M.R.O. 14–5,450—22-10-25.

MADRAS RECORD OFFICE.

Government of Madras.

Revenue **DEPARTMENT.**

G.O. No.	1430	Press ~~Mis.~~
516-17. Dated	22-5- 1868..	

Not to be folded or roughly handled

Proceedings of the Madras Government, Revenue Department,
22nd May 1868.

No. 516. Read the following Proceedings of the Madras Government in the Public Works Department:—

Communicating to the Revenue Department Circular from Government of India, forwarding papers referring to Australian coal and other matters. } (Here enter 16th May 1868, No. 1,566.)

No. 517. ORDER THEREON, 22nd May 1868, No. 1,430.

Miscellaneous.

Communicated to the Board of Revenue and to the Officiating Conservator of Forests.

(True Extract.)

(Signed) H. SEWELL,
Acting Under Secretary to Government.

To the Board of Revenue,
„ the Officiating Conservator of Forests, } With Procs. Public Works Department, No. 1,566.

Exd. S. T. Augustin.

No. 435. Read the following Circular from the Secretary to the Government of India, Public Works Department, (Railway,) to the Secretary to the Government of Madras, Public Works Department, (Railway,) dated Fort William, 16th April 1868, No. 8 :—

The accompanying copies of papers referring to Australian coal and other matters, received from Captain deBourbel, R. E., Superintending Engineer, on leave, are circulated for information to the Governments, Administrations and Departments noted in the margin.

Government of Madras.	Chief Commissioner, British Burmah.
,, Bombay.	Commissioner of Mysore.
,, Bengal.	Resident at Hyderabad.
,, North-Western Provinces.	Agent, Governor General, Central India.
,, Punjab.	,, ,, Rajpootana.
Chief Commissioner, Central Provinces.	Home Department.
,, Oudh.	Military Department (Marine).

From Captain R. DEBOURBEL, Superintending Engineer, on leave, to the Secretary to the Government of India, Public Works Department, dated 18th October 1867.

During my short stay in Australia, I picked up some information about the coal and timber of New South Wales, and send you the papers enclosed.

The best coals from Newcastle, a Port at the mouth of the River Hunter, seven hours' steam north of Sydney, are said to equal the average of English North Country coals for steam-raising purposes, but are inferior to Welsh coal.

In Australia, for marine engines, Newcastle coal is preferred; but for locomotive engines, half of Newcastle and half of Billambi coal is used. This latter coal is said to be the better fuel, but cakes, and gives much more trouble to the fire-men.

Billambi is situated in the Illawarra District, another coal-field five hours' steam south from Sydney; this coal is also cheaper than Newcastle coal, 7*s.* as against 9*s.* 3*d.* per ton shipped.

There is, however, no good harbour for large ships along the Illawarra Coast, and the trade is now carried on by small coasters. An harbour is being made at Wollongong, the Capital of this District, but it will not be finished for some time; the entrance, too, hardly seemed to me safe for large vessels in bad weather, and practically Newcastle coal will, for some time to come, be the only Australian coal available for export to India and China.

Newcastle has a fair harbour and large wharf fitted with steam-cranes, along which ten large ships can load or unload at one time, and connected by rail or tramway with the various coal-mines in this neighbourhood. The entrance to this harbour is also difficult in bad weather, as may be seen from the accompanying Circular of Messrs. Charles F. Stokes and Co., the Shipping Agents at Newcastle, from whom much of my information regarding price of freight, &c., is derived.

The price of the best Newcastle coal delivered at Bombay would vary from 36*s.* to 46*s.* per ton in ordinary times, all charges included, except cost of landing at Bombay; and if, as I believe, the price at Bombay of English North Country coal exceeds this figure (say from 50*s.* to 60*s.* per ton), the question of importing Australian coal in preference to English and Scotch coals (not Welsh) for marine, stationary, and locomotive engines, is worth considering.

Of the Newcastle coals, those from the Wallsend and Minimi mines gave the most favorable results in the trials made in England; but, at Newcastle, the Lambton, Warlah, and Australian agricultural coals are much esteemed, while the Four-Mile Creek coal, further inland, is said to be of superior quality, and as they all come from the same field, there is probably not much difference between them when tried on the spot. As some kinds of coal may, however, deteriorate more than others by a long sea voyage, I should not be inclined to accept the results of the experiments made in England or in Australia as final for India, and would suggest that a cargo of samples from the various mines at work at or near Newcastle be sent to Bombay, and be there tried and compared with English, Scotch, Welsh, and Indian coals.

The present course of trade is for ships to bring out cargo from England to the large Sea-ports of Australia; take ballast, coal, or timber to India or China, and thence take cargo back to England.

The shipping arrangements for coal could be made either in London or at Newcastle; the former would ensure more regularity in the supply from Australia to India.

The Peninsula and Oriental Steam Navigation Company, and the British India Steam Navigation Company, are said to have commenced using Australian coal in the Indian Ocean and China Seas, and some appears to have been sent to the Bombay and Baroda Railway.

Mr. Thomas' Report may be relied upon, and should you have it printed, may I ask you to send six copies to him at the Railway Engineer's Office, Sydney, New South Wales.

I showed these papers to Captain Nasmyth, R. E., from Bombay, whom I met in Sydney, and he has taken copies to send to General Rivers, the Agent for the Great Indian Peninsula Railway.

Should anything like a steady demand for Australian coal set in in any part of India for any purposes, such as Railways, in which the Government is immediately interested, the latter should insist upon the Railway Companies having an experienced and trustworthy Engineer Agent resident at Newcastle, to see in person that the coal shipped was clean and screened, and of the desired quality.

About timber for sleepers, the kinds preferred on the Railways in New South Wales are iron-bark and box, though stringy bark and gum are used, where the former are scarce, or of inferior quality.

The pecularity of these Australian woods is, that the trees are ever-green, and shed their bark annually; and the wood being close-grained, and of great density and hardness, it takes several years to season properly.

Most of the wood is, therefore, unseasoned when used, and sleepers put down in this state are said to last 12 years if of iron-bark and box; and nine years if of stringy bark and gum. All these four woods are liable to be attacked by white-ants.

There is a remarkable difference in the quality of these woods when grown on various soils, and local knowledge is necessary to determine whether the growth of any particular forest is suited for Railway sleepers or not. Speaking generally, iron-bark and box-wood are the best timber available; but in parts of the same

Proceedings of the Madras Government, Public Works Department.
16*th May* 1868.

District, their quality is inferior and unfit for Railway sleepers. A trustworthy Agent, resident on the spot, would be necessary to examine, test, and select in person the timber offered for sleepers, if a regular supply of the latter be exported annually from Australia to India.

The extract of Colonel Ward's, R. E., Report shows the elasticity and strength of these woods; the figures in each line are the mean results of three or four trials of the same wood, and each piece tried was 4 feet long between bearings, and two inches square.

Sleepers could at present be exported in large ships from Sydney, Newcastle, and Brisbane, whence Railways and rivers extend to some distance into the interior; small coasters might also bring sleepers to these Ports from the other outlets on the coast where timber is procurable.

The present price of sleepers delivered at these Ports is from 3*s.* to 4*s.* each for sound timber, 10′ × 10″ × 5″, but under the strict system of selection which would be absolutely necessary, may be expected to increase to as much as 4*s.* to 5*s.* each.

Taking eight sleepers to the ton, the cost of this Australian timber at Bombay, Madras, or Calcutta would be from 62*s.* to 75*s.* per ton, including all charges, except cost of landing at Port of delivery, and price of each sleeper would then be from 8*s.* to 9*s.* 6*d.* each.

The Local Government may possibly levy some duty on sleepers thus exported, and the price of timber is also liable to further increase from the large demand for timber and sleepers on Australian Railways, gold-fields and mines. In Tasmania, some good woods for Railway sleepers abound in the large forests on the Western Coast, but large ships would hardly go to a place so far out of the regular channel of trade. In New Zealand, also, there are extensive and thick forests of fine timber along the Western Coast, where the gold-fields have been recently discovered, but there is no good harbour yet known along this shore.

GOVERNMENT RAILWAYS.

OFFICE OF ENGINEER FOR EXISTING LINES,

Sydney, 18th September 1867.

Seeing how little is generally known of the coal-producing resources of this Colony, it will, perhaps, not be considered out of place before proceeding with the more immediate object of this Report, *viz.*, as to which quality of Australian coal is found best suited for Locomotive purposes, if I give an abridgment of an account given of the collieries of New South Wales by Mr. William Keene.

"*The Australian Agricultural Company's Mine, known as the Borehole Colliery.*—The seam is 163 feet from the surface, and 150 feet below the sea-level; its greatest thinkness about 9 feet, with average dip to the south-east of 1 in 20. This coal is greatly esteemed in Melbourne and Californian markets. Ships of large tonnage can load at the staiths of the Company, to which the coal is taken from the pits' mouth by locomotives, a distance of about two miles.

The same Company have also another pit (F) situated on the hill-side at Newcastle, and in which, at 90 feet below the surface, the coal known as the yard-seam, and visible on the coast at the sea-level, is worked. For many years, this was the only coal wrought by the Australian Agricultural Company. It is rather soft in quality, but esteemed in household purposes, gas manufac-

ture, and blacksmiths' work. These coals are also taken to the wharf by locomotives. The Company frequently ships 500 tons a day, and can readily supply larger demands,—price 14*s.* 6*d.* per ton.

The Newcastle Coal and Copper Company's Colliery, working what is known as the Burwood seam.—This coal is seen in natural section on the cliffs of the sea-coast 60 feet above the sea-level, and has been worked into by day levels in the Burwood Range of Hills near Newcastle. A new drift has just been opened in the hill known as Little Red Head, and the coal is the same seam as that of the Burwood Range. Between the two workings, there appears a down throw fault of more than 60 feet.

Section of the Seam.

	Feet.	Inches.
Top coal		
Fine clay parting	2	6
Middle coal	0	3
Clay band	2	3
Bottom coal	0	2
	3	6

This coal is easily worked, and carried by locomotives to the shipping wharves of Newcastle at the rate of 500 tons per day,—price 13*s.* 6*d.* per ton.

The Wallsend Company's Colliery known as the Wallsend Seam.—The coal in this pit is 127 feet from the surface, and 80 feet below the sea-level; 9 feet 10 inches in thickness, including partings which divide the seam into three bands. The partings are together about 10 inches in thickness. The Wallsend working are situated about half way between Minimi and Newcastle, the strata rising towards the North-West Ranges. The works connect with Newcastle by a branch Railway to join the Great Northern Line at Waratah, about 4 miles from the Port, and the locomotives take coals to the ships' side at the wharf at the rate of 500 tons or more daily,—price 14*s.* 6*d.* per ton. This colliery has not been long opened, and the coal finds favor in the markets of Melbourne and California

The Minimi Colliery Company's (C) Pit.—The seam is 90 feet from the surface, and 20 feet above the sea-level. An out-crop of the seam is visible in a creek about 400 yards from the shaft, rising in a northerly direction 1 in 18. It appears to be the second seam below the schist rock which covers the Coal and Copper Company's seam at Burwood, and is bedded on a hard sand-stone grit of good building stone. The coal is much liked by the blacksmiths of the District, and the small makes a good coke, as does the small coal of the collieries of Newcastle generally. Messrs. I. and A. Brown, the owners of these mines, raise about 300 tons a day, which is shipped at Hexham, a township on the banks of the Hunter River, 10 miles from Newcastle; or the coal is sent down in barges laden with boxes, which are hoisted by a steam-crane so as to load ships of any tonnage whilst at anchor in the stream. The seam averages 6 feet of clean coal.

The Tomago Company have put down a shaft 365 feet to the coal, the deepest as yet in New South Wales. They first struck a seam 6 feet thick at a depth of 342 feet, but finding a thinner seam of better quality 23 feet lower, they preferred to work this "Long Wall," and they supply from 100 to 150 tons daily of what is esteemed a good furnace coal. The pit is on a level at a distance of only 700 yards from the river bank where vessels of 200 tons can take in their load. The Company has lately been re-organized, and is preparing for operations on a more extended scale.

This coal is highly bituminous, and remarkable, in common with Borehole and Minimi seam, for its tendency to uniform and orbicular fracture, a peculiarity which seems to belong to the middle seams of the series, the upper and lower seams being more disposed to splinty clearage, and burning to ash with little cinder.

The Four-Mile Creek Company, Messrs. Christian, Nixon & Co., carries on its operations in the East Maitland District, and that worked is 8 feet 6 inches in thickness, 5 feet 6 inches of which is a splint coal of a very superior quality, chiefly used by the two lines of steamers navigating daily between Morpeth and Sydney.

Proceedings of the Madras Government, Public Works Department,
16*th May* 1868.

The admirable regularity with which these ocean steamers perform their service, their engines of 160 horse-power easily kept to the top of their speed with steam to spare and blowing at the valve, give sufficient and constant evidence of the excellence of the coal; in fact, I have long considered, and often expressed the opinion, that good clean hand-picked New South Wales coal is at least equal, if not preferable, to the best coals of England, when these latter have been twice transhipped; that is to say, in the state in which English coal can alone be got in Sydney, and at double the price of the best produce of our own mines. The Four-Mile Creek is a hand-splint coal; does not clinker; and burns to a fine dry ash; is very comparable to the coals shipped from Goole in Yorkshire, whilst our bituminous coals may be likened in quality to the "Hartley."

Descending the strata, and below all the seams of these collieries at West Maitland, about 5 miles north from Four-Mile Creek, two seams of cannel and splinty coal are worked, the property of the Honorable Bournie Russell. This cannel coal is most useful, and is chiefly employed for domestic purposes.

Thirty miles further to the northward, at Rix's Creek, near Singleton, a seam of good coal is also worked.

Sixty miles south from Sydney, are the Ports of Bellambi and Wollongong; and though they cannot be compared with accommodation with the Port of Newcastle, the energy of the coal owners of the Districts, and the facility with which coals can be worked by "day levels" from a 7-feet seam which shows itself in section along many miles of the mountain range, assure to this field a progressive development to prove the inexhaustible resources of New South Wales in mineral fuel; and will be a guarantee to commercial interests that no combination of monopoly can long disturb the regularity of the supply.

At Bellambi, vessels load from a jetty the coals brought down the mountain side along a tramway to the ship, and from 100 to 200 tons are thus sent away daily.

At Wollongong, there is a like arrangement for the Mount Keira Mine, and like quantities are shipped from that Port.

There is a "day level" worked by a morning party between Mr. Hales', Bellambi Mine and Mount Keira. A drift is also making into the seam 4 miles south of Dapto, and more than 20 miles south from Mr. Hales; whilst 5 miles north from Mr. Hales, a tramway is in course of construction to Bellambi for a Company about to be incorporated by Act of the New South Wales Parliament, and named the Bulli and Bellambi Coal Mining Company.

I have examined all these new drifts, both at the extreme north and south points at which the seam has hitherto been opened at heights varying from 500 to 600 feet above the level of the sea at a distance of at least 25 miles from each other, and can say that the coals appear equally good with those from the drifts in work, all upon the same seam, and showing a great regularity of thickness of about 7 feet.

Besides this, and 15 miles nearer to Sydney, at Coal Cliff, I found a seam at the level of low water, 6 feet in thickness, very like to the splint coal of Four-Mile Creek, and this seam will probably, from its apparent good quality, soon be worked.

Since the year 1856, the trade of the old Companies has nearly doubled, whilst new Companies have started into existence, and the extraction and sales of these latter are now equal to what the old Companies were doing five years ago.

On the lands of the Agricultural Company, a few miles from Strond, a seam more than 30 feet in thickness crops out in the length of a creek, and this thickness has been verified by several trial pits sunk on the dip side. There are many partings of shale and fire clay, and the coal is of various quality in the thickness of the seam, but there is quite sufficient of good coal for profitable working, if its inland position did not render it wholly unavailable in the face of coal so easily accessible from the sea-board as that of Newcastle and Wollongong.

With regard to the relative heating powers of British and Colonial coals; from some very careful experiments conducted on a large scale in the Colony, the ascertained mean value of 16 trials of different Welsh coal, 16 of English, 16 of Scotch, and 6 of Colonial coal, are as follows:—

	Mean.	Highest.	Lowest.
Welsh	8·9	10·2	7·4
Colonial	7·9	8·4	7·4
English (Newcastle)	7·8	9·3	6·7
Scotch	7·3	8·4	5·8

By this it will be seen that the Colonial coal is inferior only to that from the most famous Welsh Collieries. The Colonial coal in each of these experiments was 15 cwt., and gave as the average water evaporated 253,348·3 cubic inches.

Weight of water evaporated by 1 lb. of coal, including getting up steam to the determined pressure	lbs. 5·4
Economical value of weight of water evaporated by 1 lb. of coal after steam being raised to the determined pressure	7·3
Water evaporated	9137
Rate of evaporation in gallons at 6 lbs. above atmospheric pressure per hour...	218·7 gallons.
Rate of combustion per hour per square foot of fire grate	11·8
Weight of coal per cubic foot	53·3

Mr. Anderson, Inspector of Machinery to the War Department, also made some experiments, but on a smaller scale, at Woolwich with Australian and other coals, and the following Table shows at a glance the relative value of the several coals operated upon:—

Number of experiment.	Date.	Name of Coal	Weight of Coal.	Duration of experiment.	Weight of ashes.	Water evaporated in cubic inches.	Weight of water evaporated by 1 lb coal.	Number of revolutions made by Steam-Engine.
	March.		Cwt.	H. M.	lbs.		lbs	
1	18	Australian,	2	5·20	13¼	45,780·5	7·4	3,950
2	18	Do.	2	5·20	13¼	45,780·5	7·4	3,946
3	22	Whitworth.	2	5·12	16	45,780·5	7·4	3,970
4	22	Do.	2	5·10	15½	45,780·5	7·4	4,000
5	23	Welsh.	2	5·30	5	50,621·5	8·6	4,367
6	23	Do.	2	5·30	4¾	50,621·7	8·6	4,345
7	24	Hartley.	2	5·25	3¾	49,636·5	8·0	4,290
8	24	Do.	2	5·17	3½	48,654·0	7·8	4,199

It will be seen that these experiments in England bear out those on a larger scale in the Colony, and that, therefore, for steam purposes, the Australian coal may be considered about equal to the Newcastle coal termed "Whitworth," but that it is slightly inferior to the Hartley and Welsh varieties of English coal. The last column of the table shows exactly the relative value of the different experiments, and the true value of the several coals for steam-engine purposes.

Attached to Mr. Anderson's Report was the following analysis made by Mr. Abel, the Chemist to the War Department:—

"The coal was found to contain a very considerable admixture of shale. Very thin seams of iron pyrites were observed to be interspersed through the massive portions of the coal itself.

"An average sample of the coal, as supplied, was prepared, and the following points determined with it:—

1.—"The quantity of volatile matter furnished by the coal, amounted to 71 per cent., and 29 per cent. of a light and very porous coke was obtained. The coal is, therefore, of a highly bituminous character, and would probably be found excellently adapted for the manufacture of gas.

2.—"The per-centage of ash contained in this average sample of coal amounted to 6·8 per cent. The ash was of a red brown color, due to oxide of iron produced from the pyrites in the coal."

Proceedings of the Madras Government, Public Works Department
16th May 1868.

A massive piece of the coal was selected for a special determination of the ash, and was found to furnish 4·09 per cent. The coal, therefore, yields, even when free from shale, a quantity of ash unusually large for bituminous coal.

3.—"The per-centage of sulphur found in the average sample amounted to 1·11, a quantity slightly exceeding that usually found in Newcastle coal, but which cannot be looked upon as considerable when compared with the large amount of ash furnished by this coal."

More recent experiments at the Royal Arsenal have thus been summarised by the Government Examiner of Coal-fields, New South Wales:—

1st.—"The Woolwich boiler, which with average English North Country coal evaporated at the rate of 47 cubic feet of water per hour, with average Australian coal evaporated 46¾ cubic feet.

2nd.—"One pound of English North Country coal evaporated 8·25 lbs. of water; and 1 lb. of Australian coal evaporated 8·258 lbs.

3rd.—"The average of English coal gives 1 per cent. of clinker; the Australian 2·11 per cent.

4th.—"Of ash, the average of English coal is 4 per cent. against 7·15 per cent. for Australian; and is stated to give 5 per cent., whilst the Australian leaves 9¼ per cent.

5th.—"The average Australian coal excels average English North Country coal in power of evaporation, for 1 lb. of the former evaporates more water than a lb. of the latter, and in *time* the difference is insignificant.

The quantity of the residue to be thrown away as of little consequence when the evaporation power of the coal is nearly equal.

The English coal used in these experiments may be fairly assumed as having attained its highest average, whilst the coal of Australia is an improving average.

The following Return will give the approximate relative value for locomotive purposes of the coal from the Northern Collieries:—

Description of Coals.	Number of days running.	Average load of waggons, carriages, &c. per day.	Quantity of Coal consumed.	Number of miles run.	Weight in lbs. per mile.	Wood used lighting fires.
			Tons. cwt. qrs. lbs.			Tons. cwt. qrs. lbs.
Minimi Coals ...	7	9	10 10 0 0	1,096	21·459	2 0 0 0
Coal and Copper Co.	6	10	10 0 0 0	642	34·890	1 0 0 0
Aus. Agl. Co. ...	6	10	10 0 0 0	835	26·81	1 5 0 0
Wallsend Co. ...	9	12	11 3 0 0	1,184	21·094	1 10 0 0

With regard to the qualities of the northern and southern coal for steam-raising purposes, I may state that both in marine, stationary, and locomotive engines, the latter has been found the best; that is to say, *ceteris paribus*, a lb. of Wollongong coal will raise more steam than that of a like quantity from the Newcastle Collieries.

The following Reports which have been published will, I think, fully bear out this assertion, as the trials were not mere experiments conducted in a laboratory, but conducted upon a sufficiently large scale to practically test the coal.

From EDWARD BELL, Esq., City Engineer, to the Right Worshipful the Mayor, dated Sydney, 4th July 1861.

In accordance with the instructions of the Water Committee to furnish a three months' comparative return of Newcastle and Bellambi coal at the Botany Water-works, I have the honor to state that I have selected periods at which the coals were weighed into the furnaces, and the sum of which weighing corresponded within a fraction with the weight on the ships' certificate; and the following are the results which I have the honor to return, namely:—

From the 1st April to 30th June 1860, the coal used was Newcastle coal and Copper Company's and Minimi—

Coal consumed in raising steam was ... ... 163,800 lbs.
Coal consumed whilst pumping water ... ... 654,050 ,,
Number of gallons pumped 135 feet high... ... ... 72,763,803 ,,
Number of gallons pumped 226 feet high, with 654,050 lbs. of coal, 3,544,680, which is equal to 16,244 gallons of water pumped 1 foot high with 1 lb. of coal.

Bellambi coal.—

"From 1st January to 31st March 1861—

Coal consumed in raising steam ... ... 174,037 lbs.
Ditto in pumping water ... ... 544,861 ,,
Number of gallons pumped 135 feet high, was ... 80,804,494 ,,
Ditto. gallons pumped 226 feet high, was ... 4,386,240 ,,
With 544,861 lbs. coal, which is equal to ... ... 21,838 gallons of water raised one foot with one lb. of coal.

"The Newcastle coal made a considerable quantity of clinker and ash. The Bellambi coal no clinker, and a small quantity of white ash.

From J. H. THOMAS, Esq., to the Right Worshipful the Mayor, dated 28th June 1861.

In reply to your inquiry as to which I had found to be the most suitable class of coal for the locomotives on the Railways of this Colony, I have to state that after a series of experiments, the coal from the mines of Bellambi was proved to be far superior to any other as a fuel, both as regards its steam-raising qualities and perfect freedom from clinker.

I may also mention that it is better adapted for the smoke-consuming apparatus we employ.

From H. WOOLLEY, Senior Engineer, to the Commander of Her Majesty's Ship, "Cordelia," dated 1st August 1861.

In accordance with your instructions to report on the qualities of Bellambi coal, I have the honor to inform you of the following trial of this kind of coal made on Her Majesty's ship under your command:—

"Quantity of coal consumed ... ... 98 tons.
"Consumed per horse-power ... ... 1,344 lbs.
"Indicated horse-power ... ... 228·6 horse."

Consumed per indicated horse-power per hour 58 lbs. which is equal to 336,776·7 lbs. raised one foot high, or 33,677·6 gallons of water pumped one foot high with 1 lb. of coal.

"The Bellambi coal makes very little smoke, or soot, in comparison with other kinds of Australian coal, no clinker of any consequence; but compared with English coal, it produces rather a larger quantity of dust and ash.

"Altogether it is superior to any kind of Australian coal yet tried on board Her Majesty's Ship "Cordelia."

Although Mr. Bell's Report exhibits a difference of some 30 per cent. in favor of Bellambi (Southern) coal, yet it is but fair to state that one of the Northern coals used was of an inferior colliery, as will be seen by the Return of the trials of Newcastle coal on the Northern Railway given above.

I may add to the foregoing reports a trial made in one of our locomotives on the Great Northern Railway.

Description of Coal.	No. of Engines.	No. of days running.	No. of miles run.	Quantity of coals used.	Quantity of billet wood used.	Coal per mile in lbs
Wollongong	9	15	1,788	387	116	21·21
Newcastle	9	15	1,740	400	122	25·74

Proceedings of the Madras Government, Public Works Department,
16th May 1868.

The Wollongong coal is of rather slow combustion, and requires a strong blast; it is not generally liked by the fire-men, as it gives them a little more trouble, whereas the Newcastle burns freely and requires less attendance to the fires. We are at present using an equal quantity of each, the contract just entered upon with the Government being at the following rates to be delivered at the Railway Wharf at Sydney:—

	s.	d.	
Wollongong	13	6	per ton
Newcastle	15	0	,,

At the present time, owing to the keen competition, the price of coal is very low, and at Newcastle is now being put on board at 9*s.* 3*d.* per ton.

(Signed) J. H. THOMAS, C. E.,
Cheif Engr. for Existing Lines, and Locomotive Supt.

EXPORT OF COAL FROM NEWCASTLE, NEW SOUTH WALES, FROM 1ST JANUARY TO 21ST AUGUST 1867.

To Foreign Ports.

	Tons.	Tons.
CHINA—		
Shanghae	7,622	
Hangkong	8,603	
Cheefoo	1,553	
Ningpo	372	
Foochow	530	
		18,680
JAVA—		
Macassar	1,257	
Java...	3,115	
Batavia	1,500	
		5,872
INDIA—		
Bombay	4,788	
Calcutta	1,800	
Colombo	225	
Kurrachee	1,370	
Point de Gallo	5,175	
Singapoor	830	
Manilla	1,240	
		15,428
Banda		387
SAN FRANCISCO...		12,796
VALPARASIO		1,300
CALLAO		726
CHILLI		602
GUAN		1,420
RIO DE JANEIRO		194
MAURITIUS		2,898
Total... ...		60,303
		26,949
Shipped by Wallsend Company		9,994
,, by Australian Agricultural Company		8,399
,, by Waralah Company		6,118
,, by Lambton Company		5,238
,, by Co-operative Company		3,605
,, by Minimi Company...		60,303
Total... ...		

The export to Inter-colonial Ports to 31st July 1867	186,162	
Amounts to	115,902	
Coast-wise	55,893	
Foreign...		
Total export to 31st July 1867... ...		357,957

Extract from Report from E. B. CARROLL, Esq., Superintendent of Bombay and Baroda Railway, upon Newcastle Coal from the Warelah Mine worked comparatively with English Coal, dated 9th September 1867.

	Consumption per Vehicle per mile in lbs.	Per-centage of ash.	Per-centage of clinker.
English...	1·55	7·72	1·01
Australian	1·27	6·13	98

Mr. Carroll recommends the Australian coal as preferable to any other.

The rate of freight to Bombay from Newcastle during 1866 was from Rupees 20 to Rupees 28.

For 1867 to present time, from Rupees 30 to Rupees 35.

The rate of freight for remainder of year may be taken at Rupees 35.

1866. Cost of coal at Bombay, including, Commission, Insurance and all charges, say...Rupees 30 to Rupees 38 per ton.

1867. Ditto ditto ... ,, 40 to ,, 45 ,,

Price of coal at Newcastle, Rupees 9-3 per ton.

Price of best iron-bark sleepers 10 × 10 × 5, Rupees 2-9 to Rupees 3; this is the cost price at which the last contract was taken from the *Splitters*.

Extract from Colonel Ward's, R. E., Report on experiments made at the Sydney Royal Mint, on the elasticity and strength of the Timber of New South Wales and Queensland.

Names of the Woods.	District.	Dimensions of Tree. Average height to fork.	Dimensions of Tree. Average diameter in inches.	Specific gravity.	Greatest weight and deflection while elasticity remained perfect. Weight in lbs.	Greatest weight and deflection while elasticity remained perfect. Deflection in inches.	Breaking weight in lbs.	Ultimate deflection in inches.	$E=\frac{l^3 W'}{16ad^3 \delta}$	$S=\frac{l W}{4ad^2}$	Remarks.
		Feet.	Inches.								
Red iron bark ... ... / (*Eucalyptus*)	South ...	30	30	1·167	1,605	1·33	2,034	2·45	521,800	3,051	Timber hard, close grained, of excellent quality, great strength and durability.
White iron bark ... ... / *Eucalyptus species* ...	South ...	...	...	1·111	1,456	1·07	1,904	1·87	587,800	2,856	Valuable for ship-building, engineering works, piles, beams, sleepers, but is readily attacked by white-ants.
Iron bark ... ... / *Eucalyptus resinifera* ...	South ...	40	42	1·146	1,251	1·2	1,526	2·3	450,300	2,289	
Narrow leaved iron bark... / *Eucalyptus*	North ...	20 to 70	12 to 36	1·119	1,400	1·13	1,792	2·07	534,300	2,688	
Smooth iron bark... ... / *Eucalyptus species*... ...	Queensland ...	35	25	1·176	1,456	1·04	1,932	1·91	604,800	2,898	
Rough iron bark ... ... / *Eucalyptus resinifera* ...	Queensland ...	35	30	1·15	1,554	1·05	1,974	2·1	639,400	2,962	
Box ... ... / *Eucalyptus rostrata* ...	South ...	30	30	1·172	1,400	1·09	1,792	1·99	554,900	2,688	Timber of good quality, and valuable for engineering purposes.
Grey box ... ... / *Eucalyptus species*... ...	South ...	40	22	·989	1,232	1·05	1,680	2·45	506,900	2,520	
Yellow box ... ... / *Eucalyptus*	South ...	40	24	·877	952	1·2	1,344	2·2	343,700	2,016	
Box ... ... / *Eucalyptus*	South Albury	25	30	1·210	1,148	1·14	1,610	2·21	435,000	2,415	Said to be very useful for purposes where it does not touch the earth.
Bastard box ... ... / *Eucalyptus species*	North ...	10 to 20	12	1·131	1,139	·98	1,400	1·43	502,100	2,100	Short stunted timber of great strength and repute for poles, shafts, and spokes of wheels.
Yellow box ... ... / *Eucalyptus species*... ...	Mudgu Bridge	...	...	1·053	1,036	1·30	1,288	2·51	344,300	1,932	Considered a valuable timber.
White box ... ... / *Eucalyptus?*	Mudgu Bridge	...	...	1·180	1,050	1·15	1,274	1·57	394,400	1,911	
Box ... ... / *Lophostemon Australis* ...	Queensland ...	35	25	·977	840	2·1	1,064	3·	172,800	1,596	This timber is not in much repute.
Bastard box ... ... / *Eucalyptus*	Queensland ...	25	27	·918	1,456	1·2	1,834	1·91	524,100	2,751	A strong and durable timber.
White stringy bark ... / *Eucalyptus*	South ...	36	26	·922	952	1·15	1,512	2·3	357,600	2,268	A straight-grained wood, strong and durable.
Red stringy bark ... ... / *Eucalyptus species*... ...	South ...	36	24	1·031	1,064	·95	1,400	2·2	483,800	2,100	

Extract from Colonel Ward's, R. E., Report on experiments made at the Sydney Royal Mint, &c.,—(Continued.)

Names of the Woods.	District.	Dimensions of Tree.		Specific gravity.	Greatest weight and deflection while elasticity remained perfect.		Breaking weight in lbs.	Ultimate Deflection in inches.	$E = \frac{l^3 W'}{16 a d^3 \delta'}$	$S = \frac{l W}{4 a d^2}$	Remarks.
		Average height to fork.	Average diameter in inches.		Weight in lbs.	Deflection in inches.					
		Feet.	Inches.								
Stringy bark ... ... / *Eucalyptus robusta* ...	South Albury	40	30	1·085	896	1·09	1,078	1·69	355,100	1,617	A most useful timber for building, &c.
Stringy bark ... ... / *Eucalyptus robusta* ...	North ...	...	...	·962	1,022	1·11	1,274	1·7	397,800	1,911	Inferior timber of its kind, but used for building.
Stringy bark ... ... / *Eucalyptus robusta* ...	Mudgu Bridge	...	...	·885	1,064	1·18	1,325	2·	389,500	1,987	Said to be a valuable timber.
Stringy bark ... ... / *Eucalyptus robusta* ...	Queensland ...	30	21	·977	933	1·	1,120	1·4	403,000	1,680	Suitable for building.
Bine gum ... ... / *Eucalyptus punctata* ...	South ...	35	30	1·080	784	1·01	1,204	2·03	335,300	1,806	A valuable timber, hard and tough, with inlocked grain, suitable for ship-building, engineering.
Red gum ... ... / *Eucalyptus Oblongo* ...	South ...	25	20	1·116	952	1·0	1,400	2·17	411,300	2,100	Timber hard, and of great strength and toughness, has large gum veins, and is not therefore used.
White gum... ... ... / *Eucalyptus Hæmastoma* ...	South ...	40	28	·866	784	·90	1,008	1·9	376,300	1,512	Not valuable.
Spotted Gum ... ... / *Eucalyptus Gomocalyx* ...	South ...	40	24	·942	1,106	1·16	1,372	2·09	411,800	2,058	Timber very strong and durable, fit for ship-building.
Forest Gum ... ... / *Eucalyptus*	South Albury	25	36	1·096	840	1·22	1,064	2·15	297,400	1,596	Useful and durable; extensively used for sleepers, posts, rails, scantling.
Grey Gum ... ... / *Eucalyptus species?* ...	Wset ...	35	30	1·132	1,148	1·11	1,428	1·86	446,800	2,142	Timber of great strength and durability.
White or Silver Gum ... / *Eucalyrtus pulverulenta* ...	West ..	60 to 80	30	·988	952	·95	1,120	1·39	342,800	1,680	A very ugly species.
Apple Tree Gum ... ... / *Angophora lanceolata* ...	West , ...	40 to 80	36	·913	803	1·25	933	1·87	277,400	1,399	Strong and close grained, suitable for wheel-wrights' work.
Red Gum ... ... / *Eucalyptus oblongo* ...	North ...	10 to 60	10 to 12	1·091	924	1·47	1,092	2·32	271,500	1,638	Generally unsound.
Slaty Gum ... ... / *Eucalyptus species?* ...	Mudgu Bridge	..	...	1·101	1,050	1·37	1,274	2·14	331,100	1,911	Considered valuable.
Bine Gum ... ... / *Eucalyptus punctata* ...	Queensland...	45	30	1·094	1,358	1·32	1,680	2·35	444,400	2,520	Timber not very suitable for Railway purposes.
Flooded Gum ... ... / *Eucalyptus species...* ...	Queensland...	55	42	·752	840	1·05	1,036	2·15	345,600	1,554	Much used for building.
Spotted Gum ... ... / *Eucalyptus Gomiocalyx* ...	Queensland...	25	30	1·170	1,330	1·	1,736	2·05	574,500	2,604	Of great strength and durability in dry places, but not prized.
Grey Gum ... ... / *Eucalyptus species..* ...	Queensland...	25	30	1·143	1,064	1·15	1,372	1·97	399,700	2,058	Strong timber of large growth, but not appreciated.
Peppermint wood... ... / *Eucalyptus piperita* ...	West	...	...	·897	747	1·28	840	1·83	252,100	1,260	Fine and close-grained, strong and durable, will rend if exposed to weather, and difficult to burn.
Iron wood ... ... / *Acmena*	Queensland ...	15	9	1·002	924	1·41	1,162	2·69	283,100	1,743	Timber very hard.
Flindosa ... ... / *Flindersia Australis* ...	Queensland ...	55	30	·936	1,022	1·14	1,316	2·25	387,300	1,974	Soft, easily worked and durable.
White Maple	Queensland ...	20	21	·792	966	1·04	1,218	2·17	401,200	1,827	Strong wood, but of no value for building.
White Butt... ... ... / *Eucalyptus species* ...	South	30	21	·990	1,008	1·15	1,260	1·97	378,600	1,890	Close-grained, tough and durable, suitable for building and engineering.
Black Butt ... ... / *Eucalyptus*	South	35	30	·990	980	1 85	1,232	2·92	313,600	1,848	Very strong timber, warps and twists when exposed to the sun, and requires gradual seasoning.
Woolly Butt ... ... / *Eucalyptus Gomphocephala*	South	20	24	1·078	924	1·25	1,176	1·82	311,300	1,764	Used for wheel-wrights' work and fencing
Black Butt ... ... / *Eucalyptus persicifolia* ...	Queensland ...	45	30	·945	1,204	·95	1,484	1·49	547,500	2,226	Used for posts, rails, piles; supposed not to be durable.
Oak... ... ... / *Casuarina*	South Albury...	17	15	·836	784	1·4	1,036	3·15	241,900	1,554	Light and tough, but perishable.
Forest Swamp Oak ... / *Casuarina*	North	30 to 50	9	·857	1,092	1 6	1,344	2 8	294,800	2,016	Do. do.
Forest or Shingle Oak ... / *Casuarina suborosa* ...	West	20 to 40	18 to 30	1·104	1,204	1·05	1,540	1·57	495,300	2,310	Fine mobbled, silver grain of great strength and durability, used for shingles
Swamp Oak ... ... / *Casuarina stricta*	Queensland ...	25	16	·900	826	1·05	1,022	1·91	339,800	1,533	Used for shingles, palings, and durale.
River Oak ... ... / *Casuarina quadrivalis* ...	Queensland ...	80	18	·852	803	1·37	1,027	2·7	253,200	1,540	Strong, light, tough, used for shingles and palings.
Green Wabble ... ... / *Acacia decurrens*	North	...	6	·717	1,269	1·4	1,549	2·35	391,600	2,324	Shrub timber, close and tough, but no value.
Lignum vitæ ... ... / *Acacia*	Queensland ...	9	15	·892	1,064	1·07	1,414	1·67	429,500	2,121	Used for cabinet-work.
Rose Wood... ... ... / *Acacia species*	Queensland ...	21	18	·712	980	1·14	1,218	2·17	371,300	1,827	Durable and ornamental.
Forest Oak... ... ... / *Casuarina suberosa* ...	Queensland ...	15	15	1·494	910	1·11	1,176	2·1	354,100	1,764	Used for cabinet-work and shingles.
Blood Wood ... ... / *Eucalyptus corymbosa* ...	West	30 to 50	8 to 16	·853	1,176	1·17	1,540	2·02	434,200	2,310	Qualities not known.
Blood Wood ... ... / *Eucalyptus corymbosa* ...	Queensland ...	35	21	·983	971	1·15	1,120	1·47	364,700	1,680	Used for fencing.

Proceedings of the Madras Government, Public Works Department,
16th May 1868.

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RAILWAY, No. 36.

Communicated to the Revenue Department; also to the Superintending Engineers and to the Consulting Engineer for Railways.

(True Extract.)

Colonel, R. E.,
Secretary to Government.

To the Revenue Department.
,, Superintending Engineers.
To Captain Kennedy.
To the Consulting Engineer for Railw

Exd. S. T. Augustin.

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