FOLDER 1

Bureau of Mineral Resources, Geology and Geophysics

OPEN CUT COAL INVESTIGATIONS IN NEW SOUTH WALES

CESSNOCK MUSWELLBROOK REGION

H O W I C K A R E A R E P O R T

By J.J. Veevers

RECORDS 1953/47

Produced at the Maitland Office of the Bureau of Mineral Resources

C O N T E N T S

FOLDER 1

SUMMARY Page 1

INTRODUCTION Page 2

GENERAL Page 4

Surface Features: Page 4

Relief; Drainage; Groundwater; Weathering; Vegetation, Soil, Outcrops, Alluvium; Roads, Services

Land Divisions Page 8

Procedure Page 9

Surveying Page 9

Publication Page 11

THE STRATIGRAPHICAL SECTION AND THE GENERAL FEATURES OF THE COAL SEAMS: Page 12

Mulbring Stage: Page 13

Lithology; fauna.

Bayswater Siltstone: Page 15

Tomago Stage: Page 15

Barrett's Seam, Lower Liddell Seam, Middle Liddell Seam, Upper Liddell Seam, Artie's Seam, Seams A to Z, Farrell's Creek Seam.

Structural Geology Page 26

Igneous Geology Page 26

COAL RESERVES: Page 28

Open Cut Reserves

Total Reserves

REFERENCES Page 30

DRILLING DATA (By M.C. Konecki) Page 31

TEXT-TABLE 1. Thicknesses of the Parnell's Creek Sandstone Member and the Bayswater Siltstone facing Page 15

TEXT-TABLE 2. Open Cut Reserves facing Page 28

TEXT-TABLE 3. Summary of Surveying and Drilling Results following Page 36

MAPS AND ILLUSTRATIONS

Fig. I Isopachs of band-free coal following Page 28

Fig. II Generalised Sections facing Page 12

Plate 1 Geological Map, Howick Area (N14-110)

Plate 2 Geological Sections AA', BB', CC', Howick Area (N14-116)

Plate 3 Structure and Overburden Map, Barrett's, Artie's, Farrell's Creek Seams, Parnell's Creek (Central Prospect) and Farrell's Creek Subareas. (N14-114)

Plate 4 Structure Contours (Floor)
Barrett's Artie's and Farrell's Creek
Seams, Parnell's Creek (Central Prospect)
and Farrell's Creek Subareas (N14-115)

Plate 5 Geological Sections in Parnell's
Creek (Central Prospect) and
Farrell's Creek Subareas (N14-117)

FOLDER 2

CROSS INDEX TO COAL SEAMS intersected in
Scout Boreholes Nos. 5-26

GRAPHIC LOGS OF SCOUT BOREHOLES Nos. 5-26 in the
Central and Southern Prospects of the
Parnell's Creek Subarea

FOLDER 3

LIST OF APPROXIMATE LOCATIONS OF TEST BOREHOLES in
Parnell's Creek Subarea

CROSS INDEX TO COAL SEAMS intersected in
Test Boreholes Nos. 19-76

GRAPHIC LOGS OF TEST BOREHOLES Nos. 19-76 in the
Central and Southern Prospects of the
Parnell's Creek Subarea

FOLDER 4

CROSS INDEX TO COAL SEAMS intersected in Scout and Test Boreholes, etc. (see below)

GRAPHIC LOGS OF SCOUT AND TEST BOREHOLES in the Farrell's Creek, Pond's Creek and Jerry's Plains Subareas, and State Mine Reserve, Ravensworth

FOLDER 5

LIST OF ABBREVIATIONS used in Bore Logs

LIST OF APPROXIMATE LOCATIONS of Scout Boreholes in the Parnell's Creek Subarea.

BORE LOGS OF SCOUT BOREHOLES Nos. 5-26 in the Central and Southern Prospects of the Parnell's Creek Subarea

FOLDER 6

LIST OF ABBREVIATIONS used in Bore Logs

LIST OF APPROXIMATE LOCATIONS of Test Boreholes in the Parnell's Creek Subarea

BORE LOGS OF TEST BOREHOLES Nos. 19-76 in the Central and Southern Prospects of the Parnell's Creek Subarea

FOLDER 7

LIST OF ABBREVIATIONS used in Bore Logs

LIST OF APPROXIMATE LOCATIONS of Scout and Test Boreholes

BORE LOGS OF SCOUT AND TEST BOREHOLES in the
Farrell's Creek, Pond's Creek and Jerry's Plains
Subareas, and State Mine Reserve, Ravensworth

FOLDER 8

METHOD OF SAMPLING COAL FOR ANALYSES
(By W.A. McKinnon)

LIST OF ABBREVIATIONS

GREY KING CARBONISATION DETERMINATIONS
(N.S.W. State Mines Department)

TABLE II. Analyses and Weighted Means of Coal Samples

INDEX TO TABLE II. Analyses and Weighted Means.

FOLDER 9

INDEX TO TABLE II. Analyses and Weighted Means.

TABLE I. Thicknesses of Rock Bands and Coal Samples
in Coal Seams.

SUMMARY

This report deals with the results of 25,000 ft. of boring over an area of 15 sq. miles. Twenty-six coal seams were identified and named. Total reserves of all seams with band-free thickness greater than 4.0 ft. are 200,000,000 tons. Net open-cut reserves (to 9:1 ratio) of 7,500,000 tons over an area of 400 acres were tested and defined on four seams. All work in the Howick Area was done in the period March, 1952, to June, 1953.

INTRODUCTION

This record follows directly Record No. 76/1952, Northern Prospect, Parnell's Creek Subarea.

At the completion of boring in the Northern Prospect, boring operations proceeded in adjoining subareas in the following order:

1. Central Prospect)
2. Southern Prospect) Parnell's Creek Subarea
3. Farrell's Creek Subarea
4. Pond's Creek Subarea
5. Jerry's Plains Subarea

(For limits of these areas see Map No. N14-115)

Since these boring areas are contiguous, it will be convenient to refer to the area investigated by the Bureau as the Howick Area. The Area is circumscribed as follows:

To the South - The Hunter River

To the West - A fence separating the land districts of Muswellbrook and Singleton

To the North-West - The inferred surface outcrop of the base of the Upper Coal Measures

To the North - The latitudinal grid co-ordinate 991.000 of the Muswellbrook Military 1-Mile Map

To the East - The boundary fence between the Parishes of Howick and Ravensworth, except for the Farrell's Creek Subarea which occupies portions 48, 49, 156 and part 159 of portions 160 and 161 of the Parish of Ravensworth.

Boring operations in the Area were limited to parts where written or verbal "Authority to Enter" could be obtained.

Prospecting in the Howick Area completes detailed investigation of the lower coal seams of the Tomago Stage on the eastern limb of the Muswellbrook Dome by the Bureau of Mineral Resources; the JCB has been responsible for all work carried out in the Pike's Gully Area and others immediately north of the Howick Area.

This record deals only with the quality and quantity of coal seams in the Area which are presented for economic assessment by officers of the Joint Coal Board and State Mines Department.

A Geological Appendix dealing fully with all geological and magnetic surveys, undertaken to supplement information gained from boring operations, will be presented later.

GENERAL

SURFACE FEATURES

RELIEF

The high parts in the Area are Howick Ridge capped by the Trig. Station (elevation 760 ft.), a steep rise about 1,000 ft. east of 2(S)R Pond's Creek, the ridge in the vicinity of 60(T) Parnell's Creek and a rise about 800 ft. west-north-west of 2(S) and 3(S) Farrell's Creek. Between these elevated parts is the broad valley plain of the Southern Prospect at an elevation of 250 ft. Moderate to steep slopes in the northern part of the Southern Prospect lead to the Central Prospect, most of which has a relief of 400 ft. to 600 ft. From this Prospect, the elevation falls off into the Farrell's Creek and Pond's Creek Subareas.

Slopes are very moderate, except in the northern part of the Southern Prospect, the north-western part of the Pond's Creek Subarea and on Howick Ridge, where slopes of one in four are found.

DRAINAGE

The Area is drained by four creek systems:

1. Parnell's - Pond's Creek.
2. Farrell's Creek

3. The creeks running south-east through the Southern Prospect.

4. The creeks along the south-west flank of Howick Ridge.

1 and 4 flow into the Hunter River within the Area and 2 and 3 south-east of the Area.

Only after prolonged heavy rain is water found in most of the creeks. Apart from dam-water, the only perennial surface water is that in gullies and ponds in Parnell's Creek.

The main creeks are mature with less mature source creeks. Entrenched meanders in a meander belt 300 ft. to 600 ft. wide are common along Parnell's - Pond's Creek; drainage in most of the Southern Prospect is over the entire plain. The maturity of drainage leads to swampy conditions after heavy falls of rain.

The drainage is very closely related to geological structure.

GROUNDWATER

Small water-shows were recorded from three bores only.

17(S) Parnell's Creek passed through a water-bearing sandstone at a depth of 330 ft. The rate of flow was 600 gallons per hour with a head 10 ft. above ground-level. 94 ft. of casing capped by a well-head have been left in the bore-hole in order to control the flow of dilute salt-water.

21(S) Parnell's Creek penetrated a water-bearing sandstone with top at a depth of 350 ft. to 360 ft. As in 17(S) Parnell's Creek, the rate of flow was small.

During boring in 1(S) Pond's Creek, water was found standing in the bore-hole. No estimate was made of the depth of the water-bearing strata.

WEATHERING

The depth of weathering from the surface ranges from a minimum of 20 ft. to a maximum of 105 ft. The frequency of depths of weathering in ninety-seven bore-holes, with class-interval value 10 ft. is given:

Depth of Weathering Class Intervals	Frequency of Class Interval
20' to 30'	19
30' to 40'	41
40' to 50'	17
50' to 60'	8
60' to 70'	5
70' to 80'	2
80' to 90'	2
90' to 100'	2
100' to 110'	1

The lower surface of the weathered zone is highly irregular in shape, so that precise estimates of the depth of weathering between bore-holes is not possible.

Of the five bore-holes with depth of weathering within the 80 ft. to 110 ft. interval, two are situated on ridges and three are on slopes. Bores located on the banks of water-courses do not show any tendency towards having abnormally thick weathered zones.

In many bore-holes the base of the weathered zone was found within a coal seam. The depth to the base of the

weathered zone could be placed very exactly by noting the depth of coal samples whose analyses showed a high moisture value (range 4% to 12%). Comparison of the figure of the depth of weathering found in this way and the value recorded by the loggers in the bore-logs shows close agreement.

VEGETATION, SOIL, OUTCROPS, ALLUVIUM

The Area is crossed obliquely by a stock-route. Between this stock-route and the Hunter River, the land is well-improved by contour ploughing and the use of fertilizers. On the north-east of the stock-route, unfavourable topography and poor management have led to a very poor state of development of both grass and trees; sheet erosion is very evident, leaving a surface littered with small boulders of clay ironstone which is the only weathering-resistant rock-type in the geological section of these parts.

Soil thickness ranges from 5 ft. to 20 ft. The soil-type is almost exclusively grey-brown podsol, poor in organic matter. Extensive leaching has given a thick A horizon.

Definite alluvial deposits were recorded from 17(S) Parnell's Creek and 14(T) Pond's Creek. Coarse water-worn gravels have a thickness from the surface of 60 ft. 3 in. in 17(S) Parnell's Creek and 52 ft. in 14(T) Pond's Creek.

Rock outcrops are very rarely seen except on Howick Ridge; outcrops of coal seams, igneous rock, and baked sediments occupy a large part of the area of the Ridge.

ROADS, SERVICES

Access to the Area is from the north through Pike's Gully and from the South through Lemington, which is a small

settlement of dairy farms. The Lemington road leaves the New England Highway at Ravensworth, eight miles from Lemington. It is graded but not sealed, and it leads almost into the Southern Prospect.

Roads within the Area are bad and often impassable after heavy falls of rain.

Domestic electricity supply and telephone services are available at Lemington. Heavy electricity supply is available to the Pike's Gully Open Cut two miles north of the Area.

LAND DIVISIONS (See Plate I).

The Howick Area is situated in the Parishes of Howick and Ravensworth, County of Durham; Land Districts of both Muswellbrook and Singleton, Shire of Patrick Plains, Eastern Division of N.S.W.

The Area is also within the Upper Hunter Region of the N.S.W. Division of Development and Reconstruction. (1)

Portions taken in are:

Parish of Howick

Nos. 1,2,3,4,5,6,7,10,11,53,54,65,70, 71,80,81,83,84,121,122,134,157.

Parish of Ravensworth

Nos. 156,157,158,159,160,161.

(1) Records 76/1952 - Northern Prospect Report.

PROCEDURE

Boring was restricted to those parts where the Bureau has Authority to Enter (written or verbal). This led to the restriction of boring to the Parish of Howick (except for the small Farrell's Creek Subarea in the Parish of Ravensworth. The Hunter River and the settlement of Lemington formed the limits to boring in the south.

A full account of Bureau field administration and the relationships between the Bureau and other workers in the area is given in Section 2 of the Northern Prospect Report.

Most scout bores were placed by locating them on an enlarged Military Map (6 inches to 1 mile). It was possible to precede a large number of the Test Bores on Barrett's, Upper Liddell, and Artie's Seams in the Central Prospect by a topographic Survey which enabled a grid system (900 ft. by 600 ft.) to be pegged.

It was not possible to prepare such topographic maps to precede test boring for the Farrell's Creek Seam in the Central Prospect. Bores were located by the pace-and-compass method, with the aid of aerial photographs and Military Maps.

SURVEYING

While surveying in the Howick Area, two methods were employed and must be dealt with separately:

The Plane Table and Telescopic Alidade (Stadia method), were used over the Northern and Central Prospects of the Parnell's Creek and Farrell's Creek Subareas.

A Theodolite (Stadia method), was employed in a survey of the Pond's Creek and Jerry's Plains Subareas and the Southern Prospect of the Parnell's Creek Subarea.

PLANE TABLE SURVEY.

14 Plane Table sheets were covered by closed traverses at a scale of 200':1". The object of this survey was to provide bore locations and elevations and to produce a topographic base with contours at 5 foot intervals as required by the JCB. This was achieved with the usual accuracy of this method in an area investigated for open cut prospects (see Contour Reliability Diagram, Inset Plate I).

THEODOLITE TRAVERSE.

A Theodolite Traverse (Stadia) was run from bore to bore in the remainder of the Area not covered by the Plane Table Survey. Elevations and locations so obtained were used in adapting the contours from the Muswellbrook sheet of the 1 Mile Military Map.

The Howick Trig. Station was accepted as a datum for both surveys. For references to Plane Table Sheets and Stadia Books see Inset Plate 4.

PUBLICATION (A. Stern)

Work on the publication of this report began on 1st May, 1953, with the compilation from plane table sheets and other surveyor's information of a topographic base map covering about 15 square miles.

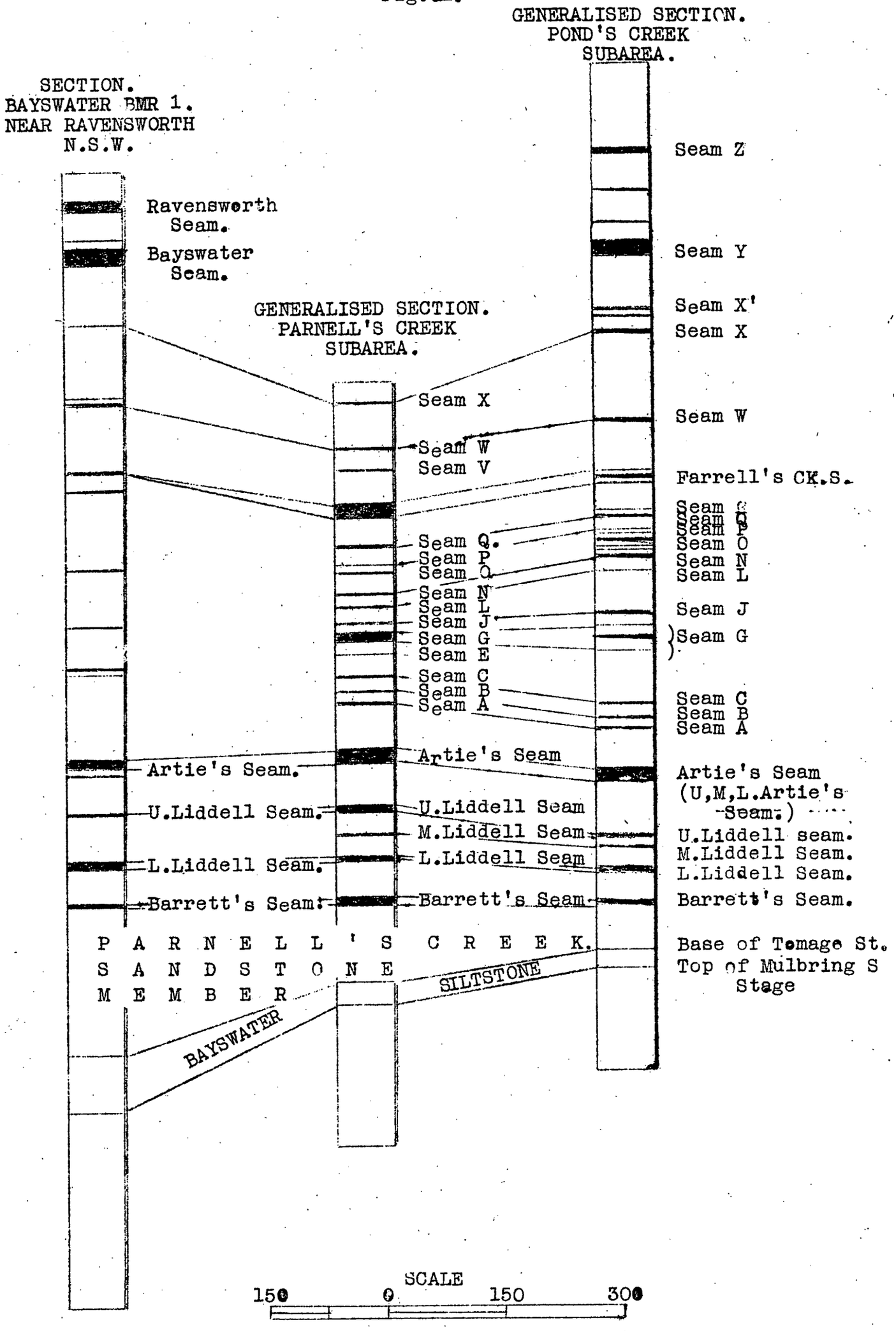
While the foundations of this report were laid during the first six hectic weeks, it took six full months to type, draw, check and duplicate 800 stencils and compile and draft several maps, sections and other illustrations.

Our thanks are due to typists and office assistants, Miss E. Colman, Mrs. M. Collins, Miss W. Lovell, Mrs. J. Perry, O. Ajkai (Diagrams), N. Gorbunow, L. Mursa (Weighted Means, etc. and general checking), J.D.Hill (graphic logs and duplicating), K. Schofield (duplicating), without whose effort and co-operation it would not have been possible to produce this very comprehensive report in so short a time.

Last but not least, we must mention the co-operation received from Messrs. Johnson and Hey (Stationers) and Norman Morriss (Printers and Bookbinders), both of Newcastle, and Harding and Halden (Stationers) of Sydney.

Maitland, 10th November 1953

BUREAU OF MINERAL RESOURCES. GEOLOGY AND GEOPHYSICS.
OPEN CUT COAL INVESTIGATION. NEW SOUTH WALES.
HOWICK AREA REPORT.
Fig. II.



THE STRATIGRAPHICAL SECTION AND THE GENERAL FEATURES OF THE COAL SEAM

General correlation of stratigraphical units between bores enabled a total stratigraphical section of 1,500 ft. to be compiled for the Howick Area. This section is made up of 320 ft. of Mulbring Stage (Upper Marine Series), 30 ft. of Bayswater Siltstone (marine-freshwater transition strata), and 1,150 ft. of Tomago Stage (Upper Coal Measures). 1077 ft. of this section were penetrated in one bore-hole, 2(S)R Pond's Creek. Rocks of the highest stratigraphical position were intercepted by 1(S) Jerry's Plains (1,150 ft. above the base of the Tomago Stage), and the lowest by 76(T) Parnell's Creek (approximately 30 ft. below the base of the Tomago Stage).

Working over such a broad stratigraphical range required extra checks to correlation. It was found that the only stratigraphical horizon constant throughout is the top of the Mulbring Stage. Full sections were established in all areas by scout bores, singly or in association; most of these bores continued into the upper part of the Mulbring Stage. This extreme care in finding a definite stratigraphical horizon, while requiring boring footage beneath coal-bearing strata, was amply repaid by the resulting complete and definite correlation of all units penetrated in all bores, aggregating over 25,000 ft. in bore-footage.

Bores giving the fullest stratigraphical and structural information were 6 (S), and 17 (S) Parnell's Creek, 1 and 6 (S) Farrell's Creek, 2 (S) R and 4 (S) Pond's Creek and 1 (S) Jerry's Plains.

Correlations between units in shallow scout and test bores were based on the data from these scout bores.

DESCRIPTION OF STRATIGRAPHICAL UNITS

1. THE MULBRING STAGE (base of section).

The constancy of lithology and fauna of the uppermost strata of this unit over the entire Area formed an invaluable basis for correlation.

(a) LITHOLOGY.

The upper part of the Mulbring Stage consists of dark-grey to black silty claystones with varying amounts of pyrite. This rock is very dense and tough when fresh and very fissile after short exposure to the weather. Carbonaceous matter in the form of plant fragments is quite commonly found. Nodular limestone with cone-in-cone structure, and nodular clay ironstone, familiar rock-types in the Tomago Stage, are recorded from these strata, but are rarely thicker than six inches. Siltstones and sandstones are very uncommon in this well-sorted unit. It is important to note that many bores passing into these strata were logged by different loggers who take a different definition of rock-types as far as grain-size is concerned. The writer takes as claystones all massive rocks with grain-size less than 0.004 mm. Others identify the

writer's "silty claystone" and "siltstone" as "siltstone" and "fine-grained greywacke" respectively.

In 76(T) Parnell's Creek, a section of 300 ft. of Mulbring Stage was bored. The grain-size of the sediments remains constant within the clay fraction to a depth of nearly 150 ft. Below this depth, there is a gradual increase in grain-size till a depth of 250 ft. is reached, where fine-grained greywacke sandstones are the only rock-type.

(b) FAUNA

Careful examination of cores for fossils was made. Macro-fossils include bryozoans, gastropods, pelecypods, worm-tracks, and crinoid-stems. These forms are poorly preserved as casts, usually in pyrite. Distortion is common in gastropods and pelecypods. The occurrence of macro-fossils is uniformly rare over the marine section.

Macro-fossils collected from bore-cores have been sent to Canberra for identification by J.M. Dickins.

Micro-fossils are comparatively abundant. Foraminifers, Ostrocods and minute fish remains are fairly well-preserved. M.A. Reynolds was responsible for the difficult extraction of micro-fossils and further intensive study of these forms. Determinations were made by Miss Irene Crespin.

TEXT-TABLE 1 - THICKNESSES OF THE PARNELL'S CREEK SANDSTONE MEMBER AND THE BAYSWATER SILTSTONE

BORE NO.	AREA	PARNELL'S CREEK SANDSTONE MEMBER		BAYSWATER SILTSTONE	
		Interval	Thickness	Interval	Thickness
1	Bayswater	992' 9 " to 1178' 9 "	186' 0 "	1178' 9 " to 1258' 0 "	79' 3 "
1S	Liddell State Coal Reserve	493' 5 " to 653'10 "	160' 5 "	653'10 " to 711' 0 "	57' 2 "
1 & 6S	Farrell's Creek Sub-Area	717' 2 " to 834' 0 "	116'10 "	834' 0 " to ▷864'11 "	▷30'11 "
2S	Parnell's Creek Sub-Area	376' 5½" to 469' 8 "	93' 2½"	469' 8 " to 485' 6 "	15'10 "
3S	Parnell's Creek Sub-Area	151' 3½" to 249'11½"	98' 8 "	249'11½" to 300'10½"	50'11 "
4S	Parnell's Creek Sub-Area	94' 6 " to 192' 8 "	98' 2 "	192' 8 " to ? 218' 6 "	25'10 "
5S	Parnell's Creek Sub-Area	310' 0 " to 391' 6 "	81' 6 "	391' 6 " to 421' 1½"	29' 7½"
6S	Parnell's Creek Sub-Area	568' 4 " to 661' 1½"	92' 9½"	661' 1½" to ▷678' 0 "	▷16'10½"
7S	Parnell's Creek Sub-Area	165' 4 " to 240' 8 "	75' 4 "	240' 8 " to 263' 0½"	22' 4½"
8S	Parnell's Creek Sub-Area	397' 9 " to 483' 1½"	85' 4½"	483' 1½" to 500' 0 "	16'10½"
9S	Parnell's Creek Sub-Area	204'11½" to 300' 6 "	? 95' 6½"		
10S	Parnell's Creek Sub-Area	399' 4 " to 495' 0½"	95' 8½"	? 495' 0½"	
12S	Parnell's Creek Sub-Area	134'11½" to ?237' 6 "	?102' 6½"	237' 6 "	
17S	Parnell's Creek Sub-Area	528' 1 " to 611'10 "	83' 9 "	611'10 " to 638' 5 "	26' 7 "
19S	Parnell's Creek Sub-Area	355' 5 " to ?437' 5 "	82' 0 "	? 437' 5 " to ?447' 0 "	? 9' 7 "
22S	Parnell's Creek Sub-Area	269'10 " to 327' 2 "	57' 4 "	327' 2 " to 348' 3 "	21' 1 "
42T	Parnell's Creek Sub-Area	64' 8 "		64' 8 " to ?100' 0 "	30'-35' approx.
52T	Parnell's Creek Sub-Area	59' 1 " to ▷138' 6 "	▷ 80' 0 "		
54T	Parnell's Creek Sub-Area	63' 1 "			
55T	Parnell's Creek Sub-Area	22' 0 " to 78' 9 "	56' 9 "	78' 9 " to 97' 6 "	▷20' 0 "
1SR	Pond's Creek Sub-Area	314' 1 " to 375' 1 "	61' 0 "	375' 1 " to ?407' 6 "	?32' 5 "
2SR	Pond's Creek Sub-Area	951' 3 " to 1036' 3 "	85' 0 "	1036' 3 " to 1062' 6 "	26' 3 "
3SR	Pond's Creek Sub-Area	539' 3 " to 617' 7 "	78' 4 "	617' 7 " to 641' 2 "	▷23' 0 "
5S	Pond's Creek Sub-Area	184' 3 " to 241' 4 "	57' 1 "	241' 4 " to 260' 4 "	19' 0 "
7S	Pond's Creek Sub-Area	210' 9 "			
4T	Pond's Creek Sub-Area			86' 6 "	
10T	Pond's Creek Sub-Area	0'- 38' 6 "	▷38' 6 "	?▷ 38' 6 " to 75' 7 "	?▷37' 1 "
13T	Pond's Creek Sub-Area	0		? 0 43' 6 "	?▷43' 6 "
16T	Pond's Creek Sub-Area	127' 3 " to 181' 9 "	54' 6 "	181' 9 " to 225' 6½"	43' 9½"

2. THE BAYSWATER SILTSTONE.

The Bayswater Siltstone was first described in the Northern Prospect Report (page 55). Data used in this description were taken largely from bores in the Central and Southern Prospects and the Bayswater BMR 1 Bore. Further complete and partial sections of this formation were provided by four bores in the Parnell's Creek Area, nine in the Pond's Creek Area, and one in the Liddell State Coal Reserve. All data concerning depths and thicknesses of this formation in BMR bores are tabulated in Text-table 1. (opposite). Mean thickness of this unit in the Area is 30 ft. The upper and lower limits are well distinguishable from the underlying strata of the Mulbring Stage and the overlying Parnell's Creek Sandstone Member (basal member of the Tomago Stage). These distinctions were used as aids in correlation.

3. THE TOMAGO STAGE.

All the coal measure strata penetrated in the Howick Area belong to the Tomago Stage. The 1,150 ft. section of Tomago Stage strata shows remarkable rhythmic uniformity, repeated in many bores. The elements of this rhythmic sequence are coal seams and greywacke sandstones; claystone and shale, siltstone and conglomerate are unimportant members of the succession.

Only where units can be clearly identified have names been given to avoid

The coal seam succession is (from the top):

Seam Z (correlated with the Ravensworth Seam)

Seam Y (correlated with the Bayswater Seam)

Seam X_1

Seam X

Seam W

Seam V

Farrell's Creek Seam

Seam R

Seam Q

Seam P

Seam O

Seam N

Seam L

Seam J

Seam G

Seam E

Seam C

Seam B

Seam A

Upper Artie's Seam

Middle Artie's Seam

Lower Artie's Seam

Upper Liddell Seam

Middle Liddell Seam

Lower Liddell Seam

Barrett's Seam

The Seams Barrett's to Artie's inclusive have been bored continuously from the Howick Area into the JCB Pike's Gully Area which is contiguous with the northern part of the northern

Prospect. Of all the remaining seams in the section, Seams Y and Z only have allowed correlation with described seams in the Liddell-Ravensworth Area.

The large number (nineteen) of thin Seams found above Artie's Seam have been named tentatively by letters of the alphabet in preference to numbers. Despite the apparent complexity in succession of these small alphabet seams, close examination of all data available enables valid correlations of these seams within the Area. The majority of these seams are splits of a few individual seams which are found in bores in the southern part of the Division 24(S), 25(S) Parnell's Creek, 4(S), 8(S) Pond's Creek).

BARRETT'S SEAM.

This is the basal coal seam of the Tomago Stage in the Howick Area. Gross thickness decreases from approximately 9 ft. in the Northern Prospect to approximately 5 ft. in the Pond's Creek Area. Numerous rock bands throughout the seam have a mean aggregate thickness range of 0.5 ft. to 1.0 ft. The ash content of band-free coal ranges from 10% to 20% and volatiles from 31% to 35%.

Altogether this seam is very constant in all features, apart from thickness, and it is free from splitting phenomena of any kind.

LOWER LIDDELL SEAM

Within the Area, the Liddell Seam is split into two parts, called the Upper Liddell Seam and the Lower Liddell Seam. A third split, the Middle Liddell Seam, is of minor

importance only. The close relationship between these splits is shown in the interval between the Upper and Lower Liddell Seams where numerous coal bands, all of which are less than 6 inches thick, are developed. The Middle Liddell Seam is a thickened development of one of these coal bands.

The Lower Liddell Seam is 40 ft. to 50 ft. stratigraphically higher than Barrett's Seam. It is very variable in its features. Its thickness changes markedly between neighbouring bores and the aggregate rock band thickness ranges from 0 ft. to 1.5 ft.; band-free mean thickness is 6.0 ft. Ash in band-free coal is from 10% to 30%.

MIDDLE LIDDELL SEAM.

The seam is recorded from a few bores only. It is approximately 25 ft. stratigraphically above the Lower Liddell Seam. Mean gross thickness is 4 ft.

UPPER LIDDELL SEAM.

The Upper Liddell Seam shows a certain constancy in its properties. It is found 45 ft. to 60 ft. stratigraphically above the floor of the Lower Liddell Seam and 65 ft. to 80 ft. stratigraphically below the floor of Artie's Seam.

Mean band-free thickness is 7 ft. Rock bands are unimportant parts of the seam. Volatile matter is moderately high and ash is moderately low.

In 32T Parnell's Creek, the Upper Liddell Seam is clearly washed out. In this bore, Artie's Seam is underlain by nearly 100 ft. of greywacke sandstone, followed by a thin 1 ft. 7 inches thick coal seam (the Lower Liddell Seam).

The interval customarily occupied by the Upper Liddell Seam is occupied by greywacke sandstone. The core recovery in this part of the bore was 100%. Bores within a 700 ft. radius of 32(T) Parnell's Creek have penetrated the Upper Liddell Seam and have so localised its maximum wash-out area to an approximate 40 acres. This is the only evidence for a wash-out in the Area.

ARTIE'S SEAM.

The stratigraphical interval between the floor of Barrett's Seam and the floor of Artie's Seam ranges from 140 ft. to 160 ft. Artie's Seam is very variable in thickness, with a gross thickness range of 28 ft. to 8 ft. Rock band thickness is high generally with approximate range 0 ft. to 8 ft., (the maximum is in 26(S) Parnell's Creek over a gross thickness of 28 ft. 6½ ins.). Mean rock band thickness is 3 ft. in a mean gross seam thickness of 16 ft. There is a marked thinning of the seam in the Pond's Creek Subarea, where mean gross thickness is approximately 8 ft.

The percentage of ash and volatile matter in band-free coal is generally constant in the ranges 10% to 15% and 30% to 35% respectively. The band-free coal in Artie's Seam from 26(S) Parnell's Creek had exceptionally low ash content of 7.4%.

Artie's Seam is split over part of the Farrell's Creek Subarea, part of the Southern Prospect and the southern part of Pond's Creek Subarea.

Three splits have been identified, and these have been called the Lower, Middle and Upper Artie's Seams. The chemical features of these splits are similar to those of the unsplit Artie's Seam.

LOWER ARTIE'S SEAM has a stratigraphical position equivalent to that of the unsplit Artie's Seam. Gross seam thickness ranges sharply from 3 ft. to 15 ft. Rock band thicknesses are moderate.

MIDDLE ARTIE'S SEAM is very thin (mean gross thickness 3 ft.) with moderate to low rock band thickness.

UPPER ARTIE'S SEAM has a very variable gross seam thickness. Rock band thickness is moderately low.

SEAM A.

The floor of Seam A is about 80 ft. stratigraphically above the floor of Artie's Seam. This seam is recorded from four bores only, 24(S) and 25(S) Parnell's Creek and 5(T) and 7(T) Pond's Creek. Gross thickness ranges from 2.7 ft. to 4.2 ft. The seam is almost free from rock bands and ash content ranges from 7% to 14%.

SEAM B

The seam has very poor development; it is identified in two bores only, 29(T) Parnell's Creek and 4(S) Pond's Creek. In 4(S) this seam has been cindered by an igneous intrusion. Seam B in 29(T) Parnell's Creek has moderately high volatiles (37.9%) and low ash.

SEAM C.

This seam is found 90 ft. to 100 ft. above the floor of Artie's Seam. It has been recorded from fourteen bores. Its features remain constant: mean gross thickness 4 ft. relatively free of rock bands, ash content 5% to 15% and volatiles 30% to 37%.

SEAM D.

Seam D is recorded from one section only, 2(S) and 3(S) Farrell's Creek. It is relatively free of rock bands, with ash content 19% and volatiles 32%. Thickness is 2.7 ft.

SEAM EC.

This is the "parent" Seam of which Seams C and E (and possibly D) are splits. It is found in two neighbouring bores, 24(S) and 25(S) Parnell's Creek. Band-free thicknesses are 4.1 ft. and 2.6 ft. respectively.

SEAM E.

This seam lies 120 ft. stratigraphically above the floor of Artie's Seam. Main development is in the Central Prospect. Gross seam thickness is constant at 3.5 ft. Volatile content ranges from 31% to 35% and ash content from 7% to 18%.

SEAM G

Seam G is 160 ft. to 180 ft. stratigraphically above the floor of Artie's Seam. Its gross thickness range of 8.9 ft. to 2.6 ft. has a much higher limit than that of other "alphabet" seams. Rock band thickness is high and the ash content of the coal is moderate at a mean value of 15%.

SEAM JG

Seam JG is recorded from 4(S) Pond's Creek only. It is possibly the "parent" seam for Seams G and J. Gross thickness is 11.7 ft. with band-free thickness 8.2 ft. The coal has been cindered by an igneous intrusion.

SEAM J.

This seam is 10 ft. to 25 ft. stratigraphically above Seam G. Gross thickness range is 2 ft. to 5 ft. Mean rock band thickness is 1 ft. in a 5 ft. thick seam. Ash content is 12% to 35%.

SEAM L.

Seam L is 20 ft. stratigraphically above Seam J in the Parnell's Creek Sub-Area and 60 ft. above Seam J in the Pond's Creek Sub-Area. All recorded thicknesses are less than 3.0 ft.; no samples were taken for analyses.

SEAM N.

Seam N is 100 ft. stratigraphically below the Farrell's Creek Seam. It has a good development with gross thickness range of 2.6 ft. to 6.5 ft. The seam is relatively free from rock bands. Volatile matter content is from 28% to 35% and ash content from 9% to 31%.

SEAM O.

This seam has very slight development. One analysis only is available (from 8(S) Pond's Creek).

SEAM P.

Seam P is found only in the Pond's Creek Subarea. No analyses are available.

SEAM Q.

Seam Q is very constant in its features. It lies

constantly 45 ft. below the Farrell's Creek Seam. Mean gross thickness is 4.5 ft. with mean rock band aggregate thickness 1.0 ft. Ash content is 12% to 34%.

SEAM QPONL.

This seam occurs in 4(S) Pond's Creek. It is apparently the "parent" seam for the single seams Q,P,O,N and L. The seam is 4 ft. thick, free of bands, with 12% of ash.

SEAM R

In 70(T) Parnell's Creek, the rock interval between Seam Q and the Farrell's Creek Seam is broken by two thin coal bands, called the Lower and Upper R Seams. Each band is less than 2 ft. thick and the ash content is high (25%).

FARRELL'S CREEK SEAM.

The Farrell's Creek Seam has been intensively prospected in that part of the Central Prospect which forms the upper reaches of the Farrell's Creek. The floor of the seam is from 600 ft. to 640 ft. stratigraphically above the base of the Tomago Stage. Its thickness is very variable, with a maximum of 15.8 ft. in 6(S) Parnell's Creek.

Thickness falls off on all sides from this bore to an average 7 ft. in the Farrell's Creek and Pond's Creek Subareas. In practically all cases the chemical composition is extremely constant. Rock bands are negligible; ash content is 12% to 19%, volatiles from 25% to 30%. It is free from splitting phenomena over the entire Area. It was not possible to make a correlation between the Farrell's Creek

Seam and seams of corresponding stratigraphical position in the Liddell-Ravensworth Area.

SEAM V.

Seam V has local development in the eastern part of the Howick Area. It has a mean gross thickness of 1.3 ft. It lies 60 ft. stratigraphically above the floor of the Farrell's Creek Seam.

SEAM W.

Seam W is 80 ft. stratigraphically above the floor of the Farrell's Creek Seam. In the Central Prospect, thickness is 2.5 ft. In 2(S)R Pond's Creek, a thickness of 4.9 ft. is attained. The seam is free from rock bands.

SEAM X.

This is the seam of highest stratigraphical position in the Parnell's Creek Subarea. It is found 140 ft. stratigraphically above the floor of the Farrell's Creek Seam. In the Pond's Creek Subarea, this seam is represented by two splits, called Seam X and Seam X_1. Gross thickness ranges from 2.2 ft. to 6.8 ft., with volatile content constant at 30%.

SEAM Y.

Owing to its high stratigraphical position, Seam Y is recorded from two bores only, 2(S)R Pond's Creek and 1(S) Jerry's Plains. In both bores the seam is split into three parts, the Upper, Middle and Lower Y Seams. The greater part of this seam has been cindered by an igneous intrusion so that chemical and physical data are not

general for this seam.

The seams are split by rock bands less than five feet thick. The Middle Y Seam has a mean band-free thickness of 5.5 ft. The other seams are less than 4 ft. thick.

In stratigraphical position and approximate thickness, this seam is similar to the Bayswater Seam.

SEAM Z.

Seam Z is stratigraphically the highest coal seam in the Pond's Creek Sub-Area. It is recorded from 1(S) Jerry's Plains only. It is 130 ft. stratigraphically above the base of the Lower Y Seam, that is, over 1,000 ft. stratigraphically above the base of the Tomago Stage. Thickness is 3.5 ft. It is almost free of rock bands, has low ash content (11%) and 33% volatile content.

The inter-seam strata are predominantly greywacke sandstones with minor lenses of siltstone and shale or claystone. These strata are uniform over the whole Area. Full petrographical descriptions may be found in the Northern Prospect Report, Section 5 (Overburden).

The one break in the uniformity of sediments is made by the conglomerate bed underlying the Farrell's Creek Seam in the Central Prospect. This is the only conglomerate of more than local development in the Area.

STRUCTURAL GEOLOGY.

The main structure is the Muswellbrook Anticline with dips in the Northern and Central Prospect of 5° to the east-south-east, passing over to dips of 20° to the south in the western part of the Pond's Creek Sub-Area; the plunge is 4½° SSE. Two local structures have been superimposed on this broad structure:

(a) The structure of Howick Ridge has resulted from the concordant intrusion of an igneous sill of possible Tertiary age with minimum thickness in the south-east of the Ridge of 200 ft. The upward movement to allow emplacement of the sill has affected only seam W and higher seams. The structural effect on strata below the sill can not be accurately gauged.

(b) 25 (S) and 26 (S) Parnell's Creek are located on the northern part of a north-plunging anticline, which has kept Artie's Seam in this part within 200 ft. of the surface. No faults have been noted in any part.

IGNEOUS GEOLOGY.

All the surface expression of the Carrington Sill is within the Area. The form of this intrusion as seen from bore data is that of a 'cedar tree' intrusion. Igneous

rocks (dioritic types) were penetrated in 2 (S), 2 (S)R, 15 (T), 15 (T) R and 16 (T) Pond's Creek and 1 (S) Jerry's Plains. Except in 1 (S) Jerry's Plains, little cindering of the coal was found. Nevertheless, for the estimation of coal reserves, a "cinder-line" was drawn, south of which reserves were not calculated.

TEXT-TABLE 2

OPEN CUT RESERVES

THICK-NESS IN FEET	RATIO 3:1				RATIO 5:1				RATIO 7:1				RATIO 9:1			
	Net		Weathered		Net		Weathered		Net		Weathered		Net		Weathered	
	Area in acrs.	Tons	Area in acrs.	Tons	Area in acrs.	Tons	Area in acrs.	Tons	Area in acrs.	Tons	Area in acrs.	Tons	Area in acrs.	Tons	Area in acrs.	Tons
														BARRETT'S SEAM.		
7.1			2.9	308,000	3.1	322,000	3.3	351,000	5.7	610,000	3.3	351,000	8.8	950,000	3.3	351,000
														UPPER LIDDELL SEAM		
7.0			3.6	378,000			7.2	756,000	2.7	283,000	7.2	756,000	6.3	661,000	7.2	756,000
														ARTIE'S SEAM		
8.9	0.5	6,000	10.3	132,000	3.6	50,000	11.2	143,500	5.0	63,000	11.2	143,500	5.0	63,000	11.2	143,500
9.10	4.7	71,300	4.2	66,700	7.3	116,000	4.9	76,700	14.1	223,000	4.9	76,700	18.6	287,000	4.9	76,700
10.11			30.8	392,000			39.8	510,000	11.3	128,000	43.8	560,000	14.9	180,000	43.8	560,000
11.12	5.1	82,000	26.4	461,000	8.1	171,000	29.7	518,400	21.5	379,000	29.7	518,400	40.4	643,000	29.7	518,400
12.13	3.8	73,000	13.7	256,000	21.6	417,000	19.3	362,000	40.8	776,000	20.2	379,000	66.0	1,350,000	20.2	379,000
13.14									11.9	241,000			22.3	452,000		
14.14									3.3	70,000			6.9	145,000		
Totals	14.1	232,300	85.4	1,007,700	40.6	754,000	98.9	1,610,600	107.9	1,880,000	109.8	1,677,600	174 1	3,120,000	109.8	1,677,600
														FARRELL'S CREEK SEAM		
8-9	7.4	98,750	7.6	97,500	11.0	140,500	11.2	143,500	13.9	168,250	11.9	151,900	17.5	214,150	11.9	151,900
9-10	2.1	29,900	4.9	69,800	10.2	147,750	6.7	95,500	17.8	255,500	6.7	95,500	27.9	398,000	6.7	95,500
10-11	1.9	30,000	14.8	233,900	14.3	225,000	14.8	233,900	24.7	406,125	14.8	233,900	33.4	544,700	14.8	233,900
11-12			7.1	122,500	3.9	67,270	9.6	152,000	12.6	168,245	9.6	152,000	22.6	340,700	9.6	152,000
12-13	0.7	13,125	10.8	202,500	7.2	135,000	11.1	207,500	10.5	196,900	11.1	207,500	12.5	234,400	11.1	207,500
13-14	0.5	9,100	8.1	164,000	4.2	85,650	9.0	182,250	5.0	99,200	9.0	182,250	7.7	153,900	9.0	182,250
14-15	1.0	21,750	3.2	70,500	4.4	94,900	3.2	70,500	5.9	129,100	3.2	70,500	7.9	172,600	3.2	70,500
15-16	2.8	65,100	7.1	165,300	13.6	300,390	7.1	165,300	16.0	357,800	7.1	165,300	18.9	425,200	7.1	165,300
16	0.9	21,600	4.5	108,000	2.2	54,000	4.5	108,000	2.2	54,000	4.5	108,000	2.2	54,000	4.5	108,000
Totals	17.3	285,325	68.1	1,234,000	71.0	1,250,460	77.2	1,358,450	108.6	1,835,120	77.9	1,366,850	150.6	2,637,650	77.9	1,366,850

Facing Page 28

COAL RESERVES

(For details of coal quality see Table II Folder 8)

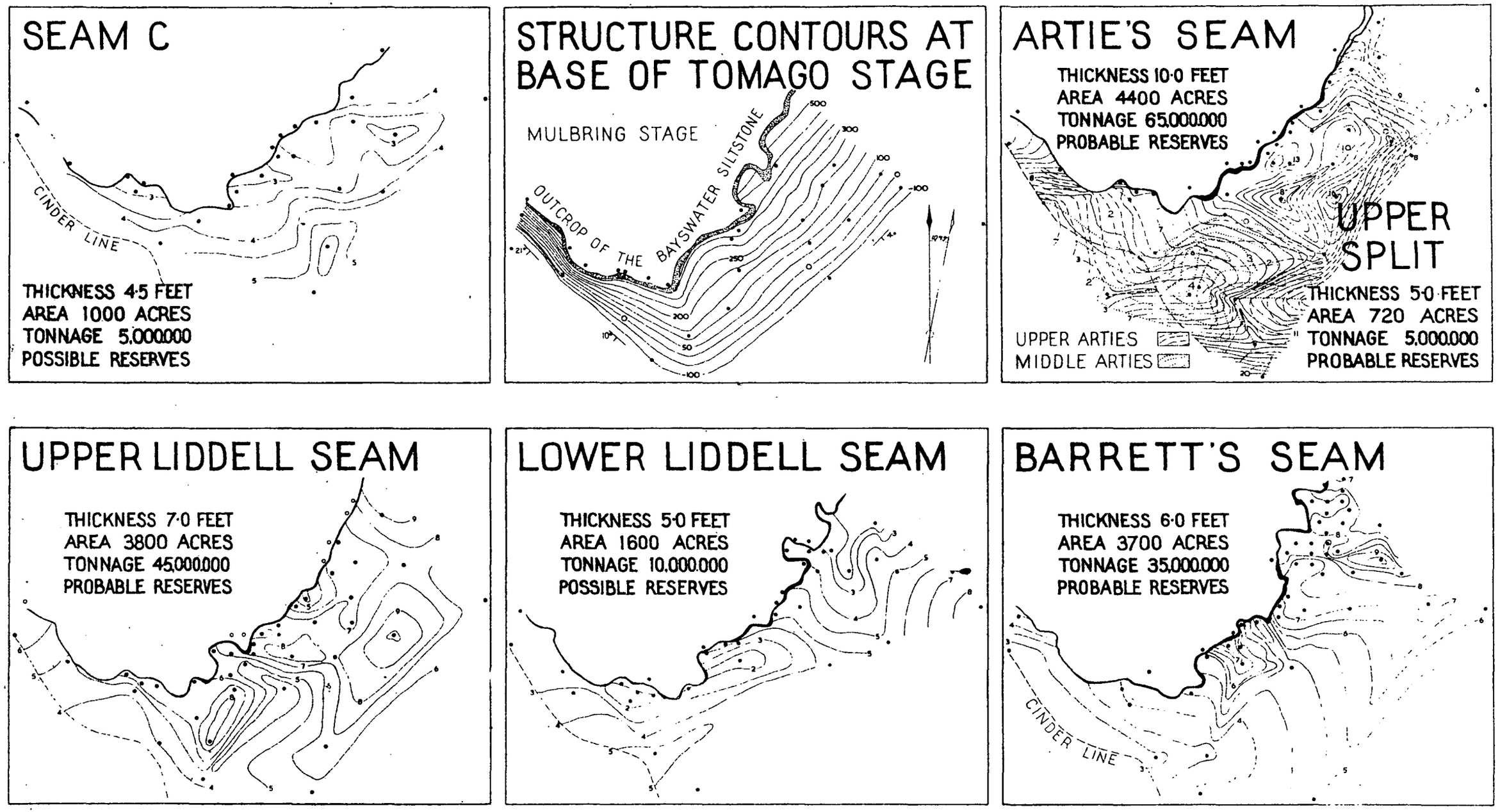
OPEN-CUT RESERVES.

Test and Define boring for open-cut coal was restricted to the Central Prospect for the Barrett's, Upper Liddell, Artie's and Farrell's Creek Seams. Reserves were calculated with overburden thickness to band-free coal thickness ratios (later called "ratios") of 3:1, 5:1, 7:1 and 9:1. Reserve figures are cumulative so that reserves up to, say a 9:1 ratio would include all that coal lying between the outcrop line of the seam roof and the 9:1 ratio line. Reserves for the Northern Prospect are not included here.

All reserves are made for band-free coal only. Net reserves include all band-free coal not weathered.

Barrett's and the Upper Liddell Seams maintain fairly constant thicknesses over their open-cut reserve areas; estimates of reserves for these seams are made by taking a mean band-free thickness. Artie's and the Farrell's Creek Seam range broadly in band-free thickness; estimates of open-cut reserves for these seams are made using isopachs with one-foot intervals so that reserves are given for particular band-free thickness ranges with one-foot intervals.

In order to assess the amount of open-cut coal which

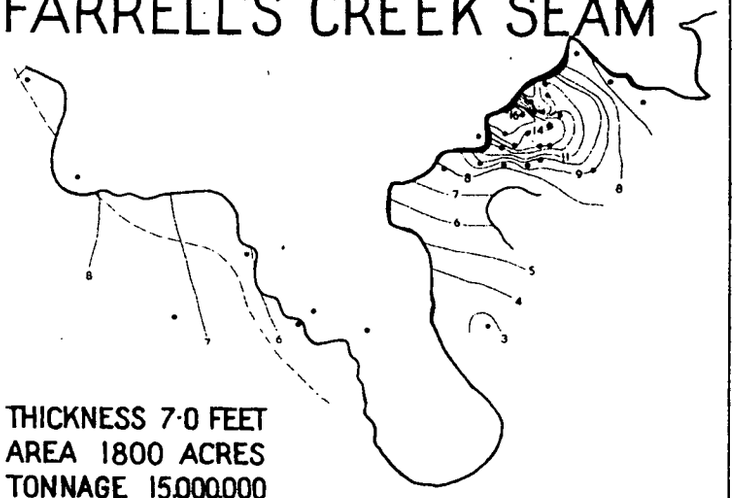


N 14-111/b

Fig. 1

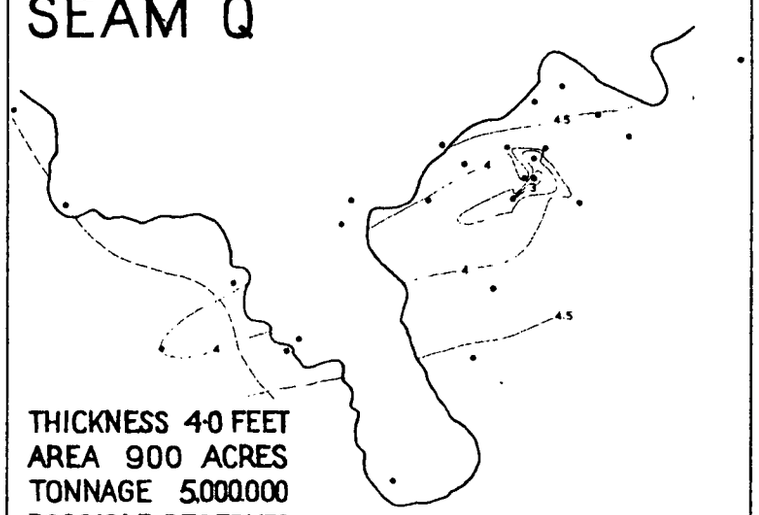
ISOPACHS OF BANDFREE COAL

FARRELL'S CREEK SEAM



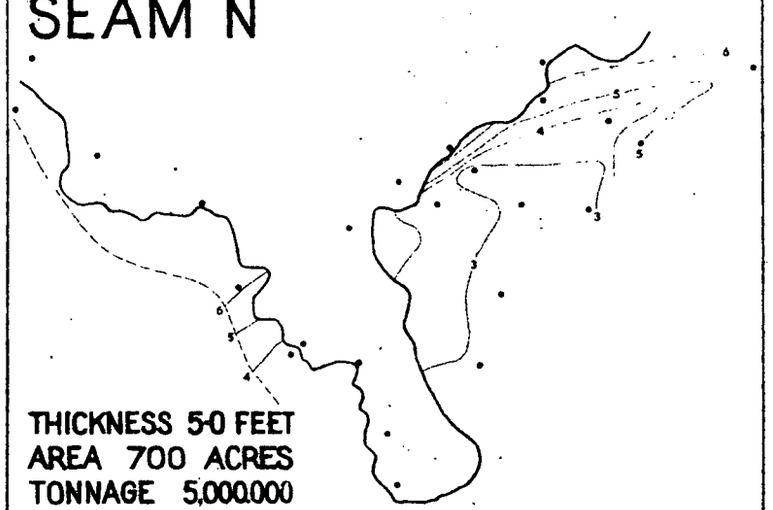
THICKNESS 7·0 FEET
AREA 1800 ACRES
TONNAGE 15,000,000
PROBABLE RESERVES

SEAM Q



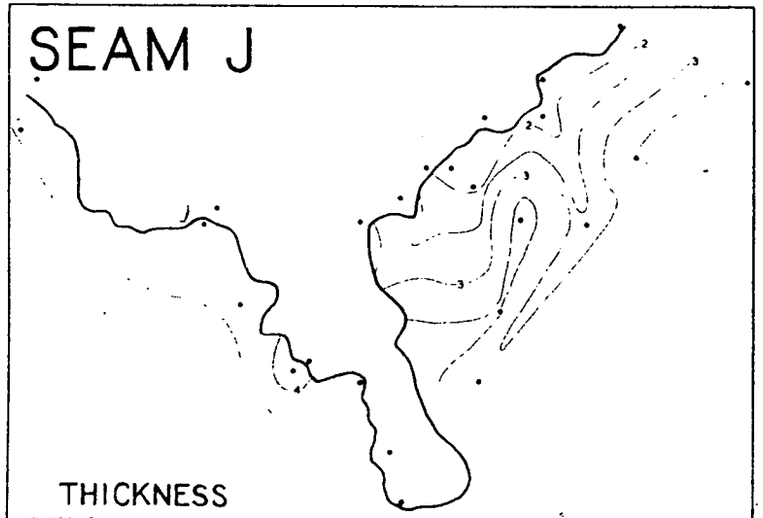
THICKNESS 4·0 FEET
AREA 900 ACRES
TONNAGE 5,000,000
POSSIBLE RESERVES

SEAM N



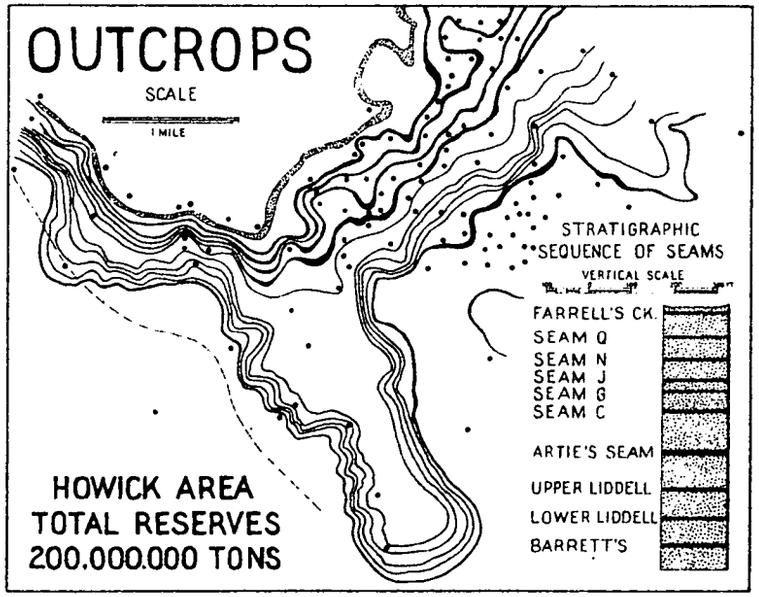
THICKNESS 5·0 FEET
AREA 700 ACRES
TONNAGE 5,000,000
POSSIBLE RESERVES

SEAM J



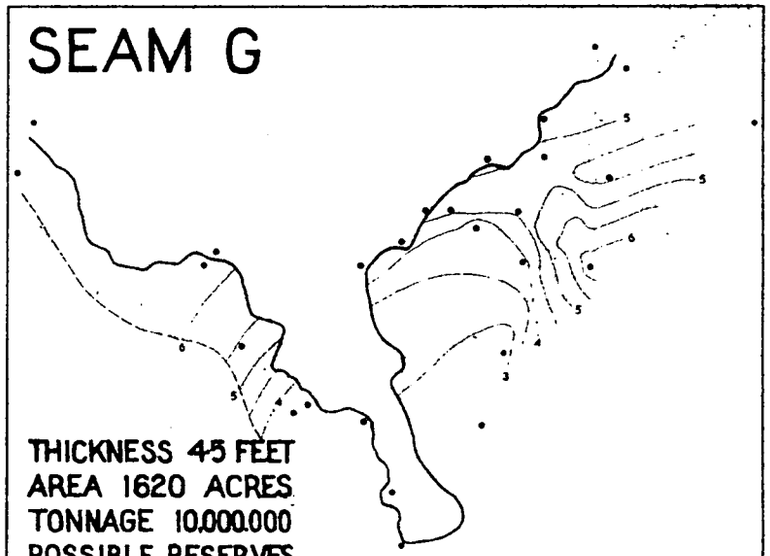
THICKNESS
BELOW 4·0 FEET
NO RESERVES

OUTCROPS



HOWICK AREA
TOTAL RESERVES
200,000,000 TONS

SEAM G



THICKNESS 4·5 FEET
AREA 1620 ACRES
TONNAGE 10,000,000
POSSIBLE RESERVES

is weathered, "weathering lines" were drawn for each seam. Such lines pass through points on the seam where fresh coal makes contact with weathered coal. Weathering-lines are then used to estimate the approximate amounts of weathered coal.

The value of 1,500 tons as the weight of one acre-foot of coal was taken in all estimates.

TOTAL RESERVES.

In estimating total reserves, reference was made to Jones (2 page 93).

Seam	Mean band-i ee thickness feet	Area (acres)	Tonnage (million tons)
Barrett's	6.0	3700	35 (probable)
Lower Liddell	5.0	1600	10 (possible)
Upper Liddell	7.0	3800	45 (probable)
Artie's	10.0	4400	65 do.
Upper Artie's	5.0	720	5 do.
Seam C	4.5	1000	5 (possible)
Seam G	4.5	1620	10 do.
Seam N	5.0	700	5 do.
Seam Q	4.0	900	5 do.
Farrell's Creek	7.0	1800	15 (probable)
			200 million tons

There are no 'Actual Reserves' in the Area; most of the reserves reported on fall into the category of 'Probable Reserves'.

The minimum band-free thickness used in estimating reserves was 4.0 ft. The area over which the coal reserves occur is that described by the outcrop line, the 4.0 band-free coal isopach, the cinder line, and the areal limits of the Area. Mean thicknesses are estimated where thickness ranges are not extreme. The maximum depth from the surface is 1,000'. Practically all coal in the Tomago Stage is at a depth less than 1,000' in the Howick Area.

Estimates were made for all seams occurring within the Area. A seam not mentioned in the reserves has no reserves.

All reserves quoted have been conservatively estimated. All calculated figures were reduced to the nearest lower five or nought digit in the millions column.

REFERENCES

1. FOSKETT W.E., "Geology of the Ravensworth-Liddell Area" - Report Joint Coal Board N.S.W., 1952.

2. JONES L.J., 1939, "Maitland-Cessnock-Greta Coal District" - Mineral Resources, N.S.W., 37.

DRILLING DATA

(M.C. Konecki)

The following is a summary of the results of drilling in the area of approximately 15 square miles:-

A	1.	Total number of bores	117	
	2.	Number of "scout" bores	42	
	3.	Number of "test & define" bores	75	
B	1.	Total footage	27,380	
	2.	Footage drilled	4,627	
	3.	Footage cored	22,753	
	4.	"Scout" footage	17,551	
	5.	"Test and define" footage	9,829	
C	1.	Average depth per bore	234	ft.
	2.	Average depth per "scout" bore	418	ft.
	3.	Average depth per "test & define" bore	131	ft.
D	1.	Total reserves of unweathered "band-free" coal in seams not less than 4 ft. thick	200,000,000	tons
	2.	Open-cut coal reserves of coal as under D.1. (at 1:9 coal to overburden ratio)	7,368,650	tons
E	1.	Footage per ton of "total" reserves	0.000137	
	2.	Footage per ton of "open-cut" reserves (at 1:9 ratio)	0.00375	
F	1.	Tonnage ("total") per foot	7,305	
	2.	Tonnage ("open-cut") per foot	269	

Drilling in the Central and Southern Prospects of Parnell's Creek Area, in Pond's Creek, Farrell's Creek and Jerry's Plains Areas was carried out jointly by the Bureau and the contractors.

The Bureau drilled a total of 9,181 feet and the contractors 18,199 feet.

The following contractors were engaged under very favourable conditions:-

1. Pacific Boring Pty. Ltd., using:
   one "Failing 750" machine
   one "Bucyrus-Ruston" machine

2. Drilling Corporation (Aust.) Pty. Ltd., using:
   two "Mindrill 1000E" machines

3. J.H. Houben, using:
   one "Mindrill 2000A" machine

4. Price and Anderson, using:
   one "Goldfields 20" machine

5. J. McD. Royle Pty. Ltd., using:
   two "Sullivan 22" machines

At one stage experimental coring in coal was made by Messrs. W.L. Sides and Son, using a "Baker" percussion core barrel. That experiment was unsuccessful, due to inability to obtain a "solid" core with percussion coring tools.

The results obtained by the contractors were generally very gratifying, both in respect of core recoveries and the rate of drilling. It is believed that this was mainly due to the incentive clauses for the high core-recovery in coal (minimum 80%). Only one contractor failed to achieve the required high standard of operations. He was promptly relieved of the contract.

Text-Table No. 3 illustrates the results of drilling by the Bureau and contractors. In order to understand this table, the following remarks may be necessary:-

(a) In calculating the "overall rate of drilling" - time spent on moving rig to the site, rigging up, drilling, setting of casing and plugging had been taken into account for each bore. The moving distance from site to site was under one mile on the average. More serious fishing operations and break-downs lasting more than eight hours have been excluded from the calculation.

(b) In calculating core-recoveries in "coal" only seams over 2'6" thick (including bands) have been taken into consideration.

(c) Both the Bureau and the contractors used the best drilling equipment available. Core barrels were of "double-tube, bottom discharge, stationary inner tube, swivel type."

The Bureau used exclusively the "Failing" core barrel of 10 ft. length. Pacific Boring Co. used the "Failing" barrel on occasions only; their standard core barrel has been the one described in BMR Records 76/1952 Part 1, Parnell's Creek Area, Completion Report, Northern Prospect).

Other contractors used "Mindrill NX & NM" core barrels.

The NM core-barrel - referred to as "mud barrel" by the manufacturers, "Mineral Drillers

Pty. Ltd." is described and illustrated in the November, 1952, issue of their publication "Mindrill Bits and Pieces."

(d) Core-bits used were of two general types, i.e. borium insert and diamond. The Bureau used exclusively borium insert core bits, while contractors used mostly diamond bits.

Houben and Price and Anderson used borium bits in some instances. Both sizes, i.e. NX and NM, were used; the NM size was favoured for coring coal in conjunction with NM core barrel.

Pacific Boring Co. used diamond bits with a setting of about 76 carats, and of "super NX" size in conjunction with their standard core-barrel. Other contractors used diamond bits with a much lower setting.

An approximate calculation was made in order to find out an "average footage per core-bit by various drilling operators engaged on this programme. The approximate figures are as follows:-

BMR (using borium insert core-bits)	61 ft./core-bit
Pacific Boring Co. Pty. Ltd. (using diamond core-bits)	880 ft./core-bit
Price & Anderson (using diamond core-bits)	490 ft./core-bit
J.H. Houben (using diamond core-bits)	330 ft./core-bit

Drilling Corporation (Aust.) Pty. Ltd.
(using diamond core-bits) 360 ft./core-bit

Diamond recovery varied between 36% and 65% (average was about 60%) and borium insert recovery was about 30% on the average.

A comparison of approximate average "cost per foot" cored by diamonds and by borium inserts is possible, taking Pacific Boring Co. and BMR as examples, and considering current prices for diamonds, borium inserts and setting charges. In addition, the following figures (mentioned earlier) have been accepted:

	BMR	PBC
Average footage per core-bit	61	880
Recovery (borium inserts or diamonds)	30%	60%
Setting (number of inserts or carats)	14	76

The "approximate average cost of core-bits per foot cored" thus calculated is:-

1s. 9d. for Pacific Boring Co. Pty. Ltd., and
3s.10d. for Bureau of Mineral Resources.

A similar calculation would show that the "approximate average cost of core-bits per foot cored" for the remaining contractors was under two shillings.

It would appear, therefore, that the use of borium insert core-bits is twice as dear as that of diamond bits, and could not be recommended for best results in coring coal. This has been verified since by using diamond bits on the western flank of the Muswellbrook Dome.

It should be mentioned here that J.H. Houben in his subsequent coring operations on the western flank of the Muswellbrook Dome increased the "average footage per core-bit" to about 870, using a diamond setting of core-bits considerably lower than that by Pacific Boring Co. Pty. Ltd., and thus correspondingly reducing the "approximate average cost of core-bits per foot cored."

Water was used as the drilling fluid by most contractors. Pacific Boring Co. used bentornite mud in some cases, while the Bureau used bentornite mud as a matter of routine. Acute losses of circulation necessitated the application of thick bentornite slurries in conjunction with plugging agents (sawdust, bran) or of cement.

These remedies were usually successful, although in one case at least drilling had to be abandoned due to inability of overcoming circulation loss in a highly fractured formation.

The assistance of Messrs. H.S. Taylor-Rogers and K.B. Cairnes of Bureau of Mineral Resources in obtaining data for the above calculations is gratefully acknowledged.

TEXT TABLE 3. SUMMARY OF SURVEYING AND DRILLING RESULTS.

Serial Number of B M R Bore	Approximate Locations from points of origin			Elevation in feet A.S.L.	Surveyor	Method of Survey	Depth of Bore		Date of Drilling		Drilled by	Type of Drilling Rig used	Type of Coring bit
	Point of origin	True Bearings	Distance in feet				Feet	Inches	Begun	Finished			
5 S	3	168°10'	5,060	509.0'	J. Veevers	Tel. Alidade	499	6	29.5.52	18.6.52	B.M.R.	Failing 750 & 1500	Borium
6 S	3	115°20'	7,660	560.2	G.S./J.S.	Tel. Alidade	678	0	18.6.52	30.7.52	B.M.R.	Failing 1500	Borium
7 S	3	147°40'	3,250	430.0	G.S./J.S.	Tel. Alidade	302	1	30.6.52	21.7.52	B.M.R.	Failing 750	Borium
8 S	3	88°50'	7,860	534.4	G.S./J.S.	Tel. Alidade	500	2	22.7.52	28.8.52	B.M.R.	Failing 750	Borium
9 S	3	88°00'	5,280	507.0	G.S./J.S.	Tel. Alidade	300	6	30.7.52	18.8.52	H & K.	Mindrill A 2000	NX Diam.& bor.
10 S	3	79°50'	11,040	450.7	G.S./J.S.	Tel. Alidade	500	0	4.8.52	27.8.52	B.M.R.	Failing 1500	Borium
11 S	3	75°00'	8,420	486.5	G.S./J.S.	Tel. Alidade	80	0	14.8.52	21.8.52	P.A.	Goldfields 20	NX Borium
12 S	3	71°20'	6,750	441.1	G.S./J.S.	Tel. Alidade	254	0	19.8.52	1.9.52	H & K.	Mindrill A2000	NM Diam.NX Bor.
13 S	3	See 11 S.		486.5	J.S./G.S.	Tel. Alidade	300	0	25.8.52	20.9.52	P.A.	Goldfields 20	NM Diam.NX Tung.
14 S	3	143°10'	6,380	546.1	J.S./G.S.	Tel. Alidade	464	0	2.9.52	30.10.52	J.Mac.D. Royle	Sullivan 22	NM & NX Diam.
16 S	3	125°00'	5,400	491.5	J.S./G.S.	Tel. Alidade	420	0	2.9.52	8.10.52	P.B.C.	Ruston Bucyrus 22W Mod. Rotary.	NX Super Diam.
17 S	4	101°00'	10,320	256.6	N. Gorbunow	Theod. Trav.	646	3	5.9.52	18.10.52	H.&.K.	Mindrill A 2000	NX & NM Diam.
18 S	3	99°10'	7,960	534.4	J.S./G.S.	Tel. Alidade.	500	0	13.9.52	30.9.52	P.B.C.	Failing 750	NX Super Diam.
19 S	3	101°50'	5,860	510.8	G. Stuart	Tel. Alidade.	465	0	1.10.52	4.11.52	P.B.C.	Failing 750	NX Super Diam.
20 S	3	119°30'	10,810	530.5	N. Gorbunow	Tel. Alidade.	413	10	9.10.52	23.11.52	P.B.C.	Ruston Bucyrus 22W Mod. Rotary.	NX Super Diam.
21 S	4	87°00'	10,930	294.9	N. Gorbunow	Theod. Trav.	486	10	24.10.52	14.11.52	H & K.	Mindrill A 2000	NX & NM Diam.&NX Bor.
22 S	4	76°20'	4,330	385.6	N. Gorbunow	Theod. Trav.	376	0	31.10.52	23.11.52	J.Mac.D. Royle	Sullivan 22	NX & NM Diam.
23 S	3	126°10'	8,600	593.2	N. Gorbunow	Theod. Trav.	499	0	5.11.52	24.11.52	P.B.C.	Failing 750	NX Super Diam.
24 S	4	107°45'	6,080	337.4	N. Gorbunow	Theod. Trav.	259	10	19.3.53	14.4.53	P & A.	Goldfields 20	NX Bor.& Diam.
25 S	4	122°50'	8,170	352.4	N. Gorbunow	Theod. Trav.	180	1	14.4.53	27.4.53	P.& A.	Goldfields 20	NX Diamond.
26 S	4	131°10'	9,600	354.3	N. Gorbunow	Theod. Trav.	148	7	27.4.53	8.5.53	P.& A.	Goldfields 20	NX & NM Diamond.

Farnell's Creek Subarea. (Scout Bores)

Serial Number of BMR Bore	Type of drilling fluid used	Footage Cored		Type of Core Barrell	Casing			Condition of Abandoned Hole	Water Shows Recorded		Number of Coal Seams over 2'6"	Number of Coal Samples Analysed	Overall Core Recovery in Coal Seams	Overall Core Recovery in bore	Overall Rate of drilling	Remarks.
					Length Cased				Estimated depth in feet	Hydrost. head in feet						
		Feet	Inches		Feet	Inches	Casing in hole						%	%	Ft/Hr	
5 S	Bentonite Mud.	479	9	Failing	NIL		NIL	Plugged to about 6ft. below surface with broken pieces of core etc. 2-3ft. of clay plug on top and 3 to 4 ft. of cement slurry covering clay. Timber post 6" Diam. set into slurry for 3-4 ft. and standing 3 ft. above surface, metal tag bearing number of bore nailed onto marker post.			6	9	72.6	83.5	1.60	
6 S	Bent. Mud.	666	0	Failing	NIL		NIL				11	22	71.9	82.3	1.25	
7 S	Bent. Mud.	287	1	Failing	NIL		NIL				2	6	98.0	83.5	1.20	
8 S	Bent. Mud.	482	7	Failing	NIL		NIL				8	27	89.3	93.6	1.30	
9 S	Natural Mud	300	6	Mind. NX	33		NIL				4	6	68.3	83.9	1.40	
10 S	Bent. Mud.	480	0	Failing	NIL		NIL				6	19	77.7	84.8	1.30	
11 S	Natural Mud	80	0	Mind. Nx.	NIL		NIL				1	0	41.3	74.5	1.20	
12 S	Natural Mud	300	0	Mind NX & NM	37	0	NIL				2	6	86.2	87.2	2.00	
13 S	Natural Mud	254	0	Mind. NX & NM	NIL		NIL				4	17	98.9	95.8	2.00	
14 S	Natural Mud	464	0	Mind. NX & NM	63	0	NIL				4	10	80.2	84.8	1.80	
15 S	Natural Mud	409	0	Mind. Super NX	NIL		NIL				7	26	95.15	90.3	1.00	
17 S	Natural Mud	643	3	Mind.NM & NX	94	0	NIL		330 340 (600 gall/hr)		14	31	89.95	90.8	1.50	
17 S	Natural Mud	489	0	Mind.Super NX	NIL	0	72				10	24	21.5	97.5	2.50	
19 S	Natural Mud	454	10	Mind.Super NX	31	0	NIL				7	15	94.45	95.3	1.80	
20 S	Natural Mud	403	0	Mind.Super NX	64	3	NIL				10	18	89.7	94.8	0.86	
21 S	Natural Mud	486	10	Mind.NX & NM	65	6	NIL		350 352 (not estimated)		10	23	98.3	94.4	2.15	
22 S	Natural Mud	376	0	Mind.NX & NM	53	0	NIL				4	7	62.5	81.0	1.70	
23 S	Natural Mud	489	0	Failing & Mind	21	0	NIL				9	23	95.3	87.2	2.40	
24 S	Natural Mud	259	10	Mind. NX	45	0	NIL				6	13	97.9	86.0	1.50	
25 S	Natural Mud	180	2	Mind. NX	25	0	NIL				5	10	100.0	91.4	1.60	
26 S	Natural Mud	148	7	Mind.NX & NM	30	0	NIL				1	11	100.0	80.4	1.90	

Parnell's Creek Subarea (Scout Bores.)

SUMMARY OF SURVEYING AND DRILLING RESULTS

Parnell's Creek Subarea (Test Bores.)

Serial Number of B M R Bore	Approximate Locations from points of origin: Point of origin	True Bearings	Distance in feet	Elevation in feet A.S.L.	Surveyor	Method of Survey	Depth of Bore: Feet	Inches	Date of Drilling: Begun	Finished	Drilled by	Type of Drilling Rig used	Type of Coring bit
19 T	3	133° 0'	6,010	538.3	J.Svoronos & G. Stuart.	Tel. Alidade.	130	0	31.8.52	12.9.52	P.B.C.	Failing 750	Diamond Sup.NX
20 T	3	109° 0'	3,870	456.4	J.S./G.S.	Tel. Alidade.	130	0	1.9.52	9.9.52	D.C.A.	E1000 Mindrill	NX & NM Diam.
21 T	3	161°10'	3,020	494.3	J.S./G.S.	Tel. Alidade.	135	9	2.9.52	9.9.52	D.C.A.	E1000 Mindrill	NX & NM Diam.
22 T	3	125°30'	6,440	535.9	J.S./G.S.	Tel. Alidade.	130	0	3.9.52	8.9.52	P.B.C.	Failing 750	Diamond Sup.NX
23 T	3	121° 0'	6,190	577.7	J.S./G.S.	Tel. Alidade.	66	6	6.9.52	9.9.52	P.B.C.	Failing 750	Diamond Sup.NX
24 T	3	111° 0'	7,670	569.3	J.S./G.S.	Tel. Alidade.	118	0	9.9.52	13.9.52	P.B.C.	Failing 750	Diamond Sup.NX
25 T	3	168°50'	4,190	504.5	J.S./G.S.	Tel. Alidade.	130	0	10.9.52	15.9.52	D.C.A.	E1000 Mindrill	NX & NM Diam.
26 T	3	123°20'	3,250	529.0	J.S./G.S.	Tel. Alidade.	138	0	10.9.52	18.9.52	D.C.A.	E1000 Mindrill	NX & NM Diam.
27 T	3	150°45'	3,960	480.2	J.S./G.S.	Tel. Alidade.	125	0	15.9.52	3/10/52	D.C.A.	E1000 Mindrill	NX & NM Diam.
28 T	3	136°20'	3,270	460.9	J.S./G.S.	Tel. Alidade.	147	0	19.9.52	25.9.52	D.C.A.	E1000 Mindrill	NX & NM Diam.
29 T	3	148°15'	4,930	468.3	J.S./G.S.	Tel. Alidade.	150	6	24.9.52	30.9.52	P.A.	Goldfields 20	NM & NX Tung.
30 T	3	99°10'	4,190	456.4	J.S./G.S.	Tel. Alidade.	78	6	27.9.52	1.10/52	D.C.A.	E1000 Mindrill	NX & NM Diam.
31 T	3	150°40'	4,680	458.7	G.Stuart	Tel. Alidade.	117	7	1.10.52	8.10.52	P.A.	Goldfields 20	NM.Diam.NX.Tung.
32 T	3	98°30'	4,630	528.4	G.Stuart	Tel. Alidade.	153	0	2.10.52	11.10.52	D.C.A.	E1000 Mindrill	NX & NM Diam.
33 T	3	127°40'	4,020	520.0	G.Stuart	Tel. Alidade.	123	0	1/10.52	16/10/52	P.A.	Goldfields 20	NX.Tung. NM Diam.
34 T	3	170°40'	4,780	521.1	G.Stuart	Tel. Alidade.	127	0	8/10.52	16.10/52	D.C.A.	E1000 Mindrill	NX & NM Diam.
35 T	3	117°15'	4,140	487.3	G.Stuart	Tel. Alidade	141	4	13.10.52	20/10/52	D.C.A.	E1000 Mindrill	NX & NM Diam.
36 T	3	121°50'	7,190	645.2	J.Svoronos	Tel. Alidade.	180	0	17.10.52	25/10.52	D.C.A.	E1000 Mindrill	NX & NM Diam.
37 T	3	106° 0'	4,690	480.6	J.Svoronos	Tel. Alidade.	84	0	17.10.52	25.10.52	P.A.	Goldfields 20	NX.Tung.NM.Diam.
38 T	3	119°15'	8,050	556.8	J.Svoronos	Tel. Alidade.	118	4	21.10.52	27.10/52	D.C.A.	E1000 Mindrill	NX & NM Diam.
39 T	3	91°40'	4,630	497.2	J.Svoronos	Tel. Alidade.	137	1	27.10.52	1.11.52	P.A.	Goldfields 20	NM.Diam.NX Tung.
40 T	3	133°30'	7,190	576.3	G. Stuart	Tel. Alidade.	114	0	25.10/52	29.10.52	D.C.A.	E1000 Mindrill	NX & NM Diam.

SUMMARY OF SURVEYING AND DRILLING RESULTS

Serial Number of BMR Bore	Type of drilling fluid used	Footage Cored		Type of Core Barrell	Casing			Condition of Abandoned Hole	Water Shows Recorded		Number of Coal Seams over 2'6"	Number of Coal Samples Analysed	Overall Core Recovery in Coal Seams	Overall Core Recovery in bore	Overall Rate of drilling	Remarks.
					Length Cased				Estimated depth in feet	Hydrost. head in feet						
		Feet	Inches		Feet	Inches	Casing in hole						%	%	Ft/Hr	
19 T	Natural Mud	119	0	Mind.Super NX	Nil	Nil	Nil	Plugged to about 6ft.below surface with broken pieces of core etc. 2-3ft. of clay plug on top and 3 to 4ft. of cement slurry,covering clay.Timber post 6" Diam.set into slurry for 3-4 ft.and standing 3 ft. above surface, metal tag bearing number of bore nailed onto marker post.	No Water Shows Recorded.		1	10	100.0	98.8	3.60	
20 T	Natural Mud	130	0	Mind.NX & NM	30	8	Nil				1	4	84.1	72.1	1.94	
21 T	Natural Mud	135	9	Mind.Nx & NM	29	0	Nil				2	4	42.1	74.8	2.20	
22 T	Natural Mud	130	0	Mind.Super NX	Nil	Nil	Nil				4	6	100.0	95.7	2.95	
23 T	Natural Mud	66	6	Mind.Super NX	Nil	Nil	Nil				1	0	48.75	96.8	1.90	
24 T	Natural Mud	118	0	Mind.Super NX	Nil	Nil	Nil				1	5	100.0	98.8	2.62	
25 T	Natural Mud	130	0	Mind. NX & NM	18	0	Nil				2	3	52.8	76.7	3.35	
26 T	Natural Mud	138	0	Mind. NX & NM	28	0	Nil				2	7	92.1	88.4	2.30	
27 T	Natural Mud	125	0	Mind. NX & NM	10	0	Nil				1	3	96.9	86.6	2.08	
28 T	Natural Mud	147	0	Mind. NX & NM	29	8	Nil				2	5	86.85	87.8	2.70	
29 T	Natural Mud	150	5	Mind. NX & NM	23	4	Nil				3	3	85.1	83.6	1.70	
30 T	Natural Mud	78	6	Mind. NX & NM	25	7	Nil				1	0	95.3	84.9	2.70	
31 T	Natural Mud	117	7	Mind. NX & Nm	25	0	Nil				1	10	100.0	82.0	1.50	
32 T	Natural Mud	153	0	Mind. NX & NM	24	8	Nil				1	6	92.8	84.5	2.15	
33 T	Natural Mud	123	0	Mind. NX & NM	40	0	Nil				1	7	99.5	88.2	1.30	
34 T	Natural Mud	127	0	Mind. NX & NM	33	0	Nil				1	6	75.2	73.5	2.00	
35 T	Natural Mud	141	4	Mind. NX & NM	Nil	Nil	Nil				2	10	95.9	82.9	2.30	
36 T	Natural Mud	180	0	Mind. NX & NM	23		Nil				3	8	91.8	80.2	2.75	
37 T	Natural Mud	84	0	Mind. NX & NM	22	4	Nil				1	7	100.0	80.8	1.45	
38 T	Natural Mud	118	4	Mind. NX & NM	[illegible]	6	Nil				1	5	91.35	84.4	2.50	
39 T	Natural Mud	137	1	Mind. NX & NM	20		Nil				2	3	100.0	89.2	1.80	
40 T	Natural Mud	114	0	Mind. NX & NM	25		Nil				2	3	66.5	68.8	3.35	

Page 1 of 4 Oxenbury Subarea. (Test Bores.)

SUMMARY OF SURVEYING AND DRILLING RESULTS

Parnell's Creek Subarea. (Test Bores)

Serial Number of B M R Bore	Approximate Locations from points of origin			Elevation in feet A.S.L.	Surveyor	Method of Survey	Depth of Bore		Date of Drilling		Drilled by	Type of Drilling Rig used	Type of Coring bit
	Point of origin	True Bearings	Distance in feet				Feet	Inches	Begun	Finished			
41 T	3	143°20'	3,620	439.2	G. Stuart	Tel. Alidade	61	2	28.10.52	29.10.52	D.C.A.	El000 Mindrill	NX & NM Diam.
42 T	3	52°20'	4,800	489.1	G. Stuart	Tel. Alidade	110	0	30.10.52	4.11.52	D.C.A.	El000 Mindrill	NX & NM Diam.
43 T	3	60°30'	5,680	507.3	G. Stuart	Tel. Alidade	100	2	30.10.52	4.11.52	D.C.A.	El000 Mindrill	NX & NM Diam.
44 T	3	137°10'	2,420	432.4	G. Stuart	Tel. Alidade	125	0	31.10.52	7.11.52	W.L.Sides & Son.	Goldfields 33 Percussion	Chisel (not corin
45 T	3	83°00'	3,910	433.2	G. Stuart	Tel. Alidade	85	0	2.11.52	4.11.52	P.A.	Goldfields 20	NM.Diam.NX Tung.
46 T	3	71°30'	5,100	419.1	G. Stuart	Tel. Alidade	105	3	5.11.52	7.11.52	D.C.A.	El000 Mindrill	NX Tung. & Diam.
47 T	3	91°50'	3,840	466.2	G. Stuart	Tel. Alidade	121	7	4.11.52	11.11.52	P.A.	Goldfields 20	NM Diam.NX Tung.
48 T	3	65°45'	5,370	436.4	G. Stuart	Tel. Alidade	60	0	5.11.52	5.11.52	D.C.A.	El000 Mindrill	NX & NM Diam.
49 T	3	76°20'	4,500	437.9	N. Gorbunow	Theod. Trav.	56	0	6.11.52	7.11.52	D.C.A.	El000 Mindrill	NX & NM Diam.
50 T	3	65°00'	6,440	443.3	G. Stuart	Tel. Alidade	101	6	10.11.52	13.11.52	D.C.A.	El000 Mindrill	NX & NM Diam.
51 T	3	91°20'	6,270	460.2	J. Svoronos	Tel. Alidade	65	0	8.11.52	11.11.52	D.C.A.	El000 Mindrill	NX & NM Diam.
52 T	3	197°10'	1,850	431.4	N. Gorbunow	Tel. Alidade	120	0	9.11.52	11.11.52	W.L.Sides & Son.	Goldfields 33 Percussion	Chisel (not coring
53 T	3	95°10'	2,630	460.0	K. Schofield	Tel. Alidade	138	6	11.11.52	18.11.52	D.C.A.	El000 Mindrill	NX Diamond.
54 T	3	124°45'	1,550	429.0	K. Schofield	Tel. Alidade	146	10	12.11.52	18.11.52	P.A.	Goldfields 20	NX Diam. & Tung.
55 T	3	103°30'	1,740	451.8	K. Schofield	Tel. Alidade	97	6	14.11.52	19.11.52	D.C.A.	El000 Mindrill	NX Diamond.
56 T	3	77°00'	7,010	494.6	G. Stuart	Tel. Alidade	113	10	18.11.52	24.11.52	D.C.A.	El000 Mindrill	NX & NM Diam.
57 T	3	151°00'	1,920	429.8	N. Gorbunow	Theod. Trav.	83	10	18.11.52	21.11.52	P.A.	Goldfields 20	NX & NM Diam.& Tung.
58 T	See 41 T.						93	0	19.11.52	24.11.52	D.C.A.	El000 Mindrill	NX & NM Diam.
59 T	3	151°00'	1,920	429.8	N. Gorbunow	Theod. Trav.	90	6	25.11.52	27.11.52	D.C.A.	El000 Mindrill	NX & NM Diam.
60 T	3	123°40'	7,830	632.3	J. Svoronos	Tel. Alidade	174	1	28.11.52	8.12.52	D.C.A.	El000 Mindrill	NX & NM Diam.
61 T	3	113°30'	7,930	511.1	J. Svoronos	Tel. Alidade	51	8	1.12.52	3.12.52	P.A.	Goldfields 20	NM Diam.& Tung.
62 T	3	104°20'	7,970	575.8	G. Stuart	Tel. Alidade	67	11	3.12.52	9.12.52	P.A.	Goldfields 20	NM Diam.NX Tung.

SUMMARY OF SURVEYING AND DRILLING RESULTS

Serial Number of BMR Bore	Type of drilling fluid used	Footage Cored		Type of Core Barrell	Casing			Condition of Abandoned Hole	Water Shows Recorded		Number of Coal Seams over 2'6"	Number of Coal Samples Analysed	Overall Core Recovery in Coal Seams	Overall Core Recovery in bore	Overall Rate of drilling	Remarks.
					Length Cased				Estimated depth in feet	Hydrost. head in feet						
		Feet	Inches		Feet	Inches	Casing in hole						%	%	Ft/Hr	
41 T	Natural Mud	61	22	Mind. NX & NM	29	6	Nil	Plugged to about 6ft. below surface with broken pieces of core etc 2-3ft. of clay plug on top and 3 to 4 ft. of cement slurry covering clay. Timber post 6" Diam. set into slurry for 3-4 ft. and standing 3 ft. above surface, metal tag bearing number of bore nailed onto marker post.	No Water Shows Recorded		Nil	0	-	48.4	3.40	Parnell's Creek Subarea (Test Bores.)
42 T	Natural Mud	110	0	Mind. NX & NM	15	0	Nil				Nil	0	-	91.7	3.10	
43 T	Natural Mud	100	2	Mind. NX & NM	Nil	Nil	Nil				1	4	84.8	78.0	2.70	
44 T	Natural Mud	19	6	Baker Percussion	Nil	Nil	Nil				2	5	61.85	18.0	5.00	
45 T	Natural Mud	85	0	Mind. NX & NM	20		Nil				1	3	100.0	36.9	2.25	
46 T	Natural Mud	105	3	Mind. NX	26	0	Nil				Nil	0		92.5	4.05	
47 T	Natural Mud	121	7	Mind. NX & NM	20	0	Nil				2	6	100.0	90.0	2.15	
48 T	Natural Mud	60	0	Mind. NX & NM	15	0	Nil				1	0	88.9	83.6	4.60	
49 T	Natural Mud	56	0	Mind. NX & NM	11	0	Nil				1	5	94.0	72.2	4.00	
50 T	Natural Mud	101	6	Mind. NX & NM	15	0	Nil				1	4	100.0	73.6	2.55	
51 T	Natural Mud	65	0	Mind. NX & NM	24	8	Nil				1	6	98.95	47.0	3.25	
52 T	Natural Mud	Nil		Baker Percussion	Nil	Nil	Nil				Nil	D R I L L E D			3.65	
53 T	Natural Mud	138	6	Mind. NX	14	8	Nil				1	3	68.4	86.3	2.95	
54 T	Natural Mud	146	10	Mind. NX	20	0	Nil				Nil	0		95.7	1.70	
55 T	Natural Mud	97	6	Mind. NX	26	0	Nil				1	0	13.9	81.8	2.70	
56 T	Natural Mud	113	10	Mind. NX & NM	19	6	Nil				1	2	94.2	58.7	2.55	
57 T	Natural Mud	83	10	Mind. NX & NM	25	0	Nil				1	2	41.3	70.0	1.80	
58 T	Natural Mud	95	0	Mind. NX & NM	26	0	Nil				2	5	98.9	62.3	3.30	
59 T	Natural Mud	90	6	Mind. NX & NM	29	6	Nil				1	0	96.5	78.8	3.35	
60 T	Natural Mud	174	1	Mind. NX & NM	19	6	Nil				3	10	95.9	81.2	2.60	
61 T	Natural Mud	51	8	Mind. NX & NM	20	0	Nil				1	5	97.35	78.9	1.80	
62 T	Natural Mud	67	11	Mind. NX & NM	20	0	Nil				1	4	98.5	84.5	1.50	

Serial Number of B M R Bore	Approximate Locations from points of origin: Point of origin	True Bearings	Distance in feet	Elevation in feet A.S.L.	Surveyor	Method of Survey	Depth of Bore: Feet	Inches	Date of Drilling: Begun	Finished	Drilled by	Type of Drilling Rig used	Type of Coring bit
63 T (Parnell's Creek Subarea. (Test Bores)	3	129°45'	7,880	606.0	G. Stuart	Tel. Alidade	170	2	9.12.52	21.12.52	D.C.A.	E1000 Mindrill	NM & NX Diamond.
64 T	3	108°00'	8,200	585.3	G. Stuart	Tel. Alidade	130	0	10.12.52	16.12.52	P.A.	Goldfields 20	NX & NM Diam.& NXTung.
65 T	3	107°50'	8,800	510.6	G. Stuart	Tel. Alidade	70	0	16.12.52	19.12.52	P.A.	Goldfields 20	NM Diam.NX-Tung.
66 T	3	119°20'	8,940	512.1	N. Gorbunow	Theod. Trav.	150	0	2. 1.53	16.1.53	D.C.A.	E1000 Mindrill	NX & NM Diamond.
67 T	3	115°00'	8,600	500.9	N. Gorbunow	Theod. Trav.	129	0	17. 1.53	23.1.53	D.C.A.	E1000 Mindrill	NX & NM Diamond.
68 T	3	113°00'	8,210	490.3	N. Gorbunow	Theod. Trav.	92	0	21. 1.53	25.1.53	P.A.	Goldfields 20	NX & NM Diamond.
69 T	3	111°50'	8,860	490.6	N. Gorbunow	Theod. Trav.	114	0	26. 1.53	30.1.53	P.A.	Goldfields 20	NX & NM Diamond.
70 T	3	96°15'	8,960	573.0	N. Gorbunow	Theod. Trav.	101	0	28. 1.53	4.2.53	D.C.A.	E1000 Mindrill	NX & NM Diamond.
71 T	3	101°15'	8,060	548.2	N. Gorbunow	Theod. Trav.	79	10	31. 1.53	6.2.53	P.A.	Goldfields 20	NX & NM Diamond.
72 T	3	120°15'	8,650	529.8	N. Gorbunow	Theod. Trav.	139	0	5. 2.53	12.2.53	D.C.A.	E1000 Mindrill	NX & NM Diamond.
73 T	3	123°10'	8,900	542.3	N. Gorbunow	Theod. Trav.	126	0	7. 2.53	12.2.53	P.A.	Goldfields 20	NX & NM Diamond.
74 T	3	126°10'	7,460	575.7	N. Gorbunow	Theod. Trav.	120	0	12. 2.53	25.2.53	P.A.	Goldfields 20	NX & NM Diamond.
75 T	4	61°00'	6,050	407.3	N. Gorbunow	Theod. Trav.	135	2	13. 2.53	3.3.53	D.C.A.	E1000 Mindrill	NM & NX Diamond.
76 T	3	69°15'	1,850	394.6	N. Gorbunow	Theod. Trav.	305	9	24. 2.53	19.3.53	P.A.	Goldfields 20	NX Tung.& Diam.

Locations by True Bearings and Distances in feet from Points of Origin:-

2. SW Cnr. Portion 157, NW. Cnr. Portion 160, Parish of Ravensworth.
3. SE Cnr. Portion 11, NE Cnr. Portion 5, Parish of Howick.
4. Howick Trig. Station.

SUMMARY OF SURVEYING AND DRILLING RESULTS

Serial Number of BMR Bore	Type of drilling fluid used	Footage Cored		Type of Core Barrell	Casing			Condition of Abandoned Hole	Water Shows Recorded		Number of Coal Seams over 2'6"	Number of Coal Samples Analysed	Overall Core Recovery in Coal Seams	Overall Core Recovery in bore	Overall Rate of drilling	Remarks.
					Length Cased				Estimated depth in feet	Hydrost. head in feet						
		Feet	Inches		Feet	Inches	Casing in hole						%	%	Ft/Hr	
63 T	Natural Mud	170	2	Mind. NX & NM	19	6	Nil				3	5	75.4	78.3	2.05	
64 T	Natural Mud	130	0	Mind. NX & NM	25	0	Nil				1	4	100.0	86.8	1.90	
65 T	Natural Mud	70	0	Mind. NX & NM	35	0	Nil				1	2	100.0	63.7	1.70	
66 T	Natural Mud	150	0	Mind. NX & NM	15	0	Nil				2	7	98.7	85.3	1.50	
67 T	Natural Mud	129	0	Mind. NX & NM	27	0	Nil				2	8	97.2	84.0	2.35	
68 T	Natural Mud	92	0	Mind. NX & NM	29	4	Nil				2	4	98.4	96.4	2.00	
69 T	Natural Mud	114	0	Mind. NX & NM	20	0	Nil				2	8	100.0	88.5	2.20	
70 T	Natural Mud	101	0	Mind. NX & NM	19	6	Nil				2	8	74.9	73.4	1.70	
71 T	Natural Mud	79	10	Mind. NX & NM	15	0	Nil				1	3	100.0	79.9	1.70	
72 T	Natural Mud	139	0	Mind. NX & NM	19	6	Nil				2	6	95.5	83.8	2.60	
73 T	Natural Mud	126	0	Mind. NX & NM	20	0	Nil				1	3	100.0	83.4	2.10	
74 T	Natural Mud	120	0	Mind. NX & NM	10	0	Nil				2	4	100.0	90.9	2.40	
75 T	Natural Mud	135	2	Mind. NX	25	0	Nil				1	4	96.85	85.5	1.70	
76 T	Natural Mud	305	9	Mind. NX	30	0	Nil				Nil			85.5	1.60	

Parnell's Creek Subarea (Test Bores)

See Page 6.

SUMMARY OF SURVEYING AND DRILLING RESULTS

Serial Number of B M R Bore		Approximate Locations from points of origin			Elevation in feet A.S.L.	Surveyor	Method of Survey	Depth of Bore		Date of Drilling		Drilled by	Type of Drilling Rig used	Type of Coring bit
		Point of origin	True Bearings	Distance in feet				Feet	Inches	Begun	Finished			
1 S	Farrell's Creek Subarea	2	103°40'	4,900	445.0	J. Svoronos	Tel. Alidade	677	0	28.8.52	7.10.52	B.M.R.	Failing 1500	Borium
2 S		2	190°00'	3,020	539.0	J. Svoronos	Tel. Alidade	369	6	29.8.52	18.9.52	B.M.R.	Failing 750	Borium
3 S		2	See 2 S.					552	10	16.9.52	15.10.52	B.M.R.	Failing 750	K.K.& Borium
4 S		2	116°10'	1,790	518.2	J. Svoronos	Tel. Alidade	68	11	16.9.52	26.9.52	B.M.R.	Failing 750	Borium
5 S		2	116°10'	1,790	518.2	J. Svoronos	Tel. Alidade	503	2	29.9.52	23.10.52	B.M.R.	Failing 750	Tung. carb.
6 S		2	See 1 S.					864	9	7.10.52	3.11.52	B.M.R.	Failing 1500	Borium
7 S		2	171°40'	3,900	530.6	J. Svoronos	Tel. Alidade	506	4	15.10.52	12.11.52	B.M.R.	Fail.750 & 1500	Borium
1 S	Pond's Creek Subarea (Scout Bores)	4	114°30'	3,550	442.4	N. Gorbunow	Theod. Trav.	454	10	4.9.52	19.11.52	J.Mac.D. Royle	Sullivan 22	NX & NM Diamond
1 SR		4	106°30'	3,940	398.5	N. Gorbunow	Theod. Trav.	418	0	20.11.52	12.12.52	J.Mac.D. Royle	Sullivan 22	NX & NM Diamond
2 S		4	318°20'	10,060	489.5	N. Gorbunow	Theod. Trav.	77	0	23.10.52	29.10.52	B.M.R.	Failing 750	Bor. & Tung.
2 SR		4	318°10'	9,980	489.5	N. Gorbunow	Theod. Trav.	1077	3	13.11.52	13.2.53	B.M.R.	Failing 1500	Borium & Tung.
3 S		4	53°10'	1,670	545.1	N. Gorbunow	Theod. Trav.	392	6	4.11.52	12.11.52	B.M.R.	Failing 1500	Borium
3 SR		4	53°10'	1,670	545.1	N. Gorbunow	Theod. Trav.	641	2	25.11.52	11.12.52	B.M.R.	Failing 1500	Tungsten
4 S		4	226°20'	2,000	476.5	N. Gorbunow	Theod. Trav.	598	7	13.12.52	9.2.53	B.M.R.	Failing 1500	Borium
5 S		4	36°50'	5,850	421.2	N. Gorbunow	Theod. Trav.	302	4	17.11.52	21.10.52	H.K.	Mindrill A2000	NX & NM Diam.NX Bor.
6 S		4	354°15'	6,120	336.4	N. Gorbunow	Theod. Trav.	217	8	27.11.52	3.12.52	B.M.R.	Failing 750	Tungsten
7 S		4	0°20'	4,020	447.0	N. Gorbunow	Theod. Trav.	369	7	3.12.52	19.12.52	B.M.R.	Failing 750	Borium
8 S		4	309°20'	6,240	260.0	N. Gorbunow	Theod. Trav.	411	6	19.1.53	20.2.53	B.M.R.	Failing 750	Tungsten
8 SR		4	309°20'	6,240	260.0	N. Gorbunow	Theod. Trav.	100	5	23.2.53	28.2.53	B.M.R.	Failing 750	NX & NM Diamond.

SUMMARY OF SURVEYING AND DRILLING RESULTS

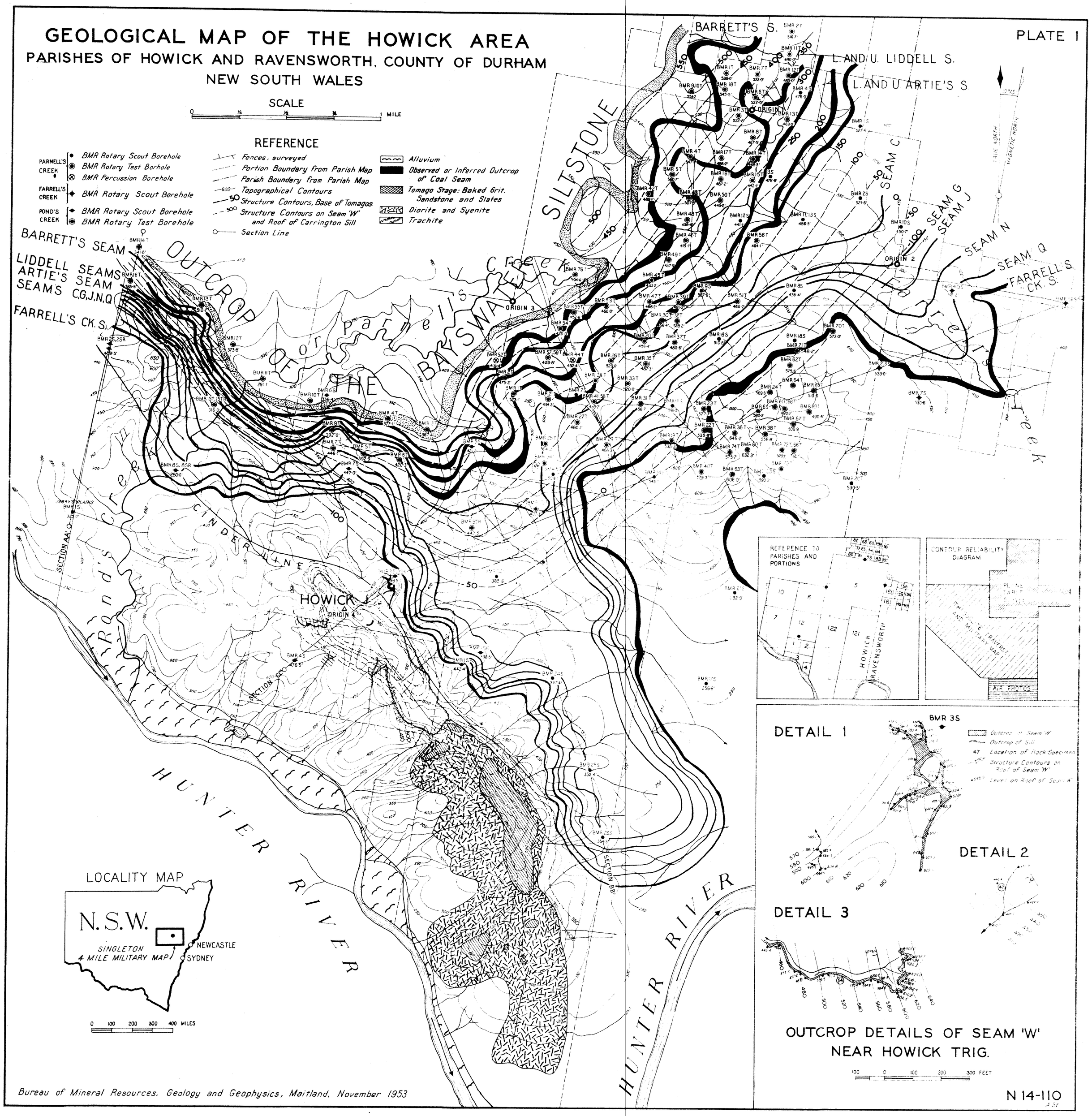
	Serial Number of BMR Bore	Type of drilling fluid used	Footage Cored		Type of Core Barrell	Casing			Condition of Abandoned Hole	Water Shows Recorded		Number of Coal Seams over 2'6"	Number of Coal Samples Analysed	Overall Core Recovery in Coal Seams	Overall Core Recovery in bore	Overall Rate of drilling	Remarks.
						Length Cased				Estimated depth in feet	Hydrost. head in feet						
			Feet	Inches		Feet	Inches	Casing in hole						%	%	Ft/Hr	
Farrell's Creek Subarea	1 S	Bent. Mud	664	0	Failing	Nil	Nil	Nil				13	33	76.2	82.6	1.20	
	2 S	Bent. Mud	352	0	Failing	Nil	Nil	Nil				11	30	77.55	85.6	2.30	Abandoned, fish in hole.
	3 S	Bent. Mud	514	6	Reed & Failing	Nil	Nil	Nil				11	30	77.55	85.6	1.50	
	4 S	Bent. Mud	48	11	Failing	Nil	Nil	Nil							86.1	0.50	Abandoned due to heavy circulation losses
	5 S	Bent. Mud	479	2	Failing	Nil	Nil	Nil				8	3	78.1	86.2	1.95	
	6 S	Bent. Mud	254	9	Failing	Nil	Nil	Nil				13	33	76.2	82.6	2.85	Cored 254'9" drilled 610'9"
	7 S	Bent. Mud	473	7	Failing	Nil	Nil	Nil				7	16	88.9	91.2	2.10	
Pond's Creek Subarea (Scout Bores)	1 S	Natural Mud	454	10	Mind.NX & NM	72	0	420	See Page 6.			14	0	67.4	91.0	1.55	
	1 SR	Natural Mud	418	0	Mind. NX & NM	10	0	Nil				8		73.4	89.7	1.60	
	2 S	Bent. Mud	65	9	Failing	Nil	Nil	Nil				Nil			64.7	0.80	
	2 SR	Bent. Mud	1065	2	Failing	Nil	Nil	Nil				20		62.6	89.4	1.10	
	3 S	Bent. Mud	382	6	Failing	Nil	Nil	Nil				9		75.4	82.4	2.50	
	3 SR	Bent. Mud	260	5	Failing	Nil	Nil	Nil				5		64.4	79.7	Mainly drilled	
	4 S	Bent. Mud	586	11	Failing	Nil	Nil	Nil				11		92.2	94.0	1.35	
	5 S	Natural Mud.	302	4	Mind. NX & NM	Nil	Nil	Nil				4		58.3	85.0	1.10	
	6 S	Bent. Mud	205	2	Failing	Nil	Nil	Nil				Nil			97.6	2.85	
	7 S	Bent. Mud	359	11	Failing	Nil	Nil	Nil				9		81.6	91.9	1.90	
	8 S	Bent. Mud	397	0	Failing	Nil	Nil	Nil				10		81.5	90.5	1.55	
	8 SR	Bent. Mud	70	5	Failing	36	Nil	Nil				2		90.7	69.7	1.25	

SUMMARY OF SURVEYING AND DRILLING RESULTS

Serial Number of B M R Bore		Approximate Locations from points of origin			Elevation in feet A.S.L.	Surveyor	Method of Survey	Depth of Bore		Date of Drilling		Drilled by	Type of Drilling Rig used	Type of Coring bit
		Point of origin	True Bearings	Distance in feet				Feet	Inches	Begun	Finished			
Pond's Creek Subarea (Test Bores)	1 T	4	37°00'	7,700	523.1	N. Gorbunow	Theod. Trav.	98	0	24.11.52	27.11.52	D.C.A.	E1000 Mindrill	NM & NX Diamond
	2 T	4	33°40'	7,900	475.2	N. Gorbunow	Theod. Trav.	116	0	25.11.52	1.12.52	P.A.	Goldfields 20	NM & NX Diamond
	3 T	4	23°10'	5,600	367.4	N. Gorbunow	Theod. Trav.	80	0	27.11.52	3.12.52	D.C.A.	E1000 Mindrill	NX Diamond.
	4 T	4	11°40'	5,550	377.1	N. Gorbunow	Theod. Trav.	105	0	3.12.52	10.12.52	D.C.A.	E1000 Mindrill	NX Diamond
	5 T	4	5°40'	4,480	392.9	N. Gorbunow	Theod. Trav.	170	0	11.12.52	10.1.53	D.C.A.	E1000 Mindrill	NM & NX Diamond
	6 T	4	18°30'	4,490	420.3	N. Gorbunow	Theod. Trav.	166	0	12.1.53	23.1.53	D.C.A.	E1000 Mindrill	NM & NX Diamond
	7 T	4	354°45'	4,610	446.1	N. Gorbunow	Theod. Trav.	165	0	24.1.53	4.2.53	D.C.A.	E1000 Mindrill	NM & NX Diamond
	8 T	4	55°40'	4,240	422.5	N. Gorbunow	Theod. Trav.	148	6	5.2.53	23.2.53	D.C.A.	E1000 Mindrill	NM & NX Diamond
	8 TR	4	55°40'	4,240	422.5	N. Gorbunow	Theod. Trav.	136	6	23.2.53	3.3.53	D.C.A.	E1000 Mindrill	NM & NX Mindrill
	9 T	4	355°00'	5,140	392.0	N. Gorbunow	Theod. Trav.	242	6	3.3.53	18.3.53	D.C.A.	E1000 Mindrill	NM & NX Mindrill
	10 T	4	349°45'	6,060	335.2	N. Gorbunow	Theod. Trav.	101	6	4.3.53	6.3.53	D.C.A.	E1000 Mindrill	NX Mindrill
	11 T	4	339°40'	6,970	291.1	N. Gorbunow	Theod. Trav.	99	0	9.3.53	11.3.53	D.C.A.	E1000 Mindrill	NX Diamond
	12 T	4	336°45'	8,200	373.8	N. Gorbunow	Theod. Trav.	154	0	12.3.53	16.3.53	D.C.A.	E1000 Mindrill	NX Diamond
	13 T	4	334°30'	9,500	510.1	N. Gorbunow	Theod. Trav.	101	0	17.3.53	19.3.53	D.C.A.	E1000 Mindrill	NX Diamond
	14 T	4	330°15'	11,800	341.8	N. Gorbunow	Theod. Trav.	105	6	19.3.53	25.3.53	D.C.A.	E1000 Mindrill	NX Diamond
	15 T	4	327°10'	6,930	316.0	N. Gorbunow	Theod. Trav.	110	6	20.3.53	25.3.53	D.C.A.	E1000 Mindrill	NM & NX Diamond
	15 TR	4	See 15 T.					328	6	26.3.53	28.4.53	D.C.A.	E1000 Mindrill	NM & NX Diamond
	16 T	4	326°40'	11,120	383.6	N. Gorbunow	Theod. Trav.	298	3	26.3.53	30.4.53	D.C.A.	E1000 Mindrill	NM & NX Diamond
Jerry's Plains Subarea	1 S	4	290°00'	8,180	325.0	N. Gorbunow	Theod. Trav.	502	5	30.10.52	26.11.52	B.M.R.	Failing 750	Tung. & Diamond

SUMMARY OF SURVEYING AND DRILLING RESULTS

Serial Number of BMR Bore	Type of drilling fluid used	Footage Cored		Type of Core Barrell	Casing			Condition of Abandoned Hole	Water Shows Recorded		Number of Coal Seams over 2'6"	Number of Coal Samples Analysed	Overall Core Recovery in Coal Seams	Overall Core Recovery in bore	Overall Rate of drilling	Remarks.
					Length Cased				Estimated depth in feet	Hydrost. head in feet						
		Feet	Inches		Feet	Inches	Casing in hole						%	%	Ft/Hr	
Pond's Creek Subarea (Test Bores.)																
1 T	Natural Mud	98	0	Mind. NX & NM	16	0	Nil	See Page 6.			2	3	96.2	66.4	3.00	
2 T	Natural Mud	116	0	Mind. NX & NM	20	0	Nil				2	6	99.3	88.5	1.60	
3 T	Natural Mud	80	0	Mind. Nx	20	0	Nil				Nil			41.8	2.30	
4 T	Natural Mud	105	0	Mind. NX	28	0	Nil				Nil			66.8	2.00	
5 T	Natural Mud	170	0	Mind. Nx.	15	0	Nil				4	9	88.4	82.0	1.55	
6 T	Natural Mud	166	0	Mind. NX	44	0	Nil				2	2	69.8	71.8	1.60	
7 T	Natural Mud	165	0	Mind. NX	21	0	Nil.				2	3	72.8	75.9	1.80	
8 T	Natural Mud	148	6	Mind. NX	20	0	Nil				2	2	27.8	53.1	1.70	
8 TR	Natural Mud	136	6	Mind. NX	15	0	Nil				2	4	61.9	51.6	1.90	
9 T	Natural Mud	242	6	Mind. NX	15	6	15'6"				2	7	86.2	82.3	2.00	
10 T	Natural Mud	101	6	Mind. NX	15	0	Nil				Nil			77.9	3.75	
11 T	Natural Mud	99	0	Mind. NX	34	0	Nil				Nil			61.2	3.65	
12 T	Natural Mud	154	0	Mind. NX	32	0	Nil				Nil			75.7	3.50	
13 T	Natural Mud	101	0	Mind. NX	17	0	Nil				Nil			61.7	3.75	
14 T	Natural Mud	105	6	Mind. NX	46	0	Nil				Nil			51.4	2.15	
15 T	Natural Mud	110	6	Mind. NX & NM	11	0	Nil				1	2	45.4	60.6	2.65	
15 TR	Natural Mud	228	6	Mind. NX & NM	32	0	10"0" at 163'				3	9	87.9	67.8	2.20	
16 T	Natural Mud	298	3	Mind. NX & NM	77	0	Nil				2	3	91.7	74.4	1.55	
Jerry's Plains Subarea																
1 S	Bent. Mud	570	5	Failing	Nil	Nil	Nil									


GEOLOGICAL MAP OF THE HOWICK AREA
PARISHES OF HOWICK AND RAVENSWORTH, COUNTY OF DURHAM
NEW SOUTH WALES
PLATE 1
SCALE
0 ¼ ½ ¾ 1 MILE
REFERENCE
PARNELL'S CREEK
BMR Rotary Scout Borehole
BMR Rotary Test Borhole
BMR Percussion Borehole
FARRELL'S CREEK
BMR Rotary Scout Borehole
POND'S CREEK
BMR Rotary Scout Borehole
BMR Rotary Test Borehole
Fences, surveyed
Portion Boundary from Parish Map
Parish Boundary from Parish Map
Topographical Contours
Structure Contours, Base of Tomagos
Structure Contours on Seam 'W' and Roof of Carrington Sill
Section Line
Alluvium
Observed or Inferred Outcrop of Coal Seam
Tomago Stage: Baked Grit, Sandstone and Slates
Diorite and Syenite
Trachite
BARRETT'S S.
L. AND U. LIDDELL S.
L. AND U. ARTIE'S S.
SILTSTONE
BARRETT'S SEAM
LIDDELL SEAMS
ARTIE'S SEAM
SEAMS C,G,J,N,Q
FARRELL'S CK. S.
OUTCROP OF THE BAYSWATER
Parnell's Creek
Rand's Creek
CINDER LINE
HOWICK
ORIGIN 1
ORIGIN 2
ORIGIN 3
ORIGIN 4
SEAM C
SEAM G
SEAM J
SEAM N
SEAM Q
FARRELL'S CK. S.
HUNTER RIVER
SECTION AA'
SECTION BB'
SECTION CC'
REFERENCE TO PARISHES AND PORTIONS
HOWICK
RAVENSWORTH
CONTOUR RELIABILITY DIAGRAM
AIR PHOTOS
DETAIL 1
DETAIL 2
DETAIL 3
BMR 3S
Outcrop of Seam 'W'
Outcrop of Sill
Location of Rock Specimen
Structure Contours on Roof of Seam 'W'
Level on Roof of Seam 'W'
OUTCROP DETAILS OF SEAM 'W' NEAR HOWICK TRIG.
100 0 100 200 300 FEET
LOCALITY MAP
N.S.W.
SINGLETON 4 MILE MILITARY MAP
NEWCASTLE
SYDNEY
0 100 200 300 400 MILES
Bureau of Mineral Resources, Geology and Geophysics, Maitland, November 1953
N 14-110

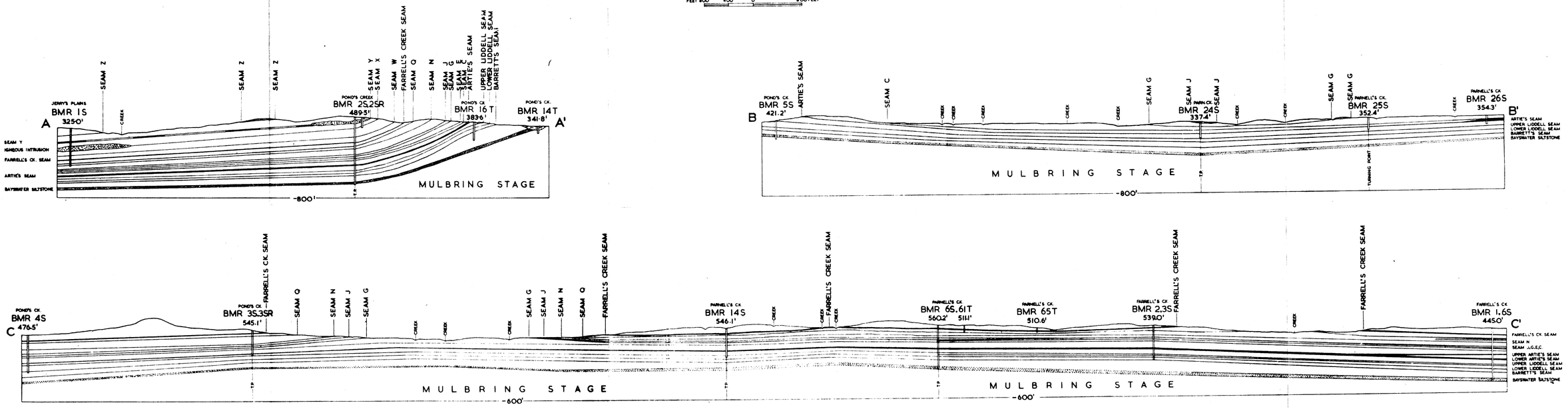
GEOLOGICAL SECTIONS AA', BB', CC', HOWICK AREA

PARISHES OF HOWICK AND RAVENSWORTH COUNTY OF DURHAM

NEW SOUTH WALES

SCALE

FEET 800 400 0 800 FEET



BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS, MAITLAND, NOVEMBER 1953.

PLATE 3

COAL OUTCROPS IN THE HOWICK AREA

0 1 MILE

AREA OF THIS MAP

GRID FROM MUSWELLBROOK 1 MILE MILITARY MAP

BOREHOLES REFERRED TO POINTS OF ORIGIN

Structure and Overburden Map of Barrett's, Artie's and Farrell's Creek Seams

PARNELL'S CREEK (CENTRAL PROSPECT), AND FARRELL'S CREEK SUBAREAS

Parishes of Howick and Ravensworth, County of Durham, N.S.W.

800 400 0 800 FEET

LOCALITY MAP

N.S.W. NEWCASTLE SYDNEY

100 0 100 200 300 MILES

REFERENCE

Topographic Base surveyed with Plane Table and Telescopic Alidade at 200 feet to 1 inch Datum: Howick Trig. Station
Boreholes located from Points of Origin (2,3) by Bearings and Distances

- BMR Rotary Scout Borehole
- BMR Rotary Test Borehole
- Topographic Contours at 5' Intervals
- Structure Contours, Roof, 10' Intervals
- Fence or Boundary, surveyed
- Portion Boundary from Parish Map
- Parish Boundary from Parish Map

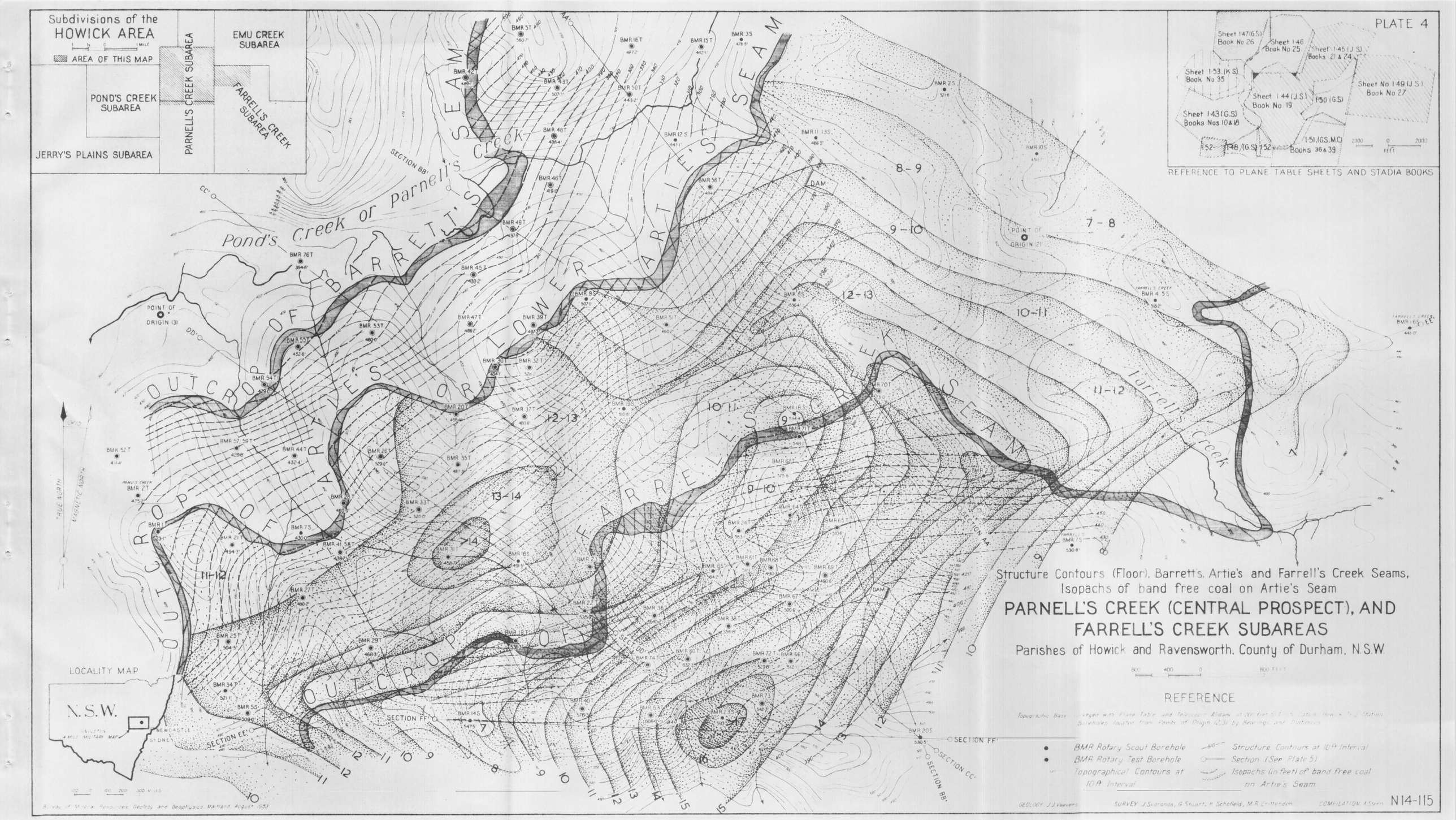
OVERBURDEN TO BAND FREE COAL RATIOS

0 - 3 : 1	
3 : 1 - 5 : 1	
5 : 1 - 7 : 1	
7 : 1 - 9 : 1	

COAL SEAM	THICKNESS
Barrett's Seam	6 feet, band free
Artie's Seam	10 feet, band free
Farrell's Ck Seam	7 feet, band free

GEOLOGY J.J. Veevers SURVEY J. Svoronos, G. Stuart, H. Schofield, M.R. Crittenden COMPILATION A. Stern

N14-114

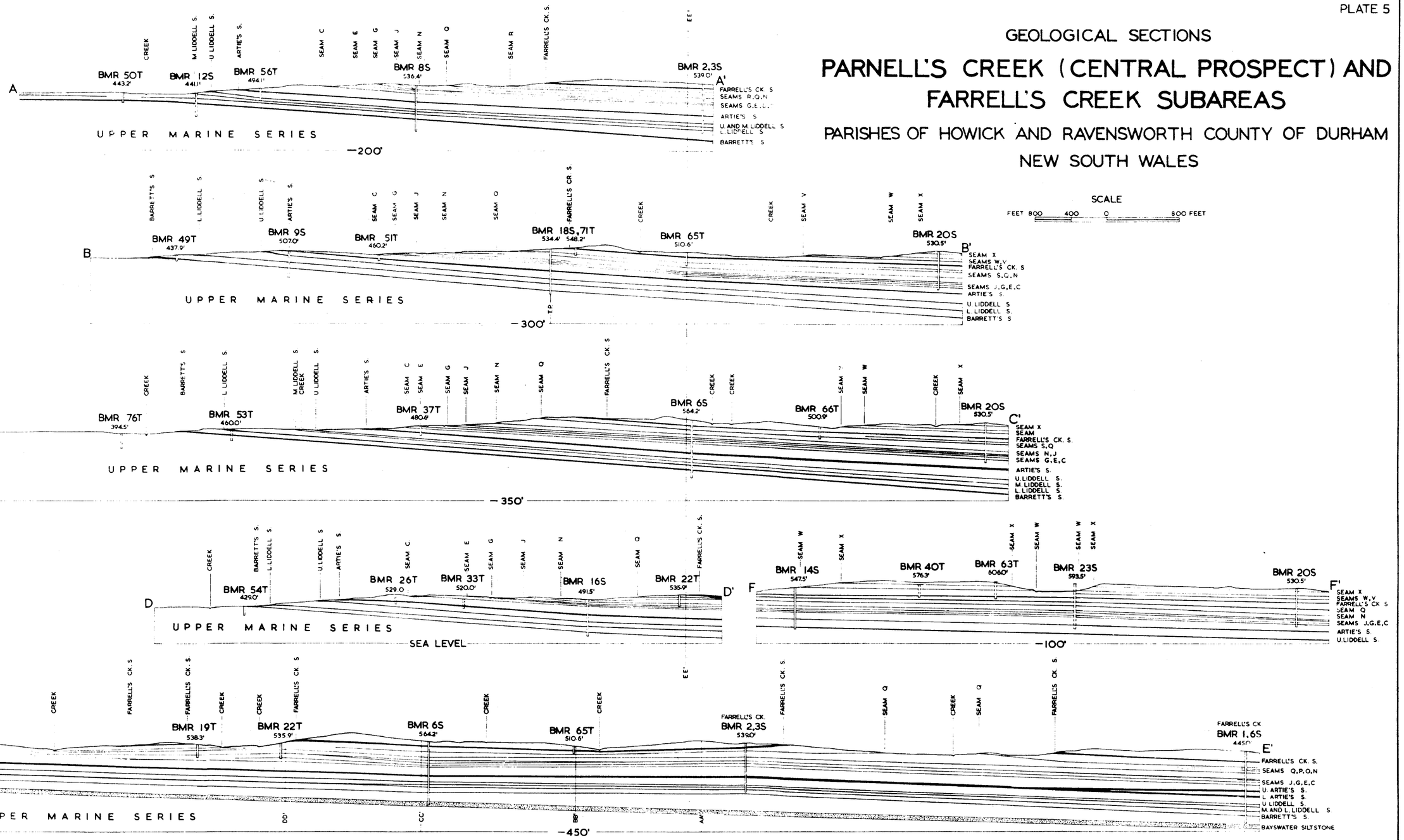

Subdivisions of the HOWICK AREA
AREA OF THIS MAP
POND'S CREEK SUBAREA
PARNELL'S CREEK SUBAREA
EMU CREEK SUBAREA
FARRELL'S CREEK SUBAREA
JERRY'S PLAINS SUBAREA
PLATE 4
REFERENCE TO PLANE TABLE SHEETS AND STADIA BOOKS
Pond's Creek or Parnell's Creek
OUTCROP OF BARRETT'S LOWER ARTIE'S SEAM
OUTCROP OF ARTIE'S LOWER FARRELLS CREEK SEAM
OUTCROP OF FARRELLS CREEK SEAM
Farrell's Creek
SECTION AA'
SECTION BB'
SECTION CC'
SECTION EE'
SECTION FF'
POINT OF ORIGIN (1)
POINT OF ORIGIN (2)
POINT OF ORIGIN (3)
DAM
LOCALITY MAP
N.S.W.
TRUE NORTH
MAGNETIC NORTH
Structure Contours (Floor), Barrett's, Artie's and Farrell's Creek Seams,
Isopachs of band free coal on Artie's Seam
PARNELL'S CREEK (CENTRAL PROSPECT), AND FARRELL'S CREEK SUBAREAS
Parishes of Howick and Ravensworth, County of Durham, N.S.W
REFERENCE
BMR Rotary Scout Borehole
BMR Rotary Test Borehole
Topographical Contours at 10ft Interval
Structure Contours at 10ft Interval
Section (See Plate 5)
Isopachs (in feet) of band free coal on Artie's Seam
GEOLOGY J.J.Veevers
SURVEY J.Svoronos, G.Stuart, M.Schofield, M.R.Crittenden
COMPILATION A.Stern
N14-115
Bureau of Mineral Resources, Geology and Geophysics, Maitland, August 1953

GEOLOGICAL SECTIONS

PARNELL'S CREEK (CENTRAL PROSPECT) AND FARRELL'S CREEK SUBAREAS

PARISHES OF HOWICK AND RAVENSWORTH COUNTY OF DURHAM

NEW SOUTH WALES



BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS, MAITLAND, NOVEMBER 1953

FOLDER 2

Bureau of Mineral Resources, Geology and Geophysics

OPEN CUT COAL INVESTIGATIONS IN NEW SOUTH WALES

CESSNOCK MUSWELLBROOK REGION

HOWICK AREA REPORT

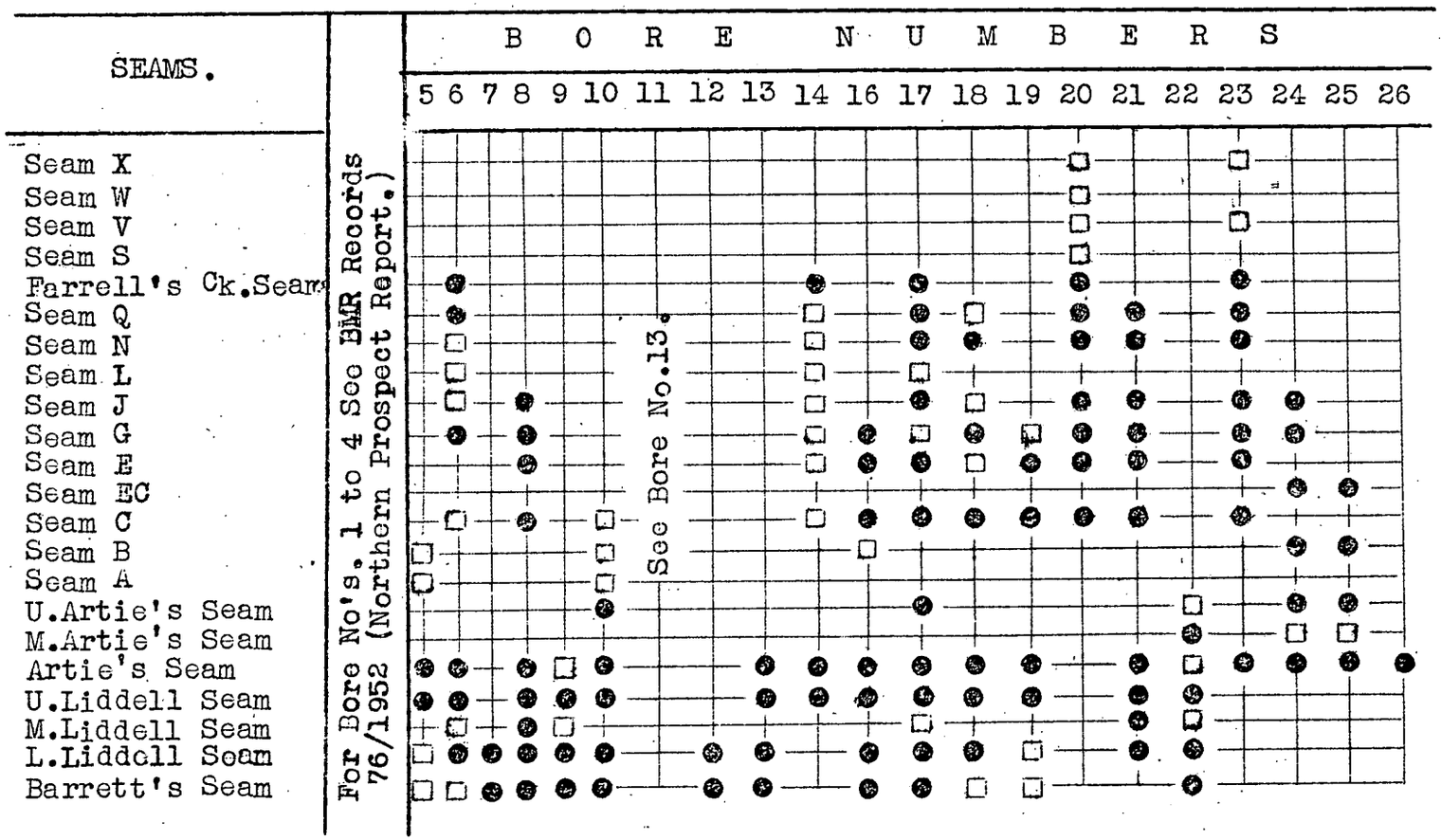
Records 1953/47

Folder 2.

Graphic logs of Scout Boreholes No's.5-26
in the Central & Southern Prospects of the
Parnell's Creek Subarea.

COAL SEAMS INTERSECTED IN SCOUT BOREHOLES

Parnell's Creek Subarea (Central & Southern Prospects.)

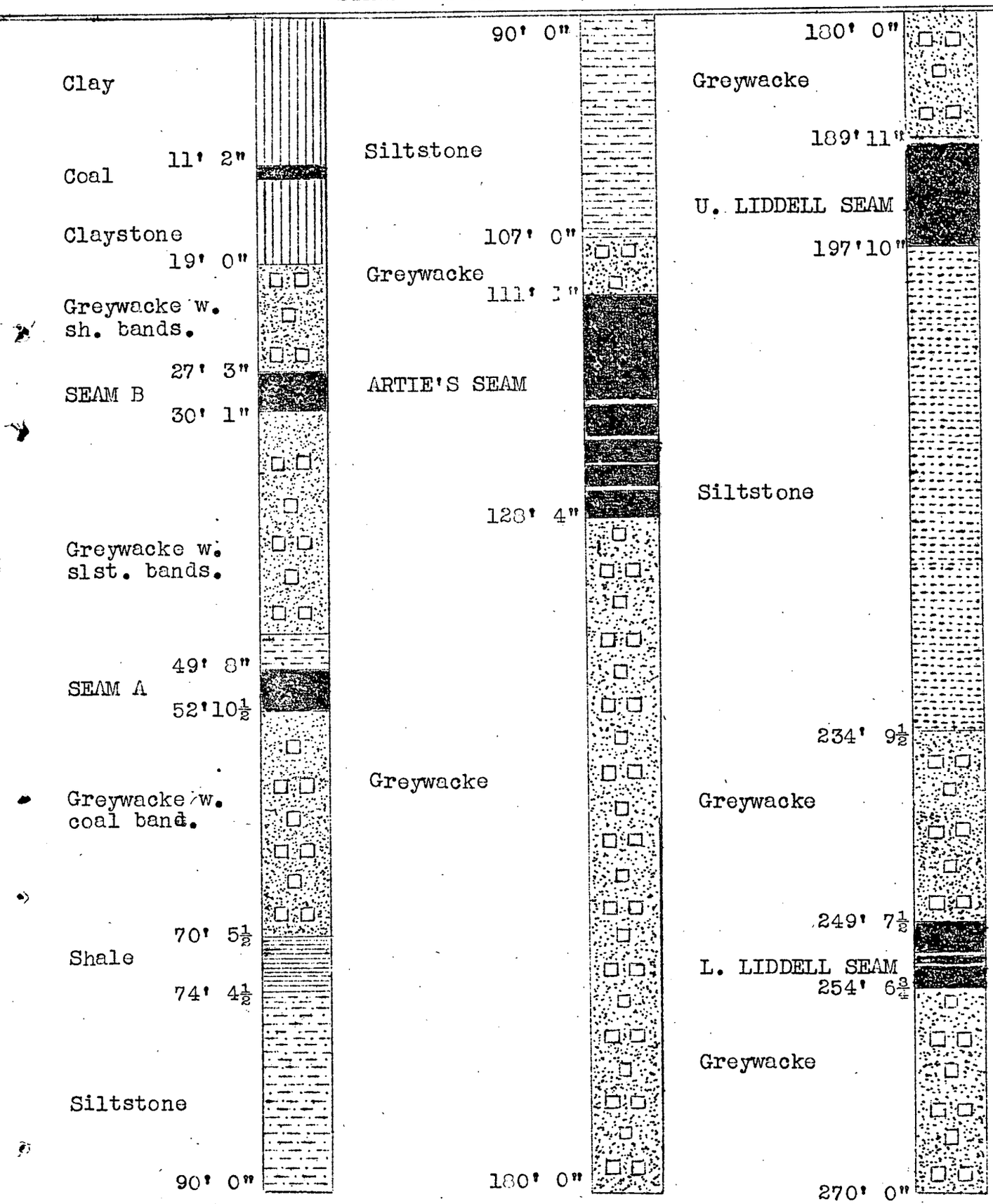


COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 5S	Elevation: 509.0' ASL
Reference: BMR Map N14/110, June 1953.		Datum: Standard
Begun: 29.5.52	Finished: 18.6.52	Depth: 500' 0"

STRATIGRAPHIC LOG (1"-10')



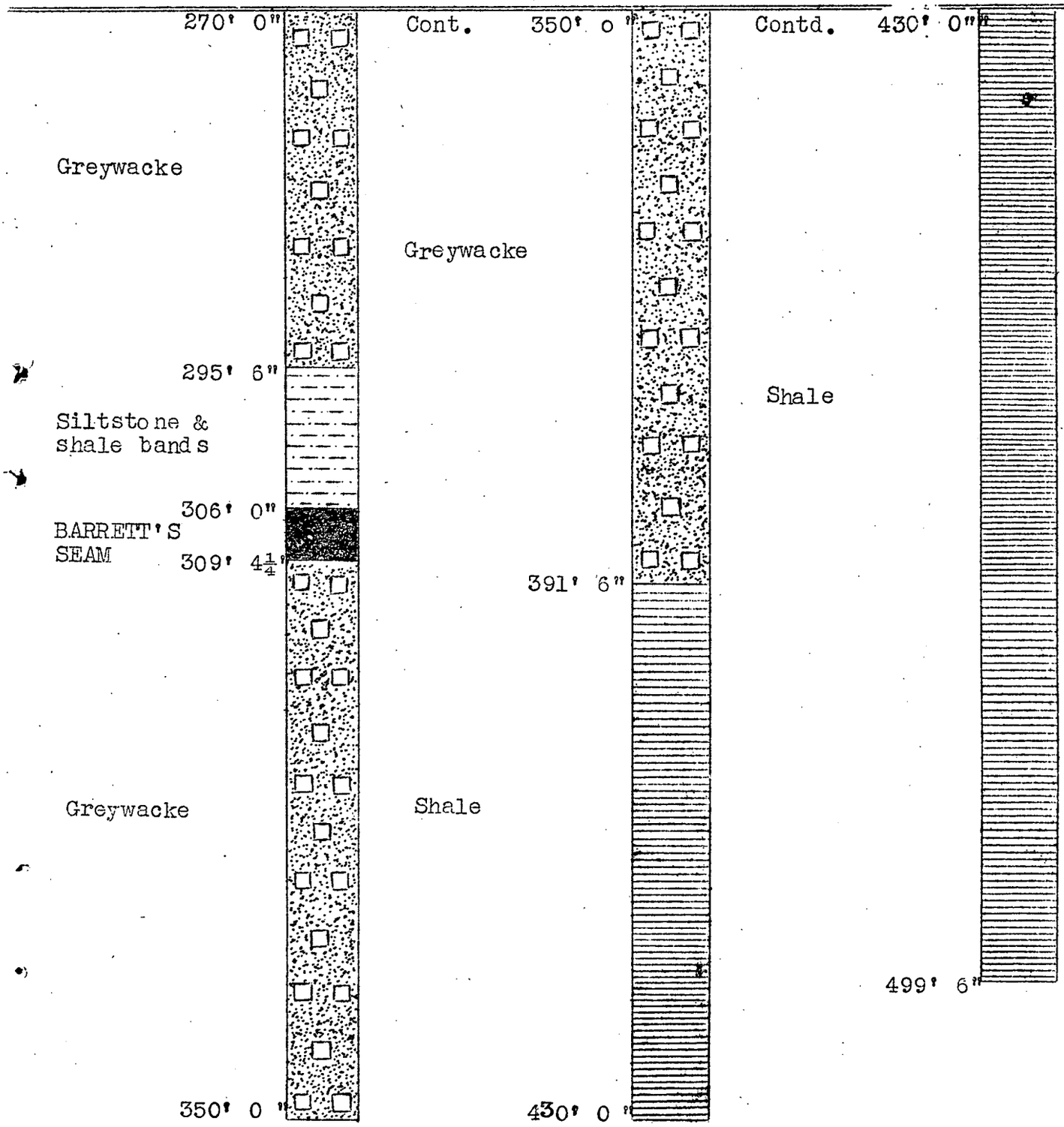
Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek Hole No: BMR 5S Elevation: 609.8' ASL

Reference: BMR Map NI4/110, June 1953 Datum: Standard

Began: 29.5.52 Finished: 18.6.52 Depth: 499' 6"

STRATIGRAPHIC LOG (1"-10')



COMMONWEALTH OF AUSTRALIA

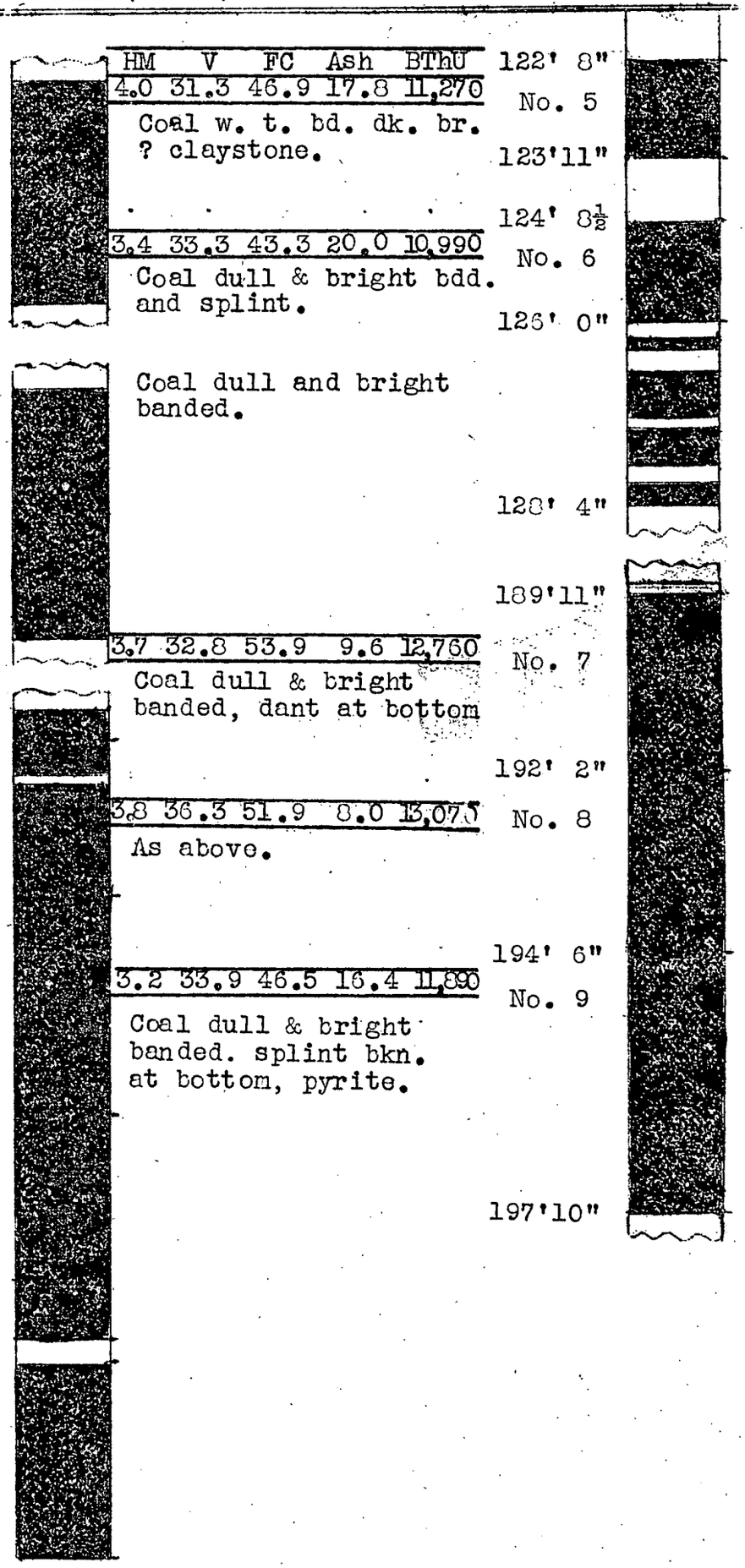
Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek | Hole No: BMR 5S | Elevation: 509.0' ASL

Reference: BMR Map N14/110, June 1953. | Datum: Standard

Begun: 29.5.52 | Finished: 18.6.52 | Depth: 499' 6"

COAL DETAIL (1"-2')



27' 3"

Dant (fusinitic and brt. bdd.) brittle.

30' 1"

49' 8"

Coal bright with dull bds. some shale, bkn.

52'10½"

111' 1"

111' 6"

HM	V	FC	Ash	BThU	
3.8	31.6	43.1	21.5	10,770	No. 1

Coal dull brt. bdd. v. bkn. w. some carb. splint.

113' 6"

3.3	36.5	47.3	12.9	12,200	No. 2

Splint coal.

116' 4"

3.9	32.6	55.6	7.9	12,900	No. 3

As above.

119' 2"

119' 6"

4.0	34.1	47.6	14.3	11,910	No. 4

As above.

122' 0"

HM	V	FC	Ash	BThU	
4.0	31.3	46.9	17.8	11,270	No. 5

Coal w. t. bd. dk. br. ? claystone.

123'11"

124' 8½"

3.4	33.3	43.3	20.0	10,990	No. 6

Coal dull & bright bdd. and splint.

126' 0"

Coal dull and bright banded.

128' 4"

189'11"

3.7	32.8	53.9	9.6	12,760	No. 7

Coal dull & bright banded, dant at bottom

192' 2"

3.8	36.3	51.9	8.0	13,075	No. 8

As above.

194' 6"

3.2	33.9	46.5	16.4	11,890	No. 9

Coal dull & bright banded. splint bkn. at bottom, pyrite.

197'10"

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 5S	Elevation: 509.0' ASL
Reference: BMR Map N14/110, June 1953.		Datum: Standard
Begun: 29.5.52	Finished: 18.6.52	Depth: 499' 6"

COAL DETAIL (1"-2')

249' 7½

Coal dull and bright banded cleated.

254' 6¾

306' 0"

Splint coal with occasional thin bright bands.

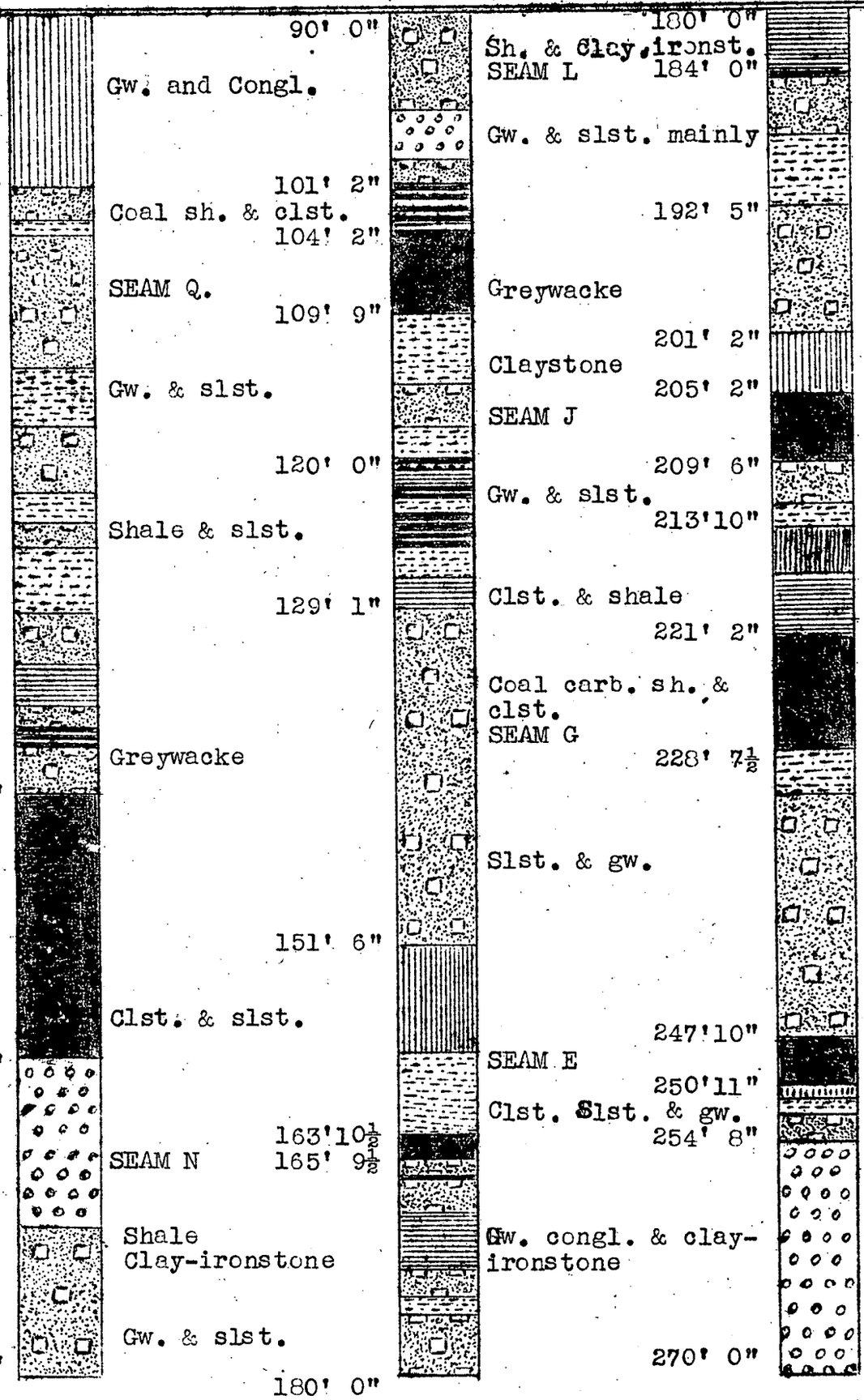
309' 4½

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 6S	Elevation: 560.2' ASL
Reference: BMR Map N14/110, June 1953.		Datum: Standard
Begun: 19.6.52	Finished: 30.7.52	Depth: 678' 0"

STRATIGRAPHIC LOG (1"-10')

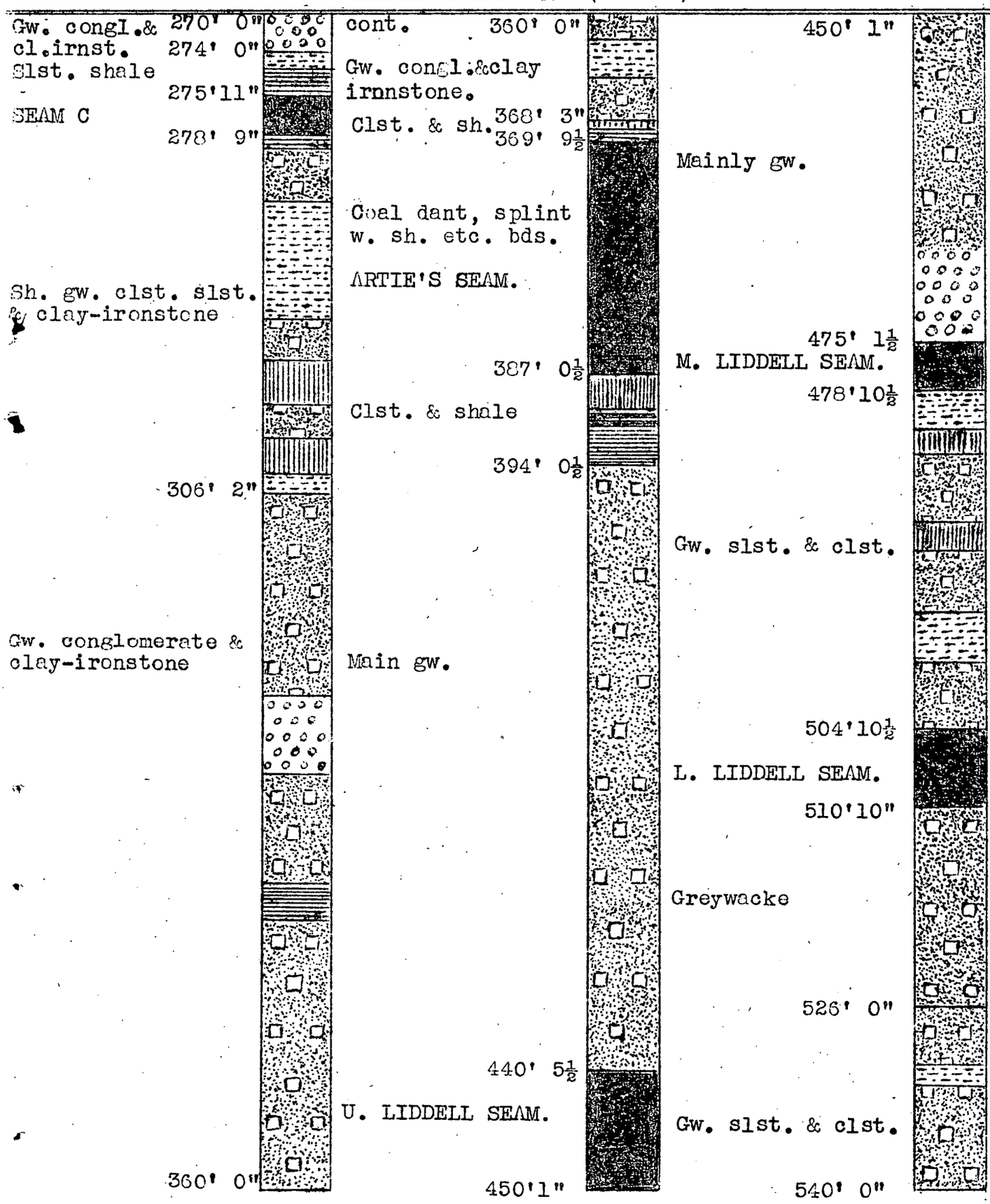


COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 6S	Elevation:	560.2' ASL
Reference: BMR Map N14/110; June 1953.		Datum:	Standard
Begun: 19.6.52	Finished: 30.7.52	Depth:	678' 0"

STRATIGRAPHIC LOG (1"-10')

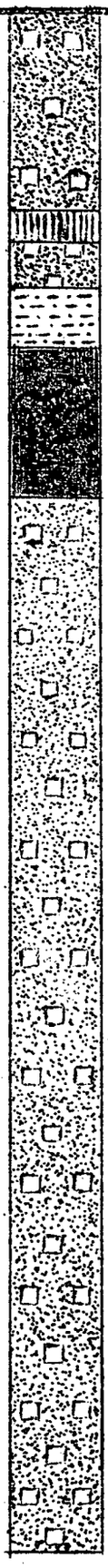


COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 6S	Elevation: 560.2' ASL
Reference: BMR Map N14-110;	June 1953.	Datum: Standard
Begun: 19. .52	Finished: 30.7.52	Depth: 678' 0"

STRATIGRAPHIC LOG (1"-10')



540' 0"

Gw. slst. & clst.

559' 6"

BARRETT'S SEAM

568' 4"

Mainly greywacke

631' 0"

Cont.

Mainly Greywacke.

651' 3½"

Slst. & claystone

666' 0"

Claystone & slst.

678' 0"

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek | Hole No: BMR 6S | Elevation: 560.2' ASL

Reference: BMR Map N14-110, June 1953. | Datum: Standard

Begun: 19.6.52 | Finished: 30.7.52 | Depth: 673' 0"

COAL DETAIL (1"-2')

HM	V	FC	Ash	BThU		
4.0	13.9	20.0	62.1	- -		

Coal splint bk. w. t. bds. of carb. shale.

51' 4" — No. 1

52' 5½"

52' 8"

4.4	23.4	52.1	20.1	10,580	No. 2

Coal dull shaly irregularly lamd.

55'10"

4.6	23.7	55.4	16.3	11,150	No. 3

Coal, mainly dull t. lamd. (shaly) but w. t. brt. lam. pyr. v. s. dant.

59' 6"

4.4	28.7	58.4	8.5	12,500	No. 4

Coal d. pyr. w. occas. & bright bands.

61' 9"

4.4	30.8	54.1	10.7	12,110	No. 5

Coal dull and bright pyrites.

64' 4"

4.0	28.9	54.2	12,9	11,940	No. 6

Coal dull and bright pyrite.

66' 5¼"

66'10¾"

3.9	30.2	50.9	15.0	11,710	No. 7

Coal dull and bright banded.

68' 6¾"

68' 8"

HM	V	FC	Ash	BThU	
3.7	28.2	39.7	28.4	9,430	No. 8

Coal d. & brt. lam shy Carbonaceous.

104' 2"

104' 4¼"

105' 5¾"

106' 2"

3.8	26.9	40.7	28.6	9,530	No. 9

Coal dull & bright lam. shaly pyrite.

109' 8¾"

163'10½"

Coal, dant, & carb. sh. Not Sampled.

165' 9½"

205' 2"

206' 0½"

Shale, (carb.) Not sampled.

208' 5"

Coal d. & brt. w. calcite pyr.

209' 6"

221' 2"

Coal brt. & carb. sh.

222'10¼"

3.6	31.4	46.8	18.2	11,420	No.10

Coal dull & bright.

223'11¼"

224' 3½"

3.5	31.2	45.5	19.8	11,190	No.11

Coal dull & bright lam. pyrite.

226' 0½"

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek | Hole No: BMR 6S | Elevation: 560.2' ASL

Reference: BMR Map N14/110, June 1953. | Datum: Standard

Begun: 19.6.52 | Finished: 30.7.52 | Depth: 678' 0"

COAL DETAIL (1"-2I)

Cont.

226' 6"

HM	V	FC	Ash	BThU	
3.7	32.0	48.2	16.1	11,710	No.12

Coal d. & brt. bdd. bk. shale carb. pyrite.

228' 7½"

Coal mainly dull

247' 10"

Coal bdd. w. ¾" carb. sh. at top.

248' 6"

248' 7½"

clay-ironstone

249' 8"

Coal dull.

250' 11"

275' 11"

Coal banded

278' 6"

278' 9"

Dant & carb. shale

369' 9½"

2.9	34.4	48.2	14.5	12,390	No.13

Coal dull & bright bdd. carb. shale pow. br. dant.

371' 10½"

372' 8¾"

2.4	38.4	45.6	13.6	12,600	No.14

Coal dull w. bright bds. carb. shale, lam.

375' 3"

375' 3¾"

3.1	33.3	53.7	9.9	13,000	No.15

Coal mainly dull with v. t. bands bright coal.

378' 6"

HM	V	FC	Ash	BThU	
3.0	35.6	49.6	11.8	12,730	No.16

Coal splint dk. br. w. brt. bds. & occas. bds pyr.

378' 9"

380' 2"

Coal irreg. bdd. shaly with dant & slst.

Not sampled

384' 6"

3.3	36.9	50.7	9.1	13,000	No.17

Coal mainly brt. shy. silty pyrite.

385' 10½"

Dant s. pow. coal w. bds. bright coal.

387' 0½"

440' 5½"

3.0	32.6	54.4	10.0	12,8[illegible]	No.18

Coal d. w. brt. bds. lam.

442' 4"

442' 9¼"

3.2	32.1	46.7	18.0	11,550	No.19

Dant w. brt. bds. coal splint carbonaceous.

446' 1"

3.1	31.6	46.4	18.9	11,540	No.20

Dant mainly with bds. splint coal bdd. and shaly dk. brown carb.

449' 1"

Dant carb. shale

449' 7"

Coal dull & bright bdd. w. v. t. bd. clay at bot

450' 1"

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geopysics

Area: Parnell's Creek Hole No: BMR 6S Elevation: 560.2' ASL

Reference: BMR Map N14/110, June 1953. Datum: Standard

Begun: 19.6.52 Finished: 30.7.52 Depth: 678' 0"

COAL DETAIL (1"-2')

475' 1½" Cont'

Coal mainly dull with thin bright bands lam. shaly.

Not sampled.

478' 10½"

559' 6"

Coal mainly dull splint with bright bands very soft powdery mainly broken.

Not sampled due to poor recovery poor quality of coal recorded.

568' 4"

HM	V	FC	Ash	BThU
2.6	30.4	42.8	24.2	10,730

504' 10½" No.21

Coal brt. v. powdery w. dant & shale.

506' 1½"

507' 10"

2.6	32.7	46.8	17.9	11,640

No.22

Coal shaly to lam. carbonaceous shale.

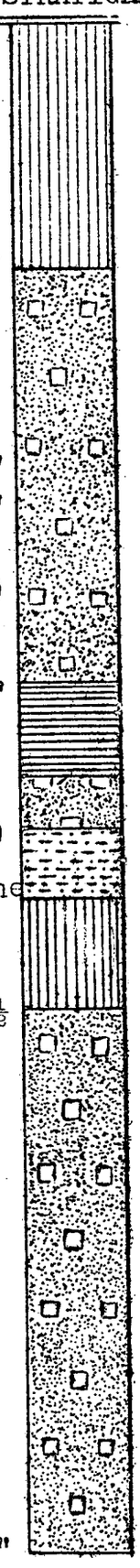
510' 0"

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 7S	Elevation: 430.0' ASL
Reference: BMR Map N14/110,	June 1953.	Datum: Standard
Begun: 30.6.52	Finished: 21.7.52	Depth: 302' 1"

STRATIGRAPHIC LOG (1"-10')



. sand & clay

14' 3"

Greywacke (friable)

Gw. (tough) 25' 0"

27' 7"

Greywacke (soft, shy)

38' 3"

Shale (carb. in part) gw. (s. shy.) slst. clst. & clay-ironstone

57' 7½

Greywacke (mainly s. shaly)

90' 0"

Gw. (Mainly s shaly)

93' 6"

Gw. (tough, calcitic) bot. 1'0" (s. friable)

99' 7"

Sh. (carb. in part) clst.

107' 2"

L. LIDDELL SEAM.

111' 5"

Clst. & siltstone

118'11½

Gw. (generally soft shy. or friable)

140' 0"

Gw. (tough calcitic 141'6"-143'6") shy. to slst. & carb. shal

157' 7½

Coal, clst. & sh. carb.

BARRETT'S SEAM.

165' 2"

Gw. (Shly to sandy. shale in Part.)

180' 0"

90' 0"

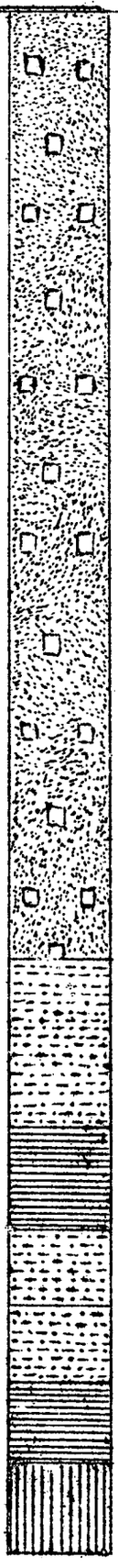
Cont.

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 7S	Elevation:	430.0' ASL
Reference: BMR Map N14/110, June 1953.		Datum:	Standard
Begun: 30.6.52	Finished: 21.7.52	Depth:	302' 1"

STRATIGRAPHIC LOG (1"-10')



180' 0"

Gw. (shaly to sandy shale in part)

234' 3½

Mainly slst. & shale

263'11"

Claystone.

270' 0"

Cont.

270' 0"

Claystone

280' 0"

Claystone & shale

302' 1"

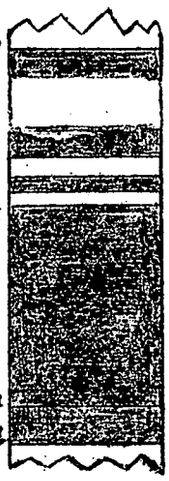
Cont.

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 7S	Elevation:	430.0' ASL
Reference: BMR map N14/110, June 1953.		Datum:	Standard
Begun: 30.6.52	Finished: 21.7.52	Depth:	302' 1"

COAL DETAIL (1"-2')



107' 2"

Coal dull and bright banded.

108' 10½"

HM	V	FC	Ash	BThU		
3.2	35.2	51.6	10.0	12,970	No. 1	2' 1¾"

Coal dull & brt. bdd. becoming broken & splint

Mainly brt. coal with bands of shale

111' 0"

111' 5"

157' 7½"

2.7	37.7	49.9	9.7	13,140	No. 2	11½"

Coal splint w. v. finely disser. pyr. w. clst.

158' 6¾"

2.8	38.7	52.6	5.9	13,700	No. 3	1' 6½"

Coal bright.

160' 1¼"

160' 2"

2.8	33.0	46.8	17.4	11,800	No. 4	2' 2"

Coal dull & bright bdd. w. clst. cleat & pyr.

162' 4"

162' 8"

2.6	37.4	51.0	9.0	13,260	No. 5	9½"

Coal dull & brt. bdd. shaly to lam.clst.

163' 5½"

163' 7"

4.1	33.3	50.2	12.4	12,350	No. 6.	1' 7"

Coal d. & brt. bdd. shy. t. lam. claystone.

165' 2"

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 8S	Elevation:	534.4' ASL
Reference: BMR Map N14/110, June 1953.		Datum:	Standard
Begun: 22.7.52	Finished: 28.8.52	Depth:	500' 0"

STRATIGRAPHIC LOG (1"-10')

Clay. gw. & slst.

16' 9"

Gw. slst. & clst.

36' 6¾"

SEAM J

39' 7"

Gw. shale.

44' 8¼"

Coal splint sh clst.

SEAM G

51'10"

Shale & slst.

57'11½"

SEAM E

61' 0"

Mainly greywacke

86' 2"

SEAM C

90' 9½"

90' 9½"

Gw. slst. & clst.

Coal 130'11"

Gw. siltstone 136' 2"

Siltstone & gw.

170' 6"

Shale & 3" coal. 173' 3"

Slst, clst. & sh. (carb. in part) 180' 0"

180' 0"

Slst.clst.& sh. (carb.in part) 184' 5"

Coal sh. & clst.

ARTIE'S SEAM.

203' 3"

Mainly sh. & slst.

212' 2"

Gw. & siltstone

251' 1"

Slst. clst. & sh.

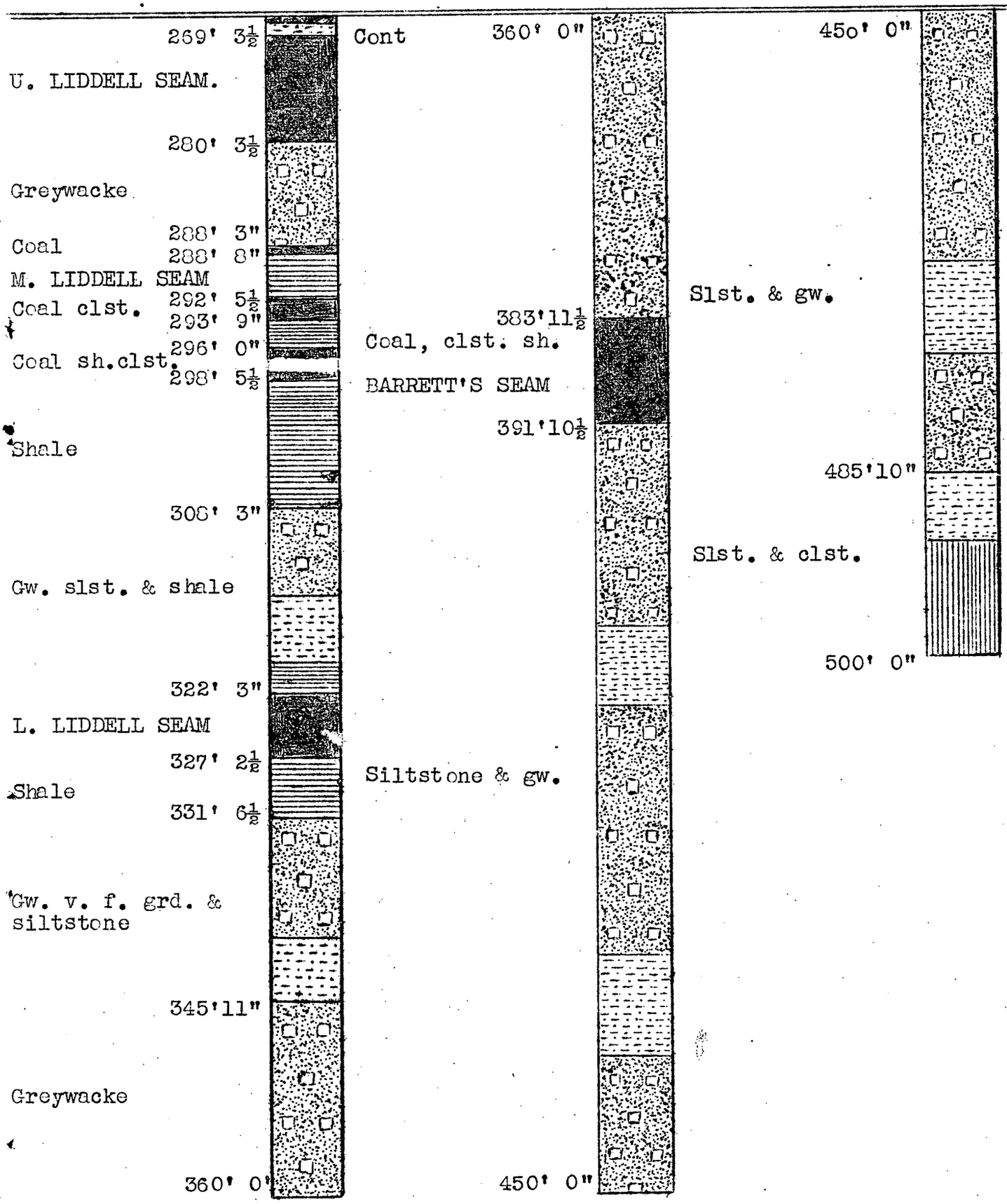
269' 3½"

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 8S	Elevation:	534.4' ASL
Reference: BMR Map N14/110, June 1953.		Datum:	Standard
Begun: 22.7.52	Finished: 28.8.52	Depth:	500' 0"

STRATIGRAPHIC LOG (1"-10')



COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek | Hole No: BMR 8S | Elevation: 534.4' ASL

Reference: BMR Map N14/110, June 1953. | Datum: Standard

Begun: 22.7.52 | Finished: 28.8.52 | Depth: 500' 0"

COAL DETAIL (1"-2')

36' 6¾"
36' 9¾"

Coal dull & brt. bdd w. t. sh. bds. clst. carb. material.

37' 11⅜"

HM	V	FC	Ash	BThU
3.6	31.9	46.6	17.9	11,450

No. 1

Coal dull & brt. bdd. w. carb. sh bds.

39' 7"

44' 8½"

4.0	28.9	37.4	29.7	9,510

No. 2

Coal dull & brt. bdd. mainly splint.

45' 5"

46' 0"

3.8	30.7	44.7	20.8	10,890

No. 3

Coal d. & brt. bdd. w.t. bk. carb. sh. bd. near bot well dev. cleat.

47' 8"

3.7	28.3	39.3	28.7	9,790

No. 4

Coal dull & bright bdd. carbonaceous, shale.

49' 3"

49' 9½"

3.7	34.1	48.2	14.0	12,000

No. 5

Coal mainly d. & bright w. r. t. carb. sh. bds. with cleat.

51' 10"

57' 11½"

3.4	32.3	48.1	16.2	11,900

Coal d. & brt. bdd. splint w. cleat & clst. br. silty hard.

58' 11"

5' 0¼"

3.7	31.6	45.2	19.5	11,280

No. 7

Coal dull & bright bdd. w. cleat w. R carb. sh.

61' 0"

86' 2"

3.7	33.7	51.4	11.2	12,590

No. 8

Coal dull & bright bdd. w. t. bds. bk. carb. sh near bottom.

88' 6"

4.4	36.3	50.9	8.4	12,900

No. 9

Coal dull & bright bdd. w. well dev. cleat powd. in part w. some dant near bottom.

90' 9½"

Coal dull & brt. bdd. carb. splint.

HM	V	FC	Ash	BRhU
3.3	33.7	43.4	19.6	11,390

No.10

Coal dull & brt. bdd.

Coal splint w. brt. lam. sh. gy. s. cly. at bottom.

3.0	35.1	49.3	12.6	12,570

No.11

Coal splint then bdd. w. occas. d. lam shy. band.

3.7	32.0	45.2	19.1	11,420

No.12

Coal dull & brt. bdd. w. clst. shale dark grey, clayey.

4.2	29.7	44.0	22.1	10,830

No.13

Coal dull & brt. bdd. lam. shly & cold grains

No.14

4.1	32.2	45.8	17.9	11,450

Coal w. R. thin lens brown clst. pyrite.

3.8	33.1	45.9	17.2	11,610

No.15

Coal banded, lam. in part with rare brown silty clst. lens.

Coal mainly bright powdery.

184' 5"

185' 4¾"

186' 7¼"

186' 10¾"

187' 3¼"

187' 7¾"

188' 4½"

191' 0"

192' 11"

193' 0"

193' 8"

193' 10¼"

196' 0"

196' 5½"

197' 4"

197' 5"

198' 4"

198' 9½"

201' 6"

202' 0¼"

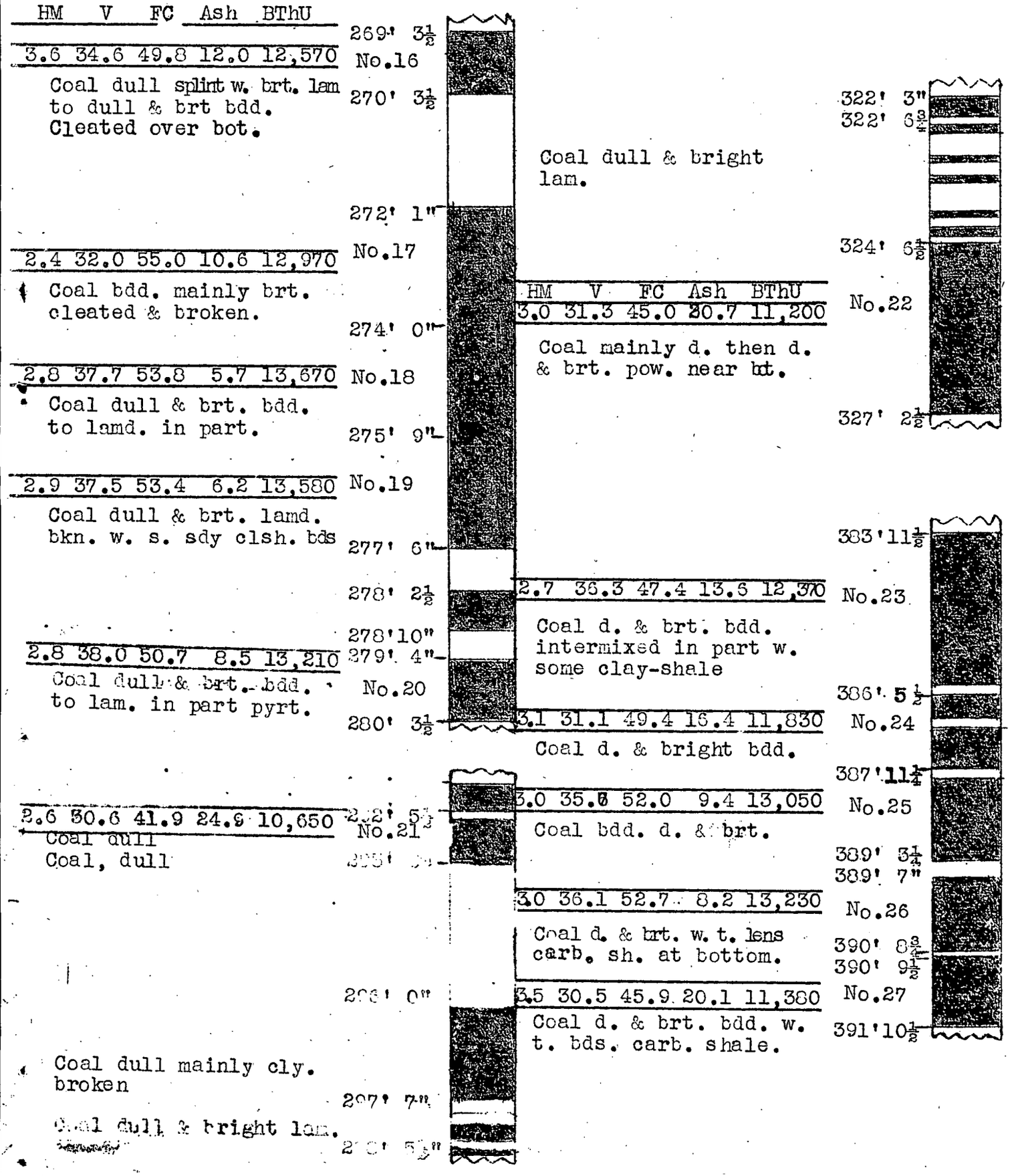
203' 3"

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 8s	Elevation:	534.4' ASL
Reference: BMR Map N14/110, June 1953.		Datum:	Standard
Begun: 22.7.52	Finished: 28.8.52	Depth:	500' 0"

COAL DETAIL (1"-2')

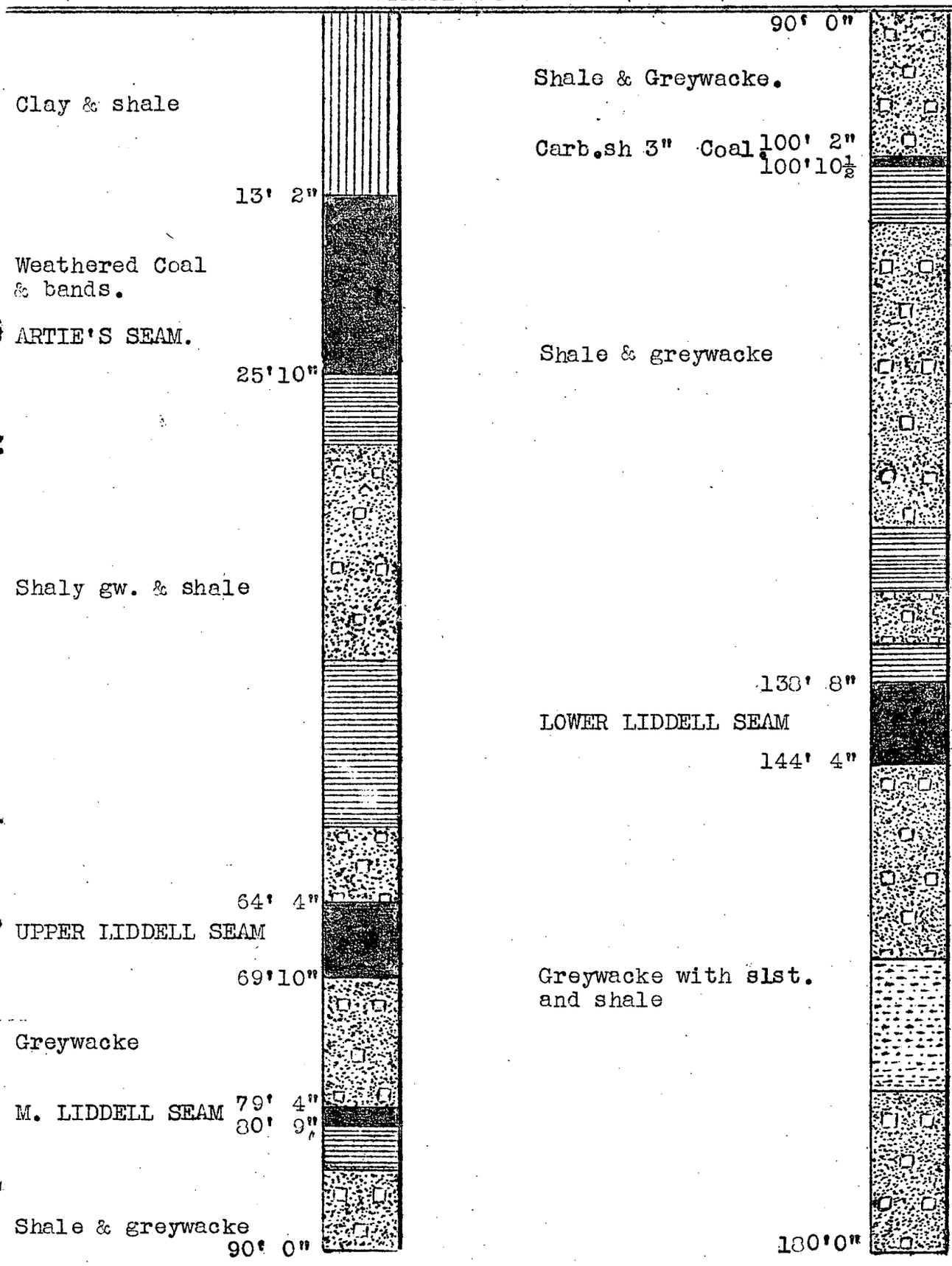


COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 9S	Elevation:	507.0' ASL
Reference: BMR Map N14/110, June 1953.		Datum:	Standard
Begun: 30.7.52	Finished: 18.8.52	Depth:	300' 6"

STRATIGRAPHIC LOG (1"-10')

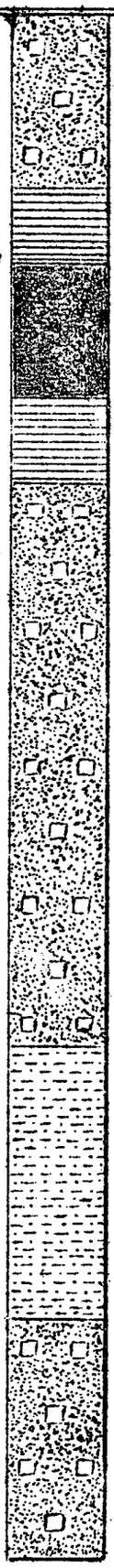


COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 9S	Elevation:	507 0' ASL
Reference: BMR Map N14/110, June 1953.		Datum:	Standard
Begun: 30.7.52	Finished: 18.8.52	Depth:	300' 6"

STRATIGRAPHIC LOG (1"-10')



180' 0"

Gw. w. slst. & shale.

194' 4"

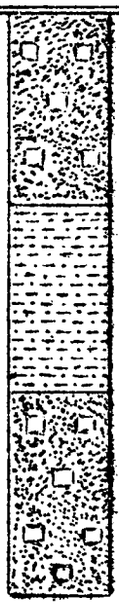
BARRETT'S SEAM

202' 0"

Shale, Greywacke & siltstone.

270' 0"

Cont



270' 0"

Shale. gw. & slst.

300' 6"

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 9S	Elevation:	507 0' ASL
Reference: BMR Map N14/110,	June 1953.	Datum:	Standard
Begun: 30.7.52	Finished: 18.8.52	Depth:	300' 6"

COAL DETAIL (1"-2')

13' 2"

Shale br. to bk. carb.

13' 9"

Coal mainly dull w. bright bds.

Shale brown to black carb. with smut.

Coal dull banded.

HM	V	FC	Ash	BThU	
2.8	33.1	46.5	17.6	11,770	No. 3

16' 9"

Smut black

17' 2½"

Coal dull & bright bdd. w. occas. t. bds. br. sdy. shale dk. br. powd. in part & w. wh. min. on cleavage planes.

Smut to dant at bottom

18' 2½"

Smut to dant

18' 4"

18' 9"

18'11"

Shale br. carb. silty w. band smut.

20' 6"

20' 9"

Mainly dant with light brown siltstone

2.7	37.6	49.9	9.8	13,030	No. 4

23'11"

24' 3"

Coal mainly d. but w. brt. lam & bds. pyr. & w. t. lens br. clst.

Smut & dant

25'10

HM	V	FC	Ash	BThU	
2.9	36.9	52.5	7.7	13,410	

64' 4"

Coal dull & brt. lam.

2.5	35.0	53.4	9.1	13,080	No. 1

Coal dull & brt. bdd. lam.

2.8	32.0	51.3	13.9	12,410	No. 6

65' 9"

Coal dull & bright with brown shaly sandy clst. carbonaceous & pyrite.

2.9	38.7	53.0	5.4	13,750	No. 2

Coal dull & bright bdd. dant, clayey.

68' 1½"

68' 7"

Coal dull & bright lam. and dant.

69'10"

79' 4"

80' 9"

138' 8"

139' 2"

144' 4"

194' 4"

195'10"

No. 5

197' 3½"

197' 5½"

197'10"

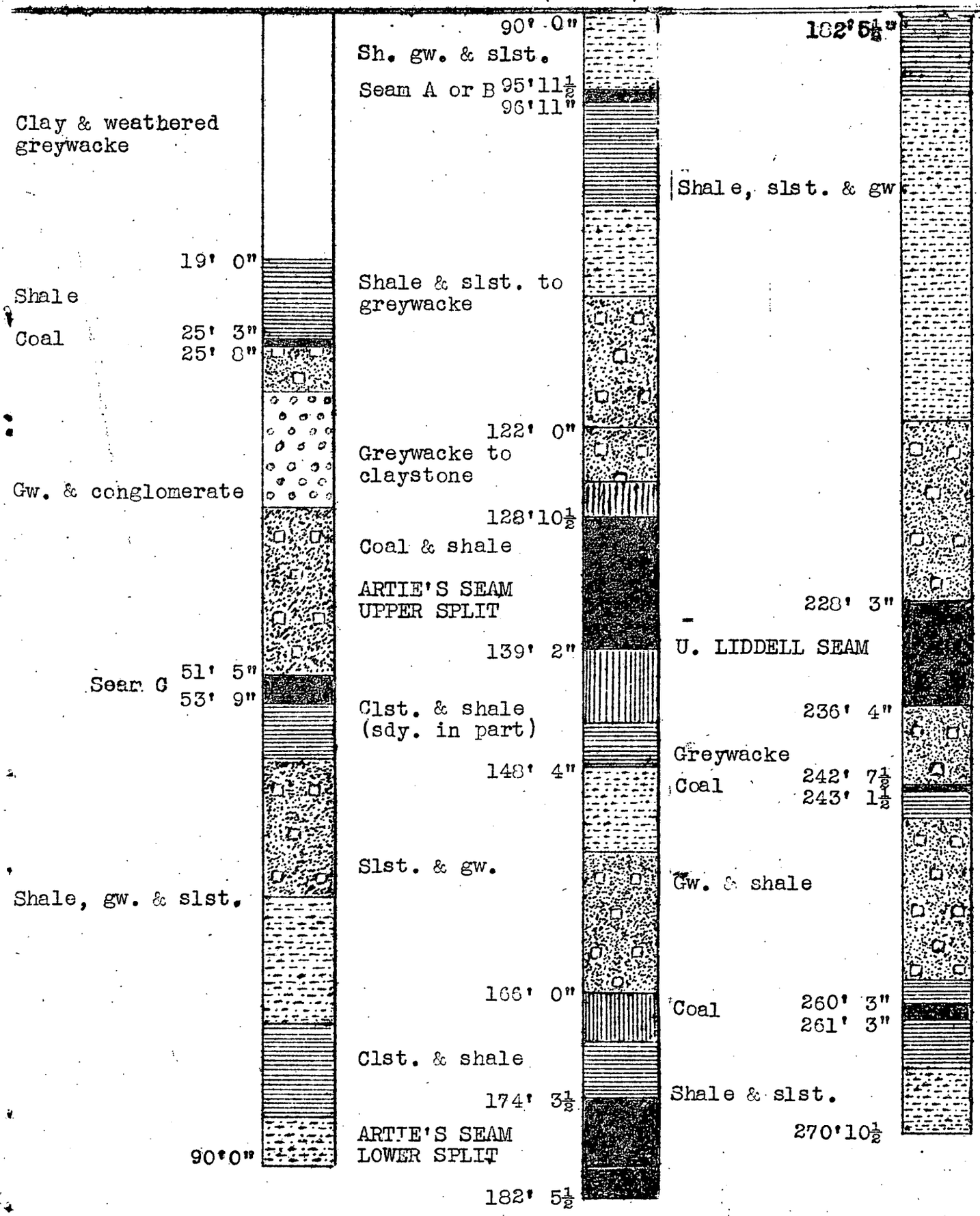
202' 0"

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 10S	Elevation:	450.7' ASL
Reference: BMR Map N14/110, June 1953.		Datum:	Standard
Begun: 4.8.52	Finished: 27.8.52	Depth:	500' 0"

STRATIGRAPHIC LOG (1"-10')

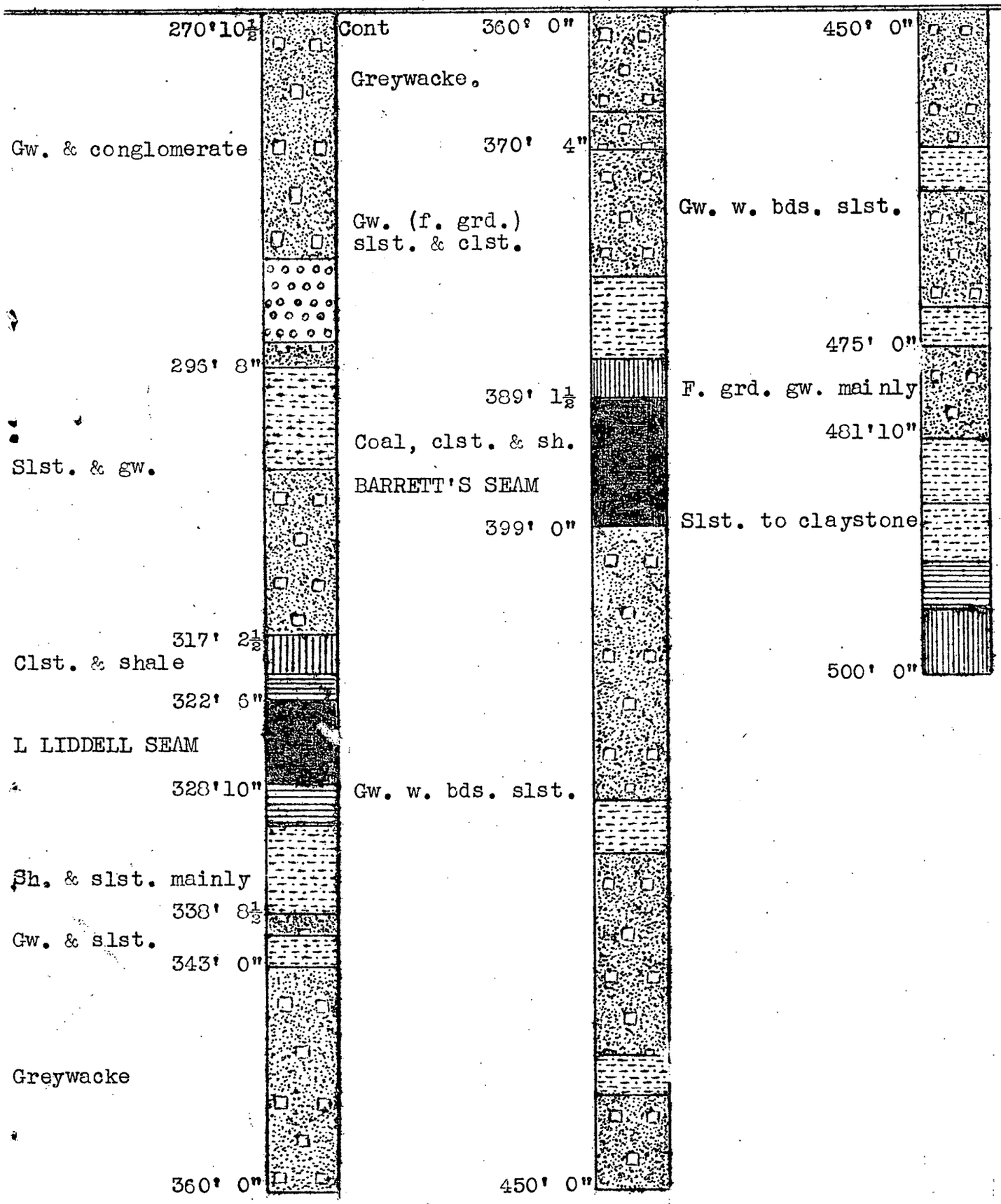


COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 10S	Elevation:	450.7' ASL
Reference: BMR Map N14/110,	June 1953.	Datum:	Standard
Begun: 4.8.52	Finished: 27.8.52	Depth:	500' 0"

STRATIGRAPHIC LOG (1"-10')

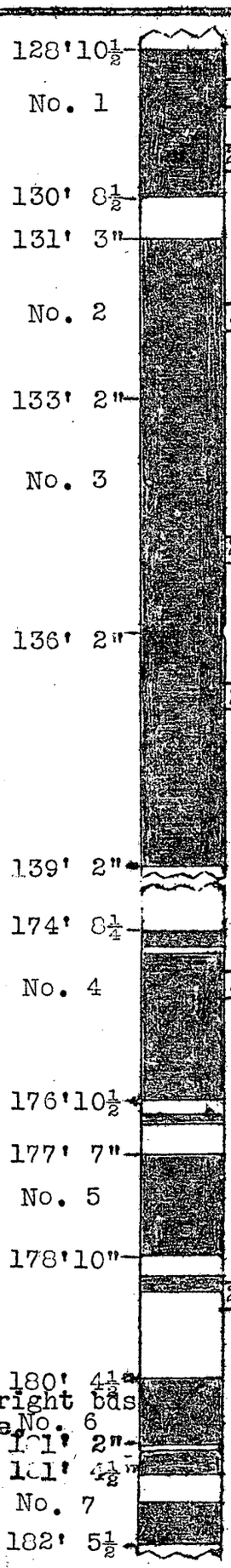


COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 10S	Elevation: 450.7' ASL
Reference: BMR Map N14/110, June 1953.		Datum: Standard
Begun: 4.8.52	Finished: 27.8.52	Depth: 500' 0"

COAL DETAIL (1"-2')



128' 10½"

HM	V	FC	Ash	BThU
2.5	34.7	47.8	15.0	12,280

No. 1

Coal dull & bright lam w. R. bd. gw. & R lens clst. w. marcasite

130' 8½"

131' 3"

2.4	37.7	49.2	10.7	12,940

No. 2

Coal dull & bright lam w. t. dk. gy. sh. bd. broken in part.

133' 2"

2.4	34.5	56.4	6.7	13,530

No. 3

Coal dull & bright lamd. to shaly in part

136' 2"

Coal mainly bright to powdery also dant.

139' 2"

174' 8¼"

2.3	32.5	49.8	15.4	12,180

No. 4

Coal, dull & brt. lam. dull & brt. bdd. pyr. with calcite.

176' 10½"

Coal bdd. w. clst.

177' 7"

2.6	34.6	50.5	12.3	12,680

No. 5

Coal d. & brt. bdd. w. pyr. carb. sh. near bot.

178' 10"

Coal mainly bright.

2.6	33.5	48.7	15.2	12,250

180' 4½"

Coal dull & bright w. bright bds slightly pyr. w. calcite

No. 6

181' 2"

181' 4½"

2.7	30.6	48.0	18.7	12,710

No. 7

Coal bdd. w. calcite pow. & intermixed w. carbonaceous shale

182' 5½"

HM	V	FC	Ash	BThU
2.4	33.5	50.8	13.3	12,560

228' 3"

No. 8

Coal d. & brt. lam w. clst. lens. dant

230' 0"

2.6	34.9	49.7	12.8	12,690

No. 9

Coal bdd. to lamd. shy to powdery - mainly bright.

233' 5"

2.9	31.8	49.4	15.9	12,100

No. 10

Dant

Coal bdd. w. lens marcasite.

234' 5"

235' 2"

2.4	31.6	46.8	19.2	11,600

No. 11

Coal d. & brt. bdd. mainly bright.

236' 4"

322' m6"

2.5	31.9	44.9	20.7	11,360

No. 12

Coal d. & brt. bdd. w. t. bd. friable gw.

324' 0"

Coal d. & brt. bdd.

Coal d. & brt. w. calcite on cleat

324' 10½"

325' 2½"

Coal d. lam. pyrite.

325' 11¾"

2.6	30.9	46.3	20.2	11,430

No. 13

Coal lamd. dull & brt. with some thin shale bands.

328' 10"

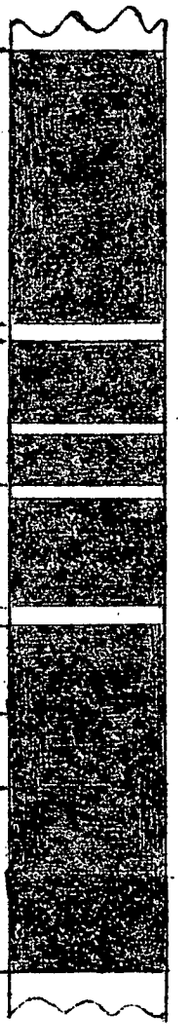
COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 10S	Elevation:	450.7' ASL
Reference: BMR Map N14/110, June 1953.		Datum:	Standard
Begun: 4.8.52	Finished: 27.8.52	Depth:	500' 0"

COAL DETAIL (1"-2')

HM	V	FC	Ash	BThU		
2.2	37.4	49.1	11.3	12,970	389' 1½	No.14
Coal d. & brt. bdd. to lamd. w. rare dark br. shale bands.					392' 0"	
					392' 2½	
2.4	28.7	44.5	24.4	10,690		No.15
Coal d. & brt. w. brt. bds. pyr. lamd. to bdd. w. claystone.					393' 9"	
2.3	36.9	50.4	10.4	13,090	393' 11½	No.16
Coal lamd. to bdd. pyr. w. calcite & cleat.					395' 0½	
22.4	31.1	15.4	21.1	11,160	395' 3"	No.17
Coal lamd.						
2.5	28.6	44.8	24.1	10,720	396' 2½	No.18
Coal powdrry bright & carb. sh.					397' 0"	
2.8	28.0	44.4	24.8	10,580		No.19
Coal d. & brt. bdd. intermixed with dant.					399' 0"	



COMMONWEALTH OF AUSTRALIA

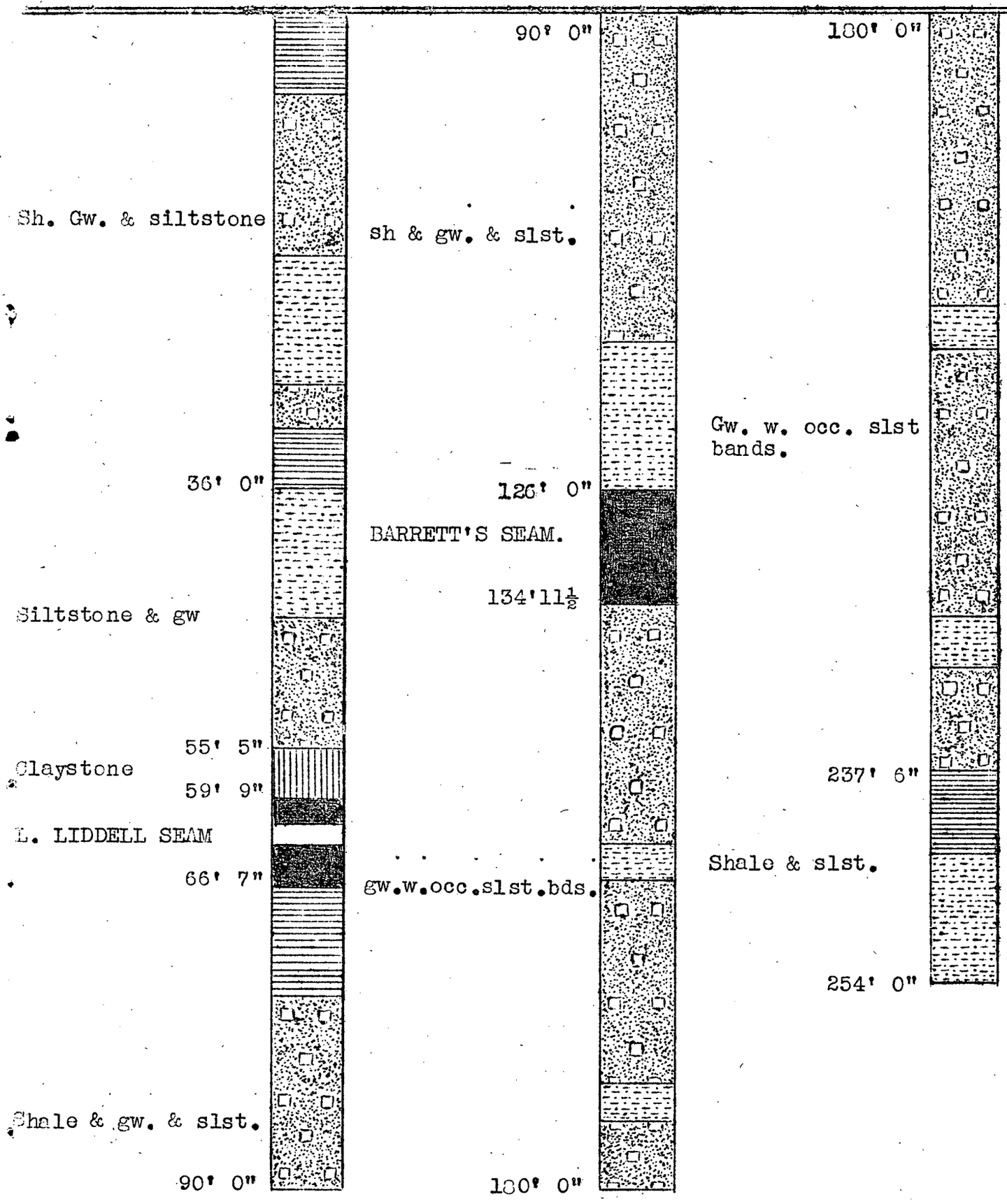
Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek Hole No: BMR 12S Elevation: 441.1' ASL

Reference: BMR Map N14/110, June 1953. Datum: Standard

Begun: 22.8.52 Finished: 1.9.52 Depth: 254' 0"

STRATIGRAPHIC LOG (1"-10')

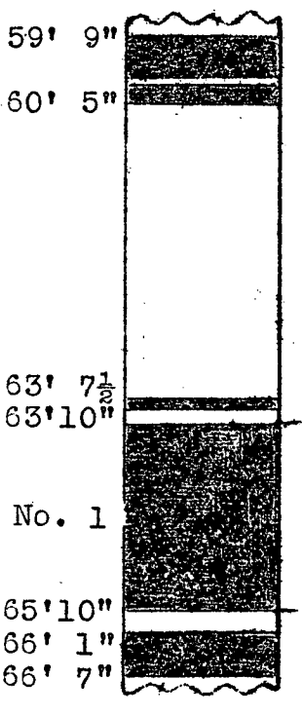


COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 12S	Elevation:	441.1' ASL
Reference: BMR Map N14/110, June 1953.		Datum:	Standard
Begun: 22.8.52	Finished: 1.9.52	Depth:	254' 0"

COAL DETAIL (1"-2')



Coal dull laminate

59' 9"

60' 5"

63' 7½"

63'10"

HM	V	FC	Ash	BThU
4.1	33.8	49.6	12.5	12,460

No. 1 — 2' 0"

Coal d. & brt. w. R. bd carb. shale

65'10"

Coal d. & bright bdd.

66' 1"

66' 7"

126' 0"

3.4	38.7	50.9	7.0	13,440

No. 2 — 2' 8"

Coal dull & bright lamd. to bdd. pyrite.

128' 8"

128' 9½"

3.9	31.3	51.5	13.3	12,370

No. 3

Coal dull & bright bdd. Pyr.w.t.clst.bds.

130' 0½"

130' 2½"

1' 3"

3.8	36.5	51.7	8.0	13,180

No. 4 — 1' 3½"

Coal d. & brt. lamd. bdd. over bot. 4" pyr.

131' 6"

131' 9½"

3.9	35.3	50.3	10.5	12,840

No. 5 — 1' 5"

Coal d. & brt. bdd. to lamd. w. R. t. bds. carb sh.

133' 2⅛"

133'5½"

4.2	33.8	49.7	12.3	12,520

No. 6 — 1' 6"

Coal d. & brt. w. R. sh. lam pyr. t. bd. bk carb. pyrite.

134'11½"

COMMONWEALTH OF AUSTRALIA

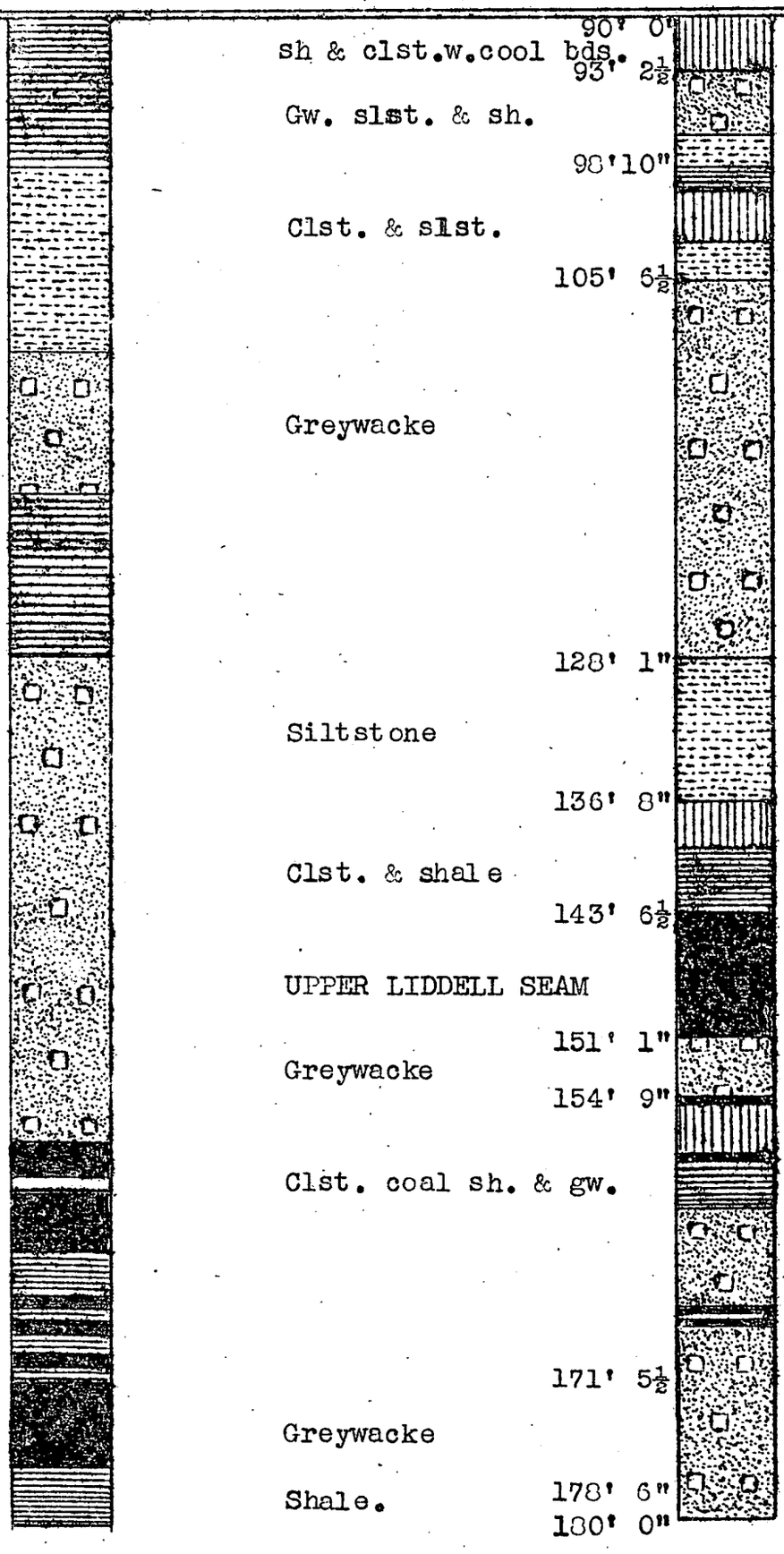
Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek Hole No: BMR 13S Elevation: 4[illegible]6.5 ASL

Reference: BMR Map N14/110, June 1953. Datum: Standard

Begun: 25.8.52 Finished: 19.9.52 Depth: 300' 0"

STRATIGRAPHIC LOG (1"-10)



Shale, slst. & gw. (shaly)

67' 8"

Coal & shale

73' 8"

ARTIES SEAM 76' 4"

Coal sh. & clst.

81' 9½"

Coal sh. & clst.

86' 11½"

Sh.&clst.w.coal bds.

90' 0"

sh & clst.w.cool bds.

93' 2½"

Gw. slst. & sh.

98' 10"

Clst. & slst.

105' 6½"

Greywacke

128' 1"

Siltstone

136' 8"

Clst. & shale

143' 6½"

UPPER LIDDELL SEAM

151' 1"

Greywacke

154' 9"

Clst. coal sh. & gw.

171' 5½"

Greywacke

178' 6"

Shale.

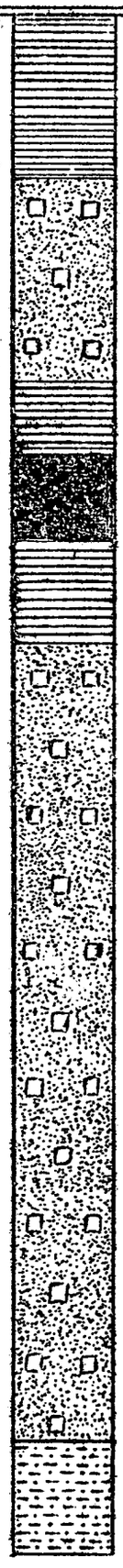
180' 0"

COMMONWEALTH OF AUSTRALIA

Bureau of Mineral Resources, Geology and Geophysics

Area: Parnell's Creek	Hole No: BMR 13S	Elevation:	486.5' RSL
Reference: BMR Map N14/110,	June 1953.	Datum:	Standard
Begun: 25.8.52	Finished: 19.9.52	Depth:	300' 0"

STRATIGRAPHIC LOG (1"-10')



180' 0"

Shale

189' 1"

Greywacke

201' 0"

Shale

205' 3"

L. LIDDELL SEAM

210' 2"

Shale

216' 1"

Greywacke

263' 2"

Siltstone

270' 0"

Cont

Coal & bands

BARRETT'S SEAM

Shale

279'10½"

282' 4½"

Greywacke

270' 6"

300' 0"