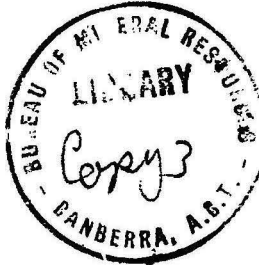


COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF SUPPLY AND SHIPPING.
BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS.



REPORT No. .

Records 1950/26.

The coal resources of New South Wales.

by

H.B.Owen and G.M.Burton.

THE COAL RESOURCES OF NEW SOUTH WALES.

RECORDS 1950/26.

(Revised October 1950)

BY

H. B. OWEN and G. M. BURTON.

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THE COAL RESOURCES OF NEW SOUTH WALES.RECORDS 1950/26.(REVISED OCTOBER 1950)ByH. B. OWEN and G. M. BURTONSUMMARY.

The tables accompanying these notes set out the estimated reserves of coal in New South Wales. Emphasis has been laid on reserves of coal which lie at a shallow depth below the surface and are suitable for open-cut mining.

Proved and inferred reserves of coal available to open-cut mining are given in Tables 2a and 2b, and are compiled from :

- i estimates made by the Joint Coal Board,
- ii estimates made by the Bureau based on information supplied by the Joint Coal Board.

Figures for total coal reserves in Tables 1, 3 and 4 have been made available by the Department of Mines, and are confidential. Total reserves for all coalfields are summarized below; these figures include the coal reserves which are available to open-cut mining.

Total Reserves of Coal to depth of 1,000 feet.

<u>COALFIELD</u>	<u>Reserves : Millions of Tons.</u>			
	<u>Actual</u>		<u>Probable</u>	
	<u>Grade</u>		<u>Grade</u>	
Northern	A	1,780	A	455
	A.B.	170	A.B.	1,590
			A.B.C.	100
		<u>1,950</u>		<u>2,145</u>
Central	A	90	A	450
Southern	A	700	A	1,900
	A.B.	75	A.B.C.	250
		<u>775</u>		<u>2,150</u>
Western	A	50	A.B.	90
	A.B.	465	A.B.C.	400
			B.C.	50
		<u>515</u>		<u>540</u>
Ashford	A	5	-	-
Coorabin	-	-	B.C.	50
TOTAL		<u>3,535</u>		<u>5,355</u>

The information contained in Tables 2a and 2b may be summarized in the following form:-

Open-cut Coal Reserves.

<u>Reserves in Tons.</u>			
<u>Western Coalfield</u>	<u>Proved</u>	<u>Inferred</u>	<u>Total</u>
Ben Bullen	3,300,000	2,000,000	5,300,000
Western Main	7,230,000	5,460,000	10,690,000
Other	3,050,000	54,000	3,104,000
	<u>13,580,000</u>	<u>5,514,000</u>	<u>19,094,000</u>
<u>Northern Coalfield.</u>			
Muswellbrook	-	5,200,000	5,200,000
Liddell-Newdell	3,750,000	10,250,000	14,000,000
Foybrook	4,250,000	2,250,000	6,500,000
Pike's Gully	4,500,000	3,500,000	8,000,000
Newraven	6,000,000	18,300,000	24,300,000
Other	7,150,000	2,150,000	9,300,000
	<u>25,650,000</u>	<u>41,650,000</u>	<u>67,300,000</u>
TOTAL	59,230,000	47,164,000	86,394,000

Exploration of the Northern field for open-cut coal reserves is far from complete. It is probable that extension of sub-surface testing over wider areas in the coal basin between Greta and Muswellbrook might disclose additional reserves of coal, but in the absence of detailed knowledge based on deep drilling in the basin it is not possible to indicate what the size of such reserves might be.

INTRODUCTION.

This report has been written as the result of conversations between the writers and officers of the Joint Coal Board in Sydney, Lithgow and Cessnock, and with similar assistance from the Geological Survey of New South Wales. The writers visited the Western and Northern coalfields during August and inspected most of the operating open-cuts.

The results of the enquiries are presented in five tables which are set out at the end of this report and which contain, in statistical form, the greater part of all the information elicited. The text matter of the report is explanatory of the tables and also discusses the methods which have been used in arriving at the estimates of coal reserves.

In the ensuing discussion emphasis has been laid on coal reserves available for open-cut mining, and all enquiries directed to the Joint Coal Board were concerned with open-cut coal only. With the exceptions of the figure given for Ashford and the combined figures given for Liddell State Coal Mine Reserve and Liddell Colliery open-cut area, the estimates of open-cut reserves in Tables 2a and 2b are derived from information supplied by officers of the Joint Coal Board. The combined figures for Liddell have been made available by the N.S.W. Geological Survey, and the Ashford estimate is based on an examination of the Ashford coalfield by the Bureau of Mineral Resources.

Independent computations of tonnage have been made by the Bureau from information supplied by the Joint Coal Board, and so far as these calculations could be completed, they have yielded results in fair agreement with those of the Board.

It was not found possible to make a complete and independent check of the Board's estimates of open-cut reserves for several reasons.

- (1) Any such check that was made could spring only from data supplied by the Joint Coal Board and consequently could be a test of arithmetic only.
- (2) In many instances the data made available by the Board was not in a form on which reliable quantitative calculations could be based. For example, plans showing the positions of test-bores were drawn to a scale of 1 inch equals 40 chains which is much too small to permit accurate measurement of the area tested.
- (3) Estimates made by the Bureau of Mineral Resources necessarily include all coal intersected by test bores irrespective of quality, as the Bureau is not in possession of sufficient information to permit a distinction to be made between marketable and non-marketable coal. On the other hand the Joint Coal Board's estimates have been made by officers familiar with the areas.

The estimates of reserves shown in the tables are given in round figures many of which are based on precise calculation. The round figures quoted are, however, more in accordance with the accuracy and completeness of the testing. In some instances figures are given for areas in which testing is still proceeding. Some figures, not resulting from recalculation by the Bureau, have been given by Coal Board officers speaking from their experience of the area in question and are subject to modification.

The preceding paragraph applies with more force to the Cessnock District than to the Western Coalfield, where testing has been brought nearer to completion.

Sub-surface testing has been done mainly with percussion (churn) drills using chisel or star bits and side-cutters. This drilling does not return a solid core and samples are recovered as a watery sludge of fine particles. Most of the churn drilling was done without using casing, as casing was difficult to procure at the time. The holes stood well without it and its use would have increased the cost and delayed the results of the campaign.

Sampling by churn drilling without casing is liable to inaccuracy due to the possible admixture of overburden material with coal samples. This, in turn may lead to misinterpretation when results are being assessed, either by rejection from the reserves of accidentally contaminated coal, or by mistakenly ascribing inherent and banded ash to accidental admixture of overburden.

It is not suggested that the Joint Coal Board's engineers were unaware of the shortcomings of percussion drilling as a means of sampling coal; they had no choice as adequate core-drilling plants and labour for pit-sinking were not available.

DEFINITIONS.

In Tables 1, 3 and 4 the grades A, B and C are applied to the quality of the coal reserves. The original definitions for these grades used by the N.S.W. Department of Mines (who prepared the original tables from which these have been adapted) are given below. It should be noted that the last ten years or so have seen an upward movement in the percentage of ash in coal as mined. As a result some of the best coals although classed as A grade do not strictly fit in the ash limit of the definition of A grade coal. The same can be considered true of B grade coals.

Grade A. The best coal of each field suitable for steam-raising, gas-making, coking, and household purposes, with ash content ranging from 5 to 15 per cent., and a calorific value of 11,500 to 13,500 British thermal units.

Grade B. Coals with lower calorific values and higher ash content than those of Grade A, but suitable for use as mined, with ash content ranging from 15 to 20 per cent., and a calorific value of 10,000 to 11,500 British thermal units.

Grade C. Coals from inferior seams generally, with a high ash content, but suitable for use after washing or flotation. Ash percentage exceeding 20.

Also in Tables 1, 3 and 4 the terms Actual, Probable and Possible have been used. These are defined by the Department of Mines as follows:-

Actual Reserves include the coal within colliery holdings proved for the most part by underground workings and partly by borings.

In the preparation of this estimate only the quantity of coal in the seam or seams actually worked is taken into account, although other seams of commercial coal may be known to exist within the colliery holdings.

The average total thickness of the seam, not the thickness actually worked in the colliery, has been taken as the basis of calculation; thus the calculated actual reserves are somewhat larger than the quantities that may be won from the seams now being worked.

For the estimation of reserves the specific gravity of the coal in each individual colliery has been considered.

Probable Reserves include the coal within areas in which particulars of thickness and quality of seams have been obtained definitely from evidence afforded by outcrops, prospecting shafts, tunnels, and bores. An area of 1 square mile around a locality where a seam has been proved is taken generally as the limit of probable reserves. In some places, however, exceptionally favourable geological conditions have allowed these limits to be extended. In the calculation of probable reserves an estimate of 1,500 tons per acre foot has been employed.

Possible Reserves include the coal within those areas in which the coal measures are known to exist, but in which evidence as to thickness and extent of coal seams is not sufficient to allow a definite estimate to be given. These reserves are expressed in relative terms only.

The open-cut reserves in Table 2 cannot be divided into the Actual, Probable and Possible categories as defined for Tables 1, 3 and 4. Consequently the terms Proved, and Inferred are used. (The factor used in converting an acre-foot of coal to tons ranges between 1400 and 1600 depending upon the specific gravity of the coal.)

Proved Reserves are those reserves which have been largely explored by drilling but not necessarily exposed over any large area by workings. In some places further tests of the quality of the coal may lead to estimates being reduced.

Inferred Reserves are reserves which on the evidence of the general geology, a limited number of drill holes or evidence in adjoining proved areas, can be considered as proved with a fair degree of probability.

GEOGRAPHICAL DISTRIBUTION.

The coal deposits of the State occur in four separate areas designated Coal Provinces, which are known as (a) Main, (b) Clarence, (c) Riverina and (d) Ashford Coal Provinces respectively.

The Main Coal Province occupies an area of approximately 16,000 square miles and includes the Northern, Central, Southern and Western Coalfields.

The Clarence Province is bounded on the north by the Queensland border and on the east by the Pacific coast. Its total area is about 7,500 square miles.

The Riverina Province includes the Coorabin Coalfield in the vicinity of Oaklands and Urana, approximately 60 miles north-west of Albury.

The Ashford Province is a small area 45 miles north of Inverell.

COAL RESERVES AVAILABLE FOR OPEN-CUT MINING.

Of the four Provinces mentioned above only two - the Main and Ashford - contain reserves of shallow coal available to open-cut mining, but the reserves at Ashford are insignificant in comparison with the resources of the Main Province.

Open-cut reserves contained in the Main Province are confined to the Northern and Western fields and, as indicated previously, the known reserves in these coalfields are set out in detail in Tables 2a and 2b, together with explanatory notes.

Total open-cut reserves revealed by exploration to a recent date are:

<u>Coalfield.</u>	<u>Proved.</u> Tons	<u>Inferred.</u> Tons	<u>Total.</u> Tons
Western	13,580,000	5,514,000	19,094,000
Northern	25,650,000	41,650,000	67,300,000
TOTAL	39,230,000	47,164,000	86,394,000

or in round figures

86,000,000 tons.

Within the Main Coal Province the areas in which open-cut mining ~~are~~^{is} likely to be possible are limited by certain geological and geographical features. South of a line joining Awaba and Lithgow younger rocks from 300 to 3000 feet in thickness cover the coal seams. North of this line open-cut mining can be developed where erosion has removed the cover of younger rocks. Suitable areas are known along the western scarp of the Blue Mountains and in the Wolgan, Ulan, Wollar, Goulburn and Hunter Valleys.

Along the western scarp of the Blue Mountains a number of areas in the Lithgow district have been geologically mapped and tested by drilling and pit sinking. In this district the open-cut coal is restricted to two major seams, the Lithgow and Lidsdale, and one seam of minor importance, the Irondale. Other seams crop out high up on the cliff sides and cannot be worked by open-cutting. The Lithgow, Lidsdale and Irondale seams maintain a fairly constant thickness and quality over most of this area and it has been reasonably easy to locate potential open-cut deposits and calculate their reserves.

The Hunter Valley and an area adjoining Newcastle are the main districts in which geological conditions are favourable for open-cutting. Much prospecting by mapping and drilling has been done in these districts.

The main areas defined by this work are described in the following section:

Western Coalfield

Problems associated with measuring reserves of shallow coal on the Western Coalfield are relatively simple when compared with those of the Northern Coalfield.

In the areas suitable for open-cut operations only two coal seams (Lidsdale and Lithgow seams) occur, except for the unimportant Irondale seam; in the northern part of the field the sandstone separating the Lidsdale and Lithgow seams dies out, and the Lidsdale merges with and becomes indistinguishable from the lower Lithgow seam.

No difficulties in correlation of seams, such as arise in the Northern field, are present in the Lithgow district.

All potential open-cut areas from Ben Bullen south have been examined with a degree of thoroughness that renders the discovery of new areas unlikely. Extension of exploration from the known areas to include coal under cover exceeding the ratio 8 : 1 is not likely to increase reserves appreciably except at Ben Bullen, where limited testing has been done and the estimated increased reserves already taken into account.

Ben Bullen.

Only the Lithgow seam is present at Ben Bullen. The seam ranges in thickness from 3'11" to 6'8" and thickens towards the east and south. Reserves have been computed using the factor 1 cubic yard equals 1 ton.

Western Main.

A total of 87 bores has been sunk in an area of 700 acres in and adjoining Portion 19, Ph. of Cox Co. Cook, and the Lidsdale seam is being worked by open-cut near the north-east corner of Por. 19. South-west from the open-cut the Irondale seam has been proved by boring and eventually the three seams

Irondale, Lidsdale and Lithgow may be worked in this area, but the quantity that can be recovered from the Irondale seam is almost negligible.

The tonnage quoted as proved reserves has been computed for an area of 433 acres in the northern part of Por. 19 and adjoining parts of Portions 67 and 42; the probable reserves lie mainly in Por. 260 adjoining Por. 19 on the south-west. Calculation by the Bureau of Mineral Resources of coal reserves at Western Main using data from all bores and a conversion factor of 1 cubic yard equals 1 ton gives the following proved reserves.

		Tons.
Lidsdale seam	--	2,687,000
Lithgow seam	--	<u>4,482,000</u>
		<u>7,169,000</u>

Kerosene Vale.

Initial estimation of reserves of commercial coal based solely on churn drilling results gave a total exceeding 4,000,000 tons but this figure has been reduced to 1,200,000 tons by the elimination of coal of poor quality and by the reservation of some of the area for underground workings and surface buildings of Newcom Colliery.

Clandulla. A large body of shallow coal, very tentatively estimated by the Joint Coal Board to contain 10,000,000 tons, is known near Clandulla 4 miles south of Kandos. The coal contains many bands and has a high ash content (approximately 23 per cent.) but is believed to be amenable to washing. This deposit is not included in Table 2a.

Wolgan, Ulan and Wollar valleys. Future prospecting may reveal coal at shallow depth suitable for open-cutting in these valleys, but prospecting may be slow and the results disappointing. The terrain is rougher than on the more south-westerly parts of the Western field. It is known that the coal seams now being mined by open-cut methods deteriorate in quality to the east, although the Katoomba Seam which is at a higher horizon, improves in this direction. Unfortunately the Katoomba Seam mainly occurs in the cliff sections and very little of it may be available for open-cutting.

Northern Coalfield - Cessnock District.

For the purpose of these notes the Cessnock District is defined as the area administered from the Cessnock office of the Joint Coal Board and includes that part of the Northern Coalfield which lies north and west of the Sugarloaf Range, the North-Western Coalfield and outlying districts such as Gloucester, Ashford, Clarence, etc.

Systematic proving of reserves of coal for open-cut operations is not as complete in the Cessnock district as in the Western field partly because of the greater area to be covered and partly because of the greater complexity of the geology of the northern field.

In the Western District the two principal seams available for open-cutting - the Lidsdale and Lithgow seams are known to be continuous over wide areas and to be reasonably constant in thickness. On the other hand some of the numerous coal seams that occur in the Upper Coal Measures are known to be lenticular and consequently the continuity of seams between adjoining properties or even between adjacent boreholes, unless

closely spaced, is uncertain.

Another difficulty arises from the presence of numerous coal seams in the basin (sixteen seams have been intersected in the Glendonbrook area), which render correlation of the results of widely spaced bores virtually impossible. In such circumstances the estimation of possible reserves in areas that have not been closely drilled is liable to wide error.

Muswellbrook. Estimates by different authorities of open-cut reserves at Muswellbrook differ according to the number of seams included. The estimate given in this report, 5,200,000 tons, is by the Joint Coal Board and represents reserves contained in the four seams now being worked. Estimates by the N.S.W. Geological Survey are higher, but probably include the fifth seam.

Liddell Colliery. Important reserves of coal under comparatively shallow cover are contained within the colliery holdings. Part of the area has been closely bored.

The estimates of reserves in the area north of Liddell Colliery and in the State Coal Mine Reserve at Liddell have been supplied by The Government Geologist, Department of Mines, Sydney. The figures for the two areas have been presented in Table 2b in such manner that their identity is lost because separate figures for the Liddell holding are the property of the company and cannot be disclosed.

Newraven. This area, bounded on the east by the New England Highway at Ravensworth is probably the most important in the District. Reserves proved by close boring in a strip parallel to the highway amount to approximately 6,000,000 tons.

Three bores, including one diamond drill hole, have been sunk on a line extending about $\frac{3}{4}$ mile westward from the closely drilled area. The results do not admit of easy interpretation without additional drilling, but on the assumption that the seam intersected by the diamond drill is continuous with that near the road, the westerly line of bores indicates an additional body of coal totalling about 18 million tons. This figure, however, must be accepted with reservation.

Mitchell's Flat. 8 miles east of Singleton two bores have been sunk in this area, and have shown the presence of numerous coal seams mostly less than 2 feet in thickness but including two seams 26 and 5 feet thick respectively. The area is believed to be much disturbed and interpretation must await further drilling and geological examination.

Caldare. The open-cut at Caldare is flooded and is being filled to prevent seepage of water into nearby underground workings.

Shallow Colliery Workings near Cessnock. There is a possibility that pillar coal could be recovered from old underground workings by stripping the cover with the heavy earth moving equipment now available.

Ashford. The figure for Ashford coalfield has been taken from the records of this Bureau, and result from a core-drilling campaign conducted under geological supervision.

Further exploration: Northern Field. In addition to the work in hand, considerable scope exists for further sub-surface prospecting for open-cut coal in the Northern field, particularly in the large area occupied by the Upper Coal Measures lying to the west and south-west of Ravensworth.

Information of considerable value would be derived from the early completion of systematic drilling in the immediate vicinity of Newraven open-cut.

TOTAL COAL RESERVES.

The figures quoted in Tables 1, 3 and 4 show total coal reserves in the various coalfield districts and include the open-cut reserves. The information has been supplied by the Department of Mines and is at present confidential.

The estimates are based on calculations of reserves made in 1927 by the Chief Mining Surveyor and have been kept up-to-date by the Mines Department, partly by deduction of current coal production, and partly by reassessment from new data.

It should be pointed out that useful reserves are depleted during mining not only by the quantity of coal brought to the surface, but also by the coal which is left underground as pillars and in roofs, etc. and, which may never be recovered. It is essential, therefore, that in making periodic adjustment of reserves, pillar and other irrecoverable coal, should be taken into account. The extent to which pillar coal has been taken into account in assessing present reserves, if at all, is not clear.

Maitland-Cessnock District. In Table 4 the actual reserves in this district are given as 1015 million tons. This figure allows for coal brought to the surface since the original estimate was made but includes the coal unavoidably lost in mining, and which should be deducted.

Since 1903 approximately 140 to 150 million tons of coal have been won from this area, but at the estimated recovery of only 30 per cent this means that about 280 million tons of the stated 1015 million tons remains in pillars, roofs etc.

Applying this argument to the southern portion of the Maitland-Cessnock District, where the main Australian supply of gas coal is derived, and from which the greater part of the production of the district has come, it will be seen that, in round figures, the actual reserves of 815 million tons contain about 245 million tons of pillar and roof coal.

With present mining practice the balance of 570 million tons will yield about 190 million tons of extractable coal and about 380 million tons of pillars etc. Some of the pillar coal may become extractable in the future with improvement in mining technique.

CONCLUSION.

Exploration of the coalfields to date has revealed reserves of coal available to open-cut mining amounting to about 86,000,000 tons. This figure is not final; there is no doubt that investigations being conducted by the Joint Coal Board will add to the reserves adjacent to known deposits.

The reserves at present disclosed by testing represent many years production of open-cut coal at the present rate of extraction, but may not be considered adequate if future open-cut mines are to supply a major or substantial proportion of Australian coal requirements.

Further large increases in the known reserves may reasonably be expected to result from explorations of wider scope than those hitherto initiated. These investigations would be directed towards finding new deposits of coal at shallow depth in areas about which little detail is known at present.

Prospecting of the scope envisaged may be regarded as divisible into two stages -

- (1) The selection and geological mapping of localities where conditions are known or thought to be suitable for open-cut mining.
- (2) Testing in detail of recommended areas to prove the quantity and grade of recoverable coal.

The first stage involves geological mapping in fair detail of areas measurable in tens of square miles, probably supplemented by geophysical survey and a relatively small amount of scout-drilling. This work could be divided between the Geological Survey of New South Wales and the Bureau of Mineral Resources working in close co-operation, but as far as possible without overlapping. Members of the Geological Survey possess a very wide experience of the coalfields and this knowledge should be of great value in selecting areas for attention.

The second stage is properly a function of the Joint Coal Board (or of the State Mines Department in areas in which the State is specially interested.) Detailed examination of local areas is at present undertaken by both organizations. Geological supervision of the detailed work of the Board could be undertaken by geologists of the Bureau of Mineral Resources if it were the desire of the Board that they should do so, but it would be essential that any officers detailed for this work should work in the closest contact with the Board's engineers so as to ensure that information is obtained and recorded in a form satisfactory to the Board's engineers.

Whatever division of responsibility is ultimately decided upon as between the three organizations mentioned above, there should be a free interchange of information both past and present between the authorities concerned.

(H. B. OWEN) and (G. M. BURTON)
Senior Geologist. Geologist.

TABLE I.

The Coal Reserves of New South Wales.

Coalfield.	District.	Measures.	Actual.		Probable.		Possible.
			Million Tons		Million Tons		
Northern	Newcastle	Upper (Newcastle)	A.	495	A & B.	1220	A.B.C. Large
	East Maitland	Upper (Tomago)	A.	80	A & B	190	A.B.C. Moderate
	Singleton	" (Newcastle & Tomago)	A & B	100	A & B	150	A.B.C. Small
	Gunnedah-Curlewis	" (Newcastle)	A	40	A & B	30	A. Small; B & C Moderate
	Werris Creek	" "	-	-	-	-	A.B.C. Very small
	Muswellbrook	" (New. & Tomago)	A & B	70	A.B.C.	100	A.B.C. Very large
	Muswellbrook	Lower (Greta) pp	A.	150	A	150	A. Moderate
	Maitland-Cessnock	" (Greta)	A.	1015	A	305	A. Large
Central	Sydney	Upper (Newcastle)	A.	90	A	450	A. Very large
Southern	Illawarra	" "	A.	600	A	1000	A & B Large; C. Very large
	Wollondilly	" "	A.	100	A	900	A.B.C. Very large
	Moss Vale-Berrima	" "	A & B	75	A.B.C.	250	A. Very small; B & C Moderate.
	Clyde River	Lower (Greta)	-	-	-	-	A. Very small
Western	Lithgow	Upper (Newcastle)	A & B	450	A.B.C.	350	A. Moderate; B & C. Large.
	Kandos	" "	A.	50	A & B	90	A.B.C. Small
	Ulan-Wollar	" "	A & B	15	A.B.C.	50	A.B.C. Large
	Talbragar	" "	-	-	B & C.	50	B & C. Moderate
		and Mesozoic					
Ashford	Ashford	Lower (Greta)	A	5	-	-	A. Small
Coorabin	Coorabin	" (Greta)?	-	-	B & C	50	B. & C. Large
North-Eastern	Clarence Basin	Mesozoic	-	-	-	-	A. Small; B. Moderate. C. Large
TOTALS				3,335		5,335	

NOTE: A. indicates Grade A coal; B. indicates Grade B coal; C. indicates Grade C Coal.

~~pp~~ Tentative estimate only. May be reduced when limits of extensive cinderling have been determined.

TABLE 2a.

RESERVES OF COAL AVAILABLE FOR OPEN-CUT MINING.

WESTERN DISTRICT COALFIELD.

WESTERN DISTRICT.

Area.	Seam.	Thickness commercial coal. Ft. ins.	Maximum overburden ratio.	Reserves Tons.			Remarks.
				Proved	Inferred	Total.	
Ben Buller	Lithgow	4' 8" to 6' 3" 3' 11" to 6' 8"	5 : 1 8 : 1 10 : 1	1,250,000 2,050,000	- 2,000,000	 5,300,000	Figures are taken from Interim Report on Ben Bullen area dated 29/12/48, by C.W. Marshall. Coal extracted to 30/6/50 has been deducted. "Proved" reserves have been tested by churn drilling. Testing of "probable" reserves is incomplete. Typical analysis of air dried coal. 1.7% Moist. 28% V.M. 51% F.C. 18% Ash. Area limited to the north by outcrop and deterioration of quality.
Beaumaris							Exhausted.
Renown							Possible future open cut area. No information.
Cullcn Main	Lithgow	7' to 8'	5 : 1	265,000	-	265,000	Underground rights alienated, hence open-cutting restricted to 50 feet from natural surface.
Red Springs							Exhausted.
Huon Extended							Produced in 1949. Reserves nearly exhausted.
Western Main	Irondale Lidsdale Lithgow	3' 2' 6" to 7' 4" 3' 6" to 8'	- 6½ : 1	very small 7,230,000	very small 3,460,000	- 10,690,000	Estimate based on widely spaced holes. Close-spaced holes drilled since tend to confirm this estimate and it is not likely that recalculation will materially alter figures. However some of this coal may not be available on account of low quality.
<u>Commonwealth.</u>							
Por. 3. Ph. Lidsdale	Lidsdale Lithgow	2' to 7'	8 : 1	290,000 380,000			
Por. 20. Ph. Cox	Lidsdale Lithgow	6' 8" 7'	8 : 1 8 : 1	270,000 283,000			
Por. 27 Ph. Cox	Lidsdale Lithgow	6' 8" 7'	8 : 1 8 : 1	108,000 215,000		1,546,000	
Johnsdale	Lithgow	4' to 7'	8 : 1	70,000		70,000	Overburden increasing and coal deteriorating to south. Area limited by these factors.
Keroscne Vale	Lidsdale Lithgow	4' to 5' 4" 3' to 7' 6"	8 : 1 10 : 1 8 : 1	323,000 44,000 802,000	35,000 19,000 -	 1,223,000	Original estimate by Operations Division of J.C.B. for this area was 4,700,000 tons of total coal, but further examination has reduced this figure partly by rejection of low quality coal and partly by reservation of some of the area for surface buildings at Newcome Colliery. The area is limited to the south by increasing overburden and deterioration of coal.
				19,094,000			
				say	19,100,000		

TABLE 23.

RESERVES OF COAL AVAILABLE FOR OPEN-CUT MINING

NORTHERN COALFIELD - GREENOCK DISTRICT.

Area.	Seam.	Thickness commercial coal. Ft. ins.	Maximum overburden ratio.	Reserves Tons.			Remarks.
				Proved.	Inferred.	Total.	
1. Kruga	-	-	-	-	-	-	Possible future open-cut area partially prospected.
2. Muswellbrook	(four seams)		3 : 1		5,200,000	5,200,000	Reserves not accurately proved. Estimates by different authorities range widely.
3. Balmoral			7 : 1	700,000		700,000	
4. Picroefield } Roxburgh }	(one seam)	5' - 8'	10 : 1	-	-	-	Possible future open-cut. No further information available.
5. Denman	(two seams)	(5' - 10') (5' - 11')	-	300,000	-	300,000	Good quality coal.
6. Newdell	Top Thin	5'	5 : 1	250,000 1,000,000	-	1,250,000	Little market for this coal on account of dirt in small coal. Large coal is clean.
7. Open-cut area north of Liddell colliery, and State Coal Mine Reserve, Liddell.	- - - -	- 20' - -	- 6 : 1 - -	- 2,500,000 - -	2,750,000 4,500,000 5,000,000	12,750,000	
8. Foybrook	-	22' to 29'	5 : 1	4,250,000	2,250,000	6,500,000	Drilling proceeding. Possible reserves limited by overthrust of Carboniferous rocks from the north and east.
9. Pikes Gully	-	15'	Av. 4 : 1	4,500,000	3,500,000	8,000,000	In three bodies approx. equal in volume. (Outside State Reserve).
10. Newraven	(two seams)	(6' to 20')		6,000,000	18,300,000	24,300,000	Estimate made from recalculation at Bureau of Mineral Resources. Top 9 feet of lower seam is being stacked pending construction of washing plant.
11. Mitchell's Flat	-	-	-	-	-	-	Geologically disturbed area. Insufficient exploration to permit estimate to be made.
12. Newmain	Greta	12' to 20'	-	500,000		500,000	Old Great Greta area.
13. Brinkburn							Cranky Corner. Partially prospected several thin seams 2' or less encountered in two boros.
14. Warkworth	(two seams)	-	-	-	-	-	Area partly tested. Drilling indicates two seams each about 6 feet thick but of doubtful quality.
15. Newfield	-	-	-	200,000	-	200,000	
16. Ovingham				750,000		750,000	
17. Abermain	Greta	12' to 22'					Alienated.
18. Heath	Greta			1,000,000		1,000,000	Coal is inferior in parts and washouts occur in the seam in this area.
19. Caledon	Greta	about 24'		200,000		200,000	
20. Goldarc							Abandoned. Open-cut being filled.
21. Cessnock No. 2	Greta	24' to 30'		250,000		250,000	
22. Bell Bird	Greta	about 22'					Future open-cut
				c/fwd.		61,900,000	

Area	Seam	Thickness commercial coal. Ft. ins.	Maximum overburden ratio.	Reserves Tons.			Remarks.
				Proved.	Inferred.	Total for Area	
					B/fwd.	61,900,000	
22. Maitland Main							Future open-cut
23. Ashford	Ashford	20'	8 : 1	2,400,000	-	2,400,000	Seam dipping 27 degrees. Good steam coal Additional reserves exist under thicker cover.
						64,300,000	

NORTHERN COALFIELD - NEWCASTLE DISTRICT.

Minmi	Young) Wallsend) Borchols)	6 : 1	400,000	1,600,000	2,000,000	Prospecting proceeding.
Nornaine			150,000	-	150,000	
Hillsborough			300,000	300,000	600,000	
Bloomfield			-	200,000	200,000	
Fassifern			-	50,000	50,000	
					3,000,000	

TOTAL OPEN-CUT RESERVES.

Western Coalfield	19,100,000 tons
Northern Coalfield	
Gessnock District	64,300,000 "
Newcastle District	3,000,000
	86,400,000

TABLE 3.

Detailed Statement of Newcastle District Coal Reserves.

(Upper Coal Measures - Newcastle Stage)

Name of Coal Seam	Reserves					
	Actual		Probable		Possible	
	Million Tons		Million Tons			
Wallerah	A. 40	B. 80	A & B 210	A. Small; B & C Moderate		
Great Northern	A. 114	B. 36	A & B 105	A. " B & C Large		
Fassifern	A. 8	B. 7	A & B 40	A. " B & C Moderate		
Australasian	A. 7	B. 33	A & B 120	A. " B & C Large		
Montrose Wave Hill Fern Valley	-		A & B 75	B & C Large		
Victoria Tunnel	A. 60		A & B 130	A. Moderate; B. Large		
Nobby's	A. 2		A & B 10	A. B. & C. Small.		
Dudley		B. 5	A & B 80	A. Small; B & C Large		
Yard		-	A 5	A. Small		
Young Wallsend		B. 8	B 120	A. Very small; B & C Moderate		
Borehole	A. 95		A & B 325	A. Moderate; B & C Large		
Totals:	A. 326	B. 169	A & B 1220			

All of these reserves lie within a depth of a thousand feet of the surface. Mining recovery is approximately 60-70% of total reserve.

TABLE 4.

Detailed Statement of Cessnock-Maitland District
Coal Reserves.

(Lower or Greta Coal Measures)

Southern Portion.

Seam.	Actual (Lying between 0 & 1750 ft.)	Probable (Lying between 1000 & 2000ft.)	Possible (Mainly be- low 2000ft.)
Top (Greta) Seam	680,000,000	} 305,000,000	Medium
Lower (Homeville) Seam	135,000,000		Small
TOTALS	815,000,000	505,000,000	-

All of this coal is of A. quality.
Mining recovery under present methods of mining
may be less than 30%.

Northern Portion.

Total reserves of A Class Coal : 200,000,000 tons

Mining recovery in this portion under present
methods of mining is less than 30%.

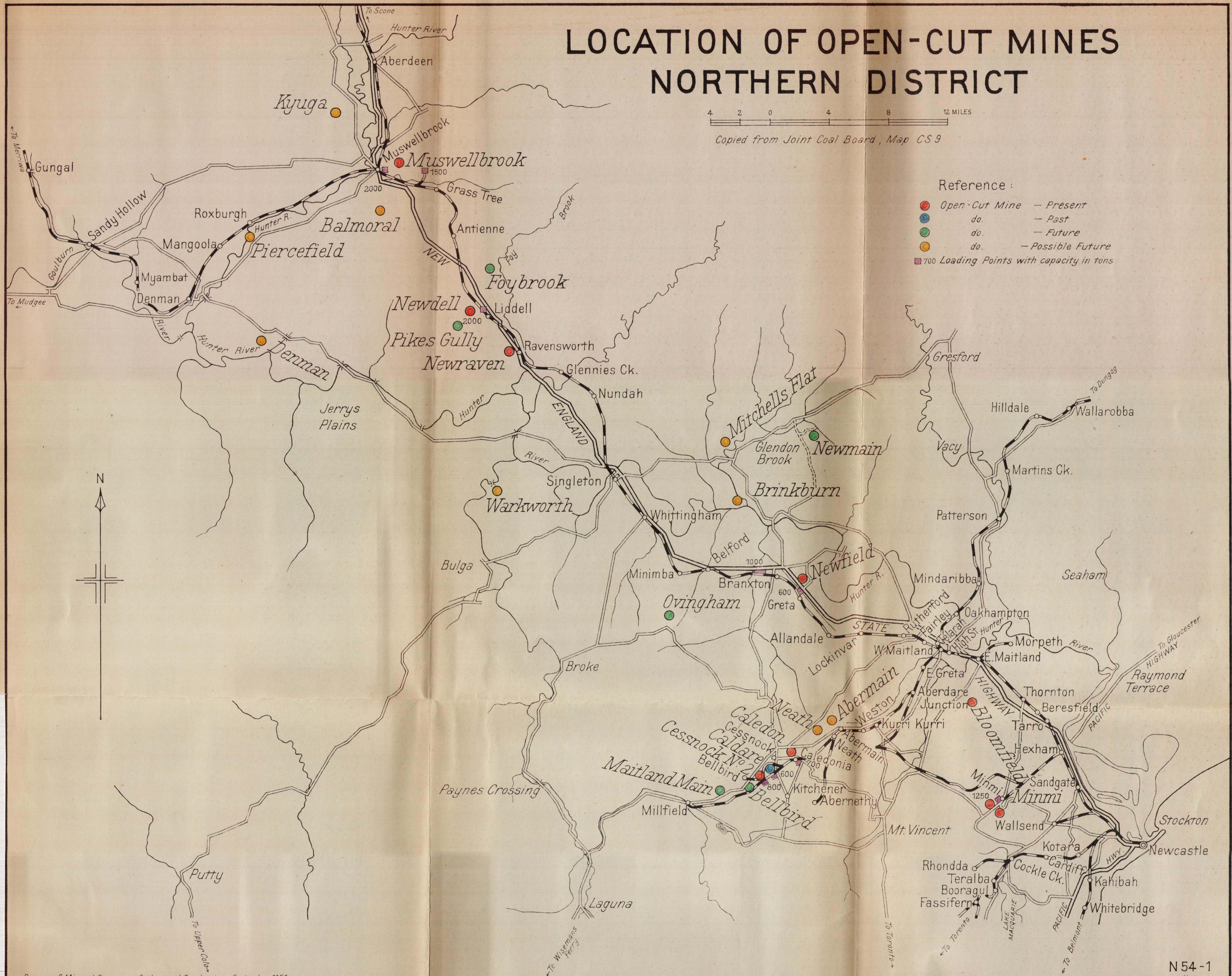
LOCATION OF OPEN-CUT MINES NORTHERN DISTRICT

4 2 0 4 8 12 MILES

Copied from Joint Coal Board, Map CS 9

Reference :

- Open-Cut Mine — Present
- do. — Past
- do. — Future
- do. — Possible Future
- 700 Loading Points with capacity in tons



LOCATION OF OPEN-CUT MINES LITHGOW DISTRICT

4 2 0 4 8 12 MILES
Copied from Joint Coal Board, Map CS 7

Reference :

- Open-Cut Mine — Present
- do. — Past
- do. — Future
- do. — Possible Future
- 700 Loading Points with capacity in tons

