GEOLOGICAL SURVEY OF NEW SOUTH WALES.

THE COAL RESOURCES OF NEW SOUTH WALES.

BY

EDWARD F. PITTMAN,

Associate of the Royal School of Mines, London.
Member of the Institution of Mining and Metallurgy.
Government Geologist, and Under Secretary for Mines, for New South Wales.

Issued by direction of
The Honorable A. EDDEN, M.L.A.,
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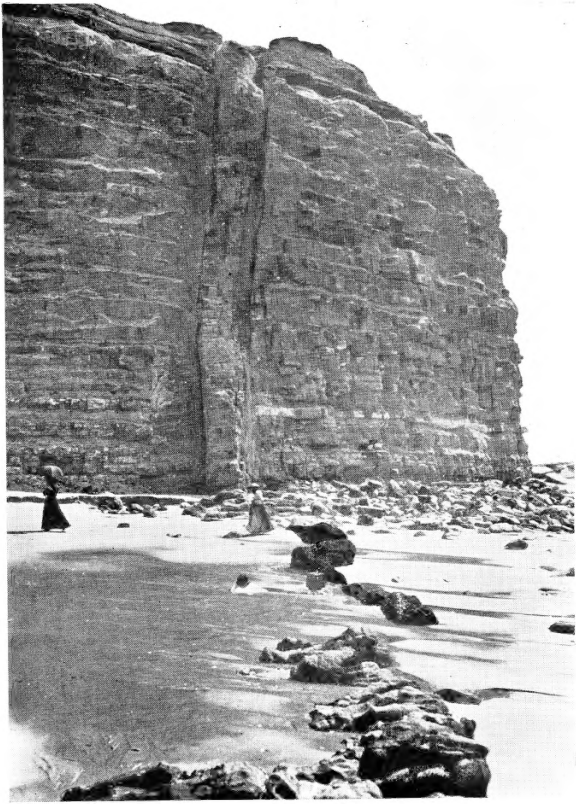

Photo. by E. F. Pittman.

Dolerite dyke intersecting the Upper Coal Measures, Nobbys, Newcastle.

The course of the dyke can be seen in the foreground, together with some masses of coal whic
have been cindered by the heat of the intrusive lava.

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PREFACE.

THIS little work is really a second edition of the article on Coal published in "The Mineral Resources of New South Wales, 1901." In view of the length of time which has elapsed since the publication referred to, and the consequent developments which have taken place in New South Wales Coal Mines, and especially in the Maitland-Cessnock field, it seems advisable that newer records of the composition of our coals should be made public.

Within the last three months no less than 194 representative samples of coal have been carefully taken by the Inspectors of Coal Mines, and these have been analysed by the Chemical Staff of the Geological Survey Laboratory. It is hoped that the results, which have been hereto appended, may be of some use to the mining community.

EDWARD F. PITTMAN,
Government Geologist.

Department of Mines,
Sydney, 1st December, 1911.

The Coal Resources of New South Wales.

EARLY HISTORY OF NEW SOUTH WALES COAL.

THE coal deposits of New South Wales constitute the most important of her many and varied mineral resources, and they are of much greater extent, besides being of much better quality, than those of any of the other Australian States. The possession of such large quantities of valuable fuel must ultimately cause New South Wales to become the chief centre of manufacturing industries of Australasia, if not of the Southern Hemisphere.

The coal from the different New South Wales coal-fields varies somewhat in character and composition, and while in some districts the fuel is most suitable for steam-raising, in others it has a special value for gas-making, or for household purposes. One special advantage about these deposits is that, for a distance of about 200 miles, they extend along the seaboard, so that they are excellently situated for export purposes.

The discovery of coal in this State dates back to August, 1797, the locality where it was first found being Coalcliff, on the coast to the north of Wollongong, in the Southern Coal-field. About a month later seams of coal were discovered in the cliffs at Newcastle, which place has since become the centre of export for the Northern Coal-field.

The following extracts in reference to the early discovery of coal in Australia are copied from a work by D. Collins, entitled "An Account of the English Colony in New South Wales," 1798, page 617 :—

> "Information was also received through the same channel (letters from New South Wales in 1797) that a ship called the *Sydney Cove* had been fitted out for Port Jackson from Bengal; but, springing a leak at sea, she was run ashore on the southern most part of New Holland. Seventeen of the crew attempted to get to Port Jackson in their longboat, but were driven on shore and lost their boat. They then attempted to reach it by land, in which hazardous attempt only three of them succeeded, the others either dying on the route or being killed by the natives. They were eighty days in performing this journey, and reported that on their way they had found great quantities of coal. This was afterwards confirmed by the surgeon of the *Reliance*, who went down to the wreck and brought specimens of it back with him, having found immense strata of this useful article."

In a second edition of the same book, published in 1802, the following statements occur (page 45):—

> "August, 1797.—Mr. Clark, supercargo of the ship *Sydney Cove*, having mentioned that, two days before he had been met by the people in the fishing boat, he had fallen in with a great quantity of coal, with which he and his companions made a large fire, and had slept by it during the night, a whaleboat was sent off to the southward with Mr. Bass, the surgeon of the *Reliance*, to discover where an article so valuable was to be met with. He proceeded about 7 leagues to the southward of Point Solander, where he found, in the face of a steep cliff, washed by the sea, a stratum of coal, in breadth about 6 feet, and extending 8 or 9 miles to the southwards. Upon the summit of the high land, and lying on the surface, he observed many patches of coal, from some of which it must have been that Mr. Clark was so conveniently supplied with fuel. . . . . By the specimens of the coal which were brought in by Mr. Bass, the quality appeared to be good, but from its almost inaccessible situation no great advantage could ever be expected from it; and, indeed, were it even less difficult to be procured, unless some small harbour should be near it, it could not be of much utility to the settlement."

Notwithstanding the unfavourable opinions thus expressed, large shipments of excellent steam coal from these seams have, for many years past, been exported, the loading being carried on from jetties. In rough weather, however, there is very little natural protection for shipping on this coast; and in view of the importance of the southern coal trade, and the extent to which it must grow if better facilities for shipping were provided, the Government have now constructed, by means of extensive breakwaters, a deep-water harbour at Port Kembla, which will enable the largest ocean-going vessels to ship cargoes of coal with safety in the roughest weather.

The discovery of coal at the site of the present city of Newcastle is thus referred to by Mr. David Collins at page 47 of the work just quoted:—

> "September, 1797.—This month began with a very vexatious circumstance. A boat named the *Cumberland*, the largest and best in the Colony, belonging to the Government, was, on her passage to the Hawkesbury, whither she was carrying a few stores, taken possession of by a part of the boat's crew, being at the same time boarded by a small boat from the shore, the people in which seized her and put off to sea, first landing the coxswain and three others, who were unwilling to accompany them, in Pittwater in Broken Bay. Those men proceeded overland to Port Jackson, where they gave the first information of this daring and piratical transaction. Two boats, well manned and armed, were immediately despatched after them, under the command of Lieutenant Shortland,

of the *Reliance*. One of these boats returned in a few days without having seen any of them, but Lieutenant Shortland proceeded with the other, a whaleboat, as far as Port Stephens, where he thought it probable they might have taken shelter; but on the 19th, having been absent thirteen days, he returned without discovering the smallest trace of them or the boat. His pursuit, however, had not been without its advantage, for on his return he entered a river, which he named the Hunter River, about 10 leagues to the southward of Port Stephens, into which he carried 3 fathoms water in the shoalest part of its entrance, finding deep water and good anchorage within. The entrance of this river was but narrow, and covered by a high rocky island lying right off it, so as to leave a good passage round the north end of the island, between that and the shore. A reef connects the south part of the island with the south shore of the entrance of the river. In this harbour was found a very considerable quantity of coal of a very good sort, and lying so near the waterside as to be conveniently shipped, which gave it, in this particular, a manifest advantage over that discovered to the southward. Some specimens of this coal were brought up in the boat."

The two localities where coal was first discovered in Australia, viz., the coast near Wollongong and the mouth of the Hunter River at Newcastle, still remain the principal sites of coal-mining activity after a lapse of 114 years. It is true that several of the collieries in the immediate vicinity of Newcastle have been worked out, and that others are within measurable distance of depletion. Nevertheless, the discovery, within comparatively recent years, of the rich seams of the Greta Measures between Maitland and Cessnock has resulted in the opening up of a number of new collieries which will supply the Australian and foreign markets with first-class coal for very many years to come, and Newcastle will certainly remain the port of its shipment.

GEOLOGY OF THE COAL-BEARING ROCKS.

The geology of the coal-bearing rocks of New South Wales was first studied by the late Rev. W. B. Clarke, M.A., F.R.S., who determined their age, and, to a considerable extent, their distribution. His work in this direction was afterwards supplemented by Messrs. Stutchbury, W. Keene, C. S. Wilkinson, John Mackenzie, R. Etheridge, Professor David, J. E. Carne, J. B. Jaquet, L. F. Harper, and others. Professor David has made a survey of the Newcastle and Maitland Coal-fields, and has shown by geological sections the relations of the Coal Measures of the Northern Fields to those of the Southern and Western Coal-fields. He also discovered the extension of the Greta seams between West Maitland and Cessnock, the district which has since become the greatest coal-mining centre in Australia.

As a result of the investigations of the abovementioned workers, the coal-bearing rocks of New South Wales may be geologically classified as follows :—

Geological Age.	Maximum thickness of strata.	Locality.	Character of Coal.
I.—Tertiary, *Eocene to Pliocene.*	About 100 feet.	Kiandra, Gulgong, Chouta Bay, &c.	Brown-coal or lignite.
II.—Mesozoic, *Triassic, or Trias-Jura.*	About 2,500 feet.	Clarence and Richmond Rivers.	Coal suitable for local use only.
III.—Palæozoic, *Permo-Carboniferous.*	About 13,000 ft.	Northern, Southern, and Western Coalfields.	Good coal, suitable for gas-making, and for household and steam-raising purposes.
IV.—Palæozoic, *Carboniferous*	About 10,000 ft.	Stroud, Bullah Delah.	Very inferior coal, with bands; of no value.

I.—Tertiary.

Deposits of lignite or brown-coal, of limited extent, have been found n deep alluvial leads, overlaid by basalt, in many of our gold-fields, as at Kiandra, Gulgong, Forest Reefs near Millthorpe, &c. No attempt has ever been made to utilise any of these deposits as a source of fuel, and they cannot be considered to be of any commercial importance. At Kiandra, one deposit of lignite was found, by the late Mr. C. S. Wilkinson, to have a maximum thickness of 30 feet, but as a general rule the seams vary from a foot to 3 or 4 feet in thickness As the deposits have not been geologically surveyed it is not possible to give an estimate of the area covered by them.

II.—Mesozoic.

The age of the Mesozoic Coal Measures has not been determined beyond all doubt, but they may be regarded as either Triassic or Trias-Jura. These Measures occupy a considerable area in the Clarence River basin, which extends in a north and south direction for about 120 miles, whilst its greatest width from east to west is about 65 miles.

The rocks forming this basin have been divided into the *Upper*, *Middle*, and *Lower Clarence Series*, as under :—

Shales, possibly containing coal seams ...	Upper Clarence Series.
Thick bedded sandstones (about 100 feet)...	Middle Clarence Series.
Shales and sandstones (300 to 1,000 feet) with coal seams	Lower Clarence Series.
Thick beds of coarse conglomerates ...	

These Measures contain at least five seams of coal and shale bands, varying in thickness from 2 to 37 feet, but in every instance shale forms the greater part of the seam, and it is a rare thing to find a layer of clean coal of more than one foot in thickness between the bands. The coal contains a rather large proportion of fixed carbon, and should, therefore, be classed as a steam coal; unfortunately, however, the percentage of ash is too high to allow of the fuel being exported for this purpose, and it is unsuitable for any other than local use. Just over the Queensland border, near the town of Killarney, a seam of clean coal, 3 feet in thickness, is being worked commercially, the coal being used on the Queensland Government railways, and it is more than probable that this seam extends into New South Wales near Koreelah Creek, one of the heads of the Clarence River. Mesozoic coal may, therefore, be worked in this district in the future, but the country is very rough and at present very sparsely settled; consequently there is not likely to be a local demand for some time to come. The Clarence River coal is, as a rule, remarkably free from sulphur, and is comparatively smokeless.

The Clarence basin extends far into Queensland, and at Ipswich thick and valuable seams of coal are worked on an extensive scale; these seams probably occur in the equivalents of the Lower Clarence series.

The Clarence Coal Measures (Middle Clarence Series) also outcrop on the western flanks of the Main Dividing Range, and dip westerly under the central plains. The sandstones of this series form the intake beds of the great artesian water basin of New South Wales. In many of the artesian bores put down on the western plains, coal seams have been intersected, as proved by the pulverised coal brought up with the drillings; but, as the *percussive* drill is used for all these bores, a solid core cannot be obtained, and consequently it has not been possible to ascertain the exact thickness or the quality of the seams passed through. However, although many thousand square miles of the north-western plains of the State are thus, in all probability, underlain by seams of coal, there is little or no likelihood of their ever being worked on account of their being associated with rocks charged with water under pressure.

In the neighbourhood of Sydney, and, in fact, overlying a very large area of the main productive (Permo Carboniferous) coal basin of New South Wales, is a series of sandstones and shales known as the Hawkesbury series, by reason of their development along the course of the Hawkesbury River. These rocks are of freshwater origin, and contain thin coal seams. One seam, 4 feet thick with bands, was described by the late W. B. Clarke as occurring (in the Wianamatta shales) at South Creek, between Sydney and Penrith, and seams (of about a quarter of an inch in thickness) of bright bituminous coal are not uncommon in the Hawkesbury sandstones, but [illegible] like a workable deposit is known in any of the series.

The Hawkesbury series has been subdivided as follows in descending order :—

The Wiannamatta Shales.
The Hawkesbury Sandstones.
The Narrabeen Shales.

In lithological characters the Hawkesbury Sandstones are indistinguishable from the sandstones of the Clarence River, and they were for many years regarded as equivalents. More recently, however, it has been considered probable that the Hawkesbury Series may be older than the Clarence Series. There is apparently a distinction to be drawn between them on Palæontological grounds ; thus, while the most characteristic fossil plants of the Clarence Coal Measures are *Tæniopteris Daintreei*, and *Thinnfeldia Odontopteroides*, which have been found both in the great artesian basin and in the Clarence River basin, in the Hawkesbury series, *Tæniopteris Daintreei*, has not, so far, been met with, although *Thinnfeldia* is plentiful. Near the Talbragar River, about 20 miles north of Gulgong, there is a small fresh-water lacustrine deposit occupying a denuded hollow in the Hawkesbury Sandstones. It contains *Tæniopteris Daintreei* and other plant remains, together with numerous fossil fishes ; and Dr. A. S. Woodward, who examined the fish, has pronounced them to be of Jurassic age. It seems possible, therefore, that the most correct classification of the Mesozoic rocks of New South Wales would be the following :—

Talbragar lacustrine beds	Jurassic
Clarence Series	Trias-Jura
Hawkesbury Series	Triassic

Amongst the principal fossil genera occurring in the Hawkesbury series, the following may be mentioned :—

Plants	*Thinnfeldia, Tæniopteris, Macrotæniopteris, Phyllotheca, Sphenopteris, Pecopteris, Alethopteris, Baiera, Pterophyllum, Equisetum.*
Fishes	*Pœlœoniscus, Myriolepis, Cleithrolepis, Apateolepis, Dictyopyge, Belonorhynchus, Semionotus, Pristosomus, Pholidophorus.*
Labyrinthodonts	*Mastodonsaurus, Platyceps.*
Mollusca ..	*Unio, Unionella, Tremanotus (?).*
Crustacea ...	*Estheria, Ostracoda.*

III.—Palæozoic.—*Permo-Carboniferous.*

The Permo-Carboniferous Coal Measures are so-called because the marine beds which accompany them contain fossil forms showing affinities to those of both the Carboniferous and the Permian Systems of Europe.

These Measures form the great storehouse of the productive coal seams of New South Wales. They occupy an area of about 16,550 square miles. The main coal basin, as indicated on the accompanying map of the State, extends along nearly 200 miles of the eastern coast, from the neighbourhood of Port Stephens on the north to Ulladulla on the south; from the latter place it trends inland to the west and north-west, the greatest width of the area, in an east and west direction, being from Newcastle to Rylstone, a distance of about 100 miles. From Rylstone the main basin extends northwards beyond Gunnedah, and it is bounded thence by a line bearing south-eastwards back to Port Stephens. The deepest part of the basin is somewhere in the neighbourhood of Sydney, where the "Sydney Harbour Colliery" is working the uppermost seam at a depth of 2,884 feet. From here the Coal Measures rise towards the north, south, and west, as proved by the fact that the coal seams outcrop at the surface in the neighbourhood of Newcastle, Bulli, and Lithgow respectively. The Measures also rise to the east, under the South Pacific Ocean, in which direction their extension is unknown.

The Permo-Carboniferous rocks have been classified, in descending order, as follows :—

	Thickness in feet.
1. *Upper or Newcastle Coal Measures*, containing twelve seams of coal. In the aggregate they contain 35 to 40 feet of workable coal	1,400 to 1,500
2. *Deapsey Series*, freshwater beds, containing no productive coal. This series thins out completely in certain directions... ...	2,200
3. *Middle, or Tomago, or East Maitland Coal Measures*, containing six seams of coal, varying from 3 to 7 feet in thickness. In the aggregate they contain about 18 feet of workable coal	500 to 1,800
4. *Upper Marine Series*, containing an abundance of marine fossils, but specially characterised by the predominance of the Brachiopod, *Productus Brachytherus*	5,000 to 6,400
5. *Lower or Greta Coal Measures*, containing an aggregate of about 20 feet of coal	100 to 300
6. *Lower Marine Series*, containing an abundance of marine fossils, but specially characterised by the predominance of the Molluse, *Eurydesma cordata*	4,800
Total Maximum thickness.....	17,000 feet.

The characteristic fossil plant genera of the Permo-Carboniferous Coal Measures are *Glossopteris*, *Vertebraria* (believed to be the root of *Glossopteris*), *Nœggerathia*, and *Gangamopteris*. Of these, *Glossopteris*

is equally common to the Upper, Middle, and Lower Coal Measures; *Vertebraria* and *Nœggerathia* are found chiefly in the Upper and Middle Coal Measures; while *Gangamopteris* is most abundant in the Lower or Greta Coal Measures, and occurs also at some depth down in the Lower Marine series.

The Permo-Carboniferous Coal Measures are overlain in many localities by the Hawkesbury Series (Triassic), and, as a general rule, there is no apparent unconformability between them, so far as their stratigraphy is concerned. A notable instance to the contrary, however, occurs near Ællalong, where, as first shown by Professor David's survey, the Hawkesbury series rests upon the Muree beds of the *Upper Marine Series*, and about 7,000 feet of the strata which usually intervene are missing. The palæontological evidence also shows a marked lapse of time between the depositions of the two formations, the Palæozoic marine fossils and plant remains of the Permo-Carboniferous rocks being succeeded by Mesozoic types of fish, labyrinthodonts, freshwater shells and crustacea (*Unio* and *Estheria*), and plants.

1. *The Upper or Newcastle Coal Measures.*

These Coal Measures show the greatest surface development of any of the Permo-Carboniferous rocks. Their coal seams outcrop in the neighbourhood of Newcastle in the north, Lithgow in the west, and Bulli in the south, and, as will hereafter be shown, they extend continuously under the deep portion of the coal basin.

In the *Northern* or *Newcastle Coal-field* no less than twelve seams (which, with included bands, vary from 3 feet to about 20 feet in thickness) have been discovered in these Measures. They have been named as follows, in descending order :—

1. The Wallarah seam	...	about 11 feet thick.
2. The Great Northern seam		about 20 feet thick.
3. The Fassifern seam	...	up to 25 feet thick.
4. The Upper Pilot seam	...	not workable.
5. The Lower Pilot seam	...	not workable.
6. The Australasian seam	...	from 7 to 20 feet thick.
7. The Burwood seam	...	from 6 to 8 feet thick.
8. The Nobbys seam	...	not workable.
9. The Dirty seam ...	...	from 6 to 10 feet thick; splits into two seams in places.
10. The Yard seam ...	...	about 3 feet thick.
11. The Borehole seam	...	from 4 to 22 feet thick; usually 8 to 9 feet thick.
12. The Sandgate seams	...	from 4 to 6 feet thick.

Of the abovementioned twelve seams, only five are at present being worked, viz., the Wallarah, Great Northern, Australasian, Burwood, and Borehole, and by far the greatest amount of work has been done in

Photo. by E. F. Pittman.

The Upper Coal Measures, overlain by the Hawkesbury Sandstones. Coal Cliff, near Clifton, South Coast of N.S.W.

the lastnamed seam (the Borehole), which has produced enormous quantities of exceedingly fine coal, the quality being especially suitable for household use and for gas-making purposes. None of the other seven seams, so far as prospected in the Newcastle district, has proved sufficiently good to be profitably worked under existing conditions.

In the *Southern* or *Illawarra Coal-field* these Coal Measures are known to contain five distinct seams which have been named as follow, in descending order :—

1. The Bulli seam ... ... 2 to 11 feet thick ; usually 6 to 7 feet thick.
2. The Four-feet seam ... about 4 feet thick.
3. The Thick seam, or Dirty seam ... ... about 17 feet thick.

(Several small seams occur between the Thick seam and the Eight-feet seam).

4. The Eight-feet seam ... from 7 to 9 feet thick.
5. The Bottom seam ... ... about 6 feet thick, including numerous bands.

Only two of the above mentioned seams have so far been worked, viz., the Bulli seam and the Four-feet seam, and the operations in the last-mentioned have only been on a small scale. Almost all the coal produced in the Southern Coal-field has been obtained from the Bulli seam, which is the uppermost one of the series. It cannot be said, however, that the other seams have been anything like thoroughly prospected.

Southern coal is essentially a steam coal, containing as it does about 65 per cent. of fixed carbon ; but, in addition to this, it produces an exceedingly strong coke, which is specially suitable for smelting purposes by reason of its capacity for sustaining the weight of the ore burden in a blast furnace.

In the *Western* or *Lithgow Coal-field* there are seven seams known to occur in the Upper Coal Measures, and of these only three have been proved to be of commercial importance ; indeed, although coal has actually been won from three seams, by far the greatest proportion of it has come from the lowest of the series, viz., the Lithgow seam.

In descending order the seams in the Western Coal-field have been defined by Mr. J. E. Carne, Assistant Government Geologist, as follows :—

1. The Katoomba or top seam ... from 2 to 6 feet thick.
2. The Dirty seam ... ... with bands attains a thickness of 18 feet.
3. } Thin, unimportant seams.
4. }
5. }
6. Upper Irondale seam ... ... from 5 to 8 feet thick.
7. The Lithgow seam ... ... about 11 feet 6 inches thick ; (lower 6 feet worked).

The top or Katoomba seam has been worked to a small extent at Hartley Vale, Main Camp, and Katoomba. The sixth seam has been opened in the upper tunnel at Irondale Colliery, in Wallace's Black Diamond Colliery (?). at Blackman's Flat, and at Cullen Bullen. All the collieries in the immediate neighbourhood of Lithgow are working the lowest or Lithgow seam.

Western coal is essentially steam coal but of an inferior quality to Southern coal ; moreover, it contains a distinctly higher percentage of ash than the latter.

A feature of the Western and Southern Coal-fields is the occurrence, in the Upper Coal Measures, of lenticular patches or deposits of kerosene shale, a variety of torbanite, cannel coal, or boghead mineral. It is used extensively for the manufacture of kerosene oil, and also for the production of gas. The lenticular patches vary considerably in extent ; their thickness ranges from an inch or two up to 4 feet 6 inches, while in length or width they seldom exceed a mile. At the edge of the deposits the shale is found to pass into either bituminous or splint coal, or into earthy or stony carbonaceous shale. It is also frequently associated with coal seams either above or below it. Very rich deposits of kerosene shale occurred at Hartley Vale, near Mount Victoria, and at Joadja, near Mittagong, but both these deposits have been worked out. An extensive deposit is at present being worked by the Commonwealth Oil Corporation, at Newnes. The Corporation's leases cover a large area of ground, including the valleys of the Capartee and Wolgan Rivers, and kerosene shale outcrops in both these valleys, and possibly may underlie the greater part of the intervening tableland ; the character of the shale, however, differs in the two outcrops, and hence the continuity of the deposit is open to doubt. The shale driven upon from the Capertee Valley is of decidedly better quality than that in the Wolgan Valley, and while the former attains a thickness of 4 feet 5 inches the latter has a maximum of about 2 feet.

Deposits of kerosene shale, though much less extensive, have also been found in both the Upper and Greta Coal Measures of the Northern Coal-field.

2. *The Dempsey Series.*

Underlying the Newcastle Coal Measures, and separating them from the Middle or East Maitland Coal Measures, is a series of barren fresh-water strata known as the Dempsey Series. They have a maximum thickness of 2,200 feet and consist of mudstones, shales, and occasional thin beds of sandstone and conglomerate. Very thin layers of coal are also known to occur, but nothing approaching a workable seam has been found, although a deep bore (nearly 3,000 feet) was put down by the Australian Agricultural Company near their sea pit at Newcastle, and must have completely intersected these Measures.

3. *The Middle or Tomago Coal Measures.*

The Middle, or Tomago, or East Maitland Coal Measures outcrop in the neighbourhood of East Maitland, and their general dip is towards Newcastle and under the Dempsey freshwater series and Upper Coal Measures. The following are the principal coal seams of the Middle Coal Measures, in descending order :—

1. Top seam, or Donaldson's seam ... 4 to 6 feet thick.
2. Big Ben, or Tomago thick seam ... 7 to 10 „
3. Tomago thin seam ... ... $2\frac{1}{2}$ to 3 „
4. Scotch Derry seam ... ... 9 to $10\frac{1}{2}$ „
5. Rathluba seam ... ... $5\frac{1}{2}$ to 11 „
6. Morpeth seam ... ... $4\frac{1}{2}$ to 8 „

It has been estimated by Professor David that the aggregate thickness of the coal in these Measures is about 40 feet, and the total thickness of coal actually worked is about 18 feet.

The Middle Coal Measures do not occur in the Western (Lithgow) Coal-field, where the Upper Coal Measures rest on the Upper Marine beds. In the Southern (Illawarra) coal-field, also, their occurrence has not actually been proved, though a bore which was put down at Bulli in 1893 showed a greater thickness of freshwater beds than might normally be expected in the Upper Coal Measures, and near the bottom there were two seams of coal which may possibly belong to the Middle or Tomago Coal Measures. It is evident, however, that these measures (Middle or Tomago) must thin out going southwards, though how far southwards they really extend is a matter of uncertainty at present. None of the diamond-drill bores put down near Sydney has been carried deep enough to intersect any but the uppermost seam of the Upper Coal Measures. Going northwards from Maitland, also, there is no certain evidence of any outcrop of the Middle Coal Measures, though it is somewhat doubtful whether the Rix's Creek seams, near Singleton, belong to those Measures or to the Newcastle Series. The maximum thickness of the Tomago Measures is believed to be about 1,800 feet.

4. *The Upper Marine Series.*

The Upper Marine Series occurs below the Middle Coal Measures, and above the Lower or Greta Coal Measures. The beds of this Series in the Northern Coal-field have been classified by Professor David as follows, in descending order :—

1. Chænomya Beds—

   Cherty shales with great abundance of the fossil lamellibranch shell Chænomya. Also contain numerous specimens of glendonites (calcareous pseudomorphs after crystals of glauberite) ... ... 130 feet

2. Crinoidal Beds—

Soft shales and mudstones, characterised by an abundance of crinoid remains. These beds also contain glendonites on several horizons ... ... 1,570 „

3. Branxton Beds—

(a) Muree beds, consisting chiefly of calcareous sandstones (with a great abundance of the small fossil brachiopod *Strophalosia*) resting upon a hard calcareous conglomerate, known as the Bolwarra conglomerate. This rock shows a bold outcrop, and consequently forms a definite geological horizon which is easily identified... 420 feet.

(b) Shales, mudstones, and sandstones. Fossil corals (*Trachypora*) very abundant in a bed a few hundred feet below the Bolwarra conglomerate. An enormous abundance of *Fenestellidæ* occur in these rocks, which are also distinguished by the presence of numerous large glacial erratics (granite and quartz-porphyry), and occasionally small ice-scratched boulders ... ... } 3,000 feet

The Upper Marine beds may be seen underlying the Middle Coal Measures to the south-east of the township of Morpeth, also between West Maitland and Branxton, and about a mile to the north-north-east of Singleton.

In the Southern Coal-field the Upper Marine beds are distributed over a fairly wide area. They rise above sea level in the vicinity of Wollongong, and continue to reach greater elevations as they are traced southwards. They consist of a lower or sedimentary stage, and an upper or volcanic stage. They have been classified by Professor David and Messrs. Jaquet and Harper as follows (in descending order):—

Upper or Volcanic Stage—

Cambewarra trachyte	350 feet
Saddleback dolerite	60 „
Jamberoo tuffs (with marine fossils)	510 „
Bumbo basalt (a dense rock with large labradorite crystals)	500 „
Kiama tuffs	120 „
Blow-Hole basalt	140 „
Westley Park tuffs	40 „
	1,720 feet

Lower or Sedimentary Stage—

Encrinital Beds—

Gray tuffaceous shales, containing *Encrinites*, *Retepora*, and abundance of Permo-Carboniferous marine fossils ... ... 800 feet

Nowra Grits—

Gritty grey sandstones containing marine fossils. These beds probably correspond with the Muree beds of the Northern Coal-field ... 250 feet

Wandra Wandian Pebbly Sandstones—

Dark grey mudstones, more or less gritty in places, with abundance of marine shells ... ... 550 feet

Conjola Beds—

Pebbly sandstones (with small erratics), and layers of conglomerate, and ferruginous grits, passing downwards into very fossiliferous sandstones (containing abundance of a species of *Mœonia*), mudstones, and fine-grained sandstones ... ... 1,400 feet

In the Western Coal-field the Upper Marine Series is represented, so far as at present known, by only coarse conglomerates, which are probably the basal beds, and which rest directly on contorted beds of Devonian age.

5. *The Lower or Greta Coal Measures.*

The Greta Coal Measures outcrop as a narrow belt of conglomerates, sandstones, shales, and coal seams. The total thickness of these beds never, apparently, exceeds 300 feet. In the neighbourhood of Maitland their outcrop follows a very irregular course, as they have been thrown into anticlines and subjected to considerable faulting, To the north of Maitland they have been traced, with intervening breaks, as far as Wingen, and they again occur as an isolated belt to the north of Inverell, and extending thence through Ashford to near the Queensland border. The outcrop of the Greta Measures is shown, on the accompanying map of the State by a red line. In their normal position they lie upon the Lower Marine beds, and are overlain by the Upper Marine Series, but they have been much intruded by igneous rocks in the northern parts of the State, so that it frequently happens that they are bounded on one side by either granite or quartz-felsite, and their angle of dip is often very considerable.

Two coal seams occur in these Measures, viz. :—

1. The upper seam, varying from 14 to 32 feet in thickness.
2. The lower seam, varying from 3 to 11 feet in thickness.

A few very small lenticular patches of kerosene shale were found to occur in the upper coal seam at Greta, and a seam of cannel, about 5 feet thick, in the same (upper) seam at Homeville, near West Maitland.

The coal from the Greta Measures is very hard, and can therefore be very economically worked, inasmuch as it makes a minimum quantity of "smalls"; it is, moreover, of exceedingly good quality, being useful for gas-making and household purposes, and also for steam-raising, though, on account of its large proportion of volatile hydrocarbons, it has a tendency to burn rather too fast for use with a forced draught; moreover it makes too much black smoke for navy purposes. Still it is undoubtedly the purest, and, generally, the most useful coal in the State, while the great thickness of the seams in which it occurs makes it an exceptionally valuable deposit of fuel. One disadvantage from which the Greta coal suffers is that it contains rather a high percentage of sulphur, and this is especially true in regard to the top bands of coal in the upper or thick seam These are termed by the miners the "brassy tops," on account of the presence of so much iron-pyrites (marcasite) in them. They are usually left as a roof, and only the lower part of the seam is worked. When the "brassy tops" fall, in the pillar workings, they are very liable to spontaneous combustion, and many gob-fires have been traced to their agency.

The Greta coal seams are being very extensively worked between West Maitland and Cessnock, and it can safely be stated that this stretch of country, covering a distance of about 15 miles, is at the present time by far the most important coal-mining district in Australasia. The following ten collieries are now at work within this area, viz., South Greta, East Greta, Heddon Greta, Stanford Merthyr, Pelaw Main, Hebburn, Abermain, Neath, Aberdare, and Aberdare Extended; and their aggregate output for the year 1910 was 2,561,861 tons.

The Greta Coal Measures have also been recognised in the Clyde Valley in the extreme southern portion of the Illawarra Coal-field; but the seams there, so far as they have been prospected, do not appear to be workable under present conditions, the coal being somewhat inferior and the seams thin. Kerosene shale, of rather inferior quality, has also been met with in that neighbourhood.

In the Western Coal-field there is no appearance of the Greta Coal Measures. The Upper Coal Measures of that field lie upon the Upper Marine beds, and the latter rest, unconformably, upon Devonian strata.

Photo. by E. F. Pittman.

Twenty-two feet of first-class coal without a band. Greta Coal Seam in the Stanford-Merthyr Colliery, Kurri Kurri, near Maitland.

6. *The Lower Marine Series.*

The Lower Marine series in the Northern Coal-field has been described by Professor David as follows, in descending order :—

1. Farley Beds—

   Hard sandstone with marine shells. A small variety of *Martiniopsis* is very abundant in the upper part of these beds. At the base of the beds occurs the Ravensfield sandstone—a fine-grained brownish marine sandstone much used for building purposes. It is abundantly fossiliferous, the most characteristic genera being *Edmondia (?)* and *Goniatites.* ...1,000 feet

2. Lochinvar Beds—

   Amongst the higher beds may be mentioned the tuffaceous chloritic sandstones of Harper's Hill, the *Eurydesma cordata* and *Fenestella* beds of Annandale, and the foraminiferal and the *Stenopora* limestones of Pokolbin. Then succeed andesitic and basaltic tuffs and agglomerates with interbedded andesites, natrolite basalt, and hypersthene basalt. At the base of the beds are small glaciated boulders in a reddish shaly matrix. *Gangamopteris* has been traced downwards to about the middle of these beds. ... ... 3,800 feet.

The Lower Marine Series does not occur in either the Southern or the Western Coal-fields, where the Upper Marine beds rest directly upon Devonian strata.

Continuity of the Coal Measures under Sydney.

The general dip of the Permo-Carboniferous Coal Measures being towards Sydney as a centre it was a fair assumption that they would be found to be continuous from north to south, and from Lithgow eastwards to the coast. The late Rev. W. B. Clarke was the first to argue this on scientific grounds in the year 1847. In that year he made the following statement in his evidence before a Select Committee of the Legislative Council on Coal Inquiry :—

> "If we take a dip of only 1 degree from Newcastle to the south, and from Illawarra to the north, the synclinal curve will meet at the entrance to Broken Bay, which is exactly half way (the extremity, probably, of the minor axis), at a depth of 4,680 feet—the depth of the coal seams if continuous."

For many years past there had been no doubt in the minds of local geologists as to the Coal Measures of the Newcastle and Illawarra fields being continuous under Sydney, and the only question upon which there was any divergence of opinion was as to the actual depth at which the coal would be found to occur. This question of depth was, however, one of considerable importance from a commercial point of view, since it was quite possible that the depth of the coal under the metropolitan area would be too great to allow of its profitable extraction; and the Rev. W. B. Clarke's estimate (already alluded to), on the basis of a regular dip of only 1 degree from Newcastle and Illawarra respectively towards the centre of the basin, indicated a depth of 4,680 feet to the coal under Broken Bay.

Obviously, the problem could be most easily solved by boring, and the first attempt in this direction was made in 1878, when a diamond drill bore was put down at Newington, on the Parramatta River. This bore attained a depth of 1,312 feet without striking coal, and was then abandoned. In the following year another bore, put down at Botany, reached a depth of 2,193 feet, when it also was abandoned without accomplishing its object. The third attempt was made at Moore Park, where, at a depth of 1,860 feet, the bore was abandoned without having reached the coal. Other unsuccessful bores were put down at Narrabeen, north of Manly, 1,985 feet; and at Rose Bay, Sydney Harbour, 1,700 feet; the cause of failure in each case being that a sufficient depth was not attained.

In 1884 a bore at Camp Creek, near the site where the Metropolitan Colliery's shafts were subsequently sunk, was successful in striking the Bulli seam, 12 feet thick, at a depth of 846 feet from the surface.

In 1886 a bore was put down, near the Waterfall railway station, to a depth of 1,586 feet, and two seams of coal were reached—viz., an upper seam, 4 feet 8½ inches thick, at a depth of 1,513 feet; and a lower seam, 6 feet 1 inch thick, at a depth of 1,577 feet from the surface.

In 1887 another successful bore was completed, this time at Dent's Creek, on the Holt-Sutherland Estate. The total depth reached was 2,307 feet from the surface, and two seams of coal were again penetrated, viz., an upper seam, 4 feet 2 inches thick, at a depth of 2,228 feet, and a lower seam, 5 feet 3 inches thick, at 2,296 feet from the surface.

Again, at Moorebank, near Liverpool, a bore was carried to a depth of 2,601 feet, and penetrated three seams of coal. The upper seam, 1 foot 5 inches thick, was met with at 2,493 feet; the second, 1 foot 4 inches thick at 2,507 feet; and the lowest, 6 feet 6 inches thick, at 2,583 feet from the surface.

The Liverpool bore was situated at a distance of 20 miles south-west of Sydney, while the Holt-Sutherland bore was only about 15 miles in a direction rather west of south from the city; so that the evidence

afforded by them went a long way in support of the theory of the continuity of the Newcastle and Illawarra Coal Measures, though it did not absolutely demonstrate it.

The opinion was formed, that the comparatively thin seams met with in the Liverpool and Holt-Sutherland bores were the result of a splitting up of the thick (Bulli) seam penetrated at Camp Creek, and it was believed that these seams would reunite as they were traced further to the north—a belief which was subsequently confirmed.

In 1890 a party of gentlemen, who had applied for the right to mine for coal beneath Sydney Harbour, deemed it advisable to place the question (of the occurrence of coal there) beyond all doubt before forming a company to erect the necessary plant, and sink the shafts. They, accordingly, put down a diamond drill bore on Cremorne Point, on the northern shore of the harbour, and in 1891 this bore was completed at a depth of 3,095 feet. At 2,801 feet a seam of coal 7 feet 4 inches thick was penetrated, but, unfortunately, the site had been chosen close to the outcrop of a dolerite dyke, which had intruded the seam just where the drill penetrated it, and, consequently, the coal was found to be charred, or partly converted into coke, by the action of the molten rock. It was then decided not to endeavour to float the company until a sample of good coal from the seam could be exhibited, and it consequently became necessary to put down a second bore. The Government of the day regarded the experiment as one of almost national importance, as the future value to the State of workable seams of coal beneath Sydney could scarcely be overestimated. They therefore acceded to a request for assistance, made by the syndicate, and granted a sum of money from the Prospecting Vote to cover part of the expense of putting down a second bore at Cremorne. The site for the second bore was chosen as far away as possible from the outcrops of dolerite dyke, and boring operations were commenced in July, 1892, under the supervision of Mr. W. H. J. Slee, Superintendent of Diamond Drills. On the 9th November, 1893, the drill penetrated a fine seam of coal, 10 feet 3 inches thick, and free from any alteration by contact with dykes. The depth of the bore from the surface (143 feet above sea level) to the roof of the coal seam was 2,917 feet. The following is a descending section of the seam :—

	ft.	in.
Roof, clay shale.		
Coaly clay shale	0	1
Splint coal, somewhat inferior	0	8
Coal, splint and bituminous, of good quality ...	2	10
Band, dark clay shale...	0	¼
Coal, splint and bituminous, of good quality ...	6	4¼
Coal, soft, bituminous, a trifle clayey	0	3½
	10	3
Floor, black carbonaceous clay shale, containing impressions of *vertebraria*.		

Six samples were carefully taken from different portions of the core of coal brought up by the diamond drill, and these were analysed by Mr. J. C. H Mingaye, of the Geological Survey Laboratory. The mean of these six analyses gave the average composition of the entire seam as follows:—

Hygroscopic moisture	·66	
Volatile hydrocarbons	17·57	
Fixed carbon	71·09	Coke, 81·77
Ash	10·68	
	100·00	

Sulphur, ·724; specific gravity, 1·346; calorific value, 13.

The result of the boring operations at Cremorne established beyond all doubt the fact that the Newcastle and Illawarra Coal Measures are continuous under Sydney, and an enormous coal-bearing area, in which the coal occurs within a workable depth from the surface, is thus added to the already large reserves of the State. There is reason for believing that the Cremorne bore penetrated the basin at or near its deepest part, and that the Bulli seam, which is without doubt the one met with in this bore, will be found to rise gradually as it is traced further north and south, as well as east and west, from Sydney.

It is not unreasonable to expect that several, if not all the other seams of the Upper Coal Measures will be found to occur within a workable depth from the surface under Sydney. The question as to whether the Middle or Tomago Coal Measures extend as far south as Port Jackson has not yet been definitely settled, as the Cremorne bore did not descend to a sufficient depth to intersect them, if present. There is no reason to doubt that the Lower or Greta Coal Measures underlie Sydney, but their depth must be so great that there is very little probability of their ever being worked there.

The results obtained in the Cremorne bore led to the formation of the Sydney Harbour Collieries Company. It was originally intended that their shafts should be sunk on the high land at the back of Athol Bay, near Bradley's Head; but objections were made to this, on the ground that the mining plant would deface the natural beauties of the harbour. Eventually the company purchased some land at Longnose Point, Balmain, for the purpose of sinking shafts and erecting a plant capable of working the coal under the waters of Port Jackson. This site is situated about 3 miles from the bore at Cremorne, and, unfortunately, the shafts were sunk there at great expense without previously boring to ascertain whether the character of the seam had varied. These shafts were about 2,900 feet deep, circular in form, with a diameter of 18 feet, and lined throughout with brickwork. When the

first shaft reached the coal it was found that the seam was split by a band of shale, and could not, at that point, be worked remuneratively. The section was as follows :—

	ft.	in.
Coal	2	9
Shale	2	11
Coal	0	10
	6	6

It was then decided to drive east in the direction of Cremorne, and after some time it was found that the shale was becoming thinner, and being gradually replaced by coal. The face at present being worked is 66 chains from the shaft, and it shows 5 ft. 5½ in. of coal without a band, the coal being of good quality. The colliery is well equipped with the most modern machinery, including a Walker fan 24 feet in diameter and 8 feet wide, for ventilating the workings. The operations of the company are being watched with great interest, as the colliery is one of the deepest in the world. Unfortunately, insufficient capital was provided in the first instance, and unforeseen expense was entailed in opening up the colliery, on account of the splitting of the seam. It is believed, however, that most of the difficulties have now been surmounted, and mining should proceed smoothly in future. No trouble has yet been experienced in regard to the occurrence of water or firedamp, although it was feared that the latter might be found troublesome. The question of pressure was also one that, it was anticipated, might cause some trouble, as these coal workings are two and a half times as deep as any previously in existence in Australia So far, however, there has been no difficulty on this score. One of the great advantages possessed by this colliery is that the largest ocean-going steamers are able to load their cargoes of coal from its wharf in the harbour.

The accompanying geological sections show the structure of the main coal basin of New South Wales from north to south, and also from east to west ; but it must be stated that the information shown in the deeper parts of the basin is more or less theoretical, except in regard to the uppermost seams of coal and overlying strata where they have been penetrated by bores (as shown in the sections.) The depth of the lower seams under Sydney, for instance, may be much greater or much less than that shown in the sections, for there may be a thickening or a thinning-out of the intervening strata.

It has been shown that the Upper, or Newcastle Coal Measures, extend from Newcastle on the north to Ulladulla on the south, and also to Lithgow on the west, and that in the central part of the basin they occur at a depth of some thousands of feet, being overlain by the Hawkesbury series (Triassic). It is not possible, however, to correlate

all the seams occurring near Newcastle with those discovered in the Southern and Western Coal-fields; indeed it will be noticed that nearly twice as many seams have been mentioned in the first-named locality as in either of the latter. Doubtless some of the seams thin out altogether between Newcastle and Ulladulla, while others may split and make together again at intervals. It would certainly be very remarkable if all the coal seams followed the same horizons, and maintained the same approximate thickness for a distance of 200 miles. It is, nevertheless believed that the Wallarah seam of the Northern Coal-field is identical with the uppermost or Bulli seam of the South, and the top or Katoomba seam of the West; also that it coincides with the seam met with in the diamond drill bore at Sydney, at a depth of nearly 3,000 feet, and which is now being worked in the Sydney Harbour Collieries, Limited. If this be so, the seam has a wonderfully persistent development; its quality, however, is by no means uniform. For instance, in the Southern Coal-field the upper or Bulli seam consists of good steam coal, and has been extensively worked. In the Sydney Harbour Colliery the coal is of about equal quality, while in the Newcastle Coal-field the Wallarah seam is only worked in one colliery, and in the Western Coal-field the workings in the top or Katoomba seam have been unimportant.

Volcanic Rocks Associated with the Permo-Carboniferous Coal Measures.

In the Southern Coal-field there occurs, between the Upper Marine beds and the Upper Coal Measures, a considerable thickness of volcanic rocks, consisting of sheets of basalt and trachyte, and beds of grey and red volcanic tuffs. These contemporaneous lavas and tuffs represent a maximum thickness of about 1,700 feet near Kiama, where the upper basalt sheet, which has a remarkable prismatic structure, is quarried for road metal. Further to the north, about 4 miles from Wollongong, a quarry was opened in the same rock for the purpose of obtaining large blocks wherewith to construct the moles for the deep-water harbour of Port Kembla.

Again, in the Lochinvar beds of the Lower Marine Series of the Northern Coal-field, Professor David describes a series of inter-bedded andesites, natrolite-basalt, hypersthene-basalt, and andesitic and basaltic tuffs and agglomerates. The augite-andesite varies from 500 to 1,000 feet in thickness, and terminates in a bed of augite-andesite tuff.

The Greta Coal Measures in the northern part of the State have been intruded by granites and quartz-felsites, which have destroyed a considerable proportion of the coal; and in all parts of the main coal basin the Upper Coal Measures have been intersected by intrusive dykes, though their effect upon the coal is much more noticeable in some cases than in others. At Bowral, near Mittagong, an intrusive mass of

trachyte has converted a seam of coal into typical anthracite; this trachyte is largely used for building purposes in Sydney and elsewhere, as it is an extremely durable as well as ornamental stone of a dark-grey colour. In nearly all other instances the dykes which intersect the Coal Measures consist of dolerite or basalt, which is clearly post-Triassic in its age, as it has intersected the Hawkesbury Series as well as the underlying Permo-Carboniferous rocks. The dykes are of various widths, and have frequently been decomposed at the surface into a buff or greyish-white plastic clay. As a general rule, where a coal seam has been intersected by a dyke, the coal is found to be cindered or coked for a short distance (a foot or so) on each side of the line of contact, but in some cases a much greater amount of damage has resulted from the intrusion of the volcanic rock. Thus the Borehole seam was much cindered in places in the Stockton Mine (now abandoned), Newcastle, and the Lower Tomago seams have suffered considerably from the same cause at Hexham and Ash Island, being converted into natural coke or completely cindered in places.

It is in the Southern Coal-field, however, that the greatest effect of volcanic intrusions upon the coal seams is noticeable; and this fact is, no doubt, due to the greater size of the dykes intersecting the field, and its proximity to the ancient centre of volcanic activity. Near Bulli, dolerite dykes of great width (up to 100 yards in some cases) can be seen at the surface, and the colliery workings have proved that off-shoots from these dykes, in the shape of horizontal sheets, have followed the coal seams for considerable distances, with the result that large areas of coal have been converted into natural coke. In some instances there has been a good sale for this natural coke, at a satisfactory price, for fuel, but on the whole, there can be no doubt that the effect of the volcanic intrusions near Bulli has been very detrimental.

IV.—Palæozoic.—*Carboniferous.*

In the neighbourhood of Stroud, about 40 miles to the north of Newcastle, seams consisting of coal and bands, occur in rocks which correspond in age with the Carboniferous System of Europe. The coal is of very inferior quality, however, and certainly cannot, so far as has been ascertained, be regarded as workable. Moreover, the deposits are probably very limited in extent, so that the true Carboniferous rocks may safely be disregarded as a possible source of fuel in New South Wales.

Quantity of Coal available in New South Wales.

Attempts to estimate the quantity of coal available in any country are more or less hazardous, owing to the tendency of the seams to vary in thickness, and of the coal to alter in quality.

In a comparatively young country like Australia, this statement is even more applicable than in the case of European coal-fields, for here there has been much less exploration of the seams, and there are, consequently, many more uncertain factors in the calculation. Reference has already been made to the fact that the coal seams of the Upper Coal Measures outcrop at the surface in three widely separated districts, viz., Newcastle, Illawarra, and Lithgow, and that they dip under the intervening country, and attain their greatest depth probably near Sydney. The only knowledge which we possess of the deposits of coal in their deepest parts has been acquired by boring, in the first instance, and, subsequently, by the sinking of a pair of shafts to the top seam, which was penetrated at a depth of about 2,900 feet in the Sydney Harbours Colliery. It has never been ascertained how many of the other seams of the Upper Coal Measures underlie this seam, whether the Middle Coal Measures occur there or not, at what depth the Greta seams occur, or whether they maintain their quality. As the Greta seams outcrop in both the Northern and Southern Coal-fields, it is probable that they do underlie Sydney, but their depth from the surface there is doubtless very great indeed—probably 8,000 or 10,000 feet—so that there is very little chance of their ever being worked. While it is impossible to correlate with certainty many of the coal-seams of the Northern Coal-fields with those of the Southern and Western Fields, we are in a position to say that the seams which contain the best coal in any one field are of inferior quality or unworkable in the others; in other words, there is such variation in the quality of the coal that it is impossible to say over what area any particular seam may or may not be worked.

In 1907 a diamond drill bore was put down to a depth of 1,141 feet at Bungaree Norah, on the coast near Tuggerah Beach Lake. Several coal seams were intersected, though none of them was of a very satisfactory character. The uppermost, or Wallarah seam, was met with at a depth of 324 feet; it was only 2 feet thick, and an analysis showed 16·94 per cent. of ash. What was probably the Great Northern seam was intersected at a depth of 401 ft. 6 in., and proved to be 6 ft. 6 in. in thickness, but on being analysed the coal was found to contain 18·35 per cent. of ash. None of the other seams below this was of a workable character, and, unfortunately, the bore was not carried deep enough to test the Borehole seam, which probably occurs here at a depth of not less than 1,600 feet.

In the year 1910 a diamond drill bore was carried to a depth of 3,005 feet on the northern side of the Hawkesbury River, near the railway crossing. The top seam (Wallarah, or Bulli) was intersected at 2,322 feet, and proved to be 3 ft. 3 in. thick. The coal was of a decidedly friable character, and an analysis showed that it contained 12·25 per cent. of ash. At a depth of 2,360 feet, another seam of coal

2 ft. 10 in. thick was met with, and below this there were several other inferior seams, but the boring was stopped before the horizon of the Borehole seam was reached.

The results of the two bores just referred to would seem to indicate that the Newcastle seams deteriorate as they are followed south from Lake Macquarie. At the same time, too much reliance must not be placed upon this evidence, for experience has shown that very great changes may take place, both in the thickness and quality of a coal-seam, within a comparatively short distance.

It is clear, therefore, that any estimate of the quantity of coal in New South Wales must be based upon very uncertain data. For the purposes of an approximate estimate, however, we may assume the following :—

Palæozoic Coal-fields.

	sq. miles.
Area within which the Upper and Middle Coal Measures are productive within 4,000 feet of the surface	15,800
Area within which the Greta Coal Measures are productive in the Northern District, within 4,000 feet of the surface ...	250
Area within which the Greta Coal Measures are productive in the Southern District, within 4,000 feet of the surface ...	500
Total area	16,550

In their most productive areas the Upper Coal Measures contain about 40 feet of workable coal ; the Middle Coal Measures contain about 18 feet of workable coal ; the Greta Coal Measures contain about 20 feet of workable coal. There is, therefore, a maximum thickness of about 78 feet of workable coal in the Permo-Carboniferous rocks. It would, however, be very unsafe, in estimating our coal resources, to assume that anything approaching that thickness of coal is available under the area mentioned above, for reasons which have already been given.

It seems preferable, therefore, to base the calculation upon the assumption that a thickness of only 10 feet of workable coal underlies an area of 16,550 square miles. Taking 84 lb. as the average weight of a cubic foot of coal, and deducting one-third of the gross weight for loss in working, impurities, &c., this would represent a total quantity of 115,346,880,000 tons of available fuel in the Permo-Carboniferous Coal Measures within a depth of 4,000 feet.

No estimate of the coal obtainable in the Middle and Upper Coal Measures between depths of 4,000 and 6,000 feet can be attempted, because the necessary data are not available, no bore or shaft having ever penetrated deeper than the uppermost seam of the Upper Coal Measures in the deeper parts of the basin. The Greta Coal Measures are of wide extent, but as they are separated from the Upper and Middle Coal Measures by a thickness of about 6,000 feet of marine beds, and are, therefore concealed for the greater part, the quantity of coal

available in them between 4,000 and 6,000 below the surface can only be estimated under a limited area which has recently been surveyed by Professor David. Within this area, which is in the vicinity of Kurri Kurri and Cessnock (*vide* map), they are estimated to contain 1,893,000,000 tons of workable coal above a depth of 4,000 feet, under an area of 158 square miles, and an additional 1,200,000,000 tons between 4,000 and 6,000 feet, under an area of 100 square miles.

Analyses of New South Wales Coals.

A large number of analyses of so-called "samples" of coal from the Northern, Southern, and Western Coal-fields of New South Wales is on record, and it has been customary in the past to take the mean of these analyses as representing the average composition of the coal from the several fields. There is good reason for believing, however, that these so-called samples were not, in many instances, truly representative of the various seams from which they were selected, many of them being single fragments taken from some particular band in which the coal presented a favourable appearance; and hence the results obtained probably indicated a better quality of coal than could be obtained in bulk from the seam.

The value of an analysis of a sample of coal depends mainly upon the manner in which the sample is taken, since the proportions of volatile hydrocarbons, fixed carbon, and ash, vary considerably in different parts of the same seam, and carelessly selected samples may give an absolutely misleading idea of the value of any seam for commercial purposes.

With the object, therefore, of obtaining as reliable information as possible in regard to the average composition of the coals at present being won in New South Wales, proximate analyses have been made of 194 thoroughly representative samples of coal taken during the past three months from all the collieries now working in the State. In all the larger collieries, at least two samples have been taken from working faces as far removed from one another as possible, and in many cases samples have also been taken from portions of the seams not at present being worked. The samples were taken by the Government Inspectors of Mines in accordance with the following directions:—

> "Details to be observed in taking samples of coal for analysis: The samples should be taken from two of the working faces of the colliery as far from one another as possible. A strip of coal should be carefully cut out with a pick for the whole thickness of the seam as worked, so that the samples may represent the coal actually sent to market. The strip of coal should be the same width (say, 3 inches) all the way from the roof to the floor, and the depth of the cut should also be uniform. If any bands occur, which are usually picked out before the coal is sent to market,

they should also be excluded from the sample, but all those which are usually left in the coal sent to market should also be included in the sample. Before taking a sample the floor of the working place should be cleared, and a large strip of brattice-cloth should be spread out so as to catch all the coal cut out of the strip. The entire quantity should then be broken down carefully to the size of small nuts, and thoroughly mixed. One-half of this should then be again well mixed and halved, and the mixing and halving should be repeated until a sample of about 1½ lb. or 2 lb. in weight has been obtained. It is especially desired that the greatest care be observed in attending to all the above details."

The analyses have all been made in the Geological Survey Laboratory (by Messrs. J. C. H. Mingaye, H. P. White, and W. A. Greig), and the details of these are appended.

The average composition of the coal from the Upper or Newcastle Coal Measures in the Northern Coal-field, as calculated from the analyses of seventy-eight samples, is as follows:—

Hygroscopic moisture	2·01
Volatile hydrocarbons	36·01
Fixed carbon	53·27
Ash	8·71
	100·00
Sulphur	0·468
Calorific value	12·7

The average composition of the coal from the Middle or Tomago Coal Measures in the Northern Coal-field, as calculated from the analyses of five samples, is as follows:—

Hydroscopic moisture	1·88
Volatile hydrocarbons	35·71
Fixed carbon	52·77
Ash	9·64
	100·00
Sulphur	1·185
Calorific value	12·5

The average composition of the coal from the Lower or Greta Coal Measures in the Northern Coal-field, as calculated from the analyses of fifty-one samples, is as follows:—

Hygroscopic moisture	1·84
Volatile hydrocarbons	41·61
Fixed carbon	49·52
Ash	7·03
	100·00
Sulphur	1·291
Calorific value	13·67

The average composition of thirty-one samples of the coal from Greta seams, as actually worked in the Northern Coal-field, is as follows:—

Hygroscopic moisture	1 89
Volatile hydrocarbons	41·35
Fixed carbon	50·51
Ash	6·25
	100 00
Sulphur	1·014
Calorific value	13·2

The average composition of the coal from the Upper Coal Measures in the Western Coal-field, as calculated from the analyses of twenty-five samples, is as follows:—

Hygroscopic moisture	2·05
Volatile hydrocarbons	32·31
Fixed carbon	53·08
Ash	12·56
	100·00
Sulphur	0·672
Calorific value	11 9

The average composition of the coal from the Upper Coal Measures in the Southern Coal-field, as calculated from the analyses of thirty-five samples, is as follows:—

Hygroscopic moisture	0·71
Volatile hydrocarbons	23·65
Fixed carbon	63·98
Ash	11·66
	100·00
Sulphur	0·470
Calorific value	12·68

GEOLOGICAL SECTIONS

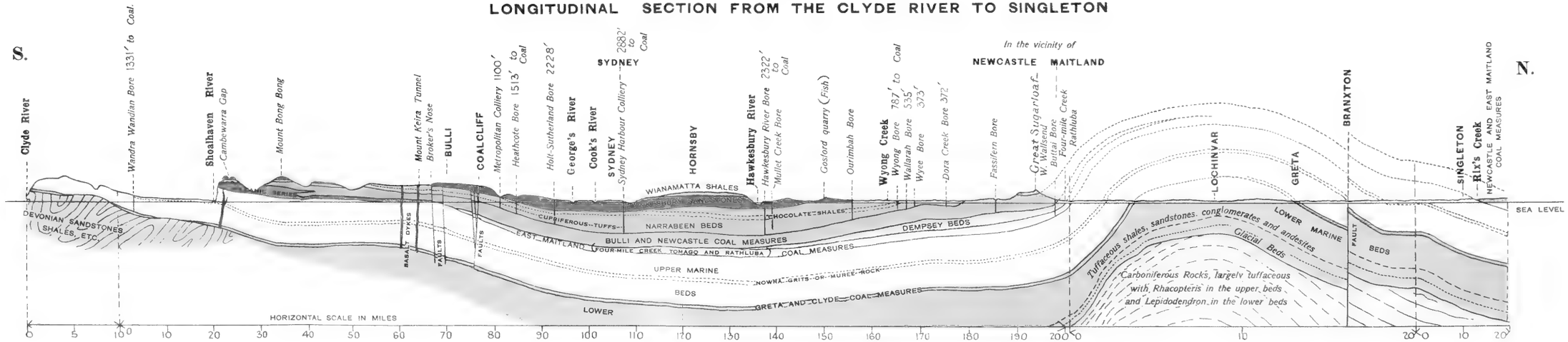
Showing the structure of the Main Coal Basin of New South Wales

COMPILED CHIEFLY FROM SURVEYS BY PROFESSOR T. W. E. DAVID, C.M.G., B.A., F.R.S., F.G.S.

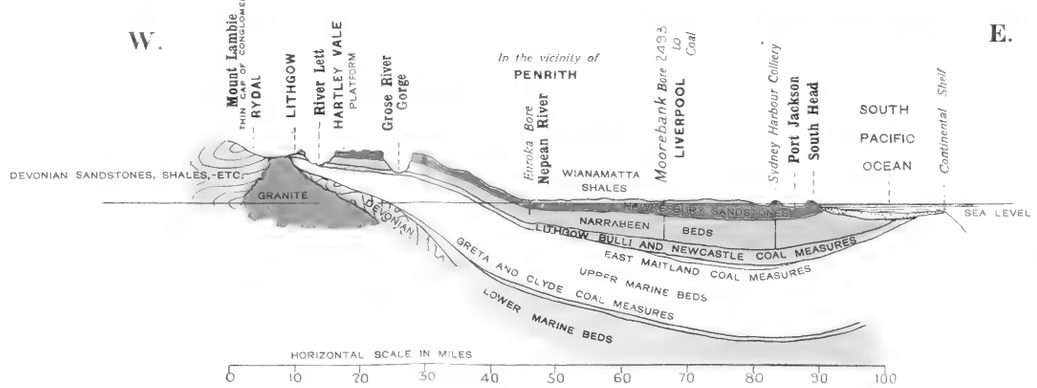
E. F. PITTMAN, A.R.S.M., GOVERNMENT GEOLOGIST

VERTICAL SCALE 10000 20000 FEET

LONGITUDINAL SECTION FROM THE CLYDE RIVER TO SINGLETON



TRANSVERSE SECTION FROM RYDAL TO THE COAST



REFERENCE

TRIASSIC	WIANAMATTA SHALES HAWKESBURY SANDSTONES NARRABEEN BEDS
PERMO-CARBONIFEROUS	LITHGOW BULLI AND NEWCASTLE COAL MEASURES DEMPSEY BEDS EAST MAITLAND COAL MEASURES UPPER MARINE BEDS GRETA AND CLYDE COAL MEASURES LOWER MARINE BEDS
CARBONIFEROUS	
DEVONIAN	

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APPENDIX.

Proximate Analyses of 194 Samples of Coal from Collieries in New South Wales.

PROXIMATE Analyses of Samples of Coal from the **Upper Coal Measures, Northern Coalfield.**

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
A.A. Company's New Winning Colliery, Newcastle. Borehole Seam— Sample from face of first bord, right side of Dyett's heading.	Roof, top band coal. Coal "top ply" ... ft. 3 in. 6 " big tops " ... 3 6 Band ... ... 0 1 Coal—" bottom ply " ... 1 11 " big tops " ... 1 11 Morgan stone ... 0 9 Coal—" four inch " ... 0 10 Band ... ... 0 1 Coal—" little tops " 1 0 8 2 Floor, jerry stone.	1·76	38·16	55·02	5·06	0·417	1·286	60·08	13·4	Bands picked out; coke, slightly swollen, firm and lustrous; ash, reddish brown colour, granular.
A.A Company's New Winning Colliery, Newcastle. Borehole Seam— Sample from overcast, fifth cut-through, right-hand side, Wilson's district.	Roof, coal and shale bands. Coal—" top band " ... ft. 3 in. 5 Band ... ... 0 1 Coal—" top ply " ... 3 7 " big tops " ... 3 7 Band ... ... 0 1 Coal—" bottom ply " 1 8 " big tops ... 1 8 Morgan stone ... 1 0 Coal—" four inch " ... 0 9 Band ... ... 0 1 Coal—" little tops " 1 2 11 10 Floor, jerry stone.	1·71	38·88	54·82	5·59	0·609	1·285	59·41	13·4	Bands picked out; coke, slightly swollen, firm and lustrous; ash, dark buff coloured, semi-granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Belmont Colliery, Lake Macquarie. Australasian Seam.	Roof, coal and bands, 9 feet.									
	ft. in.									
	Coal 2 0									
	Band 0 3									
	Coal 1 3	2·19	37·24	51·44	9·13	0·524	1·353	...	12·7	Bands picked out; no true coke formed; light buff coloured ash; semi-granular.
	Band 0 1									
	Coal 2 9									
	6 4									
	Floor, fireclay.									
Brickworks Colliery. Adamstown, near Newcastle. Burwood Seam.	Roof, dark shale.									
	ft. in.									
	Coal 2 0									
	Band 0 3									
	Coal 0 4	2·36	36·34	52·22	9·08	0·477	1·332	61·30	12·3	Bands picked out; coke, slightly swollen, firm and lustrous; ash, grey in colour, semi-granular.
	Band 0 2									
	Coal 2 2									
	4 11									
	Stone floor.									
Brown's No. 4 Tunnel Colliery. Minmi. Borehole Seam—Sample from face of the boundary heading, No. 23 district	Roof, shale.									
	ft. in.									
	Inferior coal ... 0 6									
	Coal... ... ... 1 7									
	Band 0 1									
	Coal 1 5½	2·02	35·10	54·25	8·63	0·486	1·345	62·88	12·7	Coke, fairly swollen, firm and lustrous; ash, buff coloured, granular.
	Band 0 0½									
	Coal 1 5									
	5 1									
	Floor, hard stone									

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Brown's No. 4 Tunnel Colliery, Minmi. Borehole Seam— Sample from face of No. 5 pillar, No. 9 district.	Roof, shale. Inferior coal ... ft. 0 in. 11 Coal ... ... 1 7 Band ... 0 0½ Coal ... ... 1 8 Band ... 0 0½ Coal ... ... 1 8 5 9½ Floor, hard stone.	2·03	35·97	53·22	8·78	0·480	1·336	62·00	13·0	Coke, fairly swollen, firm and lustrous; ash, buff-coloured, granular.
Burwood Colliery. Redhead. Borehole Seam— Sample from face of No. 20 bord, east crossent.	Roof, coal and shale bands. Coal ... ... ft. 2 in. 9 Penny band ... 0 1 Coal ... ... 2 2½ Penny band ... 0 0½ Coal ... ... 1 2½ 6 4 Floor, Morgan stone.	2·07	37·83	54·10	6·00	0·431	1·310	60·10	13·2	Bands picked out; coke, fairly swollen, firm and dull lustre; ash, reddish brown, flocculent.
Burwood Colliery, Redhead. Borehole Seam— Sample from face of No. 18 bord, left side, shaft crossent district.	Roof, coal and shale bands. Coal ... ... ft. 2 in. 3½ Penny band ... 0 0½ Coal ... ... 1 10 Penny band ... 0 0½ Coal ... ... 1 6½ 5 9 Floor, Morgan stone.	1·98	37·42	53·60	7·00	0·387	1·320	60·60	13·3	Bands picked out; coke, fairly swollen, firm, and dull lustre; ash, reddish brown, flocculent.

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal	Remarks.
Burwood Extended Colliery, Redhead. Burwood Seam—Sample from right-hand district.	Roof, coal and bands, 3 feet. Coal ... ... 2 7 Band ... ... 0 2 Coal ... ... 0 4 Inferior coal ... 0 2 Band ... ... 0 0½ Coal ... ... 2 5 5 8½ Floor, hard shale.	1·86	37·26	55·36	5·52	0·453	1·311	60·88	13·2	Bands picked out; coke slightly swollen, firm and lustrous; ash, light grey, granular.
Burwood Extended Colliery, Redhead. Burwood Seam—Sample from left-hand district.	Roof, coal and bands, 3 feet. Coal ... ... 2 4 Band ... ... 0 2 Coal ... ... 0 5 Inferior coal ... 0 2 Band ... ... 0 0½ Coal ... ... 2 6½ 5 7½ Floor, hard shale.	1·96	35·12	53·80	9·12	0·395	1·347	62·92	12·6	Bands picked out; coke, slightly swollen, firm and lustrous; ash, grey, semi-granular.
Centenary Colliery, Curlewis—Sample from the present workable thickness of 6 feet.	Roof, kerosene shale of varying thickness. ft. in. Coal ... ... 6 0 Floor, sandstone.	2·77	35·10	54·05	8·08	0·506	1·351	62·13	12·5	Coke, slightly swollen, firm and lustrous; ash, light grey, granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Co-operative Colliery. Platts-burg. Borehole Seam—	Roof, coal and shale bands.									
Sample from face of a pillar. Keira narrow bords, No. 2 tunnel.	Coal ... ... 1 9 Stone band ... ... 0 1 Splint coal ... ... 0 2 Coal ... ... 1 8 Stone band ... ... 0 1 Coal ... ... 2 4 Coal and shale bands 1 0	1·84	36·16	55·99	6·01	0·576	1·314	62·00	13·2	Bands picked out; coke, fairly swollen, firm and lustrous; ash, buff-coloured, semi-granular.
	Sandstone floor.									
Co-operative Colliery, Platts-burg—	Roof, coal and shale bands.									
Sample from face of a pillar in Reay's district, No. 1 tunnel.	Coal ... ... 1 11 Stone band ... ... 0 0½ Coal ... ... 1 8 Stone band ... ... 0 0½ Coal 4 0 7 8	1·71	36·60	56·22	5·47	0·535	1·317	61·69	13·2	Bands picked out; coke, fairly swollen, firm and lustrous; ash, buff-coloured, semi-granular.
	Floor, sandstone.									
Duckenfield Colliery, Minmi. Borehole Seam—	Roof, coal and shale bands.									
Sample from face of narrow bord pillar, "Fault" district.	Inferior coal ... 0 9 Coal ... ... 1 8 Band ... ... 0 1 Coal ... ... 1 6 Band ... ... 0 1 Coal 1 4 5 5	2·36	36·63	54·00	7·01	0·502	1·339	61·01	12·8	Bands picked out; coke, fairly swollen, firm and lustrous; ash, grey in colour, granular.
	Floor, hard stone.									

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water converted into steam by 1 lb. of the coal	Remarks.
Duckenfield Colliery, Minmi. Borehole Seam— Sample from face of No. 10 pillar, No. 8 district.	**Roof, shale.** ft. in. Coarse coal ... ... 0 9 Coal ... ... 1 5½ Band ... ... 0 0½ Coal ... ... 1 6 Band ... ... 0 1 Coal ... ... 1 6 5 4 **Floor, hard stone.**	2·17	35·63	52·83	9·37	0·573	1·360	62·20	12·5	Bands picked out; **coke,** fairly swollen, firm and lustrous; ash, light pink colour, granular.
Dudley Colliery, Dudley. Borehole Seam— Sample from face of No. 64 bord, Toll's district, west side of pit.	**Roof, shale.** ft. in. Coarse coal ... ... 0 6 Coal ... ... 1 6 Band ... ... 0 1 Coal ... ... 1 11 Band ... ... 0 1 Coal ... ... 1 0 5 1 **Floor, Morgan stone.**	1·45	36·51	52·70	9·34	0·455	1·400	62·04	12·8	Bands picked out; **coke,** fairly swollen, firm and lustrous; ash, pink, semi-granular.
Dudley Colliery, Dudley. Borehole Seam— Sample from No. 5 going bord, to left of Ocean crosscuts.	**Roof, coal and shale bands.** ft. in. Coal ... ... 2 5 Penny band ... ... 0 0½ Coal ... ... 2 0 Penny band ... ... 0 1 Coal ... ... 1 1 5 7½ **Floor, Morgan stone.**	2·07	36·40	54·40	7·13	0·585	1·318	61·53	13·0	Bands **picked out**; coke, fairly swollen, firm and lustrous; ash, reddish tinge, semi-granular.

Name of Colliery, Locality, &c	Section of Seam.		Hygroscopic Moisture	Volatile Hydrocarbons	Fixed Carbon.	Ash.	Sulphur	Specific Gravity.	Coke	Lbs. of water converted into Steam by 1 lb. of the coal	Remarks.
Ebbw Vale Colliery, Adamstown. Bute Seam. Sample from East bord to the rise off Powell's heading.	Roof, dark shale.	ft. in.									
	Coal	2 0									Bands picked out, coke, well swollen, firm and lustrous, ash, grey in colour, semi-granular.
	Clay band	0 2½									
	Coal	0 3	1·80	37·51	51·09	8·70	0·137	1·350	60·60	12·3	
	Inferior coal	0 2									
	Coal	0 4									
		5 1½									
	Stone floor.										
Ebbw Vale Colliery, Adamstown. Sample from No. 1 main heading.	Roof, dark shale.	ft. in.									
	Coal	2 3									Bands picked out, coke, well swollen, with cauliflower excrescences, firm and lustrous; ash, grey in colour, granular.
	Clay band	0 2									
	Coal	0 5	2·15	5·24	85·23	9·38	0·130	1·326	60·64	12·4	
	Inferior coal	0 2½									
	Coal	2 7									
		5 7½									
	Stone floor										
Evermore Vale Colliery. Walsrend Berthole Seam. Sample from the last bord next the boundary crosscut.	Roof, "little tops coal," 8 inches.	ft. in.									
	Clay parting	0 0½									
	Coal	1 10									Bands picked out, coke, slightly swollen, firm and lustrous; ash light buff coloured, semi-granular.
	Band	0 0½	2·07	35·46	56·31	6·16	0·549	1·311	62·47	13·0	
	Coal	2 4									
		6 1½									
	Floor, sandstone.										

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Elermore Vale Colliery, Wallsend. Borehole Seam — Sample from the first bord off the main crosscut.	*Roof*, coal 7½ inches. Clay parting ... 0 0½ Coal ... ... 1 9½ Band ... ... 0 0½ Coal ... ... 1 9 Band ... ... 0 0½ Coal ... ... 2 4 6 0 Floor, sandstone.	1·83	35·36	57·16	5·65	0·410	1·320	62·81	13·4	Bands picked out; coke, slightly swollen, firm and lustrous; ash, buff-coloured, semi-granular.
Glebe Hill Colliery, Merewether. Burwood Seam — Sample from the innermost bord on the left of main heading.	*Roof*, clay shale. Coal ... ... 0 11 Clay band ... ... 0 3 Coal ... ... 0 6 Clay and coal bands 0 3 Coal ... ... 2 6 4 5 Floor, sandstone.	2·56	35·09	55·03	7·32	0·425	1·331	62·35	13·1	Bands picked out; coke, slightly swollen, firm and lustrous; ash, light buff coloured, semi-granular.
Glebe Hill Colliery, Merewether. Burwood Seam — Sample from the innermost bord off the main heading to the right.	*Roof*, clayey shale. Coal ... ... 0 11 Clay band ... ... 0 3 Coal ... ... 0 6 Clay and coal bands 0 3 Coal ... ... 2 6 4 5 Floor, sandstone.	2·55	34·78	55·34	7·33	0·404	1·324	62·67	12·9	Bands picked out; coke, slightly swollen, firm and lustrous; ash, light buff coloured, semi-granular.

Proximate Analyses of Samples of Coal - Upper Coal Measures, Northern Coalfield - *continued.*

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water converted into steam by 1 lb. of the Coal.	Remarks.
Glenrock Colliery, near Newcastle, Burwood Seam — Sample from Prescott's bord, east side of main tunnel.	Roof, clay.	ft. in.	1·84	37·09	53·71	7·36	0·130	1·326	61·07	12·8	Bands picked out; coke, well swollen, firm and lustrous; ash, grey in colour, semi-granular.
	Coal	1 0									
	Clay bands	0 6									
	Coal	2 3									
	Shale	0 6									
	Coal	2 5½									
	Fireclay	0 2½									
	Coal	0 5									
	Coal and stone band...	0 2									
	Coal	2 10½									
		10 4½									
	Shale floor.										
Glenrock Colliery, Burwood Seam — Sample taken from Ainsworth's bord, west side of main tunnel.	Roof. clay.	ft. in.	2·00	36·89	54·26	6·85	0·412	1·319	61·11	12·8	Bands picked out; coke, fairly swollen, firm and lustrous; ash, grey in colour, semi-granular.
	Shale	0 6									
	Coal	2 1									
	Fireclay	0 3									
	Coal	0 4½									
	Coal and band ...	0 2									
	Coal	2 8½									
		6 1									
	Floor, shale.										
Gunnedah Colliery — Sample from the first working thickness of 7 ft. 7 in.	Roof, coal.	ft. in.	3·27	35·18	54·62	6·93	0·504	1·337	61·55	12·7	No permanent bands, but occasional floating bands; coke, slightly swollen, firm and lustrous; ash, light grey, granular.
	Coal	7 7									
	Floor, sandstone.										
Gunnedah Colliery — Sample from the present workable thickness of 10 ft. 10 in.	Roof, splint of variable thickness.	ft. in.	4·35	34·70	54·70	6·25	0·454	1·341	60·95	12·8	Coke, slightly swollen, firm and lustrous; ash, light grey, granular.
	Coal	10 10									
	Sandstone floor.										

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of dry coal.	Remarks
Hetton Colliery, Newcastle. Borehole **Seam** — Sample from face of No. 5 bord, Rouse's district. No. 1.	Roof, bands of coal and shale.									
		ft. in.								
	Inferior splint 0 2									
	Coal 1 3									
	Brass band 0 0½									
	Coal 1 1									
	Brass band 0 1									
	Coal 1 0	1·89	39·60	54·61	3·90	0·369	1·278	58·51	14·5	Bands picked out; coke, slightly swollen, firm and lustrous; ash, reddish tinge, flocculent.
	Stone band 0 0½									
	Coal 3 8									
	Stone band 0 1									
	Coal 1 11									
	9 4									
	Floor, shale (Morgan).									
Hetton Colliery, Newcastle — Sample from the face of No. 8 bord, No. 14 heading, to the left of Wilkins' narrow bords. No. 2.	Roof, shale and coal bands.									
		ft. in.								
	Splinty coal 0 5									
	Coal 1 3									
	Brass band 0 0½									
	Coal 1 8									
	Dirt band 0 0½									
	Coal 0 6									
	Stone band 0 0½	1·56	39·76	52·64	6·04	0·350	1·290	58·68	14·1	Bands picked out; coke, slightly swollen, firm and lustrous; ash, reddish tinge, flocculent.
	Coal 1 5									
	Stone band 0 0½									
	Coal 2 1									
	Stone band 0 0½									
	Coal 1 7									
	Splint 0 4									
	9 6									
	Floor, shale (Morgan).									

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Hillside Colliery, Merewethe Burwood Seam.	Roof, clay shale. ft. in. Splint coal 1 0	1·32	31·94	47·64	19·10	0·263	1·426	66·74	11·2	Coke, fairly swollen, firm and lustrous; ash, grey in colour, semi-granular.
	Good coal ... ... 1 4 Stone parting ... 1 1 Coal ... ... 3 0 Stone band ... ... 0 2 Coal ... ... 0 8 Parting ... ... Coal ... ... 0 2 Parting ... ... Coal ... ... 2 6 9 11 Floor, shale.	1·36	37·34	53·20	8·10	0·348	1·312	61·30	12·7	Coke, fairly swollen, firm and lustrous; ash, grey in colour, semi-granular.
		1·68	35·28	52·70	10·34	0·214	1·350	63·04	12·5	Coke, slightly swollen, firm, dull lustre; ash, grey in colour, granular.
Kayuga Colliery, near Aberdeen— Sample taken from the fourth bord left, off main heading.	Roof, coal 6 feet thick, not being worked. ft. in. Shale parting ... . Coal ... ... 3 0 Shale band ... ... 1 to 6 Coal ... ... 3 0 Floor, inferior coal.	4·84	37·40	50·90	6·86	0·622	1·319	57·76	12·9	Coke, slightly swollen, firm and lustrous; ash, light grey, granular.

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Killingworth Colliery, near Cockle Creek. Borehole Seam— Sample from 19 bord, No. 3 split, narrow bords.	Roof, shale.	ft. in.									
	Coarse coal	1 0									
	Inferior coal and stone bands	0 6									
	Coal	0 9									
	Parting	.....									
	Coal	1 6½									
	Band	0 1	1·72	36·80	52·72	8·76	0·601	1·343	61·48	13·0	Bands picked out; coke, fairly swollen, firm and lustrous; ash, light grey in colour, semi-granular.
	Coal	1 6									
	Band	0 1									
	Coal	1 2									
	Stone and impure coal	0 6									
		7 1½									
	Floor, sandstone.										
Killingworth Colliery, near Cockle Creek. Borehole Seam— Sample from 52 bord, No. 8 split, Main dip section.	Roof, shale.	ft. in.									
	Inferior coal ...	0 10									
	Coal and stone bands	0 7									
	Coal	0 9									
	Band	0 0½									
	Coal	1 6									
	Band	0 1	1·64	36·79	54·00	7·57	0·554	1·329	61·57	13·0	Bands picked out; coke, well swollen, firm, and lustrous; ash, light buff coloured, granular.
	Coal	1 6									
	Band	0 1									
	Coal	1 1									
		6 5½									
	Floor, sandstone.										

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Lambton Colliery, Lambton. Borehole Seam— Sample from the "Straight down District."	Roof, shale. ft. in. Coal ... ... 0 10 Band ... ... 0 0½ Coal ... ... 2 2 Band ... ... 0 0½ Coal ... ... 2 0 Band ... ... 0 0½ Coal ... ... 0 11 6 0½ Floor, dark shale.	1·93	36·23	52·67	9·17	0·560	1·339	61·84	12·5	Bands picked out; coke, slightly swollen, firm and lustrous; ash buff coloured, granular.
Lambton "B" Colliery, Redhead. Borehole Seam— Sample from Ocean district.	Roof, coal and shale, 3 feet. ft. in. Band ... ... 0 2 Coal ... ... 1 11 Band ... ... 0 0½ Coal ... ... 2 0½ Band ... ... 0 1 Coal ... ... 0 11 5 2 Floor, shale.	1·64	35·88	54·30	8·18	0·582	1·333	62·48	12·9	Bands picked out; coke, slightly swollen, firm and lustrous; ash, dark buff coloured, semi-granular.
Lambton "B" Colliery, Redhead. Borehole Seam— Sample from Pretoria left district.	Roof, coal and shale, 3 feet. ft. in. Band ... ... 0 2½ Coal ... ... 2 0 Band ... ... 0 0½ Coal ... ... 1 11 Band ... ... 0 0½ Coal ... ... 0 11 5 1½ Floor, shale.	1·73	35·56	53·46	9·25	0·508	1·329	62·71	12·6	Bands picked out; coke, well swollen, firm and lustrous; ash, dark buff coloured, semi-granular.

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water con. vert'd into steam by 1 lb. of the coal	Remarks.
Lymington Colliery, Cardiff. Australasian Seam— Sample from No. 1 top heading, rise side of dyke.	Roof, coal and shale, 3 feet. ft. in. Coal ... ... 1 6 Band ... ... 0 0½ Coal ... ... 2 6 Band ... ... 0 7 Coal ... ... 1 6 — 6 1½ Floor, hard shale.	1·99	33·79	52·53	11·69	0·164	1·358	64·22	12·6	Bands picked out; coke, well swollen, firm and lustrous; ash, grey, semi-granular.
Lymington Colliery, Cardiff. Australasian Seam — Sample from No. 8 heading, dip side of dyke.	Roof, coal and shale, 3 feet. ft. in. Coal ... ... 1 4 Band ... ... 0 0½ Coal ... ... 2 6 Band ... ... 0 6 Coal ... ... 1 5 — 5 9½ Floor, hard shale.	1·82	36·24	53·23	8·71	0·357	1·331	61·94	12·9	Bands picked out; coke, well swollen, firm and lustrous; ash, grey in colour, semi-flocculent.
Maryland Colliery, Plattsburg. Borehole Seam— Sample from face of No. 8 pillar, "pump district."	Roof, coal and shale bands. ft. in. Coal ... ... 1 11 Penny band ... 0 0½ Coal ... ... 1 8½ Penny band ... 0 0½ Coal ... ... 3 9½ — 7 6 Floor, hard sandstone.	1·96	36·72	55·18	6·14	0·587	1·315	61·32	13·0	Bands picked out; coke, fairly swollen, firm and lustrous, with cauliflower-like excrescences; ash, buff coloured, semi-granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal	Remarks.
Maryland Colliery, Plattsburg. Borehole Seam— Sample from face of No. 4 pillar, Downie's district.	Roof, coal and shale bands. ft. in.									
	Coal 1 11									
	Penny band 0 1									
	Coal 1 11	2·06	37·33	55·19	5·42	0·620	1·317	60·61	13·2	Bands picked out; coke, slightly swollen, firm and lustrous; ash, buff coloured, granular.
	Penny band 0 0½									
	Coal 4 0½									
	8 0½									
	Floor, hard sandstone.									
Morrisett Colliery, near Lake Macquarie. Great Northern (?) Seam.	Roof, conglomerate. ft. in.									
	Coal 2 0									
	Band 0 0½									
	Coal 1 8									
	Band 0 1	2·82	30·18	50·40	16·60	0·431	1·462	67·00	11·3	Bands picked out; coke, slightly swollen, firm and lustrous; ash dark buff coloured. granular.
	Coal 0 10									
	Band 0 0½									
	Coal 1 0									
	5 7½									
	Floor, shale.									
Newcastle Colliery, "A". Pit, Newcastle. Borehole Seam— Sample from near face of No. 61 heading, No. 5 district.	Roof, shale. ft. in.									
	Coal 1 1									
	Penny band 0 1									
	Coal 1 11	1·78	36·22	55·22	6·78	0·480	1·322	62·00	13·3	Bands picked out; coke, well swollen, firm and lustrous; ash, reddish tinge, semi-granular.
	Penny band 0 0½									
	Coal 0 8½									
	Morgan stone ... 0 8									
	Inferior coal ... 0 6									
	Strong shale ... 1 0									
	Coarse coal 0 6									
	6 6									
	Floor, sandstone.									

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Newcastle Colliery, "A" Pit, Newcastle. Borehole Seam—Sample from face of No. 17 pillar, No. 2 district.	Roof, coal and shale bands. ft. in. Coal ... ... 2 11 Penny band ... ... 0 0½ Coal ... ... 2 4½ Penny band ... ... 0 0½ Coal ... ... 0 10½ 6 3½ Floor, Morgan stone.	1·44	37·69	52·20	8·67	0·617	1·294	60·87	13·0	Bands picked out ; coke well swollen, firm and lustrous; ash, reddish tinge, semi-granular.
New Park Colliery, Rix's Creek, Singleton—Sample from No. 3 tunnel.	Roof, coal and bands, 2 feet. ft. in. Band ... ... 0 4½ Coal ... ... 1 0 Band ... ... 0 2½ Coal ... ... 1 0 Band ... ... 0 2½ Coal ... ... 0 4½ Band ... ... 0 0½ Coal ... ... 0 7 Band ... ... 0 0½ Coal ... ... 0 2 Band ... ... 0 2 Coal ... ... 0 8 Band ... ... 0 9 Coal ... . 1 1½ 6 8½ Coal and bands.	2·60	38·42	51·21	7·77	0·574	1·275	58·98	12·7	Bands picked out; coke, slightly swollen, firm and lustrous; ash, buff-coloured, semi-granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water converted into steam by 1 lb. of the coal	Remarks
New Park Colliery, Rix's Creek— Sample from No. 2 tunnel, back dip.	Roof, coal and bands, 3 feet. ft. in. Band ... ... 0 4½ Coal ... ... 1 0½ Band ... ... 0 2½ Coal ... ... 0 11½ Band ... ... 0 2½ Coal ... ... 0 3½ Inferior coal ... ... 0 0½ Black band ... ... 0 6½ White stone ... ... 0 0½ Coal ... ... 0 1½ Band ... ... 0 2½ Coal ... ... 0 9 Band ... ... 0 4 Coal ... ... 1 1 — 6 2½ Floor, coal and bands.	2·58	38·59	51·80	7·03	0·607	1·245	58·83	12·9	Bands picked out; coke, slightly swollen, firm and lustrous; ash, buff-coloured, semi-granular.
Northern Extended Colliery, Teralba. Great Northern Seam— Sample from the dip workings.	Roof, top coal, 5 feet. ft. in. Coal ... ... 0 7 Band ... ... 0 0½ Coal ... ... 2 8 Band ... ... 0 0½ Coal ... ... 2 0 Band ... ... 0 0½ Coal ... ... 1 2 Band ... ... 0 8 Coal ... ... 1 6 — 8 8½ Floor, white band.	2·31	33·25	48·88	15·56	0·464	1·423	...	11·5	Bands picked out; no true coke formed; caked on heating; ash, almost white, granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Northern Extended Colliery, Teralba— Sample from the top coal (not usually worked).	Conglomerate roof. Coal ... ... 1 5 White band ... ... 0 0½ Inferior coal ... 1 0 Coal ... ... 2 3 Inferior coal ... 1 0 5 8½ Floor, coal.	1·95	33·61	48·05	16·39	0·433	1·476	...	11·0	Bands picked out; no true coke formed; caked on heating; ash, pink tint, granular.
Northern Extended Colliery, Teralba. Great Northern Seam— Sample from Modder workings.	Roof, top coal, 5 feet. Coal ... ... 1 8 Band ... ... 0 0½ Coal ... ... 1 4 Band ... ... 0 0½ Coal ... ... 2 10 Band ... ... 0 0½ Coal ... ... 2 0 7 11½ Floor, white band.	2·21	31·50	53·12	13·17	0·502	1·432	...	12·1	Bands picked out; no true coke formed; caked on heating; ash, pink tint, granular.
North Lambton Colliery, Lambton. Borehole Seam.	Roof, coal and bands, 1 ft. 3 in. ft. in. Coal ... ... 2 3 Band ... ... 0 0½ Coal ... ... 2 0 Band ... ... 0 1 Coal ... ... 4 4 8 8½ Floor, dark shale.	2·00	37·63	55·32	5·05	0·502	1·311	60·37	13·2	Bands picked out; coke, slightly swollen, firm and lustrous; ash, dark buff coloured, granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Northumberland Colliery, Fassifern, Great Northern Seam — Sample from No. 2 tunnel.	Roof, top coal and bands, 6 feet. ft. in. Coal ... ... 5 6 Band ... ... 0 0½ Coal ... ... 1 10 7 4½ Floor, hard shale.	2·42	34·19	51·62	11·77	0·453	1·405	...	12·1	Band picked out; no true coke formed; ash light buff coloured-semi-granular.
Northumberland Colliery, Fassifern— Sample from middle of workings.	Roof, top coal and bands, 6 feet. ft. in. Coal ... ... 6 0 Band ... ... 0 0½ Coal ... ... 1 9 7 9½ Floor, hard shale.	2·14	34·08	51·46	12·32	0·450	1·416	...	12·0	Band picked out; no true coke formed; ash, light grey in colour, granular.
Pacific Colliery, Teralba. Great Northern Seam — Sample from No. 1 bord, 16 east heading.	Roof, top coal and bands, 6 feet. ft. in. Coal ... ... 1 6 Band ... ... 0 0½ Coal ... ... 3 1 Band ... ... 0 0½ Coal ... ... 2 6 7 1½ Floor, coal and bands.	2·38	33·76	51·50	12·36	0·464	1·386	...	11·8	Bands picked out; no true coke formed; ash, almost white, granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Pacific Colliery, Teralba—Sample from No. 14 west jig district, No. 39 bord.	Roof, top coal and bands, 6 feet. ft. in. Coal ... ... 2 4½ Band ... ... 0 0½ Coal ... ... 3 2 Band ... ... 0 0½ Coal ... ... 2 6 8 1½ Floor, coal and bands.	2·65	33·16	51·63	12·56	0·433	1·397	...	11·8	Bands picked out; no true coke formed; ash, pink colour, granular.
Rhondda Colliery, Teralba. Great Northern Seam—Sample from Middle district.	Roof, inferior coal and bands, 6 feet. ft. in. Coal ... ... 4 6½ Band ... ... 0 0½ Coal ... ... 2 0 6 7½ Floor, coal and bands.	2·47	37·02	50·92	9·59	0·466	1·362	60·51	12·3	Band picked out; coke, well swollen, firm and lustrous; ash, grey in colour, semi-granular.
Rhondda Colliery, Teralba. Great Northern Seam—Sample from the boundary heading.	Roof, inferior coal and bands, 6 feet. ft. in. Coal ... ... 4 10 Band ... ... 0 0½ Coal ... ... 1 10½ 6 9 Floor, coal and bands.	2·65	34·07	52·21	11·07	0·494	1·408	63·28	12·3	Band picked out; coke, slightly swollen, firm and lustrous; ash, buff-coloured, semi-granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Rosedale Colliery, Nundah—Sample from left side of Rosedale tunnel.	Roof, soft shale. ft. in. Coal ... ... 2 1½ Band ... ... 0 6 Coal ... ... 0 10 Band ... ... 0 6½ Coal ... ... 0 8 4 8 Floor, hard shale.	1·98	39·71	50·53	7·78	0·615	1·305	58·31	12·9	Bands picked out; coke, slightly swollen, firm and lustrous; ash, reddish tinge, semi-granular.
Rosedale Colliery, Nundah Sample from right-hand side.	Roof, soft shale. ft. in. Coal ... ... 2 3 Band ... ... 0 7½ Coal ... ... 0 10½ Band ... ... 0 8 Coal ... ... 0 8 5 1 Floor, hard shale.	2·47	40·27	51·01	6·25	0·623	1·300	57·26	13·0	Bands picked out; coke, slightly swollen, firm and lustrous; ash, reddish tinge, semi-granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Seaham Colliery, West Wallsend. Borehole Seam— Sample from the unworked portion of the seam.	Roof, shale.	ft. in.	1·81	38·54	52·70	6·95	0·535	1·309	59·65	13·3	Coke, fairly swollen, firm and lustrous; ash, light buff coloured, semi-granular.
	Good coal	1 1									
	Coarse coal	0 7									
	Parting	.....									
	Coarse coal	0 6½									
	Parting	.....									
	Coarse coal and stone bands	0 7½									
	Coal	1 9									
	Band	0 1									
	Coal	1 6									
	Band	0 1									
	Coal	1 4½									
		7 7½									
	Floor, sandstone.										
Seaham Colliery, West Wallsend. Borehole Seam— Sample from No. 12 bord, west jig (working section.	Roof, coarse and impure coal.	ft. in.	1·83	36·78	53·83	7·56	0·580	1·317	61·39	12·9	Coke, fairly swollen, firm and lustrous; ash, light buff coloured, granular.
	Clay pricking ...	0 0½									
	Stone	0 1½									
	Coarse coal	0 3									
	Coal	0 7									
	Parting	.....									
	Coal	1 5									
	Band	0 1									
	Coal	1 6½									
	Band	0 1									
	Coal	1 3½									
		5 5½									
	Floor, sandstone.										

Working section.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Seaham Colliery, West Wallsend. Borehole Seam —	Roof, shale.	ft. in.									
Sample from the middle of No. 3 split.	Coal	1 1									
	Coarse coal	0 6½									
	Clay band	0 0½									
	Coarse coal	0 6½									
	Stone band	0 0½									
	Coarse coal	0 2									
	Fireclay	0 1									
	Stone	0 1½									
	Coarse coal	0 3½									
	Parting	.....									
	Coal	0 6									
	Parting	0 0½									
	Coal	1 8									
	Band	0 1	1·88	35·76	51·96	10·40	0·752	1·350	62·36	12·61	Bands picked out; coke, slightly swollen, firm and lustrous; ash, dark buff coloured, granular.
	Coal	1 6									
	Band	0 1									
	Coal	1 4½									
		8 1⅛									
	Floor, sandstone.										

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Seaham No. 2 Colliery, West Wallsend. Borehole Seam—Sample from Kennedy's boundary cross-cut, No. 2 split.	Roof, impure coal. ft. in. Claystone band ... 0 2 Impure coal ... 0 3 Parting ... . Coal ... ... 0 7 Parting ... 0 0½ Coal ... ... 1 7 Stone band ... 0 0½ Coal ... ... 1 8 Clay band ... 0 0½ Coal ... ... 1 6 Black shale ... 0 2 Coal ... ... 0 6 6 6½ Floor, sandstone.	1·53	36·65	52·22	9·60	0·587	1·346	61·82	12·8	Bands picked out; coke, slightly swollen, firm and lustrous; ash, dark buff coloured, granular.
Seaham No. 2 Colliery, West Wallsend. Borehole Seam—Sample from second bord off Jones' heading, No. 2 split.	Roof, shale. ft. in. Coal and bands ... 2 8 Coal and stone bands 0 5½ Parting ... ... Coal ... ... 0 8 Parting ... ... Coal ... ... 1 6½ Stone band ... 0 0½ Coal ... ... 1 8½ Stone band ... 0 0½ Coal ... ... 1 6½ Black shale ... 0 2 Coal ... ... 0 6 9 4 Floor, sandstone.	1·82	35·99	54·50	7·69	0·606	1·349	62·19	13·0	Bands picked out; coke, fairly swollen, firm and lustrous; ash, buff-coloured, semi-granular.

Proximate Analyses of Samples of Coal— **Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Shortland Colliery Adamstown, near Newcastle. Burwood Seam— Sample from main heading, left-hand side.	Roof, black stone. Coal ... ... ft. 2 in. 0 Clay band ... ... 0 2 Inferior coal ... 0 1 Coal ... ... 0 4 Black band ... ... 0 2 Coal ... ... 2 7 5 4 Floor, black shale.	2·03	38·19	50·14	9·64	0·477	1·360	59·78	12·3	Bands picked out; coke, fairly swollen firm and lustrous; ash, pink tint, semi-granular.
Shortland Colliery, Adamstown. Sample from right-hand district crosscut.	Roof, black stone. Coal ... ... ft. 2 in. 0 Clay band ... ... 0 2 Inferior coal ... 0 1 Coal ... ... 0 5 Black band ... ... 0 2 Coal ... ... 2 6 5 4 Floor, black stone.	2·09	36·53	54·40	6·98	0·486	1·334	61·38	13·0	Bands picked out; coke, fairly swollen, firm and lustrous; ash, light grey, semi-granular.
Stockton Borehole Colliery, Cockle Creek. Borehole Seam— Sample from No. 5 gate-way, south side of the colliery.	Roof, shale. Coal ... ... ft. 0 in. 7 Band ... ... 0 0½ Coal ... ... 1 7 Band ... ... 0 0½ Coal ... ... 1 7 3 10 Floor—coal bands, jerry and stone.	1·10	35·96	57·44	5·50	0·494	1·398	62·94	13·2	Bands picked out; coke, fairly swollen, firm and lustrous; ash, buff-coloured, semi-granular.

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water converted into steam by 1 lb. of the coal.	Remarks.
Stockton Borehole Colliery—Sample from north side of longwall face, No. 3 gateway.	Roof, shale. Coal ... ... 0 5 Band ... ... 0 0½ Coal ... ... 1 7 Band ... ... 0 0½ Coal ... ... 2 1 Coal bands and stone 1 6 5 8 Floor, sandstone.	1·47	35·16	57·76	5·61	0·466	1·321	63·37	13·3	Bands picked out; coke, fairly swollen, firm and lustrous; ash, buff-coloured, semi-granular.
Wallarah Colliery, Catherine Hill Bay. Wallarah Seam—Sample from No. 6 right-hand heading, Nord's district.	Roof, sandstone. Splint coal ... ... 2 0 Band ... ... 0 1 Splint coal ... ... 0 4 Band ... ... 0 1 Splint coal ... .. 1 0 Coal ... ... 2 6½ Stone band ... ... 0 1 Coal ... ... 3 0 Impure coal ... ... 1 0 10 1½ Floor, sandstone.	1·56	31·94	57·61	8·89	0·442	1·394	...	12·4	Band picked out; no true coke formed; ash, buff-coloured, semi-granular.
Wallarah "B" Tunnel Colliery, Catherine Hill Bay. Wallarah Seam—Sample from 41 bord, No. 1 split.	Top coal and splint... 2 6 Band ... ... 0 1 Splint ... ... 1 10 Coal ... ... 6 0 = Inferior coal ... 0 6 10 11 Floor, sandstone.	1·52	32·99	57·11	8·38	0·488	1·389	...	12·3	No true coke formed; ash, buff-coloured, semi-granular.

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Wallsend Colliery, Wallsend. Borehole Seam— Sample from the back heading, Modder River district, No. 1 split.	Roof, shale.	ft. in.	1·04	35·27	53·40	10·29	0·488	1·376	63·69	12·4	Bands picked out; coke, slightly swollen, firm and lustrous; ash, buff-coloured, semi-granular.
	Kerosene shale ...	0 3									
	Coal	0 5									
	Band	0 0½									
	Coal	0 2½									
	Band	0 0½									
	Coal	1 6									
	Band	0 0½									
	Coal	1 4½									
	Jerry	1 6									
		5 4½									
	Floor, sandstone.										
Wallsend "C" Pit Colliery, Wallsend. Borehole Seam— Sample from the back heading, Empire district.	Roof, shale.	ft. in.	1.01	37·55	51·19	10·25	0·620	1·371	61·44	12·3	Bands picked out; coke, slightly swollen, firm and lustrous; ash, buff-coloured, semi-granular.
	Little tops	0 8									
	Coal	1 8									
	Band	0 0½									
	Coal	1 7½									
	Band	0 0½									
	Coal	3 4									
		7 4½									
	Floor, sandstone.										

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water converted into steam by 1 lb. of the coal.	Remarks
Waratah Colliery, Charleston. Burwood Seam— **Sample** from right side workings.	Roof, coal and bands, 3 feet. ft. in. Coal ... ... 1 10½ Stone band ... ... 0 2½ Coal ... ... 0 5 Band ... ... 0 0½ Coal ... ... 0 1½ Band ... ... 0 0½ Coal ... ... 1 2 Band ... ... 0 0½ Coal ... ... 0 11½ — — 4 9½ Floor, hard shale.	1·84	35·22	52·01	10·93	0·150	1·368	62·94	12·3	Bands picked out; coke, well swollen, firm and lustrous; ash, reddish tinge, semi-granular.
Waratah Colliery, Charleston. Burwood Seam— Sample from left-side workings.	Roof, coal and bands, 3 feet. ft. in. Coal ... ... 1 10½ Stone band ... ... 0 2 Coal ... ... 0 5 Band ... ... 0 0½ Coal ... ... 0 2½ Band ... ... 0 0½ Coal ... ... 1 1½ Band ... ... 0 0½ Coal ... ... 1 1½ — — 5 0 Floor, hard shale.	2·03	36·40	53·87	7·70	0·151	1·314	61·57	13·0	Bands picked out; coke, well swollen, firm and lustrous; ash, reddish tinge, semi-granu ar.

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water combined to form by 1 lb. of the coal.	Remarks.
West Wallsend Colliery, Wallsend. Borehole Seam— Sample taken from the house pump district, east side crosscut.	Roof, shale. ft. in. Coarse coal ... ... 0 3 Coal ... ... 0 6 Parting ... ... Coal ... ... 1 9 Band ... ... 0 1 Coal ... ... 1 8 Band ... ... 0 1 Coal ... ... 1 6 5 10 Floor, sandstone.	0·94	35·84	55·64	7·58	0·579	1·338	63·72	12·7	Bands picked out; coke, slightly swollen, firm and lustrous; ash, buff-coloured, semi-granular.
West Wallsend Colliery, Wallsend. Borehole Seam— Sample from 57 bord, No. 3 west level face.	Roof, shale. ft. in. Coarse coal ... ... 0 8 Parting ... ... Coarse coal ... ... 0 6 Stone picking ... 0 2 Coarse coal ... ... 0 3 Coal ... ... 0 6 Parting ... ... Coal ... ... 1 5 Band ... ... 0 1 Coal ... ... 1 0 Band ... ... 0 1 Coal ... ... 1 4 6 6 Floor, sandstone.	0·95	36·48	54·03	8·54	0·425	1 45	62·57	12·7	Bands picked out; coke, slightly swollen, firm and lustrous; ash, buff-coloured, semi-granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
West Wallsend Colliery. Wallsend. Seam about 60 feet above the Borehole Seam— Sample from face of third bord to left of going bord, main west heading, north side.	Roof, inferior coal. ft. in. Coal ... ... 0 7 Band splint ... ... 0 1 Coal ... ... 1 0 Coal and bands ... 0 3 Coal ... ... 2 8 Clay band ... ... 0 3½ Coal and bands ... 0 3 Clay band ... ... 0 0½ Coal ... ... 0 10 — 6 0 Floor, clay.	1·89	32·91	50·76	14·44	0·439	1·384	65·20	11·8	Bands picked out; coke, slightly swollen, firm and lustrous; ash, grey in colour, semi-granular.
Young Wallsend Colliery. Wallsend. Seam about 70 feet above Borehole Seam— Sample from face of No. 1 bord, second cut-through from east side back heading, south side.	Roof, inferior coal, 1 ft. 4½ in. ft. in. Band ... ... 0 0½ Coal ... ... 0 7 Splint ... ... 0 1 Coal ... ... 1 0 Coal and bands ... 0 3 Coal ... ... 2 6 Clay band ... ... 0 3½ Coal and bands ... 0 3 Clay band ... ... 0 0½ Coal ... ... 0 9 — 9 Floor, clay.	2·00	33·20	50·75	14·05	0·412	1·405	64·80	12·0	Bands picked out; coke, slightly swollen, firm and lustrous; ash, grey in colour, semi-granular.

Proximate Analyses of Five Samples of Coal from the **Middle or Tomago Coal Measures, Northern Coalfield.**

Name of Colliery, Locality, &c	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water converted into steam by 1 lb. of the coal	Remarks.
Thornley Colliery, Four-mile Creek, near East Maitland—Sample from left side of tunnel race's bord.	Roof, dark shale. Coal ... ... 1 6 Band ... ... 0 2 Coal ... ... 1 7 Band ... ... 0 8 Coal ... ... 3 2 7 1 Floor, hard shale.	1·44	36·40	49·98	12·18	1·236	1·359	62·16	12·1	Bands picked out; coke, slightly swollen, firm and lustrous; ash, grey in colour, granular.
Thornley Colliery—Sample from left side of tunnel, Thompson's bord.	Roof, dark shale. ft. in. Coal ... ... 1 8 Band ... ... 0 1 Coal ... ... 1 3 Band ... ... 0 8 Coal ... ... 3 0 6 8 Floor, hard shale.	1·57	35·09	52·60	10·74	2·093	1·351	63·34	12·1	Bands picked out; coke, slightly swollen, firm and lustrous; ash, grey in colour, granular.

Proximate Analyses of Samples of Coal—**Middle or Tomago Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water consumed in steam by 1 lb. of the coal.	Remarks.
Bloomfield Colliery, Four-mile Creek, East Maitland— Sample from top heading.	Roof, coal and shale, 1 foot. ft. in. Band ... ... 0 2 Coal ... ... 1 6 Band ... ... 0 3 Coal ... ... 1 4 Band ... ... 0 1½ Coal ... ... 1 3½ Band ... ... 0 0½ Coal ... ... 2 2 6 10½ Floor, hard shale.	2·07	36·51	54·94	6·48	0·862	1·338	61·42	12·8	Bands picked out; coke, slightly swollen, firm and lustrous; ash, light grey in colour, semi-granular.
Bloomfield Colliery — Sample from dip bord.	Roof, coal and shale. ft. in Band ... ... 0 1½ Coal ... ... 1 6 Band ... ... 0 1½ Coal ... ... 1 6 Band ... ... 0 1½ Coal ... ... 3 6 6 10½ Floor, hard shale.	1·82	34·42	55·43	8·33	0·914	1·360	63·76	12·6	Bands picked out; coke, slightly swollen, firm and lustrous; ash, grey in colour, semi-granular.
Rathluba Colliery, East Maitland.	Roof, coal and shale, 5 feet. ft. in. Coal ... ... 1 8 Band ... ... 0 3 Coal ... ... 2 7 4 6 Floor, dark shale.	2·50	36·10	50·91	10·49	0·821	1·322	61·40	12·8	Band picked out; coke, fairly swollen, firm and lustrous; ash, grey in colour, semi-granular.

PROXIMATE Analyses of Fifty one Samples of Coal from the **Lower or Greta Coal Measures, Northern Coalfield.**

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water converted into steam by 1 lb. of the coal	Remarks.
Aberdare Colliery, Upper Seam—	Coal roof.										
		ft. in.									
Sample from 6 chains S.W. of winding shaft.	Shale	1 6									
	Coal	3 10									
	Brass band ...	0 1	2·23	42·31	48·25	7·21	2·963	1·282	55·46	12·9	Brass band picked out; coke, slightly swollen, firm and lustrous; ash, grey in colour, semi-granular. (Not at present worked.)
	Coal	2 6									
	Stone band	0 1½									
	Coal	0 4									
	Stone band	0 1	2·45	40·58	46·60	10·37	1·057	1·343	56·97	12·2	½ Inch band picked out; coke, slightly swollen, firm and lustrous; ash, grey in colour, flocculent. (Not at present worked.)
	Coal	1 2									
	Band	0 0½									
	Coal (dirty) ...	2 0									
	Band	0 0½									
	Coal (dirty) ...	1 6									
	Band	0 1									
	Coal	0 10									
	Band	0 1									
	Coal	8 6									
	Clay floor.										
Aberdare Colliery, Upper Seam—	Coal roof.	ft. in.									
Sample from No. 1 bord, No. 1 panel, Scotch heading, south side.	Band	0 1									
	Coal	8 5	1·94	41·62	51·81	4·63	0·843	1·280	56·44	13·3	Coke, slightly swollen, firm and lustrous; ash, grey in colour, semi-granular.
	Inferior coal	0 3½									
	Clay floor.										

Proximate Analyses of Samples of Coal —**Lower or Greta Coal Measures, Northern Coalfield** — *continued.*

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of fuel.	Remarks.
Aberdare Colliery, Upper Seam—	Coal roof.										
Sample from No. 45 bord No. 2 north panel.	Band	ft. in. 0 1	2·22	41·22	51·92	4·65	0·906	1·278	56·57	13·3	Coke slightly swollen, firm and lustrous; ash grey in colour, semi-granular.
	Coal	8 2½									
	Inferior coal ...	0 5									
	Clay floor.										
Aberdare Colliery, Upper Seam—	Coal roof.										
Sample from No. 2 north "overcast."	Coal	ft. in. 2 5	1·92	41·57	48·32	8·19	0·768	1·264	56·51	13·0	Coke, well swollen, firm and lustrous; ash, grey in colour semi-granular. (Not at present worked.)
	Band	0 2									
	Coal	0 3									
	Band	0 3									
	Coal	0 4									
	Band	0 1									
	Coal	4 8									
	Band	0 1									
	Coal	1 2									
	Band	0 0½									
	Coal	8 6									
		17 11½									
	Clay floor.										

Proximate Analyses of Samples of Coal—**Lower or Greta Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Aberdare Colliery, Upper Seam—	Coal roof.										
		ft. in.									
Sample from No. 1 north "overcast."	Coal	3 4	2·18	36·87	41·13	19·82	0·398	1·370	60·95	11·3	Coke, fairly swollen, firm dull lustre; ash, grey in colour, semi-granular. (Not at present worked.)
	Stone band	0 1½									
	Kerosene shale ...	0 5									
	Stone band	0 1									
	Coal	1 1½									
	Stone band	0 1									
	Coal	1 7									
	Stone band	0 2									
	Coal	1 7									
	Stone band	0 1½									
	Coal	0 10½									
	Stone band	0 1½									
	Coal	8 6									
		18 1½									
	Clay floor.										
Aberdare Colliery, Upper Seam—	Coal roof.										
		ft. in.									
Sample from the "overcast" in the safety-lamp district.	Coa	2 6	1·90	39·77	51·26	7·07	0·412	1·291	58·33	13·0	Bands picked out; coke, fairly swollen, firm, dull lustre; ash, buff-coloured, semi-granular. (Not at present worked.)
	Stone	0 3									
	Inferior coal ...	0 4									
	Stone	0 2½									
	Coal	1 0									
	Black stone	0 2½									
	Coal	1 1									
	Stone	0 2									
	Coal	2 0									
	Stone and clay band	0 4½									
	Coal	1 3									
	Stone	0 4									
	Coal	9 6									
		19 2½									
	Clay floor.										

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal	Remarks.
Aberdare Extended Colliery, near Maitland. Upper Seam—Sample from fallen bord in No. 2 west panel.	Conglomerate roof. ft. in. Coal ... ... 1 4 Band ... ... 0 1 Coal ... ... 3 2 =	0·95	39·97	45·57	13·51	3·212	1·369	...	12·2	No true coke formed; ash, light grey, granular.
	Soft fireclay ... ... 3 3 Blake shale ... ... 0 10½ Coal ... ... 2 5 = Sandstone 0 3	1·79	43·08	49·26	5·87	1·030	1·311	55·13	13·3	Coke, well swollen, firm and lustrous; ash, grey in colour, semi-granular.
	Coal ... ... 0 9 = Band 0 3	1·33	43·13	48·80	6·74	0·859	1·278	55·54	13·0	Coke, slightly swollen, firm and lustrous; ash, light grey, semi-granular.
	Coal ... ... 1 10) Band ... ... 0 1) Coal ... ... 2 4½) Band 0 1	1·27	42·73	51·26	4·74	0·824	1·269	56·00	13·6	Coke, slightly swollen, firm and lustrous; ash, light grey, semi-granular.
	Coal ... ... 2 4 = Black shale ... ... 0 10 Kerosene shale ... 0 9 Coal ... ... 11 6 15 32 2 Floor, clay.	1·88	42·05	51·35	4·72	0·535	1·251	56·07	13·7	Coke, well swollen, firm and lustrous; ash, slight reddish tinge, granular. (None of this coal is at present worked.)

Proximate Analyses of Samples of Coal—**Lower or Greta Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Aberdare Extended Colliery, Upper Seam— Sample from cut-through near face of "going bord," No. 3 west district.	Coal roof.	ft. in.									
	Coal	8 7	1·93	43·17	51·55	3·35	0·909	1·266	54·90	13·5	Coke, slightly swollen, firm and lustrous; ash, grey in colour, flocculent.
	Inferior coal ...	0 1									
	Clay floor.										
Aberdare Extended Colliery, Upper Seam— Sample from corner of cut-through near face of "going bord," No. 3 east district.	Coal roof.	ft. in.									
	Coal	8 7 =	1·70	42·96	51·80	3·54	1·323	1·266	55·34	13·5	Coke, slightly swollen, firm and lustrous; ash, grey in colour, flocculent.
	Inferior coal ...	0 3									
	Clay floor.										
Abermain Colliery, Maitland District Upper Seam— Samples from No. 19 bord, "going bord" district.	Roof, conglomerate.	ft. in.									
	Coal	2 0 =	1·84	45·66	41·88	10·62	2·943	1·289	52·50	12·5	Coke, very slightly swollen, firm and lustrous; ash, pink, semi-granular.
	Clay band	1 0									
	Coal	1 6 =	1·88	44·68	45·97	7·47	3·979	1·282	...	12·9	No true coke formed; ash, pink, semi-granular.
	Coal and black splint	3 0 =	1·71	42·94	47·44	7·91	2·962	1·310	...	13·2	No true coke formed; ash, pink, semi-granular.
	Coal	1 6 =	1·28	40·75	53·21	4·76	1·502	1·284	...	13·2	No true coke formed; ash, dark buff coloured, semi-granular.
	Black shale	1 1									
	Coal	0 8									
	Band	0 1									
	Coal	2 3									
	Band	0 1									
	Coal	2 0									
	Band	0 0½									
	Coal	5 8									
		20 9½									(None of this coal at present worked.)

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Abermain Colliery. Upper Seam— Sample from face of No. 14 bord, No. 10 heading, Main Dip district.	Roof, coal, replaced by conglomerate in places. ft. in. Coal ... ... 2 6 Stone band ... ... 0 1 Coal ... ... 2 5 Stone band ... ... 0 0½ Coal ... ... 1 10 Inferior coal ... 0 5 7 3½ Clay floor.	1·93	39·90	52·15	6·02	0·952	1·274	58·17	13·3	Bands picked out; coke, slightly swollen, firm and lustrous; ash, grey, semi-granular.
Abermain Colliery. Upper Seam— Sample from face of No. 8 bord, No. 3 flat, "going bord" district.	Coal roof. ft. in. Coal ... ... 2 6 Stone band ... ... 0 1 Coal ... ... 2 1 Stone band ... ... 0 1 Coal ... ... 4 7½ Inferior coal ... 0 5 9 9½ Clay floor.	1·98	41·78	50·34	5·90	1·112	1·267	56·24	13·3	Bands picked out; coke, slightly swollen, firm and lustrous; ash, grey, semi-granular.

Proximate Analyses of Samples of Coal—**Lower or Greta Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water evaporated into steam by 1 lb. of the coal.	Remarks.
Central Greta Colliery. Upper Seam.		ft. in.									
	Top coal	4 0	1·26	46·70	47·01	5·03	2·700	1·280	52·04	13·2	This coal is not worked; coke, fairly swollen, firm and lustrous: ash, light grey, semi-granular.
	White stone ...	0 8									
	Coal	4 10									
	Stone band	0 2									
	Coal	0 7	1·76	42·75	48·53	6·96	1·650	1·310	55·49	12·9	Coke, fairly swollen, firm and lustrous; ash-grey in colour, seim, granular.
	Stone band	0 2									
	Coal	4 8									
		11 1									
	Floor, clay.										
Central Greta Colliery Upper Seam—	Roof, conglomerate.										
		ft. in.									
Second sample including top coal from west heading main dip.	White stone ...	0 4									
	Top coal	4 2									
	Coal	2 5									
	Band	0 2									
	Coal	0 9	1·39	43·49	48·34	6·78	2·693	1·310	55·12	12·8	Bands picked out; coke, slightly swollen, firm and lustrous; ash, grey, semi-granular.
	Band	0 2									
	Coal	4 2									
		12 2									
	Floor, dark clay.										

Proximate Analyses of Samples of Coal—**Lower or Greta Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
East Greta Colliery. Top Seam— Sample from No. 4 level, between 1 and 2 tunnels.	Roof, conglomerate.									
		ft. in.								
	Coal	1 8								
	Penny band ...	0 2								
	Clean coal	2 2								
	*Chance band ...	0 1								*Picked out.
	Clean coal	0 4½								
	Parting	.....								
	Clean coal	1 3								
	Parting	.....								
	*Inferior coal ...	1 9								
	Parting	.....								
	Good coal	2 0	0·95	41·45	51·79	5·81	2·021	1·282	57·60	13·3	Coke, very little swollen, firm and lustrous; ash, grey in colour, floculent. (Not at present worked.)
	*Brown stone... ...	0 1								
	Clean coal	1 0								
	*Inferior stony coal ...	2 5								
	Parting	.....								
	Clean coal	2 0								
	*Stone band ...	0 3								
	Clean coal	0 10½								
	*Stony coal	0 5								
	*Brown dirt	0 2								
	Good clean coal ...	5 3								
	*Coal and dirt ...	7 6								
		29 5								
	Floor, fireclay.									

Proximate Analyses of Samples of Coal—**Lower or Greta Coal Measures, Northern Coalfield**—*continued*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the...	Remarks.
East Greta Colliery, near Maitland. Bottom Seam. Sample from No. 8 bord, Wright's jig, No. 2 tunnel.	Conglomerate roof. Coal ... ... 5 2 Parting ... ... Coal ... ... 6 3 11 5 Floor, fireclay.	1·32	40·40	49·75	8·53	0·576	1·270	58·28	12·9	Coke, well swollen, firm and lustrous; ash, dark grey, semi-granular.
		1·37	40·79	51·57	6·27	0·521	1·284	57·84	13·2	Coke, well swollen, firm and lustrous; ash, reddish tinge, semi-granular.
East Greta Colliery. Bottom Seam— Sample from No. 5 South level, No. 1 tunnel.	Conglomerate roof. Coal ... ... 5 2 Parting ... ... Coal ... ... 8 10 14 0 Fireclay floor.	1·30	39·58	52·88	6·24	0·549	1·271	59·12	13·3	Coke, well swollen, firm and lustrous; ash, reddish tinge, semi-granular.
Ebbw Main Colliery, Greta. Bottom Seam— Sample from face of main tunnel.	Conglomerate roof. Brassy tops ... ... 0 5 Black stone ... ... 0 8 Coal ... ... 2 3 Clay band ... ... 0 5 Coal ... ... 0 7 Band ... ... 0 2 Coal ... ... 3 6 8 0 Conglomerate floor.	1·54	42·05	49·29	7·12	0·862	1·304	56·41	12·9	Bands picked out; coke, fairly swollen, firm and lustrous; ash-buff-coloured, semi, granular.

Proximate Analyses of Samples of Coal—**Lower or Greta Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Ebbw Main Colliery, Greta. Top Seam— Sample from face of No. 10 slant.	Roof, brassy tops. ft. in. Clay ... ... 2 0 Kerosene shale ... 0 11½ Coal ... ... 3 0 Coarse coal ... ... 0 5 Coal ... ... 2 0 6 6½ Floor, soft fireclay.	1·36	44·49	48·28	5·87	1·570	1·296	54·15	13·3	Coke, slightly swollen, firm and lustrous; ash, pink tint, semi-granular.
Hebburn Colliery, near Maitland. Top Seam— Sample from face of main west heading.	Roof, black shale. ft. in. Coal ... ... 1 0 Band ... ... 0 1 Coal and splint ... 0 4½ Coal ... ... 0 9 Splint ... ... 0 3 Coal ... ... 1 9 Band ... ... 0 1 Coal 1 11 6 2½	1·70	40·23	48·61	9·46	2·255	1·312	58·07	12·9	Bands and splint picked out; coke, slightly swollen, firm and lustrous; ash, grey, semi-granular.
Hebburn Colliery, near Maitland. Middle Seam— Sample from third bord in left-hand back heading a stop of the fault in the cross-cut district.	Roof, conglomerate. ft. in. Coal ... ... 7 1 = Band of stone and dirty coal ... 0 1½ 7 2½ Floor, clay.	1·58	42·72	50·30	5·40	0·873	1·272	55·70	13·5	Coke, fairly swollen, firm and lustrous; ash, pink, semi-granular.

Proximate Analyses of Samples of Coal—**Lower or Greta Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Hebburn Colliery, near Maitland. Middle Seam— Sample from face of No. 7 bord, left back heading, on top of upthrow fault in Jones' district.	Roof, conglomerate. Coal ... ... 8 1 — Inferior coal ... 0 3 8 4 Floor, clay.	1·72	42·88	50·64	4·76	0·763	1·272	55·40	13·6	Coke, fairly swollen, firm and lustrous; ash, grey, semi-granular.
Hebburn Colliery, near Maitland. Bottom Seam— Sample from 2nd bord from face of cross-cuts, in Savage's district.	Roof, conglomerate. ft. in. Coal ... ... 3 1 Curly coal ... ... 0 2 Coal ... ... 2 0 Stone band ... ... 0 1 Inferior coal ... 0 3 5 7 Floor, hard stone.	2·12	39·75	51·00	7·13	0·810	1·292	58·13	13·2	Bands picked out; coke, slightly swollen firm and lustrous; ash, grey, semi-granular
Hebburn Colliery, near Maitland. Bottom Seam— Sample from face of No. 12 bord, in Finlay's district.	Roof, conglomerate. Coal ... ... 5 4½ Band ... ... 0 0½ Inferior coal ... 0 3 5 7¾ Floor, hard stone.	1·86	40·60	49·72	7·82	0·873	1·293	57·54	13·2	Coke, slightly swollen, firm and lustrous; ash, pink, semi-granular.

Proximate Analyses of Samples of Coal—**Lower or Greta Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water contained in coal by 1 lb. of the coal.	Remarks.
Muswellbrook Colliery, Muswellbrook. Sample taken from No. 10 bord.	Roof, clayey shale and sandy shale. Bottom Seam— ft. in. Top coal ... ... 8 4 Parting ... ... Coal ... ... 6 6 — Shale ... ... 2 6 Coal ... ... 2 0 Floor, clayey shale.	2·98	40·72	50·26	6·04	1·792	1·298	56·30	13·3	Coke, slightly swollen, firm and lustrous; ash, grey, granular.
Muswellbrook Colliery, Muswellbrook. Sample taken from the main heading.	Roof, clayey shale and sandy shale. Bottom Seam— ft. in. Top coal ... ... 6 3 Parting ... ... Coal ... ... 8 7 — Clayey shale floor.	2·80	41·19	49·61	6·40	0·847	1·276	56·01	13·4	Coke, slightly swollen, firm and lustrous; ash light grey, granular.

Proximate Analyses of Samples of Coal—**Lower or Greta Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Neath Colliery. Top Seam—Sample from old No. 25 bord, No. 2 west panel, north side.	Coal roof.	ft. in.									
	Clay band	1 8									
	Kerosene shale ...	0 4									
	Coal	3 11 =	2·13	41·81	47·66	8·40	3·460	1·301	56·06	12·8	Coke, slightly swollen, firm and lustrous; ash, pink in colour, semi-granular.
	Grey band	0 1									
	Coal	0 4									
	Grey band	0 2									
	Coal	0 5½									
	Band	0 1½									
	Coal	1 9½ =	1·87	41·16	45·34	11·63	1·042	1·309	56·97	12·2	Coke caked, firm and lustrous; ash, grey in colour, semi-granular.
	Grey band	0 1½									
	Coal	1 10									Band picked out; coke, slightly swollen, firm and lustrous; ash, buff-coloured, semi-granular.
	Grey band	0 1	2·36	40·43	48·21	9·00	0·986	1·279	57·21	12·7	
	Coal	2 5½									
	Grey band	0 1									
	Coal	1 9½									
	Clay band	0 1½									
	Coal	5 0									
	Inferior coal ...	0 10									(None of this coal at present worked.)
	Clay floor.										
Neath Colliery. Top Seam—Sample from near face of main north-west heading.	Coal roof.	ft. in.									
	Stone band	0 4									
	Coal	2 0									
	Band	0 1	1·57	41·93	51·65	4·85	0·810	1·273	56·50	13·6	Bands picked out; coke, slightly swollen, firm and lustrous; ash, buff-coloured, flocculent.
	Coal	5 5									
	Band	0 0½									
	Inferior coal ...	0 6									
	Clay floor.										

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water evaporated into steam by 1 lb. of the coal.	Remarks.
Neath Colliery. Top Seam—Sample from face of No. 1 west heading, south side.	Coal roof. Stone band ... ... ft. 0 in. 1 Coal ... ... 2 4 Band ... ... 0 0½ Coal ... ... 0 9 Band ... ... 0 0½ Coal ... ... 5 6½ Band ... ... 0 0½ Inferior coal ... 0 7 Clay floor.	1·85	42·66	49·27	6·22	0·738	1·285	55·49	13·2	Bands picked out; coke, slightly swollen, firm and lustrous; ash, grey, semi-granular. (Not at present worked.)
Pelaw Main Colliery. Bottom Seam—Sample from No. 30 bord, 6 dip slant, No. 5 east district.	Conglomerate roof. Coal ... ... ft. 15 in. 9 Sandstone floor.	1·62	42·91	51·32	4·15	0·453	1·396	55·47	13·5	Coke, fairly swollen, firm, dull lustre; ash, buff-coloured, semi-granular.
Pelaw Main Colliery. Bottom Seam—Sample from No. 20 bord, 16 slant, No. 2 west.	Conglomerate roof. Coal ... ... ft. 15 in. 2 Clay parting ... 0 0½ Coal ... ... 1 7 16 9½ Sandstone floor.	2·10	41·45	49·74	6·71	0·947	1·251	56·45	13·0	Coke, well swollen, firm and lustrous; ash, light reddish tinge, semi-granular.

Proximate Analyses of Samples of Coal—**Lower or Greta Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
South Greta Colliery. Farley. Bottom Seam. Sample from face of No. 3 bord, No. 2 south jig.	Roof, conglomerate. Coal ... ... ft. 0 in. 4 Band ... ... 0 1 Coal ... ... 4 4 Inferior coal ... 0 3 5 0 Floor, clay.	1·90	38·14	51·62	8·34	0·809	1·339	59·96	12·8	Bands picked out; coke slightly swollen, firm and lustrous; ash, light grey in colour, semi-granular.
South Greta Colliery. Farley. Bottom Seam— Sample from No. 4 bord, No. 2 north jig.	Roof, conglomerate. Coal ... ... ft. 0 in. 6 Band ... ... 0 0½ Coal ... ... 3 6 Inferior coal ... 0 2 4 2½ Floor, hard stone.	1·07	39·38	49·73	8·92	0·961	1·333	58·65	12·8	Bands picked out; coke, slightly swollen, firm and lustrous; ash, grey in colour, granular.
Stanford-Merthyr Colliery. Bottom Seam— Sample from No. 3 bord, Maitland jig, No. 2 north level.	Conglomerate roof. Coal ... ... ft. 23 in. 3 Sandstone floor.	2·38	41·01	51·70	4·91	1·159	1·282	56·61	13·3	Coke, slightly swollen, firm and lustrous; ash, buff-coloured, semi-granular.

Proximate Analyses of Samples of Coal—**Lower or Greta Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of fuel.	Remarks.
Stanford-Werthyr Colliery. Bottom Seam— Sample from No. 9 bord, Blue Bell jig, No. 2 south level.	Conglomerate roof. ft. in. Coal ... ... 10 4 — Dirt ... ... 12 0 Coal ... ... 5 0 Sandstone floor.	2·29	40·80	52·66	4·25	1·076	1·271	56·91	13·3	Coke, slightly swollen, firm and lustrous; ash, buff-coloured, floccu-lent.
	(Not worked here.)									
Stanford-Merthyr Colliery. Bottom Seam— Sample from lower portion of seam under Port Arthur jig.	Conglomerate roof. ft. in. Coal ... ... 10 4½ Conglomerate ... 16 0 Coal ... ... 4 8½ — Sandstone floor.	2·61	38·79	51·10	7·50	1·194	1·307	58·60	12·8	Coke, slightly swollen, firm and lustrous; ash, buff-coloured, semi-granular.
West Greta Colliery, near Farley. Bottom Seam.	Roof, conglomerate. ft. in. Coal and bands ... 0 6 Coal ... ... 2 11 — 3 5 Floor, hard clay.	1·88	40·28	49·14	8·70	0·793	1·340	57·84	12·7	Coke, slightly swollen, firm and lustrous: ash, light grey, granular.

Proximate Analyses of Samples of Coal—**Lower or Greta Coal Measures, Northern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Whitburn Colliery, Greta. Top Seam— Sample from No. 2 level north.	Coal roof. Black stone ... ... ft. 0 in. 4 Coal ... ... 2 9 Inferior coal ... 0 6 Coal ... ... 0 5 Shale ... ... 0 2 Coal ... ... 0 4 Band ... ... 0 0½ Coal ... ... 3 4 7 10½ Shale floor.	1·77	42·61	49·14	6·48	0·247	1·275	55·62	13·4	Bands picked out; coke, well swollen, firm and fairly lustrous; ash, reddish tinge, semi-granular.
Whitburn Colliery, Greta. Top Seam— Sample from No. 4 south level.	Coal roof. Coal ... ... ft. 2 in. 5 Band ... ... 0 3 Inferior coal ... 0 6 Coal ... ... 0 6 Band ... ... 0 1½ Coal ... ... 3 6 7 3½ Shale floor.	1·95	42·20	49·87	5·98	0·302	1·293	55·85	13·3	Bands picked out; coke, well swollen, firm and fairly lustrous; ash, slight reddish tinge, semi-granular.

Proximate Analyses of Twenty-five Samples of Coal from the **Upper Coal Measures, Western Coalfield.**

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water converted into steam by 1 lb. of the coal.	Remarks.
Commonwealth Colliery, Lidsdale. Lithgow Seam— Sample taken at face of innermost place to left of main tunnel.	Roof, coal and bands. ft. in. Coal ... ... 1 2½ Band ... ... 0 to 1 Coal ... ... 2 6½ 3 9 Shale floor.	2·07	29·23	54·07	13·73	0·315	1·403	67·80	11·7	Coke, slightly swollen, brittle, dull lustre; ash, grey in colour, semi-flocculent.
Folly Colliery, Lidsdale. Lithgow Seam— Sample from face of innermost place to right of main tunnel	Roof, coal and bands. ft. in. Coal ... ... 1 5½ Band ... ... 0 to 1 Coal ... ... 2 9½ 4 3 Shale floor.	2·96	28·78	54·86	13·40	0·384	1·388	68·26	11·6	Coke, fairly swollen, firm, dull lustre; ash, white flocculent.
Great Cobar Colliery, Eskbank. Lithgow Seam— Sample from No. 16 heading, off main tunnel.	Roof, sandstone. ft. in. Coal ... ... 0 10 Band ... ... 0 3 Coal ... ... 1 8 Band ... ... 0 1 Coal ... ... 0 9 Band ... ... 0 2 Coal ... ... 0 10 Band 0 3	1·92	30·24	54·64	13·20	0·864	1·397	...	11·4	Bands picked out; no true coke formed, only a dull compact cake; ash, light grey in colour, semi-granular.
Sample from cut-through between Nos. 17 and 18 headings off main tunnel.	Coal ... ... 2 0½ Band ... ... 0 0½ Coal ... ... 2 8½ Band ... ... 0 0½ Coal ... ... 0 4 10 0½ Floor—splint 1 foot, then sandstone.	1·89	31·87	54·02	12·22	1·156	1·366	...	11·9	Bands picked out; no true coke formed, but a compact mistrous cake left; ash, light grey in colour, semi-granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Western Coalfields**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	lb. of water converted into steam by 1 lb. of the	Remarks.
Great Western Colliery, Cullen Bullen. Lithgow Seam— Sample from about 75 yards from tunnel mouth.	Roof, shale with coal above. Splint coal ... ... 1 5 Clay band ... ... 0 3 Splint coal ... ... 0 7 Coal and bands ... 0 2½ Coal ... ... 0 7 Band ... ... 0 2 Coal ... ... 2 4 Band ... ... 0 0½ Coal ... ... 1 7 7 1½ Floor, sandstone.	1·63	32·42	51·34	14·61	0·686	1·392	65·95	11·5	Bands picked out; coke, very little swollen, firm, dull lustre; ash, grey, flocculent.
Invincible Colliery. Cullen Bullen. Lithgow Seam— Sample from about middle of Pike's longwall, about 6 chains from face of main tunnel.	Roof, coal and bands. Coal ... ... 2 7 Clay band ... ... 0 to 1 Coal ... ... 2 3 4 10 Shale floor.	2·39	34·79	51·39	11·43	0·329	1·347	62·82	12·2	Coke, fairly swollen, firm, dull lustre; ash, white flocculent.
Invincible Colliery, Cullen Bullen. Lithgow Seam— Sample taken about the middle of Mirrell's longwall face.	Roof, coal and bands. Coal ... ... 2 8 Band ... ... 0 to 1 Coal ... ... 2 4 5 0 Floor, shale.	1·93	33·42	51·44	13·21	0·801	1·357	...	11·8	No true coke formed; ash, almost white, granular.

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal	Remarks.
Irondale Colliery, Piper's Flat. Lithgow Seam— Sample from main drive, about 33 chains from tunnel mouth.	Roof, sandstone and conglomerate. ft. in. Coal ... ... 1 3 Coal and bands ... 0 2½ Coal ... ... 2 1 Clay band ... ... 0 0½ Coal ... ... 1 0 Clay band ... ... 0 0½ Coal ... ... 0 10 Band ... ... 0 0½ Coal ... ... 1 2 6 7½ Floor, sandstone.	2·53	33·68	48·65	15·14	0·672	1·395	63·79	11·2	Bands picked out; coke, fairly swollen, firm, dull lustre; ash, grey, flocculent.
Ironworks Colliery, Eskbank. Lithgow Seam— Sample from face of back heading to pump heading.	Roof, coal and bands. ft. in. Coal ... ... 2 11 Band ... ... 0 to 0½ Coal ... ... 2 0½ Band ... ... 0 0½ Coal ... ... 0 3½ 5 4 Floor, splint and then shale.	1·65	33·06	53·66	11·63	0·821	1·361	...	12·7	Bands picked out; no true coke formed; ash, light grey in colour, semi-granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Western Coalfields**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of fuel.	Remarks.
Ivanhoe Colliery, Portland. Lithgow Seam— Sample from main drive, 41 chains from tunnel mouth.	Roof, sandstone. ft. in. Coal ... ... 0 3½ Clay band ... ... 0 2½ Coal ... ... 2 0 Band ... ... 0 0½ Coal ... ... 1 0½ Band ... ... 0 0½ Coal ... ... 2 0½ — 5 7½ Floor, sandstone.	2·02	30·36	55·84	11·78	0·453	1·401	...	11·5	Bands picked out; no true coke formed; ash, white, semi-granular.
Ivanhoe Colliery, Portland. Lithgow Seam— Sample from No. 1 right heading, 26 chains along main drive from the tunnel mouth, then 22 chains from main drive.	Roof, sandstone. ft. in. Coal ... ... 1 7½ Clay band ... ... 0 2½ Coal ... ... 2 2 Band ... ... 0 0½ Coal ... ... 0 8 Band ... ... 0 0½ Coal ... ... 0 10 Band ... ... 0 1½ Coal ... ... 2 0 — 7 8½ Floor, sandstone.	1·87	28·92	51·54	17·87	0·535	1·442	...	10·8	Bands picked out; no true coke formed; ash, white, granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Western Coalfields**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Main Range (Household Coal) Colliery, Piper's Flat. Lithgow Seam— Sample from main drive, 13 chains from tunnel mouth.	Roof, grey shale. ft. in. Splint coal ... ... 0 10 Coal ... ... 3 10½ 4 8½ Floor, shale.	1·91	33·51	51·03	13·55	0·837	1·390	64·58	11·5	Coke, fairly swollen, brittle, dull lustre; ash, grey, semi-granular.
Main Range (Household Coal) Colliery, Piper's Flat. Lithgow Seam— Sample from 9½ chains along main drive, then 3 chains N. 62° W.	Roof, grey shale. ft. in. Splint coal ... ... 0 9 Coal ... ... 4 0½ 4 9½ Floor, shale.	1·69	36·16	49·93	12·22	0·920	1·358	62·15	11·7	Coke, fairly swollen brittle, dull lustre; ash, grey, semi-granular.
Main Range (Steam Coal) Colliery, Piper's Flat. Lithgow Seam— Sample from 4½ chains along main drive from tunnel mouth, then 1 chain west.	Roof, sandstone. ft. in. Coal ... ... 0 8½ Coal and bands ... 0 2½ Coal ... ... 0 8 Clay band ... ... 0 2 Coal ... ... 2 3½ Band ... ... 0 0½ Coal ... ... 1 9 5 9½ Floor, sandstone.	1·79	32·96	49·34	15·91	0·727	1·405	65·25	11·2	Bands picked out; coke, fairly swollen, firm, dull lustre; ash, grey, flocculent.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Western Coalfields**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	**Remarks.**
Methven Colliery, Lithgow. Lithgow Seam— Sample from right rib, near face of main tunnel.	Roof, coal and bands. Coal ... ... 1 4 Band ... ... 0 0½ Coal ... ... 2 6 Band ... ... 0 0½ Coal ... ... 0 4 Band ... ... 0 0½ Coal ... ... 0 3½ 4 6½ Floor—splint coal, 6 inches, then sandstone.	2·89	27·35	55·87	13·89	0·582	1·425	...	11·9	Bands picked out; no true coke formed; ash, light grey, granular.
Oakey Park Colliery, Lithgow. Lithgow Seam— Sample from Bennett's place, first right, No. 2 district.	Roof, coal and bands. Coal ... ... 2 5½ Band ... ... 0 0½ Coal ... ... 2 6 Band ... ... 0 0½ Coal ... ... 0 4½ 5 5 Floor—coal and bands, 1 foot, then sandstone.	1·71	34·78	52·13	11·38	0·672	1·347	63·51	12·4	Bands picked out; coke, well swollen, firm, fair lustre; ash, grey, flocculent.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Western Coalfields**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water condensed by 1 lb. of steam by 1 lb. of the coal.	Remarks.
Cakey Park Colliery, Lithgow. Lithgow Seam— Sample from No. 26 bord, to left of main heading, No. 2 district.	Roof, coal and bands. ft. in. Coal ... ... 2 6 Band ... ... 0 0½ Coal ... ... 2 8½ Band ... ... 0 0½ Coal ... ... 0 4 — 5 7½ Floor—coal and bands, 10 inches, then sandstone.	1·79	34·17	52·30	11·74	0·645	1·348	64·04	12·4	Bands picked out; coke, well swollen, firm and lustrous; ash, dark grey, granular.
Portland Colliery, Cullen Bullen. Lithgow Seam— Sample from main drive, 22 chains from tunnel mouth.	Roof, sandstone. ft. in. Coal ... ... 1 11½ Clay band ... ... 0 0½ Coal ... ... 0 9½ Coal and bands ... 0 1½ Coal ... ... 0 8½ Coal and bands ... 0 2½ Coal ... ... 2 3 — 6 1 Floor, sandstone.	1·83	30·58	56·88	10·71	0·590	1·400	...	11·8	Bands picked out; no true coke formed; ash, white, semi-granular.
Portland Colliery, Cullen Bullen. Lithgow Seam— Sample from bord on the right of the main drive, 20 chains from tunnel mouth.	Roof, sandstone. ft. in. Coal ... ... 1 10 Clay band ... ... 0 0½ Coal ... ... 0 10 Band ... ... 0 1 Coal ... ... 0 9 Coal and bands ... 0 2½ Coal ... ... 1 11 — 5 8 Floor, sandstone.	1·85	30·23	56·33	11·59	0·603	1·404	...	11·9	Bands picked out; no true coke formed; ash, white, semi-granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Western Coalfields**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscop. Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Torbane Colliery, Torbane. Lithgow Seam—Sample from face of No. 8 heading.	Roof, coal and bands. ft. in. Coal ... ... 2 7 Band ... ... 0 0½ Coal ... ... 0 3½ 2 11 Floor—fireclay, 2 inches, then shale.	2·94	31·02	55·99	10·05	0·540	1·370	...	12·1	Bands picked out; true coke formed; ash light grey, granular.
Vale of Clwydd Colliery, Lithgow. Lithgow Seam—Sample from face of Stone's bord, No. 2 section, No. 1 district.	Roof—coal and bands, 4 ft. 6. in ft. in. Coal ... ... 2 4 Band ... ... 0 0½ Coal ... ... 2 11½ Band ... ... 0 0½ Coal ... ... 0 5½ 5 10 Floor—splinty coal, 1 foot.	1·42	34·58	52·15	11·85	0·750	1·343	64·00	12·5	Coke, fairly swollen, with cauliflower-like excrescences, firm and lustrous; ash, grey in colour, semi-granular.
Vale of Clwydd Colliery, Lithgow. Lithgow Seam—Sample from end of pillar in first right heading off No. 4 main heading.	Roof, coal and bands. ft. in. Coal ... ... 5 8 Floor—splint coal, 1 foot, then sandstone.	1·80	34·38	52·74	11·08	0·824	1·364	63·82	12·5	Coke, slightly swollen, firm and lustrous; ash, grey in colour, granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Western Coalfields**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Wolgan No. 1 Colliery, Newnes. Seam about 200 feet above the Lithgow Seam— Sample from face of No. 4 slope.	Roof, shale. ft. in. Coal ... ... 2 3½ Parting ... ... Coal ... ... 0 5½ 2 9 Floor, coal and bands.	1·62	36·54	55·50	6·34	0·738	1·295	61·84	13·3	Coke, slightly swollen, firm and semi-lustrous; ash, light grey in colour, flocculent.
Zig Zag Colliery, Eskbank. Lithgow Seam— Sample from face of Usher and Humphrey's place, No. 1 district.	Roof, coal and bands. ft. in. Coal ... ... 2 1½ Band ... ... 0 0½ Coal ... ... 3 0 Band ... ... 0 0½ Coal ... ... 0 9½ Band ... ... 0 0½ Coal ... ... 0 5½ 6 6 Floor, sandstone.	2·15	31·96	51·86	14·03	0·658	1·347	65·89	12·0	Bands picked out; coke, slightly swollen, firm, fair lustre; ash, grey, semi-granular.
Zig Zag Colliery, Eskbank. Lithgow Seam— Sample from face of Thompson's place, air-shaft district.	Roof, coal and bands. ft. in. Coal ... ... 2 0½ Band ... ... 0 0½ Coal ... ... 3 2 Band ... ... 0 0½ Coal ... ... 0 8½ 6 0 Floor, sandstone.	2·16	32·63	53·43	11·78	0·691	1·361	...	12·3	Bands picked out; no true coke formed; ash, light grey, granular.

Proximate Analyses of Thirty-five Samples of Coal from the **Upper Coal Measures, Southern Coalfield.**

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Bellambi Colliery, Bellambi. Bulli Seam— Sample from face of main heading, No. 2 district.	Roof, shale.	ft. in.	0·73	23·93	64·28	11·06	0·554	1·390	75·34	12·7	Coke, fairly swollen, firm and lustrous; ash, almost white, semi-granular.
	Spar	0 4									
	Coal	8 6 =									
		8 10									
	Floor, shale.										
Bulli Colliery, Bulli. Top or Bulli Seam— Sample taken at working face of a pillar, No. 1 heading, Robinson's district.	Roof, shale.	ft. in.	0·97	24·23	61·90	12·90	0·424	1·429	74·80	12·6	Coke, well swollen, firm and lustrous; ash, light grey, granular.
	Coal	7 9 =									
	Splint	0 3									
		8 0									
Bulli Colliery. Top or Bulli Seam— Sample taken from near face of right back heading, Western district, just through troubled country.	Roof, shale.	ft. in.	0·57	24·30	64·61	10·52	0·369	1·400	75·13	13·0	Coke, fairly swollen, firm and lustrous; ash, reddish tinge, granular.
	Spar	0 4									
	Coal	6 0 =									
		6 4									

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Southern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water evaporated from and at 212° by 1 lb. of the coal.	Remarks.
Bulli Colliery, Bulli. Four-feet Seam—	Roof, sandstone.	ft. in.									
Sample taken in Salisbury's cut-through.	Coal	1 3	1·07	21·46	65·71	11·76	0·413	1·432	77·47	12·7	Coke, slightly swollen, firm, dull lustre; ash, light grey, granular.
	Band	0 1									
	Coal	2 8									
	Splint	0 8									
		4 8									
Bulli No. 4 Tunnel Colliery. Bulli. Four-feet Seam—	Roof, sandstone.	ft. in.									
Sample from face of Mordue's bord.	Coal	2 0½	0·42	22·67	63·72	13·19	0·384	1·422	76·91	12·2	Band picked out; coke, slightly swollen, firm and lustrous; ash, grey, granular.
	Band	0 1									
	Coal	1 8½									
	Splint	0 6									
		4 4									
	Floor, shale.										
Coal Cliff Colliery, Top or Bulli Seam—	Roof, sandstone.	ft. in.									
Sample taken in pump heading, West district (Jetty).	Spar	0 1	0·57	22·93	62·55	13·95	0·328	1·391	76·50	13·4	Coke, slightly swollen, firm and lustrous; ash, light grey, granular.
	Coal	5 6 =									
		5 7									
Coal Cliff Colliery, Bulli Seam—	Roof, sandstone.	ft. in.									
Sample taken in right back heading, west drive over stone drift (shaft).	Spar	0 3	0·85	22·00	65·37	11·78	0·341	1·394	77·15	13·4	Coke, fairly swollen, firm and lustrous; ash, light grey, granular.
	Coal	5 1 =									
		5 4									

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Southern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water converted into steam by 1 lb. of the coal.	Remarks.
Collins' Colliery, near Exeter.	ft. in. Coal ... ... 0 9½ Band ... ... 0 4½ Coal ... ... 1 6 Splint and bands ... 2 0 Coal ... ... 0 4 Splint ... ... 0 1 Coal ... ... 0 3½ Splint ... ... 0 10½ Coal ... ... 1 5 Splint and bands ... 0 9 Coal ... ... 0 8 Splint ... ... 0 3 Coal ... ... 0 3 Band ... ... 0 4 Coal ... ... 0 7 Floor, splint and bands.	1·36	28·80	50·56	19·28	0·903	1·452	69·84	11·0	Band picked out; coke, slightly swollen, firm and lustrous; ash, white, semi-granular.
		1·24	30·08	50·28	18·40	0·922	1·390	**68·68**	11·2	Bands picked out; coke, slightly swollen, firm and lustrous; ash, white, semi-granular.
Corrimal-Balgownie Colliery, Corrimal. Top or Bulli Seam— Sample from Egan and Son's place, No. 8 right heading.	Roof, shale. ft. in. Spar ... ... 0 4½ Coal ... ... 7 7 = 7 11½ Floor, shale.	0·60	24·83	64·79	9·78	0·409	1·368	74·57	12·8	Coke, slightly swollen, firm and lustrous; ash, light grey, semi-granular.
Corrimal-Balgownie Colliery— Sample from face of back heading, No. 1 West Extended.	Roof, shale. ft. in. Spar ... ... 0 4 Coal ... ... 7 10 = 8 2 Floor, shale.	0·61	23·67	66·90	8·82	0·455	1·370	75·72	12·9	Coke, slightly swollen, firm and lustrous; ash, light grey, semi-granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Southern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Excelsior Colliery, Thirroul. Bulli Seam— Sample from face of Hamilton's heading, to left of main tunnel.	Roof, shale.	ft. in.	0·63	18·77	71·05	9·55	0·660	1·395	80·60	12·9	Coke, very little swollen, firm and lustrous; ash, nearly white, granular.
	Coal	5 2½									
	Floor—cinder coal, 9 inches, then shale.										
Metropolitan Colliery, Helensburgh. Bulli Seam— Sample from face of No. 11 East main heading.	Roof shale.	ft. in.	0·42	19·36	69·43	10·79	0·329	1·401	...	12·4	No true coke formed; a compact dull cake left on applying the coking test; ash, light buff colour, semi-granular.
	Spar	0 2									
	Coal	6 7									
	Band	0 1									
	Coal	2 0									
	Band	0 1									
	Coal	2 0									
		10 11									
	Floor, shale.										
Metropolitan Colliery, Helensburgh. Bulli Seam— Sample from face of Sherrack and Dawkin's place, Commonwealth district.	Roof, shale.	ft. in.	0·61	18·53	68·92	11·94	0·343	1·410	80·86	12·21	Coke, fairly swollen, firm, dull lustre; ash, buff-coloured, semi-granular.
	Spar	0 10									
	Band	0 1									
	Coal	6 0									
	Band	0 1									
	Coal	2 0									
	Band	0 1									
	Coal	2 0									
		11 1									
	Floor, shale.										

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Southern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of fuel.	Remarks.
Mount Kembla Colliery, near Wollongong. Bulli Seam— Sample from face of No. 1 right main heading.	Roof, shale. ft. in. Spar ... ... 0 4 Coal ... ... 6 9 = 7 1 Floor, shale.	0·82	25·00	63·33	10·85	0·453	1·395	74·18	12·9	Coke, slightly swollen, firm and lustrous; ash, light grey in colour, granular.
Mount Kembla Colliery, near Wollongong. Top or Bulli Seam— Sample from face of No. 7 right heading, shaft district.	Roof, shale. ft. in. Coal ... ... 5 5 Floor, shale.	0·75	23·85	65·10	10·32	0·450	1·393	75·42	12·8	Coke, slightly swollen, firm and lustrous; ash, light grey, semi-granular.
Mount Pleasant Colliery, Top or Bulli Seam— Sample from face of main rope-road heading.	Roof, shale. ft. in. Spar ... ... 0 6 Coal ... ... 7 6 = 8 0 Floor, shale.	0·67	24·66	64·41	10·26	0·436	1·376	74·67	12·5	Coke, fairly swollen, firm and lustrous; ash, pink, semi-granular.

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Southern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Mount Pleasant Colliery, Top or Bulli Seam— Sample from near face of back heading, No. 1 cross-cut.	Roof, shale. ft. in. Spar ... ... 0 4 Coal ... ... 8 1 = 8 5 Floor, shale.	0·84	23·79	61·61	13·76	0·439	1·379	75·37	12·6	Coke, fairly swollen, firm and lustrous; ash, almost white, granular.
North Bulli Colliery, Coledale. Bulli Seam— Sample from a face of first right cross-cut off No. 17, left heading below the down-throw (150 feet) fault.	Roof, shale. ft. in. Spar ... ... 0 3 Coal ... ... 5 0 5 3 Floor, shale.	0·83	22·79	63·97	12·41	0·519	1·403	76·38	12·7	Coke, fairly swollen, firm and lustrous; ash, light grey in colour, semi-granular.
North Bulli Colliery, Coledale. Bulli Seam— Sample from face of 7th left, off No. 18 right heading.	Roof, sandstone. ft. in. Spar ... ... 0 2 Coal ... ... 3 11½ = 4 1½ Splint ... ... 0 1½ 4 3 Floor, shale.	0·43	24·22	62·98	12·37	0·398	1·415	75·35	12·4	Coke, slightly swollen, firm and lustrous; ash, light grey, granular.

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal	Remarks.
Osborne-Wallsend Colliery, near Wollongong. Top or Bulli Seam— Sample from face of 2nd right heading, off No. 3 right heading, over down-throw fault.	Roof, shale.	ft. in.	0·67	24·97	64·48	9·88	0·477	1·383	74·36	13·2	Coke, slightly swollen, firm and lustrous; ash, nearly white, semi-granular.
	Shale band	0 1									
	Coal	7 9½									
		7 10½									
	Floor, shale.										
Osborne-Wallsend Colliery, near Wollongong. Bulli Seam— Sample from face of main No. 5 left heading.	Roof, shale.	ft. in.	0·60	24·84	64·18	10·38	0·508	1·398	74·56	12·6	Coke, slightly swollen, firm and lustrous; ash, light grey in colour, semi-granular.
	Spar	0 2									
	Coal	7 0 =									
		7 2									
	Floor, shale.										
Cwen's Balgownie Colliery, Balgownie. Four-feet Seam— Sample from shaft drive, 5½ chains from tunnel mouth.	Roof, sandstone.	ft. in.	0·93	23·61	62·85	12·61	0·549	1·433	75·46	12·4	Bands picked out; coke, well swollen, firm and fairly lustrous; ash, grey, semi-granular.
	Coal	0 6½									
	Clay band	0 0½									
	Coal	3 0									
	Pyritous coal ...	0 6									
		4 1½									
	Floor, clay shale.										

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Southern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water converted into steam by 1 lb. of the coal.	Remarks.
Owen's Balgownie Colliery Balgownie. Four-feet Seam—	Roof, sandstone.	ft. in.									
Sample from old main drive, 100 yards from tunnel mouth.	Coal	0 6	0·86	24·71	63·03	11·40	0·645	1·409	74·43	12·7	Bands picked out; coke, well swollen, firm and fairly lustrous; ash, reddish tinge, semi-granular.
	Clay band	0 0½									
	Coal	2 10									
	Pyritous coal ...	0 5									
		3 9½									
	Floor, fireclay.										
South Bulli Colliery, near Bulli, Top or Bulli Seam—	Roof, shale.	ft. in.									
Sample from the up-throw side of the 67-feet fault in Hansen's heading to the left of the main west tunnel.	Spar-coal and bands	0 2	0·77	25·41	64·38	9·44	0·388	1·372	73·82	13·5	Coke, fairly swollen, firm and lustrous; ash, light grey, semi-granular.
	Coal	7 6									
		7 8									
	Floor, shale.										
South Bulli Colliery—	Roof, shale.	ft. in.									
Sample taken in Williams and Son's bord, right side of north-west heading, west tunnel.	Spar	0 6½	0·46	24·64	66·07	8·83	0·501	1·371	74·90	13·3	Coke, fairly swollen, firm and lustrous; ash, light grey, semi-granular.
	Coal	7 7½									
		8 2									
	Floor, shale.										

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Southern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lb. of water consumed in evaporating from and at 212° by 1 lb. of the coal.	Remarks.
South Bulli Colliery— Sample taken in Hill and Son's bord, No. 6 north heading, north-west tunnel.	Roof, shale.	ft. in.	0·78	24·55	65·29	9·38	0·517	1·392	74·67	13·3	Coke, fairly swollen, firm and lustrous; ash, light grey, semi-granular.
	Spar	0 7									
	Coal	9 0									
		9 7									
	Floor, shale.										
South Clifton Colliery. Scarborough. Bulli Seam— Sample from "A" heading, about 3 chains from "D" heading.	Roof, sandstone.	ft. in.	0·62	21·75	65·99	11·64	0·329	1·427	77·63	12·3	Coke, slightly swollen, firm and fairly lustrous; ash, light grey, granular.
	Spar	0 1									
	Coal	5 0									
		5 1									
	Floor, shale.										
South Clifton Colliery. Bulli Seam— Sample from face of No. 10 heading off first right flat, off No. 8 rope road.	Roof, shale.	ft. in.	0·69	22·02	65·61	11·68	0·466	1·384	77·29	12·8	Coke, slightly swollen, firm and lustrous; ash, light grey in colour, semi-granular.
	Coal	5 7									
	Floor, shale.										
South Clifton Tunnel Colliery, Clifton. Bulli Seam— Sample from No. 2 cross-cut to left of No. 2 tunnel.	Roof, conglomerate.	ft. in.	0·86	23·33	63·52	12·29	0·447	1·379	75·81	12·7	Coke, slightly swollen, firm and lustrous; ash, slight reddish tinge, granular.
	Coal	3 10									
	Floor, shale.										

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Southern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.		Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water converted into steam by 1 lb. of the coal	Remarks.
South Clifton Tunnel Colliery. Bulli Seam— Sample from face of No. 2 tunnel.	Roof, sandstone.	ft. in.									
	Spar	0 3									
	Coal	4 4	0·58	24·43	64·11	10·88	0·464	1·368	74·99	12·7	Coke, slightly swollen, firm and lustrous; ash, nearly white, semi-granular.
		4 7									
	Floor, shaly sandstone.										
Sydney Harbour Colliery. Balmain. Bulli Seam— Sample from the south end of the east face.	Roof, shale.	ft. in.									
	Coal	3 2									
	Band	0 3	0·30	19·82	69·93	9·95	0·260	1·360	79·88	12·7	Band picked out; coke fairly swollen, firm and fairly lustrous; ash, buff-coloured, semi-granular.
	Coal	2 4									
		5 9									
	Floor, shale.										
Sydney Harbour Colliery. Balmain. Bulli Seam Sample from the north end of the east face.	Roof, shale.	ft. in.									
	Coal	5 5½	0·35	19·25	70·17	10·23	0·230	1·359	80·40	12·7	Coke, fairly swollen, firm and fairly lustrous ash, buff coloured, semi-granular.
	Floor, shale.										

Proximate Analyses of Samples of Coal—**Upper Coal Measures, Southern Coalfield**—*continued.*

Name of Colliery, Locality, &c.	Section of Seam.	Hygroscopic Moisture.	Volatile Hydrocarbons.	Fixed Carbon.	Ash.	Sulphur.	Specific Gravity.	Coke.	Lbs. of water converted into steam by 1 lb. of the coal.	Remarks.
Wongawilli Prospecting Operations, south-west of Mount Kembla. Third or Dirty Seam— Sample from the main tunnel, 85 yards from mouth.	Roof, carbonaceous clay band. ft. in. Coal ... ... 0 9 Band ... ... 0 0½ Coal ... ... 1 0½ Band ... ... 0 0½ Coal and partings ... 0 8 *Band ... ... 0 0½ *Friable coal ... ... 0 3 *Band ... ... 0 0½ Coal ... ... 0 10½ *Band ... ... 0 0½ Coal ... ... 0 8½ Band ... ... 0 0½ Coal ... ... 0 2½ Band ... ... 0 0½ Coal ... ... 0 3 Band ... ... 0 0½ Coal and partings ... 2 8½ 7 7 Floor, coal and bands.	0·70	26·33	57·73	15·24	0·542	1·487	78·97	12·6	*Picked out. Coke, well swollen, firm and lustrous.
Wongawilli Prospecting Operations, Third or Dirty Seam— Sample from cut-through 15 yards off main tunnel, 85 yards from mouth. (The site from which this sample was taken was only 15 yards from the site of the one described above.)	Roof, band of clay shale. ft. in. Coal ... ... 1 2 Band ... ... 0 0½ Coal ... ... 0 5½ Band ... ... 0 0½ Coal and partings ... 2 5½ 4 1 Floor, coal and bands.	0·55	28·20	60·51	10·74	0·616	1·426	71·25	13·2	Coke, well swollen, firm and lustrous.

The following Statement shows the quantity and value of coal raised from the opening of the coal-seams to 1857, inclusive :—

Year.	Quantity.	Average per ton.	Value.
	tons.	£ s. d.	£
Prior to 1829	50,000	0 10 0·00	25,000
1829	780	0 10 1·23	394
1830	4,000	0 9 0·00	1,800
1831	5,000	0 8 0·00	2,000
1832	7,143	0 7 0·00	2,500
1833	6,812	0 7 6·73	2,575
1834	8,490	0 8 10·00	3,750
1835	12,392	0 8 10·19	5,483
1836	12,646	0 9 1·06	5,747
1837	16,083	0 9 8·81	7,828
1838	17,220	0 9 9·05	8,399
1839	21,283	0 9 9·73	10,441
1840	30,256	0 10 10·86	16,498
1841	34,841	0 12 0·00	20,905
1842	39,900	0 12 0·00	23,940
1843	25,862	0 12 6·54	16,222
1844	23,118	0 10 8·34	12,363
1845	22,324	0 7 10·27	8,769
1846	38,965	0 7 0·46	13,714
1847	40,732	0 6 9·01	13,750
1848	45,447	0 6 3·38	14,275
1849	48,516	0 6 0·45	14,647
1850	71,216	0 6 6·77	23,375
1851	67,610	0 7 6·51	25,546
1852	67,404	0 10 11·33	36,885
1853	96,809	0 16 1·51	78,059
1854	116,642	1 0 5·63	119,380
1855	137,076	0 12 11·96	89,082
1856	189,960	0 12 4·06	117,906
1857	210,434	0 14 0·97	148,158
	1,468,961	0 11 10·04	869,391

The following Table shows the quantities and average value per ton of coal exported to Australasian and other ports respectively, the quantity of coal consumed in this State, and the average price per ton of the total output of the collieries, from the opening of the coal-seams to 1911 inclusive :—

Year.	Exports to Australasian Ports.			Exports to Other Ports.			Total Exports.			Home consumption.	Total Output and Value.		
	Quantity.	Average per ton.	Value. (a)	Quantity.	Average per ton.	Value. (a)	Quantity	Average per ton.	Value. (a)	Quantity.	Average per ton.	Value. (b)	
To end of—	tons.	s. d.	£	tons.	£ s. d.	£	tons.	s. d.	£	tons.	s. d.	£ s. d.	
1857*	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,468,961†	1,468,961	11 10·04	869,391 0 0
1858	101,488	15 1·67	76,824	12,039	1 0 1·85	12,132	113,527	15 8·05	89,956	102,870	216,397	14 11·84	162,162 0 0
1859	129,586	14 6·67	94,312	44,349	0 17 5·27	38,672	173,935	15 3·49	132,984	134,278	308,213	13 3·14	204,371 0 0
1860	140,183	14 10·85	104,471	93,694	0 16 11·10	79,290	233,877	15 8·57	183,761	134,985	368,862	12 3·36	226,493 0 0
1861	157,278	15 2·25	119,433	50,502	0 16 5·37	41,532	207,780	15 5·92	160,965	134,287	342,067	12 9·52	218,820 0 0
1862	195,427	15 0·55	147,019	113,355	0 17 4·34	98,403	308,782	15 10·75	245,422	167,740	476,522	12 9·73	305,234 0 0
1863	213,909	13 8·40	146,532	84,129	0 17 6·10	73 649	298,038	14 9·30	220,181	135,451	433,489	10 10·66	236,230 0 0
1864	283,539	10 3·74	146,199	88,927	0 14 10·90	66,289	372,466	11 4·91	212,488	176,546	549,012	9 10·10	270,171 0 0
1865	292,664	9 11·83	146,129	90,304	0 15 0·79	68,029	382,968	11 2·20	214,158	202,557	585,525	9 4·43	274,303 0 0
1866	344,194	9 2·98	159,175	196,711	0 14 4·53	141,413	540,905	11 1·37	300,588	233,333	774,238	8 4·44	324,049 0 0
1867	312,101	9 4·35	146,111	161,256	0 13 3·47	107,148	473,357	10 8·40	253,259	296,655	770,012	8 10·79	342,655 0 0
1868	329,052	9 5·76	155,975	218,984	0 12 5·29	136,226	548,036	10 7·06	292,201	496,195	954,231	8 9·08	417,809 0 0
1869	340,466	8 9·07	149,059	255,087	0 11 8·31	149,136	595,553	10 0·16	298,195	324,221	919,774	7 6·32	346,146 0 0
1870	335,564	8 6·02	142,656	242,825	0 10 3·57	125,025	578,389	9 3·07	267,681	290,175	868,564	7 3·54	316,836 0 0
1871	378,891	8 6·91	162,470	186,538	0 10 1·22	94,220	565,429	9 0·95	256,690	333,355	898,784	7 0·47	316,340 0 0
1872	394,052	8 8·11	170,947	275,068	0 9 11·46	136,914	669,110	9 2·42	307,861	343,316	1,012,426	7 9·92	396,198 0 0
1873	425,937	12 9·32	272,110	347,142	0 14 7·59	253,979	773,079	13 7·32	526,089	419,783	1,192,862	11 1·94	695,747 0 0
1874	467,538	13 8·11	320,119	405,442	0 15 4·76	312,128	872,980	14 5·32	632,247	431,632	1,304,612	12 1·37	790 224 0 0
1875	518,858	13 7·77	354,074	408,154	0 15 6·64	317,409	927,007	14 5·84	671,483	402,722	1,329,729	12 3·89	819,429 17 2
1876	542,952	13 8·45	372,045	325,865	0 15 6·45	253,166	868,817	14 4·70	625,211	451,101	1,319,918	12 2·06	803,300 5 6
1877	563,757	13 8·64	386,740	351,970	0 14 10·81	262,237	915,727	14 2·03	648,977	528,544	1,444,271	11 10·74	858,998 8 2
1878	623,323	13 8·77	427,954	383,097	0 14 7·69	280,482	1,006,420	14 0·93	708,406	569,077	1,575,497	11 8·28	920,936 7 4
1879	621,087	13 6·75	421,198	376,962	0 14 6·13	273,509	998,049	13 11·05	694,707	545,332	1,583,381	12 0·12	950,878 18 3
1880	550,672	11 2·67	309,004	202,684	0 11 5·70	116,295	753,356	11 3·48	425,299	712,824	1,466,180	8 6·36	615,336 11 7
1881	657,135	7 9·34	255,572	372,709	0 8 8·29	161,958	1,029,844	8 1·30	417,530	739,753	1,769,597	6 9·55	603,248 5 8
1882	760,226	9 9·54	372,334	501,319	0 10 11·50	274,699	1,261,545	10 3·09	647,033	847,737	2,109,282	8 11·97	948,965 0 0
1883	855,704	10 5·75	448,356	656,741	0 11 7·34	381,306	1,512,445	10 11·65	829,662	1,009,012	2,521,457	9 6·40	1,201,941 12 11
1884	994,087	10 8·66	532,938	696,676	0 11 5·14	398,107	1,690,763	11 0·15	931,045	1,058,346	2,749,109	9 5·71	1,303,076 19 11
1885	991,924	10 7·13	525,443	764,432	0 11 6·52	441,220	1,756,356	11 0·09	966,663	1,122,507	2,878,863	9 3·72	1,340,212 13 7

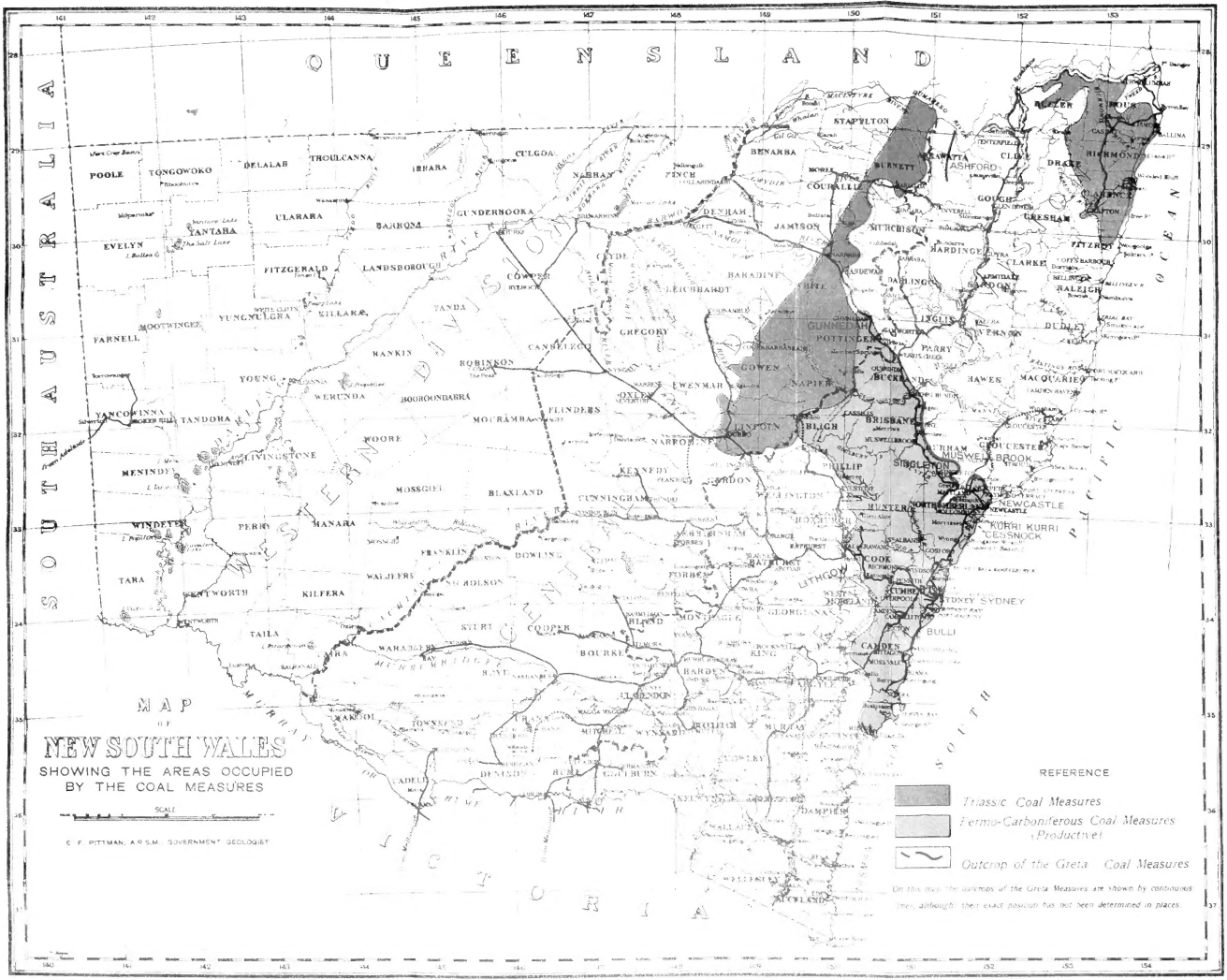
* For details see preceding table. † This item includes also all exports prior to 1858. (a) At port of shipment. (b) At the pit's mouth.

Coal exported to Australasian and other ports—*continued.*

Year.	Exports to Australasian Ports.			Exports to Other Ports.			Total Exports.			Home consumption.	Total Output and Value.		
	Quantity.	Average per ton.	Value. (a)	Quantity.	Average per ton.	Value. (a)	Quantity.	Average per ton.	Value. (a)		Quantity.	Average per ton.	Value. (b)
To end of—	tons.	s. d.	£	tons.	£ s. d.	£	tons.	s. d.	£	tons.	tons.	s. d.	£ s. d.
1886	1,027,775	10 7·22	544,824	708,090	0 11 4·31	402,178	1,735,865	10 10·93	947,002	1,094,310	2,830,175	9 2·53	1,303,164 4 1
1887	1,077,270	10 5·89	565,084	713,172	0 11 1·98	395,455	1,790,442	10 8·75	960,539	1,132,055	2,922,497	9 2·57	1,346,440 2 7
1888	1,039,764	10 10·25	564,293	884,108	0 11 3·77	500,179	1,923,872	11 0·78	1,064,472	1,279,572	3,203,444	9 1·02	1,455,198 4 1
1889	1,296,369	10 11·58	710,720	1,091,333	0 11 1·89	608,551	1,387,702	11 0·61	1,319,271	1,267,930	3,655,632	8 11·20	1,632,848 15 6
1890	1,149,544	10 6·96	608,108	672,330	0 11 3·31	379,065	1,821,874	10 10·04	987,173	1,239,002	3,060,876	8 4·29	1,579,088 19 5
1891	1,510,976	10 0·00	755,509	1,003,392	0 10 11·82	551,121	2,514,368	10 4·72	1,306,630	1,523,561	4,037,929	8 7·58	1,742,795 12 6
1892	1,318,008	8 10·89	587,016	879,697	0 10 1·24	441,379	2,191,705	9 4·61	1,028,395	1,589,263	3,780,968	7 8·82	1,462,388 9 4
1893	1,160,238	8 6·05	493,372	674,852	0 9 6·35	321,557	1,835,090	8 10·57	814,929	1,443,238	3,278,328	7 1·78	1,171,722 4 6
1894	1,171,842	7 1·74	418,654	953,283	0 8 1·21	386,115	2,125,125	7 6·88	804,769	1,546,951	3,672,076	6 3·53	1,155,573 7 10
1895	1,196,504	6 9·69	407,271	969,726	0 7 6·75	366,683	2,166,230	7 1·74	773,954	1,572,359	3,738,589	5 10·31	1,095,327 1 0
1896	1,371,796	7 0·34	482,096	1,103,111	0 7 6·38	418,168	2,474,907	7 3·30	900,264	1,434,610	3,909,517	5 9·08	1,125,280 16 7
1897	1,498,992	6 11·49	521,462	1,197,631	0 7 2·23	430,592	2,696,623	7 0·72	952,054	1,686,968	4,383,591	5 7·34	1,230,041 1 1
1898	1,629,072	6 9·19	551,083	1,162,724	0 7 0·96	411,585	2,791,796	6 10·76	962,668	1,914,455	4,706,251	5 4·86	1,271,832 11 0
1899	1,624,137	6 9·81	553,629	1,174,386	0 7 8·40	452,165	2,798,523	7 2·26	1,005,794	1,798,505	4,597,028	5 9·22	1,325,798 12 5
1900	1,978,580	7 2·92	716,585	1,390,752	0 8 0·03	556,449	3,369,332	7 6·68	1,273,034	2,138,165	5,507,497	6 0·72	1,668,911 3 7
1901	2,130,638	9 3·18	986,832	1,340,847	0 10 4·44	694,992	3,470,985	9 8·29	1,681,824	2,497,441	5,968,426	7 3·62	2,178,929 4 9
1902	1,929,604	9 7·29	926,902	1,331,855	0 10 5·87	698,478	3,261,459	9 11·60	1,625,380	2,680,552	5,942,011	7 5·13	2,206,598 8 4
1903	2,081,473	8 2·74	835,776	1,684,721	0 10 3·83	869,217	3,716,194	9 2·11	1,704,993	2,638,652	6,354,846	7 3·61	2,319,660 1 9
1904	1,880,545	8 0·31	754,616	1,292,322	0 9 8·30	626,223	3,172,867	8 8·45	1,380,839	2,846,942	6,019,809	6 7·54	1,994,951 14 0
1905	2,066,576	7 8·96	800,478	1,051,477	0 8 3·33	683,500	3,718,053	7 11·79	1,483,978	2,914,085	6,632,138	6 0·50	2,003,461 4 10
1906	2,260,090	7 9·33	878,911	2,701,456	0 8 10·76	1,201,689	4,961,540	8 4·64	2,080,600	2,664,822	7,626,362	6 1·55	2,337,226 19 5
1907	2,379,024	8 3·46	985,956	3,304,483	0 9 11·57	1,676,262	5,745,507	9 3·24	2,662,218	2,914,417	8,657,924	6 9·01	2,922,418 13 1
1908	2,715,310	8 10·54	1,205,353	3,383,366	0 10 8·80	1,815,668	6,098,676	9 10·89	3,021,021	3,048,349	9,147,025	7 3·98	3,353,093 3 0
1909	2,200,769	9 3·32	1,020,761	2,198,834	0 11 0·80	1,213,356	4,393,603	10 2·04	2,234,117	2,626,276	7,019,879	7 5·53	2,618,596 2 0
1910	2,478,497	10 1·77	1,257,485	2,211,936	0 10 10·38	1,201,671	4,690,433	10 5·83	2,459,156	3,483,075	8,173,508	7 4·37	3,009,656 14 1
1911	2,525,776	10 4·35	1,308,690	2,493,304	0 10 10·22	1,355,501	5,024,080	10 7·27	2,664,191	3,667,524	8,691,604	7 3·45	3,167,165 6 11
Totals	57,170,758	9 3·27	26,506,665	46,132,633	0 10 3·57	23,752,342	103,303,391	9 8·76	50,259,007	68,406,774	171,710,165	7 7·45	65,427,672 17 9

(*a*) At port of shipment. (*b*) At the pit's mouth.

Sydney: William Applegate Gullick, Government Printer.—1912.



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