

## SECTION XII.

## MINES AND MINING.

## § 1. The Mineral Wealth of Australia.

1. **Place of Mining in Australian Development.**—The value of production from the mineral industry is now considerably less than that returned by the agricultural or the pastoral industry, nevertheless it was the discovery of gold in payable quantities, that first attracted population to Australia, and thus laid the foundation of its nationhood. Prior to 1851, the year when Hargraves' memorable discovery was made, coal and copper had both been mined to some extent, and the existence of deposits of other minerals, including gold, had been proved. But it was the news of the sensational finds of the precious metal in 1851 and the year immediately following that brought about a constant stream of immigration, and caused an increase in population from 221,000 at the end of 1841 to upwards of 1,168,000 at the end of 1861.

2. **Extent of Mineral Wealth.**—The large production of gold, silver, copper, and tin, the extent of the coal deposits, the presence of large quantities of iron ore, and the great variety of minerals found in appreciable quantities, suggest that the future history of mining will, in all probability, be more remarkable even than that of the past. For the extent of the total mineral wealth of Australia cannot yet be regarded as well ascertained, since the mineral exploration of the country is, after all, still in its infancy. The presence of considerable deposits of valuable minerals has long been known. Thus, coal was discovered in 1797, and a shipload was exported to Bengal in 1799; silver was discovered by Count Strzelecki as early as 1839, and was worked as early as 1864; copper mining dates back to 1844; lead to about 1848; iron to about 1850; while the discovery of gold in payable quantities dates back to 1851. Cobalt, nickel, manganese, chromium, tungsten, molybdenum, mercury, antimony, bismuth, zinc, radio-active ores, etc., have all been found, some in fairly large quantities.

Among the more valuable non-metalliferous substances may be mentioned coke, kerosene shale, graphite, alunite, asbestos, diatomaceous earth, clays, ochres, etc.; in building stones, sandstones, syenites, granites, basalts, augite-andesite, porphyries, serpentines, slates, limestones, and marbles; in precious stones, diamonds, emeralds, rubies, sapphires, amethysts, precious opal, turquoise, topazes, garnets, chrysolites, cairngorm, agates, etc. In general it may be said that the variety of Australian mineral wealth is very great.

3. **Value of Production during 1911.**—Compared with the returns for 1910 the total mineral production of the Commonwealth shews an increase in 1911 of over £265,000. The largest advance is exhibited in the figures for New South Wales, where the total was over £955,000 in excess of that for the preceding year. South Australia also shews an increase amounting to nearly £26,000. The improvement in the States mentioned was, however, counterbalanced by more or less heavy decreases in the remaining States, the return for Western Australia shewing a falling-off amounting to over £416,000, while there was a decline in the Victorian yield to the extent of £166,000. In Victoria the decline is attributed to the falling-off in the gold yield, due to diminished returns from the lode mines at Bendigo, Ballarat and Walhalla, and the deep alluvial workings at Chiltern, Rutherglen, Creswick, and Clunes. In Western Australia, the gold yield shewed a falling-off of £424,000, through diminished returns from the principal fields. In Tasmania the production of copper was adversely affected by the low prices ruling for

the metal in 1911. The decline in the gold yield for the Commonwealth amounted to over £1,000,000, the Northern Territory alone shewing an increased output over the total for the preceding year.

The comparative value of the production of minerals raised in each State during 1911 is given in the following table:—

### COMMONWEALTH MINERAL PRODUCTION IN 1911.

Minerals.	N.S.W.	Victoria.	Q'land.	S.A.	W.A.	Tas.	N.T.	C'wealth.
	£	£	£	£	£	£	£	£
Alunite ...	3,795	...	...	...	...	...	...	3,795
Antimony ...	2,010	8,928	72	...	...	...	...	11,010
Asbestos ...	...	...	...	...	...	...	...	...
Bismuth ...	1,800	...	117,089	...	...	5,758	25	24,672
Coal ...	3,167,165	301,142	323,998	...	111,154	26,214	...	3,923,673
Coke ...	184,337	...	...	...	...	...	...	184,337
Copper ...	590,102	2,088	1,151,351	332,500	78,118	408,649	1,470	2,564,278
Diamonds ...	4,064	...	...	...	...	...	...	4,064
Diatomaceous earth	106	1,600	...	...	...	...	...	1,706
Gems (unspecified)...	...	...	24,393	...	...	...	...	24,393
Gold ...	769,353	2,140,855	1,640,323	15,000	5,823,075	132,108	30,910	10,551,624
Gypsum ...	...	448	...	7,275	...	...	...	7,723
Iron ...	145,416	...	...	...	...	...	...	145,416
Iron oxide ...	2,377	...	...	...	...	...	...	2,377
Ironstone flux ...	861	...	11,157	26,400	...	...	...	38,418
Kaolin ...	...	440	...	...	...	...	...	440
Lead (pig, etc.) ...	209,784	...	23,460	...	15,002	...	...	248,246
Limestone flux ...	12,541	...	27,887	7,175	...	...	...	47,633
Manganese ...	...	10	4,021	...	...	...	...	4,031
Molybdenite ...	2,591	...	13,278	...	...	...	...	15,659
Opal ...	57,300	...	3,000	...	...	...	...	60,300
Platinum ...	2,999	989	...	...	...	...	...	3,988
Salt ...	...	*	...	40,600	...	...	...	40,600
Scheelite ...	11,342	...	394	...	...	...	...	11,736
Shale ...	36,980	...	...	...	...	250	...	37,230
Silver ...	177,095	2,135	56,305	140	18,333	...	...	254,008
Silver-lead bullion	2,265,669	...	...	...	...	...	...	2,519,030
Silver-lead ore ...	...	...	...	...	253,361	...	...	...
Tin ...	307,089	3,417	307,847	...	55,220	513,500	22,900	1,209,973
Wolfram ...	29,991	1,309	54,163	154	826	7,769	4,048	98,260
Zinc ...	1,414,980	...	...	...	189	...	...	1,415,169
Unenumerated ...	5,554	504	...	8,360	3,936	1,888	...	20,242
Total ...	9,405,301	2,463,865	3,658,738	437,604	6,105,853	1,349,497	59,353	23,480,211

It may be pointed out in connection with the figures given in the above table that the totals are exclusive of returns relating to certain commodities, such as stone for building and industrial uses, sand, gravel, brick clays, lime, cement, and slates, which might rightly be included under the generic term "mineral." Valuations of the production of some of these may be obtained from the reports of the various Mines Departments, but in regard to others it is impossible to obtain adequate information. In some instances, moreover, the published information is of little value. Thus, the New South Wales Mines Report supplies the value of exports only in connection with building stone, and it is obvious that such figures are of little value as regards production, while the Victorian figures are incomplete. It has therefore been considered advisable to discard both totals. By restricting the comparison to the items enumerated above, it is believed that a fairly satisfactory estimate of the progress of the mineral industry can be readily obtained. The items excluded from the total for New South Wales in 1911 consist of—lime, £22,918; marble, £1610; Portland cement, £315,569; building stone, £2417; and grindstones, £191. From the Queensland total, fireclay, £2325, has been excluded. The South Australian figures are exclusive of—bluestone, £4163; sulphuric acid, £6940; chalk, £200; flint pebbles, £856; and crude ochre, £105.

4. Total Production to end of 1911.—In the next table will be found the estimated value of the total mineral production in each State up to the end of 1911. The figures given in this table are also exclusive of the same items referred to in connection with the preceding table. Thus the total for New South Wales falls short by £1,753,750 of that published by the State Department of Mines, the principal items excluded being cement, £1,471,000, lime £233,000, and building stone, £23,617.

## COMMONWEALTH MINERAL PRODUCTION TO END OF 1911.

Minerals.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	North'mn Territ'y.	C'wealth.
	£	£	£	£	£	£	£	£
Gold	58,760,846	289,663,989	73,739,851	812,505	103,850,486	7,245,982	2,123,322	536,196,981
Silver and lead	56,476,104	217,735	2,123,801	338,528	670,063	5,949,650	73,999	65,849,880
Copper	11,204,311	215,761	9,250,119	27,235,052	1,052,528	9,816,537	325,408	59,149,716
Tin	8,989,535	776,947	7,746,201	...	983,547	11,429,499	301,897	30,227,626
Coal	65,427,673	2,203,069	5,038,971	...	933,578	548,395	...	74,151,686
Other	15,287,556	384,571	1,827,175	1,325,781	79,073	186,214	40,632	19,131,002
Total	216,146,025	293,462,072	99,726,118	29,761,866	107,569,275	35,176,277	2,865,258	784,706,891

The "other" minerals in New South Wales include antimony, £304,870; bismuth; £127,327; chrome, £101,408; coke, £1,976,214; diamonds, £118,407; iron, £1,740,750; opal, £1,295,199; oil shale, £2,288,061; wolfram, £115,933; and zinc, £5,773,661. In the Victorian returns antimony ore was responsible for £224,712. Included in "other" in the Queensland production were opal, £169,195; gems, other, £186,186; bismuth and wolfram, £786,018; antimony ore, £50,953; manganese, £63,428; limestone flux, £255,222; and ironstone flux, £193,741. The chief item in South Australian "other" minerals was salt, £775,194. In the Tasmanian returns limestone flux was responsible for nearly £100,000, and iron ore for about £26,000.

It will be convenient in the succeeding pages to deal first with gold and the various metals, then with non-metallic minerals and precious stones, and finally to furnish some account of the extent of employment in mining generally.

## (A) METALS.

## § 2. Gold.

1. **Discovery of Gold in Various States.**—The discovery of gold in payable quantities was an epoch-making event in Australian history; for as one writer aptly phrases it, this event "precipitated Australia into nationhood." A more or less detailed account of the finding of gold in the various States appears under this section in Official Year Books Nos. 1 to 4, but considerations of space preclude the insertion of this matter in the present issue.

2. **Production of Gold at Various Periods.**—In the table hereunder will be found the value of the gold raised each year in the several States and in the Commonwealth from the dates when payable discoveries were first reported. Owing to defective information in the earlier years the figures fall considerably short of the actual totals, for during the first stages of mining development large quantities of gold were taken out of Australia by successful diggers, who preferred to keep the amount of their wealth secret. For South Australia the records in the earlier years are somewhat irregular, and the remark applies to some extent also to the returns for Western Australia and Tasmania.

In New South Wales the yield for 1911 was much below the average, the output being the lowest recorded since 1902. The decreased yield is in large measure due to the circumstance that the demand for miners in other branches of the industry, coupled with the steady employment obtainable in other pursuits has led to the slackening in operations at a number of small mines and claims which formerly were responsible for no inconsiderable portion of the total output. In Victoria the decrease was mainly due to the falling-off in the returns from the deep alluvial mines at Chiltern, Rutherglen, Creswick, and Clunes, and the quartz mines at Bendigo, Ballarat, and Walhalla. The deficiency in Queensland was due to the reduced returns from some of the chief centres such as Mount Morgan, Charters Towers, Gympie, and Etheridge. Nearly half the fall in the gold production of Western Australia is attributable to a decline in the yield for the East Murchison field. Pilbara and East Coolgardie were the only fields shewing increases during the year.

## VALUE OF GOLD RAISED IN AUSTRALIA, 1851 to 1911.

Year.	N.S.W.	Victoria.	Q'sland.	S.A.	W.A.	Tas.	N.T.	C'wealth.
	£	£	£	£	£	£	£	£
1851	468,336	851,596	...	...	...	...	...	1,319,932
1852	2,660,946	9,146,140	...	...	...	...	...	11,807,086
1853	1,781,173	10,976,392	...	...	...	...	...	12,757,564
1854	773,209	8,873,932	...	...	...	...	...	9,647,141
1855	654,594	11,277,152	...	...	...	...	...	11,931,746
1856	689,174	11,214,976	...	8,800	...	...	...	12,912,950
1857	674,477	11,320,852	...	876	...	...	...	11,996,205
1858	1,104,175	10,384,924	...	2,348	...	...	...	11,491,447
1859	1,259,127	9,394,812	...	730	...	...	...	10,654,669
1860	1,465,373	8,896,276	11,631	...	...	...	...	10,373,280
1861	1,806,171	8,140,692	3,137	...	...	...	...	9,950,000
1862	2,467,780	6,920,804	499	12,442	...	...	...	9,401,525
1863	1,796,170	6,779,276	11,820	...	...	...	...	8,587,266
1864	1,304,926	6,489,788	66,513	...	...	...	...	7,861,227
1865	1,231,243	6,446,216	74,216	...	...	...	...	7,751,675
1866	1,116,404	6,187,792	68,325	...	...	...	...	7,372,521
1867	1,053,578	6,005,784	151,125	...	...	4,382	...	7,214,869
1868	994,665	6,739,672	473,956	2,936	...	2,536	...	8,213,765
1869	974,149	6,179,024	417,681	15,593	...	514	...	7,586,961
1870	931,016	5,217,216	390,925	24,217	...	7,475	...	6,570,849
1871	1,250,485	5,475,768	492,635	6,000	...	14,218	...	7,239,106
1872	1,644,177	5,325,508	527,365	6,363	...	16,065	...	7,519,468
1873	1,396,375	4,681,588	572,996	293	...	18,390	...	6,669,642
1874	1,041,614	4,390,572	1,082,899	4,175	...	18,491	...	6,537,751
1875	877,694	4,273,668	1,196,583	7,034	...	11,932	...	6,366,961
1876	613,190	3,855,040	1,140,282	9,888	...	44,923	...	5,663,323
1877	471,448	3,238,612	1,043,780	...	...	23,289	...	4,777,129
1878	430,200	3,032,160	1,149,240	1,225	...	100,000	...	4,712,825
1879	407,219	3,035,788	1,034,216	90	...	230,895	...	4,708,208
1880	444,253	3,316,484	944,869	...	...	201,297	...	4,906,903
1881	573,582	3,333,512	957,570	880	...	216,901	111,945	5,194,390
1882	526,522	3,458,440	785,868	3,080	...	187,337	82,274	5,043,521
1883	458,530	3,121,012	736,810	10,534	...	176,442	77,195	4,580,523
1884	396,069	3,114,472	1,062,471	15,469	...	160,404	77,935	4,826,810
1885	378,665	2,940,872	1,062,514	18,295	...	155,309	70,414	4,626,069
1886	366,294	2,660,784	1,187,189	32,535	1,148	117,250	63,139	4,428,339
1887	394,579	2,471,004	1,481,990	72,003	18,517	165,533	68,774	4,665,400
1888	317,241	2,500,104	1,690,477	34,205	13,273	147,154	34,802	4,737,256
1889	434,784	2,459,352	2,695,629	37,305	58,871	119,703	47,651	5,853,295
1890	460,285	2,354,240	2,182,563	20,808	86,664	75,888	80,769	5,261,217
1891	559,231	2,305,596	2,030,312	27,380	115,182	145,459	98,701	5,281,861
1892	575,299	2,617,824	2,164,391	26,097	226,284	158,917	109,658	5,878,470
1893	651,286	2,684,504	2,167,794	12,561	421,385	141,326	108,130	6,186,986
1894	1,156,717	2,867,816	2,330,282	33,401	787,099	217,024	109,699	7,502,038
1895	1,315,929	2,960,344	2,150,561	26,060	879,748	206,115	102,816	7,641,573
1896	1,073,360	3,220,348	2,132,979	14,350	1,068,808	237,574	81,210	7,828,629
1897	1,104,315	3,251,064	2,552,668	39,020	2,564,977	296,660	81,210	9,889,914
1898	1,201,743	3,349,028	2,750,348	10,676	3,990,698	291,496	84,789	11,678,778
1899	1,623,320	3,418,000	2,838,446	15,582	6,246,732	327,545	63,565	14,533,190
1900	1,070,920	3,229,628	2,871,578	14,494	6,007,610	316,220	67,988	13,578,438
1901	737,164	3,102,753	2,541,764	16,613	7,235,653	295,176	76,609	14,005,732
1902	684,970	3,062,028	2,720,512	24,878	7,947,661	301,573	70,325	14,811,947
1903	1,080,029	3,259,482	2,839,801	28,650	8,770,719	254,403	61,600	16,294,684
1904	1,146,109	3,252,045	2,714,934	76,025	8,424,226	280,015	3,983	15,897,337
1905	1,165,013	3,173,744	2,517,295	45,853	8,305,654	312,380	30,971	15,550,910
1906	1,078,866	2,980,478	2,313,464	27,000	7,622,749	254,963	54,225	14,631,745
1907	1,050,730	2,954,617	1,978,998	20,540	7,210,749	277,607	21,928	13,615,109
1908	954,854	2,849,838	1,975,554	12,300	6,999,882	242,482	23,943	13,058,853
1909	869,546	2,778,956	1,935,178	30,206	6,776,274	190,201	24,148	12,604,509
1910	802,211	2,422,745	1,874,955	28,000	6,246,848	157,370	21,711	11,553,840
1911	769,353	2,140,855	1,640,323	15,000	5,823,075	132,108	30,910	10,551,624
Total	58,760,846	289,663,989	73,739,851	892,810	103,850,486	7,245,982	2,043,017	536,196,981

The amount of gold raised in the Commonwealth in any one year attained its maximum in 1903, in which year Western Australia also reached its highest point. For the other States of the Commonwealth the years in which the greatest yields were obtained, were as follows:—New South Wales, 1852; Victoria, 1857; Queensland, 1900; South Australia, 1904; and Tasmania, 1899.

The following table shews the quantity in fine ounces of gold raised in each State and in the Commonwealth during each of the last ten years, the value of one ounce fine being £4 4s. 11 $\frac{1}{2}$ d.

## QUANTITY OF GOLD PRODUCED IN THE COMMONWEALTH, 1902 to 1911.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Ter.	C'wealth.
	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.
1902	161,256	720,863	640,463	7,231	1,871,039	70,996	15,182	3,487,030
1903	254,260	767,347	668,546	8,650	2,064,803	59,892	12,597	3,836,095
1904	269,817	765,596	639,150	17,897	1,983,230	65,921	938	3,742,549
1905	274,267	747,163	592,622	10,983	1,955,317	73,540	7,103	3,660,995
1906	253,987	772,290	544,636	8,037	1,794,548	60,023	11,085	3,444,606
1907	247,363	695,576	465,882	5,609	1,697,555	65,354	4,389	3,181,728
1908	224,792	670,909	465,085	2,908	1,647,912	57,085	5,624	3,074,315
1909	204,708	654,222	455,579	7,111	1,595,270	44,777	5,685	2,967,352
1910	188,857	570,362	441,402	6,603	1,470,633	37,048	5,100	2,720,005
1911	181,120	504,000	386,165	3,537	1,370,868	31,101	7,277	2,484,068

3. **Changes in Relative Positions of States as Gold Producers.**—A glance at the figures in the table shewing the value of gold raised will sufficiently explain the enormous increase in the population of Victoria during the period 1851 to 1861, when an average of over 40,000 persons reached the State each year. With the exception of the year 1889, when its output was surpassed by that of Queensland, Victoria maintained its position as the chief gold-producer for a period of forty-seven years, or up to 1898, when its production was outstripped by that of Western Australia, the latter State from this year onward contributing practically half the entire yield of the Commonwealth. New South Wales occupied the second place on the list until 1874, when Queensland returns exceeded those of the parent State, a condition of things that has been maintained ever since. South Australia has occupied the position of lowest contributor to the total gold yield of the Commonwealth since the year 1871. Taking the average of the last ten years, the relative position of each State in regard to the gold production of the Commonwealth was as follows :—

## RELATIVE POSITION OF STATES AS GOLD PRODUCERS, 1902 to 1911.

State.	Annual Average of Gold Production, 1902 to 1911.	Percentage on Commonwealth.	State.	Annual Average of Gold Production, 1902 to 1911.	Percentage on Commonwealth.
Commonwealth ...	£13,847,056	100.00	New South Wales	£960,168	6.94
Western Australia	7,412,784	53.53	Tasmania ...	240,310	1.71
Victoria	2,917,479	21.07	South Australia *	65,219	0.47
Queensland	2,251,096	16.26			

\* Including Northern Territory: average for period £34,374.

4. **Methods of Gold Mining adopted in Each State.**—The circumstances of gold mining in the various States are not quite identical, for which reason reference is made to that of each State.

(i.) *New South Wales.* In New South Wales the earlier “rushes” were to surface alluvial or shallow-sinking grounds. Many of these were apparently soon worked out, but there is reason to believe that in some instances payable results would be obtained by treating the rejected wash-dirt on more scientific principles. With the exhaustion of the surface deposits discoveries were made by sinking to what are called deep alluvial leads, representing the beds of old drainage channels in Pliocene times. The first of these deep alluvial leads was discovered at Forbes, in New South Wales, in 1862. The Tertiary deep leads at Gulgong were discovered in 1871. Cretaceous leads occur at Tibooburra, and detrital gold has been found in permo-carboniferous conglomerates at Tallawang. The method of dredging is at present being extensively used for winning gold from the beds

of running streams, and from loose river flats and other wet ground where sinking would be impracticable. The system was introduced from New Zealand, where it was originally applied with great success on the Clutha River, and there are now dredges working on practically all the auriferous rivers of New South Wales. Hydraulic sluicing is also employed in several places, the necessary machinery being fitted to a pontoon for convenience in moving from place to place. The quantity of alluvial gold obtained, other than by dredging, amounted to 8073 ozs. in 1911, the chief yields being—Braidwood, 1948 ozs.; Stuart Town, 500 ozs.; Wattle Flat, 474 ozs.; and Uralla, 401 ozs. The quantity obtained by dredging was 25,494 ozs.; the largest returns being obtained at Araluen, 8960 ozs.; Adelong, with 3409 ozs.; Braidwood, 2877 ozs.; Wellington, 2489 ozs.; Stuart Town, 2227 ozs.; and Yambulla 1868 ozs. The dredges in operation during 1911 numbered 71, of which 25 were of the bucket type and 46 were suction plants. In the recovery of gold 21 bucket dredges and 14 pumping plants were employed, while four bucket dredges and 32 pumping plants were engaged in the winning of stream tin. The value of the plants in operation was estimated at £388,991. The quantity of gold won from quartz amounted to 133,225 ozs. At the present time the Cobar district is the chief centre of the production from quartz, the yields from the Cobar and Canbelego fields included therein being respectively 42,596 ozs. and 26,194 ozs. Next come the Hillgrove field, with 10,848 ozs.; Wyalong, 7865 ozs.; Wellington, 5715 ozs.; Peak Hill, 5588 ozs.; and Adelong, 5145 ozs.

The table below shews as far as can be ascertained the yield from alluvial and quartz mining in each of the principal districts during 1911. Owing to the circumstance that it was impossible to obtain complete returns from the whole of the mine and battery owners the total for the State necessarily falls short of that given in preceding pages.

#### GOLD WON IN NEW SOUTH WALES, ALLUVIAL AND QUARTZ, 1911.

District.	Alluvial.		Quartz.	Total.
	Other than by Dredging.	By Dredging.		
	ozs.	ozs.	ozs.	ozs.
Albert ... ..	159	...	2,295	2,454
Bathurst ... ..	834	4	4,597	5,435
Clarence and Richmond ... ..	92	...	1,018	1,110
Cobar ... ..	...	...	69,054	69,054
Hunter and Macleay ... ..	2	...	343	345
Lachlan ... ..	514	1,709	19,376	21,599
Mudgee ... ..	1,077	2,489	11,462	15,028
New England ... ..	153	33	462	648
Peel and Uralla ... ..	793	2,072	11,435	14,300
Southern ... ..	2,448	11,959	7,670	22,077
Tambaroora and Turon ... ..	1,121	3,466	123	4,710
Tumut and Adelong ... ..	880	3,762	5,390	10,032
Total ... ..	8,073	25,494	133,225	166,792

(ii.) *Victoria.* Quartz-reefing predominates in Victoria, although a considerable amount of gold is obtained from alluvial workings, both surface and deep leads. The deepest mines in Australia are found in the Bendigo district, where the two deepest shafts were at the 31st December, 1911, 4614 and 4318 feet deep respectively. Altogether there were at the close of 1911 no less than fifty-three shafts in this district which had reached a depth of over 2000 feet. A considerable amount of attention is given to dredging and hydraulic sluicing, particularly in the Beechworth, Maryborough, Castlemaine, Ararat, Stawell, and Ballarat districts, the number of plants in operation at the end of 1911 being 95. The total quantity of gold won from dredge mining in 1911 was 78,535

ounces, and from sluicing 3059 ounces, the total area treated being 706 acres. The yields from alluvial workings and quartz reefs as returned (in crude ounces) from the chief mining districts of the State during last year were as follows:—

**GOLD WON IN VICTORIA, ALLUVIAL AND QUARTZ, 1911.**

District.	Alluvial.	Quartz.	Total.
	ozs.	ozs.	ozs.
Ararat and Stawell ... ..	15,967	6,009	21,976
Ballarat ... ..	15,704	64,884	80,588
Beechworth ... ..	79,174	19,520	98,694
Bendigo ... ..	2,520	166,140	168,660
Castlemaine ... ..	13,010	60,892	73,902
Gippsland ... ..	6,498	25,753	32,251
Maryborough ... ..	39,457	28,172	67,629
Total ... ..	172,330	371,370	543,700

The largest output from lode mines in 1911 was furnished by the Central Red, White and Blue, at Bendigo, with 20,686 ozs.; followed by the Lord Nelson, St. Arnaud, with 13,080 ozs.; the North Nuggetty Ajax, Daylesford, with 10,548 ozs.; and the South New Moon, Bendigo, with 9946 ozs. Of the deep alluvial mines the Duke and Main Leads Consols, at Maryborough, produced 11,636 ozs., and the Cathcart, at Ararat, 11,133 ozs. In dredging, the Maori Queen Proprietary, at Bright, headed the list with a return of 3648 ozs.

(iii.) *Queensland.* Operations in Queensland are at present chiefly confined to quartz reefing, the yield from alluvial in 1911 being only 6664 ounces, while the quantity produced from quartz was 272,014 ounces; from copper and other ores 103,093 ounces; and from old tailings 4393 ounces; making a total production of 386,164 ounces, valued at £1,640,323. The yields from the principal fields are given below:—

**GOLD WON IN QUEENSLAND, ALLUVIAL AND QUARTZ, 1911.**

District.	Alluvial.	Quartz.	From Copper and other Ores and old Tailings.	Total.
	fine ozs.	fine ozs.	fine ozs.	fine ozs.
Charters Towers ... ..	398	133,074	361	133,833
Gympie ... ..	322	50,561	71	50,954
Mount Morgan ... ..	89	51,449	76,803	128,341
Ravenswood ... ..	177	20,059	126	20,362
Croydon ... ..	4	5,955	1,947	7,906
Etheridge and Woolgar ... ..	894	5,973	2,747	9,614
Cloncurry ... ..	105	2	12,498	12,605
Gladstone ... ..	94	2,466	1,267	3,827
Rockhampton ... ..	63	95	8,917	9,075
Other districts ... ..	4,518	2,380	2,749	9,647
Total ... ..	6,664	272,014	107,486	386,164

(iv.) *South Australia.* In South Australia alluvial gold has been worked for many years in the gullies round Adelaide, while a fair amount of gold has been obtained by this method at Teetulpa, in the northern areas. There are some valuable reefing fields in the Echunga district, at Mt. Grainger, Barossa, Wadnaminga, Mannahill, etc., but they have not been developed to the extent they deserve. Good stone was discovered a few years ago at Tarcoola, but the present returns are comparatively small. The rich finds at Arltunga in the centre of the continent, within the boundaries of the Northern

Territory, have not yielded up to expectations, but the field has not been systematically prospected. It is stated that the gold occurs chiefly in vughs, crevices, and cellular quartz, the latter being at times exceedingly rich. The solid stone is low grade and is not worked. Operations are confined to the vein matter, which is passed through screens, and the larger lumps hand picked, the "fines" and all that contains vughs or cellular quartz being saved for treatment and the balance discarded. South Australia is not divided into mining districts as is the case in the other States. The Macdonnell Ranges, although within the boundaries of the Northern Territory and coming under the operation of the Northern Territory Mining Act, yet geographically belong to South Australia proper. The total output of gold for 1911 from the Northern Territory amounted to 7277 ounces, valued at £30,910.

(v.) *Western Australia.* In Western Australia the operations are confined principally to quartz reefing, the returns from ordinary alluvial and hydraulic sluicing being comparatively small. Estimates give the average value of ore treated in 1911 as 41.2 shillings as compared with 41.5 shillings in 1910. The total production of gold from all sources during 1911 was 1,370,868 ounces, of which only 0.3 per cent. was alluvial.

#### GOLD WON IN WESTERN AUSTRALIA, ALLUVIAL AND QUARTZ, 1911.

Goldfields.				Alluvial.	Dollied and Specimens.	Crushed.	Total.
				Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.
East Coolgardie	...	...	...	365	587	775,541	776,493
East Murchison	...	...	...	293	1,943	100,155	102,391
Mount Margaret	...	...	...	460	678	151,336	152,474
Murchison	...	...	...	278	2,084	117,291	119,653
North Coolgardie	...	...	...	118	181	64,460	64,759
Coolgardie	...	...	...	503	424	32,827	33,754
Dundas	...	...	...	32	292	28,665	28,989
North-east Coolgardie	...	...	...	439	1,146	17,970	19,555
Yilgarn	...	...	...	2	131	18,679	18,812
Broad Arrow	...	...	...	185	214	6,754	7,153
Peak Hill	...	...	...	162	434	1,150	1,746
Pilbara	...	...	...	655	112	3,841	4,608
Phillips River	...	...	...	12	18	5,626	5,656
Yalgoo	...	...	...	503	31	628	1,162
West Pilbara	...	...	...	159	16	808	983
Ashburton	...	...	...	256	...	...	256
Kimberley	...	...	...	171	...	...	171
Other goldfields	...	...	...	9	3	360	372
Total	...	...	...	4,602	8,294	1,326,091	1,338,987

The figures in the above table are compiled from returns from the individual mines and are somewhat incomplete; the total is therefore less than that shewn on page 481, which represents mint and export returns.

(vi.) *Tasmania.* The yield from Tasmania is also chiefly obtained from quartz reefing, although there is a little alluvial mining carried on in the Lisle district. The yields as returned from the chief centres in 1911 are shewn hereunder:—

#### GOLD WON IN TASMANIA, ALLUVIAL AND QUARTZ, 1911.

Description.		Northern & Southern.	North-eastern.	Eastern.	Western.	Total.
		ozs	ozs.	ozs	ozs	ozs.
Quartz	...	21,596	...	1,301	7,918*	30,815
Alluvial	...	136	237	...	85	458

\* Gold contained in blister copper and silver-lead bullion.



The total production equalled 31,101 fine ounces, valued at £132,108, of which the Tasmanian Gold Mine Ltd., in the Beaconsfield district, produced 21,326 ozs., valued at £92,478.

5. **Remarkable Masses of Gold.**—Allusion has already been made in preceding Year Books to the discovery of “nuggets” and other remarkable masses of gold, but it is not proposed to repeat this information in the present issue.

6. **Modes of Occurrence of Gold in Australia.**—This subject has been alluded to at some length in preceding issues of the Year Book, but considerations of space will not permit of repetition in the present issue.

7. **Place of Commonwealth in the World's Gold Production.**—In the table given below will be found the estimated value of the world's gold production, and the share of the Commonwealth therein during the ten years 1902 to 1911. The figures given in the table have been compiled chiefly from returns obtained direct by the Commonwealth Bureau of Census and Statistics from the gold-producing countries of the world.

**WORLD'S GOLD PRODUCTION, 1902 to 1911.**

Year.	World's Production of Gold.	Gold produced in Commonwealth.	Percentage of C'wealth on Total.
	£	£	%
1902 ...	60,619,000	14,812,000	24.43
1903 ...	66,761,000	16,295,000	24.41
1904 ...	70,554,000	15,897,000	22.53
1905 ...	76,839,000	15,551,000	20.24
1906 ...	83,180,000	14,632,000	17.59
1907 ...	84,770,000	13,515,000	15.94
1908 ...	90,370,000	13,059,000	14.45
1909 ...	91,910,000	12,605,000	13.71
1910 ...	94,193,000	11,554,000	12.27
1911 ...	93,999,000	10,552,000	10.16

While the production of gold in the Commonwealth rose by about 17 per cent. in the fifteen years from 1897 to 1911, the world's total increased by about 95 per cent. in the same period. The following table will be found interesting, as shewing the various foreign countries where the chief increases have taken place during the interval in question:—

**INCREASE IN GOLD YIELD, VARIOUS COUNTRIES, 1897 to 1911.**

Country.	1897.	1900.	1909.	1910.	1911.
	£	£	£	£	£
United States ...	11,787,000	16,269,000	20,481,000	19,781,000	19,774,000
Canada ...	1,240,000	5,742,000	1,928,000	2,097,000	2,010,000
Mexico ...	2,045,000	1,884,000	4,582,000	4,930,000	5,065,000
Transvaal ...	11,654,000	1,481,000	30,988,000	31,973,000	35,041,000
Rhodesia ...	800	308,000	2,624,000	2,568,000	2,648,000
Gold Coast ...	85,000	38,000	979,000	780,000	1,079,000
Madagascar ...	8,500	142,000	505,000	442,000	389,000
India ...	1,571,000	1,893,000	2,205,000	2,202,000	2,271,000
Korea ...	208,000	371,000	631,000	955,000	953,000
Japan ...	142,000	290,000	520,000	581,000	614,000
Java ...	24,000	112,000	630,000	723,000	625,000
Costa Rica ...	2,000	31,000	116,000	96,000	149,000

The largest increase was recorded in the Transvaal, where the production more than trebled itself in the fifteen years 1897 to 1911.

8. **Employment in Gold Mining.**—The number of persons engaged in gold mining in each State in 1901 and during each of the last five years is shewn in the following table:—

## PERSONS EMPLOYED IN GOLD MINING, 1901 to 1911.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	N. Terr.	C'w'lt'h.
	No.	No.	No.	No.	No.	No.	No.	No.
1901 ...	12,064	27,387	9,438	1,000	19,771	1,112	200	70,972
1907 ...	7,468	23,291	8,883	900	17,237	953	250	58,982
1908 ...	6,363	20,853	7,736	880	16,075	843	333	53,083
1909 ...	5,585	18,671	7,150	920	17,027	713	257	50,323
1910 ...	5,247	16,553	6,115	950	16,279	682	306	46,132
1911 ...	4,650	14,015	5,227	920	15,428	570	358	41,168

## § 3. Platinum and the Platinoid Metals.

1. **Platinum.**—(i.) *New South Wales.*—The existence of platinum was first noted in New South Wales in 1851 by Mr. S. Stutchbury, who found a small quantity near Orange. Since the year 1878 small quantities of the metal have been obtained from beach sands in the northern coastal district. Platiniferous ore was noted in 1889 at Broken Hill. The chief deposits at present worked in the State are situated at Fifield, near Parkes, but the entire production in 1911 was small, amounting to only 470 ozs., valued at £2999, while the total production recorded to the end of 1911 amounted to 12,380 ozs., valued at £25,130.

The increased price of the metal was responsible for the opening up of some of the inferior land at Platina, in the Fifield district; and the production for the year was consequently higher than in 1910, when the yield was recorded at 332 ozs. A certain amount of gold is also obtained from the wash-dirt in this division, the proportion of the metals averaging about 1 part of gold to 7 of platinum per load.

(ii.) *Victoria.* In Victoria the metal has been found in association with copper at the Walhalla Copper Mine in Gippsland. The mine was worked extensively from 1874 to 1881 and then abandoned, but was reopened in 1910. It is stated that there are 70,000 tons of ore in sight, assaying three to four per cent. copper, and containing also platinum and silver. The production of platinum in 1911 amounted to 184 ozs., valued at £989.

2. **Osmium, Iridium, etc.**—(i.) *New South Wales.* Small quantities of osmium, iridium, and rhodium are also found in various localities. As far back as 1860, the Rev. W. B. Clarke states that he found native iridium. Platinum, associated with iridium and osmium, has been found in the washings from the Aberfoil River, about 15 miles from Oban, on the beach sands of the northern coast; in the gem sand at Bingara, Mudgee, Bathurst, and other places. In some cases, as for example in the beach sands of Ballina, the osmiridium and other platinoid metals amount to as much as 40 per cent. of the platinum, or about 28 per cent. of the whole metallic content.

(ii.) *Victoria.* In Victoria, iridosmine has been found near Foster, and at Waratah Range, South Gippsland.

(iii.) *Tasmania.*—For many years osmiridium has been known to exist in the bed of the Savage River, on the West Coast, and in rivulets and creeks in the Serpentine country, but it was not until early in 1911 that efforts were made to work the deposits. During that year the price paid for the mineral was as high as £7 10s. per oz., and about 100 men were engaged in the search for it. The quantity produced amounted to 272 ozs., valued at £1888.

## § 4. Silver.

1. **Occurrence in Each State.**—Particulars regarding the occurrence of silver in each State will be found in preceding Year Books, Nos. I. to V., but considerations of space preclude the repetition of this matter in the present volume.

2. **Development of Silver Mining.**—In illustration of the development of silver mining in Australia the following table has been compiled, shewing the production of silver, silver-lead and ore, and lead from each State during the years 1881, 1891, and the ten years ending 1911:—

## PRODUCTION OF SILVER AND LEAD, AUSTRALIA, 1881 to 1911.

Year.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tasmania.	North. Terr.	C'wealth.
	£	£	£	£	£	£	£	£
1881	...	5,239	13,494	1,182	11,224	...	...	31,139
1891	3,621,614	6,017	21,879	1,787	250	62,138	4,140	3,717,825
1901	1,954,964	6,550	69,234	3,886	7,718	325,335	...	2,367,687
1907	4,290,128	4,355	187,870	11,780	26,674	572,560	2,093	5,095,460
1908	2,346,941	2,835	206,716	9,000	23,883	322,007	30	2,911,412
1909	1,839,688	2,310	167,636	673	19,977	298,880	...	2,329,164
1910	2,110,040	2,090	123,086	907	20,210	247,576	...	2,503,909
1911	2,652,548	2,070	79,765	140	33,335	*253,361	...	3,021,219

\* Exclusive of silver to the estimated value of £42,831 contained in blister copper.

1. *New South Wales.* The figures quoted for New South Wales in the above table represent the *net* value of the product (excluding zinc) of the silver-lead mines of the State. In explanation of the values thus given, it must be noted that the metallic contents of the larger portion of the output from the silver-lead mines in the State are extracted outside New South Wales, and it is considered, therefore, that the State should not take full credit for the finished product. Hence the *net* value referred to above relates to that of the ore, concentrates, and bullion, as declared by the several companies to the Customs Department at date of export. The real importance of the State as a producer of silver, lead, and zinc is thus to some extent lost sight of. The next table, however, which indicates the quantity and value of these metals locally produced, and the quantity and value of concentrates exported during the last eight years, will shew the estimated total value of the yield:—

VALUE OF PRODUCTION FROM SILVER-LEAD MINES OF NEW SOUTH WALES,  
1904 TO 1911.

Year.	Value of Silver, Lead, and Spelter produced within the C'wealth.	Value of Concentrates Exported.	Total.
	£	£	£
1904	2,088,784	642,125	2,730,909
1905	2,131,317	1,181,720	3,313,037
1906	2,112,977	1,876,834	3,989,811
1907	2,228,420	3,574,775	5,803,195
1908	2,008,410	2,400,997	4,409,407
1909	1,176,394	2,707,680	3,884,074
1910	1,755,220	3,180,850	4,936,070
1911	1,949,271	3,259,246	5,208,517

As regards silver alone, the following table, which has been prepared on a basis similar to that on which the preceding table was compiled, shews the estimated total quantity and value of that metal yielded by the mines of New South Wales up to the end of 1903 and during the last eight years:—

ESTIMATED QUANTITY AND VALUE OF SILVER YIELDED BY MINES OF NEW  
SOUTH WALES, TO END OF 1911.

Period.	Produced in Australia.		Contained in Concentrates, etc., Exported.		Total Production.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
To the end of 1903	Fine ozs. 82,947,404	£ 13,807,421	Fine ozs. 104,659,834	£ 18,330,147	Fine ozs. 187,607,238	£ 32,137,568
1904	7,751,667	920,947	2,945,058	349,891	10,696,725	1,270,838
1905	6,804,934	852,533	3,480,561	436,050	10,285,495	1,288,583
1906	5,575,410	775,409	3,111,013	432,669	8,686,423	1,208,078
1907	5,921,457	795,982	6,228,225	845,845	12,149,682	1,641,827
1908	6,484,288	693,034	5,499,381	587,768	11,983,669	1,280,802
1909	3,717,016	382,605	6,867,775	732,563	10,584,791	1,115,168
1910	5,196,323	561,280	7,608,336	843,257	12,804,659	1,404,537
1911	5,731,468	620,578	8,797,677	973,210	14,529,145	1,593,788
Total	130,129,967	19,409,789	149,197,860	23,531,400	279,327,827	42,941,189

With the exception of Block 10 and Junction Mines all the mines on the Broken Hill field were in active operation during the year, the total ore raised amounting to 1,484,397 tons or 240,713 more than in the preceding year.

**3. Chief Centres of Silver Production.**—Broken Hill, in New South Wales, and Zeehan, in Tasmania, are the great centres of silver production in Australasia. The production in Queensland has, however, considerably expanded during the last few years.

(i.) *New South Wales.* (a) *Broken Hill.* The bulk of the production is, of course, from New South Wales, being contributed mainly by the mines in the celebrated Broken Hill district. A description of the silver-bearing area in this district is given in preceding issues of the Year Book.

Although the returns are not complete in all cases, the following table relating to the mines at Broken Hill will give some idea of the richness of the field:—

**YIELDS OF BROKEN HILL SILVER MINES, 1911.**

Mine.	Authorised Capital.	Value of Out-put to end of 1911.	Dividends and Bonuses Paid to end of 1911.
	£	£	£
Broken Hill Proprietary Co. Ltd. ...	384,000	33,994,053*	9,992,000†
Broken Hill Proprietary Block 14 Co. ...	155,000	3,352,798	462,827
British Broken Hill Proprietary Co. ...	264,000	2,307,595	367,500
Broken Hill Proprietary Block 10 Co. ...	1,000,000	3,856,666	1,255,000
Sulphide Corporation Ltd. (Central Mine) ...	1,100,000	12,186,471†	941,875
Broken Hill South Silver Mining Co. ...	200,000	4,139,900	905,000
North Broken Hill Mining Co. ...	175,000	2,005,930†	405,190
Broken Hill Junction Lead Mining Co. ...	100,000	813,055†	85,000
Broken Hill Junction North Silver Mining Co. ...	180,000	1,153,682	79,793
Broken Hill South Blocks Ltd. ...	200,000	655,819	10,000
Broken Hill South Extended Ltd. ...	337,500	150,344	50,000
Totals ...	4,095,500	64,616,713†	14,554,185

\* The value of the ores purchased during 1908, 1909, 1910, and 1911 is not included. † Incomplete. ‡ Excluding nominal value of shares (£1,744,000) in Block 14, British, allotted to shareholders of Broken Hill Proprietary. || This company went into liquidation on 24th July, 1911, and after that date the mine was worked by the Zinc Corporation Ltd.

(b) *Yerranderie.* The mines on the Yerranderie field in the Southern Mining District produced 728,340 ozs. of silver in 1911, besides small quantities of gold and lead, the total production being valued at £105,600. It is stated that mining operations are carried on under considerable difficulties owing to the heavy cost of transport, and that the advent of a railway (the construction of which is proposed) would completely change the outlook.

(c) *Kangiarra.* The yield from the Kangiarra field, in the Yass district, consisted of 40,263 ozs. of silver, besides gold, 115 ozs.; lead, 729 tons; zinc, 474 tons; and copper, 108 tons; the total production being valued at £32,656.

(d) *Conrad.* The ore raised by the Conrad Mines Ltd., at Howell, in the Tingha division, amounted in 1911 to 21,662 tons, valued at £49,662, of which lead concentrates accounted for £21,058; and copper matte, £22,969. The number of men employed in 1911 was 210, and the value of plant and machinery, £10,000.

(e) *Cobar.* A considerable quantity of silver is obtained from the Great Cobar Ltd. Mine and attached properties, the production in 1911 amounting to 122,559 ozs. At the Cobar Peak Silver Mine the production was 3400 ozs.

(ii.) *Tasmania, West Coast.* The silver-lead mines on the west coast are now well established. Amongst the most important are the Mt. Zeehan, Zeehan-Montana, Zeehan-Western, Zeehan-Dundas, Oonah, Comet, Hercules, Adelaide, North Mt. Farrell, Primrose (Rosebery), and Chester (North Pieman). The blister copper produced by the

Mt. Lyell Co. in 1911 contained fine silver valued at £42,831. The total production of silver-lead ore in 1911 was 61,501 tons, valued at £253,361.

(iii.) *Queensland.* The yield for the chief silver-producing centres in 1911 was as follows:—Chillagoe, £13,235; Charters Towers, £9031; Stanthorpe, £12,525; Cloncurry, £3073; Rockhampton, £3456.

4. **World's Production of Silver.**—The world's production of silver during the last nine years is estimated to have been as follows:—

**WORLD'S PRODUCTION OF SILVER, 1903 to 1911.**

Year ... ..	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.
World's production * in 1000 fine ozs. ...	173,222	176,840	181,333	184,552	183,386	212,570	227,291	240,233	251,909

\* Add 000 to figures for fine ounces.

Australasia's share in the world's silver production in 1911 was estimated at 17,109,000 ounces, or about 6½ per cent. on the total production.

5. **Prices of Silver.**—As the production of silver is dependent to a very large extent on the price realised, a statement of the average price per standard ounce paid by the London Mint at various periods and during the last five years is given below.

**PRICE OF SILVER, 1871 to 1911.**

Year ... ..	1871.	1881.	1891.	1901.	1907.	1908.	1909.	1910.	1911.
Pence per standard oz. ...	60½	51½	45½	27½	28½	24½	23½	24½	24½

During the month of November, 1906, owing to the small sales in New York, and also to the fact that the Indian, American, and Mexican Governments were all buying silver, the price rose to 33½d., the highest realised since 1893, when the average stood at 36½d.

6. **Employment in Silver Mining.**—The number of persons employed in silver mining during each year of the period 1901 to 1911 is given below:—

**NUMBER OF PERSONS EMPLOYED IN SILVER MINING, 1901 to 1911.**

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tasmania.	N. Terr.	C'wealth.
	No.	No.	No.	No.	No.	No.	No.	No.
1901...	6,298	...	40	150	...	2,414*	†	8,902‡
1907...	10,021	10	785	50	8	1,908	36	12,818
1908...	7,560	3	496	50	5	1,740	†	9,856
1909...	6,207	...	354	40	5	1,516	†	8,122
1910...	7,999	...	590	60	21	1,173	65	9,908
1911...	8,495	...	433	30	43	1,125	47	10,173

\* Including copper miners. † Included in South Australia. ‡ Including copper miners in Tasmania.

As the table shews, the bulk of the employment was in New South Wales and Tasmania, the quantity of silver raised in the other States, excepting Queensland, being unimportant.

**§ 5. Copper.**

1. **Production of Copper.**—The production of copper in the various States of the Commonwealth has been influenced considerably by the ruling prices, which have undergone extraordinary fluctuations. The quantity and value of the production in earlier years and for 1907 to 1911 is shewn in the following tables:—

# PRODUCTION OF COPPER, AUSTRALIA, 1881 to 1911.

State.	1881.	1891.	1901.	1907.	1908.	1909.	1910.	1911.
QUANTITY.								
N.S.W. ... { Copper Ore	Tons. *	Tons *	Tons. 6,087 645	Tons. 8,963 1,135	Tons. 8,679 392	Tons. 6,857 109	Tons. 8,435 4,455	Tons. 10,618 1,462
Victoria... { Copper & Ore	*	*	...	38 963	17 14,994	150 16,387	36 20,384	...
Q'land ... { Copper Ore	330 3,824	85 3,551	3,061 6,736	12,756 8,763	14,961 6,152	14,494 5,776	16,387 15,199	20,384 5,922
S. Aust. ... { Copper Ore	21,638	13,239	2,353	...	479 2,503	833 6,959	1,281 6,309	10,654
W. Aust. ... { Copper Ore	...	*	10,157	3,727	2,503	6,959	6,309	...
Tasmania { Copper Ore	...	...	9,730	9,035	8,833	8,638	8,864	8,308
Northern Territory	...	...	10,029	...	1,185	1,588	...	163
C'wealth { Copper Ore	...	...	25,614 23,184	46,019	44,167	36,598 10,018	40,166 10,914	57,567

\* Not available.

+ Including 97 tons of copper, Northern Territory.

## VALUE.

	£	£	£	£	£	£	£	£
New South Wales...	227,667	119,195	412,292	727,774	502,812	424,737	486,257	590,102
Victoria ...	8,186	216	...	2,356	3,928	44	450	2,088
Queensland ...	19,637	3,554	194,227	1,028,179	893,535	853,196	932,469	1,151,351
South Australia ...	418,296	235,317	500,077	705,031	345,968	342,329	*307,316	332,500
Western Australia ...	...	4,463	75,246	203,376	57,091	104,644	95,928	78,118
Tasmania ...	...	...	1,026,748	869,665	609,651	608,038	566,972	408,649
Northern Territory	...	...	...	...	...	...	...	1,470
Commonwealth ...	673,786	362,745	2,208,590	3,536,382	2,412,985	2,332,988	2,389,412	2,564,278

\* Including £1196, Northern Territory.

A short account of the discovery of copper in the different States is given in preceding Year Books.

2. Sources of Production.—(i.) *New South Wales.* The principal seat of the copper-mining industry at the present date is in the Cobar district, the value of the deposits there being first recognised in 1869. The value of the output from this district in 1911 was £370,109, out of a total for the State of £590,102. Operations at the Great Cobar Mines were to some extent interfered with in the early months of the year owing to lack of skilled labour, but the shortage in production was more than counterbalanced by the increased output later, the total for 1911 being 6548 tons of copper as compared with 6248 in 1910. Owing chiefly to the low price of copper, and the lack of railway facilities, the Nymagee, Mount Hope and Girilambone Mines remained closed down, while operations were conducted on a limited scale only at Shuttleton.

From the Grafton Company's mine at Cangai the output was valued at £33,288, as compared with £41,477 in the preceding year. The Kyloe mine, in the Cooma division, contributed materially to the total output, the production from this mine being valued at £66,483. The Electrolytic and Refining and Smelting Company of Australia Limited, established at Port Kembla, had a successful year, the output of electrolytic copper being 13,132 tons, most of which was made from matte and ore produced in other states, chiefly in Queensland.

(ii.) *Victoria.* The copper produced in this State was obtained from the mine near Walhalla operated by the Gippsland Copper, Platinum, and Gold Mining and Smelting Company. During 1911 the company smelted 1116 tons of copper ore and 18 of auriferous quartz, and from the resultant 91 tons of matte, copper was produced to the value of £2088, silver valued at £65, gold at £220, and platinum at £989.

(iii.) *Queensland.* The yield in this State amounted in 1911 to 20,384 tons, valued at £1,151,351, to which the Cloncurry field contributed 8511 tons valued at £477,346. From the Mount Elliott mine 5446 tons of copper were obtained together with 10,494 ozs. gold, and 5156 ozs. silver. The yields for the other chief centres of production in 1911 were as follows :—Mount Morgan, £297,516; Gladstone, £112,513; Rockhampton, £107,872; Etheridge, £62,197; Chillagoe, £44,253.

(iv.) *South Australia.* Taking the entire period over which production extended, the yield of copper in South Australia easily outstrips that of any other State in the Commonwealth. In recent years, however, Tasmania, Queensland, and New South Wales have come to the front as copper producers, as the table on the preceding page will shew. Deposits of copper ore are found over a large portion of South Australia. The Kapunda mine, discovered in 1842 by Messrs. Dutton and Bagot, is situated fifty miles north of Adelaide, and is the oldest copper mine in the State. Up to the end of 1879 the production amounted to 70,000 tons, the metal possessing such a high standard of purity that it always obtained the highest prices in the world's markets. During the nine years 1870 to 1878 the production was valued at £157,000. The Burra Burra mine, located in 1845 by a shepherd named Pickett, is situated about 100 miles north of Adelaide. The original capital invested in this mine was £12,320 in £5 shares, on which no call was ever made, while dividends to the amount of £800,000 were paid. For many years this mine produced from 10,000 to 13,000 tons of ore, averaging 22 to 23 per cent. of copper. During the 29½ years in which the mine was worked the production was valued at £4,749,000. In 1859 as many as 1170 persons were employed on it. The mine has lain practically idle for many years, but recently there have been attempts at reworking.

Yorke's Peninsula, between Spencer's Gulf and St. Vincent's Gulf, contains a large area of copper-bearing country. The principal mines at Wallaroo and Moonta are situated a few miles from Port Wallaroo, and date back to 1860. For about thirty years the Moonta mines were worked independently, selling their ores to the Wallaroo company. During its separate existence the Wallaroo field produced about £2,600,000 worth of copper, while Moonta yielded £5,396,000, and was the first Australian mining field to produce £1,000,000 in dividends. The amalgamation took place in 1889, and since that year the united properties have produced about £4,281,000 worth of copper. The entire yield from the date of first working is estimated at about £12,500,000. The mines just enumerated represent a very small proportion only of those opened on the copper-bearing areas of the State. Owing to the depression in the price of copper in 1911 mining operations were considerably restricted, except at the old and well-established mines. The Paramatta and Yelta mines, in the Moonta district, have now been acquired by the Government for the sum of £6000.

Copper is also obtained in the Northern Territory; the actual output of ore for the year, however, was only £1470 in value. The poor result was entirely due to the low prices and high cartage rates from outlying fields from which, in the main, copper is produced.

(v.) *Western Australia.* The copper produced in this State was raised principally on the West Pilbara field, which in 1911 yielded 9082 tons, valued at £69,140. Phillips River field, which in the preceding year produced the bulk of the output, returned in 1911 a production of 13,564 tons, valued at £46,862, the falling off being due to the temporary closing of the mines of the Phillips River Gold and Copper Company. The figures shewn in the table on the preceding page refer to exports for the year.

(vi.) *Tasmania.* The quantity of blister copper and copper ore produced in Tasmania during 1911 was 8308 tons, valued at £408,649, the bulk of the production being due to the Mount Lyell Mining and Railway Co. Ltd. This company treated 261,562 tons of ore in 1911, and produced 6022 tons of blister copper, containing copper to the value of £342,966; silver, £42,831; and gold, £33,537. The Mount Balfour field raised 2280 tons of ore, valued at £22,840.

3. **Price of Copper.**—The great variation in price that the metal has undergone is shewn in the following table, which gives the average price in London and New York during 1901 and in each of the last five years. The figures are given on the authority of "The Mineral Industry."

#### FLUCTUATION IN VALUE OF COPPER, 1901 to 1911.

Year.	London Price per Ton Standard Copper.	New York. Price in Cents. per lb.	
		* Lake Copper.	Electrolytic Copper.
	£	Cents.	Cents.
1901 ... ..	66.79	16.55	16.11
1907 ... ..	87.01	20.66	20.00
1908 ... ..	59.90	13.42	13.21
1909 ... ..	58.73	13.34	12.98
1910 ... ..	57.05	13.04	12.74
1911 ....	55.97	12.63	12.38

\* The term "Lake" copper is used to designate all copper sold in the trade as such, regardless of the process by which it is refined.

There is no doubt that the steady rise in the price of copper from the year 1902 onwards caused a large amount of overtrading with consequent unhealthy inflation of values, while the sudden drop in 1908 was directly due to the financial panic in America. It is believed, however, that the increasing demand for the metal in electrical and other industries will, under ordinary circumstances, tend in time to establish prices on a sounder basis, and at higher rates than those quoted for the last twelve months in the table above.

4. **Relationship to World's Production.**—The world's production of copper in 1901 and during the last five years is estimated to have been as follows:—

#### WORLD'S PRODUCTION OF COPPER, 1901 to 1911.

Year ... ..	1901.	1907.	1908.	1909.	1910.	1911.
World's production— (short tons) ... ..	583,517	798,205	835,623	942,408	966,998	970,308

5. **Employment in Copper Mining.**—The number of persons employed in copper mining during 1901 and in each of the last five years was as follows:—

#### PERSONS ENGAGED IN COPPER MINING, 1901 to 1911.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tasmania.	Nor. Ter.	C'wealth.
	No.	No.	No.	No.	No.	No.	No.	No.
1901	2,964	4	814	4,000	321	*	†	8,103†
1907	3,764	10	3,941	4,500	611	2,614	†	15,440
1908	2,745	9	3,540	4,470	283	2,076	88	13,211
1909	2,024	2	3,241	4,450	497	2,038	54	12,306
1910	2,286	40	2,418	4,150	559	2,042	49	11,544
1911	2,151	57	2,458	4,030	317	1,565	29	10,607

\* Included with silver miners. † No returns. ‡ Excluding Tasmania.



## § 6. Tin.

1. **Production of Tin.**—The development of tin mining is, of course, largely dependent on the price realised for the metal, and, as in the case of copper, the production has been subjected to somewhat violent fluctuations. The table below shews the production in each of the Commonwealth States during the years 1881, 1891, 1901, and 1907 to 1911:—

## TIN PRODUCED IN AUSTRALIA, 1881 to 1911.

State.		1881.	1891.	1901.	1907.	1908.	1909.	1910.	1911.
QUANTITY.									
New South Wales	{ Ingots	Tons. 5,824	Tons. 1,454	Tons. 648	Tons. 1,331	Tons. 954	Tons. 951	Tons. 847	Tons. 958
	Ore	609	203	11	583	841	992	1,021	970
Victoria ...	Ore	†	†	77	104	79	89	41	33
Queensland*	Ore	†	†	1,661	5,140	4,885	3,326	2,953	3,091
West Australia	Black tin	...	†	734	1,502†	1,093†	698†	500†	495
Tasmania ...	Ore	†	†	1,790	4,343	4,521	4,511	3,701	3,953
Northern Territory	Ore	...	†	81	436	441	427	364	239
Commonwealth	{ Ingots, ore, etc.	†	†	5,002	13,439	12,814	10,994	9,427	9,739
VALUE.									
New South Wales...	{ Ingots	£ 531,303	£ 124,320	£ 76,080	£ 229,607	£ 126,292	£ 127,089	£ 127,700	} 307,089
	Ore	37,492	9,643	464	63,698	79,155	83,940	100,456	
Victoria ...	Ore	7,334	5,092	4,181	10,831	6,070	7,067	3,706	3,417
Queensland	Ore	193,699	116,387	93,723	496,766	341,566	244,927	243,271	307,847
West Australia	Black tin	...	10,200	40,000	166,139	83,595	65,959	45,129	55,220
Tasmania ...	Ore	375,775	293,170	212,542	501,681	421,580	418,165	399,393	513,500
Northern Territory	Ore	...	1,938	5,586	41,365	35,876	32,741	31,113	22,900
Commonwealth	...	1,145,603	560,750	432,576	1,509,787	1,094,134	979,888	950,768	1,209,973

\* Dressed tin ore, about 70% tin. † Tin ingot and ore. ‡ Not available.

2. **Sources of Production.**—(i.) *New South Wales.* The bulk of the yield in New South Wales comes from the Tingha district, the production in 1911 being £143,684, out of a total for the whole State of £307,089. Of the total production in 1911, £208,095, or about 68 per cent., represents the value obtained by dredging. During the twelve years ending in 1911, the tin won by dredging amounted to 10,566 tons, valued at £1,049,255. In the Emmaville division the yield of ore was estimated at 806 tons, valued at £94,784, the increase on the previous year's return being due to the satisfactory results of dredging. In addition to smaller quantities won in other divisions, it may be noted that a certain amount of tin is obtained by fossickers, in search of gold, on the beach sands in the Clarence and Richmond district.

(ii.) *Victoria.* In Victoria lode tin has been discovered at Mt. Wills, Beechworth, Eldorado, Chiltern, Stanley, and other places in the north-eastern district; and stream tin has been found in a large number of places, including those just mentioned in the north-eastern district. The bulk of the production last year was obtained by dredging and hydraulic sluicing at Tallandoon.

(iii.) *Queensland.* The high price of the metal during 1911 was responsible for renewed activity in tin mining, particularly in the Herberton district, where there was increased development in existing mines, while great attention was devoted to recent discoveries. The yield for this district amounted in 1911 to £199,177. From the other chief districts the yields were as follows:—Chillagoe, £51,262; Cooktown, £22,559; Stanthorpe, £15,199.

(iv.) *Northern Territory.* Valuable lodes of tin are found in the Northern Territory at Mount Wells, West Arm and Bynoe Harbour, and at Horseshoe Creek, and Bur-rundie, but the deposits have not yet been exploited to the extent they deserve. In 1911 there were 231 miners engaged in tin mining in the Northern Territory, and the quantity of tin ores and concentrates exported was 239 tons.

The metal has also been discovered near Earea Dam in South Australia.

(v.) *Western Australia.* The production of tin ore and ingot for the State during 1911 amounted to 495 tons, valued at £55,220, to which the Greenbushes field contributed 411 tons, valued at £44,638, and the Pilbara field 149 tons, valued at £16,064. Production at the former field shewed increased activity during the year, but development at the latter was hampered through lack of necessary capital.

(vi.) *Tasmania.* The tin ore raised in 1911 amounted to 3953 tons, valued at £513,500, the largest contributor to the total being the Mount Bischoff Co. in the North Western Division. This company treated 204,722 tons of ore from which 1100 tons of concentrates valued at £143,000 were made. The dividends paid for the year amounted to £52,500, and the total to the end of 1911 to £2,287,500. The Mt. Bischoff Extended produced 181 tons of calcined tin oxide. In the North-Eastern Division, the Briseis Co., which employs 111 men, produced 547 tons of ore, and paid £30,000 in dividends; the Arba Co. raised 116 tons of black tin; the Pioneer obtained 573 tons, and paid £43,000 in dividends, while the South Mt. Cameron raised 8½ tons. In the Eastern Division the Anchor and Australian mines together produced 194 tons of tin oxide, and employed about 150 men. In the Western Division the Renison Bell produced 130 tons of tin, valued at £15,122, and the Boulder 54 tons, valued at £6244.

3. **World's Production of Tin.**—According to "The Mineral Industry" the world's supplies of tin during each of the last five years were obtained as follows:—

#### THE WORLD'S TIN SUPPLIES, 1907 to 1911.

Origin.	1907.	1908.	1909.	1910.	1911.
	Tons.	Tons.	Tons.	Tons.	Tons.
English production ... ..	4,407	5,052	5,198	5,810	4,500
Chinese exports ... ..	3,480	4,558	4,445	4,500	2,600
Straits to Europe and America ... ..	53,520	60,491	58,541	54,625	50,270
Straits to India and China ... ..	2,178	2,187	2,030	2,100	3,400
Australia to Europe and America ... ..	6,612	5,748	5,384	4,563	3,825
Banka sales in Holland ... ..	11,264	11,530	11,973	12,000	12,581
Billiton sales in Java and Holland ... ..	2,229	2,235	2,241	2,250	2,650
Bolivian arrivals in Europe ... ..	15,594	17,032	18,121	18,225	22,064
South Africa... ..	...	...	...	...	2,200
Total (long tons) ... ..	99,284	108,833	107,933	104,073	104,090

The main users of tin are the manufacturers of tin-plates, while it is also required in conjunction with other metals to produce bronze, brass, Britannia metal, pewter, printers' type, and solder. It is stated that the rising tendency of prices during recent years is due to the fact that production has not been commensurate with the demands for consumption, and also in some measure to the fact that for industrial purposes the metal can be replaced by others to a limited extent only.

4. **Prices of Tin.**—The average price of the metal in the London market for the year 1897 and from 1901 to 1911 was as follows:—

## PRICE PER TON OF TIN, 1897 to 1911.

Year.			Price per Ton.	Year.			Price per Ton.
			£ s. d.				£ s. d.
1897	...	...	61 8 0	1906	...	...	180 12 11
1901	...	...	118 12 8	1907	...	...	172 12 9
1902	...	...	120 14 5	1908	...	...	133 2 6
1903	...	...	127 6 5	1909	...	...	134 15 6
1904	...	...	126 14 8	1910	...	...	155 6 2
1905	...	...	143 1 8	1911	...	...	192 7 0

According to "The Mineral Industry" the maximum price obtained for tin during the period 1897-1911 was reached in December, 1911, when the metal was quoted at £203 7s. 2d. per ton.

Recent advices shew that the price of tin has been steadily rising for some time, and it is expected that good values will be maintained sufficiently long to enable a number of new mines in Australia to be properly opened up.

5. **Employment in Tin Mining.**—The number of persons employed in tin mining during each of the years 1901 to 1911 is shewn below:—

## PERSONS ENGAGED IN TIN MINING, COMMONWEALTH, 1901 to 1911.

Year.			N.S.W.	Victoria.	Qld.	W. Aust.	Tas.	Nor. Ter.	C'wealth.
			No.	No.	No.	No.	No.	No.	No.
1901	...	...	1,428	...	1,148	413	1,065	...	4,054
1907	...	...	3,173	87	2,582	1,003	1,828	554	9,227
1908	...	...	2,456	53	2,140	614	1,588	384	7,235
1909	...	...	2,037	48	2,158	406	1,576	355	6,580
1910	...	...	2,028	25	1,932	326	1,598	322	6,231
1911	...	...	2,225	34	1,860	321	1,755	280	6,475

## § 7. Zinc.

1. **Production of Zinc.**—The production of spelter is practically confined to the Broken Hill district of New South Wales, where zincblende forms one of the chief constituents in the enormous deposits of sulphide ores.

Gratifying results have been achieved in the work of the profitable extraction of the zinc contents of the large heaps of accumulated tailings and from the ore raised on the Broken Hill field. The year 1909 witnessed the passing of this problem out of the experimental stage, and the practical solution of the difficulty which has confronted the mining companies for many years. At present not only is the zinc being obtained in a marketable form, but the silver and lead contents are being turned to profitable account. During 1911 the various process plants on the field were all in continuous operation, and improvements were effected tending towards simplicity of construction and increased capacity. In 1899 the exports of zinc (spelter and concentrates) amounted to 49,879 tons; in 1909 they totalled 373,906 tons, valued at £1,041,280; and in 1911, 516,378 tons, valued at £1,414,980, the great bulk of the production being obtained from tailings. The following table shews the production of zinc in New South Wales from 1889 to 1911:—

NEW SOUTH WALES.—PRODUCTION OF ZINC, 1889 to 1911.

Year.	Quantity of Zinc (Spelter and Concentrates) Produced.	Value.	Year.	Quantity of Zinc (Spelter and Concentrates) Produced.	Value
	Tons.	£		Tons.	£
1889	97	988	1908	276,720	600,883
1891	219	2,622	1909	373,906	1,041,280
1899	49,879	49,207	1910	468,627	1,289,634
1907	237,219	536,620	1911	516,378	1,414,980

The total quantity of zinc (spelter and concentrates) produced in New South Wales to the end of the year 1911 was 2,299,199 tons, valued at £5,773,671. The average price of spelter per ton in the London market during the last seven years was £23 16s. 10d. ranging from £20 3s. 3d. in 1908 to £27 0s. 5d. in 1905. The price in 1911 was £23 5s. 6d.

During the year 1911, 12 tons of zinc, valued at £189, were raised in Western Australia.

§ 8. Iron.

1. **General.**—The fact that iron-ore is widely distributed throughout the Commonwealth has long been known, and extensive deposits have been discovered from time to time at various places in New South Wales, Queensland, South Australia, Western Australia, and Tasmania. It will appear, however, from what is stated below, that until quite recently, little has been done in the way of converting these deposits into a marketable commodity.

(i.) *The Manufactures Encouragement Act 1908.* It was hoped that the passing by the Commonwealth Parliament of the Manufactures Encouragement Act, which came into force on the 1st January, 1909, would assist in firmly establishing the iron industry in Australia on a remunerative basis, both in the smelting of pig iron and in the production of bar iron and steel from Australian ore. The Act referred to provides for the payment of bounties on iron in accordance with the terms set out hereunder :—

**BOUNTIES PAYABLE ON AUSTRALIAN PIG IRON, BAR IRON, STEEL, etc.**

Description of Goods.	Rate of Bounty.	Total Amount which may be authorised.	Date of Expiry of Bounty.
CLASS 1.			
Pig iron made from Australian ore ... ..	12s. per ton	£150,000	30th June, 1914
Puddled bar iron made from Australian pig iron ... ..	"		
Steel made from Australian pig iron ... ..	"		
CLASS 2.			
Galvanised sheet or plate iron or steel (whether corrugated or not) made from Australian ore	10 per cent. on value	£30,000	30th June, 1912
Wire netting, not being prison made and being made from Australian ore or from wire manufactured in the United Kingdom	10 per cent. on value		
Wire made from Australian ore			
Iron and steel tubes or pipes (except riveted or cast), not more than six inches internal diameter, made from Australian pig iron or steel	10 per cent. on value		

Particulars of the bounties paid under the above Act during the half-year ended the 30th June, 1912, and during the financial years 1909-10, 1910-11 and 1911-12, are shewn in the following statement:—

**PARTICULARS OF BOUNTIES PAID ON AUSTRALIAN PIG IRON, BAR IRON,  
STEEL, etc., 1909 to 1912.**

Description of Goods.	Steel made from Australian Pig Iron.	Puddled Bar Iron made from Australian Pig Iron.	Pig Iron made from Australian Ore.	Galvanised Sheet Iron made from Australian Ore.	Wire netting made from wire manufactured in the United Kingdom.	Total.
	£	£	£	£	£	£
Half-year ended 30th June, 1909	575	568	2,314	192	...	3,649
1909-10 ... ..	1,491	1,254	23,510	287	6,036	32,578
1910-11 ... ..	1,940	2,080	20,462	121	4,824	29,427
1911-12 ... ..	723	671	15,611	74	5,968	23,047
Total ... ..	4,729	4,573	61,897	674	16,828	88,701

So far New South Wales is the only State where bounty has been claimed, and the above figures, taken in conjunction with those in the succeeding table, show that production has not been as rapid as might have been expected.

**2. Production of Iron.**—(i.) *New South Wales.* Reference to the extent of the deposits of iron ore in the State, and the events leading up to the establishment of ironworks at Lithgow will be found in earlier issues of the Year Book (see No. III., p. 508). During 1911 the following materials were received at the blast furnace:—Iron ore, 58,206 tons; limestone, 23,921 tons; and coke, 45,178 tons. The output was 36,354 tons of pig iron, valued at £145,416, while 4838 tons of steel ingots were also manufactured. The following table shews the quantity and value of finished iron, pig iron, etc., made in New South Wales during the last seven years, chiefly from scrap iron, but since 1908 partly from the smelting of iron ore:—

**NEW SOUTH WALES.—PRODUCTION OF IRON, 1905 to 1911.**

Particulars.	1905.	1906.	1907.*	1908.†	1909.‡	1910.§	1911.§
Quantity Tons	4,447	8,000	29,902	40,207	29,762	40,487	36,354
Value ... £	85,693	112,848	178,632	118,224	106,357	161,948	145,416

\* Includes 18,631 tons pig iron, valued at £60,550, produced from 34,500 tons of iron ore raised within the State. † Includes 30,333 tons pig iron, valued at £93,777, from 51,206 tons of ore raised within the State. ‡ Includes 26,762 tons pig iron, valued at £100,357, from 46,740 tons of iron ore raised within the State. § From ore raised within the State.

The falling-off in 1911 was due to industrial troubles at the ironworks during the last half of the year.

The bounty paid in 1910 and 1911 on iron and steel made from ores mined in New South Wales was as follows:—

### BOUNTY PAID ON IRON AND STEEL, NEW SOUTH WALES, 1910 and 1911.

Description.	1910.		1911.	
	Tonnage.	Bounty.	Tonnage.	Bounty.
		£		£
Pig iron ... ..	40,326.5	24,196	24,658	14,795
Puddled bar iron ... ..	3,383.5	2,036	1,789	1,073
Steel ... ..	3,410.0	2,046	2,633	1,580
Total ... ..	47,120.0	28,278	29,080	17,448

It is stated that a large proportion of the ore has been found to yield 68½ per cent. metallic iron, and the Broken Hill Proprietary Co. proposes to erect extensive works at Newcastle, New South Wales, for the purpose of manufacturing iron from this ore.

A quantity of iron oxide is purchased by the various gasworks for use in purifying gas, the output in New South Wales being drawn chiefly from the deposits at Port Macquarie, while smaller quantities are obtained from Mittagong, Goulburn and Moruya. During 1911 the quantity raised was 1586 tons, valued at £2377, while the total output to the end of that year was 19,939 tons, valued at £25,984. The quantity of ironstone disposed of for flux in New South Wales during 1911 exhibits a decrease, since the requirements of the smelting companies were diminished, owing to suitable ores being obtained. In 1911 the quantity raised was 1216 tons, valued at £861, as against 1648 tons, valued at £1321, in the preceding year.

(ii.) *Victoria.* Iron ore has been located at various places in Victoria, particularly at Nova Nowa, in the Gippsland district, and at Dookie. A blast furnace was erected in 1881 near Lal Lal, on the Moorabool River, and some very fair quality iron was produced, which was used for truck wheels and stamper shoes in the Ballarat mines. The fall in the price of the metal, however, led to the closing of the works. In his report for 1905 the Secretary for Mines states that without special assistance to the industry there does not seem to be any prospect of the deposits being cheaply worked.

(iii.) *Queensland.* Queensland possesses some extensive deposits of iron ore, which is mined chiefly for fluxing purposes in connection with the reduction of gold and copper ores. During the year 1911, 20,639 tons of ironstone, valued at £11,157, were raised, the bulk of the production being in the Rockhampton and Cloncurry districts.

(iv.) *South Australia.* In South Australia iron ore is raised for fluxing purposes only, although the State possesses some rich deposits capable of being mined for an indefinite period. The best known deposit is the Iron Knob, a veritable hill of iron of high percentage, situated about forty miles W.S.W. from Port Augusta. The estimated quantity of iron ore in sight at the Iron Knob and Iron Monarch has been set down at 21,000,000 tons.

(v.) *Western Australia.* This State has some very rich deposits of iron ore, but owing to their geographical position, the most extensive fields at the present time are practically unexploited, the production in the State being confined chiefly to that needed for fluxing purposes. The Murchison field possesses some extensive deposits of high-grade ore. There are also deposits on Koolan Island at Yampi Sound.

(vi.) *Tasmania.* The existence of large quantities of iron ore in Tasmania was noted as far back as 1822, when Surveyor-General Evans alluded to the "surprising abundance of iron within a few miles of Launceston." A company known as the Tasmanian Charcoal Iron Company was formed to work these deposits, and commenced operations in June, 1876. Unfortunately, however, the presence of chromium rendered the pig iron so hard and brittle that the works had to be abandoned. Extensive deposits of specular iron ore are also found in the neighbourhood of the Blythe and Gawler Rivers. The total production of iron ore in 1908 was 3600 tons, valued at £1600, and

was all raised by the Tasmanian iron mine at Penguin, but owing to the closing down of that mine in 1909, there has been no further production. Iron pyrites for the manufacture of sulphuric acid, and in connection with manures, is produced on the West Coast. During 1911 the Mount Lyell Co. raised 9112 tons, valued at £3595.

(vii.) *World's Production of Iron, 1911.* The quantity of iron produced in Australia is but a very small proportion of the world's production, which in 1911 amounted to 63,252,000 metric tons (pig iron). The leading position for magnitude of production is held by the United States, which in 1911 produced 24,028,000 tons, compared with Germany's 15,280,000 tons, and the United Kingdom 9,875,000 tons. The position of the three countries named is similar to what it has been for several years past.

## § 9. Other Metals.

1. **Aluminium.**—The ores from which aluminium is chiefly made in other countries are widely distributed in great abundance in New South Wales in the form of hydrous silicate of alumina, which occurs in all clays. In the form of bauxite or hydrous sesquioxide, it is found at Emmaville, Inverell, and Wingello, its existence being first recognised in the last named locality in 1889. The metal, however, has not been manufactured locally.

2. **Antimony.**—This metal is widely distributed in New South Wales, and has been found native at Lucknow, near Orange. Dyscrasite, a silver antimonide, has been found in masses up to one ton in weight in the Broken Hill lodes. Large quantities of antimony are obtained in the Hillgrove district, and deposits are being worked in the Port Macquarie Division and at Yulgilbar in the Copmanhurst Division. It has also been found at various places in Victoria, chiefly in association with gold. In 1911 the export of antimony metal and ore from New South Wales amounted to £2010. The total quantity of antimony ore raised in New South Wales up to the end of 1911 was 17,463 tons, valued at £304,869. Comparatively little attention was given to mining for antimony in New South Wales during 1911 owing to the low price ruling. The metal occurs in large quantities in the Hillgrove division, and can readily be mined extensively should the price warrant operations. The production of antimony ore in Victoria during 1911 amounted to 743 tons, valued at £8928. The ore was raised by a syndicate operating at Costerfield. In Queensland extensive deposits were discovered at Neerdie, in the Wide Bay district, during 1872, also at Wolfram Camp on the Hodgkinson field, on the Palmer River, in the Ravenswood district, and on the Mitchell River in the Herberton district. A small quantity valued at £72 was produced in 1911. In Western Australia good lodes of stibnite carrying gold have been found in the Roeburne district.

3. **Arsenic.**—In the form of arsenopyrite, arsenic is of wide distribution in Victoria, but the deposits are worked to a limited extent only. At Ballarat a small quantity of the oxide is obtained from the flues of roasting furnaces. In New South Wales about 200 tons of arsenic were obtained in 1910 by the Conrad Mines Ltd. at Howell.

4. **Barium.**—A valuable lode of barium sulphate has been discovered near Dalwin, on the North Lyell railway, in Tasmania, and it is proposed to develop the deposit. It is stated that the lode is from 2½ to 7 feet wide over a length of over 40 chains.

5. **Bismuth.**—This metal has been found in New South Wales, near Glen Innes, and also in the vicinity of Pambula, its discovery dating from 1877. A large body of bismuth-bearing ore has been located near Oberon, and was being prospected during 1910, while several trial parcels were obtained for treatment from a mine at Kirkdale, in the Yass division. About 8 tons of metal and ore, valued at £1800, were exported from New South Wales during 1911; the total quantity exported to the end of that year was 535 tons, valued at £127,327. In Queensland wolfram, molybdenite, and bismuth have been found in various parts of the Herberton and Chillagoe districts, but the chief

centres of production are at Wolfram Camp, where they have been found in association, and at Mount Carbine, where chiefly wolfram is mined. There is also a fair amount of mining at Bamford. The total production in 1911 was valued at £71,252 of which £54,163 was returned as wolfram, £5525 as bismuth, and £11,564 as bismuth and wolfram. In South Australia deposits are found at Balhannah, at Mount Macdonald, and at Winnininnie, on the shores of Spencer's Gulf. In Tasmania 14 tons, valued at £5748, were raised in 1911 at Middlesex.

**6. Chromium.** In New South Wales chromium is found at Bowling Alley Point, on the Peel River, in the Clarence River district, and near Gundagai. During 1911 the production came to 150 tons, valued at £300, and was obtained from a lease near Barabara. The total exports to the end of 1911 amounted to 30,812 tons, valued at £101,408. Chrome iron ore is found in Queensland in the Rockhampton district, where the Elgalla mine, at Cawwaral, produced a small quantity in 1911. There was also some production from the mine near Broadmount.

**7. Carnotite.**—A discovery of carnotite ore was made in 1906 twenty miles E.S.E. from the Olary railway station in South Australia, and steps are being taken to test its value commercially.

**8. Cobalt.**—This metal was found at Carcoar in New South Wales in 1889, and subsequently at Bungonia, Port Macquarie, and various other places. There was no export of cobalt in 1911, and the total produced since 1860 amounted in value to only a little over £8000. Deposits have been noted in South Australia near Bimbourie, and South Blinman; in Western Australia at Norseman and Kanowna; and at various places in Victoria.

**9. Lead.**—This metal was first noted in New South Wales in 1849, when small specimens of native metal were found by the Rev. W. B. Clarke. At present lead mining *per se* is not practised to any extent in the Commonwealth, the supply of the metal being chiefly obtained in conjunction with silver. In New South Wales the lead contents of the bullion produced within the State amounted in 1911 to 17,276 tons, valued at £209,784. The total lead production to the end of 1911 was 120,941 tons, valued at £1,736,381. In Victoria oxides, sulphides, and carbonates of lead are found in the reefs of most of the goldfields. The deposits are not, however, of sufficient extent to repay the cost of working. In Queensland the deposits are worked chiefly for the silver or gold contents of the ore, the lead produced amounting to 1771 tons, valued at £23,460, of which 886 tons, valued at £11,483, were produced from the mines in the Chillagoe district, while the Etheridge, Herberton, and Charters Towers districts produced 229, 124, and 393 tons respectively. Lead ore to the value of £15,002 was exported from Western Australia in 1911. The Northampton Mineral Field reported a production for the year of 8195 tons, valued at £17,663. Complete information is not available as to the lead contents of Tasmanian silver lead ores. At one time South Australia produced a fair amount of lead, £22,303 worth being raised in 1902, but the production has rapidly decreased, the average value for the last 3 years being about £100.

**10. Mercury.**—In New South Wales mercury was first recorded by the Rev. W. B. Clarke in 1843. Cinnabar has been found in lodes and impregnations at various places, such as Bingara, Clarence River, etc. In the Copmanhurst division a lode yielding encouraging assays has been discovered. Up to the present the production of quick-silver has been small, the total being only a little over 1000 lbs. Lodes of cinnabar have been found in Queensland at Kilkivan, and at Black Snake, in the Wide Bay district; about four tons were produced between 1824 and 1891. Between O.K. and Mungana several shows have been prospected with encouraging results. Small quantities have been found disseminated over a large area near Willunga in South Australia.



**11. Manganese.**—Ores of this metal occur in considerable quantity in widely separated districts in New South Wales, but the low price of the metal precludes mining to any great extent, and the production to date has been trifling. In Queensland there are extensive deposits at Mount Miller, at Gladstone, and Mount Nansen, near Gympie, the product being utilised chiefly by the Mount Morgan mine. The production from the Mount Miller mine amounted in 1911 to 1149 tons of ore, valued at £4021. Small quantities of manganese ore were raised in Victoria during 1911, from mines in the vicinity of Yackandandah. Extensive deposits of the ore were mined at Boolcunda in South Australia some years ago, but latterly the production has ceased. Deposits have also been noted at Kangaroo Island, Quorn, Tumby, and various other parts of the State. In Western Australia ores of the metal are found widely scattered, the black oxide being especially plentiful in the Kimberley district.

**12. Molybdenum.**—In New South Wales molybdenite (associated with bismuth) is obtained at Kingsgate, near Glen Innes, the export in 1911 being 21 tons, valued at £2591, as compared with 48 tons, valued at £5667, in the previous year. The production in Queensland for 1911 was 100 tons, valued at £13,278, practically the whole of which was contributed by the mines in the Chillagoe field.

**13. Radium.**—(i.) It is reported that there have been several definite discoveries in Australia of the occurrence of minerals containing radium. The discovery at Olary, in South Australia, of carnotite, which is an alteration product of pitchblende, the compound from which radium is obtained, has already been referred to. In 1910 pitchblende was identified in portion of the workings at Olary, and a specimen, exhibiting a high degree of radio-activity, was obtained. This is the first authentic discovery of the mineral pitchblende in Australia. The deposits of radio-active uranium ores found at Radium Hill are now being mined, and it is hoped that they will prove of economic value as a source of radium. In another case a monazite from Pilbara, Western Australia, has been shewn to give off radium emanations. This mineral has been called "pilbarite." Yet another specimen of mineral having the composition of a secondary pitchblende has been discovered by a prospector. The exact place where this specimen was found is uncertain, but it is believed that it came from the New England district of New South Wales. It is stated that its radio-activity is very marked, the mineral being 1 per cent. more active than the Bohemian variety, and that it contains only such elements as were readily separable from one another by the methods used to obtain pure uranium and radium from Bohemian pitchblende. Lastly, it is stated that the ores obtained at the Moonta mines, South Australia, contain from one-tenth to one-fifteenth of the amount of radium found in high-grade pitchblende, and that a product having a fairly high degree of radio-activity can be extracted therefrom with comparative ease.

(ii.) **Production of Radium Bromide.**—At the end of November, 1912, a small quantity of radium bromide was produced at the Radium Hill Co.'s works at Woolwich, Sydney, this being the first occasion on which a marketable amount of this salt has been obtained outside of Europe. It is estimated by the chemist in charge that the present plant at the works is capable of providing £600 worth of radium weekly.

**14. Tungsten.**—Wolfram and scheelite, the principal ores of tungsten, are both mined to a small extent in New South Wales. During 1911 the export of wolfram was 283 tons, valued at £29,991, and of scheelite 108 tons, valued at £11,842. Wolfram was mined chiefly at Torrington, in the Deepwater division, and scheelite at Hillgrove. A mine near Omeo, in Victoria, was developed during 1909, and 17½ tons of concentrates, valued at £1070, were produced during 1911. A small quantity of concentrates was also produced at Bendoc. In Queensland, tungsten ores are found in several districts, the chief centres of wolfram production in 1911 being Chillagoe and Herberton. (See also Bismuth, page 499.) A deposit of wolfram was discovered near Yankalilla in South Australia as far back as 1893, but the production up to date has been small.

In Western Australia a deposit of wolfram has recently been discovered in the West Kimberley district, about 70 miles to the north-east of Derby; nine tons, valued at £826, were raised during 1911. Wolfram is mined in Tasmania, the production for 1911 being 70 tons, valued at £7769, obtained chiefly from the Shepherd and Murphy mine at Middlesex, and the Avoca mine. A rich lode of scheelite has been discovered on King Island in Bass Strait.

15. **Tantalum.**—Tantalite in small quantities has been found in the Greenbushes mineral field of Western Australia for some time past, but recently a lode of fairly extensive proportions was located at the Wodgina tinfield. Up to the end of 1905 the production of this mineral in Western Australia amounted to 73 tons, valued at about £10,000, but early in 1906 it was found that the supply exceeded the demand and production was temporarily stopped; in 1908 a small quantity valued at £400 was exported. About £327 worth was reported as having been raised in the Greenbushes and Pilbara fields during 1909, but none was exported owing to the entire absence of any market. No production was recorded in 1910 and 1911. Small quantities of the mineral are also produced in the Northern Territory.

16. **Uranium.**—This mineral has been discovered in South Australia in the country between Mount Painter and Mount Pitts, about 80 miles east from Farina. The uranium ores occur most frequently in the form of torbernite and autunite, and are found over a considerable area. The discovery is therefore of considerable importance, since ores of this mineral are found to a very limited extent in other parts of the world, and uranium is the chief source from which radium is derived.

In addition to the metals enumerated above there is a large number of others occurring in greater or less degree, while fresh discoveries are being constantly reported.

## (B). NON-METALLIC MINERALS.

### § 10. Coal.

1. **Production in each State.**—(i). *Historical.* A historical account of the discovery of coal in each State will be found in preceding issues of the Year Book. (See No. III., pp. 515-6.)

(ii). *New South Wales.*—The production in 1911 amounted to 8,691,604 tons, valued at £3,167,165, an increase of 518,076 tons and £157,509 in value, as compared with the preceding year. Although there was no general strike, several of the mines were idle for various periods in consequence of local industrial troubles; so that, under the circumstances, the output for 1911 may be considered as highly satisfactory.

(iii). *Victoria.*—During 1911, 659,998 tons of coal were raised, an increase of 290,289 tons on the previous year. A State coal mine was established at Powlett River towards the end of 1909, and its contribution to the total production in 1911 was 506,059 tons. A railway, 27 miles in length, has been constructed from Nyora to the coal-field. There are eleven shafts at the mine from 30 to 278 feet deep and coal is being raised from five of them. The average number of men employed at the mine and surface works in 1911 was 946. The township—under the name of Wonthaggi—has been laid out on modern lines, and elaborate arrangements have been made for its lighting and water supply, while State brickworks and quarries have been established. The population of Wonthaggi was given in 1911 as 3200, and the valuation of the borough as £355,000. Other payable seams in this district outcrop about five miles away, near Cape Patterson, and it is believed that the coal-bearing area has an extent of from twelve to fifteen square miles.

(iv). *Queensland.* The number of collieries contributing to the output in 1911 was 42, and the quantity of coal raised was 891,568 tons, valued at £323,998, as against 871,166 tons, valued at £322,822, for the preceding year. The industry is at present in a

very satisfactory position in the northern State, and owing to the wide area over which the deposits stretch, practically no limit can be set to its possibilities of extension.

(v.) *Western Australia.* Six collieries were in operation on the Collie field during 1911, and the output for the year was 249,890 tons, or about 12,000 tons less than in 1910. The decrease was due principally to the sealing up of portion of the workings at the Collie Proprietary, necessitated by an outbreak of fire.

(vi.) *Tasmania.* The principal collieries in Tasmania are the Cornwall and Mount Nicholas, the former producing 24,000 and the latter 30,000 tons out of a total yield in 1911 of 57,067 tons.

The quantity and value of coal produced in each State and in the Commonwealth at various periods since 1881, are shewn in the following table:—

#### PRODUCTION OF COAL, AUSTRALIA, 1881 to 1911.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	C'w'th.
QUANTITY.							
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1881	1,769,597	...	65,612	...	...	11,163	1,846,372
1891	4,037,929	22,834	271,603	...	...	43,256	4,375,622
1901	5,968,426	209,329	539,472	...	117,836	45,438	6,880,501
1907	8,657,924	138,635	683,272	...	142,373	58,891	9,681,095
1908	9,147,025	113,962	696,332	...	175,248	61,068	10,193,635
1909	7,019,879	128,673	756,577	...	214,302	66,162	8,185,593
1910	8,173,508	369,709	871,166	...	262,166	82,455	9,759,004
1911	8,691,604	659,998	891,568	...	249,890	57,067	10,550,127
VALUE.							
	£	£	£	£	£	£	£
1881	603,248	...	29,033	...	...	4,465	636,746
1891	1,742,796	19,731	128,198	...	...	17,303	1,908,028
1901	2,178,929	147,228	189,877	...	68,561	18,175	2,602,770
1907	2,922,419	79,706	222,135	...	55,158	23,556	3,302,974
1908	3,353,093	64,778	244,922	...	75,694	24,427	3,762,914
1909	2,616,596	76,945	270,726	...	90,965	26,464	3,083,696
1910	3,009,657	189,254	322,822	...	113,699	48,609	3,684,041
1911	3,167,165	301,141	323,998	...	111,154	26,214	3,929,672

The Victorian figures for 1911 include about 6000 tons of brown coal, the bulk of which was raised at Altona.

2. *Distribution and Quantity of Coal in each State.*—(i.) *New South Wales.* Estimates have from time to time been made as to the total quantity of coal available for working in the deposits in New South Wales, and while these naturally differ to some extent, they agree in placing the amount at well over a thousand million tons, without taking into consideration the deposits existing below a depth of 4000 feet. According to Mr. E. F. Pittman, the coal-bearing rocks of New South Wales may be classified as follows:—

#### COAL-BEARING ROCKS OF NEW SOUTH WALES.

Geological Age.	Maximum Thickness of Coal-bearing Strata.	Locality.	Character of Coal.
I. Tertiary—Eocene to Pliocene	Approx. 100 ft.	Kiandra, Gulgong, and Chouta Bay	Brown coal or lignite.
II. Mesozoic—Triassic or Trias-Jura	2,500 ..	Clarence and Richmond Rivers	Coal suitable for local use only.
III. Palæozoic—Permo-Carboniferous	13,000 ..	Northern, Southern and Western Coalfields	Good coal, suitable for gas, household and steaming.
IV. Palæozoic—Carboniferous	10,000 ..	Stroud, Bullah Dellah.	Very inferior coal with bands; of no value.

In regard to the Tertiary deposits, it may be noted that no serious attempt has been made to use the coal as fuel in New South Wales. At Kiandra a deposit of lignite was found to possess a maximum thickness of 30 feet, but as a general rule the seams vary

from 3 to 4 feet in thickness. The Triassic or Trias-Jura deposits in the Clarence and Richmond districts contain numerous seams, but the coal is largely intersected by bands, while its large percentage of ash renders it unfit for use as fuel for industrial purposes. These beds extend under the great western plains, but the presence of artesian water precludes the possibility of their being worked. The Clarence basin extends into Queensland, and at Ipswich thick and valuable seams of coal are worked. The Hawkesbury sandstone and Wiannamatta shale, which cover a large area of the Permo-Carboniferous coal basin, also contain numerous small coal seams, but none is of sufficient extent to pay for working. It is in the Permo-Carboniferous division that the great productive coal seams of the State are found, the area which they cover being estimated at about 16,550 square miles. The deepest part of the basin is somewhere in the vicinity of Sydney, where the "Sydney Harbour Colliery" is working the top seam at a depth of 2884 feet. Towards the north, south and west the seams rise towards the surface, and outcrop in the neighbourhood of Newcastle, Bulli and Lithgow. The coal from the various districts embraced in this division differs considerably in quality—that from the Newcastle district being especially suitable for gas-making and household purposes, while the product of the Southern (Illawarra) and Western (Lithgow) is an excellent steaming coal. At the present time the Greta coal seams are being extensively worked between West Maitland and Cessnock, and this stretch of country, covering a distance of fifteen miles, is now the most important coal mining district in Australasia. The Permo-Carboniferous measures have in various places been disturbed by intrusions of volcanic rocks, which in some instances have completely cindered the seams in close proximity to the intrusive masses, while in other instances the coal has been turned into a natural coke, some of which has realised good prices as fuel.

#### COAL RAISED IN NEW SOUTH WALES, 1881 to 1911.

District.	1881.		1901.		1905.		1911.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.	£	Tons.	£	Tons.	£	Tons.	£
Northern ...	1,352,472	437,270	3,999,252	1,669,519	4,645,742	1,473,995	5,793,646	2,320,673
Southern ...	253,283	115,505	1,544,454	407,196	1,556,678	421,768	2,066,621	636,163
Western ...	163,842	50,473	424,720	102,214	429,718	107,698	831,337	210,329
Total ...	1,769,597	603,248	5,968,426	2,178,929	6,632,138	2,003,461	8,691,604	3,167,165

*Sydney Harbour Colliery.* So far back as 1847 the Rev. W. B. Clarke expressed the belief that workable coal would be found in the strata below Sydney, a belief that was also held by subsequent geologists, who based their contentions on stratigraphical and palaeontological evidence. The later geologists urged that the Illawarra coal measures of the South Coast district were identical with the Newcastle measures of the Northern district, although it was agreed that the deposits in the neighbourhood of Sydney would probably be found at a considerable depth. Borings were made in several localities close to Sydney, and in 1891 a drill put down at Cremorne Point in Sydney Harbour passed through a seam of coal seven feet four inches thick at a depth of 2801 feet. Unfortunately the site of the bore happened to be in the vicinity of a volcanic dyke, which had cindered the coal near the locality of its intrusion. A second bore was commenced in July, 1892, and in November, 1893, a seam of excellent coal, ten feet three inches thick, was reached at 2917 feet. The results attained led to the formation of a company which acquired land at Balmain, and expended a considerable sum of money in the purchase of plant suitable for working coal at such a great depth. Sinking operations were commenced in June, 1897, and coal was struck at a depth of about 2900 feet on the 21st November, 1901. Various causes tended to retard production on any considerable scale. In the first place it was found that when the coal was reached the seam was split by a band of shale and would not pay for working, and more capital was necessary before a drive could be put in to reach the payable deposit. In 1910, however, the colliery passed into other hands

and with improved financial conditions developmental work was pushed along more rapidly. A great advantage possessed by this colliery is that the largest ocean-going steamers can load their coal supplies from its wharf in the harbour. The colliery possesses considerable interest from the circumstance that its workings are amongst the deepest in the world.

(ii.) *Victoria.* The deposits of black coal in Victoria occur in the Jurassic system, the workable seams, of a thickness ranging from two feet three inches to six feet, being all in the Southern Gippsland district. The coal is of excellent quality for steaming and household purposes. The full exploitation of the Victorian coal deposits has, however, been rather severely hindered by various obstacles. In the Report of the Royal Commission on the Coal Industry, 1906, these have been summarised as follows:—(a) Labour troubles. (b) Difficulties of working arising from faults, displacements, and thin seams. (c) Increased cost of production as the workings extend. (d) The low price ruling for coal.

As pointed out in a preceding page, however, the production in 1911 was considerably in advance of that recorded in any preceding year.

Deposits of brown coal and lignite of immense extent occur in gravels, sands, and clays of the Cainozoic period throughout Gippsland, Mornington Peninsula, Werribee Plains, Gellibrand, and Barwon and Moorabool basins. In the Latrobe Valley the beds reach a thickness of over 800 feet. When dried, the material makes good fuel, but owing to its excessive combustibility and friability requires to be consumed in specially constructed grates. Attempts have been made to manufacture briquettes from the brown coal, but so far without any great measure of success. At the Melbourne and Altona Colliery Company's mine at Altona, 5914 tons of brown coal, valued at £2235, were raised in 1911.

The output of coal from the chief Victorian collieries during the last ten years was as follows:—

#### PRODUCTION OF COAL IN VICTORIA, 1902 to 1911.

Year.	State Coal Mine.	Outtrim Howitt Company	Jumbunna Coal Company	Coal Creek Proprietary.	Silkstone Co. operative Company	Austral Coal.	Other Companies.	Total Production.	Value.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	£
1902	...	114,686	67,876	39,257	2,257	...	1,088	225,164	155,850
1903	...	20,602	18,517	20,727	4,354	...	5,661	69,861	43,645
1904	...	57,328	39,364	22,547	2,014	...	489	121,742	70,208
1905	...	71,989	49,009	27,710	1,624	...	4,804	155,136	79,060
1906	...	74,812	64,222	13,214	3,977	...	4,406	160,631	80,283
1907	...	64,083	61,755	3,762	7,565	...	1,470	138,635	79,706
1908	...	47,633	58,552	...	6,967	...	810	113,962	64,778
1909	2,946	44,156	65,945	3,265	...	10,631	1,730	128,673	76,945
1910	201,053	46,832	61,954	10,968	...	36,052	13,050	369,709	189,254
1911	506,059	28,359	57,397	4,589	...	34,607	28,987	659,998	301,141

Included in the total "for other companies" is an amount of 20,400 tons raised by the Powlett North Woolamai Collieries. The figures also include about 6000 tons of brown coal, the bulk of which was raised at Altona.

(iii.) *South Australia.* The coal from Leigh's Creek in South Australia is subject to similar disabilities to the Victorian brown coal, and until some means are devised of overcoming these, production will probably languish.

(iv.) *Queensland.* In Queensland the coal-bearing strata are of vast extent and wide distribution, being noted under the greater portion of the south-eastern districts, within 200 miles of the sea, as far north as Cooktown, and under portions of the far western interior. The Ipswich beds are estimated to occupy about 12,000 square miles of country, while the Burrum fields occupy a considerably larger area. At Callide, fifty miles west of Gladstone, a seam of coal free from bands has been struck in a shaft only sixty feet deep, and borings have proved the deposit to be of considerable magnitude.

The beds in the Cook district are estimated to comprise rather more than 1000 square miles, but coal measures extend to the south-west far beyond Laura and to the north of the railway. Extensive beds occur in the basin of the Fitzroy River, in the Broadsound district, and at the Bowen River. Amongst other places where the mineral is found may be enumerated Clermont, the Palmer River, Tambo, Winton, Mount Mulligan, and the Flinders River. Boring operations have proved the existence of seams of workable coal for some distance on both sides of the Dawson River. A bituminous coal is yielded by the Ipswich seams, those of the Darling Downs yield a cannel, while anthracite of good quality is furnished by the Dawson River beds.

The quantity and value of coal raised in Queensland at various periods since 1861 were as shewn below :—

#### PRODUCTION OF COAL IN QUEENSLAND, 1861 to 1911.

Year ... ..	1861.	1871.	1881.	1891.	1901.	1911.
Quantity ... Tons	14,212	17,000	65,612	271,603	539,472	891,568
Value ... £	9,922	9,407	29,033	128,198	189,877	323,998

At present coal mining in Queensland is in a very satisfactory position, the increasing volume of the trade being chiefly due to the action of the Government in granting concessions to vessels coaling at local ports.

The distribution of production during the last two years was as follows :—

#### QUEENSLAND COLLIERIES, 1910 and 1911.

Collieries.	1910.		1911.	
	Tons Raised.	Average Value at Pit's Mouth.	Tons Raised.	Average Value at Pit's Mouth.
Ipswich and Darling Downs ... ..	729,012	s. d. 6 11	709,183	s. d. 6 8
Wide Bay ... ..	93,055	10 5½	98,827	10 10
Rockhampton ... ..	14,392	11 9	16,293	10 4½
Clermont ... ..	34,707	8 0	67,325	7 6
Total ... ..	871,166	7 5	891,568	7 3

The output in 1911 was distributed approximately as follows:—Bunker coal, 221,821 tons; cargo coal, 100,443; Railway and Government Departments, 316,684 tons; factories, works, etc., 252,620 tons.

(v.) *Western Australia.* The coal seams in Western Australia belong to the Carboniferous, Mesozoic, and Post-tertiary ages. Most of the coal contains a large proportion of moisture, and belongs partly to the hydrous bituminous and partly to the lignite class. The only coalfield at present worked is at Collie, in the Mesozoic beds of the south-west. The coal produced is bright and clean, but very fragile when free from moisture. The increased output for the last three years is consequent on the establishment of a bunkering trade at Bunbury and Fremantle, which has developed very satisfactorily. The production from this field since 1901 was as follows :—

#### PRODUCTION OF COAL IN WESTERN AUSTRALIA, 1901 to 1911.

Year ... ..	1901.	1905.	1906.	1907.	1908.	1909.	1910.	1911.
Quantity Tons	117,836	127,364	149,755	142,373	175,248	214,302	262,166	249,890
Value ... £	68,561	55,312	57,998	55,158	75,694	90,965	113,699	111,154

(vi.) *Tasmania.* In Tasmania coal occurs in the following geological periods:—  
 (1) Permo-Carboniferous: Lower Coal Measures. (2) Mesozoic: Upper Coal Measures.  
 (3) Tertiary: Brown Coal and Lignite deposits. Permo-Carboniferous coal is found at Avoca, Mt. Nicholas and Fingal, Thomson's Marshes, Langloh, Seymour, York Plains, Mike Howe's Marsh, Longford, Colebrook, Schouten Island, Spring Bay and Prosser's Plains, Compton and Old Beach, Lawrenny, Longhole, Sandfly, Ida Bay, Hastings and Southport, Recherché and South Coast, Tasman's Peninsula. Deposits of lignite and brown coal are plentiful in beds of Tertiary age, but they have not been exploited to any extent. An estimate gives the approximate quantity of coal available as sixty-five million tons, of which eleven millions are in the Lower Coal Measures and fifty-four millions in the Upper Measures, exclusive of an unknown quantity in strata fringing the Central Tiers.

#### PRODUCTION OF COAL IN TASMANIA, 1901 to 1911.

District.	1901.	1905.	1906.	1907.	1908.	1909.	1910.	1911.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
North-western ...	2,952	1,261	1,878	1,045	...	1,543	1,720	1,496
Eastern ...	37,239	46,708	46,803	53,214	55,539	57,227	71,115	54,296
Midland ...	1,536	200	393	624	...	560	721	635
South-eastern ...	...	200	1,483	4,008	5,529	6,832	8,899	640
South-western ...	3,711	3,624	2,339					
Total ...	45,438	51,993	52,896	58,891	61,068	66,162	82,455	57,067

The bulk of the output in 1911 was raised from the Cornwall and Mt. Nicholas mines, which produced 24,060 and 30,058 tons respectively.

3. *Production of Coal in Various Countries.*—The total known coal production of the world in 1911 amounted to about 1140 million tons (exclusive of brown coal or lignite), towards which the Commonwealth contributed 10 million tons, or less than 1 per cent. The following table shews the production of the British Empire and the chief foreign countries in units of 1000 tons during each year of the period 1901 to 1910:—

#### COAL PRODUCTION, BRITISH EMPIRE, 1901-11.

Year.	United Kingdom.	British India.	Canada.	Australian C'wealth.	New Zealand.	Union of S. Africa.
	1000 tons.	1000 tons.	1000 tons.	1000 tons.	1000 tons.	1000 tons.
1901 ...	219,047	6,636	5,791	6,881	1,228	712
1907 ...	267,831	11,147	9,385	9,681	1,831	2,766
1908 ...	261,529	12,770	9,720	10,194	1,861	5,137
1909 ...	263,774	11,870	9,376	8,186	1,911	5,534
1910 ...	264,433	12,047	11,526	9,759	2,197	6,351
1911 ...	271,899	12,716	11,032	10,550	2,066	6,780

#### COAL PRODUCTION, FOREIGN COUNTRIES, 1901-1911.

Year.	Russian Empire.	Sweden.	German Empire.	Belgium.	France.	Spain.	Austria-Hungary.	Japan.	United States.
	1000 tons.	1000 tons.	1000 tons.	1000 tons.	1000 tons.	1000 tons.	1000 tons.	1000 tons.	1000 tons.
1901 ...	16,215	268	106,795	21,856	31,126	2,609	12,895	8,885	261,875
1907 ...	25,583	300	140,885	23,324	35,411	3,637	14,881	13,656	428,996
1908 ...	25,487	300	145,298	23,179	36,044	3,823	14,843	14,587	371,288
1909 ...	26,232	243	146,397	23,140	36,519	3,799	14,868	14,806	411,432
1910 ...	24,460	298	150,372	23,532	37,030	3,751	14,834	15,429	447,654
1911 ...	22,824	307	158,164	22,683	38,023	...	15,000	15,763	443,025

Including New Zealand the production from Australasia takes second place amongst the possessions of the British Empire, British India coming first in order.

4. **Export of Coal.**—The exports of coal from the Commonwealth are practically confined to New South Wales.

The total quantity of coal of Australian production (exclusive of bunker coal) exported from the Commonwealth to other countries in 1911 was 1,687,857 tons, valued at £900,622, of which amount 1,686,482 tons, valued at £899,807, were exported from New South Wales. The quantity of bunker coal taken by oversea vessels was 1,455,683 tons, of which 1,187,968 tons were taken from New South Wales.

(i.) *New South Wales.* In the following table will be found the quantity and value of the exports at decennial intervals since 1881 and during the last five years. The figures for New South Wales are given on the authority of the Mines Department of that State, and include both bunker coal and coal exported from New South Wales to other States of the Commonwealth :—

#### EXPORTS OF NEW SOUTH WALES COAL, 1881 to 1911.

Year.	1881.	1891.	1901.	1907.	1908.	1909.	1910.	1911.
Quantity ... 1000 tons	1,030	2,514	3,471	5,744	6,099	4,394	4,690	5,024
Value ... £1000	417	1,307	1,682	2,662	3,021	2,234	2,459	2,664

The principal oversea countries to which coal was exported from New South Wales during the year 1911 were as shewn hereunder. The quantity and value refer strictly to exports, and exclude bunker coal :—

#### DESTINATION OF NEW SOUTH WALES OVERSEA EXPORTS OF COAL, 1911.

Country.	Quantity.	Value.	Country.	Quantity.	Value.
	Tons.	£		Tons.	£
Chile ...	619,806	338,350	Peru ...	64,559	34,650
Philippine Islands...	156,280	82,914	Hawaii...	53,201	28,999
Straits Settlements	131,029	69,655	United States ...	180,769	98,201
Fiji ...	33,453	16,776	India ...	38,165	18,924
New Zealand ...	211,160	114,474	Java ...	134,742	65,819

The quantity of bunker coal taken from New South Wales by oversea vessels was about 1,188,000 tons, valued at £650,000.

The distribution of the total output from New South Wales collieries during the last five years was as follows ; the particulars given of amounts exported include coal shipped as bunker coal :—

#### DISTRIBUTION OF TOTAL OUTPUT OF NEW SOUTH WALES COAL, 1907 to 1911

Year.	Exports to Aus- tralian Ports.	Exports to other Ports.	Local Consumption.	Total.
	Tons.	Tons.	Tons.	Tons.
1907 ...	2,379,024	3,364,483	2,914,417	8,657,924
1908 ...	2,715,310	3,383,366	3,048,349	9,147,025
1909 ...	2,200,769	2,192,834	2,626,276	7,019,879
1910 ...	2,478,497	2,211,936	3,483,075	8,173,508
1911 ...	2,525,776	2,498,304	3,667,524	8,691,604



The figures quoted above are given on the authority of the New South Wales Mines Department. Owing to the abolition of the record of interstate trade it is impossible to give the quantities forwarded to each of the States of the Commonwealth.

5. **Consumption of Coal in Australia.**—An estimate of the consumption of coal in the Commonwealth may be arrived at by adding the imports to the home production, and deducting the exports (including bunker coal taken by oversea vessels). The following table shews the consumption of coal in Australia, computed in the manner specified, for the last five years:—

CONSUMPTION OF COAL IN AUSTRALIA, 1907 to 1911.

Year.	Quantity of Coal Consumed.			
	Home Produce.	Produce of the United Kingdom.	Produce of Other Countries.	Total.
	Tons.	Tons.	Tons.	Tons.
1907 ... ..	5,954,000	3,000	12,000	5,969,000
1908 ... ..	6,087,000	4,000	11,000	6,102,000
1909 ... ..	5,367,000	2,000	7,000	5,376,000
1910 ... ..	6,897,000	110,000	193,000	7,205,000
1911 ... ..	7,407,000	7,000	4,000	7,418,000

The figures for 1910 are, of course, abnormal, the comparatively heavy importation from the United Kingdom and foreign countries being due to uncertainty in the local supply on account of the strike of coal-miners in New South Wales. Of the total importation from foreign countries, India supplied 138,000 tons, and Japan 28,000 tons.

6. **Price of Coal.**—(i.) *New South Wales.* The price of coal in New South Wales has been subject to considerable fluctuation since the date of first production. Up to the end of 1857 the average value of the total output was 11s. 10d. per ton. Next year the value had risen to nearly 15s., declining thereafter until in 1871 the price realised was 7s. From 1872 to 1879 there was a rise in value to 12s. Between 1882 and 1891 the price ranged between 8s. and 10s. From 1891 onwards there was a steady decline until 1898, when the average was 5s. 4d. Henceforward prices rose again until 1902, when 7s. 5d. was the average. A decline then set in until 1905, when the price stood at a little over 6s., followed by a rise of one penny in 1906, and a further rise of eightpence in 1907. In 1908 the average was 7s. 4d.; in 1909, 7s. 5½d.; in 1910, 7s. 4d.; and in 1911, 7s. 3d. per ton. The price of New South Wales coal depends on the district from which it is obtained, the northern (Newcastle) coal always realising a much higher rate than the southern or western product. The average rate in each district during the last five years was as follows:—

PRICE OF COAL IN NEW SOUTH WALES (PER TON), 1907 to 1911.

Year.	Northern District.	Southern District.	Western District.
	s. d.	s. d.	s. d.
1907 ... ..	7 4.41	5 7.44	4 6.90
1908 ... ..	8 0.78	5 10.91	4 5.52
1909 ... ..	8 3.48	5 11.91	4 9.34
1910 ... ..	8 1.44	6 1.76	5 5.56
1911 ... ..	8 0.13	6 1.88	5 0.72

(ii.) *Victoria.* In Victoria the average price of coal up to the 31st December, 1890, was 19s. 3d. per ton. In 1895 the price was still as high as 12s. 2d., but in the following five years there was a serious decline, the value in 1900 being quoted at 9s. 7d. per

ton. In 1901, however, there was an astonishing rise, the figure being as high as 14s. 7d. Since that year, however, the price again declined, the average for 1905 being 10s. 2d.; for 1906, 10s.; for 1907, 11s. 6d.; for 1908, 11s. 5d.; for 1909, 12s.; for 1910, 10s. 6d.; and for 1911, 9s. 3d.

(iii.) *Queensland.* Prices in the principal coal-producing districts during the last five years were as follows:—

#### PRICE OF COAL, QUEENSLAND, 1907 to 1911.

District.	Value at Pit's Mouth.				
	1907.	1908.	1909.	1910.	1911.
	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.
Ipswich and Darling Downs ...	6 1½	6 6½	6 8½	6 11	6 8
Wide Bay and Maryborough ...	8 4	9 5½	9 7¾	10 5½	10 10
Rockhampton ...	11 6½	11 7½	11 6	11 9	10 4½
Clermont ...	...	...	4 6	8 0	7 6

(iv.) *Western Australia.* The average price of the Collie (Western Australia) coal up to the end of 1901 was 9s. 4d. per ton, the price in 1901 being 11s. 7d. In 1902 the average stood at 12s. 3d., and from that time the price fell steadily until 1906, when it was 7s. 7½d. per ton. In 1907, the average price was 7s. 8¾d.; in 1908, 8s. 7½d.; in 1909, 8s. 5½d.; in 1910, 8s. 8d.; and in 1911, 8s. 10d. per ton.

(v.) *Tasmania.* The average price per ton of coal at the pit's mouth in Tasmania, was 8s. in 1901. In 1902 it was 8s. 7d.; in 1903, 8s. 9d.; in 1904 and 1905, 9s. 8d.; in 1906, 9s. 9d.; in 1907, 1908, and 1909, 8s.; in 1910, 11s. 9d.; and in 1911, 9s. 2d.

7. **Price of Coal in other Countries.**—According to a report published by the Board of Trade the average value of coal at the pit's mouth in the five principal coal-producing countries of the world, for the five years ended 1911, was as follows:—

#### PRICES OF FOREIGN COAL, 1907 to 1911.

Year.	United Kingdom.	Germany.	France.	Belgium.	United States.
	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.
1907 ...	9 0	9 8½	12 3	13 8½	5 11½
1908 ...	8 11	10 3½	12 11½	13 1½	5 11½
1909 ...	8 0½	10 2½	12 5½	11 8½	5 7½
1910 ...	8 2½	9 11½	12 3½	11 10½	5 10½
1911 ...	8 1½	9 9½	*	12 0	5 10½

\* Not available.

The price of coal at the pit's mouth in the principal British possessions is averaged by the same authority as follows:—

#### PRICE OF COAL, BRITISH POSSESSIONS, 1907 to 1911.

Year.	British India.	C'wealth of Australia.	New Zealand.	Canada.	Union of Sth. Africa.
	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.
1907 ...	4 8	6 10	10 7	10 8½	10 2½
1908 ...	5 3	7 4½	10 4½	10 8	6 9½
1909 ...	4 8½	7 6½	10 10½	10 10½	6 3½
1910 ...	4 1	7 6½	11 1½	10 8½	5 10½
1911 ...	3 11½	7 5½	10 10½	10 9	5 8½

8. **Employment and Accidents in Coal Mining.**—The number of persons employed in coal mining in each of the States during the year 1911 is shewn below. The table also shews the number of persons killed and injured, with the proportion per 1000 employed, while further columns are added shewing the quantity of coal raised for each person killed and injured, this being a factor which must be reckoned with in any consideration of the degree of risk attending mining operations.

Returns published by the Board of Trade, England, give the total known number of persons engaged in mining and quarrying throughout the world as  $6\frac{1}{2}$  millions, more than one-half of whom were employed in coal mining, the number in the United Kingdom being 1,033,000; the United States, 725,000; Germany, 694,000; France, 197,000; Belgium, 144,000; Austria, 131,000; and India, 116,000.

Recent returns shew the rate in the United Kingdom in respect of deaths through accidents in coal mines as 1.43, and for the British Empire 1.48 per 1000 persons employed in coal mines. For France the rate is given as 1.17, for Germany 2.30, and the United States 3.35. For foreign countries generally the rate is stated at 2.48 per 1000.

#### EMPLOYMENT AND ACCIDENTS IN COAL MINING, 1911.

State.	Persons Employed in Coal Mining.	No. of Persons.		Proportion per 1000 Employed.		Tons of Coal Raised for Each Person.	
		Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
New South Wales ...	17,375	15	92	0.85	5.21	579,000	94,000
Victoria ...	1,754	...	23	...	13.11	...	3,000
Queensland ...	1,981	4	44	2.02	22.21	223,000	20,000
Western Australia ...	463	...	50	...	108.00	...	50,000
Tasmania ...	189	...	1	...	5.30	...	57,000
Commonwealth	21,762	19	210	0.87	9.65	355,000	50,000

### § 11. Coke.

1. **Production of Coke.**—Notwithstanding the large deposits of excellent coal in Australia, there is at the present time a fairly considerable amount of coke imported from abroad, the oversea import during the year 1911 amounting to 22,252 tons, valued at £23,429, the bulk of which came from the United Kingdom, Belgium, and Germany, and was taken chiefly by South Australia, Victoria, and Western Australia. The table hereunder gives the production in New South Wales during the last five years.

#### COKE MADE IN NEW SOUTH WALES, 1907 to 1911.

Year.	1907.	1908.	1909.	1910.	1911.
Quantity ... Tons	254,609	283,873	204,274	282,337	264,687
Value, total ... £	159,316	199,933	137,194	189,069	184,337
Value per ton ...	12s. 6d.	14s. 1d.	13s. 5d.	13s. 4d.	13s. 11d.

The falling-off in the returns for 1909 is, of course, due to the shortage of supplies occasioned by the coal strike.

A small quantity of coke is made in Queensland, but the bulk of that used in ore reduction is imported, mainly from New South Wales. The following table shews the amount manufactured locally, and the amount imported during the last five years; the quantities imported include shipments landed from other States of the Commonwealth.

**QUEENSLAND—COKE MANUFACTURED LOCALLY AND IMPORTED, 1907 to 1911.**

Year.	1907.	1908.	1909.	1910.	1911.
Manufactured locally ... .. tons	8,280	10,684	8,633	11,188	35,025
Imported ... .. „	34,013	58,804	55,559	*32,054	†

\* Nine months only. † Not available.

The development in smelting operations in Queensland is reflected in the increased consumption of coke. It must be understood that the coke referred to above is the production of coke-making establishments only, and does not include the inferior article produced at gasworks.

**§ 12. Oil Shale and Mineral Oils.**

1. **Production of Shale.**—(i.) *New South Wales.* As pointed out by Mr. E. F. Pittman, the name kerosene shale has been rather inaptly applied to a variety of torbanite, cannel, or boghead mineral found at various geological horizons in New South Wales. The mineral does not, as a rule, split in parallel layers, the fracture being rather of a conchoidal type. Pure samples have been found to contain over 89 per cent. of volatile hydro-carbons and over 5 per cent. of fixed carbons. The discovery of the mineral in New South Wales dates probably from 1827, although the first authentic mention by a scientific observer dates from 1845, when its occurrence in the Hartley Vale district was noted by Count Strzelecki. The mineral has been found at several places in the Upper Coal Measures, and in at least two in the Lower Carboniferous. Production on anything like a large scale commenced in 1868, when about 17,000 tons, valued at £48,000, were raised. The production in 1911 amounted to 75,104 tons, valued at £36,980, as compared with 68,293 tons, valued at £33,896, in 1910. With the exception of 9000 tons obtained near Murrurundi in the northern district, the whole of the output for 1911 was won in the Western District, chiefly from the mines of the Commonwealth Oil Corporation at Wolgan, and New Hartley, near Capertee. The increased production in the Northern district is due to the establishment of oil works at Murrurundi and a refinery at Hamilton by the British Australian Oil Company.

(ii.) *Victoria.* Up to the present no extensive deposit of oil shale has been located in Victoria.

(iii.) *Queensland.* Deposits of oil shale are known to exist at various localities in Queensland, and what is believed to be a payable oil-bearing area has been located near Roma. In 1907 a contract was let for sinking a bore at this place to search for artesian water, natural gas, or petroleum, to a depth of 4500 feet. In October, 1908, when the bore had reached a depth of 3702 feet, a flow of gas, estimated at over 1,000,000 cubic feet per day, was struck and became ignited accidentally. The fire was extinguished, and after an extra length of casing had been put down the gas was apparently shut off from below. It was then intended to continue the boring till the stipulated depth of 4500 feet was reached, but up to the present this has not been carried out.

(iv.) *South Australia.* In this State large areas of bituminous shale, of which the boundaries are only approximately known, occur at Leigh's Creek and Lake Phillipson. Reference to the mineral known as coorongite is made in sub-section 13. Excellent specimens of bitumen have been discovered on Kangaroo Island, and it is believed that they are the product of a petroleum-bearing area which it is proposed to test by boring.

(v.) *Western Australia.* A deposit of carbonaceous shale of considerable thickness is known to exist at Coolgardie, but the mineral has not yet been raised in any quantity.

(vi.) *Tasmania.* Tasmanite shale has been discovered in the basins of the Mersey, Don, and Minnow Rivers, and the Government geologist estimates the probable capacity of the beds at 12,000,000 tons. The crude oil content of average quality shale has been estimated at 40 gallons to the ton. A small quantity of shale was raised in 1910, but there was no production in 1911. At present mining for the product is only in the developmental stage, but there is apparently no reason why the industry should not in time become of considerable importance.

2. **Export of Shale.**—In 1911 New South Wales exported 6245 tons of shale, valued at £11,609, of which 5124 tons were sent to the Netherlands.

3. **Shale Oils Bounties.**—The Shale Oils Bounties Act 1910 provides for the payment of bounties on certain goods manufactured in Australia from Australian shale on or after the 1st July, 1910, and before the 1st July, 1913. The total amount to be made available for bounties under this Act is £50,000. Particulars are given in the following tabular statement :—

#### COMMONWEALTH SHALE OILS BOUNTIES—AMOUNT PAYABLE.

Description of Goods.	Rate of Bounty.	Maximum Amounts which may be paid during the Financial Year 1910-11.	Maximum Amounts which may be paid during each of the Financial Years 1911-12 and 1912-13.	Date of Expiry of Bounty.
Kerosene* ...	2d. per gallon.	£ 8,000	£ 16,000	} 30th June, 1913.
Refined paraffin wax ...	2s. 6d. per cwt.	2,000	4,000	

\* The product of shale, having a flashing point of not lower than 73 degrees Fahrenheit determined by the "Abel Pensky" test apparatus in manner prescribed.

During the year ended 30th June, 1912, the Commonwealth Oil Corporation Limited, operating at Hartley Vale, New South Wales, received bounty on kerosene to the amount of £2629, and on refined paraffin wax to the amount of £739.

### § 13. Other Non-Metallic Minerals.

1. **Alunite.**—Probably the most remarkable deposit of alunite in the world occurs at Bullahdelah, in the county of Gloucester, New South Wales, a large proportion of a low range of mountains in the district being composed of this mineral. The deposits are worked by quarrying, and up to the end of 1911, 35,611 tons had been exported, valued at £105,843, the exports for the year 1911 being 1006 tons, valued at £3795. Supplies of accessible mineral having been largely depleted, the company which owns the quarries is now endeavouring to locate further deposits of a sufficiently high grade to pay for working.

It is reported that large deposits of a high-class alunite have been discovered near Sunbury, Victoria.

2. **Asbestos.**—This substance has been found in various parts of Australia, but up to the present has not been produced in any considerable quantity. In New South Wales the deposits at Jones' Creek, in the Gundagai division, were opened up during the year 1909 and a trial parcel of 15 tons shipped to Germany. There was, however, no record of production in 1911. In Western Australia what may prove to be a valuable deposit of the fibrous chrysolite variety has been located at Tambourah, on the West Pilbara gold-field, and in 1909 £154 worth of this mineral was raised. In 1899 Tasmania raised 200 tons, valued at £363, but there has been no production during the last ten years.

Deposits of asbestos of the mountain leather and mountain cork varieties have recently been discovered at Oodlawirra in South Australia.

3. **Barytes.**—In New South Wales during 1911 about 290 tons of barytes, valued at £910, were obtained at Bethungra, in the Cootamundra division, while 80 tons were raised at Cobargo.

4. **Clays and Pigments.**—Valuable deposits of clays and pigments of various sorts are found throughout the Commonwealth. There is a considerable local production of earthenware, bricks, and tiles, but the finer clays have not as yet been extensively used. It is stated that kaolin of a high class has been discovered at Dunbible, near Murwillumbah, in New South Wales; during 1909 these deposits were being opened up, and parcels aggregating 30 tons realised £37 10s., but there was no production in 1911. Deposits of steatite near Wallendbeen were worked during 1911, the quantity disposed of during the year amounting to 83 tons. In Victoria 371 tons of kaolin, valued at £440, were raised during 1911, of which 335 tons were raised at Egerton, and the balance at Llandello near Gordons. In Queensland 5812 tons of fireclay, valued at £2325, were mined during the year 1911 in the Mount Morgan district. On Kangaroo Island, South Australia, where, it is stated, the first pottery mill in the Commonwealth was erected, there are vast deposits of felspar, china stone, silica, and firebrick clay. There are also very extensive deposits of fireclay near Ardrossan on the Yorke Peninsula, and it is stated that a syndicate has recently been formed to work these deposits. Porcelain and other clays of good quality have been found in the Kingston district in Tasmania. Deposits of ochre have been opened up at Dubbo and Wellington in New South Wales, and ochres and pigments of excellent quality have been produced therefrom. Extensive deposits of iron oxide, giving a return of 80 per cent. ochre, have recently been discovered near Oodlawirra in South Australia.

5. **Coorongite.**—This peculiar indiarubber-like material was first noted many years ago near Salt Creek and in the vicinity of Coorong Inlet, in South Australia. It was thought that the substance owed its origin to subterranean oil-bearing strata, but so far the search for petroleum has not been attended with success.

6. **Fuller's Earth.**—A deposit of this mineral has been located at Boggabri, in New South Wales, and a company has been formed to work it. During 1911 a small quantity, valued when treated at £5 12s. 6d. per ton, was produced. It is hoped to considerably increase the output in 1912 and to enter the export market, as the local article is said to be equal in quality to the foreign product. The deposit, which is of considerable extent, is situated in close proximity to the railway, and can therefore be handled very cheaply.

7. **Graphite.**—Graphite is found in New South Wales near Undercliff Station, in the county of Buller, but the deposit is not sufficiently pure to prove remunerative. A small quantity of ore was forwarded in 1911 to England from a site on the Bookookoorara in the Wilson's Downfall Division. In Victoria the mineral occurs in Ordovician slates in several of the goldfields, but is not worked. In Queensland graphite was raised some years ago by the Graphite Plumbago Company at Mt. Bopple, near Netherby, on the Maryborough-Gympie line. There is an extensive deposit of the mineral at Mt. Bopple, but the quality is rather inferior. In Western Australia a company has been formed to work deposits near Bunbury.

8. **Gypsum.**—This mineral is found at various places in the Commonwealth. It occurs in two forms, large crystals, and a floury earth consisting of minute crystals and known as "copi." Both forms are exceedingly pure. It is largely used as a natural manure and to some extent in the manufacture of Portland cement. Gypsum, or hydrous sulphate of lime, when burnt forms plaster of Paris, but in spite of the abundant supply of suitable material it has not yet been used for this purpose.

9. **Tripolite, or Diatomaceous Earth.**—Although tripolite has been found at Barraba, Cooma, Wyrallah, and in the Warrumbungle Mountains in New South Wales, the deposits have not yet been worked commercially on any considerable scale. From the

deposits at Bunyan, in the Cooma division, 25 tons of diatomaceous earth, valued at £106, were produced in 1911. In Victoria there is a remarkably pure deposit at Lillieur, near Talbot, while beds of the mineral are also met with at Clunes and Portland. From the deposit at Talbot, 400 tons, valued at £1600, were obtained in 1911. A fairly extensive deposit of tripolite exists in Queensland, between Nerang and Beaudesert, but the various outcrops have as yet been only partially examined.

10. **Salt.**—Salt is obtained from salt lakes in the Western and North-western Districts of Victoria, and from salterns in the neighbourhood of Geelong. Large quantities are also obtained from the shallow salt lakes of South Australia, chiefly on Yorke Peninsula. Lake Hart, about sixty square miles in area, situated about 120 miles N.W. from Port Augusta, contains immense supplies of salt of good quality, which at present, however, owing to distance from market, possess no economic value. The salt is simply scraped from the beds of the lakes in summer time and carted to the refinery. It is stated that care must be taken not to leave too thin a crust of salt over the underlying mud, as the resultant "crop" after the winter rains will in that case be smaller than usual. A bore recently put down near Kingscote, on Kangaroo Island, revealed brine which can be profitably used by evaporation. The production of crude salt in South Australia during 1910 was 54,000 tons, valued at £27,000. In Western Australia supplies are obtained from dried-up shallow lakes and consumed locally or exported. The chief centres of production were formerly Rottnest Island, near Fremantle, and Middle Island, near Esperance, but the greater part of that now produced is obtained at Port Gregory.

11. **Natural Manures.**—Gypsum has already been referred to. See 8 *ante*. South Australia possesses deposits of rock phosphate near Port Clinton and Ardrossan on Yorke Peninsula, at Belvedere near Kapunda, and at Koorunga, and also at many other places which have only been prospected to a small extent. The production in 1911 was valued at £5800. Reference has been made on page 499 to the pyrites produced by the Mt. Lyell Co., and used in the manufacture of artificial manures. Although it can hardly be considered a mineral product, mention may be made here of the large accumulations of guano on the Abrolhos Islands, off the coast of Western Australia, in the neighbourhood of Geraldton. The deposits vary in thickness from four to twenty-seven inches. During the years 1876-80 over 36,000 tons were raised; no figures are available shewing the production of recent years.

## § 14. Gems and Gemstones.

1. **Diamonds.**—Diamonds were first noted in New South Wales by E. J. Hargraves in 1851, and in October of the same year by Geological Surveyor Stutchbury. The Cudjegong field was discovered in 1867, and shortly afterwards the Bingara diamantiferous deposits were located. Stones of small size are also found at Cope's Creek and other places in the Inverell district. The largest diamond won in New South Wales was obtained in 1905 at Werong, near Oberon, and weighed  $28\frac{1}{2}$  carats. It is difficult to secure accurate returns in connection with the production of precious stones, but the yield of diamonds in 1911 was estimated at 5771 carats, valued at £4064, while the total production to the end of 1911 is given as 176,731 carats, valued at £118,407. The yield in 1911 was contributed by miners working in the vicinity of Copeton, in the Tingha division. Small quantities of diamonds are found in Victoria in the gravels of streams running through granite country in the Beechworth district; at Kongbool in the Western District; and near Benalla. The stones are generally small, and the production up to date has been trifling. A few small diamonds have been found in the Pilbara district in Western Australia. In South Australia diamonds have been found on the Echunga goldfield, the most notable gem being Glover's diamond, which was sold for £70.

2. **Sapphires.**—These gems were discovered in New South Wales in 1851, near Burrandong. They have also been found in small quantities near Inverell, and at a few other localities in the State. There is no record of production. Specimens of sapphire have been found in Victoria, but the stones of commercial size are generally of little value owing to flaws.

In Queensland sapphires are found in the gravel of creek beds, between Withersfield and Anakie on the Rockhampton-Winton railway line. The gems show excellent fire and lustre, but the colour is darker blue than the Oriental sapphire. Hyacinths are occasionally found in association with the gems. The production of sapphires in Queensland in 1911 was valued at £24,393, and up to the end of 1911 the total was £186,186. The production in 1911 included industrial corundum to the value of £5629. Sapphires are plentifully found in the tin drifts of the Ringarooma and Portland districts in Tasmania, but the stones are, as a rule, small and not worth saving.

**3. Precious Opal.**—This stone was first discovered in New South Wales at Rocky Bridge Creek on the Abercrombie River, in the year 1877, and later a most important discovery was made at White Cliffs in the Wilcannia district, which, until recently, contributed the bulk of the production. In 1911, however, out of a total production valued at £57,300, the yield from the Lightning Ridge field near Walgett, amounted to £39,100, while the output from the White Cliffs field was returned at £17,700. The colour and brilliance of the stones generally were quite up to the standard, and one stone, weighing 5 ozs and valued at £300, was recovered in 1911. Occasionally, black opals of very fine quality are found, one specimen from the Wallangulla field, weighing 6½ carats, being sold in 1910 for £102.

The total value of opal won in New South Wales since the year 1890 is estimated at £1,295,100.

Small quantities of precious opal are also found in the Beechworth district in Victoria. In Queensland, the first recorded discovery of the gem dates from about 1875. The opaliferous district stretches over a considerable area of the western interior of the State, from Kynuna and Opalton as far down as Cunnamulla. The yield in 1911 was estimated at £3000, and up to the end of that year at £169,195. These figures are, however, merely approximations, as large quantities of opal are disposed of privately to buyers on the fields, no record of which is obtained. At present, the industry is not in a very satisfactory position, as the shallower grounds of the older centres have been worked out, and there appears to be little disposition to explore the deeper grounds.

**4. Other Gems.**—Emeralds were found in New South Wales in the year 1890, near the township of Emmaville, the largest specimen found in the district weighing twenty-three carats in the rough. Altogether 2225 carats were sent to London during that year, some of the gems bringing £4 a carat, but the production has since dwindled. The mine at the Glen in the Emmaville division was reopened and worked for a short period during 1908, when about 1000 carats of emeralds, valued at about £1650, were obtained. The largest stone in the rough weighed 60 carats. Amongst other gems found in New South Wales at various times may be mentioned *turquoises*, discovered in 1894, near Bodalla; *topazes*, fine specimens of which have been obtained in the New England district, and *sircons* and *garnets*. *Topazes* are common in the tin drifts of Tasmania, and some fine specimens have been found. *Turquoises* are also found in thin veins in Victoria, but the deposit is not rich enough to pay for expenses of working. Fine *agates* are found in many places in Victoria, but have not been made use of to any extent. Garnets are found in Western Australia, and beautiful specimens of *crocidolite* have been obtained at Yarra Creek in the Murchison district. *Rubies* have been found at various places in New South Wales and Queensland. *Tourmaline* has been found on Kangaroo Island, in South Australia, and *beryls* near Williamstown, Victoria. Very large but impure beryl crystals have been found at Ben Lomond in Tasmania.

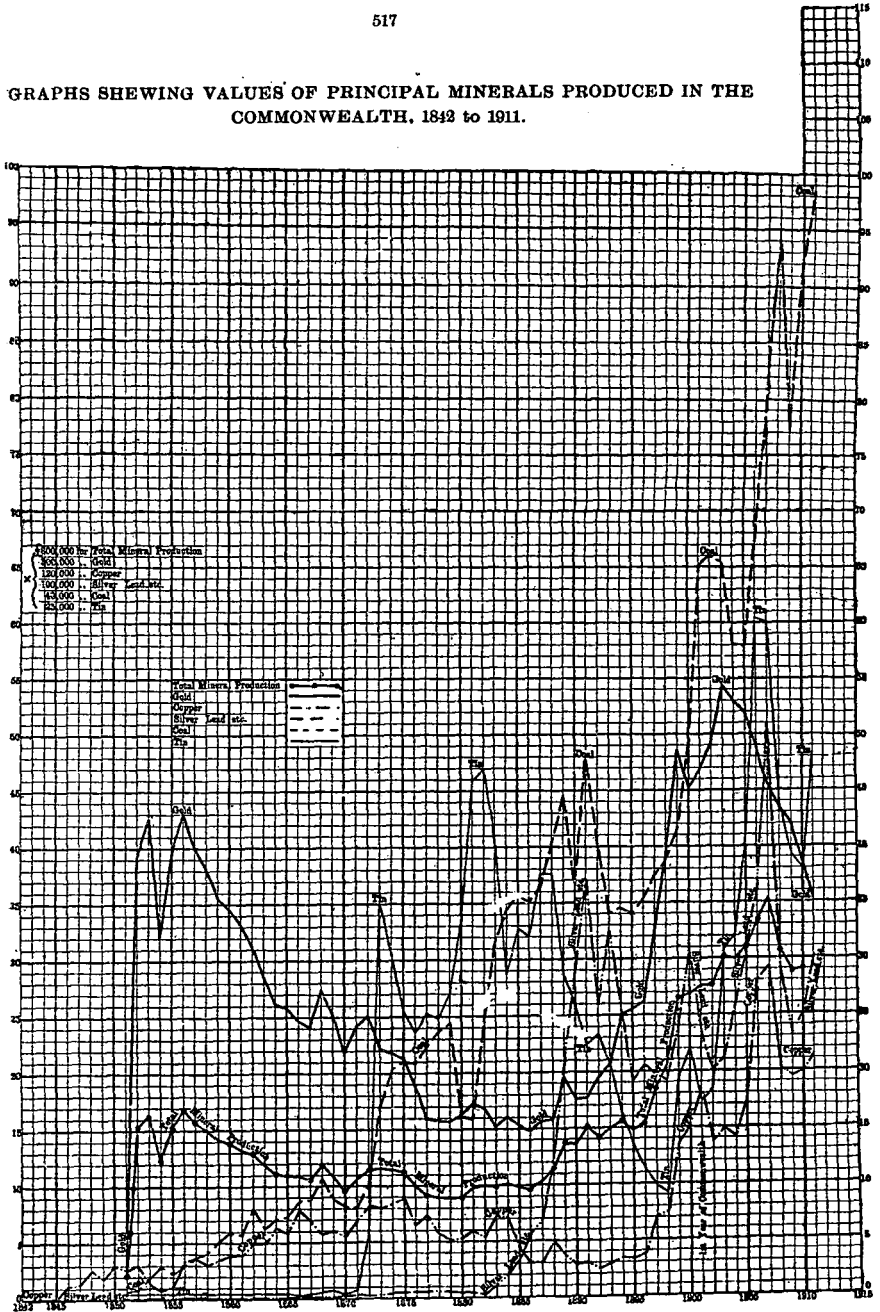
### (C). GENERAL.

#### § 15. Numbers Engaged, Wages Paid, and Accidents in Mining.

**1. Total Employment in Mining.**—The number of persons engaged in the mining industry in each State and in the Commonwealth is an index of the significance of the mineral wealth. During the year 1911 the number so employed was as follows:—



GRAPHS SHEWING VALUES OF PRINCIPAL MINERALS PRODUCED IN THE  
COMMONWEALTH, 1842 to 1911.



(See pages—for total mineral production, 478; gold, 480; silver, 487; copper, 490; tin, 493; coal, 503.)

EXPLANATION OF GRAPHS—The values shown in the above diagrams are those of the total Commonwealth production of the most important minerals in successive years from 1842 to 1911.

The base of each small square represents an interval of one year, and the vertical height represents, in the case of gold £300,000; copper, £120,000; silver, lead, etc., £100,000; coal, £40,000; tin, £25,000; and total mineral production, £800,000.

The names of the various minerals are written on the graphs which respectively represent them, and the distinctive types of line used are exhibited in detail in the central portion of the diagram.



## NUMBER OF PERSONS ENGAGED IN MINING, 1911.

State.	Number of Persons Engaged in Mining for						Total.
	Gold.	Silver, Lead, and Zinc.	Copper.	Tin.	Coal and Shale.	Other.	
New South Wales ...	4,650	8,495	2,151	2,225	17,657	1,839	37,017
Victoria ...	14,015	...	57	34	1,754	126	15,986
Queensland ...	5,227	433	2,458	1,860	1,981	1,242	13,201
South Australia ...	920	30	4,030	...	...	1,020	6,000
Western Australia ...	15,428	43	317	321	463	24	16,596
Tasmania ...	570	1,125	1,565	1,755	189	43	5,247
Northern Territory ...	358	7	29	280	...	41	715
Commonwealth ...	41,168	10,133	10,607	6,475	22,044	4,335	94,762

The following table shews the number of persons engaged in mining in the Commonwealth during each of the years 1891, 1901, and 1911, together with the proportion of the total population so engaged:—

## PROPORTION OF PERSONS ENGAGED IN MINING, 1891, 1901, 1911.

State.	1891.		1901.		1911.	
	Miners Employed.	No. per 100,000 of Popu- lation.	Miners Employed.	No. per 100,000 of Popu- lation.	Miners Employed.	No. per 100,000 of Popu- lation.
New South Wales ...	30,604	2,700	36,615	2,685	37,017	2,177
Victoria ...	24,649	2,151	28,670	2,381	15,986	1,193
Queensland ...	11,627	2,934	13,352	2,664	13,201	2,122
South Australia ...	2,683	834	7,007	1,931	6,000	1,435
Western Australia ...	1,269	2,496	20,895	11,087	16,596	5,644
Tasmania ...	3,988	2,695	6,923	4,017	5,247	2,713
Northern Territory ...	...	...	...	...	715	...
Commonwealth ...	74,820	2,341	113,462	2,992	94,762	2,074

**2. Wages Paid in Mining.**—In the next table will be found a statement of the average wages earned by employees in the chief branches of the mining industry in Australia. The value of the figures is rather prejudiced by the wide diversity of conditions, not only in the several States but in different districts of the same State.

The figures quoted for New South Wales in gold mining refer to the Hillgrove district. For copper the figures refer to the Cobar district, and represent rates as awarded by the Arbitration Court. The maximum is paid when copper is £115 per ton or over, and the minimum when the metal is £70 per ton or under, a graduated rate prevailing between the extremes. The rates for silver miners are those ruling at Broken Hill. As regards Queensland the rates for hewing in coal mines are for miners not doing their own wheeling. Where own wheeling is done the rate varies from 2s. 3d. to 5s. 6d. For Western Australia, the rates shewn in gold mining refer to the chief centres only, and are exclusive of Nullagine, where much higher rates prevail owing to increased cost of living consequent on the remoteness of the district. Generally speaking, the classification of the labour in the various States does not permit of very satisfactory comparisons.

## WAGES PAID IN THE MINING INDUSTRY IN THE COMMONWEALTH, 1911-12.

Class of Mine.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.
<b>GOLD—</b>	per day.	per day.	per day.	per day.	per day.	per day.
Labourers	8/- to 9/-	8/-	6/8 to 10/10	8/-	10/- to 13/4	7/-
Bracemen	8/- to 10/-	...	11/8 to 13/-	8/-	...	7/6
Platmen	8/6 to 10/-	8/-	7/9 to 13/-	8/-	10/10 to 14/2	7/6
Miners	9/6 to 10/6	8/8	...	9/6	11/6 to 14/2	7/6
Wet	11/6	9/1	...	11/-	...	8/4
Shaft-sinking	11/-	8/8 to 9/4	8/2 to 13/-	11/-	12/8 to 15/-	8/4
Wet	...	9/1 to 10/-	...	11/-	13/6 to 16/8	9/2
Blacksmiths	10/6 to 11/6	9/-	9/9 to 13/4	10/-	12/- to 16/8	8/-
Carpenters	10/6 to 12/-	8/4 to 8/8	9/1 to 16/-	10/6	15/- to 16/8	8/- to 8/4
<b>Engine-drivers—</b>						
Stationary	9/- to 11/6	8/4	9/9 to 15/4	10/-	13/4 to 15/-	8/-
Winding	11/- to 12/6	10/-	9/10 to 14/5	10/-	14/- to 16/8	8/4
Battery feeders	9/3	5/4 to 6/8	6/6 to 11/8	8/-	10/- to 11/10	7/6 to 8/-
Shift bosses	10/- to 11/3	9/4	10/7 to 17/2	13/4	16/8 to 20/-	wk. salary
Machine miners	9/6 to 11/6	8/8	8/4 to 15/3	11/-	12/4 to 17/2	8/4
Timbermen	10/6 to 11/6	8/8	9/2 to 14/5	10/-	12/- to 16/8	8/4
<b>SILVER-LEAD—</b>						
Labourers	9/6	...	...	8/-	...	8/- to 9/-
Bracemen	10/6	...	...	8/-	...	8/- to 9/6
Miners	11/- to 13/-	...	The above figures refer to averages per shift in all metalliferous mines in Q'nsland)	9/6	...	9/- to 10/-
Blacksmiths	10/6 to 13/6	...	...	10/-	...	9/6 to 12/2
Carpenters	12/6 to 13/6	...	...	10/6	...	9/8 to 13/4
<b>Engine-drivers—</b>					Same as gold.	
Winding	12/-	...	...	10/-	...	9/4 to 11/-
Shift bosses	14/-	...	...	13/4	...	10/- to 13/4
Truckers	9/6	...	...	8/-	...	8/- to 9/-
Timbermen	11/- to 12/-	...	...	10/-	...	8/4 to 13/4
<b>COPPER—</b>						
Labourers	8/- to 9/-	...	...	8/-	...	7/- to 8/6
Miners	9/6 to 11/-	...	...	9/6	...	9/6 to 10/6
Blacksmiths	10/6	...	...	10/-	...	10/6 to 13/4
Carpenters	10/6 to 11/6	...	...	10/6	...	9/6 to 12/6
<b>Engine-drivers—</b>					Do.	
Winding	11/- to 11/6	...	...	10/-	...	11/-
Bracemen	12/- to 13/6	...	(see above)	8/-	...	9/6
Drill sharpeners	9/2 to 10/-	...	...	10/-	...	9/6 to 10/6
Timbermen	12/-	...	...	10/-	...	10/- to 11/6
Machine miners	10/6 to 11/6	...	...	10/-	...	9/6 to 10/6
Miners in wet [ground]	9/6 to 11/-	...	...	11/-	...	9/6 to 10/6
<b>TIN—</b>						
Labourers	...	...	...	11/-	...	15/-
Miners	8/-	8/-	...	...	...	7/6 to 8/6
Blacksmiths	9/6 to 9/10	...	...	...	...	7/6 to 9/-
Carpenters	10/6	10/-	...	...	...	9/- to 13/4
<b>Engine-drivers—</b>					Do.	
Stationary	10/6	10/-	...	...	...	9/- to 12/-
Shift bosses	9/- to 11/-	...	...	...	...	9/- to 10/-
Nozzlemen	10/-	10/-	(see above)	Not mined.	Do.	8/- to 10/6
Racemen	10/- to 15/-	9/-	...	...	...	8/- to 9/6
Face bosses	9/6	9/-	...	...	...	7/- to 11/-
Boxmen	8/8	9/-	...	...	...	9/- to 15/-
Suicemen	9/-	9/-	...	...	...	8/6 to 10/-
<b>COAL—</b>						
Deputies	8/8	9/-	...	...	...	...
Shot firers	10/- to 12/4	10/- to 12/-	10/- to 10/6	...	14/9	8/- to 8/6
Shiftmen	10/- to 12/3	...	...	...	13/11	...
Wheelers	8/6 to 12/4	10/- to 10/2	10/- to 10/6	...	13/11	7/- to 8/-
Overmen	8/- to 9/1	8/4 to 9/2	4/6 to 7/-	...	11/11 to 12/9	3/- to 7/-
Miners	£3 to £5/10/wk	10/- to 15/-	10/6 to 11/6	...	£5 per week.	10/- to 11/8
Machinemmen	10/- to 15/-	10/- to 15/-	pd. at pr. ton	...	13/11	8/- to 10/-
<b>Engine-men—</b>					13/5 to 15/1	...
Winding	11/- to 12/6	11/-	11/- to 12/-	Not mined.	...	...
Hauling	10/- to 11/3	10/-	9/- to 10/-	...	13/1	8/4 to 10/-
Other	8/9 to 11/3	7/6 to 9/-	9/- to 11/-	...	...	6/- to 8/-
Labourers	7/10 to 8/2	7/6 to 8/4	7/- to 8/-	...	10/1	6/- to 7/6
Blacksmiths	9/5 to 12/2	10/- to 11/-	9/- to 13/-	...	12/11	7/- to 9/6
Carpenters	9/5 to 11/6	10/-	8/- to 11/-	...	12/9	7/- to 9/-
Safety lampmen	4/1 to 10/9	...	...	...	...	...
Platmen or [banksmen]	8/2 to 10/-	8/2 to 10/-	7/6 to 8/6	...	11/11	6/-

\*The higher rates are at the State Mine. †At the State Mine miners received 13/9½ nett on contract.

The figures given in the above table are quoted on the authority of the various Mines Departments, and, while not embracing all employees in the mining industry, will, it is believed, give a fair idea of the remuneration paid in the principal callings.

Under notice issued on the 24th August, 1912, the wages paid by the Wallaroo and Moonta Mining and Smelting Company, in South Australia, are as follows:—Boring machine contract miners, 54/- per week; other contract miners, Wallaroo mines 50/-, Moonta mines 48/-; and other employees at ruling rates. Bonuses are paid as under:—

	—When Copper Averages per Ton—				
	Over £55 to £60.	£60 to £65.	£65 to £80.	£80 to £95.	Over £95.
Boring machine and other contract miners, per week	2/6	3/-	7/6	10/-	12/-
Other employees on standard wages	5 %	10 %	15 %	20 %	25 %

3. **Accidents in Mining, 1911.**—The following table gives particulars of the number of men killed and injured in mining accidents during the year 1911:—

#### NUMBERS KILLED AND INJURED IN MINING ACCIDENTS, 1911.

Mining for—	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	N. T.	Cwlth.
KILLED.								
Coal and shale	15	..	4	...	...	...	...	19
Copper	10	...	1	2	...	2	...	15
Gold...	1	19	7	...	36	...	1	64
Silver, lead and zinc	23	...	1	...	...	1	...	25
Tin	...	...	1	...	1	1	3	6
Other minerals	1	...	...	...	...	...	...	1
Total	50	19	14	2	37	4	4	130
INJURED.								
Coal and shale	92	23	44	...	50	1	...	210
Copper	5	...	47	...	...	15	...	67
Gold...	6	65	182	...	474	20	1	748
Iron	...	...	...	...	...	...	...	...
Silver, lead and zinc	20	...	11	...	3	15	...	49
Tin	1	...	8	...	1	20	...	30
Other minerals	...	...	26	...	...	6	...	32
Total	124	88	318	...	528	77	1	1,136

### § 16. State Aid to Mining.

1. **Introduction.**—The terms and conditions under which State aid is granted in mining are alluded to at some length in previous issues (see Year Books IV. and V.), but owing to considerations of space they have been omitted from this issue.

2. **New South Wales.**—The chief aid given in this State is in the direction of assistance to prospectors. Up to the end of 1911 the total sum expended in this manner

amounted to £426,142, of which £9927 was advanced in 1911. During the year the Government subsidy to the Miners' Accident Relief Fund amounted to £13,623.

3. **Victoria.**—Under the Mining Development and Surplus Revenue Acts the sum of £410,876 has been expended during the period 1897 to 1911 as follows:—

	£
Advances to mining companies ... ..	150,935
Advances to prospectors ... ..	58,478
Boring for gold and coal ... ..	60,643
Construction of roads and tracks ... ..	69,881
Erection of testing plants ... ..	22,705
Miscellaneous, Cyanide patent, Schools of Mines, etc. ...	48,284
Total ... ..	410,876

The expenditure in 1911 was £33,606, of which £7958 was advanced to companies as loans under Surplus Revenue Acts; £49 was loaned to miners; £406 was spent on constructing roads, etc.; £1412 on boring for gold, and £60 miscellaneous. From votes £17,518 was spent on boring; £3275 on batteries, while £2928 was advanced to miners. The Government batteries number 24, and of these 15 are managed by local trusts without expense to the Department so far as cost of working is concerned. The repayment of loans by companies amounts to £18,366, by miners £2187, and for cost of boring £5918. The State's contribution to the Coal Miners' Accident Relief Fund amounted in 1911 to £720.

4. **Queensland.**—State assistance to the mining industry in 1911 amounted to about £25,000, of which £4500 was granted as aid in prospecting for further deposits of auriferous stone in existing mines; £12,500 was advanced to assist in deep sinking; £1700 for boring for coal; £2000 to prospectors and small working parties; while £4000 was granted towards the construction and maintenance of roads and tracks in mining districts.

5. **South Australia.**—Aid is given to the mining industry under the terms of the Mining Act of 1893, and previous measures. Up to the end of 1911 the total amount of subsidy paid was £55,238, of which £6112 has been recovered, leaving a debit of £49,126. Portion of this amount is represented by machinery that has fallen into the hands of the Government. Four Government batteries are in operation in this State.

6. **Northern Territory.**—In the Northern Territory, Government assistance in the form of free rations is granted to prospectors and free assays are made. There are three Government boring plants, and two batteries and cyanide plants (both the latter being situated in the Macdonnell Ranges).

7. **Western Australia.**—Under the Mining Development Act of 1902 assistance was granted in 1911 in accordance with the subjoined statement.

Advances in aid of mining work and equipment of mines with machinery, £1654; advances in aid of erection and equipment of crushing plants, including subsidies on stone crushed for the public, £3297; advances in aid of boring, £1142; providing means of transport, £282. In addition, amounts totalling in all £2144 were expended from the Mining Development vote on various matters such as water supply, roads, cartage, and subsidies for development below the 100 feet level in small mines. The sum of £3297 shewn above includes an amount of £943 paid to owners of plants crushing for the public at fixed rates. The Water Supply Department performs a considerable amount of work in the way of boring, construction of reservoirs, well sinking, clearing of tracks, &c.

In 1911 there were thirty-three State batteries in operation. The amount expended on the erection of State batteries up to the end of 1911 was £91,981 from revenue, and £198,752 from loan, giving a total of £290,733. During the year receipts amounted to £53,322, and working expenditure to £60,062.

The total value of gold and tin recovered to the end of 1911 at the State plants was £3,733,939, resulting from the treatment of 834,780 tons of gold ore and 51,553 tons of tin ore.

**S. Tasmania.**—In Tasmania provision is made for State aid to mining under the Deep-Sinking Encouragement Acts of 1899, 1900, and 1901. Under these Acts sums of £5000, £2000, and £1000 respectively were provided for assisting persons and companies to sink shafts or to drive tunnels below a specified depth, the amount advanced in any particular case varying according to the amount expended by the borrower. The total amount advanced to October, 1909, was £6861, granted to five companies in sums ranging from £682 to £1452, leaving an unexpended balance of £1139. None of the companies to whom the advances were made has been successful, and consequently none of the sums advanced, which were to be repaid out of profits, has been refunded. A sum of £1000 was placed on the estimates for 1911-12 for the purpose of assisting prospectors, the money to be expended on the £ for £ principle, and of this £730 was expended.