



NEW ZEALAND
GOVERNMENT GAZETTE
(PROVINCE OF NELSON).

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By His Honor's command,

J. C. RICHMOND, Provincial Secretary.

VOL. XIII.

NELSON, TUESDAY, FEBRUARY 21, 1865.

No. 7.

Provincial Secretary's Office, Nelson,
February 21, 1865.

HIS Honor the acting Superintendent directs the publication of the following Report for general information.

ALFRED GREENFIELD,
Chief Clerk.

REPORT ON THE COAL-FIELD OF
NEW SOUTH WALES.

Nelson, January 12, 1865.

To the Provincial Secretary, Nelson.

SIR,

In accordance with the instructions conveyed to me in your letter of Nov. 2, 1864, giving directions for Mr. Blackett and myself to examine the "Coal Works of New South Wales, and ascertain how far it is likely the coal in this Province can be worked in competition with the Australian Coal-fields," I beg to report for the information of his Honor the Superintendent, that on Nov. 3rd last, in company with Mr. Blackett, I started for Sydney in the S.S. *Otago* and arrived there on the 8th, after a passage of a little less than five days.

The next few days we were engaged visiting the Botany Bay Waterworks, from which Sydney is supplied with water, the Patent Slips, Dry Dock, and other engineering works. We also had several interviews with Mr. Adams, the Deputy-Surveyor-General of New South Wales, and Mr. Smalley, the Astronomer, on matters connected with trigonometrical surveys, survey instruments, &c., &c., but as all those are

more under Mr. Blackett's department than my own, I will leave the details to him and proceed at once to give you some account of the Coal-field of New South Wales; partly from my own observations, and partly from information derived from various other sources.

From the researches of Leichhardt, Rev. H. B. Clarke, of St. Leonard's, near Sydney, Messrs. Keene, and Mackenzie, Government Examiners of Coal Mines, and others, it would appear, that almost the whole east coast of Australia from the Tropic of Capricorn to Shoal Haven, in 35° south, (an extent of 12° of latitude) is composed of carboniferous rocks. Its extent into the interior is of course not so well defined, but the same formation is reported by Sir Thomas Mitchell, to exist in the Grampian Mountains west of the meridian of 143°, though whether it continues from the coast so far inland, is, I presume, not yet ascertained; however, there is no doubt that this is one of the largest and most important coal-fields in the world. It contains great numbers of seams of almost every thickness up to 30 feet, and is generally speaking remarkably flat and regular, but broken through in places by basaltic dykes. The coal is of course very varied in quality but generally good; and is at present being worked at several places in this magnificent field, the principal being near Newcastle on the Hunter River, in the neighborhood of Wollongong in the Illawarra district, both in New South Wales; and also near Moreton Bay in Queensland, but as I have only visited the two former districts I will confine my remarks to them.

Being supplied with letters of introduction from Mr. Thomas Topham, Government Inspector of Coal Mines in the Hunter River district, to several gentlemen there; we started from Sydney on the evening of November 15th, in the steamer *Morpeth*, and arrived at Newcastle early next morning.

In the neighborhood of Newcastle there are seventeen seams, from 3 feet to 12 feet thick, and of various qualities, several of which are worked in the different collieries of the district, some by free level but generally from shafts from 36 feet to 365 feet deep; they are not much troubled with water, and as a rule the pumping apparatus is worked by the winding engine, and this is found sufficient to keep the mines dry. Through the kindness of Mr. J. B. Winship, the Colliery Viewer of the Australian Agricultural Co., (generally known as the A. A. Co.) we were enabled to inspect their very fine and extensive mines. One of the principal of these is 200 feet deep, 14 feet diameter, and bricked from top to bottom, as it is through soft clay with a great deal of quicksand, and was sunk with great difficulty. The seam at this shaft is about 11 feet thick, mostly clean coal, with two small bands; it is worked on the North of England plan of "pillar and stall," eight yards being taken away and five yards left to support the roof, five feet of the bottom is worked off a few yards in advance and the remainder brought down afterwards, the partings are good and coal though hard is free; very little timber is used even in these wide workings, which shows that the roof is strong and good; there is a slight dip of about 1 in 20 to S.W., and on the whole is very favorable for working. Mr. Winship says that in about $1\frac{1}{2}$ miles this seam varies from 3 feet to 12 feet in thickness. The coal is brought from the face of the workings to the bottom of the shaft in wagons, each containing half-a-ton, and drawn by horses, two of these are taken up the shaft in one cage three times a minute, i.e. 3 tons per minute, so that 1,800 tons may be drawn out of this shaft in 10 hours constant work, or allowing for delays say 1,400 tons, but the greatest quantity yet raised in one day of 10 hours was 993 tons. There are 280 men digging coal, exclusive of those employed in other work both above and below ground. The men are paid 4s. 3d. per ton for the bottom and 3s. 9d. per ton for the top coal, or say roughly 4s. per ton for merely digging and putting it into wagons; the other expenses of haulage to, and drawing up the shaft, screening, putting into railway wagons, and other work above and below ground amounts to 2s. 6d. per ton, so that the coal costs 6s. 6d. per ton in railway wagons at the pit's mouth. From there it is drawn by locomotive engines about two miles to the shipping place and sold on board ship at 10s. per ton, or more generally 9s. per ton in the case of large contracts; thus leaving only 2s. 6d. per ton for haulage from the mine to the shipping place, putting on board ship, wear and tear of material, and interest of money, &c., &c. Two years ago the price of coal on board ship at Newcastle was from 13s. 6d. to 14s. 6d. per ton, and this great fall in the price is having a most depressing influence on the mining interest, many collieries being working at a great loss, and few if any doing more than paying expenses.

The coal from the A.A. Co.'s mines is conveyed along the private railway to the private shipping places of the company, where vessels of large size are loaded by simple shoots from the railway wagons. Everything connected with their works is substantially good, and the arrangements both above and below ground reflect the greatest credit on the manager of the works.

The Company is very wealthy; a great deal of the land in, and surrounding the town of Newcastle being their private property, and this land is being sold at from £3,000 to £5,000 per acre. There is no board of directors in the colony, and the whole executive power of the company is vested in the hands of the General Superintendent, and the Colliery Viewer, so that on the whole the A.A. Co. is in as good a position for

producing coal cheaply, and in large quantities, as any other mining establishment in the Newcastle District.

The coal from some of the other collieries is brought by private railways to the Hunter River, and there discharged into boxes placed in barges, which are towed down to the port by steam tugs to vessels anchored in the stream; the boxes are then lifted by steam cranes, and the coal discharged into the hold of the vessel, and the boxes replaced in the barges to be sent up the river again for a fresh supply. But the greatest quantity is brought by the Government Railway, in boxes containing four tons each, two of which are placed on one wagon; as the railway is continued to the end of the wharf, these wagons are placed close alongside the ships to be loaded; the boxes are then lifted by steam cranes from the wagons to the ships, the coal discharged, and the boxes returned to the wagons. This operation requires about four minutes, or one ton per minute, but allowing for the removal of wagons and other delays, one crane is capable of putting about 45 tons per hour on board ship; for the use of the cranes the Government charges 6d. per ton, and extra for the weight of the box, say roughly 2s. 6d. for each box of four tons. Doubtless before long arrangements will be made to elevate the railway high enough above the water to allow the wagons to discharge themselves at once into vessels, without the aid of these cranes, for fine pieces of machinery as they are in themselves, they are clumsy make-shifts when applied to shipping coals, and ought to be abandoned as soon as possible, for a bulky article like coal, should never be lifted after it is out of the mine, till it is put on board ship.

These remarks apply particularly to Newcastle, where the powers of producing coal, so far exceed the powers of shipping it; so not only are vessels often delayed for weeks in the port, but the mines are stopped because ships cannot be loaded fast enough. The great want at Newcastle is wharf accommodation, and an economical and expeditious mode of shipping coal.

The harbor itself is naturally pretty good, has been very much improved, and is still capable of great improvement, particularly in internal arrangements. It is formed by the mouth of the Hunter River, which discharges itself into the sea 75 miles north of Sydney; and is protected from the open sea by a reef of rocks which stretches out from the main land on the south side in a N.N.E. direction, nearly parallel with the line of coast north of the river; at the end of this reef there is an isolated flat rock, upwards of 100 feet high, on which the lighthouse and signal-station are situated. This reef, over which, in its natural state, the sea breaks furiously in east and south-east gales, has been taken advantage of as the foundation of a breakwater, which has been constructed at a great expense; so that now the interior of the harbor is thoroughly well sheltered from all weather. From the N. and N.N.E. it is naturally protected by the overlapping of the coast, so that the harbor is both safe and easy of access in almost any weather, and, except in severe E. and S.E. gales, can be entered or left at any time, indeed from what I have heard, there are very few days in the year, when vessels cannot enter or leave the port in safety. The breakwater, however, on which so much depends, will be a constant source of trouble and expense, for in S.E. gales, which prevail on this coast, the sea breaks heavily against it; when we were there it was very much injured, and except prompt and vigorous steps are taken, I will not be at all surprised to hear, that in some of these gales, the sea has made a clean breach through it, and exposed the inside of

the harbor to the open ocean. Of course this can be prevented, but I think it will be a difficult and expensive undertaking, permanently to secure such a work against the force of the waves.

The entrance of the harbor is by no means wide, and in one part it is divided into two narrow channels, by what is called the "Entrance Rock" nearly in the centre of the deep water passage, but, as it is well inside, and in smooth water, it is of comparatively little consequence. The least water is 20 feet with a rise and fall of tide of from $3\frac{3}{4}$ to 5 feet; ships of 1,000 tons enter the harbor but do not take a full cargo, I should say that vessels of from 300 to 600 tons are best adapted for it. There is a large extent of shoal water and mud-flat inside, extending for a considerable distance up the Hunter, much of this has been already reclaimed, and the work is still progressing, so that deep water frontage with valuable land for commercial purposes, is constantly increasing, and eventually the harbor will be able to accommodate a large fleet of colliers, even now it is a remarkably busy, lively, flourishing little port, and a wonderful example of what a place may be made by coal alone. A dozen years ago Newcastle was a mere village, with only one colliery of any importance working, and one horse tramway for taking coal from the mine to the shipping place, now it is a thriving district with a population of 8,000, nearly 4,000 of whom live in the town and suburbs, more than 1,000 tons of coal are shipped daily, the harbor is constantly alive with ships and steamers, and locomotive engines with trains of coal, and other goods, passengers, &c., are constantly rushing about, giving the whole very much the appearance of a small seaport town in England. It has a rapidly increasing trade, and a solid foundation of future prosperity, in its magnificent and inexhaustible coal-field, which is being worked and developed with talent, energy, and enterprise worthy of its vast importance.

I was informed by Mr. Winship, that on some estates of the A.A. Co, situated in Port Stephens, some 30 miles further along the coast, north of Newcastle, there is a seam of coal 30 feet thick, and an abundant supply of good ironstone in the immediate neighborhood, both near deep water frontage; this being the case, and Port Stephens being a very fine harbor, there can be little doubt, that before long, ironworks will be established there on a large scale, particularly as these valuable minerals belong to such a wealthy and enterprising company.

About 12 or 15 miles south of Newcastle, is the entrance of a very large inlet of the sea, or rather saltwater lake, called "Lake Macquarie." This lake is very irregular in shape, about 15 miles long, and varying in breadth from 1 to 5 miles; round its shores which are composed of the same regular flat sandstone formation, so characteristic of this part of the Australian Coast, a coal seam 13 feet thick crops out close to the water, so that vessels can be moored close alongside of the mouth of a mine; but this advantage is counterbalanced by the circumstance, that the entrance to Lake Macquarie, is not only exposed to the open ocean, but is very shoal, having a shifting bar, with a depth of only from 4 to 8 feet at high water. In spite of this very serious drawback, coal is about to be worked there, by an enterprising company, which has had two iron flat bottomed schooners sent out from England, for the purpose of conveying coal from there. I saw one of these vessels on the patent slip in Sydney, it was 90 feet long, 17 feet 6 inches broad, with 5 feet 6 inches depth of hold, registered 90 tons, but to carry 100 tons of coal when loaded, drawing at the same time 2 feet 9 inches of water, but with a centre board to be used when needed. That these vessels in spite of their peculiar con-

struction, are pretty good sea-boats, is proved by the fact, that they both sailed out from England; before a strong breeze they will go 11 miles an hour, and work to windward in a gale without ballast. This style of vessel might, I think, meet some of our requirements in New Zealand, particularly on the West Coast. Whether with such great disadvantages in harbor, the coal at Lake Macquarie will be able to compete with that of Newcastle, is yet to be proved, but the very attempt, shows the importance attached to this branch of industry in New South Wales; certainly to work a bar harbor, with only from 4 to 8 feet of water at high tide, and for colliery purposes, appears to me almost hopeless.

South of Newcastle and Lake Macquarie, the same formation continues, but the coal seams are below the level of the sea, and are not seen again till they appear on the coast about 40 miles south of Sydney, in the Illawarra district, where they are worked in various places, the principal being Bulli, Bellambi, and Wollongong. From this it would appear, that the whole of the coal-field is actually under the City of Sydney, though at what depth, or in what condition is not yet ascertained.

Being anxious, before leaving New South Wales, to see the southern part of the coal-field, and having letters of introduction from Mr. Watkins, of the New Zealand Bank, to Mr. Waring, Mayor of Wollongong, we started by railway from Sydney to Campbelltown, and took coach from thence. After passing a small village called Appin, about ten miles from Campbelltown, we rose rapidly on to a sort of barren table-land, covered with flat coarse sandstone rocks, stunted scrub, and a little native grass, the whole very much resembling the table-land of Mount Rochfort, both as to its geological formation, and the character of its vegetation. This continues for many miles, till the road begins to descend the seaward edge of the plateau, which is a steep mountain side about 1,500 feet above the sea, overlooking the coast from Bulli to Wollongong. On the side of this hill the coal crops out in thick seams, and has been traced 20 miles further south, gradually rising in that direction; there is no doubt that it extends under the table-land I have spoken of, thus forming a large district rich in coal, in a very accessible position.

At the edge of the plateau the character of the country rapidly changes, the stunted scrub is succeeded by fine heavy timber, with a dense growth of underwood and every indication of good land, this continues to the sea coast, and for 30 miles along it to the south, it is called Illawarra District, and is the finest country I have seen in New South Wales. With a long frontage to the sea it is backed by a range of mountains, along the side of which fine seams of coal can be worked by free level, almost the whole length of the district; the distance of these mountains from the sea in the widest part is about fifteen miles, and the whole of this is fine undulating country fit for agricultural purposes, it is extensively cultivated and laid down with artificial grasses, and is celebrated as a dairy district. But along the whole coast there is no good natural harbor, vessels generally taking in and discharging cargo in the open roadstead, or alongside of jetties put out into the open sea.

At Wollongong we visited the Mount Pleasant and Mount Keira mines, both working the same seam, which is about 7 feet thick, and crops out on the hill side about 600 feet above the sea, it dips into the hill about 1 in 20, and at Mount Pleasant is drained by a drift from a lower level, which cuts the seam 200 yards from the mouth of the mine, and the water

from the workings further in, is brought to this water level drift in wagons, three men being employed at this work night and day; but a new drift is in progress from a lower level still, which will drain a considerable breadth of coal further to the dip. The coal is brought out of the mine up a slightly rising tunnel by an ingenious arrangement of an extra drum on the self-acting incline, (which conveys the coal from the mouth of the mine to the level land below,) by which the full wagon going down, not only draws an empty one up from the bottom of the hill, but also a train of six half-ton wagons out of the mine at the same time. At Mount Keira a small steam engine is employed for that purpose.

The coal from both these mines, is conveyed down self-acting inclines to the level railway, in one case, (Mount Pleasant) by a single plane about half-a-mile long, at an angle of about 1 in $4\frac{1}{2}$ but the gradient by no means regular, the line, however, is perfectly straight, with three rails from top to bottom, and a short piece of double way in the middle; only one wagon containing 25 cwt. of coal is sent down at once, and requires $2\frac{1}{2}$ or 3 minutes to make the trip.

From Mount Keira, the coal is taken down from about the same height, by a series of three inclines, to suit the natural slope of the ground which has been very little changed, the rails being laid almost on the natural surface. The first of these, has a gradient of about 1 in 3 or $3\frac{1}{2}$, the second, 1 in 5 or 6, and the third so flat that it can scarcely work with good effect. Those gradients are not from accurate measurement, but roughly estimated, for in no case is it at all regular from top to bottom, but invariably the lines are perfectly straight. From the bottom of the hill the coal is drawn by horses about $2\frac{1}{2}$ miles along separate lines of tramway to the shipping place at Wollongong. These tramways are by no means substantial, being merely bars of iron fixed on wooden rails; and I was very much surprised to find the same rails not only on the level, but also on the remarkably steep inclines I have just described; certainly the traffic is not heavy, 100 tons a day being, I should say, very much more than an average from each place.

At Wollongong there is no natural harbor, but a roadstead, rather sheltered from the S.E. by a point of land and a reef of rocks. An artificial basin of small extent has been formed, where vessels of 80 and 100 tons load; and a new one is at present being made by the Government, at an enormous expense, as the whole is cut out of the solid rock, and the stone for the quay walls, &c., is brought from Sydney. The new basin is to be six feet deeper than the old one, which is also to be made the same depth, and the two united; to do this of course it will be necessary to dam the sea out for some considerable time, which will be a serious difficulty. The whole extent of the excavated harbor, when the two basins are united, will be about two acres, and besides this there will be anchorage for a few vessels in still water, behind the mole formed by the *debris* from the harbor excavations.

About 8 miles north of Wollongong are the mines of Bulli and Bellambi, the former of which we examined both above and below ground, the seam worked is the same as at Wollongong, but here it is only about 400 feet above the sea; it is about 8 feet thick with a dip of 1 in 20 in a northerly direction, and as it rises into the hill the water runs out of itself. It is clean coal the whole thickness, but very much disturbed by what the miners call rollers, which are formed by the floor of the seam rising in some cases nearly to the roof, and stone taking the place of coal; the roof is not altered in position by these irregularities, but is often soft and broken where they occur, and the coal itself is always injured a few feet on

each side of them. These rollers appear to be nearly parallel, and the idea suggested by them is that the coal has been deposited on a series of sandhills; of course, in the main roadways, these rollers must be driven through, and as the rock is often hard and difficult to work, this operation sometimes costs from £20 to £30. The coal between them is worked in places 6 yards wide; but the quantity lost and injured, over and above the trouble and expense, is a very serious drawback to the profitable working of this seam.

The coal is brought out of the mine in half ton wagons, six drawn by one horse; it is then screened into wagons holding 65 cwt., very strong and ponderous, and sent down a self-acting incline, one wagon at a time; this incline is about 600 yards long with a gradient of nearly 1 in 6, perfectly straight and with a double line of rails the whole distance. From the bottom of the incline the railway falls about 1 in 40 for a little more than a mile to the shipping place, so that the full wagons run down by their own weight, and are taken back when empty by horses and bullocks. All the railway work is good and substantial, the rails are malleable iron strong enough for light locomotives.

The shipping place is merely an open roadstead with no shelter whatever, and yet over the bare flat rocks a very fine jetty has been run out into the open sea. This jetty was originally constructed of a number of separate frameworks of four posts each, strongly braced together, and supporting a heavy beam on which the roadway (consisting of a double line of rails) rested; these frameworks were placed one in front of the other at intervals of 10 feet, strongly braced, but merely resting *on the rock*, with nothing to keep the whole fabric in its place but its own weight, and the way it was united into a compact and solid mass. A short time ago, the end of this jetty was washed away in a storm, and has since been replaced by a modification of the same plan, each framework having only two posts instead of four, placed at intervals of 25 feet instead of 10 feet, braced with iron, and the whole of the upper part of the roadway, &c., being very heavy. By this plan not only is there a great saving of timber, for in a (length of 50 feet only six posts are required instead of twenty-four,) but the whole thing offers much less resistance to the waves; and as it has stood several severe storms since it was repaired, sanguine hopes are entertained that it will be permanent. At the end of this jetty at high water there is a depth of 25 feet. It is a bold and spirited undertaking, and deserves success, and is another example of the difficulties which are met and overcome in developing this great coal-field.

The Bulli mine is let from year to year to a contractor, who delivers coal on board ship at 3s. 11d. per ton, the owners of the mine finding all the plant, and the contractor keeping everything in good order. Coal is put on board vessels of 80 or 100 tons here, taken to Sydney and there reshipped; a considerable quantity goes to China, where it is said to be in good demand, though it is inferior to most of the Newcastle coal.

The whole of this district is peculiarly interesting to us, for the position of the coal seams is very similar to those on the West Coast, and the mode of working is very much the same as must be adopted there.

With regard to the quality of New South Wales coal, the following tabular statement (copied from the *Sydney Morning Herald*, of Sept. 20th, 1862,) of the result of a series of trials made by order of the Lords of the Admiralty in 1862. And also some observations on these trials by Mr. H. Keene, Government Examiner of Coal Mines, will give a better idea of its value than anything I can say.

TRIALS OF AUSTRALIAN COAL.

Woolwich Dockyard, May 1, 1862.

Return to an Order of the Honorable the House of Commons, dated 5th June, 1862—for a Return “showing the result of the recent Experiments under the direction of the Admiralty, as to the Value for Naval Purposes, of Australian Coal.”

Number of Trial.	Company's coal tried.	Distinguishing Mark on Cases.	No. on Cases.	Date of the Trial.	lbs. of water evaporated to 1 lb. of coal consumed.		Cubic ft. of water evaporated per hour.		Per-centage of			Description of Smoke.
					Calculated at the temperature of the feed water.	Calculated at the constant temperature 1008.	Calculated at the temperature of the feed water.	Calculated at the constant temperature 1008.	Clinker.	Ash.	Clinker and Ash.	
1	Australian Agricultural ...	E over NSW in triangle. E LA Pit	1 to 8	1862. 16 April	8.16	8.54	45.6	47.74	1.35	5.79	7.14	Dark brown; large quantity
2	Tomago Coal ...	Ditto { TO LA }	62 to 73	17 "	7.48	7.82	45.14	47.21	4.83	5.59	10.42	Ditto ditto
3	Four Mile Creek Coal	Ditto M	8 to 13	19 "	7.74	8.08	47.26	49.42	1.18	6.41	7.59	Ditto moderate quantity
4	Coal and Copper ...	Ditto	9 to 17	22 "	7.91	8.24	44.68	46.55	3.33	6.22	9.55	Ditto ditto
5	Wallsend Coal ...	Ditto { WE LA }	1 to 8	23 "	8.22	8.57	50.63	52.8	1.21	4.30	5.51	Ditto ditto
6	Bellambi Coal ...	Ditto H	1 to 8	24 "	7.92	8.25	37.77	39.35	1.05	11.49	12.54	Light brown; small quantity
7	Mount Keira ...	Ditto { MK LA }	1 to 8	25 "	8.39	8.73	35.38	36.81	0.59	11.61	12.25	Dark grey; large quantity
8	Minmi Coal ...	Ditto { MI LA }	1 to 9	26 "	7.91	8.22	45.7	47.52	1.53	6.71	8.24	Dark brown; large quantity
9	Australian Agricultural ...	Ditto { AACF La Pit }	1 to 8	28 "	8.10	8.50	44.85	46.59	2.01	5.01	7.02	Ditto ditto
10	Tomago Coal ...	Ditto M	4 to 7	29 "	7.12	7.39	47.69	49.54	3.43	6.95	10.38	Ditto ditto
11	Tomago Coal ...	Ditto Ditto	74 to 76	30 "	8.61	8.95	49.15	51.11	2.75	8.60	11.35	Ditto ditto
	Average of North Country Coal ...	.....	...	...		8.25	...	47	1	4	5	

REMARKS:

1. Australian Agricultural Company.—This is good coal; the evaporative power being rather above the average; but the quantity of clinker and ash is rather above the average.
2. Tomago Coal Company.—The water evaporated per lb. of coal below the average of north country coal, and the rate of evaporation per hour is equal to the average of north country coal. The clinker and ash are large and spread, and stick to the bars, and their per-centage is high.
3. Four Mile Creek Coal Company.—This coal is about equal to the average of north country coal in evaporative power, and per-centage of ash is rather above that of north country coal.
4. Coal and Copper Company.—The rate of evaporation is below that of north country coal. A large quantity of clinker and ash; the clinker forms quickly, causing much trouble in stoking.
5. Wallsend Coal Company.—Very good in every respect.
6. Bellambi Coal Company.—Very inferior coal; the rate of evaporation being very low, and the quantity of ash being great.
7. Mount Keira Coal Company.—Very inferior coal; the evaporative power being very low, and the trial giving a large quantity of ash.
8. Minmi Coal Company.—Good coal, about equal to the average of north country coal. The per-centage of ash is rather high.
9. Australian Agricultural Company.—Good coal, about equal to the average of north country coal. The per-centage of clinker and ash is rather high.
10. Tomago Coal Company.—This coal is rather below the average, and the quantity of clinker and ash is great.
11. Tomago Coal Company.—The evaporative power of this coal is very high, but the quantity of clinker and ash is great.

C. H. PENNELL, Chief Clerk.

Admiralty, 19th June, 1862.

The Examiner of Coal-fields took this complicated table, and reduced the experiments to an average, thus expressing the result in the most simple form as below, viz. :—

“Average result of the trials of Australian coals, compared with the average of English north country coals.

“1st. The Woolwich apparatus or 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 46½ cubic feet, or a hundred and eighty-eighth part less in the same time of one hour.

“2nd. One pound of English north country coal evaporated 8.25 lbs. or 8¼ lbs. of water; and 1 lb. of Australian coal evaporated 8.258 lbs., being a small fraction more than a pound of English coal.

“3rd. The average of English coal gives one per cent. of clinker; the Australian, 2.11 per cent., or rather more than double.

“4th. Of ash, the average English coal is 4 per cent., against 7.15 per cent. of Australian; and of ash and clinker together, the English coal is stated to give 5 per cent., while our own leaves 9¼ per cent.

“5. We thus see that average Australian coal excels average English north country coal in power of evaporation; for one pound of our coal evaporates more water than a pound of English coal; and in time, that is to say the evaporation per hour, the difference against us is so insignificant as not to be worth attention.

“6. The quantity of residue or ash to be thrown away is of little consequence when the evaporative power of the coal is so equal.

“We may fairly assume that the English coal as supplied to Woolwich has attained its highest average, while the coal of Australia is an improving average.

“Mr. Keene shows that according to the Admiralty Report itself, Australian coal excels average English north country coal in power of evaporation; for one pound of our coal evaporates more water than a pound of English coal; and the result is that the Lords of the Admiralty have given orders that our coal shall be used in Her Majesty's ships on the station here; so that we see before us a large amount of prosperous occupation and investment for capital in working our coal-fields.”

It will be seen from the foregoing table and remarks, there is a great difference in the quality of New South Wales coal, that from the Newcastle district, viz. : Nos. 1, 2, 3, 4, 5, 8, 9, 10, 11 is generally speaking superior to that of the south part of the field in the neighborhood of Wollongong, viz. : 6 and 7, Bellambi and Mount Keira; and this is borne out by my own observation.

It will be interesting here to compare the above remarks on the Australian coal, with the report of Dr. Percy on a small sample from the River Grey, sent to England by Messrs. Curtis, of Nelson. It must be remembered that this coal was taken from the very outside long before the seam had been worked into at all.

“Metallurgical Laboratory,
Government School of Mines,

May 14th, 1861.

“SIR—

“I have now the pleasure of enclosing the analysis of the coal ex *Cresswell*, from the West Coast of the Middle Island of New Zealand.

“In composition, this coal is nearly identical with coal occurring in some of the coal measures of this country. The coal from New Zealand is a coking coal, that is, when powdered and heated in a close vessel, it affords a coherent coke, the original bulk of the coal being considerably increased during the operation. The gas which was disengaged appeared to possess a highly illuminating power as far as could be ascertained from the small quantity of coal experimented on, the residual coke amounting to 64.32 per cent.; the quantity of coke, however, obtained on so small a scale must not be taken as an exact indication of the yield by the ordinary processes. The ash of this coal is more than usually white, which shows that the sulphur does not exist in the form of iron pyrites.

"COMPOSITION OF COAL IN 100 PARTS.

" Carbon	...	...	...	79.00
" Hydrogen	...	...	...	6.35
" Nitrogen	...	...	...	0.89
" Oxygen	...	...	...	7.71
" Sulphur	...	...	...	2.59
" Ash	...	...	...	3.50
" Water (Hydroscope)	...	...	...	1.05
				100.00

"I remain, &c.,
"JOHN PERCY."

"J. L. CURTIS, Esq.,
9, Aldermanbury Place, London."

Not having an analysis of Australian coal, I cannot compare the exact composition of each, but it will be observed that while the Grey coal contains a large per centage of carbon the quantity of ash is very small indeed, and nothing is said about clinker, so I presume 3.50 per cent. is the whole of the incombustible matter contained, in this respect it compares very favorably both with English and Australian coal.

	Ash.	Clinker.	Ash & Clinker.
English Coal	4	1	5
Australian Coal	7.15	2.11	9.26
Grey Coal	3.50		3.50

And this is proved to be the case in actual practice, for whenever the coal is used in steamers, as it is now constantly in the *Nelson* and *Wallsby*, the absence of clinker is very remarkable.

I will now make a few remarks on the above observations: in the first place, it is very singular that at Newcastle it costs 7 or 8 shillings a ton to put coal on board ship without calculating anything for profit; whereas, as before-mentioned 3s. 11d. is the contract price (including, I presume, a margin for profit,) at which it is delivered on board at Bulli, near Wollongong, actually for less than the mere digging costs at the A. A. Co.'s mines at Newcastle, though the seam there is 3 feet higher and the working places 6 feet wider than at Bulli, and at the same time not troubled with rollers; in every respect the seam at Newcastle, is more easily worked, so far as the actual digging is concerned. It is true that at Bulli and Wollongong they have great advantages, in not being obliged to sink and employ expensive machinery for pumping and winding; but this will not account for the great difference in cost, which in my opinion is more owing to social and political, than to physical and mechanical causes. At Newcastle there is, and has for some time been a workmen's union, which has exercised a very prejudicial effect, both on the owners of mines and the workmen themselves. The great object seems to be, not only to equalize the earnings of the men, but also the profits of the employers. One rule is that no man shall be allowed to earn more than 11s. 4d. a day, though he may be quite able to make twice as much in an ordinary day's work. They also endeavor to regulate the working expenses by an attempt to equalize prices, independent of natural advantages or disadvantages. For instance, if the coal in A.'s mine requires 1s. per ton to work it, and B. can work his for 2s., it is considered that B. has an unfair advantage over A.; therefore B. shall pay the same as A. Again, the union dictates to masters what men shall be employed and dismissed, the amount of fines, &c., to be levied for breach of contract, &c. In short, that the whole mining interest in the Hunter River district shall be governed jointly by the representatives of labor and capital, and that the latter shall hold a very subordinate position in

the consideration. The tendency of the whole system is to reduce the rate of earnings of industrious good workmen, to the same level as lazy and inefficient men; and to lower the profits of favorably situated mines, to the same standard as those with fewer natural advantages.

I do not mean to say, that the union has been able to carry out the whole programme in its grand integrity, and so reduce everything to the desired level, but there is no doubt, that to a considerable extent, the industry and enterprise of the place has been paralyzed by its operation.

It is difficult to understand how a system having such absurd objects in view, and so prejudicial in its working both to labor and capital, should have such large support; had the object been merely to raise the rate of wages and otherwise better the condition of the laboring classes, it would have been simple; but to support a society the object of which is to reduce labor to the lazy man's standard, and to meet natural advantages with artificial impediments is quite incomprehensible. It is an example of the length of absurdity, to which a body of people may be led by a few unscrupulous men, who hide their own selfish motives under the cloak of philanthropy, and absurd notions on liberty and equality. I never heard it whispered, but I cannot help suspecting, that this union must have sanction and support from others besides the laboring men, can it be that owners of inferior collieries encourage it as a means of fettering their more fortunate rivals? If so, I expect they are making a rod for their own backs, for I am mistaken if we do not hear more of the Miner's Union before we are done with it.

To Mr. Winship, the Colliery Viewer of the A. A. Co.'s works, the whole mining interest is deeply indebted, for the determined stand he has made for some years against the union; I believe it is mainly owing to his talents, energy, and unflinching resolution, that the coal owners of New South Wales are not now almost entirely under the control of this miserable society. And though he has done much in the cause, I fear there is a long and hard struggle before it will be finally crushed, and this district freed from the unnatural incubus, which now almost neutralises the advantages of its grand natural resources.

I have said more on this subject than I intended, but it is of great importance, and though not immediately affecting us there is no doubt that as the industry of New Zealand is more developed we may expect to suffer from like causes.

In the Wollongong district this union has never got foot hold, though attempts have more than once been made to establish it there. Partly from this and partly from the peculiarly favorable position of the seams, the coal of this district, in spite of its inferior quality, and the want of harbors, can compete advantageously with Newcastle in the Australian and foreign market; and the energy and enterprise of the people, and the Government, are doing wonders to supply the natural wants of the coast by artificial means; so there is no doubt that the coal alone will very soon make this one of the most flourishing districts in the colony.

This part of the coal-field is peculiarly interesting to us in Nelson, as in many ways it resembles our own on the West Coast; superior to it in having the coal more accessible, both as to distance and elevation, but inferior in having no natural harbors, and also in the quality of its coal.

The working, or rather, I believe, the intention of working coal at Lake Macquarie, is another instance of the bold way in which difficulties are met in order to get a share in the coal trade; for here is a place which cannot be dignified with the name of harbor, having only from 4 to 8 feet of water at high tide, and that on a shifting bar, exposed to the open ocean, without the least shelter from any wind, boldly entering into competition with such a place as Newcastle; and probably before long a large quantity of coal will be sent from there, in spite of the great disadvantages in harbor.

With regard to the mode of acquiring land for coal mining in New South Wales, I will enclose with this report "The Crown Lands Act of New South Wales for 1861," from which it will be seen, that, under certain regulations, mineral land can be purchased for £2 per acre; or leased for 14 years for 5s. per acre per annum, with power to renew the lease for 14 years. No royalty is charged, but it is to be remembered, that the most favorable places for working coal, have long since been either purchased or leased, so that new companies starting enter at once into competition with old established firms, probably in more favorable positions.

In conclusion, I have only a few remarks to make on the prospect of our Nelson coal competing with that of New South Wales, in the market of the world.

In the first place all that I have seen has not changed my opinion as to the value of the Nelson coal-field; but it has opened my eyes to the fact that New South Wales is a more formidable rival than I had anticipated, both as to its natural resources, and also the facilities with which land for mining purposes may be acquired in that colony. It is quite evident that the Government of New South Wales does not look for any *direct* pecuniary advantage from the working of its coal-field, and on the contrary, spends large sums of money in developing its resources, without any hope of increased revenue to be derived *immediately* from such expenditure. But the *indirect* advantages are so enormous, as fully to justify the sacrifice of royalty, &c.

If anything was needed to illustrate the wonderful impetus which the working of coal gives to a community; the present state not only of Newcastle and the other coal producing districts, but of Sydney itself, would be sufficient to demonstrate it fully. No one who sees the rapid progress made in all kinds of engineering work in that fine city, and the large fleet of steam vessels of all classes, which crowd Port Jackson, can fail to recognise the fact, that coal is the great engine which has raised New South Wales to its present state of prosperity, and will eventually make it, one of the greatest, if not the greatest country in the southern hemisphere.

Seeing this ought to make us doubly anxious to develop our coal, for though we cannot hope to rival the vast and almost boundless resources of that great country, we have a coal-field capable of doing as much in proportion for this part of New Zealand, as has been done for New South Wales, by the coal deposits on the east coast of Australia.

If the requisite amount of capital was judiciously expended on our coal-fields, I have very little doubt that we could put an equally good, if not superior coal on board ship at as low a price as is at present done in Newcastle, viz: 9s. per ton; and even at that, leave a very fair profit for the producer. See my report of September 3rd, 1862, where the estimated cost of putting coal on board ship at the Buller, is 8s. 2½d. per ton; see also Mr. Blakett's report of

May 4th, 1863, his estimates from three different quarters being as follows:—

*Buller railway, 12½ miles ...	7s. 11½d. per ton
" " 9 miles ...	7s. 0½d. "
Grey " 7½ miles ...	6s. 8d. "

These estimates include interest of capital at 10 per cent. and a considerable margin for contingencies. It must be remembered that when they were made, coal was sold on board ship at Newcastle, at from 13s. 6d. to 14s. 6d. per ton.

Then again Newcastle has a great advantage over us, in being able to employ larger vessels than our harbors will admit; but I have shown, that in several parts of New South Wales, coal is actually shipped in the open roadstead, so that need not discourage us.

Now though there is no hope of competing with Newcastle in the Sydney market, I think there is a fair chance of getting some share of the Melbourne trade (which in itself is upwards of £200,000 a year), and also of that of Southern and Western Australia. But setting the Australian market on one side altogether, we could command the trade of New Zealand, which is no small matter in itself, and would very soon be doubled, if coal could be supplied to steamers in our principal ports, at from 20s. to 25s. per ton, which could at once be done if our coal-fields were opened.

The probability that the Panama route will be established in a few years, is in itself a guarantee that our home market will shortly be a most important one; and we may add, that if there was a certainty of our coal-fields being opened, it would have more effect in establishing that important line, than all the acts of the New Zealand legislature can do in the matter. The impetus which the Panama route will give to commercial enterprise and steam navigation, among the islands of the South Seas, and along the western shores of South America, will open a new market for coal, in which our geographical position, gives us a great advantage over Australia; but where doubtless we will come into competition with the coal-fields of Vancouver's Island.

How far the coal which has lately been found near the Bay of Islands, may be able to compete with Nelson—either as to quality, quantity, or facility for working I can form no opinion; one thing I believe is certain, it is *true coal*, and from the newspaper accounts appears to answer for steam purposes. Before leaving Nelson for Australia, Mr. Busby, of the Bank of New South Wales, gave me a sample of it, which was left for analysis with Dr. M'Adam, Professor of Chemistry, in the University of Melbourne, along with samples from the Grey and Buller.

I am more and more convinced, that the prosperity of Nelson depends almost entirely on its coal-fields, if they are judiciously and energetically worked, it will become one of the most prosperous provinces in New Zealand. If not it must sink into poverty and insignificance.

I cannot help expressing how much I feel obliged to many gentlemen, both in New South Wales and Victoria, for the kind courtesy shown to us on all occasions, and for the liberal spirit with which information has been conveyed and assistance given to us, in the prosecution of our inquiry; not only on the coal-fields but on all matters connected with our expedition.

*NOTE—This is the same as is estimated by me at 8s. 2½d. per ton.

I regret very much, that in drawing up this report I have not had the advantage of Mr Blackett's assistance, but as he has just returned I will submit it to him; we were constantly together in the examination of the coal-field, and probably he may supplement it by additional information and his own remarks.

I have, &c.,

JAMES BURNETT.

Nelson, January 14, 1865.

To the Provincial Secretary, Nelson.

SIR,

Although I was associated with Mr. Burnett in the examination of the New South Wales Coal-fields,

and accompanied him throughout, I left to him the task of reporting on them, as being more immediately in his department.

I beg, however, to state that I can add nothing of importance to the facts described therein, or to the general remarks embodied in the report; the whole of which, I think, are calculated to convey a clear and accurate notion of the enormous extent and value of that most important section of the Colony of New South Wales.

I have, &c.,

JOHN BLACKETT,

Provincial Engineer.