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The Oaklands-Coorabin Coalfield

by

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DEPARTMENT OF SUPPLY AND DEVELOPMENT

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2. INTRODUCTION.

Black coal of Permian age has been found near Oaklands and Coorabin in the Riverina District, New South Wales. The coal is low-grade compared with the bituminous coal sof Permian age at Newcastle, but has significance due to its situation in the south-western part of New South Wales, near the Murrumbidgee and Murray irrigation areas, and not far from the Victorian border.

This report has been compiled mainly from field observations and from the files of the Bureau of Mineral Resources, Geology and Geophysics, Canberra; published papers by J. E. Carne (1917), Irene Crespin (1943), L. F. Harper (1923 and 1924), and L. J. Jones (1921a, 1921b, and 1935), as well as unpublished reports by C. L. Knight, R. P. Jack, S. McKensey, H. G. Raggatt, J. M. Rayner, and L. A. Richardson, have also been used.

The assistance of Mr. G. Lowe, Manager of Riverina Pty. Ltd. at Coorabin, during the field work and in supplying later information, and of the officers of the Geological Survey, N.S.W., and the Water Conservation and Irrigation Commission, N.S.W., in furnishing details of bores, is gratefully acknowledged.

3. SITUATION OF THE FIELD.

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The Oaklands-Coorabin Coalfield is situated in the County of Urana, in the southern part of the Central Division of New South Wales (Plate 1). So far the presence of coal, at a depth of between 130 and 600 feet, has been proved in the parishes of Gunambil and Clear Hill by shaft-sinking or drilling.

Oaklands, in the Parish of Clear Hill, is a small town, about 35 miles north of the Murray River and the Victorian border, and about 55 miles north-west of Albury. Coorabin, in the same parish, is a railway siding about 5 miles north-north-east of Oaklands.

The distance by rail from Oaklands to Sydney is 417 miles and to Melbourne 200 miles. The New South Wales and Victorian railway systems meet at Oaklands; the New South Wales 4 feet 8½ inch gauge connects Oaklands and Coorabin with Urana, The Rock, and Wagga Wagga; the Victorian 5 feet 3 inch gauge runs from Oaklands to Mulwala, Yarrawonga (on the Murray River), and Benalla.

The position of the shafts and bores put down in the Oaklands-Coorabin Coalfield is shown on Plate 2. Details of the shafts and bores are given in Appendix I.

4. TOPOGRAPHY.

The country around Oaklands and Coorabin is flat or gently undulating; the lower parts have an average height of about 415 feet above sea level whereas the hills rise to a maximum height of just over 100 feet above the level of the surrounding plains.

The underlying rocks are generally covered by a mantle of brown sandy soil, no outcrops being visible. According to C. L. Knight, the nearest rock exposure are found east of Daysdale (12 miles south-east of Oaklands), where granite, schist and quartzite form a belt of hilly country trending north-south for several miles; at the western side of Lake Urana (17 miles north of Oaklands), where a cliff consists of hard conglomerates and sandstones of unknown geological age; and west of Savernake (18 miles ~~south~~-south-west of Oaklands) where granite outcrops. (Plate 1).

5. GENERAL STRATIGRAPHY

Two formations were met in the bores and shafts of the Oaklands-Coorabin Coalfield, the upper one consisting mainly of coarse sandstones and fairly pure clay, both of white colour, the lower one of multicoloured shales and mudstones with coal and sandstone beds.

A definite disconformity between the two formations has been observed in the new Inclined Shaft at Lane's Colliery. Where this shaft meets the seam, the bedding of the coal is more or less horizontal as shown by the intercalated shale layers; but the surface of the coal is eroded and the upper formation starts with a pebble bed laid down as an undulating horizon on the uneven top of the seam. The undulation flattens rapidly in the upwards-succeeding beds, the sandstone layers becoming nearly flat and horizontal about two or three feet above the coal.

The beds of the upper formation are ~~certainly~~ of Tertiary age(1) but no fossils have so far been found in them. The detailed sequence of ~~the Tertiary~~ sediments consisting of white, mostly coarse sandstones (which show cross-bedding in many places), white fire-clays, and conglomerate beds, has been measured in the Inclined Shaft and is given in the appendix and on Plate 6.

The maximum known thickness of the Tertiary as revealed by No. 5 Bore is nearly 450 feet; but it is probable that it has a greater thickness farther to the south and south-west.

The lower formation, which contains the workable coal, is of Permian age as shown by fossil evidence. Impressions of Glossopteris and Vertebraria were found on a dump of No. 2 Shaft by L. F. Harper (1923). Glossopteris has also been reported from the dump of the Gunambil Shaft (Raynor, 1942). In situ, fossils and plant remains have been found only in the shales below the coal beds. In the cores of Bores A to J put down during 1942-43 numerous plant remains were discovered, but only a few were sufficiently preserved for specific identification. A. B. Walkom determined in the shales of Bore E from 338½ to 345 feet depth (immediately below the coal) Glossopteris sp., and Glossopteris Browniana ?, and in the beds from 345 to 352 feet of the same bore (6½ to 13½ feet below the bottom of the coal) Glossopteris sp., and Noeggerathiopsis (? N. Hislopi). Irene Crespin (1943) found Permian foraminifera in the cores of Bore J in light gray shales at 384 feet depth (25 feet below the bottom of the coal) and determined the forms as Hyperamminoides cf. aciculа Parr, and Ammodiscus cf. milletianus Chapman.

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(1) It could not be established whether the beds overlying the Permian are of Tertiary, or perhaps of Pleistocene or even Recent age. However, for the sake of brevity, these beds are referred to in this report as Tertiary

Thus the Permian age of the coal-bearing strata has been well established. However, it is not known to which part of the Permian as developed in the eastern part of New South Wales the coal beds of the Oaklands-Coorabin area correspond.

The above-mentioned Inclined Shaft is the only place where the unconformable contact between Tertiary and Permian beds has actually been observed. However, it may be assumed that white, mostly coarse sandstones and white fire-clays generally characterize the Tertiary, and multicoloured, commonly carbonaceous shales or coal beds indicate the beginning of the Permian, the bottom of the Tertiary being usually a conglomeratic bed. The sections through the coalfield on Table 3 as well as the following descriptions of the structure have been made on this assumption.

Tertiary sediments extend downwards to the coal-bearing beds in most of the bores and shafts in the Oaklands-Coorabin area. Permian sediments above the coal, consisting of blue and multi-coloured partly carbonaceous shales, and sandstones, have been prepared only in No. 5 Bore and in Bores G, H, and J. The greatest thickness of Permian sediments above the coal was found in No. 5 Bore (approximately 85 feet). Below the coal, 229 feet of light gray mudstone and sandstone were struck in No. 1 Bore. Since the coal-bearing beds average between 50 and 60 feet, if they are not eroded (as revealed by the Bores G, H, and J) the Permian near Oaklands in the southern part of the area is at least 370 feet thick.

Coal is not entirely confined to the Permian. Small lignitic coal layers several inches thick have been found in the Tertiary in some of the bores around Urana and Oaklands. Clays with so-called black streaks (probably coal streaks), definitely of Tertiary age, have been recorded from the Ambleside Bore (nearly 1 mile west of Coorabin railway siding, see map, plate 2) from between 185 and 222 feet depth. The 6 inches of coal found in black mudstones in the water bore in Portion 11, Parish of Gunambil (2 miles north-north-east of Lane's Shaft, see map, plate 2) below 180 feet depth, may be of Tertiary or Permian age.

Further details of the stratigraphical sequence in the bores and shafts are given in the appendix.

6. GENERAL STRUCTURE.

Using the incomplete records of the bores and shafts and the interpretation of the stratigraphy as given above, an attempt has been made to work out the structural pattern of the known coalfield. Two structural sketch maps showing the approximate contours of the base of the Tertiary (plate 4) and of the base of the coal-bearing beds (plate 5), and three geological sections (plate 3) have been prepared. In order to emphasize the structural differences the vertical scale of these sections have been exaggerated five times.

Within the restricted area which has been investigated by bores and shafts, the Permian is gently folded, the average dip being to the west-south-west. A syncline passing west of Coorabin railway siding probably extends to the south and pitches in the same direction. Bore E was sunk near the axis of this syncline. The Clear Hill Shaft, on an anticline adjoining the syncline to the west, reached the base of the coal probably at 281 feet above sea level, assuming that the available information is correct, and Lane's Shaft on the eastern anticline at about

241 feet, whereas the base of the coal was found at 120 feet above sea-level in Bore E between these two shafts. Thus, the base of the coal rises 161 feet over a distance of about 3600 feet to the west and 121 feet over a distance of about 5000 feet to the east. The coal deposit has been struck below sea level in No. 5 Bore in the south-west. From Bore J to No. 5 Bore the top of the coal-bearing beds falls from 107 feet above sea level to 120 feet below sea level - 227 feet over a distance of about 4900 feet.

The Permian beds were partly eroded before the deposition of the Tertiary strata as shown on the geological sections (plate 3). As indicated by these sections the discordance between the Permian and the Tertiary is not only a disconformity but an unconformity. In the south-western part of the area the base of the Tertiary lies far above the coal; in Lane's Shaft and in Clear Hill Shaft and in most of the surrounding bores the Permian has been denuded down to the coal as already described (plate 5). The Permian coal is likely to be entirely eroded farther to the north, north of Gunambil Shaft.

The base of the Tertiary being an erosion surface shows a definite relief and reflects, despite its character as a plane of unconformity, to a certain degree the Permian structure as shown on the contour maps (plates 4 and 5), and geological sections (plate 3).

It is not definite whether the Tertiary beds themselves are truly horizontal, or slightly tilted and folded with a general dip to the south or south-west. As shown on the geological sections (plate 3), water-bearing strata with nearly the same high salt content have been met in nearly all bores and shafts between Coorabin in the north and Bore J (2 miles north-east of Oaklands) in approximately the same position above sea-level and below the static water-table; the horizontal position of the aquifers is well illustrated on section A - B (plate 3). Thus, since the aquifers are usually confined to coarse-grained sandstone and conglomerate beds, the bulk of the Tertiary strata is probably more or less horizontal in this part of the area, but the lowest horizons are likely to follow the irregular erosion surface of the Permian at the base of the Tertiary.

However, farther to the south-west, around Oaklands, the above-mentioned brackish water-bearing strata are found at greater depth than in the area between Coorabin and Bore J, and are overlain by fresh-water-bearing strata. The Tertiary strata which carry the brackish water have probably a southwesterly dip between Bore J and Oaklands and repeat, but to a lesser degree, the structure of the Permian beds.

Around Coorabin, structural elevations of the Permian strata underlie topographically high areas, and structural depressions underlie topographically low areas (section A - B, plate 3). On the other sections (sections C - D, and E - F, plate 3), no correlation between Permian structure and present surface can be found. The apparent local parallelism near Coorabin between the relief of the surface and the folds of the Permian is probably only a coincidence.

A gravimetric survey made in 1948-49 by the Geophysical Section of the Bureau of Mineral Resources, Geology and Geophysics, has indicated the approximate pattern of the surface of the bedrock - pre-Permian metamorphic sediments and granite.

This survey suggests that the known Oaklands-Coorabin Coalfield is the eastern marginal part of a sedimentary basin with a diameter of at least 15 miles. However, it is not known how deep this basin actually is, how much of its sediments are of Tertiary and how much of Permian age, and if and at what depth coal may be found.

The comparatively steep western slope of the Permian strata between Bore J. and No. 5 Bore (section E - F, plate 3) is parallel to a similar slope in the bedrock; between Oaklands and Bore J, the results of the gravimetric survey indicate a zone with massed contour lines, with increasing gravity to the east-north-east; this zone extends for at least 15 miles to the south-south-east and for about 5 miles to the north-north-west.

Summarizing, it may be stated that the known Oaklands-Coorabin Coalfield forms the eastern marginal part of a sedimentary basin of considerable size, that the Permian strata are slightly folded and tilted and unconformably overlain by Tertiary sediments, but that there is no proof of tectonic or other movements after Tertiary time.

7. DISCOVERY AND DEVELOPMENT OF THE COALFIELD.

Coal was first found in the Oaklands-Coorabin Coalfield on Portion 16, Parish of Gunambil, ½ mile east-south-east of Coorabin railway siding (see map, table 2) by T. J. Lane while boring for water (Lane's Bore). At the same place, a shaft (Lane's or No. 1 Shaft) was sunk in 1916. The colliery, which is referred to herein as Lane's Colliery, was opened up in 1917 and worked until 1920 (?), and again from 1934 until the present time (June 1949) with several interruptions. It is now owned by Riverina Collieries Pty. Ltd., Melbourne. The coal-bearing beds are 28 feet thick, but only the middle part of the seam is mined. The results of the geological examination of this mine will be found below.

No. 2 (or Coorabin) Shaft was sunk in 1920 close to the Coorabin railway siding. 37 feet of coal-bearing beds were reported, but the mine was worked only for a very short period and then abandoned, probably due to the inferior quality of the coal.

Five exploratory bores were put down by the New South Wales Department of Mines during 1920. No. 1 Bore, near No. 2 Shaft, proved that a supposed lower coal horizon does not exist within 230 feet below the known coal-bearing beds. No. 2 Bore was sunk close to Lane's Colliery in order to check the coal in the neighbourhood of this pit; the same thickness of coal (28 feet) was encountered as in Lane's Shaft. Nos. 3, 4 and 5 Bires revealed that the coal beds extend over a distance of at least 4½ miles; the coal pinches out towards the north-north-east (No. 3 Bore, 1½ miles north-north-east of Lane's Shaft, coal-bearing beds, at 182 feet depth, less than 11 feet thick, coal of poor quality); but the coal increases in thickness and dips towards the south-west (No. 4 Bore, 2½ miles south of Lane's Shaft, coal-bearing beds, at 265 feet depth, 37 feet thick, good coal; and No. 5 Bore, 3 miles south-west of Lane's Shaft, coal-bearing beds, at 532 feet depth, of unknown but at least 25 feet thickness, coal of excellent quality with an average calorific value of about 10,000 B.T.U. per lb.).

In the following years several shafts were sunk speculatively without any prevoous investigations by drilling. Only one of the two Carberry Shafts, which were put down close together ¾ mile south-south-west of Lane's Shaft during the years 1922-1925, struck probably the top of the coal, but had to be abandoned due to too great an inflow of water, 16,000 gallons per hour at 160 feet depth and 53,000 gallons at 186 feet having been recorded.

The shaft in Portion 27, Parish of Gunambil, more than 1½ miles east-north-east of Lane's Shaft was abandoned at a depth of 160 feet before it reached coal.

The Clear Hill Vertical Shaft, finished in 1928 (?), more than 1 mile west of Coorabin railway siding cut 7 feet of coal at a depth of approximately 195 feet (?); the mine was worked for a short period. The nearby Clear Hill Inclined Shaft struck only two feet of coal, as far as known.

The Gunambil Shaft was put down 1 mile north of Lane's Shaft in 1934-1935; the coal-bearing beds, which were approximately 15 feet thick, contained extensive shale and sandstone layers; only a few feet of coal at the base of the beds was worked intermittently from 1934 to 1937.

In 1942-1943, eight bores were drilled by the Water Irrigation and Conservation Commission of New South Wales, seven for the Commonwealth Coal Commission (Bores A and C - H), and one for the Commonwealth Department of Supply and Shipping (Bore J). The coal deteriorates in thickness and in quality east of Lane's Shaft, as shown by Bore C (¼ mile east of Lane's Shaft, coal-bearing beds about 22 feet thick) and Bore A (½ mile east of Lane's Shaft, coal-bearing beds about 18 feet thick); the ash content considerably increases, and large parts of the coal are of a lignitic composition. The projected Bore B has not been drilled. Bore D (1 mile south-west of Lane's Shaft) revealed two separate seams of coal of inferior quality, the upper one 9 feet thick, the lower one 29½ feet thick, divided by 24½ feet of shales and sandstones. Excellent coal was found at 283 feet depth in Bore E (1 mile west-north-west of Lane's Shaft); the coal beds were 55 feet thick and contained only a few intercalations of shale. Several seams extending over a total vertical distance of more than 50 feet and divided by thick shale beds were struck by Bore F, put down close to No. 2 Shaft; but the coal was of very poor quality. Bore G (nearly ½ mile west-north-west of Lane's Shaft) and Bore H (¾ mile west-north-west of Lane's Shaft) were situated on a straight line between the two good coal occurrences around Lane's Shaft and at Bore E; nevertheless the bores each revealed only two seams of low-grade coal of no economic value and separated by more than 30 feet of shales and mudstones. Bore J (2¾ miles south-south-west of Lane's Shaft) confirmed that the coal is improving in quality and thickness towards the south-south-west or south-west; 46 feet 2 inches of excellent coal with an average calorific value of 9630 B.T.U. per lb were found. The coal was divided into three major seams by shale layers with a total thickness of only 2 feet 2 inches.

An inclined shaft was put down near Lane's Shaft before 1947(?) in order to provide a second exit to the mine and to improve the ventilation.

Further details on shafts and bores may be found in the appendix.

8. LANE'S COLLIERY

i. Structural features.

In the workings of Lane's Colliery, at present the only accessible mine in the Oaklands-Coorabin Coalfield, the strata are flat and not disturbed. The dip is generally to the south-west, but hardly noticeable. In the centre of the mine, between the Inclined Shaft and Lane's Shaft, the average dip is less than 2° to the south-west; locally in the south-western part of the workings, a dip of 5° to the south-west has been found.

No faults, veins, or dykes have been observed; only a joint, filled with wet sand and mud, crosses the mine at about N40°E and shows a dip of 83° to 87° to the south-east.

ii. Water in the mine.

Water was struck in Lane's Shaft at the top of and below the coal. The water at the top of the coal had a static pressure of 2 feet, but has since been drained off by the mining operations. Thus no water was struck in the Inclined Shaft. However, water still enters the mine from the strata on top of the coal through the fall in the eastern part of the mine and the above-mentioned joint.

The water below the coal is saline and contains 1230 parts total solids per million. Although approximately eight feet at the bottom of the coal-bearing beds are not worked, some saline water from below enters the workings, but only to a small extent.

In 1942, 8000 gallons of water which contained 1450 total solids per million were pumped out of the mine per day.

iii. Mining of the coal.

The seam in Lane's Colliery is approximately 28 feet thick; it contains numerous thin shale layers and partings (tables 7 and 11). Only the central portion of the seam, a thickness about 8 feet, is worked, 12 feet above and approximately 8 feet below the central portion remaining unworked. The reason for this is, or at least was originally, to keep away as far as possible from the upper as well as from the lower water horizon.

Due to the convenient thickness of the working section, the nearly horizontal position of the beds, the absence of any inflammable or noxious gases, and the good roof conditions, the mining of the coal is very easy and may be performed even by unskilled labour. Mechanical mining by coal cutters and mechanical loaders could be applied successfully provided that future investigations find the coal reserves large enough.

Up to the present time (June 1949), the coal has only been mined in irregular gangways thus leaving at least 80 per cent. of the coal between them unworked. The gangways extend over an area of approximately 8 acres. Two small shafts connect the workings with the surface, the vertical outcast Lane's Shaft and the downcast Inclined Shaft.

In April, 1949, the production of coal was between 200 and 250 tons per week.

9. STRATIGRAPHY OF THE COAL-BEARING STRATA.

The entire original thickness of the coal-bearing strata in the Oaklands-Coorabin Area is between 55 and 70 feet, but the percentage of coal in these strata varies not only in a vertical direction, but also between the different parts of the area; as a general rule the percentage of coal increases from the north to the south.

Throughout the known coalfield, the coal-bearing beds can be divided into two or three different seams as found in bore and shaft logs (plates 8 to 15) and shown on the geological sections (plate 3). The beds between the coal seams consist mainly of shale, sandstones and sandy shales being reported only from Bore D and Gunambil Shaft. The seams are of variable thickness, and in some places almost coalesce to form a single seam. The coal seams are not workable everywhere due to limited thickness or inferior quality. Furthermore, in a large part of the area the upper two seams have been destroyed where the post-Permian erosion has reached the coal.

The Upper Seam has been found in its entire thickness of 12 to 25 feet and in normal development in No. 5 Bore and in Bores E and J only, but in a marginal facies with higher ash contents in Bores G and H. Remains of the Upper Seam were found in Bores D and F.

A Middle Seam has been struck in No. 4 Bore and in Bores E and J, its thickness being between 11 and 17 feet; it was separated from the Lower and Upper Seams by thin shale beds between 3 inches and 2 feet thick. Towards the north the Middle Seam disappears and shale beds up to 36 feet thick take its place; in Bore F it was only 1 foot thick, and it was entirely absent in Bore G. The Middle Seam is probably also not present in Lane's Colliery, No. 2 Bore, and Bores D and H.

The Lower Seam is between 14 and 30 feet thick where it has not been eroded. A marginal facies of the Lower Seam with high ash content and intercalated shale layers was found in the Gunambil Shaft, No. 3 Bore, and in Bores A, C, D, F, G and H. In Bores A and C considerable parts of the Lower Seam have preserved a lignitic composition with a ratio between fixed carbon and volatile matter (fuel-ratio) of between 0.9 and 1.2. The greatest thicknesses of the Lower Seam have been struck in Bore D (29½ feet), in Lane's Shaft and No. 2 Bore (28 feet), and in Bore H (24½ feet). However, it is possible that the upper part of the coal beds in these localities represents partly or entirely the Middle Seam, the shale beds between Middle and Lower Seam having disappeared.

10. PETROGRAPHY OF THE COAL

Lane's Colliery was the only place where it is possible to examine the coal-bearing strata. The middle part of the coal beds is visible in the workings of this colliery, and the upper part in the Inclined Shaft (see appendix and plate 7); but the lower part is nowhere accessible.

The major part of the coal itself is of a dull black colour and not very hard, shows no structure and only indistinct cleat fractures, but contains thin bright streaks, and so displays megascopically the characteristic features of durain.

Horizons of quite different character are found mainly immediately below and above shale layers and consist of alternating irregular bands of dull durain and bright black vitrain. The vitrain bands themselves, which are seldom more than ¼ inch thick, are quite hard, with a glassy appearance, and vertical cleat fractures. These layers of intercalated durain and vitrain bands can be traced as persistent horizons throughout the underground workings.

Very soft, friable coal of dull dark-grey colour, found as a layer 2½ inches thick at the top of the coal-bearing strata in the Inclined Shaft, is probably lignite. In Bores A and C, more than half of the coal had the composition of lignite, as revealed by the analyses; and lignite occurred also on the top of the coal-bearing beds in Bore F.

The layers and partings which divide the coal seam in Lane's Colliery consist of soft shale of a fawn colour. They are mostly comparatively straight, but some of them are floating and mingled with coal and shaly coal. These shale layers and partings are between one tenth of an inch and two inches thick; their thickness commonly changes rapidly in a horizontal direction, and in some places they disappear altogether. However, on the whole, they form remarkably persistent horizons which may be traced throughout Lane's Colliery. The partings and layers of shale can be used as roof or florr of working sections.

No megascopically visible impurities in the coal such as pyrites or sulphur concretions have been found.

11. THE QUALITY OF THE COAL.

Chemically, the coal of the Oaklands-Coorabin Coalfield is characterized by a fairly high amount of water and of ash, compared with Newcastle coal, but the ratio between fixed carbon and volatile matter (fuel-ratio) is nearly the same.

Some recent average coal analyses from workable sections in Bores E and J and in Lane's Colliery, including shale partings, are given in the following table; further information on the composition of the coal beds may be found in the appendix and, in diagrammatic form, on plates 8 to 15.

	Depth below Surface	Hygroscopic Moisture per cent.	Volatile Matter per cent.	Fixed Carbon per cent.	Ash per cent.	B.T.U. per lb.
Bore E	283'6" -292'3"	7.6	26.2	46.2	20.0	9110
	292'3" -308'6"	8.1	25.6	52.3	14.0	9840
	310'3" -322'	9.0	26.1	51.8	13.1	9990
	324' -330'3"	8.6	26.7	47.5	17.2	9870
Bore J	310'8" -322'8"	11.5	27.6	47.8	13.1	9800
	323'2" -335'2"	12.5	25.7	50.1	11.7	9910
	335'4" -341'	11.5	22.3	46.4	19.8	9010
	342'6" -359'	12.8	28.0	45.5	13.7	9520
Lane's Colliery	232'1" -239'9" (including shale layers)	12.0	27.4	46.7	13.9	9410

The sulphur content is very low, but figures are available only for the upper part of the coal beds in Lane's Shaft; these beds contain between 0.2 per cent and 0.3 per cent S.

The above figures for moisture comprise only the inherent moisture. The moisture content of the coal in the mine is commonly still higher, due to adherent water. However, if the coal is exposed to the dry air on the surface, it readily loses a great part of its moisture so that the moisture content of the coal when delivered to the consumer may be found to be even below the above figures and the calorific value correspondingly higher.

All analyses made by the New South Wales Department of Mines, Geological Survey Branch, during the first half of 1943, namely, the analyses of samples from Bores D, E, F, G, and H, contain an unusually low percentage of hygroscopic moisture compared with earlier and later determinations. It may be assumed that these differences are due to different methods of sampling and of analyses rather than to differences in the actual moisture content of the coal obtained in these bores.

The average analyses of the workable sections as given above, including shale partings and layers, are representative of the three different localities in which coal of economic value has been proved. The average of these figures probably gives the average composition of the Oaklands-Coorabin coal. For this calculation, it was assumed, according to the above statement, that the moisture content of the coal in Bore E was the same as in Lane's Colliery and in Bore J. Thus, the following figures for the average composition were obtained :

Hygroscopic Moisture	12.1 per cent
Volatile Matter	25.7 per cent
Fixed Carbon	47.3 per cent
Ash	14.9 per cent
B.T.U. per lb.	9410.

Or if the ash content, which is not an integral part of the coal, is disregarded, the average composition may be given on a mineral-matter-free basis :

Hygroscopic Moisture	14.2 per cent.
Volatile Matter	30.2 per cent
Fixed Carbon	55.6 per cent.
B.T.U. per lb.	11050.

However, many sections of the coal beds in Bore E and in the bores in the southern part of the area (No. 4 and No. 5 Bores and Bore J) are of considerably higher quality than average, as shown in the table above, in the appendix, and on plates 9 to 15. Thus, the average calorific value of the mined coal, shale layers and inherent moisture included, could rise even above 10,000 B.T.U. per lb. through working of high grade coal only and through extensive loss of moisture on the surface.

The Oaklands-Coorabin Coal does not yield coke. It can be used, but is not particularly suitable for locomotive purposes. However, it is an excellent coal for boiler furnaces and domestic uses.

Coals are usually classified according to physical properties and average chemical composition. Since no ultimate analyses of the Oaklands-Coorabin coal are available, only classification schemes based on proximate analyses such as the A.S.T.M. classification or the new classification proposed by the Standards Association of Australia (1946) can be used.

In the A.S.T.M. classification adopted by the U.S. Bureau of Mines, coals are classified by using the percentage of fixed carbon for coals of higher rank, and the calorific value for coals of lower rank, both calculated to a mineral-matter-free basis. The average percentage of dry, mineral-matter-free fixed carbon in the Oaklands-Coorabin coal is 64.8 per cent, the calorific value on a moist, but mineral-matter-free basis is 11050 B.T.U. per lb.; and the coal is neither agglomerating (does not form coke) nor weathering. Hence, the Oaklands-Coorabin coal belongs to the group "High Volatile C Bituminous Coal".

A new classification of Australian coals has been proposed by the Standards Association of Australia (1946). This classification is based on the inherent moisture content and on the ratio between fixed carbon and volatile matter (fuel-ratio). Coals with more than 12.5 per cent inherent moisture are classified as sub-bituminous coals or lignites, all coals with less moisture, as bituminous coals or anthracites. Since the Oaklands-Coorabin coal contains on an average 12.1 per cent inherent moisture and has an average fuel-ratio of 1.84, it has to be put in the group "Bituminous C".

Summarizing, it may be stated that the Oaklands-Coorabin coal is a low-rank and comparatively low-grade bituminous coal. In a diagram of Australian coals it would appear just above the limit between bituminous and sub-bituminous coals.

12. WATER IN THE COALFIELD.

Excessive amounts of water struck in shafts and bores were in the past the greatest handicap to the mining of the coal. Modern methods permit shaft sinking through aquifers which yield large quantities of water; but mining coal immediately underneath such aquifers should be avoided whenever possible.

The water in the Oaklands-Coorabin Coalfield is contained in sub-artesian aquifers consisting of coarse-grained beds mainly of Tertiary age. The Tertiary beds in the area between Coorabin and Bore J contain up to three water horizons. Water horizons with a yield of over 2400 gallons per hour are reported from several bores (~~the actual yield may have been very much more;~~ 2400 gallons per hour being the maximum capacity of the bailing plant). The basal conglomerate of the Tertiary, which rests unconformably on the Permian, carries large volumes of water in many places.

Water horizons immediately below the top of the Permian were found in Bores H and J. Whether any other water horizons exist in the Permian above the coal is not known; no information regarding aquifers is available from No. 5 Bore, the only one where a considerable thickness of Permian above the coal has been struck.

Water has been reported from below the coal-bearing beds in Bores A, C, D and F, Lane's Shaft and No. 2 Shaft. It seems that this water horizon is more or less confined to the north-eastern part of the area, where sandstones occur below the coal beds. In Bore J, no water was found in the 25 feet of sediments which were drilled below the coal.

The static water level in the Oaklands-Coorabin area is for all aquifers more or less the same and lies between 280 and 290 feet above sea-level.

All the water struck in Tertiary and Permian beds in shafts and bores around Coorabin itself and in the area southwards to Bore J contained large amounts of solid matter, on an average between 10,000 and 20,000 parts per million, mainly sodium chloride. Water which was pumped from Lane's Colliery in 1942 at a rate of 8,000 gallons per day contained in parts per million :

Cl	6600
SO_4	1130
Ca	470
Mg	600
SiO_2	10
$Fe_2O_3 + Al_2O_3$	10
Other ions	5680
Total solids	14500

However, fresh water with less than 1000 parts total solids per million has been struck in numerous water bores within a distance of about 1 mile around Oaklands, at the same altitude (between 220 and 260 feet above sea-level), at which farther to the north or north-east brackish water has been found. Below those fresh-water horizons around Oaklands, brackish water is reported to occur. It may be assumed that the horizons which contain the brackish water dip from Bore J towards the south-west and underlie the fresh-water horizons at Oaklands.

Favourable conditions for the mining of the coal in the Oaklands-Coorabin coalfield without striking greater amounts of water in the vicinity of the working seam, may be found either where the top of the coal is near or above the water table (as in Lane's Colliery), or where the coal-beds are covered by a sufficient thickness of Permian shales (as probably in No. 5 Bore) to enable the water to be sealed off effectively.

13. EXTENSION OF THE COALFIELD

To date, the occurrence of Permian coal near Oaklands and Coorabin has been proved over an area of about 8 square miles (plate 2). Good coal was struck in the northern part of this area, as mentioned above, at two separated localities, in Lane's Colliery (including Lane's Shaft, the Inclined Shaft, and the nearby No. 2 Bore) and in Bore E. In the southern part, coal of economic value has been proved over a distance of 2 miles by No. 4 Bore, Bore J, and No. 5 Bore. The small occurrences of good coal in the north are probably somehow connected with the large deposit in the south; perhaps they are situated on two northerly running tongues; but how much of the area between contains valuable coal resources is not known. The occurrences of good coal do not coincide with the present structure of the Permian, which has been discussed before.

As already stated, only 8 feet of the coal-bearing beds are worked at present in Lane's Colliery; but as shown by the results of No. 2 Bore, about 20 feet could probably be mined. The coal sections of economic value in Bore E are approximately 34 feet thick. The workable coal in No. 4 Bore was between 30 and 35 feet, and in Bore J 40 feet thick, whereas No. 5 Bore penetrated only the upper 25 feet of the coal, which was of excellent quality (see appendix and plates 11, 14 and 15).

To the north, the area of coal of economic value is limited by the original margin of the coal deposit as well as by the post-Permian erosion.

As indicated by the high ash content, the original margin of the coal was probably close to the north or north-east of the Gunambil Shaft, of No. 3 Bore, and of Bores A, C, F, G and H. The coal-bearing beds in the Gunambil Shaft consist of nearly 50 per cent. of sandstone and shale; in No. 3 Bore the coal contained 29.5 per cent ash; in Bores F, G and H, an upper and a lower coal seam, both small with much ash, were divided by 26 to 36 feet of shale; and in Bores A and C, the coal was not only of very low grade, but was also partly of a lignitic composition with a fuel-ration of between 0.9 and 1.2 (see appendix and plates 9, 10, 12 and 13).

It has already been shown that the coal beds had been partly destroyed in the northern part of the area before the deposition of the Tertiary (see map, plate 5). Only a small percentage of the original thickness of the coal-bearing beds was found in Clear Hill Shaft, Gunambil Shaft, and No. 3 Bore; the coal beds are partly eroded in Lane's Shaft, No. 2 Bore, the Bores A and C, and in No. 4 Bore, and probably also in the Bores D and F (see plates 9 to 12 and 14).

Thus, the coal beds thin out and are partly or entirely eroded to the north and east of Coorabin and Lane's Shaft. No coal of economic value can be expected north-east of Billabong Creek (see map, plate 2). There is no chance of finding Permian coal suitable for open cut mining in the area between Coorabin and Urana.

No exact information is available on the extension of the coal beds to the east, south and west, beyond the area around Oaklands and Coorabin. No bore logs other than those mentioned report the occurrence of Permian coal. However, strata of pre-Permian and possibly also of Permian age, but without coal, are recorded from several bores south of Daysdale, and granite outcrops occur east and south-east of Daysdale (see map, plate 1), thus limiting the extension of the Permian to the east.

Shale of unknown, but possibly Permian, age has been struck in several bores between 2½ miles south and 8 miles south-south-west of Daysdale. A bore 2½ miles south of Daysdale went through clays and shales from 136 feet depth downwards and struck metamorphic quartzite at 425 feet depth; another bore 3 miles south of Daysdale penetrated shales from 214 to 220 feet; blue clay is reported from 291 feet down to 350 feet from a bore 5 miles south-south-west of Daysdale; and farther south, in a bore 8 miles south-south-west of Daysdale, shales were found between 188 and 214 feet depth.

It has been shown above that the structural pattern of the bed-rock as revealed by the gravimetric survey is parallel to the structure of the Permian beds themselves, at least to a certain degree. A large sedimentary basin with a diameter of more than 15 miles exists to the west of Oaklands (map, plate 1) and it is probable that the coal beds extend into this basin. However, west of the slope between Oaklands and Bore J, which has been revealed by bores (section E - F, plate 3) and gravimetric survey, the coal must be expected to be at much greater depth than in any of the bores drilled to date.

Granite outcrops extending from Berrigan south-east to a point about 6 miles south-west of Savernake form the utmost western margin of the sedimentary basin, but the continuation of this margin to the north or north-west is not known.

To the south, the Permian could possibly extend as far as the Murray River, or even into Victoria. Rock exposures of pre-Permian age are found to the west between Berrigan and Mulwala, and to the east, near Corowa, thus leaving a gap of about 15 miles between (Harper, 1924) (map, plate 1). However, two bore holes in the valley of the Ovens River, near Wangaratta, drilled by the Victorian Government, bottomed at 300 and 368 feet in beds reported to be glacial and of Permian age, without finding a trace of coal (Jones, 1935).

Summarizing the geological observations and gravimetric investigations it may be stated that the Permian coalfield is probably limited to the north-east of Coorabin by Billabong Creek, that it does not reach to the east beyond Daysdale, and that it extends to the west not farther than about 6 or 8 miles west of Savernake. The north-western and the south-eastern limits of the sedimentary basin as well as of the Permian coalfield itself are unknown.

14. COAL RESERVES.

Only a very small portion of the Oaklands-Coorabin Coalfield has been opened by shafts and drives. Lane's Colliery is the only locality from which enough data is available to allow actual coal reserves to be calculated. In this colliery, good coal has been proved by drives over an area of about 15 acres; 2½ acres should be left unworked as shaft pillars (nearly 2 acres for the Inclined Shaft and more than ½ acre for the vertical shaft); thus, the actual coal reserves which can be worked extend over about 12½ acres, of which area about 8 per cent. has already been exploited and 20 per cent. has to be left as pillars in the workings. Since the worked coal seam is on an average nearly 8 feet thick, the actually proved and available coal reserves in Lane's colliery amount to approximately 100,000 tons.

The probable coal reserves are much higher. Around Lane's Colliery, it can be assumed that a coal seam with a workable thickness of an average of 16 feet extends over perhaps 90 to 100 acres; thus, the probable coal reserves around the colliery amount to approximately 2 million tons.

In Bore E, the workable coal is probably 34 feet thick. It may be estimated that the deposit around the bore extends over at least 70 acres; thus 3 million tons of probable coal reserves can be expected.

Around No. 4 Bore, Bore J, and No. 5 Bore, about 1,000 acres probably contain coal of economic value; the average thickness of the workable coal is approximately 35 feet; hence, the probable coal reserves in the southern part of the area may be estimated at about 45 million tons. Thus, the entire probable coal reserves in the Oaklands-Coorabin area, as indicated up to date (April 1949) by shaft sinking and drilling activities are about 50 million tons.

As shown above, the coal beds may extend from Bore J and No. 5 Bore for perhaps two or three miles to the north, and for many miles to the west and south-west. The possible reserves of coal may amount to several thousand million tons.

15. FURTHER INVESTIGATIONS.

Two different problems exist as far as further investigation of the Oaklands-Coorabin Coalfield are concerned:

(1) the size of the deposits surrounding the known occurrences of good quality coal and the situation of the water horizons above the coal;

(2) the distance to which the coal-beds extend to the west into the sedimentary basin and whether they improve in rank and grade in this direction.

So far, the most promising coal deposit has been struck in Bore J and No. 5 Bore. More bores are needed to trace the extension of this deposit, to examine whether the quality of the coal is still improving towards the south-west, and to investigate at what depth water horizons, which have not been recorded from No. 5 Bore, occur above and below the coal. Bores should be put down around No. 5 Bore, commencing with one about 0.7 miles south-south-west of No. 5 Bore, and another 0.4 miles west of No. 5 Bore; both bores would be situated close to the Oaklands-Coorabin-Urana road and would probably find coal at greater depth than No. 5 Bore.

Whether the coal reserves in the area around Lane's Colliery are large enough and of sufficient high quality to warrant the investment of more capital and the introduction of mechanical mining equipment is doubtful. It is known that this deposit deteriorates towards the east (Bore C, 0.2 miles east of Lane's Shaft, see map, plate) and to a lesser degree to the west (Bore G, 0.4 miles west-north-west of Lane's Shaft); but to the south as well as to the north the deposit may extend for a considerable distance. Bores should be drilled at a distance of about 0.3 miles around the existing pit, one each to the south, to the south-west and to the north.

Similar considerations may be applied to the deposit struck in Bore E as to the deposit in Lane's Colliery. Bores at a distance of about 0.4 miles to the north-north-east and to the south-south-west of Bore E could give evidence whether the deposit extends in a northerly or southerly direction as supposed.

An approximate picture of the sedimentary basin has been obtained by the gravimetric survey; a more detailed one which may even show the distribution of the coal will probably be obtained by the proposed seismic surveys. Geophysical techniques are mainly interpolation methods which should preferably be based on normal profiles; only near Oaklands and Coorabin is the sequence of Tertiary and Permian sediments above the bed-rock partly known; hence it would be advisable to drill two bore holes at two widely-separated localities within the sedimentary basin itself, concurrently with the seismic work, in order to get results as exact and detailed as possible from the geophysical observations.

BIBLIOGRAPHY

Andrews, E.C., 1928 : Coal. The Mineral Industry of New South Wales. Geol. Surv. N.S.W. p.250.

Billson, J.W., 1924 : Second progress report from the Parliamentary Standing Committee on Railways, on the proposed border railway to Oaklands, New South Wales. Vic. Parl. Paper, C. No. 1, pp. 6-8

Carne, J. E., 1917 : Reported discovery of a coal seam on Mr. T.J. Lane's property at Coorabin, 6 miles from Oaklands. Ann. Rep. Dept. Mines N.S.W. for 1916, p. 198.

Crespin, Irene, 1943 : Permian Foraminifera from a bore at Coorabin, New South Wales. Aust. Journ. Sci. Vol. 6, No. 2, p.65.

David, T.W.E., 1932 : Explanatory notes to accompany a new geological map of the Commonwealth of Australia. C'wealth Counc. Sci. Ind. Res. (Aust), pp. 63-65.

Harper, L.F., 1923 : Coorabin Coal Measures. Ann. Rep. Dept. Mines. N.S.W. for 1922, p.91.

Harper, L.F., 1924 : Possible extension of Coorabin coal to south or southwest. Ann. Rep. Dept. Mines N.S.W. for 1923, P.84.

Jack, R.P., 1943 : Oaklands-Coorabin coalfields. Question of possible development. C'wealth Coal Commission (unpublished).

Jaquet, J.B., 1921 : Metalliferous Mines. Ann. Rep. Dept. Mines N.S.W. for 1920, pp. 41-43

Jones, L.J., 1921a : Coorabin Coalfield. Ann. Rep. Dept. Mines N.S.W. for 1920, pp. 113-118.

Jones, L.J., 1921b : Notes on further prospecting operations at the Coorabin Coalfield. Ann. Rep. Dept. Mines N.S.W. for 1920, pp. 118-119.

Jones, L.J., 1935 : The Coorabin Coalfield. Notes on recent developments. Ann. Rep. Dept. Mines N.S.W. for 1934, pp. 77-78.

Knight, C.L., 1942 : Coorabin Coalfield. Summary of results of geological survey of Coorabin area. Dept. of Supply and Shipping, Min. Res. Surv. (unpublished).

Knight, C.L., 1946 : Note on extent, structure and thickness of Coorabin coal measures. Dept. Supply and Shipping, Min. Res. Surv. (unpublished).

McKensey, S., 1942 : Coorabin Coalfields. C'wealth Coal Commission. (unpublished).

Raggatt, H.G., 1942a : Oaklands-Coorabin coalfield. Preliminary report. Dept. Supply and Shipping. Min. Res. Surv. (Unpublished)

Raggatt, H.G., 1942b : Coorabin-Oaklands coalfield. Dept. Supply and Shipping, Min. Res. Surv. (Unpublished)

Raggatt, H.G., 1944 : Report on summary of results of boring operations Coorabin-Oaklands coalfield 1942-1943. Dept. Supply and Shipping, Min. Res. Surv. Rep. No. 1944/31 (unpublished).

Raggatt, H.G., 1949 : Geophysical survey of the Oaklands-Coorabin Coalfield. Dept. Supply and Development. Bur. Min. Res. Geol. and Geophys. (Unpublished).

Rayner, J.M., 1942 : Notes to accompany plan and section of Coorabin Coalfield. Dept. Supply and Shipping, Min. Res. Surv. (Unpublished)

Richardson, L.A.,1942a: Coorabin Coalfield. Historical Data. Dept. Supply and Shipping, Min. Res. Surv. (Unpublished).

Richardson, L.A.,1942b: Report on surveys made at Coorabin on 12th and 13th August, 1942. Dept. Supply and Shipping, Min. Res. Surv. (Unpublished).

Standards Association of Australia, 1929 : The coal resources of Australia. Stand. Assoc. Aust. Power Surv. Rep. No.3 pp. 34-35.

Standards Association of Australia, 1926 : The coal resources of Australia. Stand. Assoc. Aust. Draft supplement Power Surv. Rep. No. 3 (1929).above. (Unpublished).

Toutcher, R. F., 1923 : Progress report from the Parliamentary Standing Committee on Railways, on the proposed border railways to Oaklands, New South Wales. Vic. Parl. Paper. C. No. 6, pp. 3-4.

REFERENCES

Andrews, E.C., 1928 : Coal. The Mineral Industry of New South Wales. Geol. Surv. N.S.W., p.250.

Billson, J.M., 1924 : Second progress report from the Parliamentary Standing Committee on Railways, on the proposed border railway to Oaklands, New South Wales. Vic.Parl. Paper, C. No. 1, pp. 6-8.

Carne, J.E., 1917 : Reported discovery of a coal seam on Mr. T.J. Lane's property at Coorabin, 6 miles from Oaklands. Ann. Rep. Dept. Mines N.S.W. for 1916, p. 198.

Crespin, Irene, 1943 : Permian Foraminifera from a bore at Coorabin, New South Wales. Aust. Journ. Sci., Vol. 6, No. 2, p.65.

David, T.W.E., 1932 : Explanatory notes to accompany a new geological map of the Commonwealth of Australia. C'wealth Counc. Sci. Ind. Res. (Aust.), pp. 63-65.

Harper, L.F., 1923 : Coorabin Coal Measures. Ann. Rep. Dept. Mines, N.S.W. for 1922, p.91.

_____ 1924 : Possible extension of Coorabin coal to south or southwest. Ann. Rep. Dept. Mines N.S.W. for 1923, p. 84.

Jack, R.P., 1943 : Oaklands-Coorabin coalfields. Question of possible development. C'wealth Coal Commission (unpublished).

Jaquet, J.B., 1921 : Metalliferous Mines. Ann. Rep. Dept. Mines N.S.W. for 1920, pp. 41-43.

Jones, L.J., 1921a : Coorabin Coalfield. Ann. Rep. Dept. Mines N.S.W. for 1920, pp. 113-118.

_____ 1921b : Notes on further prospecting operations at the Coorabin Coalfield. Ann. Rep. Dept. Mines N.S.W. for 1920, pp. 118-119.

_____ 1935 : The Coorabin Coalfield. Notes on recent developments. Ann. Rep. Dept. Mines N.S.W. for 1934, pp. 77-78.

Knight, C.L., 1942 : Coorabin Coalfield. Summary of results of geological survey of Coorabin area. Dept. Supply and Shipping, Min. Res. Surv. (unpublished).

_____ 1946 : Note on extent, structure and thickness of Coorabin coal measures. Dept. Supply and Shipping, Min. Res. Surv. (unpublished).

McKenney, S., 1942 : Coorabin Coalfields. C'wealth Coal Commission. (unpublished).

Raggatt, H.G., 1942a : Oaklands-Coorabin coalfield. Preliminary report. Dept. Supply and Shipping. Min. Res. Surv. (unpublished)

_____ 1942b : Coorabin-Oaklands coalfield. Dept. Supply and Shipping. Min. Res. Surv. (unpublished).

_____ 1944 : Report on summary of results of boring operations Coorabin-Oaklands coalfield 1942-1943. Dept. Supply and Shipping. Min. Res. Surv. Rep. No. 1944/81 (unpublished).

_____ 1949 : Geophysical survey of the Oaklands-Coorabin Coalfield. Dept. Supply and Development, Bur. Min. Res. Geol. and Geophys. (Unpublished).

Rayner, J.M., 1942 : Notes to accompany plan and section of Coorabin coalfield. Dept. Supply and Shipping, Min. Res. Surv. (Unpublished)

Richardson, L.A., 1942a: Coorabin Coalfield. Historical Data. Dept. Supply and Shipping, Min. Res. Surv. (Unpublished).

_____ 1942b : Report on surveys made at Coorabin on 12th and 13th August, 1942. Dept. Supply and Shipping, Min. Res. Surv. (Unpublished).

Standards Association of Australia, 1929 : The coal resources of Australia. Stand. Assoc. Aust. Power Surv. Rep. No. 3, pp. 34-35.

_____ 1946 : The coal resources of Australia. Stand. Assoc. Aust. Draft supplement Power Surv. Rep. No. 3 (1929) above. (Unpublished).

Toutcher, R.F., 1923 : Progress report from the Parliamentary Standing Committee on Railways, on the proposed border railways to Oaklands, New South Wales. Vic. Parl. Paper. C. No. 6. pp. 3-4.

APPENDIX I.

DATA ON SHAFTS AND BORES

OAKLANDS-COORABIN COALFIELD

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DATA ON SHAFTS AND BORES.

OAKLANDS-COORABIN COALFIELD.

Lane's (or No. 1) Shaft
(plates 7 and 11)

Situation — Por. 16, Par. Gunambil.
Approx. 3,000 ft SSE of Oaklands-Urana railway.
Surface RL 495 ft.

Date of sinking — 1916.

Dimensions — Single 3 x 5 ft vertical shaft, approx. 240 ft deep.

Geological log

0'	-	220'	Coarse sandstones with layers of clay.
?	-	220'	Conglomerate bed; aquifer.
		220'	Base of Tertiary. (1)
220'	-	240'+	20+ ft coal with shale layers.

For Tertiary sequence in the vicinity of Lane's Shaft see Inclined Shaft at Lane's Colliery.

Water

Just above coal - at 220' during shaft sinking, rising to 218'.

Below coal - approx. 2,000 gal. per hour with 12,300 parts solids per million.

Water from the mine in 1942, 8,000 gal. per day.
Analysis (in parts per million):

Cl	6,600
SO_4	1,130
Ca	470
Mg	600
SiO_2	10
$Fe_2O_3 + Al_2O_3$	10
Total Solids	14,500.

Log of coal-bearing beds

Depth below collar	Thickness	Type of material
220'		
	2'9"	Coal
222'9"		
	1"	Shale layer
222'10"		
	3½"	Coal
223'1½"		
	1"	Shale layer
223'2½"		
	1' 7"	Coal
224'9½"		
	1½"	Shale layer
224'11"		
	1'4"	Coal

/ see over.

(1) It could not be established whether the beds overlying the Permian are really of Tertiary or perhaps of Pleistocene or even Recent age. However for the sake of brevity these beds are referred to in this appendix as Tertiary.

226'3"		
	3/4"	Shale layer
226'3 1/4"		
	1'4 3/4"	Coal
227'8"		
	1"	Shale layer
227'9"		
	6"	Coal
228'3"		
	1"	Shale layer
228'4"		
	1'8"	Coal
230'		
	2"	Shale layer
230'2"		
	1'10"	Coal
232'		
	1"	Shale layer
232'1"		
	4 1/2"	Coal
232'5 1/2"		
	1/2"	Shale layer
232'6"		
	1'6"	Coal
234'		
	3/4"	Shale layer
234' 1/2"		
	5'8 3/4"	Coal
239'9"		
	approx. 1/4"	Shale layer
approx. 239'9 3/4"		
	approx. 8'2 3/4"	Coal with some shales
approx. 248'		

For petrographical log of coal in the vicinity of Lane's Shaft see Inclined Shaft at Lane's Colliery.

Analyses

(a) In the shaft Depth below collar	Hygroscopic Moisture %	Volatile Matter %	Fixed Carbon %	Ash %	Sulphur in Coal %	B.T.U. per lb.
220'-222'9" (Without clay layers)	14.3	25.7	42.0	18.0	0.21	.
222'9"-224'9 1/2" (do)	16.1	29.1	41.8	13.0	0.30	.
224'11"-228'3" (do)	15.2	29.4	43.9	11.5	0.34	.
228'4"-230' (do)	17.0	31.2	41.2	10.6	0.26	.
230'2"-231'5" (do)	14.3	30.6	41.5	13.6	0.30	.
(b) In the adjoining workings						
232'1"-233'1"	10.1	27.2	44.1	18.6	.	8810
233'1"-234'1"	11.5	28.6	45.7	14.2	.	9140
234'1"-235'1"	11.7	28.3	47.2	12.8	.	9690
235'1"-236'1"	12.4	27.4	48.9	11.3	.	9800
236'1"-237'1"	12.2	26.2	48.0	13.6	.	9560
237'1"-238'1"	12.5	25.4	48.5	13.6	.	9540
238'1"-239'1"	13.1	27.3	48.0	11.6	.	9650
239'1"-239'9"	12.6	29.6	41.7	16.1	.	8910

For further analyses of coal in the vicinity of Lane's Shaft see No. 2 Bore.

Structure

Dip in the centre of the workings less than 2° to the SW; locally in the south-western part up to 5° to the SW.

Workings

Only section between 232' and 239'9" is generally worked. Lane's Shaft is used as upcast, the Inclined Shaft which met the coal approx. 250 ft NE of Lane's Shaft as downcast.

Production

Lane's Colliery has been in production from 1917 until about 1920(?) and since 1934 intermittently until present (June, 1949).

Production up to June, 1942, allegedly 6,000 tons (information from local residents), production July, 1943, until December, 1948, about 5,000 tons.

Output in April, 1949 : 200-250 tons per week.

Remarks

In the vicinity of Lane's Shaft the coal has also been intersected by an Inclined Shaft, Lane's Bore, and No. 2 Bore.

Inclined Shaft at Lane's Colliery
(plates 6 and 7)

Situation — Por. 16, Par. Gunambil.
Collar of the Inclined Shaft approx. 310 ft WNW of Lane's Shaft.
Surface RL 497 ft.

Date of Sinking — Finished in 1947(?).

Dimensions — Approx. 550 ft long; on an average 6 ft high and 7 ft wide.

Geological Log

Vertical depth		
0	- 9'3"	Coarse and medium-grained sandstones
9'3"	- 10'3"	Clayey sandstone
10'3"	- 13'6"	Sandy clay with layers of coarse sandstone
13'6"	- 30'1"	Coarse and medium-grained sandstones
30'1"	- 37'10"	Clay with coarse sand grains
37'10"	- 50'2"	Coarse and medium-grained sandstones
50'2"	- 56'5"	Pure clay
56'5"	- 60'2"	Sandstone with one thin clay layer
60'2"	- 60'8"	Clay
60'8"	- 61'11"	Sandstone
61'11"	- 65'5"	Very sandy clay
65'5"	- 88'3"	Medium-grained and coarse sandstones
88'3"	- 90'6"	Clay with lenses and layers of sand
90'6"	- 93'5"	Medium-grained and coarse sandstones
93'5"	- 94'6"	Clay with lenses of sand
94'6"	- 96'6"	Medium-grained and coarse sandstones
96'6"	-102'8"	Sandy clay
102'8"	-104'3"	Medium-grained and coarse sandstones
104'3"	-109'1"	Clay
109'1"	-116'3"	Coarse and medium-grained sandstones
116'3"	-129'	Sandy clay with lenses and layers of sand in the upper part
129'	-131'5"	Medium-grained sandstone
131'5"	-136'	Medium-grained and coarse sandstones becoming conglomeratic towards the base
136'	-140'4"	Coarse sandstones with layer of fine-grained sandstone at the top
140'4"	-143'4"	Coarse sandstone with conglomeratic layers
143'4"	-146'7"	Medium-grained and coarse sandstones
146'7"	-149'	Coarse sandstone and conglomeratic layers
149'	-153'1"	Clayey sandstone
153'1"	-154'1"	Sandstone with conglomeratic layers
154'1"	-154'10"	Medium-grained and coarse sandstones
154'10"	-157'9"	Coarse sandstone and conglomeratic layers
157'9"	-157'11"	Sandy clay
157'11"	-168'	Coarse and medium-grained sandstones with quartz and sandstone pebbles near the base
168'	-171'2"	Fine-grained sandstone
171'2"	-176'7"	Medium-grained and coarse sandstones
176'7"	-182'6"	Medium-grained and coarse sandstones with some pebbles in the middle part
182'6"	-190'11"	Medium-grained and coarse sandstones with conglomeratic beds and patches of clay in the middle part
190'11"	-194'11"	Fine-grained clayey sandstone with conglomeratic lenses in the middle part
194'11"	-195'3"	Unconsolidated sand
195'3"	-199'1"	Coarse and medium-grained sandstones with lenses of brown clay
199'1"	-202'4"	Coarse and medium-grained sandstones
202'4"	-203'	Brown clay

/see over

203'	- 207'1"	Coarse and medium-grained sandstones with several layers and lenses of brown clay
207'1"	- 207'6"	Brown clay
207'6"	- 209'2"	Coarse and medium-grained sandstones
209'2"	- 211'6"	Brown clay with some sandy layers
211'6"	- 212'1"	Unconsolidated fine-grained sand
212'1"	- 214'7"	Very sandy brown clay
214'7"	- 215'1"	Fine-grained loose sand
215'1"	- 215'10"	Brown clay
215'10"	- 216'5"	Conglomerates and sandstone
216'5"		Base of Tertiary
216'5"	- 236'9"+	20 ft 4 in.+ coal with shale layers.

All Tertiary beds are of white colour if not shown to the contrary. Cross-bedding is found in most of the Tertiary sandstones.

Water

No water struck, probably drained by the workings before the shaft was sunk.

Log of coal-bearing beds

Vertical depth	Thickness	Type of material
216'5"		
	2½"	Friable lignite
216'7½"		
	2'1½"	Durain
218'9"		
	1/10"	Shale
218'9 1/10"		
	7 9/10"	Durain
219'5"		
	½"	Durain and vitrain bands
219'5½"		
	1/10"	Shale
219'5 6/10"		
	4 4/10"	Durain and vitrain bands
219'10"		
	1/10"	Shale
219'10 1/10"		
	9/10"	Shaly coal
219'11"		
	1½"	Shale
220'½"		
	3"	Durain with vitrain bands in the lower part
220'3½"		
	1/10"	Shale (in parts)
220'3 6/10"		
	7 4/10"	Durain
220'11"		
	4"	Vitrain with durain bands
221'3"		
	½"	Shale (in parts)
221'3½"		
	3½"	Shaly durain and vitrain
221'7"		
	¾"	Shale (in parts)
221'7¾"		
	8½"	Durain with some vitrain bands
222'4"		
	1/10"	Shale (in parts)
222'4 1/10"		
	10 9/10"	Durain

/see over

223'3"		
	1"	Vitrain and durain bands
223'4"		
	9"	Durain
224'1"		
	1"	Durain and vitrain bands
224'2"		
	1/10"	Shale
224'2 1/10"		
	4/10"	Durain and vitrain bands
224'2½"		
	8½"	Durain
224'11"		
	5"	Vitrain with durain bands
225'4"		
	¼"	Shale
225'4¼"		
	6¾"	Durain with some vitrain bands
225'11"		
	2"	Shaly coal
226'1"		
	¾"	Shale (irregular layer)
226'1¾"		
	6¼"	Durain
226'8"		
	1"	Durain with vitrain bands
226'9"		
	6"	Durain
227'3"		
	2"	Durain with vitrain bands
227'5"		
	1'3"	Durain
228'8"		
	¾"	Shale
228'8¾"		
	1"	Durain and vitrain bands
228'9¾"		
	2¼"	Durain
229'		
	1"	Vitrain with durain bands
229'1"		
	¼"	Shale
229'1¼"		
	1'5"	Durain
230'6¼"		
	2¾"	Durain with vitrain bands
230'9"		
	1/10"	Shale
230'9 1/10"		
	3 4/10"	Durain
231' ½"		
	3½"	Durain and vitrain bands
231'4"		
	1/10"	Shale (in parts)
231'4 1/10"		
	9/10"	Vitrain and durain bands
231'5"		
	8"	Durain
232'1"		
	2½"	Durain with some vitrain bands
232'3½"		
	1/10"	Shale (in parts)
232'3 6/10"		
	6 9/10"	Durain with vitrain bands near the top
232'10½"		
	1"	Vitrain with durain bands

/ seeover

	232'11½"		
		11"	Durain
	233'10½"		
		4½"	Durain with some vitrain bands
	234'3"		
		1/10"	Shale (in parts)
	234'3 1/10"		
		1'7 9/10"	Durain
	235'11"		
		1"	Durain with some vitrain bands
	236'		
		1/10"	Shale (only in the south-western workings)
	236' 1/10"		
		3/10"	Vitrain with some durain bands
	236' 4/10"		
		4 6/10"	Durain
	236'5"		
		4"	Durain with vitrain bands
	236'9"		
		approx. ¼"	Shale
approx.	236'9¼"		
		approx. 8'2¾"	Coal with some shales
approx.	245'		

The log from 216'5" to 228'8" depth has been taken in the Inclined Shaft itself; the log from 228'8" to 236'9" represents the average log of the coal-bearing strata as taken on four different localities in the workings of Lane's Colliery.

All shale layers are soft when wet and of a fawn colour.

Remarks

The Inclined Shaft connects Lane's Colliery, which was formerly worked from Lane's Shaft, with the surface. For details of workings and production see Lane's Shaft.

No. 2 (or Coorabin) Shaft

Situation — Por. 131, Par. Clear Hill.
Approx. 800 ft E of Coorabin railway station.
0.5 mi. NW of Lane's Shaft.
Surface RL 452 ft.

Date of Sinking — 1920 (?)

Dimensions — Single 14 x 7 ft vertical shaft, 220 ft deep; a winze continues down to 269 ft.

Geological log

0 - 190'	Mainly coarse sandstones
168'	Aquifer
190'	Base of Tertiary (?)
190' - 227'	37 ft coal, coaly beds and partings
227' - 269'	Mainly mudstones
269'	Aquifer.

Water

Above coal - at 168', 2500 gal. per hour of saline water.
Below coal - at 269'.

Production

Probably only worked in 1920(?) and then abandoned; total production allegedly 1,100 tons (information from local residents).

Remarks

The coal was probably of poor quality, as indicated by the results of Bore F situated nearby.

The coal seam near No. 2 Shaft has also been intersected by No. 1 Bore.

Carbery Shafts

Situation — Por. 133, Par. Clear Hill.
Approx. 1 mi. S of No. 2 Shaft.
Surface RL 443 ft.

Date of sinking — 1922-1925.

Dimensions — A pair of 14 x 7 ft vertical shafts 174 ft apart; the SW Shaft 190 ft (?) deep.

Geological log

0 - 190'	Mainly sandstones and clays (?)
160'	Aquifer
186'	Aquifer
190'(?)	Top of coal-bearing beds and base of Tertiary (?).

Water

Above coal - at 160', 16,000 gal. per hour
at 186', 4 ft above coal, 53,000 gal. per hour (?). allegedly saline and sulphurous.

Remarks

The SW Shaft probably struck the top of the coal, but had to be abandoned due to an excessive inflow of water.

Shaft in Portion 27, Parish of Gunambil

Situation — 405 ft SSE of NW corner of Por. 27, Par. Gunambil.
Approx. 1.55 mi. ENE of Lane's Shaft.
Surface RL 447 ft.

Date of sinking — (?)

Dimensions — Single 7 ft x 3 ft 7 in. vertical shaft, 160 ft (?) deep.

Geological log

0 - 160'	Sandstones.

Water

No water in the shaft.

Remarks

Shaft abandoned without reaching coal.

Clear Hill Vertical Shaft

Situation	SE corner of Por. 112, Par. Clear Hill. Approx. 1.05 mi. WNW of Oaklands-Urana railway line. Surface RL 483 ft.
Date of sinking	Finished in 1928.
Dimensions	Single 9 x 6 ft vertical shaft, approx. 200 ft deep.

Geological log

0 - 195'(?)	Mainly sandstones
195' (?)	Base of Tertiary (?)
195' - 202'(?)	7 ft coal-bearing beds.

Water

Depth to water level in the shaft 195' (RL 288 ft).

Coal-bearing beds

7 ft thick; thickness of workable coal thinning to 4 ft to the N and to 2 ft to the W, because of intercalations of mudstone (?).

Production

The shaft was abandoned in 1929(?) due to the insufficient thickness of the workable coal.

Production in 1929(?) allegedly 200 tons (information from local residents).

Clear Hill Inclined Shaft

Situation	Por. 112, Par. Clear Hill. Approx. 1.1 mi. WNW of Oaklands-Urana railway line. Head of Clear Hill Inclined Shaft approx. 650 ft N of Vertical Shaft. Surface RL 464 ft (?).
Date of sinking	Between 1928 and 1935.
Dimensions	Inclined shaft on a grade of 1 in 2 downwards in southern direction, at least 300 ft long.
Coal-bearing beds	Only 2 ft of coal struck.

Gunambil Shaft
(plate 9)

Situation — Por. 14, Par. Gunambil.
Approx. 1 mi. N of Lane's Shaft.
Surface RL 410 ft (?).

Date of sinking — 1934.

Dimensions — Single 6 ft 6 in. x 4 ft vertical shaft, 154 ft 6 in. (?) deep.

Geological log

0 - approx. 115'	Sandstones and clays
approx. 115'	Base of Tertiary (?)
approx. 115' - 128'	Shale with occasional coal layers
128' - 136' (?)	Mudstone
136'(?)-151'2" (?)	15 ft 2 in.(?) coal with sandstone and shale layers
151'2"(?)-154'6"(?)	Mudstone.

Water

Above coal - no water.
Below coal - water in an augur hole in mudstone, 7 ft. below the bottom of the coal.
Depth to water level in the shaft - 122' (RL 288 ft).

Log of coal-bearing beds

Depth below collar	Thickness	Type of Material.
136'(?)		
	1'3"	Coal
137'3"(?)		
	3'6"	Sandstone
140'9"(?)		
	2'6"	Coal
143'3"(?)		
	2'11"	Black shale
146'2"(?)		
	½"	Mudstone layer
146'2½"(?)		
	11½"	Black shale
147'2"(?)		
	7½"	Coal
147'9½"(?)		
	½"	Layer
147'10"(?)		
	3'4"	Coal
151'2"(?)		

Analyses

	Hygroscopic Moisture %	Volatile Matter %	Fixed Carbon %	Ash %
140'9" - 143'3"(?)	15.6	26.9	43.5	14.0
147'2" - 151'2"(?)	14.8	25.4	40.7	19.1.

Structure

To the E coal rises 1 in 60, to the N coal practically flat.

Workings

Only 4 ft of coal at the base of the coal-bearing beds worked in 1934.

Production

Worked intermittently 1934-1937, closing down in 1937 probably due to inferior quality of coal.

Total production allegedly 4,000 tons (information from local residents).

Lane's Bore

Situation	Por. 16, Par. Gunambil. On the site of the later Lane's Shaft. Surface RL 495 ft.
Date of drilling	1915.
Total depth	(?)
Coal-bearing beds	Top of coal at 220 ft. Allegedly 50 ft coal down to 270 ft.
Remarks	This bore put down for water, was the first in which coal was found.

No. 1 Bore

Situation — 65 ft S 15° W from No. 2 Shaft.
Surface RL 452 ft (?).

Date of drilling — 1920.

Total depth — 456 ft.

Geological log

0 - 190'	Mainly coarse sandstones
190'	Base of Tertiary (?)
190' - 227'	37 ft coal and coaly shales
227' - 456'	Coarse sandstones, passing into mudstones with depth.

No. 2 Bore
(plate 11)

Situation — Por. 16, Par. Gunambil.
Close to Lane's Shaft.
Surface RL 495 ft (?).

Date of drilling — 1920.

Total Depth — 304 ft.

Geological log

0 - 217'	Mainly coarse sandstones with layers of clay
217'	Base of Tertiary (?)
217' - 245'2"	28 ft 2 in. coal with shale layers and partings
245'2" - 254'2"	9 ft. highly carbonaceous mudstones
254'2" - 304'	Mudstones

Log of coal-bearing beds

Depth below collar	Thickness	Type of material.
217'		
	1'	Coal
218'		Parting
	2'2"	Coal
220'2"		
	½"	Shale layer
220'2½"		
	9"	Coal
220'11½"		
	2"	Shale layer
221'1½"		
	2'6"	Coal
223'7½"		
	½"	Shale layer
223'8"		
	1'9"	Coal
225'5"		Parting
	10"	Coal
226'3"		Parting
	3'	Coal
229'3"		Parting
	1'	Coal
230'3"		Parting
	1'	Coal
231'3"		
	1"	Shale layer
231'4"		
	6'	Coal
237'4"		
	4"	Shale layer
237'8"		
	7'6"	Coal
245'2"		
	9'	Highly carbonaceous mudstones
254'2"		

Analyses

	Hygroscopic Moisture %	Volatile Matter %	Fixed Carbon %	Ash %
217' - 230'3" (excl. of shale layers)	12.9	26.7	46.4	14.0
231'4" - 237'4"	10.1	25.0	41.3	23.6
237'8" - 245'2"	10.7	25.9	47.0	16.4
245'2" - 254'2"	5.6	11.9	21.3	61.2

No. 3 Bore
(plate 9)

Situation — Por. 410, Par. Gunambil.
Approx. 1.4 mi. N 10°E from Lane's Shaft
Surface RL 410 ft.

Date of drilling — 1920.

Total depth — 326 ft.

Geological log

0 - 182'	Coarse sandstones with clay beds
182'	Base of Tertiary (?)
182' - 190'3"	8 ft 3 in. coal
190'3" - 192'9"	2 ft 6 in. coaly beds
192'9" - 326'	Mainly mudstones

Log of coal-bearing beds

Depth below collar	Thickness	Type of material
182'		
	8'3"	Coal
190'3"		
	2'6"	Coaly beds
192'9".		

Analysis

	Hygroscopic Moisture	Volatile Matter	Fixed Carbon	Ash
	%	%	%	%
182'-192'9"(?)	9.1	20.9	40.5	29.5

No. 4 Bore
(plate 14)

Situation — Near SW corner of Por. 31, Gunambil
Surface RL 418 ft.

Date of drilling — 1920.

Total depth — 350 ft (?)

Geological log

0	- 175'	White clays with sandstone beds
175'	- 175'6"	Clay with coal layers (?)
175'6"	- 265'	Coarse sandstones with clay beds
265'		Base of Tertiary (?)
265'	- 266'3"	1 ft 3 in. coaly bed
266'3"	- 302'3"	36 ft coal with carbonaceous shale bed and partings
302'3"	- 350'(?)	Mudstones

Log of coal-bearing beds

Depth below collar	Thickness	Type of material.
265'		
	1'3"	Coaly bed
266'3"		
	11'3"	Coal
277'6"		Parting
	5'	Coal
282'6"		
	3"	Shale layer
282'9"		
	12'6"	Coal
295'3"		
	1'	Carbonaceous shale
296'3"		
	6'	Coal
302'3"		

Analyses

	Hygroscopic % Moisture	% Volatile Matter	Fixed % Carbon	% Ash	% Sulphur in coal	B.T.U. per lb.
266'3" - 282'6" (excl. of shale layer)	11.7	27.1	47.4	13.8	0.25	10250
282'9" - 295'3"	12.6	23.9	48.5	15.0	0.21	9766
296'3" - 302'3"	11.5	24.8	50.0	15.7	0.22	9379

No. 5 Bore
(plate 15)

Situation — Near the N boundary of Por. 31, Par. Clear Hill.
Surface RL 412 ft.

Date of drilling — 1920.

Total depth — 556 ft 10 in.

Geological log

0	- approx.	364'	Coarse sandstones and clay beds
approx. 364'	- approx.	447'	Mostly white clays (?)
approx. 447'			Base of Tertiary (?)
approx. 447'	- approx.	491'	Blue shales (?)
" 491'	- "	529'	Sandstones (?)
" 529'	-	531' 6"	Shale
531' 6"	-	556' 10"	25 ft 4 in. + coal with shale layers.

Log of coal-bearing beds

Depth below collar	Thickness	Type of material.
531' 6"		
	2' 5"	Coal
536' 11"		
	2"	Sandy parting
534' 1"		
	4"	Coal
534' 5"		Parting
	2' 1"	Coal
536' 6"		
	1"	Shale layer
536' 7"		
	6' 9"	Coal
543' 4"		Shale layer
	8' 3"	Coal
551' 7"		Parting
	4' 6"	Coal
556' 1"		
	1¼"	Sandy parting
556' 2½"		
	7½"	Coal
556' 10"		

Analyses

	Hygroscopic Moisture %	Volatile Matter %	Fixed Carbon %	Ash %	Sulphur in coal %	B.T.U. per lb.
531' 6" - 536' 7" (excl. cf layers)	11.2	21.6	43.8	23.4		
536' 7" - 543' 4"	11.3	25.3	49.8	13.6	0.13	10056
543' 4" - 551' 7"	13.5	25.6	48.7	12.2	0.19	10346
551' 7" - 556' 9" (incl. cf layers)	12.7	28.4	45.7	13.2	0.27	10250

Remarks

No. 5 Bore was abandoned when still in coal-bearing strata.

Bore A
(plate 10)

Situation — Por. 43, Par. Gunambil.
2381 ft E of Lane's Shaft.
Surface RL 454 ft.

Date of drilling — 1942.

Total depth — 300 ft.

Geological log

0 - 125'	Clayey sandstones with clays
125' - 130'	Conglomeratic sandstone
130' - 178'	Sandstones
178' - 179'	Clay
179' - 182'	Sandstone with pebbles, aquifer
182'	Base of Tertiary (?)
182' - 192'	10 ft lignite
192' - 200'5"	8 ft 5 in. coal with shale layers
200'5"-216'	15 ft 7 in. shales and mudstones with coaly layers and 2 lignite beds
216' - 221'	Fine-grained sandstone, aquifer
221' - 223'	Sandy shale
223' - 227'	Sandstone
227' - 230'	Mudstone
230' - 232'	Sandstone, aquifer
232' - 255'	Sandstone
255' - 300'	Mudstone.

Water

Above coal - at 179', 270 gal. per hour.
Below coal - at 216', more than 500 gal. per hour
at 230'.

All three aquifers yielded brackish water rising to 171' (RL 283 ft).

Log of coal-bearing beds

Depth below collar	Thickness	Type of material
182'		
	10'	Lignite
192'		
	8'5"	Coal with shale layers
200'5"		
	5'7"	Mudstones with thin coal layers
approx. 206'		
	approx. 2'	Shale
" 208'		
	" 8"	Lignite
" 208'8"		
	" 2'4"	Shale
" 211'		
	" 1'3"	Lignite
" 212'3"		
	" 3'9"	Shale
216'		

Analyses

	Hygroscopic Moisture	Volatile Matter	Fixed Carbon	Ash
	%	%	%	%
185' - 187' 6"	18.6	22.8	26.3	32.3
187' 6" - 189'	19.3	22.8	26.4	31.5
189' - 191'	19.2	22.3	27.0	31.5
191' - 192'	18.0	23.1	26.7	32.2
192' - 194'	20.7	23.5	32.9	22.9
195' 4" - 196'	16.5	24.6	37.2	21.7
196' - 197'	8.4	14.1	21.7	55.8
197' - 198' 3"	14.8	24.9	44.6	15.7
198' 3" - 199' 6"	9.4	16.3	28.6	45.7
199' 6" - 201'	5.3	9.0	14.1	71.6

Bore C
(plate 10)

Situation — Por. 43, Par. Gunambil.
Approx. 800 ft N of SE corner of Por. 16 and less than 65 ft E of the W boundary of Por. 43.
Approx. 1300 ft E of Lane's Shaft.
Surface RL 476 ft.

Date of drilling — 1942.

Total depth — 245 ft (?)

Geological log

0	-	120'	Clayey sandstones with beds of clay
120'	-	approx.134'	Clayey sandstone with pebbles
approx.134'	-	206'	Clayey sandstone
206'	-	208'	Coarse sandstone with pebbles and some clay
208'			Base of Tertiary (?)
208'	-	217'	9 ft lignite with shales
217'	-	223'	6 ft coal with thick shale beds
223'	-	228'	5 ft shale with thin coal layers at the top
228'	-	230'	2 ft coal with shales
230'	-	231'	1 ft coarse sandstone, aquifer
231'	-	233'6"	2 ft 6 in. shale with coal layers
233'6"	-	235'3"	Shale and mudstone
235'3"	-	238'	Fine-grained sandstone, aquifer
238'	-	238'3"	Mudstone
238'3"	-	245' (?)	Fine-grained sandstone, aquifer.

Water

Above coal - no water (probably drained from Lane's Colliery).
Below coal - at 230', approx. 20 gal. per hour
at 235'3", approx. 90 gal. per hour
at 238'3", more than 480 gal. per hour.

Log of coal-bearing beds

Depth below collar	Thickness	Type of material
208'		
	4'	Lignite with ?
212'		
	4'	Lignite with shale bed in the middle
216'		
	1"	Lignite and mudstones
217'		
	1'6"	Lignitic coal with mudstone and thin coal layers
218'6"		
	1'	Shale
219'6"		
	1'	Coal with mudstone especially in the lower part
220'6"		
	1'6"	Shale
222'		
	1'	Shale and coal
223'		
	5'	Shales with a few thin coal layers in the upper part
228'		
	2'	Coal with shales

/ see over

230'		
	1'	Clayey coarse sandstone
231'		
	2'6"	Shale with coal layers, especially in the lower part
233'6"		

Analyses

	Hygroscopic Moisture	Volatile Matter	Fixed Carbon	Ash
	%	%	%	%
208' - 212'	10.4	23.0	21.7	44.9
212' - 216'	12.2	24.7	28.0	35.1
217' - 218'6"	13.7	26.7	41.0	18.6
219'6" - 220'6"	10.3	28.6	42.6	18.5
222' - 223'	8.3	22.0	36.8	32.9
228' - 230'	9.5	26.4	42.6	21.5

Bore D
(plate 14)

Situation — Por. 82, Par. Clear Hill.
3,500 ft S of N boundary and 2,300 ft W of E boundary of Por. 82.
Surface RL 460 ft.

Date of drilling — 1942.

Total depth — 380 ft.

Geological log

0	- 195'	Clayey sandstones with clay beds
195'	- 210'	Sandstone with pebbles, aquifer
210'	- 267'	Clayey sandstone
267'	- 281'	Clay and sandstone with pebbles
281'		Base of Tertiary (?)
281'	- 290'	9 ft coal and coaly shales
290'	- 314'6"	24 ft 6 in. shales and mudstones with layers of carbonaceous shales and plant remains
314'6"	-334'	19 ft 6 in. coal with shale layers
334'	-336'	2 ft sandy shale
336'	- 344'	8 ft coal with shale layers
344'	- 360'	Shale with some plant fragments
360'	- 367'	Sandstone, aquifer
367'	- 380'	Shale.

Water

Above coal - at 195', more than 650 gal. per hour, rising to 177'6" (RL 282.5 ft), 7,410 parts Cl per million (12,200 parts NaCl).

Below coal - at 360', more than 600 gal. per hour, 7,900 parts Cl per million (13,000 parts NaCl).

Log of coal-bearing beds

Depth below collar	Thickness	Type of material.
281'		
	6'	Coaly shales and coal
287'		
	0'6"	Shale
287'6"		
	2'6"	Coal with coaly shale
290'		
	22'5"	Shales and mudstones with layers of carbonaceous shale and plant remains
312'3"		
	9"	Coaly shale
313'		
	1'6"	Shale
314'6"		
	9'4"	Coaly shales and coal
323'10"		
	4"	Sandstone
324'2"		
	10"	Coaly shales and coal
325'		
	2'	Carbonaceous shales with coal layers

/see over

327'		
333'	6'	Coaly shales and coal
334'	1'	Sandy shale with some coal
336'	2'	Sandy shale
	3'	Layers of shale, sandstone and coal
339'		
339'3"	3"	Shale and sandstone
	3'9"	Coal and carbonaceous shales
343'	3"	Sandstone
343'3"	9"	Coal and carbonaceous shales
344'		

Analyses

	Hygroscopic Moisture	Volatile Matter	Fixed Carbon	Ash	B.T.U. per lb.
	%	%	%	%	
281' - 283'	6.8	17.1	31.7	44.4	6120
283' - 287'	6.5	17.5	26.9	49.1	5410
287'6" - 290'	7.8	23.3	35.1	33.8	7310
514'6" - 318'	7.4	16.4	30.7	45.5	.
318' - 320'	6.1	15.9	23.7	54.3	.
320' - 323'	6.7	14.9	28.1	50.3	.
323' - 325'	4.7	12.2	21.7	61.4	.
325' - 327'	4.8	11.9	19.5	63.8	.
327' - 329'	8.0	18.2	34.0	39.8	.
329' - 330'6"	6.4	14.2	25.3	54.1	.
330'6" - 333'	4.9	14.2	22.4	58.5	.
333' - 333'10"	2.9	9.1	13.0	75.0	.
336' - 339'	2.4	8.9	11.6	77.1	.
339'3" - 344'(?)	5.4	16.8	24.5	53.3	.

Bore E
(plate 13)

Situation — Por. 82, Par. Clear Hill.
Approx. 66 ft S of N boundary and approx. 2,240 ft W of E boundary of Por. 82.
Surface RL 458 ft.

Date of drilling — 1942-1943.

Total depth — 352 ft.

Geological log

0	- 216'	Clayey, mainly coarse sandstones with some clay beds
approx. 172'	- 174'	Aquifer within clayey coarse sandstone
216'	- 228'	Coarse sandstone
217'		Aquifer
228'	- 281'	Clayey sandstone
281'	- 283'6"	Pebbly sandstone with coaly streaks
283'6"		Base of Tertiary (?)
283'6"	- 338'6"	55 ft coal with some shale beds
338'6"	- 345'	6 ft 6 in. carbonaceous shales with coal streaks and plant remains
345'	- 352'	Sandy mudstone.

Water

Above coal - at approx. 172'-174', 40(?) gal. per hour, rising to 168'3" (RL 289.6 ft), 2,500 parts Cl per million (4,200 parts NaCl).
at 217', more than 600 (?) gal. per hour, rising to 150' (RL 308 ft), 6,700 parts Cl per million (11,000 parts NaCl).

Below coal - no water struck.

Log of coal-bearing beds

Depth below collar	Thickness	Type of material.
283'6"(?)		
	7'6"(?)	Shaly coal (?)
291'		
	1'3"	Coal
292'3"		
	3"	Shale
292'6"		
	8'10"	Coal
301'4"		
	2'2"	Shaly coal
303'6"		
	5'	Coal
308'6"		
	1'9"	Shale with some coal
310'3"		
	5'9"	Coal
316'		
	1'4"	Coal, somewhat shaly
317'4"		
	4'8"	Coal
322'		
	2'	Mostly carbonaceous shale (?)

/see over

324'		
	6'3"	Coal
330'3"		
	2'	Carbonaceous shale
332'3"		
	1'6"	Coal
333'9"		
	½"	Shale
333'9½"		
	2'2½"	Coal
336'		
	1'6"	Carbonaceous shale with coal layers
337'6"		
	1'	Coal, partly shaly
338'6"		
	6'6"	Carbonaceous shale with coal streaks and plant remains
345'.		

Analyses

	Hygroscopic Moisture %	Volatile Matter %	Fixed Carbon %	Ash %	B.T.U. per lb.
283'6" - 291' (only selected pieces)	7.6	26.6	45.8	20.0	9130
291' - 292'3"	7.4	23.7	48.7	20.2	9010
292'6" - 295'	8.0	27.2	53.5	11.3	10160
295' - 298'	8.1	27.8	54.6	9.5	10650
298' - 301'4"	7.8	24.7	52.9	14.6	9870
301'4" - 303'6"	6.8	20.7	46.5	26.0	8120
303'6" - 305'6"	8.7	25.6	53.1	12.6	9950
305'6" - 308'6"	9.5	26.8	51.2	12.5	9890
310'3" - 312'	9.5	26.2	54.1	10.2	10270
312' - 314'	9.0	26.1	48.4	16.5	9520
314' - 316'	9.2	26.8	51.5	12.5	10050
316' - 317'4"	7.7	24.1	49.1	19.1	9290
317'4" - 320'6"	8.9	26.2	53.2	11.7	10250
320'6" - 322'	9.2	26.4	53.8	10.6	10280
324' - 327'6"	8.7	25.6	46.0	19.7	9790
327'6" - 330'3"	8.4	28.0	49.5	14.1	9970
332'3" - 333'9"	8.3	28.8	46.9	16.0	9820
333'9" - 336'	8.6	24.0	48.3	19.1	9210
336' - 337'6"	6.7	18.5	36.3	38.5	.
337'6" - 338'6"	7.5	25.6	43.8	25.1	8710.

Bore F
(plate 12)

Situation 209 ft N of No. 2 Shaft.
Surface RL 448 ft.

Date of drilling 1943.

Total depth 272 ft.

Geological log

0	- 124'	Sandy white clays and clayey sandstones
124'	- 133'6"	Pebbly sandstone
133'6"	- 178'	Sandstones and sand with some pebbles
168'	- 178'	Aquifer
178'	- 184'	Fine grained clayey sandstone
184'		Base of Tertiary (?)
184'	- 187'	3 ft lignitic mudstone (?)
187'	- 188'	1 ft lignite
188'	- 193'	5 ft shales with lignite layers and some coal
193'	- 198'	5 ft coal with shale layers
198'	- 216'	18 ft shales with coaly layers and two coal beds
216'	- 217'	1 ft impure coal
217'	- 224'	7 ft shales with coal layers and plant remains
224'	- 228'10"	4 ft 10 in. coal
228'10"	- 232'6"	3 ft 8 in. carbonaceous shale with coal
232'6"	- 238'6"	6 ft coal with shale layers
238'6"	- 245'	Shale
245'	- 270'	Mudstone grading downwards into sandstone
252'		Aquifer.

Water

Above coal - at 168'-178', 520(?) gal. per hour, 6,750 parts Cl per million (11,100 parts NaCl).

Below coal - at 252', more than 2,500 (?) gal. per hour, 7,100 parts Cl per million (11,700 parts NaCl).

Waters of both aquifers rose to approx. 164' (RL 284 ft).

Log of coal-bearing beds

Depth below collar	Thickness	Type of material
184'		
	3'	Lignitic mudstone (?)
187'		
	1'	Lignite with some quartz conglomerate
188'		
	4'	Clay and shales with some coal
192'		
	6"	Lignite with some coarse sandstone
192'6"		
	6"	Shale
193'		
	2'	Coal
195'		
	6"	Shale

/ see over

195'6"		
	2'6"	Coal
198'		
	3"	Shale with coaly layers
198'3"		
	3"	Coal
198'6"		
	1'9"	Shale with coaly layers
200'3"		
	3"	Coal
200'6"		
	2'	Shale with coaly layers, some carbonaceous shales in the lower part
202'6"		
	3"	Coal
202'9"		
	13'3"	Shales
216'		
	1'	Low grade coal
217'		
	7'	Shales with coaly layers and plant remains
224'		
	3'	Low grade coal
227'		
	1'10"	Coal
228'10"		
	2"	Shale
229'		
	3'6"	Carbonaceous shale and low grade coal
232'6"		
	4'2"	Coal
236'8"		
	4"	Shale and carbonaceous shale
237'		
	1'	Coal
238'		
	1"	Shale
238'1"		
	5"	Coal
238'6"		

Analyses

	Hygroscopic Moisture	Volatile Matter	Fixed Carbon	Ash
	%	%	%	%
193' - 195'	9.1	24.9	34.7	31.3
195'6" - 197'	6.5	24.7	45.4	23.4
197' - 197'6"	6.7	25.9	39.9	27.5
197'6" - 198'	6.2	26.8	42.5	24.5
216' - 217'	4.5	20.8	30.5	44.2
224' - 227'	5.6	17.4	34.8	42.2
227' - 228'10"	7.7	23.2	45.1	24.0
229' - 232'6"	5.8	16.0	27.5	50.7
232'6" - 235'	7.9	25.2	47.6	19.3
235' - 236'8"	8.3	21.1	43.0	27.6
237' - 238'6"	7.6	20.2	36.8	35.4

Bore G
(plate 12)

Situation — On a line joining Lane's Shaft and Bore E. 720 ft SSW of No. 2 Shaft. Surface RL 455 ft.

Date of drilling — 1943.

Total depth — 274 ft (?)

Geological log

0	- 127'	Coarse sandstone and white clay
127'	- 176'	Slightly clayey sandstone with quartz pebbles
176'	- 199'	Sandstones (?)
176'		Aquifer
199'	- 205'	Clayey sandstone
205'	- 213'	Coarse sandstone, lower part carbonaceous, aquifer
213'		Base of Tertiary (?)
213'	- 218'	5 ft carbonaceous mudstone (?)
218'	- 224'3"	6 ft 3 in. coal with carbonaceous shales
224'3"	- 260'3"	36 ft carbonaceous shales with mudstone beds
260'3"	- 261'	9 in. low grade coal
261'	- 265'	4 ft carbonaceous shale grading downwards into low grade coal
265'	- 267'	2 ft low grade coal
267'	- 270'3"	3 ft 3 in. coal
270'3"	- 272'	1 ft 9 in. very carbonaceous shale
272'	- 274'	Mostly sandstones.

Water

Above coal - at 176', 200 gal. per hour, 4,300 parts Cl per million (7,090 parts NaCl)
at 205'-213', more than 2,160 gal. per hour rising to 171'3" (RL 284 ft), 6,280 parts Cl per million (10,350 parts NaCl).

Below coal - no water struck.

Log of coal-bearing beds

Depth below collar	Thickness	Type of material
213'		
	5'	Carbonaceous mudstone (?) grading more carbonaceous towards the base
218'		
	1'	Carbonaceous shale
219'		
	5'3"	Coal with some carbonaceous shale
224'3"		
	4'9"	Carbonaceous shale
229'		
	12'10"	Shales and mudstones, in places slightly carbonaceous
241'10"		
	5"	Carbonaceous shale
242'3"		
	11'9"	Slightly carbonaceous shale
254'		
	2'	Carbonaceous shale
256'		
	4'	Slightly carbonaceous shale

/ see over

260'		
260'3"	3"	Mudstone
261'	9"	Low grade coal
265'	4'	Carbonaceous shale, grading downwards into low grade coal
267'	2'	Low grade coal
270'3"	3'3"	Coal
272'	1'9"	Very carbonaceous shale

Analyses

	Hygroscopic Moisture	Volatile Matter	Fixed Carbon	Ash
	%	%	%	%
219' - 221'	8.6	27.0	40.0	24.4
221' - 223'	6.1	25.6	40.6	25.7
223' - 224'3"	8.5	26.1	41.3	24.1
265' - 267'	7.9	16.8	30.8	44.5
267' - 270'3"	9.9	22.2	42.2	25.7

Bore H
(plate 13)

Situation — Por. 82, Par. Clear Hill.
On a line joining Lane's Shaft and Bore E.
Surface RL 447 ft.

Date of drilling — 1943.

Total depth — 326 ft, cored 216'-219' and 247'-326'.

Geological log

0	- 163'	Coarse sandstones and clays
163'	- 165'	Sandy shale
165'	- 174'	Sandstone, aquifer
174'	- 183'	Sandstone with quartz pebbles
183'	- 216'	Mostly coarse sandstone
216'		Base of Tertiary (?)
216'	- 219'	Multicoloured shales
219'	- 235'	Sandstone, aquifer
235'	- 246'	Sandy mudstone
246'	- 254'9"	8 ft 9 in. coal
254'9"	- 257'	2 ft 3 in. slightly carbonaceous mudstone
257'	- 260'9"	3 ft 9 in. coal
260'9"	- 294'	33 ft 3 in. mudstones, only slightly carbonaceous
294'	- 299'	5 ft coal, with mudstone layers in lower part
299'	- 301'	2 ft carbonaceous shale
301'	- 318'6"	17 ft 6 in. coal with mudstone layers
318'6"	- 325'	6 ft 6 in. carbonaceous mudstones with plant remains
325'	- 326'	Sandstone with mudstone.

Water

Above coal - at 165', 1,300 gal. per hour, 5,700 parts Cl per million (9,400 parts NaCl)
at 219', more than 2,400 gal. per hour, 5,700 parts Cl per million (9,400 parts NaCl)
Water of both aquifers rose to approx. 163' (?) (RL 284 ft).

Below coal - No water struck.

Log of coal-bearing beds

Depth below collar	Thickness	Type of material
246'		
	1'	Coal (?)
247'		
	7'9"	Coal
254'9"		
	2'3"	Slightly carbonaceous shale
257'		
	3'9"	Coal
260'9"		
	1'3"	Carbonaceous mudstone
262'		
	24'	Mudstone, very slightly carbonaceous
286'		
	1'	Carbonaceous shale
287'		
	6'	Mudstone, very slightly carbonaceous

/ see over

293'		
	1'	Carbonaceous mudstone
294'		
	3'	Coal
297'		
	2'	Coal and coaly mudstone (?)
299'		
	2'	Carbonaceous shale
301'		
	4'	Coal
305'		
	1'6"	Coaly with sandy and shaly layers
306'6"		
	5'6"	Coal with thin layers of very carbonaceous mudstone
312'		
	6'6"	Coal with shales
318'6"		
	6'6"	Carbonaceous mudstone becoming progressively less carbonaceous towards the base, with plant remains
325'		

Analyses

	Hygroscopic Moisture %	Volatile Matter %	Fixed Carbon %	Ash %	B.T.U per lb.
247' - 251'	9.1	23.8	40.3	26.8	.
251' - 254'9"	8.9	26.0	37.2	27.9	.
257' - 260'9"	8.9	21.0	38.5	31.6	.
294' - 297'	10.8	25.1	46.1	18.0	9020
297' - 299'	9.0	18.8	32.4	39.8	.
301' - 305'	11.0	25.7	43.5	19.8	8770
306'6" - 309'	9.4	21.2	36.5	32.9	.
309' - 312'	9.4	19.9	35.4	35.3	.
312' - 315'	7.4	19.5	25.2	47.9	.
315' - 318'6"	7.7	21.7	24.5	46.1	.

Bore J
(plate 15)

Situation — Por. 74, Par. Clear Hill.
30 ft N of S boundary of Por. 74 and 1,950 ft E of Oaklands-Urana railway track.
Surface RL 415 ft (?).

Date of drilling — 1943.

Total depth — 384 ft (?).

Geological log

0	- 142'	Mostly sandy clays
142'	- 154'	Coarse sandstone
154'		Aquifer
154'	- 227'	Mostly sandy clays with some clayey sandstone beds
227'	- 234'	Coarse sandstone with quartz pebbles, aquifer
234'	- 235'	Carbonaceous clay remnants
235'	- 301'	Clayey corase sandstones and sandy clays
301'		Base of Tertiary (?)
301'	- 306'	5 ft carbonaceous mudstones (?) with some sandstone, aquifer
306'	- 308'	2 ft carbonaceous mudstone (?)
308'	- 341'	33 ft coal with a few shaly layers
341'	- 342' 6"	1 ft 6 in. shale
342' 6"	- 359'	16 ft 6 in. coal with a few shaly layers
359'	- 360'	1 ft carbonaceous shale with coaly layers
360'	- 364'	Sandy shale
364'	- 374'	Sandstone
374'	- 384'	Sandy shale with Permian foraminifera

Water

Above coal - at 142', 960 gal. per hour, 5,780 parts Cl per million (9,530 parts NaCl)
at 227', more than 2,400 gal. per hour, 6,100 parts Cl per million (10,050 parts NaCl)
at 301', more than 2,400 gal. per hour, 6,100 parts Cl per milion (10,050 parts NaCl)
waters of all three aquifers rose to 133' (RL 282 ft).

Below coal - no water struck.

Log of coal-bearing beds

Depth below collar	Thickness	Type of Material
301'		
	5'	Carbonaceous mudstones (?) with some sandstone, aquifer
306'		
	2'	Carbonaceous mudstone (?)
308'		
	4"	Coal
308' 4"		
	8"	Shale with fusain
309'		
	1'	Very carbonaceous shale
310'		
	4"	Coal
310' 4"		
	4"	Very carbonaceous shale

/ see over

310' 8"		
	7' 4"	Coal
318'		
	½"	Shaly coal
318' ½"		
	4' 7½"	Coal
322' 8"		
	4"	Shale
323'		
	2"	Carbonaceous mudstone (?)
323' 2"		
	12'	Coal
335' 2"		
	2"	Carbonaceous sandy mudstone (?)
335' 4"		
	5' 8"	Low grade coal
341'		
	1' 6"	Shale
342' 6"		
	6'	Coal with shaly layers
348' 6"		
	7' 6"	Coal
356'		
	3'	Slightly lower grade coal
359'		
	1'	Carbonaceous shale with coaly layers
360'		

Analyses

	Hygroscopic Moisture	Volatile Matter	Fixed Carbon	Ash		B.T.U. per lb.
	%	%	%	%		
308' - 308' 4"	11.1	28.5	47.0	13.4		9660
310' - 310' 4"	11.3	31.4	45.2	12.1	approx.	9760
310' 8" - 312'	13.0	29.0	46.7	11.3	"	9760
312' - 312' 6"	10.9	27.2	47.4	14.5	"	9690
312' 6" - 314' 6"	11.0	27.6	49.1	12.3	"	9990
314' 6" - 315'	13.0	28.6	43.2	15.2		9350
315' - 316'	11.1	28.5	48.1	12.3	approx.	9920
316' - 318'	11.6	27.4	47.3	13.7	"	9700
318' ½" - 319'	10.1	30.0	44.8	15.1	"	9570
319' - 320' 6"	11.7	25.5	49.5	13.3	"	9850
320' 6" - 322'	11.5	26.3	50.1	12.1	"	10010
322' - 322' 8"	10.4	28.4	46.9	14.3		9600
323' 2" - 324'	11.9	27.4	50.4	10.3	approx.	10160
324' - 326'	12.3	27.5	50.7	9.5		10110
326' - 328'	12.1	26.0	50.2	11.7	approx.	10000
328' - 330' 6"	13.2	24.1	51.2	11.5	"	9970
330' 6" - 333'	12.9	25.5	48.9	12.7	"	9760
333' - 334'	11.6	24.7	48.8	14.9		9340
334' - 335' 2"	12.3	25.9	49.6	12.2	approx.	9900
335' 4" - 337'	11.7	23.7	49.2	15.4	"	9630
337' - 338'	10.1	21.6	43.7	24.6		8210
338' - 341'	11.8	21.8	45.7	20.7	approx.	8930
342' 6" - 344'	11.9	28.0	43.3	16.8	"	9150
344' - 346'	12.0	25.3	45.6	17.1		9180
346' - 348' 6" (1" omitted)	14.3	28.6	44.5	12.6	approx.	9390
348' 6" - 351'	12.9	28.0	46.8	12.3	"	9680
351' - 353'	12.0	27.9	46.8	13.3	"	9670
353' - 355'	13.6	28.1	47.0	11.3	"	9720
355' - 357'	12.3	26.6	48.2	12.9	"	9760
357' - 359'	12.6	31.0	41.7	14.7		9520

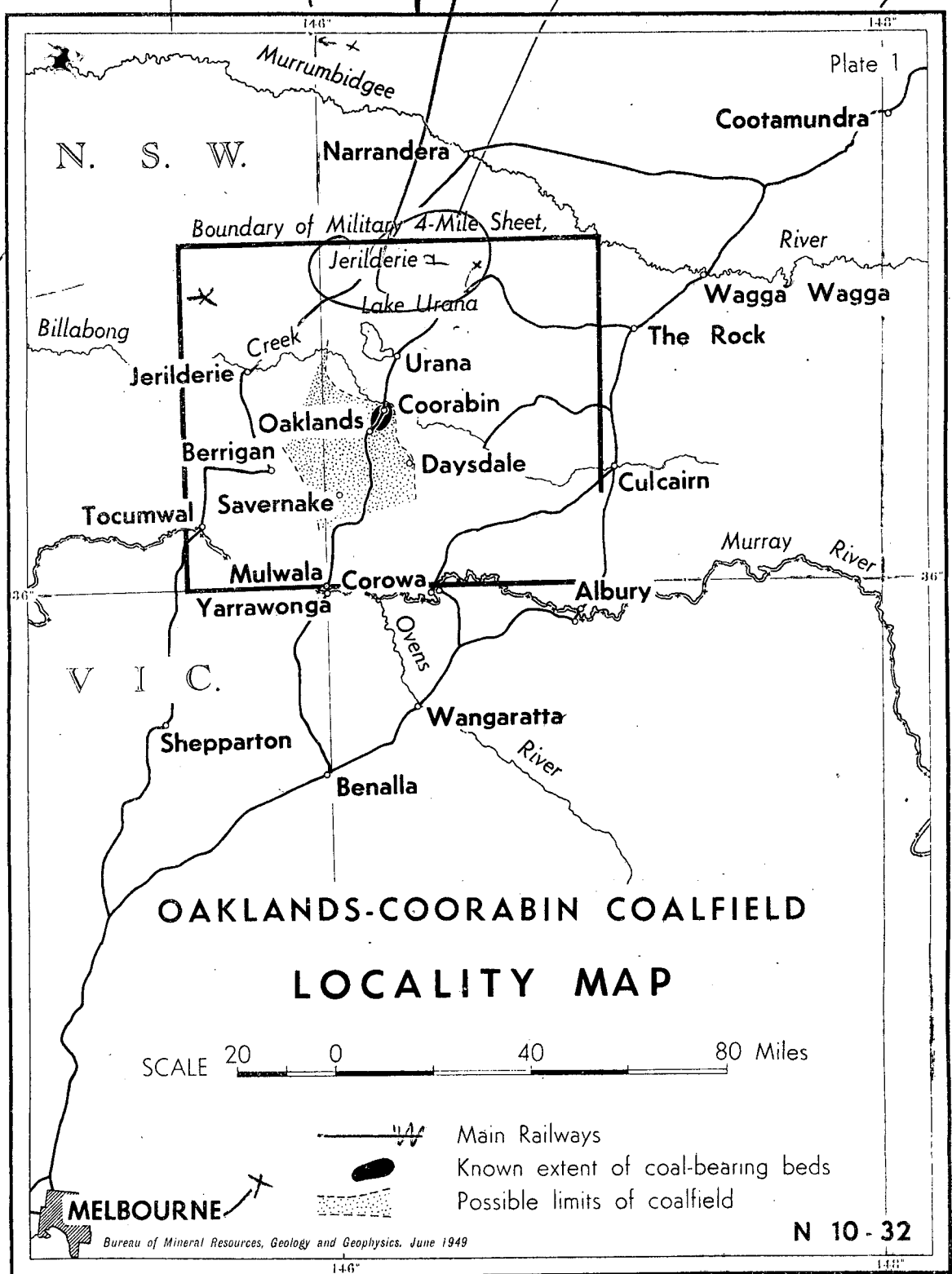


Plate 1
Murrumbidgee
N. S. W.
Narrandera
Cootamundra
Boundary of Military 4-Mile Sheet,
Jerilderie
Lake Urana
River
Wagga Wagga
Billabong
Creek
The Rock
Urana
Jerilderie
Coorabin
Oaklands
Berrigan
Daysdale
Culcairn
Tocumwal
Savernake
Murray River
Mulwala
Corowa
Albury
Yarrawonga
Ovens
V I C.
Wangaratta
Shepparton
River
Benalla
OAKLANDS-COORABIN COALFIELD
LOCALITY MAP
SCALE 20 0 40 80 Miles
Main Railways
Known extent of coal-bearing beds
Possible limits of coalfield
MELBOURNE
Bureau of Mineral Resources, Geology and Geophysics, June 1949
N 10-32

Plate 2

PARISH OF HASTINGS

BILLABONG CREEK

PARISH OF NORTH GUNAMBIL

To Urana

PARISH OF NORTH GUNAMBIL

True North
Mag. Var. 9° (approx)

WATER BORE IN PORTION 11 o

ROAD TO URANA

PARISH OF CLEAR HILL

D

Nº3 BORE

GUNAMBIL SHAFT

CLEAR HILL INCLINED SHAFT

CLEAR HILL VERTICAL SHAFT

AMBLESIDE BORE

A

COORABIN

PARISH OF GUNAMBIL

SHAFT IN PORTION 27

BORE E

BORE F

Nº2 SHAFT

Nº1 BORE

BORE H

BORE G

INCLINED SHAFT

Nº2 BORE

LANE'S (Nº1) SHAFT

BORE C

BORE A

B

BORE D

CARBERY SHAFTS

REFERENCE

- Vertical Shafts
- Inclined Shafts
- Coal Bores
- Water Bores
- Parish Boundaries

SOUTH CREEK

WELL TSR.CR 31531 o

E

Nº5 BORE

C

BORE J

Nº4 BORE

F

WATER BORE o IN PORTION 6

H. GAFFNEY'S BORE

FAIRVIEW BORE

ROCKLIFF BORE

o INNES' BORE

MUNITIONS Nº1 BORE

TOWN BORE

OAKLANDS

MUNITIONS Nº2 BORE

MILITARY Nº1 BORE

MILITARY Nº2 BORE

TO BERRIGAN

NIXON'S BORE o

o DINE'S BORE

To Yarrawonga

o W. NIXON'S BORE

OAKLANDS-COORABIN COALFIELD

LOCATION OF BORES AND SHAFTS

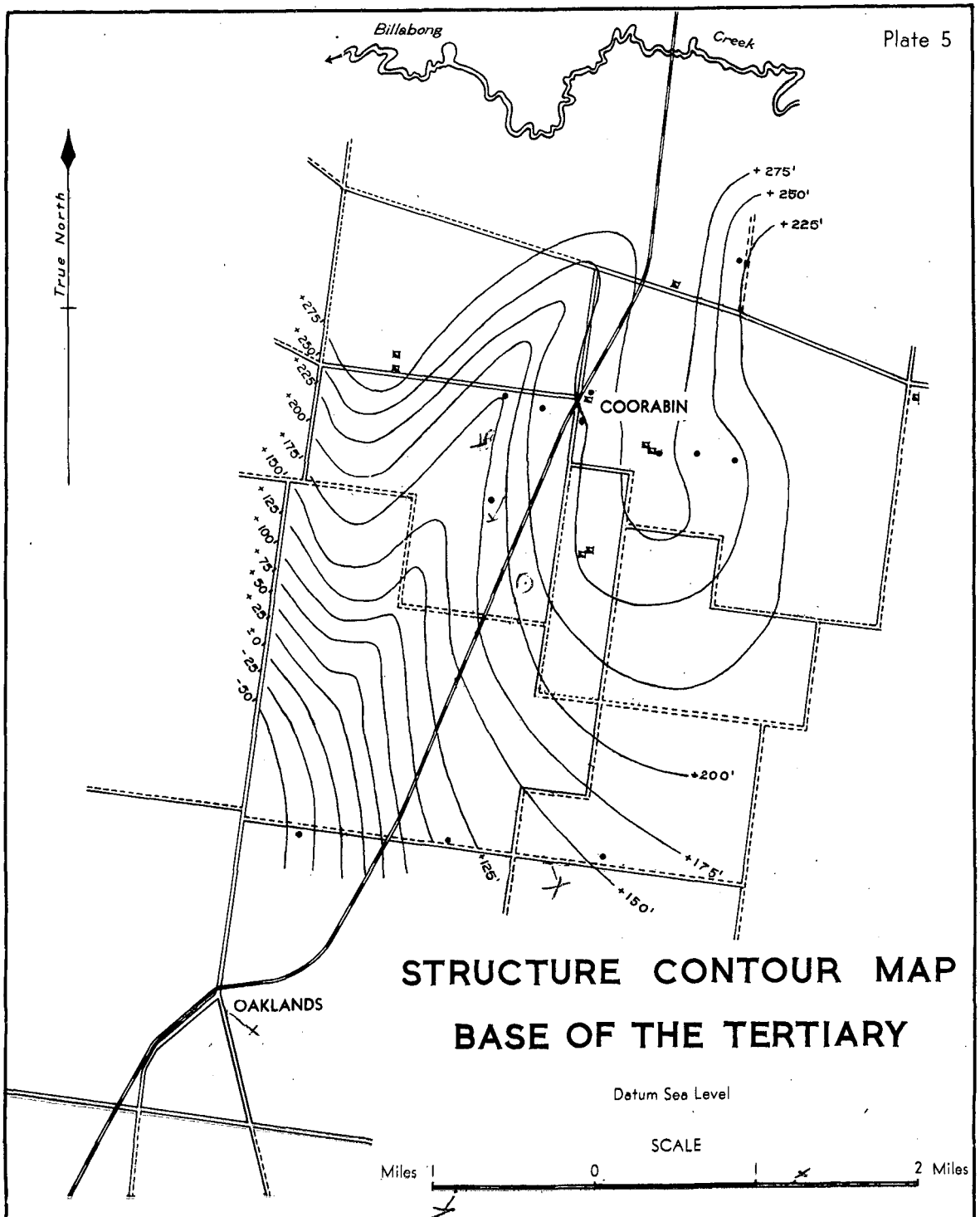
SCALE ½ ¼ 0 1 2 Miles

Bureau of Mineral Resources, Geology and Geophysics. June 1949

N 10 - 33

O.K

Plate 5



STRUCTURE CONTOUR MAP

BASE OF THE TERTIARY

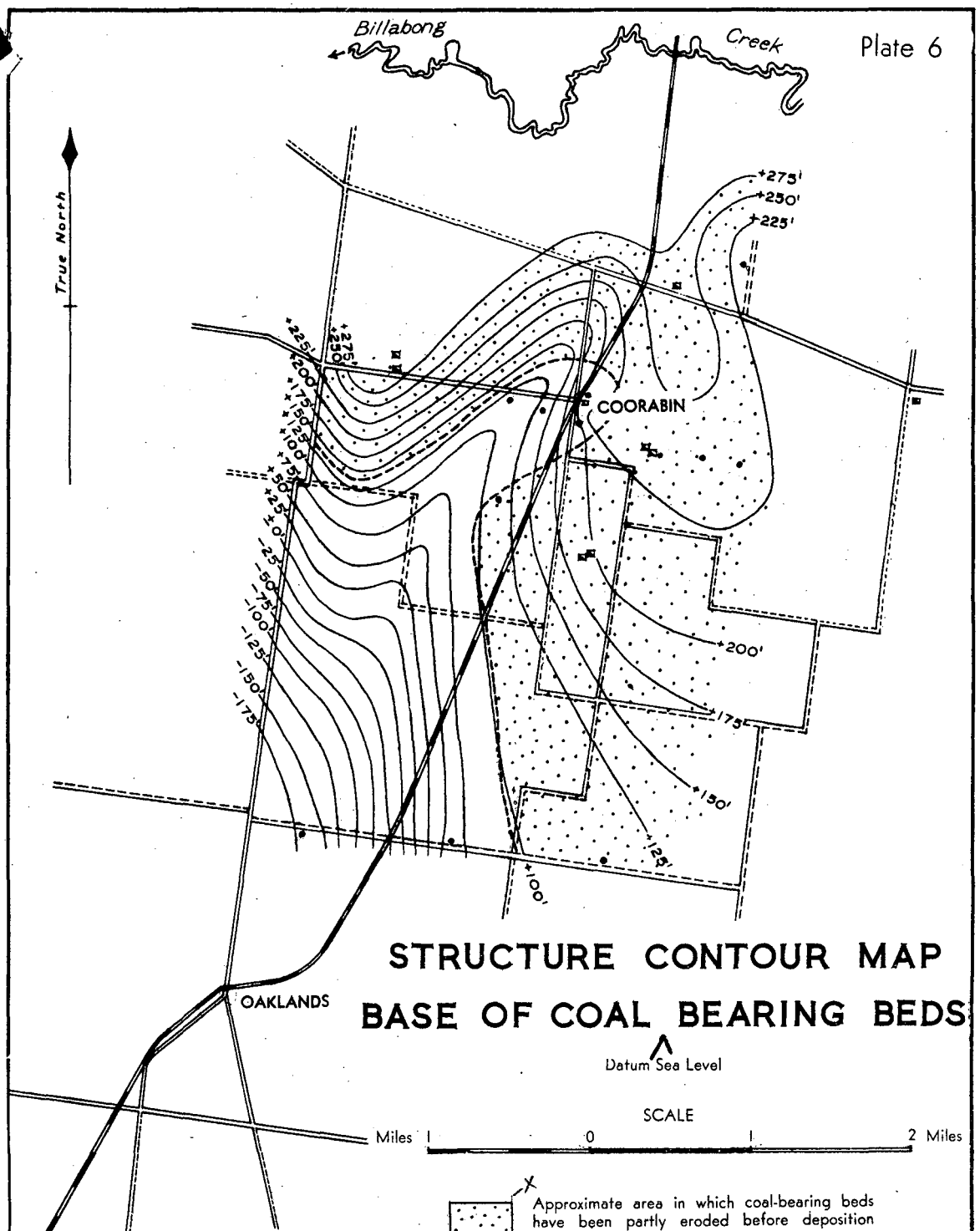
Datum Sea Level

SCALE

Bureau of Mineral Resources, Geology and Geophysics, June 1949

N 10-35

Plate 6



STRUCTURE CONTOUR MAP
BASE OF COAL BEARING BEDS

Datum Sea Level

SCALE

Miles 1 0 1 2 Miles

Approximate area in which coal-bearing beds have been partly eroded before deposition of the Tertiary strata.

Coal bores

Shafts

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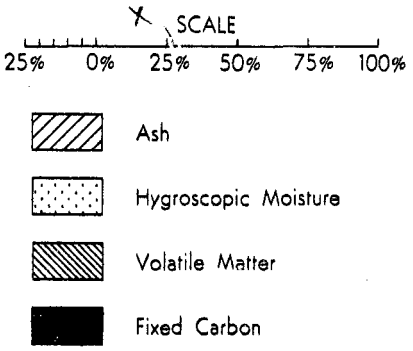
OAKLANDS - COORABIN COALFIELD

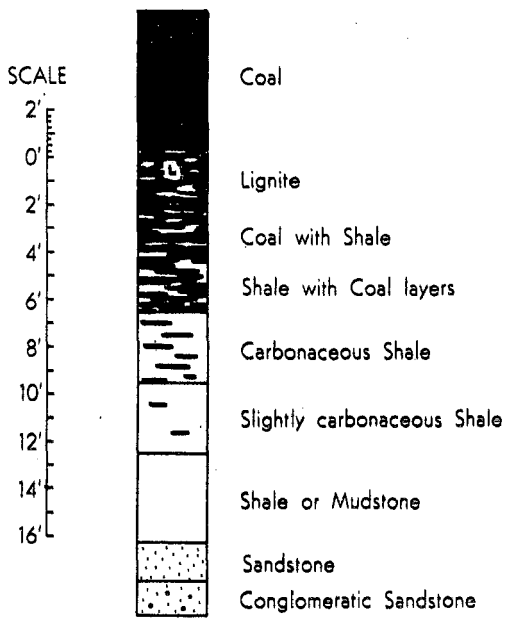
KEY TO PLATES 9 TO 15

ANALYSES



LOGS OF COAL-BEARING BEDS

Black and white are roughly in the proportion of coal and country rock



THE PLACING OF TWO SYMBOLS ON A PART OF A LOG INDICATES THAT IN THAT PART THE ROCKS ARE INTERBEDDED AND THAT THE BEDS ARE TOO THIN TO BE SHOWN SEPARATELY (FOR FURTHER DETAILS REFER TO THE APPROPRIATE APPENDIX)

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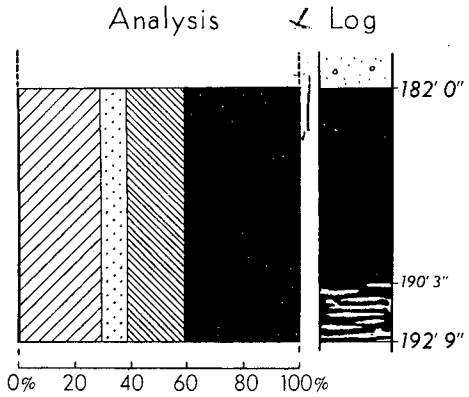
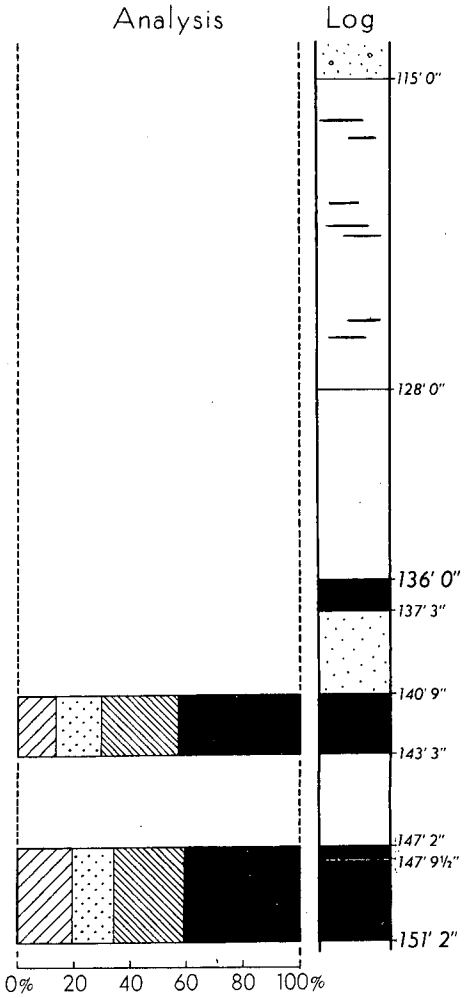
OAKLANDS - COORABIN COALFIELD

No. 3 BORE



GUNAMBIL SHAFT



Note

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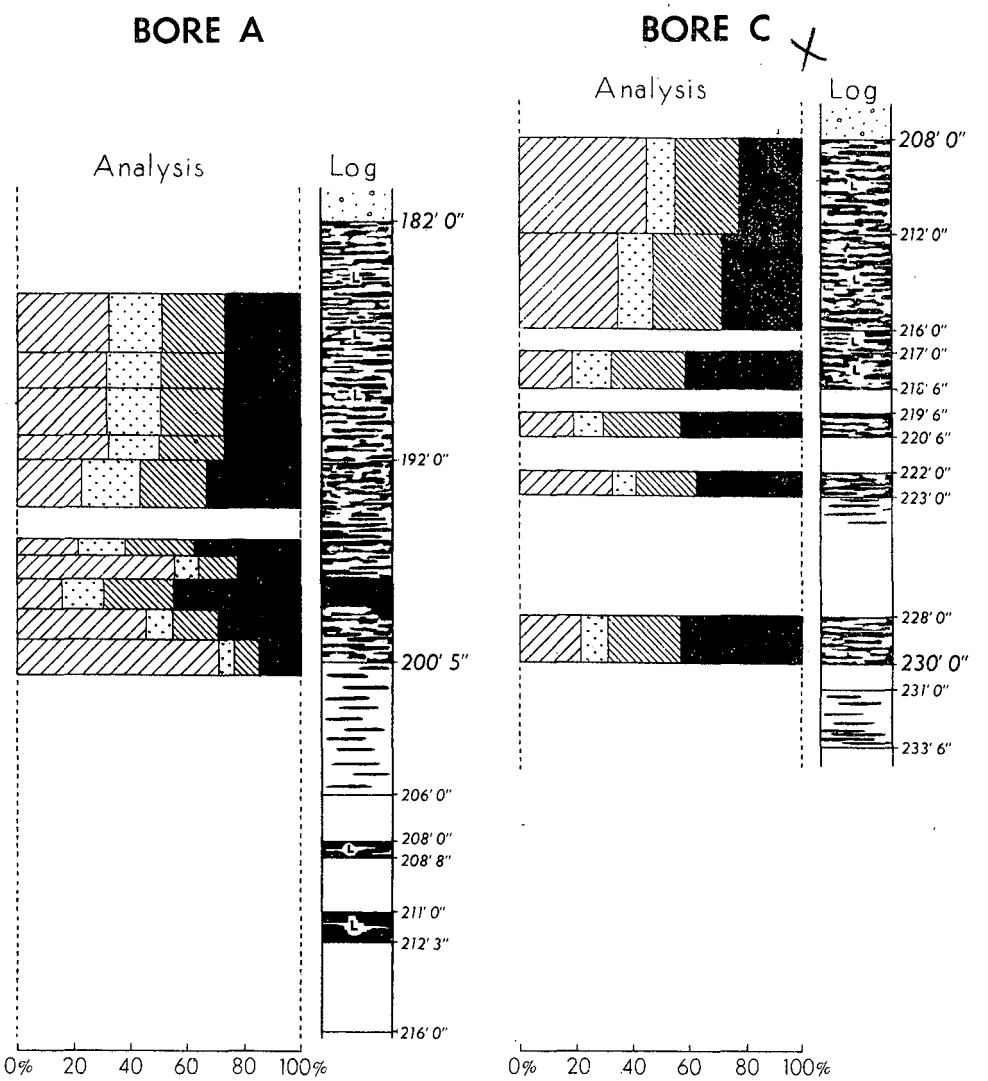

Note

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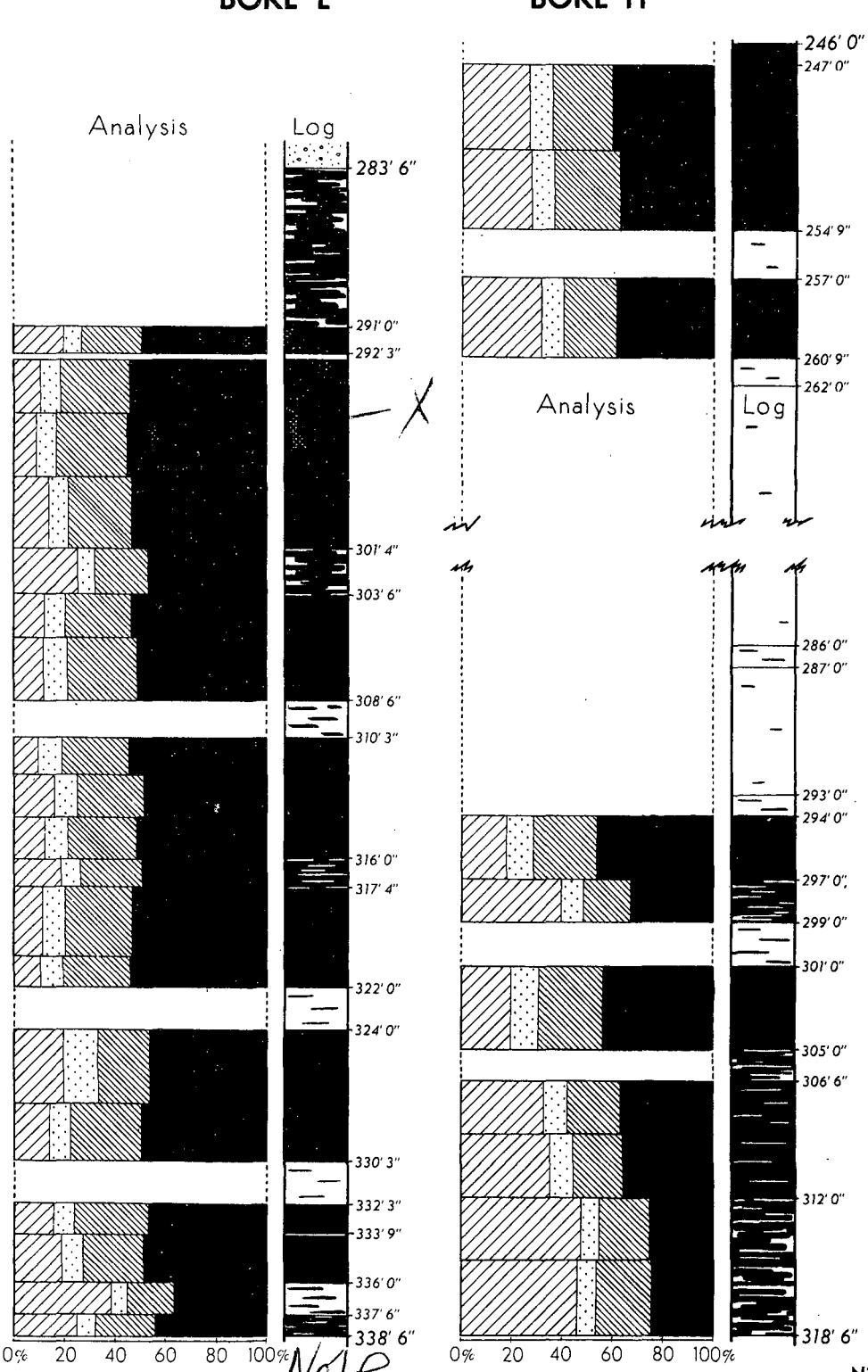

Note

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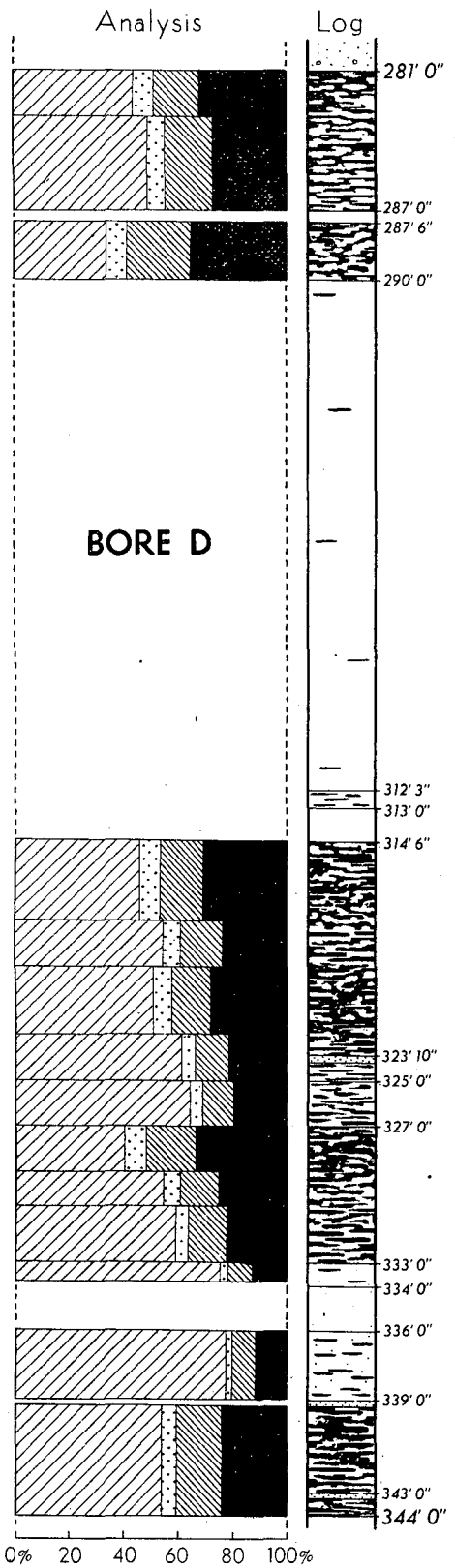
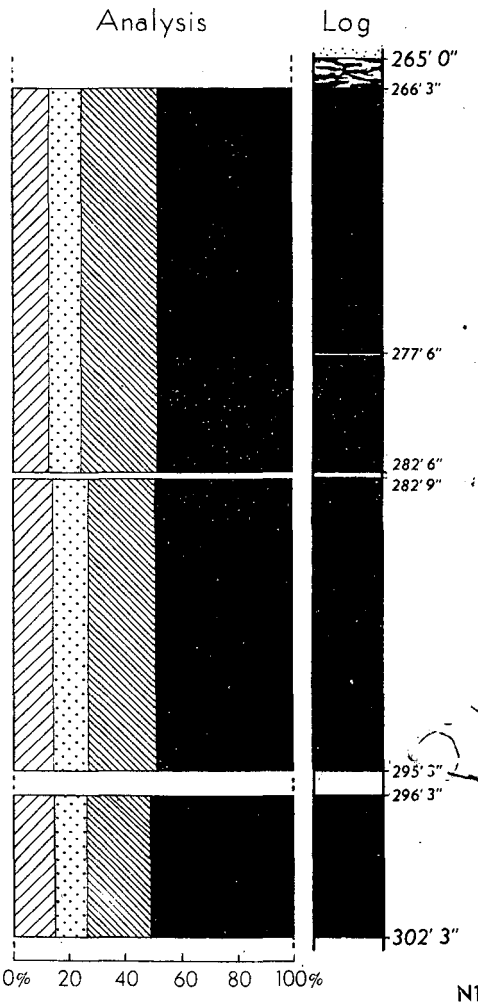


BORE D



No. 4 BORE

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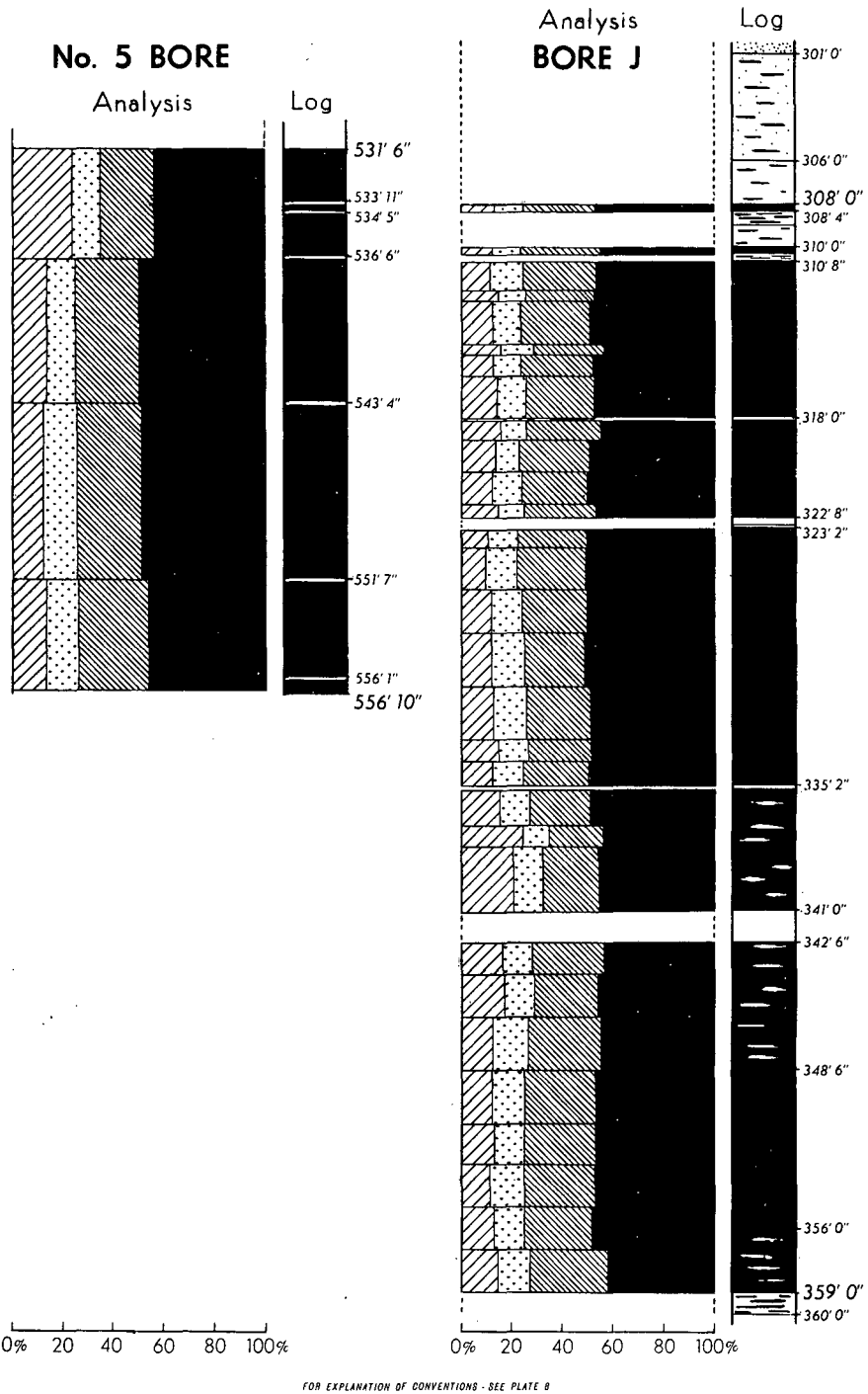
OAKLANDS – COORABIN COALFIELD



FOR EXPLANATION OF CONVENTIONS - SEE PLATE 8

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