THE SHELL COMPANY OF AUSTRALIA LIMITED

EXPLORATION LICENCE 18/77, AVOCA

SIX MONTHLY PROGRESS REPORT FOR PERIOD ENDING 26th JULY 1978

By :

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SIX MONTHLY PROGRESS REPORT FOR PERIOD ENDED 26th JULY 1978

CONTENTS

LIST OF ENCLOSURES

TABLES

1. INTRODUCTION

1.1 SCOPE

This report details the results of exploration conducted in EL 18/77 Avoca, during the six month period ended 27th July 1978. All exploration activity has been confined to the central part of the licence, in the vicinity of the Elizabeth River (Encl.1).

During the period four fully cored diamond drill holes were completed and a fifth AV4 temporarily abandoned at 155.6m due to difficult access. One other hole, AV6 was still in progress. The total metreage to 26th July 1978 was 2149.8 metres.

Table 1 : Drilling Statistics

HOLE NO.	DEPTH (m)	STATUS
AV1	458.00	Completed
AV2	442.50	Completed
AV3	538.70	Completed
AV4	155.60	Temp.Abandoned
AV5	350.00	Completed
AV6	250.00	Drilling Ahead
TOTAL	2149.80	

Borehole lithological logs will be submitted with later reports

1.2 TENURE DETAILS

Exploration Licence 18/77, Avoca was granted to the Shell Company of Australia Limited on the 26th January 1978 for a six month period. Renewal of the Licence for a further six month period is pending.

1.3 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 an area of 1142 square km. (Encl. 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 Esk Highway running along the South Esk (Fingal) River Valley and the main east coast Tasman Highway which passes through the east coast portion of the area. A railway used primarily for freight, runs adjacent to the Esk Highway.

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 roughtly parallel to the southern border of the prospect. All other access in the southern part 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 June and July, these tracks have 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 the Estate includes the homesteads of Benham, Windfalls, Harrimount (unoccupied) and Stonehouse.

1.4 TOPOGRAPHY AND CLIMATE

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 east coast (100-150 m). Thus the area viewed as a whole slopes south-eastward towards the sea.

The area consists of dissected topography varying from plateau country up to 800m A.S.L. to major valleys 200m A.S.L. The main rivers traversing the area are, in the north, the St. Pauls River, South Esk River and Buffalo Brook Creek, and in the south the south-west the Elizabeth River, and in the south-east the Cygnet and Swan Rivers. (Encl. 1). All drainage is tributary to these rivers which have formed wide valleys. Subsidence in the late Tertiary has lead to the deposition of 15-20m 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 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 winder. In summer months where 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 relatively 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 and snow are experienced in winter in upland valleys and above 300m 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 500mm 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.

2. PREVIOUS INVESTIGATIONS

Buena Vista Coal Mine (Early 1900's-1920)

This mine covered an area of approximately 40 square kilometres between Castle Carey Creek and Buffalo Creek. Early exploratory work was confined to outcrop observations, shallow adits and borings mainly around Mt. Christie. (Locations 4-11, Encl. 1).

At location 4 a prospecting shaft was driven on a seam through to be the Beta seam.

At location 5 an adit was driven on a coal seam, which was also though to be the Beta seam.

Location 6 was the only recorded occurrence of 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' (1.2m) thick seam.

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

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

Mt. Christie Mine (1922)

This mine consisted of shallow shafts, dip tunnels and adits. (Encl. 1). One adit was driven for 200' (60m) 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' (1.8m) thick, while 80m 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 interrupted by a fault of 60' (18m) displacement trending N 75°E.

Stanhope Colliery (1931-1960)

This mine was situated 9km from Avoca and 900' (274m) above in altitude. This Colliery included 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 was divided into the old and new workings as showin in Encl. 1.

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

International Mining Corporation (1970)

This company 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 least area. (Encl. 1). No coal was recorded in any of these holes.

Western Mining Corporation (1976-1977)

W.M.C. 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 Tar 1-9, were drilled (Encl.1) to a maximum depth of 85m, using a Gemco 210 rotary rig. These holes were logged using a "suitcase" type unit which produced Gamma Ray, Point Resistivity and S.P. logs.

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. The holes failed to indicate significant coal seams.

Field mapping was carried out by W.M.C. geologists but the mapping 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, 21km north east of Avoca, and outside the exploration area.

3. GEOLOGY OF THE AREA

3.1 STRATIGRAPHY

Shell's mapping is currently in progress and the following descriptions of the stratigraphy and structure are based on published work on the regional geology.

The Triassic coal measures, with a total thickness of between 450m and 500m, 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. (Threader, 1968).

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

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

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 were strongly folded (north-west trending fold axis) during the Tabberabberan Orogeny, and later intruded by Devonian (Ben Lomond) granite.

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

Permian (Lower Parmeener Super Group)

Consists of approximately 150m of marine and freshwater sediments. Outcrops of Permian are more common east of the Castle Carey 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 Fault is to the north of Avoca and abutting the fault.

Triassic

The Triassic formations are considered to be non-marine and from drillhole information (Stanhope Area) the sediments are apparently around 300m thick. No exact thicknesses are available as no drillhole has penetrated the whole Triassic section. 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.

Jurassic Dolerite

The dolerite intruded the Permo-Triassic during the Jurassic Period. The dolerite most commonly occurs in the upper horizons of the Triassic sequence as a sill or transgressive sill structure in the region on the north side of the South Esk Valley. A mass of dolerite occurs between the Mt. Christie (Stanhope) Mine and Bonneys Plains (Hills, 1922). 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 5kms 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. On the south side of the South Esk Valley the dolerite is again exposed on the north face of a disected plateau area rising to over 700m in places. The intrusive sheet extends to the southern boundary of the EL.

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 40m thick, and has boulders up to 2m across.

Tertiary sediments and basalts are confined to the South Esk Valley, parts of St. Pauls Valley, and in the Elizabeth River area.

3.2 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 of 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.

Folding has not been observed in the Permo-Triassic.

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

Heavy faulting of up to 600m 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 (Hills, 1922).

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 500m to the southwest (Encl. 1). Several faults trending approximately NNW and downthrown to the east are present west of the Castle Carey Fault.

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

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

South of Eastbourne, three significant faults with throws of around 100m 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. (Encl.4)

4. RESULTS OF EXPLORATION (26.1.1978-26.7.1978)

4.1 DRILLING

Drilling in the Licence area commenced on May 2nd, when the first of two diamond rigs arrived. Longyear (Australia) Pty. Ltd. will carry out the first stage of drilling using two rigs, a Longyear 38 and a Longyear 44. It is planned to drill 18 holes in the area and to date (27.7.1978) four holes (AV1,2,3,5) have been completed, a fifth (AV4) temporarily abandoned due to access problems, and one other hole AV6 is in progress. (Encl.1)

Weather conditions during the period have been severe with above average rainfall, snow and frosts contributing to be constant problem of access. Continuous dozing has been necessary to maintain tracks to drill sites. However, in the case of AV4, drilling had to be suspended due to impossible access, and the hole will be completed when weather permits.

Drillhole AV1 (Encl.2) was completed, at a total depth of 458.00m. Tri-cone bits were used to 25.5m, H.Q.3 wireline to 211.00m and N.Q.3 to 458.00m. Steel casing was run to 211.00m, all casing being recovered on completion of hole. Water was the only drilling fluid used with a small amount of Hy-Seal used to prevent circulation loss in broken dolerite areas.

Dolerite scree and weathered dolerite were penetrated to a depth of 25.5m. Solid fresh dolerite was intersected to a depth of 211.24m. The dolerite where fresh is grey-green in colour fine to medium grained and very hard producing long unbroken coresticks. The majority of the dolerite was badly fractured and sheared, the shearing thought to be associated with the Castle Carey Fault interpreted to pass approximately 1.5km east of the drill site. (Encl.1) Fault and shear zones are obvious in the core and are characterised by numerous joint planes showing slickensides and infilling with calcite, talc and clay minerals. Minor amounts of epidote and chlorite are also present. Most joint sets were steeply dipping between 60^{o}-70^{o} and have two major orientations approximately 90^{o} apart. On either side of major fault/shear zones calcite filled en-echelon joints decreased in intensity away from the main zone. In places where joints or shears were not developed pyroxene alignment is visible at angles similar to the jointing dips. Oxidation had occurred along all joint planes.

Below the dolerite (Encl.2) coal measure sediments were intersected. The transition from dolerite to sediments is gradual with approximatley 2.00m of indurated sediments occuring below the dolerite. Three coal horizons were intersected, however all of these horizons include appreciable amounts of carbonaceous mudstone and heavy dull coal. Nearly all other coal is in the dull coal range, being earthy in appearance and very hard. The major coal interval penetrated was 1.55m thick (Encl.3) at a depth of 250.09m; other thin, inferior quality seams were penetrated at 275.65m, 279.90m (Encl.3) and 300.17m. All coal occurrences were in the upper 100m of the coal measure section. Coal is associated with two major facies, a mudstone/siltstone facies and a lichic sandstone facies. Numerous coaly bands, whisps and lenses occur throughout the upper sections of the coal measures penetrated. None of the units are thick and generally grade from one lithotype to another without a well defined boundary. The sandstones are lithic, fine to medium grained and often laminated with silts and muds. The mudstones are often carbonaceous and exhibited plant remains on bedding planes.

Below approximately 330.00m quartzose sandstones occur these being medium to coarse grained, well sorted and clean. Calcite cement is common. Steeply dipping joints 70°, were observed in the sediments but the intensity of jointing and shearing, is very much less than in the overlying dolerite.

Drillhole AV2 was completed at a depth of 442.50m HW casing was run to 49m, and NW casing to 93m. To gain penetration in badly broken zones, cementing was carried out and mud circulation used. Tricone bits were used to 55.3m, H.Q.3 wireline to 73.5m and N.Q.3 wireline to 442.5m.

At the depth of 442.50m the hole was abandoned as no coal measures were intersected and no indications of the targeted Triassic were observed. The dolerite was highly fractured over the full 442.50m interval with numerous fault zones which are characterized by brecciation, shearing,slickensiding and infilling with clay, tale and calcite gouge. The top 97.70m of the hole consisted of lithic sandstones, siltstones and mudstones some which show induration effects. These sediments similar to the Triassic coal measures usually found below the dolerite, were also observed in outcrop close to the drillsite.

It is thought that AV2 was located in disturbed ground and the increased thickness of dolerite may be due to faulting.

The dolerite is mainly grey green, medium of fine grained and when fresh extremely hard. Some phases of the dolerite show pyrite crystals associated with the pyroxenes, the percentage in some sample being as high as 2-3% numerous joints and shears are present these usually being tight and filled with calcite or talc and clay minerals. In some open fractures dog-tooth and crystalline calcite has formed.

Highly sheared and brecciated fault zones are common, with the major zones being shown on the attached graphic log (Encl.2). The fault zones are usually highly weathered, soft, crumbly with a high percentage of sofe clay, talc and calcite minerals. The breccias are composed of dolerite fragments set in a matrix of calcite and clay minerals. Most joints and shears dip at angles between 60-70°.

Drillhole AV3. 285.00m of H.Q.3 and 253.70m of N.Q.3 were drilled totalling 538.70m. All casing was recovered except for 10.00m of HW casing at the top of the hole. Dolerite which was intersected to a depth of 269.57m is very homogeneous with only a few narrow fracture zones. Most core runs were recovered as 3.00m stick of solid unbroken dolerite, which was medium grained, greenish grey in colour and very hard. Broken zones were calcite and talc filled. The Triassic coal measures were penetrated to 504.17m this being a total thickness of 234.60m. The upper section of the measures consist of a lithic sandstone facies which is medium to coarse grained and light gray in colour. Lower in the sequence the lithic sandstones are associated with siltstone, mudstone, shale and coal seams. Only one coal seam is greater then 1m thick this being from 355.70m to 356.84 (Encl.3). Numerous coal and carbonaceous bands were penetrated in the lithic sandstone/mudstone facies all coal being dull or heavy dull. Below the mudstone facies is a siltsone/sandstone facies. The sandstones are fine to medium grained and commonly showed grading from siltstone to graded sandstone with mud pellet horizons towards the base. The sandstones have a low quartz content except at their base where a quartz rich grit occurrs overlying the ? Permian. The ? Permian consists of fine to coarse grained quartzose sandstone which is pale green to green in colour.

Drillhole AV4. This hole has been temporarily abandoned at 155.60m. Due to weather conditions access to the drill site cannot be maintained and the hole has been abandoned until the weather conditions improve. Dolerite was penetrated to the abandoned depth. Numerous fault and broken zones are present, these being calcite, clay and talc filled with slickensiding on shears. (Encl.2) All core was HQ diameter.

Drillhole AV5. This hole was stopped on 26.7.1978 at 350.0m having penetrated Jurassic dolerite from surface. The dolerite is fine to medium grained, greenish grey in colour and is relatively free from shearing and broken zones with many core runs being recovered as 3m core sticks.

Drillhole AV6. This hole as at 26.7.1978, was at a depth of 205m and at the contact with the underlying Triassic coal measures. The dolerite was fine to medium grained, greenish grey in colour and relatively free from shearing and broken zones.

4.2 PHOTOGEOLOGICAL PLANS AND MAPPING

During the period, consultants Layton & Associates, compiled a geological map of the Licence Area from air photographs and Landsat Imagery, with lithological subdivisions taken from 1:250,000 Geological Survey of Tasmania Sheets SK55-4 and SK55-6 and to a lesser extent from Hills,L., 1922, "The Coal Resources of Tasmania Geological Survey of Tasmania Mineral Resources No.7".

The structural parameters were divided into geological contacts and bedding features and major lineaments and faults together with undifferentiated structural features such as those observed in the vicinity of Cranbrook (Encl.4). A simplified pattern of major lineaments is outlined, with particular emphasis on those showing evidence of faulting. In most cases some displacement of photogeological boundaries was recognised across the major lineaments, and displacement of lineament by lineament was common.

Field mapping commenced during the period with initial activity on the north slope of the tier in the vicinity of the drilling.

The stratigraphically oldest rock type encountered is the ? Ben Lomond granite. This shows numerous phases ranging from aplite to a coarse grained quartz, feldspar porphyry. Overlying the granite are Permian sediments which can be further subdidivided. The lower most unit of the Permian encountered is a conglomerate consisting of rounded quartz and river gravel with a matrix of coarse grained quartzose sand. No outcrop of this rock type has been found and description is based on scree boulders found near the granite/Permian boundary. This grades upwards to a quartzose sandstone this itself showing upwards fining. Above the sandstone is a silicified, fossiliferous mudstone, the fossils being marine (brachiopods, productus etc). Also within this horizon minor limestone occurrences have been observed. Outcrops of both sandstone and silicified muds have been observed showing a horizontal dip. Cross bedding is well developed in the sandstone.

As yet no Triassic sediments have been observed directly overlying and in contact with the Permian. However some ? Triassic sandstone outcrops have been observed, one outcrop being in fault contact with the granite. Other outcrops of Triassic sandstone are limited in extent and were observed in creek beds where dolerite scree has been removed by erosion. These outcrops are of lithic, (minor quartz) fine to medium grained, sandstone. Dips are difficult to measure but from one outcrop a dip of approximately 20^{o} to the south-west was observed.

Overlying the Triassic is the medium grained Jurassic dolerite which forms a resistant capping. Talus derived from the dolerite is extensive and appears to cover nearly all the Triassic and part of the Permian outcrops.

The Quaternary is represented by both the dolerite talus and river alluvium which is confined to the major creeks and low lying drainage areas.

Field mapping will continue during the coming six month period and the base maps updated in the light of the results from our field observations.

4.3 LABORATORY TESTING OF COAL SAMPLES

Each seam was logged in detail and sampled (subsectionally when necessary) on the basis of coal lithotypes (Encl.3). Roof and floor material was sampled when necessary and will be analysed separately. This will allow later calculation of mining seam intervals. Attractive seams, i.e. ones considered suitable for underground development, will be analysed in detail according to the flow sheet on Encls.5 & 6. Significant seams (1-1.5m thick) will be analysed according to Encl.1.

Results of laboratory testing of coal samples from AV1 are listed in table 2. The second stage testing of these samples is in progress.

TABLE 2 : PRELIMINARY ANALYSIS OF SAMPLES FROM HOLE AV1

Sample AV1 / 1

Relative Density = 2.06
Ash = 67.9%

Sample AV1 / 2

Relative Density = 1.54
Raw Coal Ash = 30.8%

Float & Sink Analysis

Relative Density Fraction	Fractional % Mass	Fractional % Ash	Cumulative % Mass	Cumulative % Ash
F1.50	49.4	18.5	49.4	18.5
1.50 - 1.60	16.0	28.0	65.4	20.8
1.60 - 1.70	10.5	36.1	75.9	22.9
1.70 - 1.80	5.6	43.1	81.5	24.3
S1.80	18.5	57.8	100.0	30.5

Calculated ash of Total Sample = 30.6%

Sample AV1 / 3

Relative Density = 1.43
Raw Coal Ash = 20.7%

Float & Sink Analysis

Relative Density Fraction	Fractional % Mass	Fractional % Ash	Cumulative % Mass	Cumulative % Ash
F1.50	73.0	13.9	73.0	13.9
1.50 - 1.60	9.5	27.9	82.5	15.5
1.60 - 1.70	7.4	37.6	89.9	17.3
1.70 - 1.80	4.4	44.3	94.3	18.6
S1.80	5.7	58.0	100.0	20.8

Calculated ash of Total Sample = 20.8%

Sample AV1/4

Relative Density = 1.79
Ash = 53.2%

Sample AV1/5

Relative Density = 1.75
Raw Coal Ash = 51.6%

Float & Sink Analysis

Relative Density Fraction	Fractional % Mass	Fractional % Ash	Cumulative % Mass	Cumulative % Ash
F1.50	15.0	17.6	15.0	17.6
1.50 - 1.70	20.9	35.2	35.9	27.8
1.70 - 2.00	38.1	53.9	74.0	41.3
S2.00	26.0	78.9	100.0	51.0

Calculated Ash of Total Sample = 51.2

Sample AV1/6

Relative Density = 1.35
Raw Coal Ash = 11.6%

Float & Sink Analysis

Relative Density Fraction	Fractional % Mass	Fractional % Ash	Cumulative % Mass	Cumulative % Ash
F1.50	94.6	9.8	94.6	9.8
1.50 - 1.70	3.5	26.0	98.1	10.4
1.70 - 2.00	1.7	55.4	99.8	11.1
S2.00	0.2	73.7	100.0	11.3

Calculated Ash of Total Sample = 11.4

50mm Cores

ATTRACTIVE SEAMS (> 1·5m)

Samples (a, B, C, D, e)
- SG (a B.... e)

Crush (minus 12mm)

where a = roof mat.
B etc = coal
e = floor mat.

Raw coal (a, e) (ash)

1 part | 3 parts

Raw Coal

- ash (if ash < 20%)

Selected Composites or subsections

- PH Proximate Analysis
- TS Total Sulphur
- SE Specific Energy
- HGI Hardgrove Grindibility Index
  Chlorine

Composite or Individual

F/S 1·50 - 1·80 (0·1 steps)
- Ash
- Mass

Select possible Mining Sections
a B C, a B C e etc.

Wash at Selected S.G. & determine

Proximate Analysis	• P A
Total Sulphur	• T S
Specific Energy	• S E
Ash Fusion Temperature*	• AFT (Red)
Ultimate Analysis*	• U A (incl. CO_3)
Hardgrove Grindibility Index*	• H G I
Free Swelling Index*	• F S I
Ash Analysis *	• A A

* selected samples only

Retain Samples

014

100 mm Cores

ATTRACTIVE SEAMS (> 1·5 m)

Samples (a B C D e)

Crush (- 38 mm)

• S.G. (raw)

Raw coal
• Ash

a, e

100 % BCD

Pre Treatment and
Size at 25 mm, 12·7 mm, 6·3 mm,
3·2 mm, 0·5 mm w/w
0·1 mm

• Raw Ash on each Size
(1 CORE ONLY)

Combine +0·5 mm.
0·5 - 0·1 mm.
-0·1 mm.

Reconstitute F/S
→ Raw Coal
• P A
• T S
• S E
* H G I
* A F T
* A A
* U A

* Selected

(+0·5 mm)

F/S 1·35 - 1·60 (0·05)
1·60 - 2·00 (0·10)

• ash
• Mass
• calc. cumulatives

shell advises composites

P A
Sulp (Total, forms)
S E
A F T (Red ; I oxid.)
U A
A A
H G I
F S I
Petrographic / Reflectance (1 sample)
H G I, P, As Ba

(0·5 - 0·1 mm)
on F/S at 1·50
• Mass
• ash
• T.S.

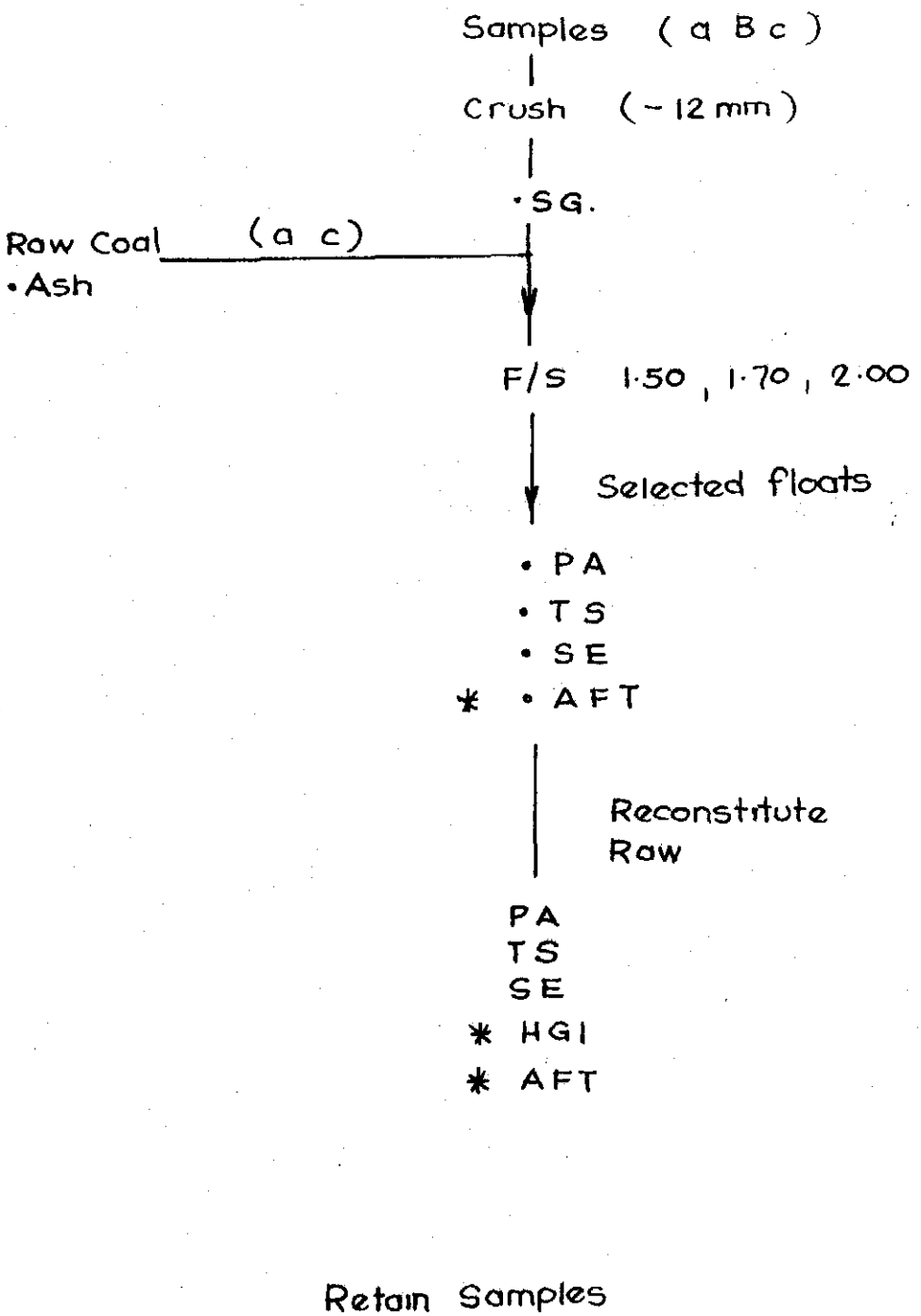
(-0·1 mm)
• Raw Ash
Mass

ENCLOSURE 6

Retain Samples

100 mm | 50 mm CORES

SIGNIFICANT SEAMS (1.0 m - 1.5 m)



Retain Samples

ENCLOSURE 7

5. REFERENCES

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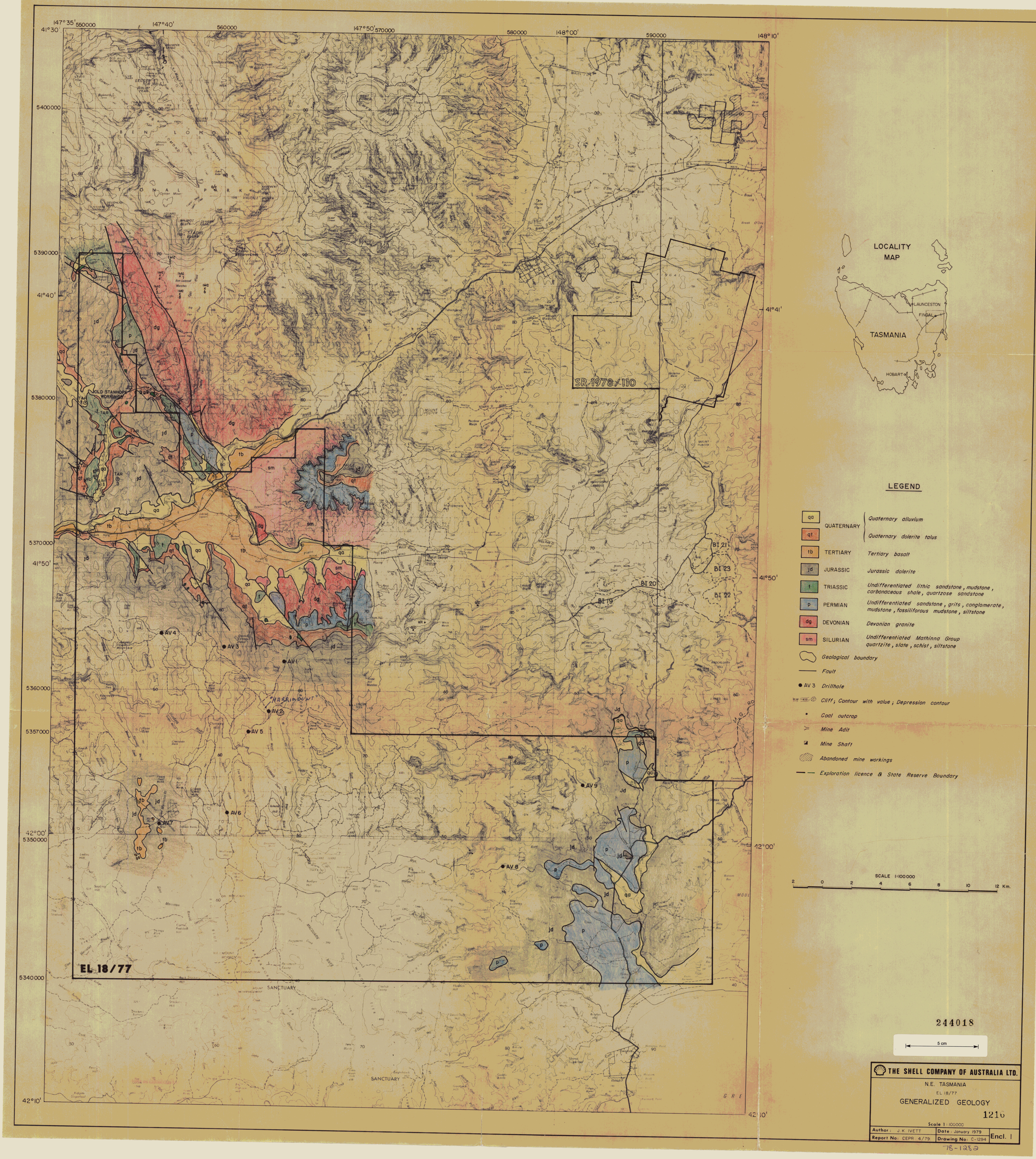

EL 18/77
SR 1978/110
LOCALITY MAP
TASMANIA
LAUNCESTON
FINGAL
HOBART
LEGEND
qa QUATERNARY Quaternary alluvium
qt Quaternary dolerite talus
tb TERTIARY Tertiary basalt
jd JURASSIC Jurassic dolerite
t TRIASSIC Undifferentiated lithic sandstone, mudstone, carbonaceous shale, quartzose sandstone
p PERMIAN Undifferentiated sandstone, grits, conglomerate, mudstone, fossiliforous mudstone, siltstone
dg DEVONIAN Devonian granite
sm SILURIAN Undifferentiated Mathinna Group quartzite, slate, schist, siltstone
Geological boundary
Fault
AV 3 Drillhole
Cliff; Contour with value; Depression contour
Coal outcrop
Mine Adit
Mine Shaft
Abandoned mine workings
Exploration licence & State Reserve Boundary
SCALE 1:100000
2 0 2 4 6 8 10 12 Km.
244018
5 cm
THE SHELL COMPANY OF AUSTRALIA LTD.
N.E. TASMANIA
EL 18/77
GENERALIZED GEOLOGY
1216
Scale 1 : 100000
Author : J.K. IVETT
Date : January 1979
Report No: CEPR 4/79
Drawing No: C-1294
Encl. 1
78-1282

244019

5 cm

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA BASIN, TASMANIA
SHELL 18/77 AVOCA

GENERALIZED BOREHOLE LOGS

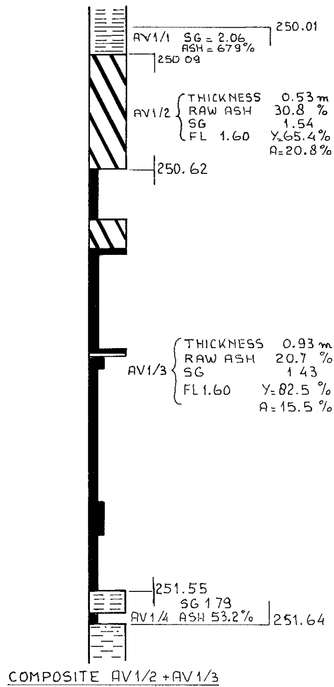
1217

Scale 1:

Author: HOBART	Date: JUNE '78	Fig. 2
Report No:	Drawing No:	

78-1282

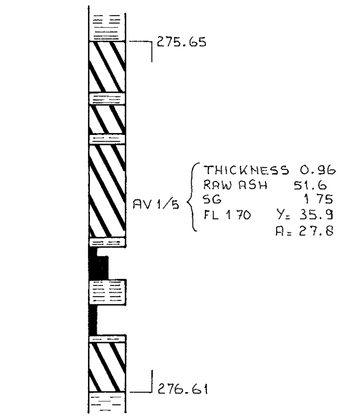
AV 1

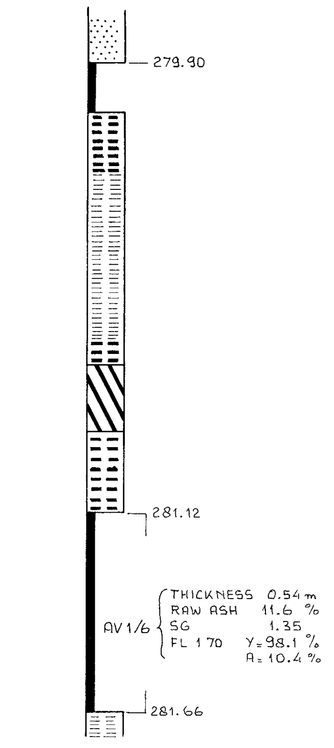


COMPOSITE AV1/2 + AV1/3

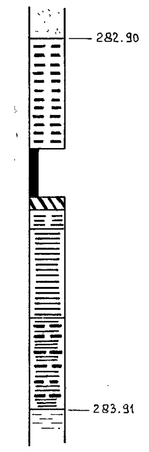
FL 1.60 T = 1.46 m Y = 76.0% A = 17.2 %

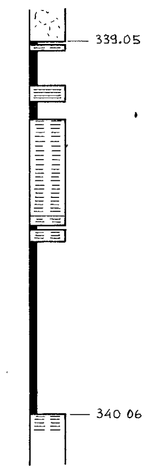
FL 1.70 T = 1.46 m Y = 84.6 % A = 19.2 %

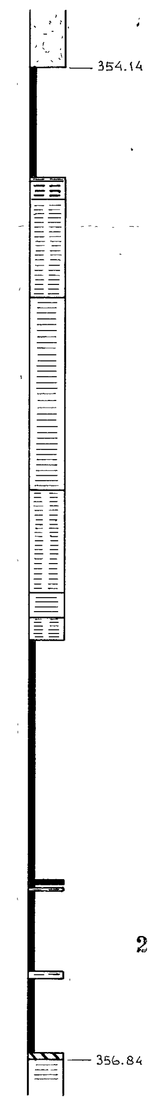




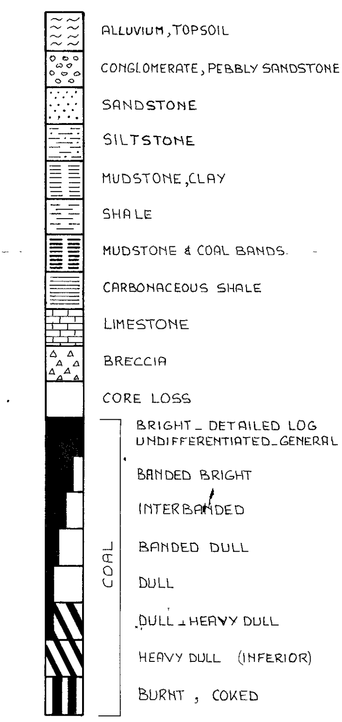
AV 3

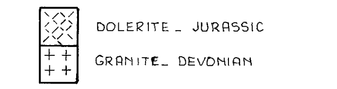






LEGEND





VERTICAL SCALE 1 10

20 10 0 10 20 30 40 50 cm

244020

5 cm

THE SHELL COMPANY OF AUSTRALIA LTD.

TASMANIA BASIN, TASMANIA
SHELL EL 18/77, AVOCA

DETAILED SEAM SECTIONS

1218

Scale 1:

Author. HOBART	Date. JUNE '78	Encl. 3
Report No:	Drawing No:	

78-1252.

78-1282

LAYTON and ASSOCIATES PTY. LTD
BRISBANE AUSTRALIA

EL 18/77 — TASMANIA

PHOTOGEOLOGICAL MAP

1219

SCALE: APPROX. 1: 40,000
0 400 800 1200 1600 2800 metres
0 1 2 3 km.

JOB No. B 283 CLIENT Shell Development Australia Pty. Ltd.

ENCL.: 4 SHEET 1 OF 2 DATE JUNE '78

244021

GEOLOGICAL LEGEND

- Alluvium
- Talus
- Tertiary (undifferentiated)
- Tertiary (basalt)
- Dolerite and related rock types (Jurassic)
- Dolerite sill with dip slope
- Sandstone, mudstone & limestone with coal measures (Parmeener Super Group) (Triassic – Permian – U.Carb.)
- Granite & porphyry (L. Carb. – U. Devonian
- Micaceous quartzwacke turbidite sequences (Mathinna Beds) (L.Dev. – Tremadocian – Cambrian ?)
- ? Undifferentiated rocks

- Geological contacts & bedding features
- Major lineaments & faults
- Undifferentiated structures

Geological references from
Geol. Survey of Tasmania
Sheets SK 55-4 & 55-6

LEGEND

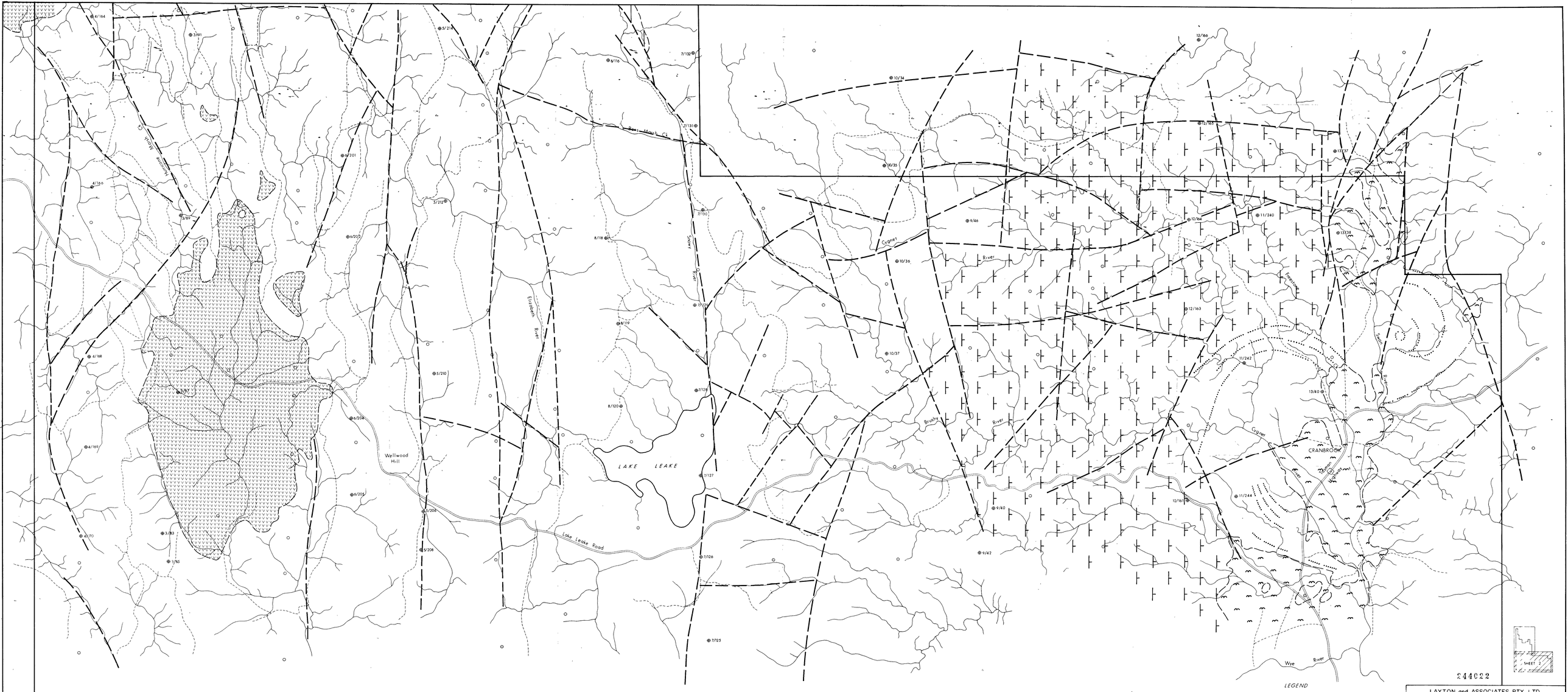
- Drainage
- Major road
- Minor road
- ⊙ Photo corner
- Run no. / Photo no. ⊕ 8/107 Photo corner showing run & photo numbers

EL boundary is approximate only.
Base compiled from aerial photos only and is uncontrolled

5 cm

SHEET 1

Grass Ck
Buffalo Brook
Turners Hill
Coyle Corry
Ringel
Railway
South Esk River
Esk Main Road
St Pauls River
Stynes Ck
Pole Ck
Royal George Road
AVOCA
ORMLEY



244022

LEGEND

- Drainage
- Major road
- Minor road
- Railway line
- Photo corner
- Run no. / Photo no. — Photo corner showing run & photo numbers

EL boundary is approximate only

Base compiled from aerial photos only and is uncontrolled

REFER SHEET 1 FOR GEOLOGICAL LEGEND

LAYTON and ASSOCIATES PTY LTD
BRISBANE AUSTRALIA

EL 18/77 — TASMANIA

PHOTOGEOLOGICAL MAP

5 cm

1220

SCALE APPROX 1 40,000

0 400 800 1200 1600 2000 2400 2800 3200 3600 metres
0 1/2 1 2 3 4 km

JOB NO B 283 CLIENT Shell Development Australia Pty Ltd

ENCL.: 4 SHEET 2 OF 2 DATE JUNE '78

78-1252