air at night. Severe frosts are experienced in winter in upland valleys and above 300 m there is no frost free month.

There is a strong gradation in rainfall from west coast to east coast, because of topography with a distinct rain shadow east of the Central Plateau. Parts of the Midlands average less than 500 mm of rain per year.

Average Rainfall/Year

Rainfall District		
Midlands	557 mm	
East Coast	829 mm	
Rainfall Stations	**Ave. (mm)**	**Days rain**
Avoca	562	109
Campbell Town	547	91
Oatlands	540	165
St. Marys	1038	100
Swansea	621	117

Hail is most likely in spring, though possible in any month.

In Tasmania the river system most affected by flooding is the South Esk. As many rivers in the South Esk system flow through flat country, flooding can be widespread and disruptive.

3. PREVIOUS EXPLORATION

Buena Vista Coal Mine (1920 and earlier).

Consisted of an area between Castle Carey Creek and Buffalo Creek. It involved mainly exploratory work which was scattered around Mt. Christie over an area of approximately 40 square km with observations at Localities 4 to 11. (Plotted approximately as shown on Encl. 1).

Locality 4 consisted of prospecting shafts which showed the Beta seam (Encl. 4).

At locality 5 an adit was driven on a coal seam, which is thought to be the Beta seam.

Locality 6 was the only recorded occurrence of the dolerite forming the roof of a coal seam. Several bore holes were drilled at the Buena Vista Mine (Encl. 1) but only the following results are available:-

Bore A - 100' B.O.H. - no results
Bore B - 300' B.O.H. - passed through several seams of coal
Bore C - 500' B.O.H. - passed through one 4' (1.2 m) thick seam.

These 3 borehole locations are shown on Encl. 1, but the numbering is unknown.

At localities 7-11 coal outcrops were observed but were of no great significance.

Mt. Christie Mine (1922)

Consisted of shallow shafts, dip tunnels and adits. (Encl.1) One adit was driven for 200' (60 m) on the Delta seam at Bonney's Plains.

On the southern fall of Greenstone Hill an adit was driven on a bed of coal reported to be 6' (1.8 m) thick, while 80 m to the south-west an adit was opened on the Beta seam (from 9 to 12' (2.7-3.6m) thick). This latter seam was interupted by a fault of 60' (18 m) displacement trending N 75^{o}E.

Stanhope Colliery (1931-1960)

Is situated 9 km from Avoca and 900' (274 m) above in altitude. This Colliery includes the old workings of Buena Vista mine and possibly the Mt. Christie mine. Mining was carried out on the B seam and 2 adits were also driven at Bonneys Plains to the west by the Company. The Colliery is divided into the old and new workings as shown Encl. 1.

Five exploratory bores were drilled but failed to show anything conclusive, in terms of potential coal seams.

International Mining Corporation (1970)

Carried out preliminary geological, geochemical and radiometric surveys and drilled eight 100mm diameter holes for a total metreage of 346m, just north east of the lease area. (shown on Enclosure 1). No coal was recorded in any of these holes.

Western Mining Corporation (1976-1977)

Were involved in exploration for 12 months up to 2/8/77. The W.M.C. lease covered the northern part of the Shell area. Nine holes were drilled (Encl. 2) with a maximum depth of 85m, using a Gemco 210 rotary rig, and these were logged using gamma ray, point resistance and S.P. A "suitcase" type unit was employed.

The S.P. and resistivity logs indicated much greater variation in lithologies than the gamma logs, but correlation between the holes was not possible as no characteristic units or lithologies could be delineated.

S.P. logs showed opposite deflection to the normally observed case, which was attributed to formation waters being less saline than the drilling fluid.

Field mapping was carried out by W.M.C. geologists but does not differ significantly from that shown on the 1:250,000 Geological Map (Launceston, Oatlands).

The only coal currently being mined in the area is at Fingal, 21 km north east of Avoca, and outside the exploration area.

4. GEOLOGY

4.1 STRATIGRAPHY

The Triassic coal measures, with a total thickness of between 450 m and 500 m, are widespread within the Tasmania Basin. The Triassic rocks are composed of lacustrine and fluviatile, quartz and feldspathic sandstones, shales, coal seams and minor conglomerates.

Within the sequence the sandstones are more quartzose towards the base and coal seams are more prevalent towards the top. However variations do exist and quartzose sandstones have been found in association with coal seams.

Variations in thickness and lithology occur and repetition in rythmic sequences has always made coal seam correlation extremely difficult and uncertain.

Above 300 m, dolerite covers most Triassic outcrop, while below 300 m outcrop is covered to a lesser extent by dolerite but to a greater extent by Tertiary sediments, basalt, alluvium and loam. (Enclosure 3).

The Jurassic dolerite is uniform and forms high plateau areas due to its resistance to erosion and weathering. Elevation of the dolerite is varied, e.g. 200 m ASL west of Castle Carey Fault and up to 1000 m ASL at Snow Hill, south-west of Royal George.

Northern (Avoca) area of EL 18/77

The northern portion of the area is situated on the north-eastern flank of the Permo-Triassic Tasmania Basin. The basement rocks consist of Silurian (Mathinna beds) which have been strongly folded (north west trending fold axis) during the Tabberabberan Orogeny, and later intruded by Devonian (Ben Lomond) granite.

The Silurian and Devonian were then peneplained and overlain by 150 m of marine and freshwater sediments.

Permian (Lower Parmeener Super Group)

Consists of approximately 150 m of marine and freshwater sediments. Outcrops of Permian are more common east of the Castle Farey Fault, but are not continuous due to Tertiary erosion. The Permian is expected to be continuous west of Castle Carey Fault and south of Royal George where Triassic and Jurassic (dolerite) overlie the Permian. The main outcrop of Permian west of Castle Carey is in the north of Avoca and abutting the fault. The Permian sequence in the region has been divided into 5 units but these are of minor importance at the present.

Triassic

The Triassic formations are considered to be non-marine and from drillhole information (Stanhope Area) the sediments are apparently around 300 m thick. No exact thicknesses are available as no drillhole has penetrated the whole Triassic section. (Enclosure 2). Previously the Triassic was subdivided into the Feldspathic Sandstone and the Ross Sandstone, but this has now tended to become obsolete with the terms Upper, Middle, or Lower Triassic now in general use.

In general within the area the outcrop of Triassic sediments is poor due to abundant Cainozoic cover.

The Triassic coal measure sequence in the area has been divided by WMC, into a number of facies. These facies are:-

- Coal/carbonaceous shale
- mudstone
- lithic sandstone/siltstone
- quartzose sandstone

The coal/carbonaceous shale facies commonly occurs in association with the lithic sandstone/siltstone facies which often forms the roof of the coal seams.

The mudstone facies is commonly associated with the coal/carbonaceous shale facies and the lithic sandstone/siltstone facies.

The quartzose sandstone facies is the most common outcrop as it is the most indurated and resistant.

Silicified Triassic sediments can be observed as scree close to the contact with the overlying Jurassic dolerite.

Jurassic Dolerite

The dolerite intruded the Permo-Triassic during the Jurassic and probably occurred along existing fault lines. The dolerite most commonly occurs in the upper horizons of the Triassic sequence as a sill or transgressive sill structure in the region. A mass of dolerite occurs between the Mt. Christie (Stanhope) mine and Bonneys Plains. This body occupies the higher levels and is completely surrounded by Triassic coal measures. On the east side, the strata dip underneath the dolerite to the south-west and on the western side they dip away from the dolerite in the same direction and apparently are undisturbed. At the upper end of a valley leading eastward from Bonneys Plains, dolerite forms the roof of a coal seam in a tunnel while 5 kms due south and 150m lower the same seam is exposed again on the other side of the dolerite capped hill. Again on the other side of Bonneys Plains, seams of coal occur dipping south-west underneath the dolerite. Thus it appears, in some cases at least the dolerite occurs as a sill.

Quarternary

Sediments are widespread and consist of dolerite talus on plateau slopes and valley flanks, alluvium on river plains and swampy loams on valley floors. The dolerite talus is up to 40 m thick, and has boulders up to 2 m across.

Tertiary sediments and basalts are confined to the South Esk Valley and parts of St. Pauls Valley.

4.2 STRUCTURE

Regionally the dip of the coal seams and the Permo-Triassic sequence is to the south-west and usually less than 5^{0}. Local variations occur in close proximity to faults, e.g. the strata on the east side of Castle-Carey Fault dip to the south-east at Castle Carey Rivulet, and near Gipps Creek they are almost horizontal. (Encl.1)

No folding is observed in the Permo-Triassic.

Faulting is very common in the Permo-Triassic sediments and Jurassic dolerite in Tasmania.

Following the intrusion of the dolerite along the lines of weakness of earlier Palaeozic rocks, normal faulting produced readjustment of the Permo-Triassic sediments. Thus it is found in most cases that faults of any magnitude occur at or near the point of contact between Devonian granites and Silurian slates and follow this line for many miles.

Heavy faulting of up to 600 m throw has brought the Triassic and Permian rocks down against the granite. The whole area is badly affected by faults, dykes and sills. The Delta seam has been identified at Mt. Christie in one instance with a sill resting directly on the coal and coking the upper part.

The Castle Carey Fault is the dominant fault in the area and in fact is one of the major faults in Tasmania. It is observed to follow the granite contact and is considered identical with the fault occurring in the vicinity of Swansea. The trend of the Castle Carey Fault is NNW and is downthrown approximately 500 m to the southwest. (Enclosure 1 and 3).

Several faults trending approximately NNW and downthrown to the east are present west of the Castle Carey Fault. Faulting and tilting consistently downthrown to the east has been observed to the west in the Tertiary Launceston Basin.

Major faulting in the Avoca area is associated with the intrusion of the dolerite and early Tertiary block movements. (Enclosure 3).

Minor faulting, affecting the coal bearing strata has been considerable and displacements of the order of 20 m have been observed in the Mt. Christie Mine.

South of Eastbourne, three significant faults with throws of around 100 m to the east have been noted. (Encl.1)

The Buena Vista coal area is comparatively free from serious faults with the exception of indications of minor faulting in places (the most important passing between the Mt. Christie Mine and Stevenson's workings (Encl.1).

Strong lineations can be seen on aerial photo's in areas of dolerite outcrop and some of these correspond to major faults while others are possibly major joints.

5. COAL RESOURCES OF THE PROSPECT AREA

Although a number of seam sections are described in early reports, these are of little value as no exact, or in some cases general, locations can be plotted. The same applies to coal quality data which is described in terms of suitability for burning at "home".

In the Mt. Christie area the coal seams dip in a south-westerly direction at 5-15° depending on their position with respect to the Castle Carey Fault.

The quality of the coal in this area was described as varying through anthracite - coking humic - non-coking humic.

The B seam mined at Stanhope exhibits a thickness of 12 feet (3.7 m) and contains from 1 to 7 bands. (Enclosure 4).

Coal mined from the Stanhope and Bonneys Plains area is generally reported as having lower ash and higher specific energy than other Triassic coals of Tasmania (e.g. Fingal: ash 19.6%, specific energy 25.59 MJ/Kg).

Selected chip samples from TAR 2, (W.M.C.) were washed, then analysed by Griffith Australia Services, Newcastle and indicated coal of poor quality. Preliminary analysis for these samples showed swelling indices of up to 6 and ash content from 7-19%.

At least 5 seams have been recognised in the Avoca field and the principal seam is up to 3.7 m thick including 0.6 m of bands.

At Mt. Christie five seams have been discovered, but correlation of these with others on the Bona Vista property could not be made with certainty.

Coal bed Delta (Encl. 5) is stratigraphically 150 feet (46 m) lower than Beta. The Delta seam is 3-4 feet (0.9-1.2 m) thick contains only one band of stony material and consists of hard dense coal of thinly banded texture. The Eta seam as exposed on Bona Vista was 3 feet (0.9 m) thick.

In the Mt. Christie Mine the coal is of a humic type. The upper bands consist of a bright laminated coal, rich in hydrocarbons, while the lower bands consist of a dense, hard, unlaminated variety, with only occassional bright streaks. It possesses a bright to dull black colour, brown streak, dull to brilliant lustre, and dense texture, the fracture is brittle, and in the lower bands is splintery and conchoidal. The bright coal is friable and tends to slack more readily than the hard, tough, dense variety. A number of analyses for the Mt. Christie area are given in Table 1.

The coal from Stanhope (Table 1) could be efficiently washed by a simple jig at about 80% yield to a product with 13-14% ash. (Kind, 1978).

Stanhope has a higher heat value, higher volatile content and lower ash content than other coal mined in the area.

W.M.C. selected samples of coal from borehole TAR 2. These chip samples were washed to remove extraneous material and analysed. The results (Table 1) indicate a coal of very poor quality, perhaps a reflection of the sampling method.

TABLE 1 CHARACTER AND ANALYSES OF COAL FROM AVOCA AREA

LOCATION	COAL STATE	TOTAL MOISTURE %	INHERENT MOISTURE %	ASH %	VOLATILE MATTER %	FIXED CARBON %	BTU/LB	SULPHUR %	CRUCIBLE SWELLING NUMBER
STANHOPE	Floats 1.6	-	-	13.5	32.8	53.7	-	0.52	
	1.8	-	-	14.1	32.7	52.6	-	0.49	
	1.6	-	-	14.0	32.1	53.9	-	0.42	
	1.8	-	-	14.9	31.6	53.5	-	0.36	
W.M.C. - TAR 2	CHIP	-	2.5 (2.5)	36.9	19.9	40.7	-	-	½
"	"	-	2.5 (1.4)	29.1	25.6	43.8	-	-	½
"	"	-	2.5 (3.3)	52.1	19.1	26.3	-	-	½
"	"	-	2.5 (1.6)	29.5	32.6	35.4	-	-	½
"	"	-	2.5 (1.5)	71.1	11.9	14.5	-	-	-
"	"	-	2.5 (1.7)	80.3	10.3	6.9	-	-	-
"	"	-	2.5 (1.4)	86.0	8.2	3.3	-	-	-
W.M.C.									
New Stanhope Mine	RAW	2.5	2.1	14.4	32.0	51.5	-	-	1
" " "	"	3.1	2.1	10.8	31.0	56.1	-	-	1
" " "	"	2.4	2.0	7.6	35.9	54.5	-	-	6
Old Stanhope Mine	"	6.2	3.4	7.4	33.9	55.3	-	-	0
Bonney Plains	"	2.9	1.9	7.2	33.0	57.9	-	-	1
" "	"	3.1	2.2	16.1	27.9	53.8	-	-	½
MT.CHRISTIE 684	RAW	2.74(at 105°C)	-	18.66	23.40	55.20	-	0.45	-
" " 685	"	2.86 "	-	26.16	21.34	49.64	-	0.45	-
" " 686	"	15.08 "	-	16.92	25.50	42.50	-	0.27	-
" " 687	"	14.50 "	-	22.46	24.20	38.84	-	0.27	-
" " 688	"	1.68 "	-	24.72	20.32	53.28	10,450	0.46	-
" " (689)	"	1.78 "	-	28.06	19.82	50.34	-	0.49	-
" " (690)	"	1.96 "	29.74	24.04	44.26	44.26	-	0.66	-

6. REFERENCES

BUREAU OF METEOROLOGY, 1977 : Climate of Tasmania
Extract from Tasmanian Year Book No. 11, 1977 Edition.

HILLS, L., et al, 1922 : Coal Resources of Tasmania, Mineral Resources No. 7, Tas Mines Depart. (pp. 202-216).

HUGHES, D., 1954 : Future operations at Stanhope Colliery (unpubl. report).

., 1958 : Coal Resources at Stanhope. (unpubl. report.)

INTERNATIONAL MINING CO. N.L., 1969 : Report on E.L. 13/68, Avoca Tasmania. Open File Report Q 48/9.

KEMPTON, N.H., 1977 : Proposal for Exploration and Mining in Tasmania. Unpubl. Company Report CEPR 3/77. (Shell).

KIND, H.D., 1978 : Washability, Quality and Rank of Mine samples from north-east Tasmania. Unpubl. Company report CEPR 7/78. (Shell).

WESTERN MINING CORPORATION, 1977 : EL 16/76 Avoca Tasmania. Report for 6 months 2.8.76-2.2.77. Open File Report Q 55/6.

., 1977 : EL 16/76, Avoca Tasmania. Terminal Report Open File Report Q 55/7.

TOPOGRAPHIC SURVEY

BREAK O'DAY

REFER TO THIS MAP AS: SHEET 8514 (EDITION 1)
NATIONAL TOPOGRAPHIC MAP SERIES

ST HELENS 30 km
SCAMANDER 5 km
FINGAL 16 km
FINGAL 4 km
ROYAL GEORGE 9 km
SWANSEA 17 km
COLES BAY 18 km
SR 1966 No 70
SR 1964 No 167
E.L. 5/61 BOUNDARY
T A S M A N
S E A
KILLYMOON BH
HAREFIELD BH
CORNWALL NO 1.
CORNWALL NO 2
JUBILEE NO 1
GOULDS FAULT
St Marys
Cornwall
DALMAYNE MINE
DDH No.1
DDH NO.2
CORNWALL FAULT
M.G ROAD
SEYMOUR BOREHOLE NO.1.
SEYMOUR BOREHOLE NO. 4
SEYMOUR BOREHOLE NO.3
SEYMOUR BOREHOLE NO 2.
SEYMOUR BOREHOLE NO 5
ADIT DOUGLAS R.
ADITS DENISON R. INNER MINES
OUTER (LAGOON) MINE - COAST
LAGOON FAULT
MACLEAN BAY
BI 19
BI 20
BI 21
BI 22
BI 23
B12
B13
B11
LLANDAFF BOREHOLE NO.1
LLANDAFF BOREHOLE NO.3
LLANDAFF BOREHOLE NO. 2
LLANDAFF WEST FAULT
LLANDAFF EAST FAULT
Falmouth
Bicheno
Seymour
Chain of Lagoons
Moulting Lagoon CONSERVATION AREA
Apsley Marshes
Sherbourne Bay

SCALE 1 : 100000

Kilometres 2 1 0 2 4 6 8 10 12 Kilometres

PRODUCED by the Survey Branch Lands Department Hobart under the direction of the Minister for Minerals and Energy as part of the national mapping programme
PRINTED by authority of the Minister for Minerals and Energy 1975.
DISTRIBUTED by the Department of Minerals and Energy. A state edition is available from the Lands Department, Hobart
MAP ACCURACY The average accuracy of this map is ± 25 metres in the horizontal position of well defined detail and ± 5 metres in elevation
MAP RELIABILITY Topographic information shown on this map is correct to 1975
ROAD CLASSIFICATION Roads are classified according to their intended function as part of the national road system

BLACK NUMBERED GRID LINES ARE 1000 METRE INTERVALS OF THE AUSTRALIAN MAP GRID ZONE 55
GRID VALUES ARE SHOWN IN FULL ONLY AT THE SOUTH WEST CORNER OF THE MAP
HORIZONTAL DATUM AUSTRALIAN GEODETIC DATUM 1966
VERTICAL DATUM AUSTRALIAN HEIGHT DATUM
TRANSVERSE MERCATOR PROJECTION
CONTOUR INTERVAL 20 METRES
ELEVATIONS IN METRES

INDEX TO ADJOINING MAPS

FORESTER 8415	GEORGES BAY 8515	
ST PAULS 8414	BREAK O'DAY 8514	TASMAN SEA
LITTLE SWAN PORT 8413	FREYCINET 8513	

522084

5 cm

GRID REFERENCE

TO GIVE A UNIQUE REFERENCE ON THIS SHEET TO NEAREST 100 METRES

IGNORE the SMALLER figures of any grid number, these are for finding the full co-ordinates. Use ONLY the LARGER figures of the grid number, eg 84

SAMPLE POINT 778 ▵ MOUNT ST JOHN

1. Quote this 1:100000 map sheet — 8514
2. Locate first VERTICAL grid line to LEFT of point and read LARGE figures labelling the line either in the top or bottom margin, or on the line itself — 90
3. Estimate tenths from grid line to point — 2
4. Locate first HORIZONTAL grid line BELOW point and read LARGE figures labelling the line in either the left or right margin, or on the line itself — 73
5. Estimate tenths from grid line to point — 9

SAMPLE REFERENCE — 8514-902739

Built-up area; National route marker
Principal road and highway; Cutting
Secondary road; Embankment
Minor road; Road bridge
Vehicular track
Gate; Cattle grid
Railway, multiple track; Station; Railway bridge
Railway, single track; Railway tunnel
Light railway or tramway
Power transmission line

Fence; Levee or bank
Mine; Windmill; Yard; Quarry
Building/s; Church; Ruin; Drive-in theatre
Trig station; Bench mark; Spot elevation
Cliff; Contour with value; Depression contour

⊙ Drillhole locations (various programmes)
● Coal outcrop
Mine Adit
Mine Shaft
Abandoned mine workings
Fault
Exploration licence & State Reserve Boundary

GN TN MN
GRID CONVERGENCE 0.8°
GRID/MAGNETIC ANGLE 14.6°

TRUE NORTH, GRID NORTH AND MAGNETIC NORTH ARE SHOWN DIAGRAMMATICALLY FOR THE CENTRE OF THE MAP. MAGNETIC NORTH IS CORRECT FOR 1975 AND MOVES EASTERLY BY 0.1° IN ABOUT TWO YEARS.

83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA BASIN, TASMANIA
SHELL - IMI EL 5/61 GRAY

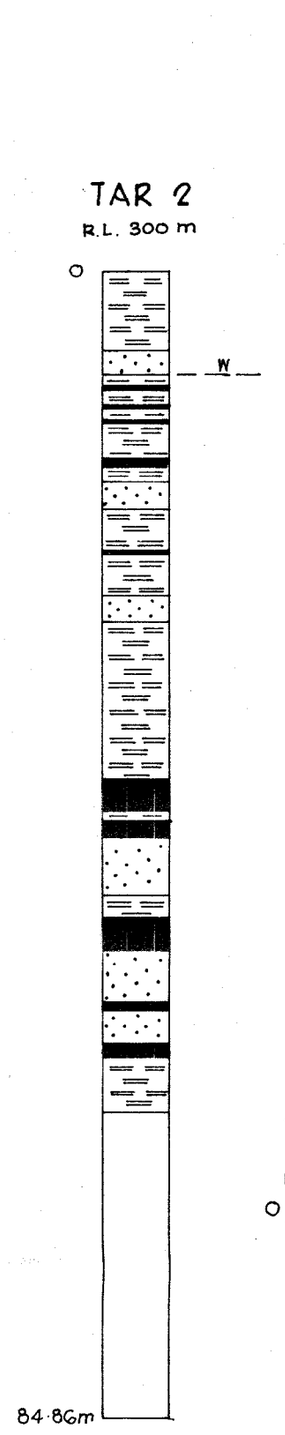
083

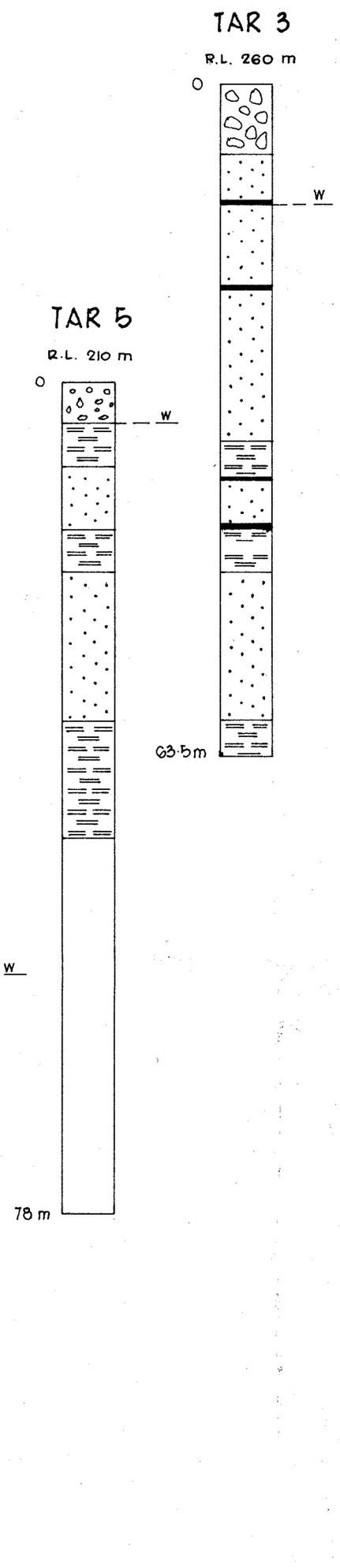
TOPOGRAPHIC MAP

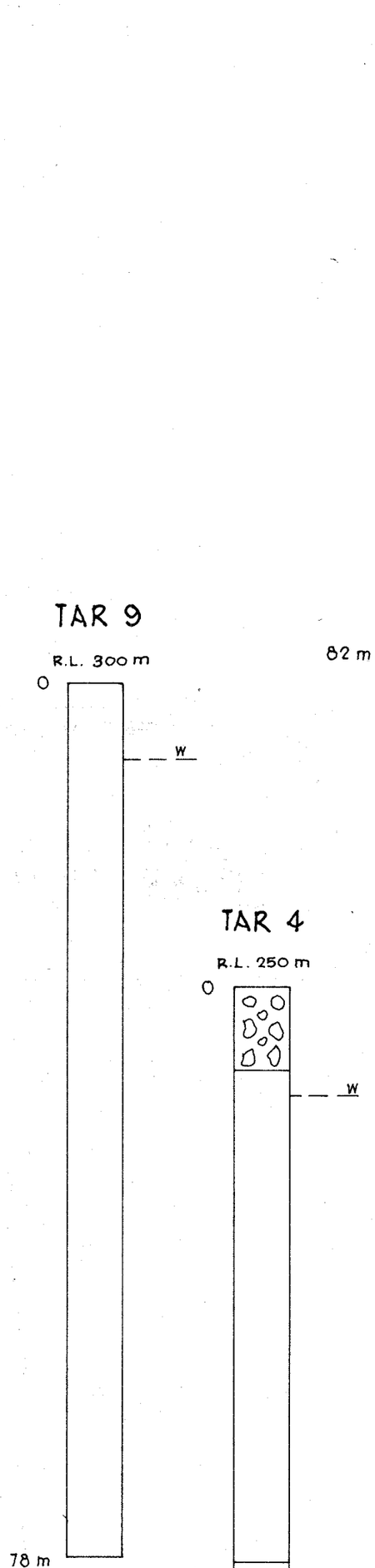
Showing Infrastructure, Drillhole Locations
Coal Outcrops & Faults

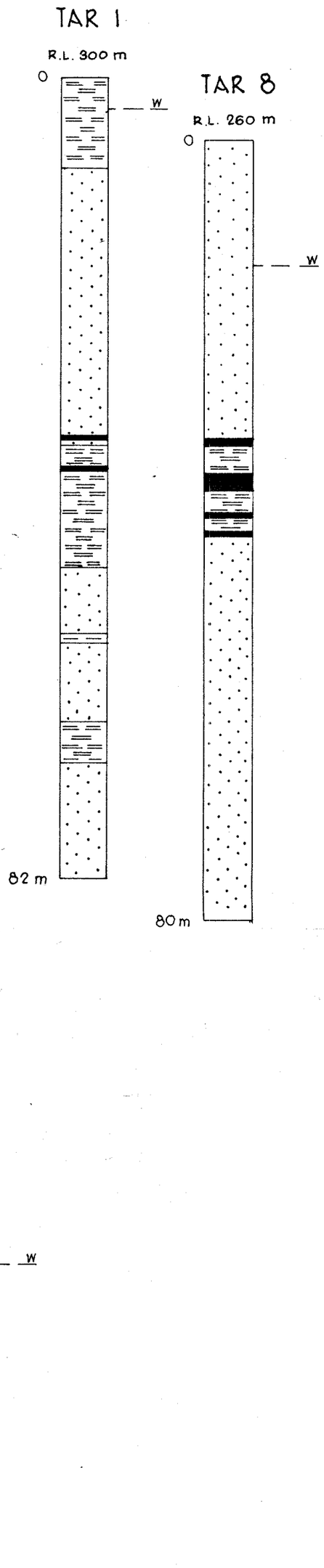
Scale 1: 100,000

Author: HOBART	Date: MAY 1978	Encl. 1
Report No: CEPR 16/78	Drawing No: C 1181	









LEGEND

- DOLERITE TALUS
- COAL AND CARBONACEOUS SHALE FACIES
- MUDSTONE FACIES
- LITHIC SANDSTONE AND SILTSTONE FACIES
- QUARTZOSE SANDSTONE FACIES
- W WEATHERING

522085

5 cm

0 10 20 30 m

SCALE

83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

WESTERN MINING CORPORATION

DRILLHOLE PLOTS ~ POSSIBLE CORRELATION

084

Scale 1:500

Author: P Senini	Date APRIL '78	Encl. 2
Report No: CEPR 16/78	Drawing No: C-1173	

147°35' 147°40' 147°50'

41°30' 550000 560000 570000

5400000 5390000 41°40' 5380000 5370000 41°50' 5360000 42°00' 5350000 5340000

NILE RIVER

TOWER HILL

ABERFOYLE

STORYS CK

SOUTH CK

MT. CHRISTIE

Avoca

SOUTH ESK RIVER

ESK MAIN ROAD

FINGAL LINE

ST PAULS

ELIZABETH RIVER

CYGNET RIVER

TASMAN

BRUSHY RIVER

LAKE LEAKE

WYE RIVER

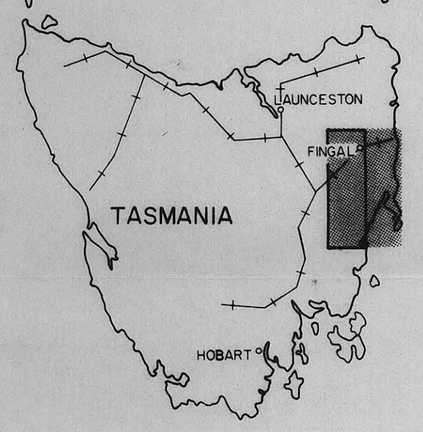
SWAN

SHELL **EL 18/77**

1 : 100 000 SHEET INDEX

Currie	Nara Coopa					Killie-crankie	Babel Island	
Pear-shape	Grassy					Goose Island	Lady Barron	
Three Hummock								
Welcome	Circular Head	Table Cape			Ninth Island	Cape Portland	Swan Island	
Sandy Cape	Arthur River	Hellyer	Forth	Tamar	St Patricks	Forester	Georges Bay	
Conical Rocks	Pieman	Sophia	Mersey	Meander	South Esk	St Pauls	Break O'Day	
	Cape Sorell	Franklin	Nive	Shannon	Lake Sorell	Little Swanport	Freycinet	
	Spero	Olga	Wedge	Tyenna	Derwent	Prosser	Maria	
		Port Davey	Old River	Huon	D'entre Casteaux	Storm Bay		
			South West Cape	South East Cape				

LOCALITY MAP



LEGEND

	Alluvium, sand	RECENT
V J T	Dolerite scree	
	Basalt	TERTIARY
	Dolerite	JURASSIC
	Coal measures	TRIASSIC
	Undifferentiated	
	Undifferentiated	PERMIAN
	Granite	L. CARBONIFEROUS - U. DEVONIAN
	Undifferentiated graywackes	L DEVONIAN & L PALAEOZOIC

Fault (downthrow marked)

Exploration License and State Reserve boundaries

Coal mine (all defunct except Fingal)

SCALE 1 : 100 000

KM. 2 1 0 2 4 6 8 10 12 KM.

NOTE : 1. BLACK NUMBERED GRID LINES (5340000) ARE 1000 METRE INTERVALS OF THE AUSTRALIAN MAP GRID., ZONE 55

2. HORIZONTAL DATUM : AUSTRALIAN GEODETIC DATUM 1966

3. VERTICAL DATUM : AUSTRALIAN HEIGHT DATUM

4. TRANSVERSE MERCATOR PROJECTION

5 cm

522086

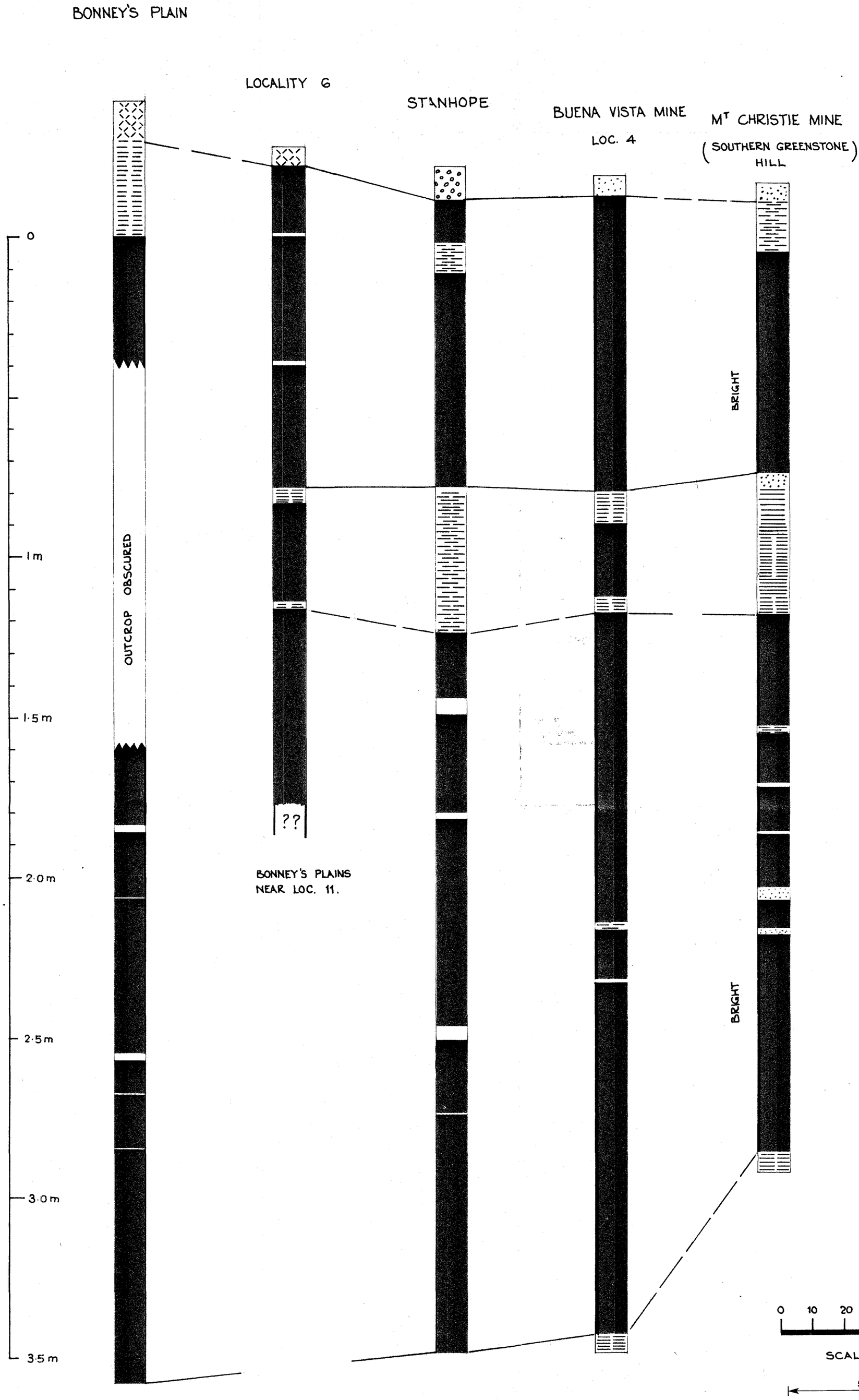
83-2031.

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA — TASMANIA BASIN 085

SHELL EL 18/77 AVOCA GEOLOGICAL MAP

Author : N.H.K.	Date : June 1978	Encl. 3
Report No: CEPR 16/78	Drawing No: 1166	



LEGEND

DOLERITE
MUDSTONE
SANDSTONE
COAL
PARTING (UNDIFFERENTIATED)
GRAVEL DETRITUS, RUBBLE, SHINGLE, CONGLOMERATE
SHALE

522087 83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

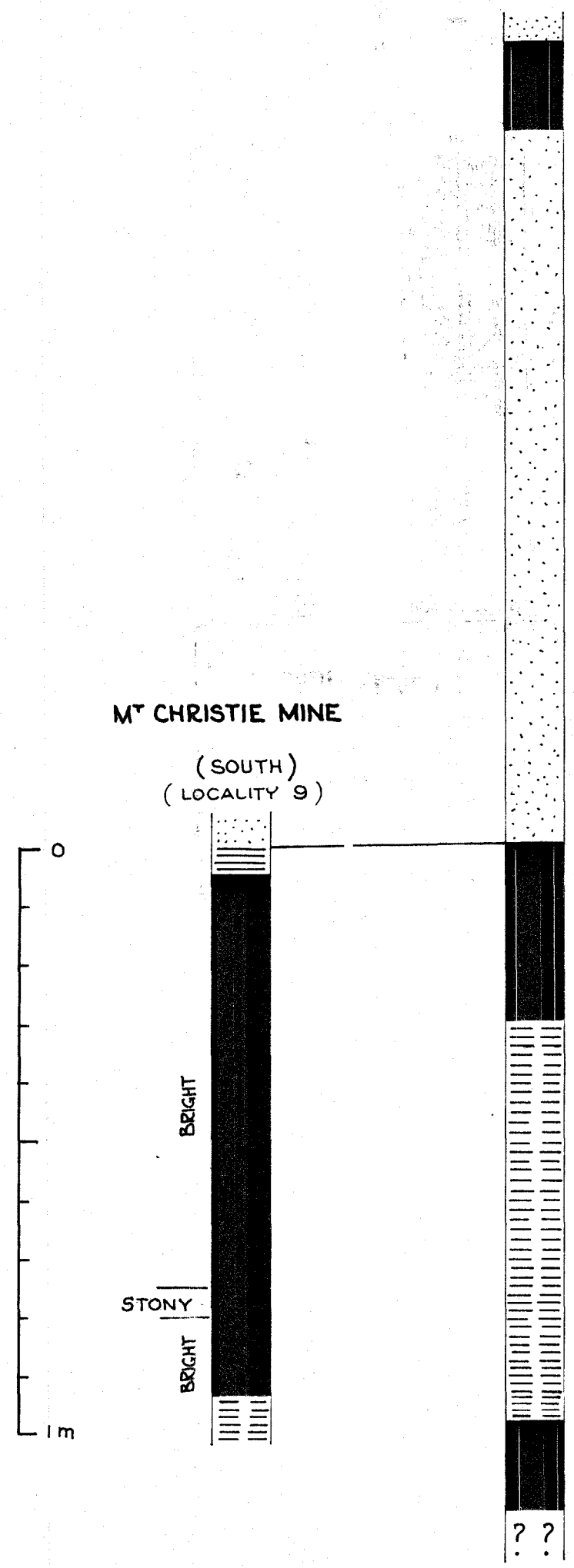
AVOCA AREA, TASMANIA

SHELL EL 18/77 086

POSSIBLE CORRELATION BETA (B) SEAM

Scale 1:10

Author: P Senini	Date: APRIL '78	Encl 4
Report No: CEPR 16/78	Drawing No: C-1174	



5 cm

LEGEND

SANDSTONE

CARBONACEOUS SHALE

MUDSTONE

COAL

0 10 20 30 40 50 cm.

SCALE

522088

83-2031

THE SHELL COMPANY OF AUSTRALIA LTD.

AVOCA AREA, TASMANIA

087

SHELL EL 18/77

POSSIBLE CORRELATION DELTA SEAM.

Scale 1:10

Author : P. Senini	Date : APRIL '78	Encl. 5
Report No: CEPR 16/78	Drawing No: C-1175	