

CHAPTER XVII.

MINERAL INDUSTRY.

(NOTE.—A table showing particulars of mineral production for the year 1938 will be found in the Appendix. With the exception of gold this information was not available when this chapter was compiled. Details of gold production are included in § 2 hereinafter.)

§ 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 in large numbers and thus accelerated its national development.

2. **Extent of Mineral Wealth.**—The extent of the total mineral wealth of Australia cannot yet be regarded as completely ascertained, as large areas of country still await systematic prospecting. More detailed reference to this matter will be found in preceding Official Year Books. (See No. 22, p. 755.)

3. **Quantity and Value of Production in 1937.**—The quantities (where available) and the values of the principal minerals produced in each State, and in Australia as a whole, during the year 1937 are given in the tables immediately following. It must be clearly understood that the figures quoted in these tables refer to the quantities and values of the various minerals in the form in which they were reported to the State Mines Departments, and represent amounts which the Mines Departments consider may fairly be taken as accruing to the mineral industry as such. They are not to be regarded as representative of Australia's potentiality as a producer of *metals* this matter being dealt with separately in § 17 hereinafter. New South Wales is, of course, in normal times, a large producer of iron and steel from ironstone mined in South Australia. As the table shows, the latter State receives credit for this ironstone in its mineral returns. The iron and steel produced therefrom cannot be assigned to the mineral industry of New South Wales, but the value of the transformation from ore to metal is credited to the manufacturing industry of that State. Similarly lead, silver-lead and zinc are credited in the form reported to the State of origin—chiefly New South Wales—although the actual metal extraction is carried out principally in South Australia and Tasmania.

MINERAL PRODUCTION: QUANTITIES, 1937.

Minerals.	Unit.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
Antimony ..	ton	144	295	1	..	565	..	..	1,005
Arsenic ..	..	..	..	..	..	3,387	..	..	3,387
Asbestos ..	cwt.	..	..	..	2,420	3,500	40	..	5,960
Barytes ..	ton	264	70	..	2,693	..	76	..	3,103
Bismuth ..	cwt.	1	..	169	..	..	4	..	174
Brown Coal ..	ton	..	3,393,919	..	..	..	..	..	3,393,919
Coal ..	..	10,051,519	257,945	1,120,179	..	553,510	91,121	..	12,074,274
Copper (ingot, matte, etc.) ..	..	3,627	..	5,149	340	35	12,420	7	21,578
Diatomaceous earth ..	..	2,997	100	93	..	..	..	..	3,190
Gold ..	fine oz.	68,607	145,799	127,281	6,962	1,000,647	20,276	11,563	1,381,135
Gypsum ..	ton	9,153	20,862	..	116,121	9,073	..	..	155,209
Ironstone ..	..	677	..	4,479	1,866,414	..	61	..	1,871,631
Kaolin ..	..	10,660	5,686	50	292	..	..	..	16,688
Lead ..	..	(a)	..	38,474	12	..	9,117	..	(b) 47,603
Lead and silver-lead ore, concentrates, etc. ..	..	281,624	..	..	..	6,163	..	26	287,813

(a) See letterpress preceding this table.

(b) Incomplete.

MINERAL PRODUCTION: QUANTITIES, 1937—continued.

Minerals.	Unit.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
Limestone flux ..	ton	144,371	..	18,876	25,885	..	302,093	..	491,225
Magnesite ..	"	19,494	141	..	70	..	..	..	19,705
Manganese ore ..	"	107	..	1,035	..	..	..	..	1,142
Molybdenite ..	cwt. (a)	320	615	465	..	..	..	..	1,400
Osmiridium ..	oz.	..	..	..	..	..	586	..	586
Phosphate ..	ton	16	..	..	..	..	..	..	16
Pigments ..	"	781	6	..	..	..	..	..	787
Platinum ..	oz.	46	..	..	..	..	..	..	46
Salt ..	ton	..	(c)	..	73,558	..	..	..	(d) 73,558
Silver ..	fine oz. (b)	44,330	5,443	3,264,994	955	180,562	1,060,785	..	4,557,069
Tin and tin ore ..	ton	1,143	218	1,171	..	80	1,090	41	3,743
Wolfram ..	cwt.	915	..	1,963	..	..	5,820	5,831	14,529
Zinc and concentrates ..	ton	219,838	..	27,598	..	..	23,481	..	270,917

(a) Ore and Sands. (b) See letterpress preceding this table. (c) Not available.
(d) Incomplete.

The values of the minerals raised in each State in 1937 are given in the following table:—

MINERAL PRODUCTION: VALUES, 1937.

Minerals.	N.S.W. (a)	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas. (a)	N.T.	Australia.
	£	£	£	£	£	£	£	£
Antimony ..	3,468	4,563	44	..	9,236	..	..	17,311
Arsenic ..	..	..	..	..	91,492	..	..	91,492
Asbestos ..	..	..	..	1,177	10,162	29	..	11,368
Barytes ..	440	270	..	5,796	..	174	..	6,680
Bismuth ..	7	..	3,588	..	..	78	..	3,673
Brown Coal ..	..	325,950.	..	..	..	..	..	325,950
Coal ..	5,823,469	171,369	934,107	..	340,444	66,883	..	7,336,272
Copper (ingot and matte) ..	72,406	..	308,968	21,620	986	759,332	55	1,163,367
Diamonds ..	200	..	..	..	..	..	..	200
Diatomaceous earth ..	5,994	412	191	..	..	..	..	6,597
Gems ..	..	..	1,410	..	..	..	..	1,410
Gold ..	595,855	1,266,507	1,104,760	60,372	8,688,921	176,130	100,402	11,993,007
Gypsum ..	8,627	6,221	..	87,091	9,809	..	..	111,748
Ironstone ..	374	..	2,858	2,146,376	..	36	..	2,149,644
Kaolin ..	8,381	4,929	93	876	..	..	..	14,279
Lead ..	(g)	..	667,939	285	..	212,492	..	1,100,716
Lead and silver-lead ore, concentrates, etc. ..	4,306,616	..	..	..	7,248	..	328	4,314,192
Limestone flux ..	28,317	..	13,179	9,709	..	82,444	..	133,649
Magnesite ..	36,552	536	..	86	..	..	..	37,174
Manganese ore ..	322	..	4,269	..	..	..	..	4,591
Molybdenite ..	1,139	5,790	3,849	..	..	..	..	10,778
Opal ..	3,357	..	100	11,887	..	..	..	15,344
Osmiridium ..	..	..	..	..	..	9,077	..	9,077
Phosphate ..	77	..	..	..	..	..	..	77
Pigments ..	1,185	120	..	..	..	..	..	1,305
Platinum ..	455	..	..	..	..	..	..	455
Salt ..	..	(f)	..	147,116	..	..	..	(g) 147,116
Silver ..	(b) 3,997	491	284,592	86	20,596	95,770	..	(g) 405,532
Tin and tin ore ..	336,628	44,127	202,614	..	12,421	260,673	7,205	863,668
Wolfram ..	13,051	..	26,139	..	..	71,643	84,832	195,665
Zinc and concentrates ..	657,967	..	606,150	..	..	525,824	..	1,789,941
Unenumerated ..	(c) 73,007	910	7,642	16,972	(d) 38,867	21,780	e 12,969	172,147
Total ..	11,981,891	1,832,195	4,392,492	2,509,449	9,230,182	2,282,365	205,851	32,434,425

(a) For items excluded see letterpress below. (b) See letterpress above preceding table.
(c) Includes dolomite £11,814, silica £15,919, fireclay £15,422, and zircon-rutile-ilmenite £21,155.
(d) Includes tantalite £29,011. (e) Mica £12,524. (f) Not for publication. (g) Incomplete.

It should be pointed out in connexion with the figures given in the table above that the totals are exclusive of certain commodities, such as stone for building and industrial uses, sand, gravel, brick and pottery clays, lime, cement and slates, which might 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 certain instances, moreover, the published information is of little value. Some of the items excluded, such as cement, carbide and sulphuric acid, are included in manufacturing production, and, in any case, only the raw material could properly be included in mineral production. The items excluded from the total for New South Wales in 1937 consisted of—lime, £75,648, building stone, £122,210; Portland cement, £1,348,826; coke, £909,822; road material and gravel, £1,094,710; shell grit, £18,170; sulphur and sulphuric acid, £48,649; and brick and pottery clays, £254,776. Carbide and cement, £359,803, have been excluded from the Tasmanian figures.

4. Value of Production, 1933 to 1937.—The values of the minerals produced in the various States for the years 1933 to 1937 are given in the table hereunder:—

MINERAL PRODUCTION: VALUES.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
	£	£	£	£	£	£	£	£
1933 ..	6,964,834	1,060,437	2,373,251	1,076,434	5,269,194	845,668	18,150	17,607,968
1934 ..	7,766,504	1,092,029	2,713,135	1,713,537	5,884,430	750,389	28,806	19,948,830
1935 ..	9,210,820	1,394,253	2,887,440	2,498,617	6,107,990	1,071,507	76,900	23,247,527
1936 ..	10,136,789	1,623,003	3,613,511	2,513,359	7,771,454	1,624,036	98,601	27,380,753
1937 ..	11,981,891	1,832,195	4,392,492	2,509,449	9,230,182	2,282,365	205,851	32,434,425

The value of the mineral production in 1937 exceeded that of 1936 by more than £5,000,000. With the exception of South Australia, all of the States recorded increases in values, mainly through the agency of gold, zinc and concentrates, coal, silver-lead ores and concentrates, copper, tin and wolfram. Of these gold was the most important; the production increased by 201,384 fine oz., which, at its enhanced price, accounted for nearly £1,800,000 of the increase mentioned above.

Zinc and concentrates followed gold in the order of increase during 1937, the value of production rising by £855,000 mainly owing to an improvement in prices. The quantity production declined in New South Wales and Queensland but this was more than offset by the increased output recorded in Tasmania. The latter State resumed production in 1936 after a lapse of five years.

The production of silver-lead ores and concentrates in New South Wales increased by 25,626 tons. This was accompanied by a slight rise in price with the result that the value of output exceeded that of 1936 by £491,000.

The quantities of copper, lead and tin were also greater in 1937 and were likewise accompanied by increases in values.

Coal also increased in quantity and price; the average price for Australia increased from 11s. 9d. per ton in 1936 to 12s. 2d. per ton in 1937.

The production of 14,529 cwt. of wolfram in 1937 was more than double that of the previous year. As the increase in quantity was the result of a steep advance in price the value of production rose from £39,500 in 1936 to £195,600 in 1937.

Particulars of the variations in production, etc., by States, will be found in greater detail in the various sections hereinafter.

5. Total Production to end of 1937.—In the next table will be found the estimated value of the total mineral production in each State up to the end of 1937. The items mentioned as excluded from the preceding table are also omitted in this table.

Thus the total for New South Wales falls short by £62,000,000 of that published by the State Department of Mines, the principal items excluded being coke, £18,709,000; cement, £23,968,000; lime, £1,960,000; and considerable values for marble, slate, granite, ocher, gravels, etc., which the Department now includes in the returns for quarries.

MINERAL PRODUCTION: VALUES TO END OF 1937.

Minerals.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Ter.	Australia.
	£	£	£	£	£	£	£	Million. £
Gold ..	66,337,578	308,311,580	90,926,197	1,980,740	204,910,271	9,559,917	2,560,782	685
Silver and lead ..	137,954,055	267,603	9,460,117	384,275	2,356,207	9,857,853	66,652	160
Copper ..	15,833,051	216,686	27,639,542	33,215,233	1,811,043	23,652,492	235,630	103
Iron ..	7,754,064	15,641	506,448	18,666,543	36,722	91,229	..	27
Tin ..	16,136,100	1,056,094	12,072,155	..	1,646,968	18,555,224	661,760	50
Wolfram ..	303,698	11,885	1,102,453	301	1,441	400,374	336,256	2
Zinc ..	26,127,335	..	1,141,829	15,993	5,437	1,805,006	..	29
Coal ..	223,252,089	17,089,365	24,918,764	..	8,767,652	2,454,605	..	277
Other ..	8,895,429	948,374	2,932,925	6,007,850	728,381	2,487,035	133,096	22
Total ..	502,593,399	327,917,228	170,700,430	60,270,935	220,264,122	68,863,735	3,994,176	1,355

The "other" minerals in New South Wales include alunite, £212,000; antimony, £373,000; arsenic, £194,000; bismuth, £245,000; chrome, £134,000; diamonds, £148,000; magnesite, £343,000; molybdenite, £216,000; opal, £1,623,000; scheelite, £200,000; and oil shale, £2,695,000. In the Victorian returns antimony ore was responsible for £619,000. The value for coal in this State includes £3,358,000 for brown coal. Included in "other" in the Queensland production were opal, £188,000; gems, £643,000; bismuth £142,000; cobalt, £158,000; molybdenite, £610,000; limestone flux, £816,000; and arsenic, £124,000. The chief items in South Australian "other" minerals were salt, £3,805,000; limestone flux, £321,000; gypsum, £1,395,000; phosphate, £135,000; and opal, £160,000. In the Tasmanian returns osmiridium was responsible for £623,000, scheelite for £112,000, and iron pyrites for £211,000.

6. **Quarries.**—Hitherto the data published in the Official Year Book relating to the mineral industry has contained no reference to quarrying. At the Conference of Australian Statisticians held in March, 1935, it was resolved that the values of quarry products should be included with mining. Steps are now being taken to give effect to this resolution, but some time must elapse before material can be collected in all States.

7. **Geophysical Methods for Detection of Ore Deposits.**—Reference to the application of geophysical survey methods in Australia will be found in Official Year Book No. 24, p. 570. See also § 16 hereinafter.

§ 2. Gold.

1. **Discovery 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:

2. **Production at Various Periods.**—In the following table will be found the values of the gold raised in the several States and in Australia as a whole during each of the eight decennial periods from 1851 to 1930, and in single years from 1926 to 1937. Owing

to the 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.

GOLD : VALUE OF PRODUCTION.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Ter.	Australia.
	£	£	£	£	£	£	£	£
1851-60..	11,539,583	93,337,052	14,565	..	..	788,564	..	105,670,764
1861-70..	13,676,103	65,106,264	2,076,494	..	..	12,174	..	80,871,035
1871-80..	8,576,654	40,625,188	10,733,048	579,068	..	700,048	79,022	61,293,028
1881-90..	4,306,541	28,413,792	13,843,081	246,668	178,473	1,514,921	713,345	49,216,821
1891-1900..	10,332,120	29,904,152	23,989,359	219,931	22,308,524	2,338,336	906,988	89,999,410
1901-10..	9,569,492	30,136,686	23,412,395	310,080	75,549,415	2,566,170	473,871	142,009,109
1911-20..	4,988,377	13,354,217	9,876,677	238,808	46,808,351	873,302	a 100,652	76,240,384
1921-30..	940,946	2,721,309	1,976,715	47,564	20,462,957	193,833	(a) 9,894	26,353,218
1926 ..	82,551	208,471	43,914	3,219	1,857,716	17,936	(a) 594	2,214,401
1927 ..	76,595	163,699	161,321	1,776	1,734,571	20,646	(a) 468	2,159,076
1928 ..	54,593	144,068	56,395	2,258	1,671,093	15,306	(a) 431	1,944,054
1929 ..	31,842	111,609	40,250	4,289	1,602,142	23,772	(a) 553	1,814,457
1930 ..	53,066	102,456	33,224	5,569	1,773,500	18,976	(a) 57	1,986,848
1931 ..	118,623	262,488	79,652	17,328	3,054,743	28,150	(a) 2,535	3,563,519
1932 ..	203,622	351,699	173,144	22,018	4,413,809	43,137	(a) 4,196	5,211,512
1933 ..	226,068	448,228	710,168	49,619	4,915,950	51,579	(a) 4,449	6,406,061
1934 ..	307,662	597,040	982,636	58,582	5,534,491	48,139	(a) 8,124	7,536,674
1935 ..	439,149	768,401	904,755	64,109	5,677,328	73,143	(a) 44,458	7,971,334
1936 ..	525,792	1,018,670	1,048,748	-66,593	7,326,309	152,291	b 112,786	10,251,184
1937 ..	595,855	1,266,507	1,104,760	60,372	8,688,921	176,130	100,462	11,993,007
Total—								
1851-1937	66,337,817	308,311,580	90,926,203	1,980,201	204,910,271	9,559,825	2,560,782	684,586,679

(a) Period ended June of year stated.

(b) Eighteen months ended December of year stated.

The values quoted on this page are in Australian currency throughout.

Owing to the exhaustion of the more easily worked deposits and the unprofitableness of gold mining during the era of high prices following the Great War, the production of gold in Australia declined from 3,838,029 oz. in 1903 to 427,159 oz. in 1929, the lowest output since the discovery of the precious metal.

Increased activity in prospecting due to prevailing economic conditions resulted in some improvement in 1930, but the marked development since that year received its impetus from the heavy depreciation of Australian currency in terms of gold. Oversea and local capital were attracted to the industry, and the employment of advanced geological methods and technical improvements brought many difficult or extinct propositions into profit. The output of gold rose from 466,593 ozs. in 1930 to 1,381,135 ozs. in 1937, and further increases are forecast. Values in Australian currency assigned to the production of gold during recent years in the table above are £5 19s. 9d. in 1931, £7 5s. 11½d. in 1932, £7 14s. 3½d. in 1933, £8 10s. 0½d. in 1934, £8 15s. 1½d. in 1935, £8 13s. 2d. in 1936 and £8 13s. 8d. in 1937. Monthly fluctuations in the price of gold in London and in Australia are shown in Chapter XXVII. "Public Finance." Reference to the bounty paid by the Commonwealth Government on local production will be found in § 16 par. 1 hereinafter.

The amount of gold raised in Australia in any one year attained its maximum in 1903, in which year Western Australia also reached its highest point. For the other States the years in which the greatest yields were obtained were as follows:—New South Wales, 1852; Victoria, 1856; Queensland, 1900; South Australia, 1894; and Tasmania, 1899.

The following table shows the quantities of gold raised in the various States and in Australia during each of the five years ending 1937. A separate line is added showing the total production in thousands of fine ounces from 1851 to 1937:—

GOLD : QUANTITY PRODUCED.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tasmania.	Nor. Ter.	Australia.
	Fine oz.	Fine oz.	Fine oz.	Fine oz.	Fine oz.	Fine oz.	Fine oz.	Fine oz.
1933 ..	29,252	58,183	91,997	6,361	637,207	6,673	(a) 594	830,267
1934 ..	36,123	70,196	115,471	6,870	651,338	5,622	(a) 989	886,609
1935 ..	50,102	87,609	102,990	7,333	649,049	8,343	(a) 5,066	910,492
1936 ..	60,739	117,596	121,174	7,681	840,208	17,600	b 12,998	1,183,996
1937 ..	68,607	145,799	127,281	6,962	1,000,647	20,276	11,563	1,381,135
Total (c)								
1851-1937	15,294	71,920	20,730	425	43,206	2,179	569	154,323

(a) Year ended 30th June.
omitted in each case.

(b) Eighteen months ended December of same year.

(c) '000

3. **Changes in Relative Positions of States as Gold Producers.**—The figures in the table showing the value of gold raised 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 Colony each year. With the exception of the year 1889, when its output was exceeded by that of Queensland, Victoria maintained its position as the chief gold producer for a period of forty-seven years, until its production was surpassed by that of Western Australia in 1898. From that year onward Western Australia contributed practically half, and so far as the last ten years are concerned nearly four-fifths, of the entire yield of Australia.

4. **Place of Australia in the World's Gold Production.**—The table given below shows the world's gold production, and the share of Australia therein in decennial periods since 1851 and during each of the last seven years for which returns are available. The figures given in the table have been compiled from the best authoritative sources of information.

GOLD : WORLD'S PRODUCTION.

Period.	World's Production of Gold.	Gold Produced in Australia.	Percentage of Australia on Total.
	Fine oz.	Fine oz.	%
1851-60 ..	61,352,295	24,877,013	40.55
1861-70 ..	53,675,679	19,038,661	35.47
1871-80 ..	50,473,314	14,429,599	28.59
1881-90 ..	51,998,060	11,586,626	22.28
1891-1900 ..	102,695,748	21,187,661	20.63
1901-10 ..	182,891,525	33,434,069	18.28
1911-20 ..	206,114,773	17,426,466	8.45
1921-30 ..	186,091,278	5,841,902	3.14
1931 ..	22,786,773	595,123	2.61
1932 ..	24,204,275	714,135	2.95
1933 ..	25,568,779	830,267	3.25
1934 ..	27,063,639	886,609	3.28
1935 ..	29,446,483	910,492	3.09
1936 ..	33,136,416	1,183,996	3.57
1937 ..	34,520,225	1,381,135	4.00

For the year 1937 the world's production of gold in fine ounces was 34,520,000, as compared with a return of 33,136,000 fine ounces in 1936. It is estimated that the world's production in 1938 approximated 37,109,000 fine ounces, of which Australia's share amounted to 1,592,035 fine ounces or 4.29 per cent.

The quantities of gold produced in the ten principal producing countries in each of the five years 1933 to 1937 are given in the table hereunder. Particulars of the quantities

and values of gold produced in all countries for the ten years 1928-37 will be found in *Production Bulletin* No. 32, Part II., issued by this Bureau.

GOLD PRODUCTION IN PRINCIPAL COUNTRIES.

Country.	1933.	1934.	1935.	1936.	1937.
	Fine oz.	Fine oz.	Fine oz.	Fine oz.	Fine oz.
Union of South Africa	11,013,712	10,479,857	10,773,991	11,336,214	11,734,575
Soviet Union	2,814,000	3,700,000	4,500,000	5,500,000	5,000,000
Canada	2,949,309	2,972,074	3,284,890	3,748,028	4,096,213
United States	2,276,682	2,742,161	3,163,166	3,759,645	4,088,500
Australia	830,267	886,609	910,492	1,183,996	1,881,135
Mexico	637,727	662,000	682,319	753,950	846,381
Rhodesia	645,087	693,265	727,928	801,513	808,447
Japan	502,875	531,371	589,030	713,666	720,000
Gold Coast	305,908	326,040	358,835	428,144	559,212
India	336,100	322,100	327,600	333,300	330,744

The next table shows the average yearly production in order of importance of the yield in the principal gold-producing countries for the decennium 1928 to 1937:—

GOLD : AVERAGE ANNUAL PRODUCTION IN PRINCIPAL COUNTRIES, 1928 TO 1937.

Country.	Quantity.	Country.	Quantity.
	Fine oz.		Fine oz.
Union of South Africa	10,925,760	Mexico	681,043
Soviet Union	2,883,862	Rhodesia	649,027
Canada	2,870,976	Japan	527,982
United States	2,676,434	India	337,624
Australia	785,424	Gold Coast	314,431

5. **Employment in Gold Mining.**—The number of persons engaged in gold mining in each State at various intervals since 1901 is shown in the following table. The figures are inclusive of prospectors, etc., so far as they are ascertainable, and include those who may not have worked during the whole of the year.

GOLD MINING : PERSONS EMPLOYED.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Ter.	Total.
	No.	No.	No.	No.	No.	No.	No.	No.
1901	12,064	27,387	9,438	(a)1,000	19,771	1,112	(a) 200	70,972
1903 (b)	11,247	25,208	9,229	(a)1,000	20,716	973	(a) 200	68,573
1913	3,570	11,931	3,123	800	13,445	481	175	33,525
1923	1,141	2,982	603	32	5,555	119	30	10,462
1931	9,944	4,258	2,751	180	6,344	166	70	23,713
1932	8,154	6,089	3,893	142	7,983	250	89	26,600
1933	6,913	6,126	4,161	231	9,900	229	95	27,655
1934	7,080	6,943	3,867	804	12,523	275	115	31,607
1935	6,652	6,960	3,931	243	14,708	216	403	33,113
1936	5,204	6,959	3,983	283	15,696	230	372	32,727
1937	3,885	6,180	3,436	192	16,174	179	388	30,434

(a) Estimated.

(b) Year of Maximum Production.

Owing to causes referred to earlier in this section, the number employed in gold mining had dwindled to the comparatively small figure of 6,108 in 1929. Stimulated by the enhanced price of gold in recent years employment in the industry rose more than five-fold to 33,113 in 1935, but the numbers employed declined during each of the last two years.

6. **Bounty on Production.**—A reference to the bounty provided by the Commonwealth on gold production in Australia will be found in § 16 par. 1 hereinafter.

§ 3. Platinum and Platinoid Metals.

1. **Platinum.**—(i) *New South Wales.* The deposits at present worked in the State are situated in the Fifield division, near Parkes and in the Ballina division. The production in 1937 from these divisions amounted to 19 oz. and 27 oz. respectively making a total of 46 oz. valued at £455, as compared with 47 oz. valued at £410 in the preceding year. The total production recorded to the end of 1937 amounted to 20,186 oz., valued at £128,492.

(ii) *Victoria.* In Gippsland the metal has been found in association with copper and 127 oz. were produced in 1913, but there has been no production in recent years.

(iii) *Queensland.* Platinum, associated with osmiridium, has been found in the beach sands between Southport and Currumbin, in creeks on the Russell gold-field near Innisfail, and in alluvial deposits on the Gympie gold-field, but no production has been recorded.

2. **Osmium, Iridium, etc.**—(i) *New South Wales.* Small quantities of osmium, iridium and rhodium are found in various localities. 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 sands 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.* The yield of osmiridium was returned as 587 oz. in 1937 valued at £9,077 compared with the record production of 3,365 oz. in 1925 valued at £103,570. The decrease in later years was largely due to the decline in price from £31 in 1925 to £15 12s. 6d. per oz. in 1937, but the depletion of the known alluvial deposits was also a factor.

§ 4. Silver, Lead and Zinc.*

1. **Occurrence in Each State.**—Particulars regarding the occurrence of silver and associated metals in each State were given in Official Year Books, Nos. 1 to 5.

2. **Production.**—(i) *General.* The values of the production of silver, silver-lead ore and lead from the various States during the five years ending 1937 are given hereunder:—

SILVER AND LEAD : VALUE OF PRODUCTION.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Ter.	Australia.
	£	£	£	£	£	£	£	£
1933 ..	1,783,207	198	708,804	..	6,860	70,795	(a) 410	2,570,274
1934 ..	2,199,823	370	671,255	..	7,199	43,850	(a) 11	2,922,508
1935 ..	3,189,388	642	755,899	..	12,687	63,713	..	4,022,329
1936 ..	3,820,785	525	899,101	357	14,001	215,449	..	4,950,218
1937 ..	4,310,613	491	1,172,531	371	27,844	308,262	328	5,820,440

(a) Year ended 30th June.

(ii) *New South Wales.* The figures quoted above for New South Wales for the year 1937 include silver to the value of £3,997 and silver-lead ore and concentrates valued at £4,306,616. Since the Sulphide Corporation Ltd. ceased smelting operations in 1922 the silver (metal) is obtained chiefly in the refining of gold and copper ores, and there has been no production of lead (pig) in the State. It may be noted here that the bulk of the carbonate and siliceous ore from the Broken Hill field is sent for treatment to Port Pirie in South Australia, while the remainder of the ore is concentrated on the field and then dispatched to Port Pirie for refining. The output of silver-lead ores and concentrates for 1937 showed an increase both in quantity and value over that of the previous year and was chiefly due to the improvement in the price of lead. The output of silver, however, decreased by 12,664 fine ounces to 44,330 fine ounces.

* Further details in regard to zinc are given in § 7 hereinafter.

It must be understood that the totals for New South Wales in the table above 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 may be noted that, as previously mentioned, 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 the Mines Department considers, therefore, that the State should not take full credit for the finished product. The real importance of the State as a producer of silver, lead and zinc is thus to some extent overlooked. The next table, however, which indicates the quantities of these materials locally produced and the contents by assay of concentrates exported during selected years, will show the estimated total production and the value of the metal contents of all ore mined in New South Wales :—

SILVER AND LEAD : PRODUCTION IN NEW SOUTH WALES.

Year.	Metal Produced within Australia.				Contents of Concentrates Exported.			
	Silver.	Lead.	Zinc.	Value.	Silver.	Lead.	Zinc.	Value.
	oz. fine.	tons.	tons.	£	oz. fine.	tons.	tons.	£
1903 ..	6,489,689	92,293	286	1,790,929	1,736,512	29,706	14,625	308,714
1913 ..	5,908,638	106,432	4,121	2,709,867	8,596,251	117,993	184,149	3,759,691
1923 ..	7,233,236	124,470	41,153	5,707,739	4,834,718	40,906	149,319	1,813,287
1933 ..	7,430,479	158,475	53,956	3,579,886	790,792	18,344	63,849	475,161
1934 ..	7,380,624	153,641	54,629	3,384,193	826,896	22,142	34,016	345,350
1935 ..	8,422,316	180,958	67,666	4,933,492	660,630	11,947	72,285	424,929
1936 ..	7,778,514	157,755	57,744	4,608,888	779,289	18,569	68,011	549,310
1937 ..	8,731,750	184,822	43,254	6,353,963	1,048,749	13,832	64,785	889,991

The figures given above are quoted on the authority of the Mines Department of New South Wales. Accurate details in regard to gold, copper, antimony, cadmium and cobalt contained in the silver-lead ores are not available. Cadmium was first extracted in 1922 at Risdon, in Tasmania, and in 1937 the amount won from ores of New South Wales origin was given as 162.28 tons, valued at £59,042. As pointed out previously, credit for the value is not taken in the New South Wales returns, the value accruing to the State being taken as that of the declared value of the concentrates at the time of their dispatch.

(a) *Broken Hill.* Broken Hill, in New South Wales, is the chief centre of silver production in Australia. A description of the silver-bearing area in this district is given in earlier issues of the Official Year Book. (See No. 4, page 506.)

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

SILVER : BROKEN HILL RETURNS TO END OF 1937.

Mine.	Value of Output to end of 1937.	Dividends and Bonuses Paid to end of 1937.
	£	£
Broken Hill Proprietary Co. Ltd.	53,818,488	15,873,491
Broken Hill Proprietary Block 14 Co. Ltd.	4,750,508	670,160
British-Australian Broken Hill Co. Ltd.	5,858,998	821,280
Broken Hill Proprietary Block 10 Co. Ltd.	4,946,989	1,432,500
Sulphide Corporation Ltd. (Central and Junction Mines)	28,725,764	3,740,625
Broken Hill South Ltd.	27,397,159	7,135,000
North Broken Hill Ltd.	23,824,365	7,635,190
Broken Hill Junction Lead Mining Co.	1,185,058	87,500
Junction North Broken Hill Mine	3,511,940	171,431
The Zinc Corporation Ltd.	14,313,591	4,411,036
Barrier South Ltd.	151,517	50,000
Total	168,484,377	42,028,213

The returns relating to dividends and bonuses paid are exclusive of £1,744,000, representing the nominal value of shares in Block 14, British, and Block 10 companies, allotted to shareholders of Broken Hill Proprietary Company. If the output of the companies which were, prior to 1937, engaged in treating the tailings, etc., be taken into consideration, the totals for output and dividends shown in the table would be increased to about £175.7 millions and £45.0 millions respectively. The authorized capital of the various companies amounted to £18,918,000 in 1937. This increase of £7.5 million is due to the authorized capital of the Broken Hill Proprietary Co. being raised from £7.5 million to £15 million. In 1937 the dividends and bonuses paid amounted to £2,680,446 shared in by the Companies controlling the principal mines as follows:—Zinc Corporation, £318,788; North Broken Hill, £875,000; Broken Hill South, £760,000; Broken Hill Proprietary, £621,658, and Sulphide Corporation, £105,000. The dividend of the latter company is quoted in sterling.

(b) *Other Areas.* Silver is found in various other localities in New South Wales, but the production therefrom in 1937 was relatively unimportant. An important development was the reopening of the Captain's Flat silver-lead-zinc mine which is expected to reach the production stage in 1939. The rate of production is to be 500 tons per day, increasing to 1,000 tons per day as soon as additional equipment has been installed. In addition to the production of silver-lead-zinc ores, it is expected that 80,000 tons of iron pyrites will be railed to Port Kembla annually where the sulphur contents will be used for the large-scale manufacture of sulphuric acid and superphosphates.

(iii) *Victoria.* The silver produced in 1937 amounted to 5,443 fine ounces, valued at £491, and was obtained in the refining of gold at the Melbourne Mint.

(iv) *Queensland.* The production of silver increased by nearly 181,000 fine oz. to about 3.3 million fine oz., and lead increased by 2,711 tons to 38,474 tons, practically all of which was won from the mine and works at Mount Isa in the Cloncurry mineral field.

(v) *South Australia.* Silver ore has been discovered at Miltalie and Poonana, in the Franklin Harbour district, also at Mount Malvern and Olivaster, near Rapid Bay, and in the vicinity of Blinman and Farina, at Baratta, and elsewhere. There was no production between 1932 and 1935 but in 1936, 1,560 fine oz. of silver valued at £157 was produced. In addition 10 tons of lead were mined for a value of £200. In 1937, 955 fine oz. of silver and 12.4 tons of lead valued at £86 and £285 respectively were produced.

(vi) *Western Australia.* The quantity of silver obtained as a by-product and exported in 1937 was 180,502 oz., valued at £20,596.

(vii) *Tasmania.* The silver produced in 1937 amounted to 1,060,785 oz., valued at £95,770, and the lead to 9,117 tons, valued at £212,492. This represents a very great increase on that of the previous year. About 978,000 oz. of the total silver output were contained in silver-lead, while 83,000 oz. were contained in the blister copper produced by the Mount Lyell Co.

(viii) *Northern Territory.* A rich deposit of silver-lead and copper ore was located in 1930 at the Jervois Range about 200 miles east of Alice Springs. Development is hindered, however, by transport difficulties and lack of permanent water. Rich sulphides have been found at Barrow Creek. There was no record of production in 1931, 1932, 1935 and 1936. The quantity and value of the production of silver-lead ores in other years was as follows:—1933, 24 tons, £410; 1934, 8 tons, £11; and 1937, 26 tons, £328

3. *Production of Silver in Australia.*—The following table sets out as fully as possible the total production of silver in Australia. It is based on the data published by the Australian Mines and Metals Association and shows the quantities of refined silver recovered by smelters and mints and the estimated metallic contents of ores and concentrates exported:—

SILVER : PRODUCTION IN AUSTRALIA.

Particulars.	1914.	1924.	1934.	1937.	1938.
	fine oz.	fine oz.	fine oz.	fine oz.	fine oz.
Metal recovered by—					
Smelters	4,020,904	7,529,845	8,583,133	9,279,983	9,102,178
Mints	226,019	101,368	91,416	230,526	254,961
Metallic contents in ores and concentrates exported ..	8,901,212	2,242,170	2,579,082	4,267,571	4,538,402
Total Production ..	13,148,135	9,873,383	11,253,631	13,778,080	13,895,541

4. **World's Production.**—The world's production of silver during the last five years for which particulars are available is estimated to have been as follows :—

SILVER : WORLD'S PRODUCTION.

Total.	1933.	1934.	1935.	1936.	1937.
World's production in 1,000 fine oz. ..	172,000	193,000	223,000	249,000	271,000

The world's production of silver in millions of fine ounces during the years 1917, 1927 and 1937 amounted respectively to 186, 254 and 271, of which Australia contributed 9.4 million, 11.6 million and 13.9 million fine ounces, or 5.0 per cent., 4.6 per cent. and 5.1 per cent. respectively. The production for Australia includes an estimate of the silver contents of the ores, bullion and concentrates exported.

Arranged in order of importance the estimated yields in 1937 from the principal silver-producing countries were as follows :—

SILVER PRODUCTION IN PRINCIPAL COUNTRIES, 1937.

Country.	Production.	Country.	Production.
	Fine oz. (^{000 omitted.})		Fine oz. (^{000 omitted.})
Mexico	84,679	Burma	6,180
United States	70,986	Soviet Union	5,000
Canada	22,978	Honduras	3,211
Peru	16,993	Belgian Congo	2,962
Australia	13,778	Yugoslavia	2,242
Japan	10,000	Chile	1,786
Bolivia	9,452	Newfoundland	1,448
Germany	(a) 6,541	Union of South Africa	1,101

(a) Year 1936.

5. **Prices of Silver, Lead and Zinc.**—In view of the close association in Australia, particularly in New South Wales, of ores containing these metals, the average prices of each metal during the last five years have been incorporated in the table hereunder :—

PRICES OF SILVER, LEAD AND SPELTER.

Metal.	1934.	1935.	1936.	1937.	1938.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Silver (Standard)					
per oz.	0 1 9.22	0 2 4.95	0 1 8.06	0 1 8.07	0 1 7.52
Lead .. per ton	11 1 0	14 5 7	17 13 4	23 4 3	15 5 4
Spelter per ton	13 15 6	14 3 6	15 0 9	22 5 9	13 19 10

A marked recovery in the prices of lead and spelter occurred on the London Metal Market between November, 1936, and March, 1937, when the price of lead rose from £22 to £33 per ton and that of spelter from £16 to more than £33 per ton. Prices receded after that month and by December, 1937, were quoted at £16 and £15 per ton respectively. By December, 1938, these prices had declined further to £15 and £14. Silver at the latter date was about 1s. 8d. per oz.

6. *Employment in Silver, Lead and Zinc Mining.*—The average number of persons employed in mining for these metals during each of the last five years is given below :—

SILVER, ETC., MINING : PERSONS EMPLOYED.

Year.	N.S.W. (a)	Q'land.	S. Aust.	W. Aust. (b)	Tasmania. (a)	Nor. Ter.	Australia.
	No.	No.	No.	No.	No.	No.	No.
1933 ..	3,197	553	..	10	962	..	4,722
1934 ..	3,237	523	..	4	958	1	4,723
1935 ..	3,536	544	..	..	1,046	..	5,126
1936 ..	4,163	601	3	32	1,386	..	6,185
1937 ..	5,225	578	2	29	1,586	..	7,420

(a) Silver, lead and zinc.

(b) Principally lead and silver-lead ore.

§ 5. Copper.

1. *Production.*—The production of copper in the various States has been influenced considerably by the ruling price, which has undergone extraordinary fluctuations. In 1923 when copper was worth £65 18s. 1d. per ton the production of metal amounted to 17,012 tons exclusive of 4,534 tons of ore. During the three years ended 1934 the price averaged little more than £31 per ton and the production dropped to an average of about 13,800 tons. Production responded to an improvement in price between 1935 and 1937, the output in the latter year increasing to 21,578 tons of metal, concentrates and ore. The values of the local production as reported and credited to the mineral industry for the years 1933 to 1937 are shown hereunder. Quantities for Australia as a whole as returned by the several State Mines Departments are appended on separate lines at the foot of the table :—

COPPER : PRODUCTION.

State.	1933.	1934.	1935.	1936.	1937.
	£	£	£	£	£
New South Wales	26,775	25,398	39,071	53,687	72,406
Queensland	105,031	95,903	101,489	161,688	308,968
South Australia	2,928	8,475	11,065	22,609	21,620
Western Australia	1,132	..	..	97	986
Tasmania	395,286	267,342	464,007	556,734	759,332
Northern Territory .. ..	..	..	..	(a) 1,972	55
Australia	531,152	397,118	606,632	796,787	1,163,367
Ingot, Matte, etc.	tons 14,493	12,003	16,992	18,669	18,694
Ore and Concentrates	tons ..	96	56	819	2,884

(a) Eighteen months ended 31st December, 1936.

2. *Sources of Production.*—(i) *New South Wales.* The production during 1937 amounted to 750 tons of electrolytic copper and 2,877 tons of ore and concentrates, the latter being exported overseas. Practically all of the copper was obtained at Port Kembla from the treatment of 1,518 tons of copper matte forwarded by the Broken Hill Smelters and derived from Broken Hill silver-lead ores. Copper mines operated in the State during the year but the outputs were very small. Since 1919 the production in New South Wales has rarely exceeded 1,000 tons, whilst previously it had ranged from 2,500 tons in 1915 to 10,600 tons in 1911.

(ii) *Queensland.* The yield in this State amounted in 1937 to 5,149 tons valued at £308,968. Although an improvement on the yields of recent years the output for 1937 was very much less than that of 1920 when nearly 16,000 tons valued at £1,552,000 were raised. The falling-off was due primarily to the low prices realized for copper. The returns from the chief producing areas in 1937 were as follows: Cloncurry, 2,720 tons, £163,200; Herberton, 146 tons, £8,769; and Mount Morgan, 1,962 tons, £117,700.

(iii) *South Australia.* Deposits of copper are found over a large portion of South Australia and its total production easily exceeds that of any other State. Compared with the output of previous years the production of South Australia has dwindled during recent times to very small dimensions, and is now exceeded by that of Tasmania and Queensland. A short account of the discovery, etc., of some of the principal mining areas, such as Kapunda, Burra Burra, Wallaroo and Moonta, was given in earlier issues of the Official Year Book. The Moonta and Wallaroo copper field, which was opened in 1860, was worked continuously and up to the close of 1931, £20,500,000 of copper was produced. Since 1933 the field has been worked on a co-operative basis known as the Moonta Mining Scheme which was referred to in previous issues of the Official Year Book. The production of copper in this State in 1937 amounted to 340 tons, valued at £21,620.

(iv) *Western Australia.* Thirty-five tons of copper valued at £986 were exported from this State during 1937, compared with 2 tons valued at £97 exported in 1936.

(v) *Tasmania.* The quantity of copper produced in Tasmania during 1937 was 12,420 tons, valued at £759,332, the whole of the production being by the Mount Lyell Mining and Railway Co. Ltd. This Company treated 57,846 tons of ore and concentrates and produced 12,470 tons of blister copper, containing copper 12,381, silver 83,233 oz., and gold 6,171 oz., the whole being valued at £A1,008,970.

(vi) *Northern Territory.* Copper has been found at various places, but the development of these deposits is hindered by low prices and the difficulties of transport. For the eighteen months ended December, 1936, 204 tons of ore were raised. This was the first production recorded since 1932-33. In 1937, 7 tons valued at £55 were also produced.

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

COPPER PRICES : LONDON AND NEW YORK.

Year.				Average London Price per Ton Standard Copper.	Average New York Price in Cents per lb. Electrolytic Copper.
				£	Cents.
1933	..	..	..	32.52	7.02
1934	..	..	..	30.28	8.43
1935	..	..	..	31.87	8.65
1936	..	..	..	38.44	9.47
1937	..	..	..	54.47	13.17

As evidence of the tremendous variation in price it may be noted that in December, 1916, the average London price of standard copper was £145.32 per ton, while in June, 1927, it was quoted at £54.03. In 1930, the average price was £54, and during each of the next five years just over £30 per ton. It rose to £60 in June, 1937, but declined thereafter to £35 in June, 1938, only to rise again to more than £43 in December, 1938.

4. **World's Production of Copper.**—The world's production of copper during the five years 1933–1937 is estimated to have been as follows. The figures have been taken from the statistical summary prepared by the Imperial Institute.

COPPER : WORLD'S PRODUCTION.

Year.	1933.	1934.	1935.	1936.	1937.
World's production—tons ..	1,040,000	1,300,000	1,470,000	1,700,000	2,300,000

The yields from the principal copper-producing countries in 1937 were as follows :—

COPPER : PRODUCTION IN PRINCIPAL COUNTRIES, 1937.

Country.	Production.	Country.	Production.
	Tons.		Tons.
United States	748,009	Mexico	45,350
Chile	410,000	Yugoslavia	44,000
Rhodesia	245,888	Peru	36,000
Canada	236,620	Germany	28,960
Belgian Congo	148,210	Spain	27,000
Soviet Union	90,000	Australia	21,578
Japan	86,215	Union of South Africa	11,209

During the year 1937 the share of the United States in the world's copper production amounted to nearly one-third, while the Australian proportion was less than 1 per cent.

The recovery in the world consumption of copper, which commenced in 1935, continued throughout 1936 and during a part of 1937. Although the world production and consumption figures reached record levels in 1937, business activity slumped towards the close of the year, the price of copper dropping from more than £60 in May to less than £40 in December.

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

COPPER MINING : PERSONS EMPLOYED.

Year.	N.S.W.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Ter.	Australia.
	No.	No.	No.	No.	No.	No.	No.
1933	(a) 13	175	54	..	1,483	1	1,726
1934	4	151	45	..	1,471	..	1,671
1935	7	170	54	..	1,758	..	1,989
1936	9	196	54	..	1,610	4	1,873
1937	27	306	75	..	1,714	8	2,130

(a) No production from copper mines.

In 1917 over 9,000 persons were engaged in copper mining.

§ 6. Tin.

1. **Production.**—The price of tin during 1937 averaged more than £242 per ton in London. This was the highest figure for the past ten years and production in Australia responded accordingly. The next table shows the values of the production as reported to the Mines Departments in each of the States during the five years 1933 to 1937. A separate line is appended showing the recorded tonnage for Australia during each of the specified years :—

TIN : PRODUCTION.

State.	1933.	1934.	1935.	1936.	1937.
	£	£	£	£	£
New South Wales	218,244	328,130	287,890	268,454	336,628
Victoria	1,350	3,886	14,475	14,750	44,127
Queensland	123,620	179,404	187,234	157,889	202,614
Western Australia	4,557	6,765	8,829	6,882	12,421
Tasmania	190,041	219,246	258,919	206,656	260,673
Northern Territory	(a) 2,519	(a) 9,566	(a) 6,036	(b) 4,176	7,205
Total	540,331	746,997	763,383	658,807	863,668
Ingot, Matte etc. .. . tons	2,948	3,169	3,395	3,187	3,377
Concentrates .. . tons	72	154	207	225	366

(a) Year ended 30th June.

(b) Eighteen months ended December.

2. **Sources of Production.**—(i) *New South Wales.* The production in 1937 was stated at 1,116 tons of ingots valued at £331,530, and 27 tons of concentrates valued at £5,098 were exported overseas. A large proportion of the output in this State is obtained in normal years by dredging, principally in the New England district, the quantity of stream tin won in 1937 being 527 tons. The Tingha area was the principal contributor to the output in 1937, the yield from this district comprising 574 tons of concentrates. Amongst other areas, Emmaville produced 243 tons of concentrates and Ardlethan 153 tons of concentrates and 62 tons of ore, while the lode mines at Torrington returned a yield of 188 tons of tin oxide.

(ii) *Victoria.* The production of tin in this State is obtained chiefly by dredging in the Beechworth district and by mining in the Toora district in Gippsland. The production in 1937 amounted to 218 tons of concentrates valued at £44,127 compared with 86 tons valued at £14,750 in 1936.

(iii) *Queensland.* The chief producing districts in Queensland during 1937 were Herberton, 661 tons, valued at £114,165; Cooktown, 94 tons, £17,615; Stanthorpe, 170 tons, £31,762; Chillagoe, 96 tons, £15,889 and Kangaroo Hills, 147 tons, £22,834. The total production, 1,171 tons, £202,614, showed an increase of 63 tons and £44,725 on that for 1936, but is far below that of the early years of this century, when the production ranged between 2,000 and 5,000 tons per annum.

(iv) *Western Australia.* The quantity of tin reported in this State in 1937 amounted to 80 tons, valued at £12,421, and was obtained in the Pilbara and Greenbushes fields.

(v) *Tasmania.* For 1937, the output amounted to 1,090 tons of tin, valued at £260,673, an increase of 86 tons in quantity and £54,017 in value over the return for the previous year. The production of tin in this State has substantially increased since 1929 when the metal produced amounted to only 640 tons. The mines associated with the production of tin are well equipped to deal efficiently with the deposits recently opened up.

(vi) *Northern Territory.* The production for the eighteen months ended December, 1936, amounted to 51 tons of concentrates valued at £7,256. For the year ended December, 1937, 41 tons of concentrates valued at £7,205 were produced. Under the stimulus of high prices, concentrates were produced in Central Australia for the first time, principally at the Anningee tin-field. Production was maintained at Maranboy in North Australia.

3. *World's Production.*—The world's production of tin during each of the last five years was as follows:—

TIN : WORLD'S PRODUCTION.

1933.	1934.	1935.	1936.	1937.
Tons. 89,000	Tons. 117,000	Tons. 136,000	Tons. 179,000	Tons. 208,000

The world production of tin increased to a record high level in 1937 and was due principally to the increased output of the chief producing countries—Malaya, Netherlands East Indies, Bolivia and Siam. These countries produced three-quarters of the world's total production in 1937. The agreement controlling the production and export of tin has been extended to 1941. The parties to this agreement are those countries already mentioned together with Nigeria, Congo and Indo-China. Production in Australia is not affected.

The yields from the principal producing countries in 1937 were as follows:—

TIN : PRODUCTION IN PRINCIPAL COUNTRIES, 1937.

Country.	Production.	Country.	Production.
	Tons.		Tons.
Malaya	77,468	Burma	4,636
Netherlands East Indies	39,165	Australia	3,743
Bolivia	25,127	Japan	2,300
Siam	15,985	Argentina	2,200
China	11,100	United Kingdom	1,087
Nigeria	10,782	Indo-China	1,577
Belgian Congo	8,133	Portugal	1,095

Australia's share of the world's tin production; estimated at 208,000 tons in 1937, would appear to be a little less than 2 per cent.

4. *Prices.*—The average prices of the metal in the London market for the years 1933 to 1938 were as follows:—

TIN PRICES : LONDON.

Year.	Average Price Per Ton.	Year.	Average Price Per Ton.
	£ s. d.		£ s. d.
1933	194 11 11	1936	204 12 8
1934	230 7 5	1937	242 6 7
1935	225 14 5	1938	189 12 1

The average price of tin rose to £242 per ton in 1937 compared with £118 in 1931, the peak depression year. In 1938 the price receded to £189 per ton.

5. **Employment in Tin Mining.**—The number of persons employed in tin mining during the last five years is shown below :—

TIN MINING : PERSONS EMPLOYED.

Year.	N.S.W.	Victoria. (a)	Q'land.	W. Aust.	Tas.	Nor. Ter.	Australia.
	No.	No.	No.	No.	No.	No.	No.
1933	1,448	..	818	63	1,007	33	3,369
1934	1,903	10	1,214	73	1,247	120	4,567
1935	1,807	5	1,122	58	1,452	30	4,474
1936	1,762	6	1,270	48	1,284	37	4,407
1937	1,781	8	1,389	60	1,367	27	4,632

(a) The tin produced in Victoria was raised by a dredging company operating primarily for gold.

§ 7. Zinc.

1. **Production.**—(i) *New South Wales.* (a) *Values Assigned.* The production of zinciferous concentrates is confined chiefly to the Broken Hill district of New South Wales, where zincblende forms one of the chief constituents in the enormous deposits of sulphide ores. During the earlier years of mining activity on this field a considerable amount of zinc was left in tailings, but from 1909 onwards improved methods of treatment resulted in the profitable extraction of the zinc contents of the accumulations at the various mines.

As the metallic contents of the bulk of the concentrates, etc., produced in the Broken Hill district are extracted outside New South Wales, the mineral industry of that State is not credited by the Mines Department with the value of the finished product. During 1937 the zinc concentrates produced amounted to 219,838 tons, valued at £657,967. Portion of the zinc concentrates produced is treated at Risdon in Tasmania. The production from these concentrates in 1937 as recorded by the Electrolytic Zinc Company of Australia Ltd. at Risdon amounted to 43,254 tons of zinc and 162.28 tons of cadmium. This is referred to in the Tasmania production below. The balance, which in 1937 amounted to 130,880 tons, valued at £699,898, was exported overseas.

The reopening of the mine at Captain's Flat by the Lake George Mines Ltd. was an important development in 1937. Production is expected to commence early in 1939 and an increase of 20,000 tons in the annual output for Australia is forecast.

(b) *Local and Foreign Extraction.* A statement of the quantity of zinc extracted in Australia and the estimated zinc contents of concentrates exported overseas during the five years 1933 to 1937 will be found in § 17 hereinafter.

(ii) *Queensland.* The production of zinc in the Cloncurry district of Queensland during 1937 was 27,598 tons valued at £606,150, compared with 4,411 tons valued at £68,863 obtained in 1935. The metal was produced by the Mount Isa Mines Ltd.

(iii) *South Australia.* Zinc is known to exist in various localities in South Australia, but there has been no production during recent years.

(iv) *Tasmania.* The production of zinc from Tasmanian ores was suspended from 1931 to 1935. Developmental work on the Mount Read-Rosebery district was continued during that period and production, which commenced in 1936, amounted to 18,769 tons valued at £283,175. In 1937, 23,481 tons valued at £525,824 were obtained. The latter represents the first full year's operations since the inception of milling at Rosebery.

The Electrolytic Zinc Co. at Risdon operated during 1937 on raw materials obtained wholly from Broken Hill in New South Wales. Production amounted to 43,254 tons of slab zinc valued at £1,276,470, and 162.28 tons of cadmium, valued at £59,042.

2. **World's Production.**—The world's production of zinc ore in terms of metal during the five years 1933–37 was as follows :—

ZINC : WORLD'S PRODUCTION.

1933.	1934.	1935.	1936.	1937.
Tons. 986,000	Tons. 1,162,000	Tons. 1,540,000	Tons. 1,700,000	Tons. 1,860,000

The yields from the principal producing countries in 1937 were as given hereunder, the figures referring to slab zinc produced in the various countries, irrespective of the source of the ore. In common with some other industrial metals, the production and consumption of zinc reached record high levels in 1937. Prices on the London Metal Market averaged £22 5s. 9d. for 1937 and were the highest since 1929.

ZINC : PRODUCTION IN PRINCIPAL COUNTRIES, 1937.

Country.	Production.	Country.	Production.
	Tons.		Tons.
United States	497,236	France	60,000
Belgium	222,016	Japan	45,000
Germany	160,000	Norway	40,624
Australia	146,740	Italy	37,382
Canada	141,555	Mexico	33,558
Poland	105,481	Netherlands	24,256
Soviet Union	70,000	Rhodesia	14,031
Great Britain	62,000	Czechoslovakia	7,104

The figures for Australia have been taken from returns supplied by the Australian Mines and Metals Association. On a world's production of 1,610,000 tons of slab zinc Australia's output of 146,740 tons represents 9 per cent.

3. **Prices.**—Information regarding prices of zinc will be found in the table in § 4 par. 5. *ante*.

§ 8. Iron.

1. **General.**—Iron ore is widely distributed throughout Australia, but the extent of the deposits has never been determined. The only two known ore bodies of large extent, high grade and easy access are those situated at Yampi Sound, Western Australia and at Iron Knob, South Australia. Estimates of the reserves at these centres place the quantities available at approximately 100 million tons and 150 million tons respectively. In a report submitted to the Government the Commonwealth Geologist stated that, bearing in mind the expansion of the iron industry in Australia, these reserves were sufficient for *not more than two generations and that unless supplies were conserved Australia would, by that time, become an importer of iron ore.* As the result of this advice, the Commonwealth Government prohibited the export of iron ore from 1st July, 1938. A survey of the iron ore resources of Australia is now in progress.

2. **Production.**—(i) *New South Wales.* The production from ores mined in New South Wales amounted to 4,580 tons in 1935, valued at £18,320. This is the only occasion since 1929 that ore of New South Wales origin has been used in the production of pig iron in that State. For many years the chief source of supply has been South Australia.

Small quantities of iron oxide produced in New South Wales are used by the various gasworks for purifying gas, and also in the manufacture of paper, and for pigments. These supplies are drawn chiefly from the deposits in the Port Macquarie Division.

During 1937 the iron oxide raised amounted to 677 tons, valued at £374. Ironstone flux amounting to 2,432 tons valued at £950 was raised in the Goulburn Division during 1933. This is the only production recorded since 1922.

(ii) *South Australia.* The production from the deposits worked by the Broken Hill Pty. Co. Ltd., at Iron Knob and at Middlebank reached its maximum in 1936, when 1,887,298 tons of ore valued at £2,170,392 were raised. The output in 1937 was somewhat lower than those of the previous two years and amounted to 1,866,414 tons valued at £2,146,376. The extent of the recovery that has been made in the iron and steel industry may be gauged from a comparison with the output of 289,179 tons in 1931.

(iii) *Western Australia.* Developmental works were continued on the deposits at Yampi Sound and at the end of 1937, 40 men were employed. These have not yet reached the production stage.

(iv) *Tasmania.* The production of ironstone in Tasmania during 1937 amounted to 61 tons, valued at £36. This ore, which was exported to Japan, was the first output recorded since 1908. Iron pyrites is also obtained in this State. The production, which amounted to 40,630 tons, valued at £43,723 in 1937, is not included in the mineral returns, but is credited to the manufacturing industry, as it is a by-product from the flotation of copper ore at Mount Lyell. This product is exported to the mainland, where the sulphur contents have displaced imported sulphur in the manufacture of chemical fertilizers. The recovery has grown considerably since 1932, when the output amounted to 274 tons.

(v) *Other States.* Reference to the iron ore deposits in the other States will be found in preceding issues of the Official Year Book (see No. 22, page 779).

3. *Iron and Steel Bounties.*—During the year 1937–38 the bounties paid under the Iron and Steel Products Bounty Act on articles manufactured from locally produced materials were as follows : Wire-netting, £6,741 ; traction engines, £25,556. Corresponding amounts paid during 1938–39 were £5,736 and £17,313 respectively.

4. *World's Production of Iron and Steel.*—(i) *General.* The Australian production of iron and steel at present forms a very small proportion of the world's output. According to the *The Mineral Industry*, the production in the principal countries during the latest available three years was as follows :—

PIG IRON AND STEEL : WORLD'S PRODUCTION.

Country.	Pig Iron.			Steel Ingots and Castings.		
	1935.	1936.	1937.	1935.	1936.	1937.
	Thousands of Tons.			Thousands of Tons.		
United States ..	21,373	31,029	37,127	34,550	48,478	51,792
Germany ..	12,539	15,303	15,957	16,096	19,158	19,816
Soviet Union ..	12,493	14,400	14,520	12,520	16,300	17,824
Great Britain ..	6,426	7,686	8,497	9,842	11,698	12,963
France ..	5,799	6,237	7,917	6,264	6,562	7,761
Japan ..	2,716	2,869	3,561	4,532	5,368	6,423
Belgium ..	3,060	3,207	3,843	2,966	3,105	3,777
Luxemburg ..	1,872	1,987	2,513	1,837	1,981	2,510
Czechoslovakia ..	811	1,140	1,675	1,197	1,559	2,315
Italy ..	622	816	790	2,471	2,328	2,087
Poland ..	394	582	724	946	1,143	1,450
Canada ..	600	679	898	936	1,115	1,401
Sweden ..	566	585	646	895	1,022	1,104
India ..	1,056	1,541	1,453	912	880	971
Australia ..	569	662	665	613	716	830
Hungary ..	85	306	362	225	460	706
Austria ..	193	248	380	364	418	650
Union of South Africa	171	199	272	254	298	332
Total—All Countries	72,111	89,802	92,848	97,887	124,794	135,317

The figures for world production of iron and steel reached an exceptionally low level in 1932, namely, pig iron, 39,275,000 tons; steel, 50,029,000 tons. Since that year all steel-producing nations have recorded continuous increases in production. The principal producers in Australia are the Broken Hill Proprietary and the Australian Iron and Steel Co., the former situated at Newcastle and the latter at Port Kembla in New South Wales. Additional plant has been authorized at both of these works in order to meet the increasing demand for steel in Australia whilst an extension of the industry to South Australia is also contemplated.

(ii) *Australia.* The production of steel and pig iron in New South Wales, which is the only producing State, is shown during each of the last ten years.

PIG IRON AND STEEL : AUSTRALIAN PRODUCTION.

Year ended 30th June—	Pig Iron.	Steel Ingots.	Steel Rails, Bars and Sections.	Year ended 30th June—	Pig Iron.	Steel Ingots.	Steel Rails, Bars and Sections.
	Tons.	Tons.	Tons.		Tons.	Tons.	Tons.
1929 ..	461,110	432,773	353,921	1934 ..	487,259	518,326	431,765
1930 ..	308,369	314,917	256,696	1935 ..	698,493	696,861	585,838
1931 ..	232,783	228,363	188,708	1936 ..	783,233	820,395	671,244
1932 ..	190,132	221,488	178,740	1937 ..	913,406	1,073,479	837,445
1933 ..	336,246	392,666	295,523	1938 ..	929,676	1,159,075	906,426

§ 9. Other Metallic Minerals.

Tungsten ores—wolfram and scheelite—occur in several of the States, in the Northern Territory and on King Island in Bass Strait, the last-named being the subject of an investigation in 1934. On account of the low prices during recent years, mining activities were restricted and production intermittent. In 1937, however, prices soared to the record level of £16 6s. per cwt., compared with only £3 2s. 9d. per cwt. in 1932. As a result, production of wolfram and scheelite responded accordingly. The production during the past five years is shown in the following table:—

WOLFRAM AND SCHEELITE : PRODUCTION, AUSTRALIA.

Particulars.		1933.	1934.	1935.	1936.	1937.
WOLFRAM.						
New South Wales	cwt.	5	950	1,095	105	915
	£	16	6,506	5,694	560	13,051
Queensland ..	cwt.	260	740	480	404	1,963
	£	760	5,049	2,888	1,889	26,139
Tasmania ..	cwt.	2,080	3,884	4,640	4,143	5,820
	£	7,301	27,375	29,345	28,323	71,643
Northern Territory	cwt.	..	(a) 800	(a) 1,846	(a) 1,721	5,831
	£	..	(a) 3,114	(a) 10,380	(a) 8,748	84,832
Total ..	cwt.	2,345	6,374	8,061	6,373	14,529
	£	8,077	42,044	48,307	39,520	195,665
SCHEELITE.						
New South Wales	cwt.	..	130	50	245	202
	£	..	818	381	1,631	3,401
Queensland ..	cwt.	..	..	22	..	38
	£	..	..	120	..	533
Total ..	cwt.	..	130	72	245	240
	£	..	818	501	1,631	3,934

(a) Year ended June.

Detailed information in regard to the occurrence and production of other metallic minerals in each of the States will be found in Official Year Book No. 22, pp. 780-3 and preceding issues.

§ 10. Coal.

1. **Production in each State.**—An account of the discovery of coal in each State will be found in preceding issues of the Official Year Book. (See No. 3, pp. 515-6.) The quantity and value of the production in each State and in Australia during the years specified are given in the table hereunder:—

COAL : PRODUCTION.

Year.	N.S.W.	Victoria. (a)	Q'land.	S. Aust.	W. Aust.	Tasmania.	Australia.
QUANTITY.							
	Tons	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1913 ..	10,414,165	593,912	1,037,944	..	313,818	55,043	12,414,882
1921 ..	10,793,387	514,859	954,763	..	468,817	66,476	12,798,302
1931 ..	6,432,382	571,342	841,308	..	432,400	123,828	8,401,260
1934 ..	7,873,180	356,958	956,558	..	500,343	113,633	9,800,672
1935 ..	8,698,579	476,495	1,051,978	..	537,188	123,714	10,887,954
1936 ..	9,199,466	426,725	1,046,879	..	565,075	132,264	11,370,409
1937 ..	10,051,519	257,945	1,120,179	..	553,510	91,121	12,074,274
VALUE.(b)							
	£	£	£	£	£	£	£
1913 ..	3,770,375	274,371	403,767	..	153,614	25,367	4,627,494
1921 ..	9,078,388	603,323	831,483	..	407,117	63,446	10,983,757
1931 ..	4,607,343	362,284	699,926	..	336,178	98,004	6,103,735
1934 ..	4,541,923	215,413	752,303	..	278,704	81,262	5,869,605
1935 ..	4,887,341	282,253	843,034	..	318,013	86,204	6,416,845
1936 ..	5,126,850	253,835	858,732	..	331,565	92,269	6,663,251
1937 ..	5,823,469	171,369	934,107	..	340,444	66,883	7,336,272

(a) Exclusive of brown coal, shown in next table.

(b) At the pit's mouth.

The figures for Victoria already quoted are exclusive of brown coal, the quantities and values of which were as follows. The reduced output for 1935 is attributable to floods which retarded production during the early months of the year.

BROWN COAL : PRODUCTION IN VICTORIA.

Year.	Quantity	Value. (a)	Year.	Quantity.	Value. (a)
	Tons.	£		Tons.	£
1913 ..	2,984	569	1934 ..	2,617,534	264,192
1921 ..	79,224	31,074	1935 ..	2,221,515	317,444
1926 ..	957,935	188,899	1936 ..	3,044,897	323,914
1931 ..	2,194,453	251,511	1937 ..	3,393,919	325,950

(a) Cost of Production.

2. **Distribution and Production of Coal in each State.**—(i) *New South Wales.*—The coal deposits of New South Wales constitute the most important and extensively worked in Australia. The principal fields are known as the Northern, Southern and Western, and are situated at Newcastle, Bulli and Lithgow respectively.

The coal from the various districts differs considerably in quality—that from the Northern district being especially suitable for gas-making, household purposes and steam, while the product of the Southern and Western is essentially a steaming coal. At the present time the Greta coal seams in the Northern division are being worked extensively between West Maitland and Cessnock, and this stretch of country, covering a distance of 15 miles, is now the most important coal-mining district in Australasia.

The table hereunder gives the yields in each of the three districts during the five years 1933 to 1937 :—

COAL : PRODUCTION IN DISTRICTS OF NEW SOUTH WALES.

District.	1933.	1934.	1935.	1936.	1937.
	Tons.	Tons.	Tons.	Tons.	Tons.
Northern	4,651,483	5,227,647	5,679,802	6,197,554	6,674,362
Southern	1,218,014	1,344,669	1,558,282	1,626,143	1,880,440
Western	1,248,940	1,300,864	1,460,495	1,375,769	1,496,717
Total	7,118,437	7,873,180	8,698,579	9,199,466	10,051,519
Total Value (a) £ ..	4,306,799	4,541,923	4,887,341	5,126,850	5,823,469
Average value per ton (a) ..	12s. 1d.	11s. 6d.	11s. 3d.	11s. 2d.	11s. 7d.

(a) At the pit's mouth.

During the five years ended 1927, the average annual production of coal in New South Wales exceeded 11,000,000 tons, but in 1928 the output declined to 9,448,000 tons owing to a reduction of oversea and interstate orders. A prolonged stoppage of work in the Northern mines during the next two years and the advent of the industrial depression reduced the yield to 6,430,000 tons in 1931 since when it has gradually risen to 10,052,000 tons in 1937. This latter quantity may be compared with 11,618,000 tons, the maximum output recorded in 1924. Of the total quantity of coal won in New South Wales since the inception of operations to the end of the year 1937, viz., 413,500,000 tons, about 281,000,000 or 68 per cent. was obtained in the Northern District, 85,000,000 tons or 21 per cent. came from the Southern District, and 48,000,000 tons or 11 per cent. was contributed by the mines in the Western District.

The quantity of coal cut by machinery in New South Wales amounted to 2,788,274 tons in 1937 or 27.7 per cent. of the total output for the State, compared with 20.5 per cent. so cut in 1927.

(ii) *Victoria. (a) Black Coal.* The deposits of black coal in Victoria occur in three main areas in the southern portion of the State, namely, the Wannon, the Otway and South Gippsland, which total approximately 3,500 square miles. The workable seams are restricted to the South Gippsland area, where the thickness ranges from 2 feet 3 inches to 6 feet. The total production of black coal in Victoria to the end of 1937 amounted to 17,645,000 tons valued at £13,631,406.

The output of black coal in Victoria during the last five years was as follows :—

BLACK COAL : PRODUCTION IN VICTORIA.

Year.	State Coal Mine.	Other Coal Mines.	Total Production.	Total Value. (a)	Average Value per ton. (a)
	Tons.	Tons.	Tons.	£	s. d.
1933	444,868	78,132	523,000	328,704	12 7
1934	268,861	88,097	356,958	215,413	12 1
1935	393,532	82,963	476,495	282,253	11 10
1936	355,605	71,120	426,725	253,835	11 11
1937	187,934	70,011	257,945	171,369	13 3

(a) At the pit's mou

(b) *Brown Coal.*—(i) *General.* Victoria is richly endowed, both in quantity and quality, in its brown coal deposits. Some account of these deposits and of the operations of the State Electricity Commission in connexion therewith will be found in preceding Official Year Books (see No. 22, page 785). The brown coal produced in Victoria in 1937 amounted to 3,391,419 tons, all but 2,500 tons being procured at the State open cut at Yallourn. During the year 1937-38, 3,597,048 tons of brown coal were produced by the State Electricity Commission, of which 1,993,371 tons went to the power station and 1,603,677 tons to the briquette factory.

(ii) *Production of Briquettes.* The briquetting plant started operations in November, 1924, and the output for fourteen months ending December, 1925, was 77,945 tons. In 1926 the output was 95,477 tons which had increased to 180,905 tons in 1930 and to 416,545 tons in 1937. The Yallourn briquettes are considered to be equal in quality to those produced in the best German factories.

(iii) *Queensland.* The distribution of production during the year 1937 was as follows:—

COAL : PRODUCTION IN QUEENSLAND, 1937.

District.	Production.	District.	Production.
	Tons.		Tons.
Ipswich	546,259	Clermont	63,769
Bowen	245,309	Chillagoe (Mount Mulligan)	18,770
Darling Downs	77,588	Mount Morgan	16,072
Maryborough	79,229	Other	3,238
Rockhampton	69,945		
		Total	1,120,179

The production in 1937 was the highest since 1929, but it is still 18 per cent. below the peak production of 1,369,000 tons attained in that year. The distribution of the output in 1937 was as follows: Railway Department, 431,044 tons; other industries within the State, 606,161 tons; exported, 82,974 tons. There were 54 collieries operating in the Ipswich district, 7 in the Darling Downs, 6 in the Maryborough area, 5 in Clermont district, 4 in Rockhampton district, 1 in Chillagoe district, 1 at Mount Morgan, 1 at Mackay, and 2 in the Bowen district; a total of 81 collieries for the State. State coal mines are in operation at Collinsville in the Bowen field, at Styx in the Central area, and at Mount Mulligan.

(iv) *South Australia.* So far no coal has been worked in South Australia (see Official Year Book No. 22, page 786).

(v) *Western Australia.* The production from the five collieries operating on the Collie field amounted in 1937 to 553,510 tons, a decrease of 11,565 tons on the return for 1936. The value of this production, however, increased by £8,879 to £340,444. The number of men employed was 723 and the output per man was 766 tons, which was 30 tons greater than in 1936. The total production of coal from the Collie coalfield to the end of 1937 amounted to 13,272,500 tons.

(vi) *Tasmania.* The production in 1937 amounted to 91,121 tons, being 41,143 tons less than the total for 1936. Industrial troubles in the Eastern Division were chiefly responsible for this reduction in output. About 28,700 tons of the total output in 1937 were contributed by the Cornwall Coal Company, 22,200 tons by the Mt. Nicholas Proprietary and 13,700 tons by the Jubilee Company. The three mines combined raised 65,000 tons or about 71 per cent. of the total output of the State. The Cornwall Coal Company absorbed the Mt. Nicholas Colliery in 1937 and operations at the latter mine have been abandoned.

(vii) *Australia's Coal Reserves.* The latest available estimate of the actual and probable coal reserves of Australia is shown in the Report of the Royal Commission on the Coal Industry 1929-1930, and is based upon that prepared by the Coal and Lignites Panel of the Power Survey Sectional Committee of the Standards Association of Australia. The following table shows the actual and probable coal reserves as determined by that Committee:—

ACTUAL AND PROBABLE COAL RESERVES OF AUSTRALIA.

(Millions of Tons.)

State.	Black Coal.	Sub-bituminous and Brown Coal.
New South Wales	13,929	..
Victoria	40	37,000
Queensland	2,238	67
South Australia .. .. .	..	57
Western Australia .. .. .	..	3,500
Tasmania	244	..
Total	16,451	40,624

3. *Production in Various Countries.*—The total known coal production of the world in 1937 amounted to about 1,510 million tons, towards which Australia contributed about 15.5 million tons, or 1 per cent. The following tables show the production of the chief British and foreign countries during each of the four years ended 1937:—

COAL : PRODUCTION IN BRITISH EMPIRE.

Year.	Great Britain.	British India.	Canada.	Australia.	New Zealand.	Union of S. Africa.
-------	----------------	----------------	---------	------------	--------------	---------------------

BLACK COAL.

	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1934 ..	220,728,000	22,057,000	9,461,000	9,801,000	832,000	12,002,000
1935 ..	222,249,000	23,017,000	9,193,000	10,888,000	825,000	13,360,000
1936 ..	228,448,000	22,611,000	10,146,000	11,370,000	859,000	14,607,000
1937 ..	240,409,000	25,036,000	14,139,000	12,074,000	970,000	15,246,000

BROWN COAL, LIGNITE.

1934 ..	..	..	2,870,000	2,618,000	1,228,600	..
1935 ..	..	..	3,186,000	2,222,000	1,290,000	..
1936 ..	..	..	3,452,000	3,045,000	1,281,000	..
1937 ..	..	..	(a)	3,394,000	1,308,000	..

(a) Included with black coal.

COAL : PRODUCTION IN FOREIGN COUNTRIES.

Year.	Germany.	Austria.	Hungary.	Belgium.	France. (b)	Czecho- slovakia.	Yugoslavia.
BLACK COAL.							
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1934 ..	122,885,000	246,900	744,000	25,972,000	46,880,000	10,519,000	381,000
1935 ..	140,744,000	246,500	810,000	26,087,000	46,363,000	10,791,000	394,000
1936 ..	155,783,000	240,500	814,000	27,427,000	44,512,000	12,040,000	434,000
1937 ..	181,599,000	226,600	903,000	29,213,000	43,618,000	16,683,000	432,000

Year.	Spain.	Poland.	Nether- lands.	Soviet Union.	Japan.	China. (c)	United States.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1934 ..	5,838,000	28,771,390	12,146,000	92,456,000	35,358,000	20,568,000	371,907,000
1935 ..	6,995,000	28,091,945	11,690,000	93,736,000	34,354,000	12,000,000	379,046,000
1936 ..	(d)	29,278,000	12,600,000	106,677,000	37,466,000	12,000,000	440,774,000
1937 ..	(d)	35,646,000	14,095,000	120,643,000	(d)	(d)	441,349,000

BROWN COAL, LIGNITE.

Year.	Germany.	Austria.	Hungary.	Belgium.	France.	Czecho- slovakia.	Yugoslavia.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1934 ..	135,098,000	2,806,000	6,081,000	..	1,009,000	14,932,000	3,866,000
1935 ..	145,028,000	2,924,000	6,612,000	..	885,000	14,977,000	3,971,000
1936 ..	158,848,000	2,851,000	6,993,000	..	905,000	15,697,000	3,971,000
1937 ..	182,106,000	3,191,000	7,928,000	..	1,000,000	17,757,000	4,523,000

Year.	Spain.	Poland.	Nether- lands.	Soviet Union.	Japan.	China.	United States.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1934 ..	294,000	26,000	91,032	(a)	125,000	..	(a)
1935 ..	299,000	18,000	85,000	13,602,000	(d)	..	(a)
1936 ..	(d)	13,000	87,000	17,333,000	(d)	..	(a)
1937 ..	(d)	19,000	141,000	(a)	(d)	..	(a)

(a) Included with black coal. (b) Exclusive of Saar District, which produced 11,139,000 tons in 1934, and 1,673,000 tons from 1st January to 17th February, 1935. From this date production has been included with that of Germany. (c) Includes about 300,000 tons of lignite yearly. (d) Not available.

Compared with the previous year, the production for 1937 showed a satisfactory increase in practically all of the major producing countries of the world. Any decrease which did occur was very small. The production of the British Empire amounted to 313,000,000 tons in 1937, an increase of 15,000,000 tons or 5 per cent. on that of 1936. The production of foreign countries increased by 80,000,000 tons to 1,200,000,000 tons, or by 7 per cent. in the same period.

4. Exports.—(i) *General.* The quantity of coal of Australian production (exclusive of bunker coal) exported to other countries in 1937-38 was 392,873 tons, valued at £354,754. New South Wales exported 392,013 tons, Queensland, 859 tons, and Victoria

1 ton. The quantities and values of the oversea exports of Australian coal for the years specified are shown in the appended table :—

COAL : OVERSEA EXPORTS, AUSTRALIA.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Tons.	£		Tons.	£
1913 (a) ..	2,098,505	1,121,505	1934-35 ..	305,139	273,305
1921-22 ..	1,028,767	1,099,899	1935-36 ..	307,540	276,553
1931-32 ..	344,015	341,800	1936-37 ..	340,388	300,457
1933-34 ..	292,416	269,296	1937-38 ..	392,873	354,754

(a) Calendar Year.

Australian coal taken for bunker purposes during the same years was as follows :—

COAL : BUNKER, AUSTRALIA.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Tons.	£		Tons.	£
1913 (a) ..	1,647,870	1,018,375	1934-35 ..	575,418	544,875
1921-22 ..	1,498,035	2,178,101	1935-36 ..	614,333	576,549
1931-32 ..	506,140	534,897	1936-37 ..	605,425	564,071
1933-34 ..	523,014	495,032	1937-38 ..	614,762	575,319

(a) Calendar Year.

(ii) *New South Wales.* The total export of coal from New South Wales in 1937 amounted to 3,330,493 tons, valued at £2,846,411 of which 2,959,773 tons, valued at £2,495,302 were shipped from Newcastle. Interstate exports amounted to 2,407,978 tons, valued at £2,016,340 and were divided as follows :—Cargo, 2,039,475 tons, £1,735,630; bunker, 368,503 tons, £280,710. Oversea exports totalled 922,515 tons, valued at £830,071, representing 547,422 tons of bunker coal, valued at £498,832 and 375,093 tons of cargo coal, valued at £331,239.

The distribution of the total output from New South Wales collieries during the last five years was as follows, the particulars given for quantity exported including coal shipped as bunker coal :—

COAL : DISTRIBUTION OF OUTPUT, NEW SOUTH WALES.

Year.	Exports to Australian Ports.	Exports to Foreign Ports.	Local Consumption.	Total.
	(a)	(a)		
	Tons.	Tons.	Tons.	Tons.
1933	1,623,840	831,338	4,663,259	7,118,437
1934	1,882,873	807,154	5,183,153	7,873,180
1935	1,889,274	876,591	5,932,714	8,698,579
1936	2,166,241	911,176	6,122,049	9,199,466
1937	2,407,978	922,515	6,721,026	10,051,519

(a) Including Bunker.

For the period of five years shown in the table above, 23 per cent. of the total output was exported to other States, 10 per cent. was sent overseas, and 67 per cent. was consumed locally.

The figures quoted in the table above are given on the authority of the New South Wales Mines Department.

5. **Consumption in Australia.**—It is possible from the information available to show with reasonable accuracy the disposal of the coal produced in Australia and the quantity retained for home consumption.

Under normal circumstances the production and consumption of coal move in the same direction, but in times of industrial troubles large consumers may be compelled to rely upon accumulated stocks, and, consequently annual figures may be thrown out

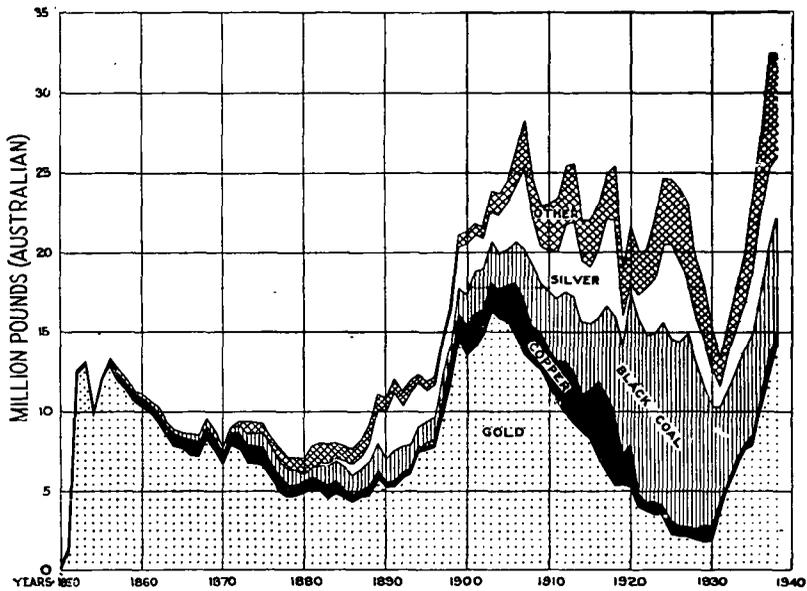
of alignment. For this reason the following table has been prepared on a quinquennial basis in order to smooth out any departures from the normal :—

COAL : PRODUCTION AND UTILIZATION IN AUSTRALIA.

Particulars.	Average for Five Years ending.			
	1932-33.		1937-38.	
BLACK COAL.				
Production of Saleable Coal (a)	Tons. 9,091,883		Tons. 10,539,869	
Imports	186,827		15,307	
Total Supplies	9,278,710		10,555,176	
Exported overseas	331,298	% 3.57	327,671	% 3.10
Exported as bunker, overseas	564,989	6.10	587,183	5.56
Total	896,287	9.67	914,854	8.66
Consumed as fuel in—				
Electric Light and Power Works	1,513,046	16.31	1,699,458	16.10
Factories (b)	1,582,078	17.05	1,910,037	18.09
Railway Locomotives (c)	2,297,706	24.76	2,250,992	21.33
Total	5,392,830	58.12	5,860,487	55.52
Consumed as raw material in—				
Gas Works	1,146,305	12.35	1,074,304	10.18
Coke Works	596,401	6.43	1,313,243	12.44
Total	1,742,706	18.78	2,387,547	22.62
Balance available for consumption including accumulation of stocks (d)	1,246,886	13.43	1,392,288	13.20
Grand Total	9,278,710	100.00	10,555,176	100.00
BROWN COAL.				
Production of Brown Coal	Tons. 2,096,100		Tons. 2,873,756	
Utilization—				
As fuel in Electric Light and Power Works	1,107,536	% 52.8	1,541,571	% 53.6
Used in Briquette Works (e)	988,564	47.2	1,332,185	46.4
Total	2,096,100	100.0	2,873,756	100.0

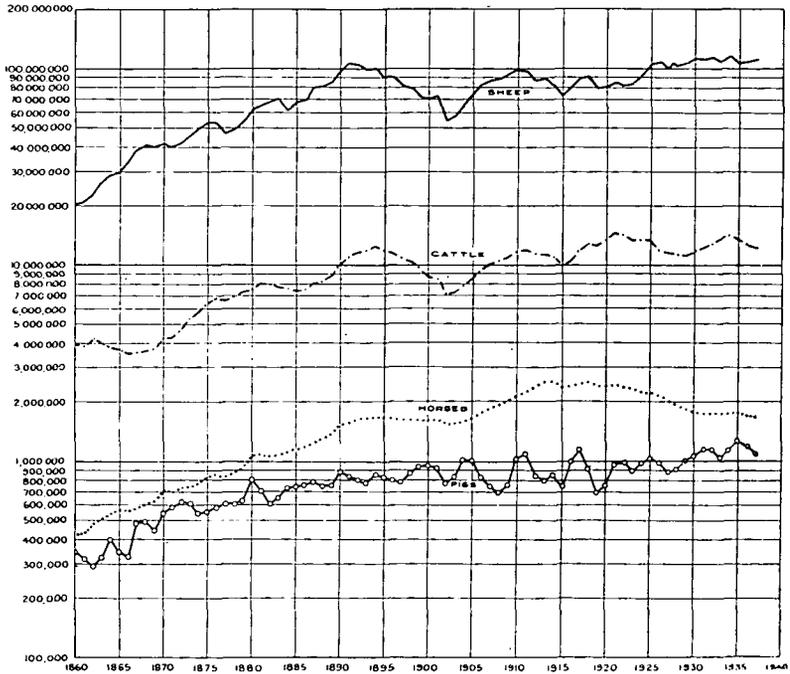
(a) Estimated. (b) Estimated where details were not available. Not including Brown coal, see Note (e). (c) Government Railways only. (d) Including bunker coal for Interstate and Intrastate Shipping. (e) A portion of the briquette output is consumed in factories.

VALUE OF PRINCIPAL MINERALS PRODUCED—AUSTRALIA, 1850 TO 1938.



EXPLANATION.—The upper curve represents the total value of mineral production while the vertical distances between the curves represent the value of production of each mineral.

LIVE STOCK—AUSTRALIA, 1860 TO 1937.



(See page 583.)

EXPLANATION.—This is a ratio graph, the vertical scale being logarithmic and the curves rise and fall according to the rate of increase or decrease. Actual numbers are indicated by the scale at the side of the graph.

The production of coal is ascertained only in calendar years and to relate it to the other factors in the table, it was necessary to have recourse to estimates which in all probability differ but slightly from the actual figures.

6. Prices.—(i) *New South Wales*. The price of New South Wales coal depends on the district from which it is obtained. Previously the northern district coal generally realized a somewhat higher rate than the southern or western product, but latterly the average price in the southern fields has been slightly in excess of that prevailing in the northern area. The average price at the mine in each district and for the State as a whole during the last five years is given in the following table. The increase in 1937 is the first recorded since 1927.

COAL PRICES : NEW SOUTH WALES.

Year.	Northern District.	Southern District.	Western District.	Average for State.
	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.
1933	12 9	12 6	9 5	12 1
1934	12 0	12 2	8 10	11 6
1935	11 9	11 10	8 8	11 3
1936	11 6	11 8	8 9	11 2
1937	11 11	12 7	9 0	11 7

(ii) *Victoria*. In Victoria the average price of coal per ton at the pit's mouth in 1933 was 12s. 7d.; in 1934, 12s. 1d.; in 1935, 11s. 10d.; in 1936, 11s. 11d.; and in 1937, 13s. 3d. These averages are exclusive of brown coal, which in 1937 cost 1s. 11d. per ton to produce.

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

COAL PRICES : QUEENSLAND.

District.	Value at Pit's Mouth.				
	1933.	1934.	1935.	1936.	1937.
	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.
Ipswich	14 9	14 11	15 5	16 0	16 4
Darling Downs	18 2	18 4	18 3	18 10	19 3
Wide Bay and Maryborough	22 7	22 11	23 1	23 9	23 7
Rockhampton	16 6	16 7	16 7	17 4	17 4
Clermont	13 11	12 11	12 5	12 8	13 0
Bowen	13 9	13 6	13 10	14 0	14 2
Mount Mulligan (Chillagoe)	28 5	26 0	29 0	28 9	30 5
Average for State ..	15 10	15 11	16 0	16 5	16 8

In 1901 the average value at the pit's mouth was 7s. per ton, and the average for the ten years 1901 to 1910 was about 6s. 8d.

(iv) *Western Australia*. The average prices of the Collie (Western Australia) coal during the last five years were: 1933, 12s. 8d.; 1934, 11s. 2d.; 1935, 11s. 10d.; 1936, 11s. 9d.; and 1937, 12s. 4d.

(v) *Tasmania*. The average prices per ton of coal at the pit's mouth in Tasmania for the last five years were: 1933, 14s. 9d.; 1934, 14s. 4d.; 1935, 13s. 11d.; 1936, 13s. 11d.; and 1937, 14s. 8d. per ton.

7. Prices in the United Kingdom.—During the five years 1933 to 1937 the average selling prices of coal per ton at the pit's mouth in the United Kingdom were: 1933, 13s.; 1934, 12s. 11d.; 1935, 13s.; 1936, 14s. 0½d.; and 1937, 15s. 2½d.

8. Employment in Coal Mines.—The number of persons employed in coal mines, both above and below ground, in each of the producing States is given in the following table for the years 1913, 1923, and for each of the years 1933 to 1937:—

COAL MINES : PERSONS EMPLOYED.

Year.	New South Wales.	Victoria.		Queensland.	Western Australia.	Tasmania.	Total.
		Black.	Brown.				
	No.	No.	No.	No.	No.	No.	No.
1913 ..	18,843	1,377	(a)	2,548	559	136	23,463
1923 ..	22,969	2,131	(a)	2,662	713	268	28,743
1933 ..	13,349	1,517	272	2,448	626	313	18,525
1934 ..	13,465	1,502	319	2,385	624	342	18,637
1935 ..	13,337	1,397	615	2,455	689	340	18,833
1936 ..	14,221	1,367	419	2,432	768	334	19,541
1937 ..	14,981	1,359	390	2,442	723	322	20,217

(a) Production prior to 1924 was of little importance.

The maximum number was employed in 1926 when 31,774 persons were engaged in the coal mines of Australia. Shortly after that year the industrial depression and a prolonged stoppage of work on one of the principal fields of New South Wales during 1929 and 1930 seriously affected the figures of employment. Since 1934 there has been a gradual improvement, but the numbers employed in 1937 were still less than two-thirds of the maximum figure already quoted. As the production in 1937 was not so far below the record output of 13.7 million tons in 1924, it would appear that the growth of mechanization in the industry has been a factor in raising production during recent years. In 1927, 20.5 per cent. of the total output of coal in New South Wales was cut by machinery, while in 1937 the percentage had increased to 27.7.

9. Accidents in Coal Mining.—(i) *Australia.* The following table gives the number of persons killed or injured, with the proportion per 1,000 employed, and in relation to the quantity of coal raised, this being a factor which must be reckoned with in any consideration of the degree of risk attending mining operations. Although no precise definition of an accident is available, any disablement from misadventure which rendered the injured unfit for work for fourteen or more days has been uniformly adopted by the State Departments of Mines. A further table gives the rate of fatalities during the last five years.

COAL MINING : EMPLOYMENT AND ACCIDENTS, 1937.

State.	Persons Employed in Coal Mining.	No. of Persons.		Proportion per 1,000 Employed.		Tons of Coal raised for each Person.	
		Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
New South Wales ..	14,981	26	68	1.37	4.54	386,597	147,816
Victoria ..	1,749	14	7	8.00	4.00	260,847	521,694
Queensland ..	2,442	2	168	0.82	68.79	560,090	6,668
Western Australia ..	723	..	251	..	347.17	..	2,205
Tasmania ..	322	1	6	3.11	18.64	91,121	15,187
Total ..	20,217	43	500	2.13	24.73	359,725	30,936

The next table shows the average number of miners employed, number of fatalities, and rate per 1,000 during the quinquennium 1933-37 :—

COAL MINING : FATALITIES, 1933 TO 1937.

State.	Average No. of Coal Miners Employed.	Average No. of Fatal Accidents.	Rate per 1,000 Employed.
New South Wales	13,876	15.00	1.08
Victoria	1,831	3.20	1.74
Queensland	2,432	3.00	1.23
Western Australia	686	0.20	0.29
Tasmania	336	0.40	1.19
Total	19,161	21.80	1.14

(ii) *Other Countries.* According to the report of the Chief Inspector of Mines, the average death rate per 1,000 miners from accidents in coal mines in Great Britain during the quinquennium 1933-37 was 1.11, the rates varying between 1.35 in 1934 and 1.02 in 1936 while the rate for Australia for the same period was 1.14.

§ 11. Coke.

1. *Production.*—(i) *General.* Notwithstanding the large deposits of excellent coal in Australia, the production of coke was limited to about 250,000 tons prior to the war. This was below local requirements and necessitated a fairly considerable import from abroad. During recent years, however, a high standard of excellence has been attained in the local product and imports have almost ceased, while Australian coke is being shipped to New Zealand and other islands in the Pacific. For the year 1937-38 the coke imported amounted to 15,781 tons, of which 7,732 tons were obtained from the United Kingdom and 5,000 tons from Poland, South Australia being the chief importing State. The quantity exported was 36,076 tons, valued at £55,512, of which 30,847 tons, valued at £47,163, were sent to New Caledonia.

(ii) *New South Wales.* The table hereunder gives the production in New South Wales during the last five years as recorded by the Department of Mines :—

COKE : PRODUCTION IN NEW SOUTH WALES.

Items.	1933.	1934.	1935.	1936.	1937
Quantity .. tons	473,427	688,621	857,875	893,201	939,944
Value, total .. £	512,693	636,346	802,887	800,632	909,822
Value, per ton ..	21s. 8d.	18s. 6d.	18s. 9d.	17s. 11d.	19s. 4d.

The figures quoted refer to the product of coke ovens, and are exclusive of coke produced in the ordinary way at gas works. Prior to the industrial depression the maximum production of coke was 709,000 tons in 1927; the output fell to 217,509 tons in 1931, but with the general recovery of trade the figure rose to a new high level of 940,000 tons in 1937.

(iii) *Queensland.* A small quantity of coke is made in Queensland, the quantity returned in 1937 being 30,459 tons, of which 26,864 tons were produced at Bowen State Coke Works. The greater proportion of the output of these works was consigned to the Mount Isa Mines Ltd, and to the Chillagoe State Smelters. Hitherto the coke used at these ore-treatment works was imported from New South Wales, but now the output is sufficient to meet the requirements of the State. In addition, a quantity was exported to Noumea during 1937. The following table shows the amount manufactured locally during the last five years :—

COKE : PRODUCTION IN QUEENSLAND.

Year.	1933.	1934.	1935.	1936.	1937.
Quantity .. tons	15,096	25,655	24,877	23,326	30,459

In order to avoid duplication with coal values, the returns for coke have not been included in the general tables of mineral production in the early part of this chapter.

§ 12. Oil Shale and Mineral Oil.

1. *Oil Shale.*—(i) *General.* Reference to the deposits of oil shale and the search for mineral oil in Australia will be found in Official Year Book No. 22, pp. 791 to 793.

(ii) *New South Wales.* The establishment of the oil-shale industry in Australia by the development of the deposits at Newnes in New South Wales has received the serious consideration of both the Commonwealth and the New South Wales Governments. The project has been the subject of a number of investigations, and a series of reports in connexion therewith have been issued. In 1937 negotiations were completed between the two Governments and the National Oil Proprietary Ltd., in which the latter company undertook to develop the shale-oil industry in the Newnes-Capertee district. The Commonwealth Government agreed to protect the industry by exempting from excise up to 10 million gallons of the Company's output of petrol for a period of 25 years. The successful establishment of this project will probably lead to an expansion of the industry in Australia; it should provide another avenue for employment and serve as a valuable training ground for technicians. Production is expected to commence not later than January, 1940.

(iii) *Tasmania.* About 38,000 gallons of crude oil were produced in 1934 from shale treated in Tasmania, while the total quantity of oil distilled from shale up to the end of 1934 was set down at 357,000 gallons. The plant operated by the Tasmanian Shale Oil Company closed down at the end of January, 1935.

2. *Coal Oil.*—Attention has been directed to the production of oil from coal by a number of processes. A committee consisting of nominees of the Commonwealth and State Governments, excepting Western Australia, and of Imperial Chemical Industries Ltd., was appointed to advise on specific questions submitted to it. In a report submitted in June, 1937, it was stated that the stage had not been reached when Australia could establish plants for the production of oil from coal. The committee recommended, however, that close touch be kept with developments abroad.

3. *Natural Oil.*—(i) *Australia.* Natural oil does exist in Australia. This has been proved in Queensland, Victoria and Western Australia. Conditions favourable to accumulation in commercial quantities have been shown to exist in Queensland, Western Australia and New South Wales. In the latter State, however, no strong positive evidence of its existence has been recorded. In Victoria, while oil has been proved to exist in considerable quantities, the problem as to whether it can be produced on a commercial basis has still to be worked out.

Reference is made in § 16 hereinafter to the assistance afforded by the Commonwealth the search for petroleum oil.

(ii) *Victoria.* The production of crude petroleum oil in the year 1937 amounted to 9,372 gallons, valued at £176. The total production to the end of that year amounted to 100,303 gallons, worth £2,448. In conjunction with the State Government, the Commonwealth Government is carrying out a scout drilling campaign in the Gippsland area of Victoria.

(iii) *Queensland.* Great hopes were at one time entertained in regard to the petroliferous area in Queensland, but while gas and light to medium gravity oils have been found at Roma, and gas and oily wax at Longreach, structural conditions for accumulations on a commercial scale have not yet been located in the drilled areas. The search for oil was continued during 1938 by several companies in localities situated at Mount Bassett, near Roma, at Hutton Creek and at Arcadia.

(iv) *South Australia.* Under prescribed conditions, the South Australian Government offers a bonus of £5,000 to the person or body corporate which first obtains from a local bore or well 100,000 gallons of crude petroleum containing not less than 90 per cent. of products obtainable by distillation.

(v) *Western Australia.* During recent years oil geologists have examined territories under the direction of three companies. All the reports so far furnished have recommended additional work and expenditure. Legislation governing petroleum prospecting was passed during the year. One company, financially assisted by the Commonwealth and State Governments, was to commence deep-drilling operations in the Kimberley district in 1939.

§ 13. Other Non-metallic Minerals.

A more or less detailed statement regarding the occurrence and production of other non-metallic minerals is given in preceding Official Year Books (see No. 22, pp. 793 to 796). The tables of quantities and values in § 1 of this Chapter will show the production of the principal items in this class for each State during the year 1937.

§ 14. Gems and Gemstones.

1. *Diamonds.*—It is difficult to secure accurate returns in connexion with the production of precious stones, but the yield of diamonds in 1937 in New South Wales was estimated at 200 carats, valued at £200. These were won by fossickers in the Inverell district. The total production to the end of 1937 is given at 205,243 carats, valued at £148,000.

2. *Sapphires.*—The production of sapphires in New South Wales during 1929 was returned as 65 ozs., valued at £450, obtained wholly at Sapphire in the Inverell division, but no output has been recorded since. Production during recent years has been restricted owing to the unfavourable market.

In Queensland, gems to the value of £1,410 were purchased on the Anakie sapphire fields in 1937. It is probable that many were sold privately or held for better prices. For these reasons the returns are considered to be very incomplete. There were about 120 miners operating on the fields during 1934 but their number decreased to 25 in 1937. Production has declined very considerably since 1920, when the yield was valued at £66,000.

3. *Precious Opals.*—The estimated value of the opal won in New South Wales during the year 1937 was £3,357, obtained on the Lightning Ridge, White Cliffs and Grawin fields. The figures quoted, however, do not represent the total output, as in many instances miners, buyers and collectors leave the fields before a record of their production or purchases can be secured. Some very fine stones are at times obtained, one weighing 5 ozs. and valued at £300 being found in 1911. Three finds of large stone were made in 1928, the gems weighing 790, 590 and 232 carats respectively, and showing

fine fire and lustre. Occasionally black opals of very fine quality are found, one specimen from the Wallangulla field, weighing $6\frac{1}{2}$ carats, being sold in 1910 for £102, while in the early part of 1920 a specimen realized £600. It is stated that this locality is the only place in the world where the "black" variety of the gem has been found. The total value of opal won in New South Wales since the year 1890 is estimated at £1,622,795, but, as pointed out above, the figures are to some extent understated.

Small quantities of precious opal are found in the Beechworth district in Victoria.

The opaliferous district in Queensland stretches over a considerable area of the western interior of the State, from Kynuna and Opalton as far down as Cunnamulla. The yield in 1937 was estimated at £100, and up to the end of that year at about £188,000. These figures are, however, merely approximations, as large quantities of opal, of which no record is obtained, are disposed of privately. Production during recent years has been limited by the paucity of demand and only 6 persons were engaged during 1937. The greatest recorded output was for the year 1895 when the yield was valued at £32,750.

Owing to the poor market for gems, production from the Coober Pedy opal field, situated in the Stuart Range in South Australia, fell from £11,056 in 1929 to £1,517 in 1934, but the demand has since improved and the production in 1937 amounted to £11,887. The field is extremely prolific, a large quantity of precious white opal having been raised therefrom, while only a small portion of the known opal-bearing area has been thoroughly tested. The greatest yield for the State in any one year was obtained in 1920 when the value of production was returned at £24,000.

4. **Other Gems.**—Various other gems and precious stones have from time to time been discovered in the different States, the list including agates, amethysts, beryls, chiasolite, emeralds, garnets, olivines, moonstones, rubies, topazes, tourmalines, turquoises and zircons. In Western Australia, 609 carats (rough) of emeralds, valued at £278, were produced during 1929 in the Cue district on the Murchison gold-field. The value of the 3,750 carats reported from the same area in 1930 was not ascertainable as there were no sales during the year. There has been no recorded production since 1930.

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

1. **Total Employment in Mining.**—The number of persons engaged in the mining industry in Australia fluctuates according to the season, the price of industrial metals, the state of the labour markets, and according to the permanence of new finds and the development of the established mines. During the year 1937, the number so employed was as follows:—

NUMBER OF PERSONS ENGAGED IN MINING, 1937.

State.	Number of Persons engaged in Mining for—						Total.
	Gold.	Silver, Lead and Zinc.	Copper.	Tin.	Coal.	Other.	
New South Wales ..	3,885	5,225	27	1,781	14,981	1,419	27,318
Victoria ..	6,180	..	..	8	1,749	100	8,037
Queensland ..	3,436	578	306	1,389	2,442	773	8,924
South Australia ..	192	2	75	..	..	556	825
Western Australia ..	16,174	29	..	60	723	150	17,136
Tasmania ..	179	1,586	1,714	1,367	322	260	5,428
Northern Territory ..	388	..	8	27	..	134	557
Australia ..	30,434	7,420	2,130	4,632	20,217	3,392	68,225

Included in the figures for "other" in South Australia were 260 engaged in mining iron ore, 56 gypsum miners, 105 salt gatherers, and 56 opal miners. The Tasmanian figures include 49 osmiridium miners, and those for the Northern Territory, 50 mica miners.

The following table shows the number of persons engaged in mining in each State at intervals since 1901 and the proportion so employed to the total population :—

NUMBER ENGAGED IN MINING PER 100,000 OF POPULATION.

State.	1901.		1911.		1921.	
	Miners employed.	No. per 100,000 of Population.	Miners employed.	No. per 100,000 of Population.	Miners employed.	No. per 100,000 of Population.
New South Wales	36,615	2,685	37,017	2,225	29,701	1,410
Victoria	28,670	2,381	15,986	1,210	5,211	339
Queensland	13,352	2,664	13,201	2,147	5,847	766
South Australia	7,007	1,931	6,000	1,457	2,020	406
Western Australia	20,895	11,087	16,596	5,787	7,084	2,122
Tasmania	6,923	4,017	5,247	2,760	3,170	1,486
Northern Territory .. ..	..	..	715	21,595	131	3,356
Australia	113,462	2,992	94,762	2,109	53,164	974
State.	1931.		1936.		1937.	
	Miners employed.	No. per 100,000 of Population.	Miners employed.	No. per 100,000 of Population.	Miners employed.	No. per 100,000 of Population.
New South Wales	30,682	1,200	26,590	997	27,318	1,014
Victoria	6,463	359	8,828	478	8,037	433
Queensland	6,753	730	8,830	902	8,924	902
South Australia	518	90	1,043	178	825	140
Western Australia	7,147	1,653	16,652	3,700	17,136	3,772
Tasmania	3,397	1,512	5,054	2,187	5,428	2,320
Northern Territory	145	2,918	508	9,667	557	10,294
Australia	55,105	844	67,505	996	68,225	998

The general falling-off since 1901 is largely due to the causes mentioned in each section hereinbefore. The proportion to population shows increases since 1931 in all States excepting New South Wales, and is attributable mainly to the larger numbers engaged in the search for gold. Since that year the increase in the number so employed was approximately 6,700 persons. The number engaged in mining for tin increased by 2,400, while increases were also recorded in the mining for silver, lead and zinc, 4,000, and copper, 300. These increases were offset to some extent by the decrease in coal mining from 21,400 in 1931 to 20,200 in 1937, which decline is largely responsible for the lower proportion employed in New South Wales.

2. *Wages Paid in Mining.*—Information regarding rates of wages paid in the mining industry, which in earlier issues of the Official Year Book was given in this chapter, is now contained in the *Labour Report* issued by this Bureau.

3. **Accidents in Mining, 1937.**—The following table gives particulars of the number of men killed or injured in mining accidents during the year 1937 :—

MINING ACCIDENTS, 1937.

Mining for—	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
KILLED.								
Coal ..	26	14	2	..	..	1	..	43
Copper ..	..	..	3	..	..	1	..	4
Gold ..	6	8	5	1	36	..	..	56
Silver, lead and zinc ..	8	..	2	..	2	2	..	14
Tin ..	..	..	..	..	..	1	..	1
Other minerals	1	..	1	..	..	..	..	2
Total ..	41	22	13	1	38	5	..	120

INJURED.								
Coal ..	68	7	168	..	251	6	..	500
Copper ..	..	..	45	2	..	53	..	100
Gold ..	33	19	43	2	1,018	..	1	1,116
Silver, lead and zinc ..	201	..	32	..	..	16	..	249
Tin ..	1	..	6	..	..	16	..	23
Other minerals	5	..	..	9	..	3	..	17
Total ..	308	26	294	13	1,269	94	1	2,005

§ 16. Government Aid to Mining.

1. **Commonwealth.**—(i) *General.* Assistance to mining has been given by the Commonwealth under the provisions of the Precious Metals Prospecting Act 1926, the Gold Bounty Act of 1930, the Petroleum Oil Search Acts 1936, which superseded the Petroleum Prospecting Acts of 1926, 1927 and 1928, the Loan Appropriation (Unemployment Relief) Act 1934 and the Northern Australia Survey Act 1934.

In addition to this financial assistance considerable sums have been spent by the Commonwealth Government in an endeavour to locate new mineral fields. In conjunction with the Empire Marketing Board a sum of £32,000 was made available to provide for geophysical prospecting in Australia. This survey was begun in April, 1928, and completed in February, 1930. A report in connexion therewith was issued.

In 1934 the Northern Australia Survey Act was passed. Under this Act the Governments of the Commonwealth and the States of Queensland and Western Australia agreed to co-operate in the conduct of an aerial, geological and geophysical survey of certain areas in Australia north of the 22nd parallel of south latitude. This survey was conducted during the three years ended 1937, and has now been extended to the end of 1940. The total cost of the survey will involve an expenditure of £252,000, of which the Commonwealth Government will contribute £140,000, Queensland £67,500 and Western Australia £44,500. The latest report was in respect of the period ending 31st December, 1938, and a number of reports on individual areas have been issued as appendices.

(ii) *Metalliferous Mining.* The Precious Metals Prospecting Act 1926 provided a sum of £40,000 of which £15,000 was to be expended in the Northern Territory, and the balance allocated to the States in such proportions as the Minister determined. The total expenditure under this Act amounted to £27,000, but no further assistance is contemplated from this fund.

The Gold Bounty Act 1930 provided that for a period of ten years from 1st January, 1931, a bounty of £1 per ounce would be payable under prescribed conditions by the Commonwealth on each ounce of fine gold produced in excess of the average production for the three years 1928-30. Under the Financial Emergency Act 1931 the Bounty was reduced to 10s. per ounce, subject to increases of 1s. for each decrease of 3s. per cent. in the average rate of exchange. The rate of exchange on which the reduction to 10s. per ounce was based was taken as 30 per cent. Under the Financial Emergency Act of 1932 the bounty was temporarily suspended.

Under the Loan Appropriation (Unemployment Relief) Act 1934 a sum of £283,750 was made available to the States as grants for assistance to metalliferous mining. In addition a further sum of £210,000 was made available during the two years ended June, 1938, for the same purpose. The total amount of assistance granted by the Commonwealth Government was £543,750, distributed among the States and Territories as follows:—New South Wales, £75,700; Victoria, £95,700; Queensland, £130,500; South Australia, £46,300; Western Australia, £106,400; Tasmania, £39,150; Northern Territory, £45,000; and Papua, £5,000.

(iii) *Search for Oil.* The Commonwealth Government has encouraged the search for oil in Australia, Papua and New Guinea and considerable sums have been spent during the past ten years in geological surveys and in drilling operations. Details of efforts made during that period are shown in previous issues of the Official Year Book.

In 1936 the Petroleum Oil Search Act was passed which replaced all previous enactments. Under this Act a sum of £250,000 was appropriated to assist in the search for oil in Australia and the Territories of Papua and New Guinea. Considerable preliminary geological surveys have already been conducted and attention is now being directed to the testing of approved sites by drilling. A technical committee known as the Commonwealth Oil Advisory Committee was appointed to act in an advisory capacity and to deal with applications for assistance.

The moneys made available under the Act mentioned may be applied—

- (1) to the payment of advances to persons and companies engaged in drilling operations or in the conduct of geological surveys in connexion with the search for petroleum; and
- (2) for the purchase of drilling plants.

Under the provisions of the Act four modern rotary-drilling plants have been purchased. These are made available on hire to companies engaged in the search. Since their purchase the four plants have been in use continuously, one in each of the States of Queensland, Victoria, New South Wales and Western Australia.

The Commonwealth Oil Refineries Ltd. of which the Government of the Commonwealth of Australia is the principal shareholder has undertaken an extensive programme of prospecting for oil. The investigation is under the control of an Australian Advisory Committee of Geologists appointed by the Company, the personnel of which comprises the Commonwealth Geological Adviser, the Government Geologist of South Australia and two other members.

(iv) *Appointment of Geological Staff.* In 1927 a small geological staff, including a palaeontologist, was appointed. The Geological Adviser visited the United States and Argentine Republic in 1930 to study oil-fields conditions on the spot, and submitted a comprehensive report, which was published as a Parliamentary Paper in 1931. Experimental aerial photographic surveys have been carried out in conjunction with the Royal Australian Air Force to determine whether similar methods were applicable under Australian conditions, and a report on the investigations has been issued.

(v) *Standing Committee on Liquid Fuels.* The Commonwealth Government has appointed a Standing Committee on Liquid Fuels to co-ordinate knowledge concerning the production of liquid fuels and the use of substitutes therefor, and to furnish information

which will enable Australia to obtain greater independence in regard to fuel supplies. This Committee undertakes the investigation of such matters as the production of oil from coal, benzol, power alcohol, shale oil and the use of producer gas in road vehicles.

2. **New South Wales.**—The chief aid given by the Government of New South Wales has been in the assistance to prospectors, but there were no appropriations from the Prospecting Vote for the three years ended 1937-38; all claims are met from Unemployment Relief Funds, and the Commonwealth Grant. Aid is granted on a footage basis to sink, drive, etc., on approved sites to which a valid mining title is held. Grants approved during the year amounted to £22,529 but the actual expenditure in respect of work completed amounted to £19,426. Loans are also made to assist in the erection of crushing batteries or reduction plants on which interest at the rate of 4 per cent. is charged. During the year loans totalling £6,535 were approved. A reward amounting to £250 was paid in 1937 in connexion with the discovery of a new gold deposit near Weethalle.

3. **Victoria.**—During the year 1936-37 expenditure in connexion with mining amounted to £39,686. Of this amount £8,601 consisted of advances to prospectors and £12,785 was advanced to companies on a £ for £ basis under conditions of Commonwealth Grant for assistance to metalliferous mining. The balance of £18,300 was provided for operation of State batteries and boring operations, etc.

4. **Queensland.**—State assistance to the mining industry in 1937-38 amounted to £52,574, of which £50,743 was advanced to prospectors, the balance consisting of grants under the Mining Machinery Advances Act £341, and £1,490 for the provision of transport facilities, etc., to mineral fields. In addition to the amounts above, a sum of £9,987 was spent in connexion with the aerial survey of North Australia.

Mining operation conducted by the State include three coal mines situated at Bowen, Styx and at Mt. Mulligan, three batteries at Kidston, Charters Towers and Bamford, an assay office at Cloncurry, smelting works at Chillagoe, coke works at Bowen, and the State treatment works at Irvinebank. The battery at Charters Towers continued to be leased privately.

5. **South Australia.**—Aid is given to the mining industry under the terms of the Mining Acts of 1930 and 1931. Up to the end of 1937 the total amount of subsidy paid was £70,915, of which £16,796 has been repaid, and £4,700 written off, leaving a debit of £49,419. Portion of this amount is represented by machinery that has fallen into the hands of the Government. Repayments must be provided from profits, but in only two instances have the profits enabled a full return to be made. The State maintains batteries and cyanide works at Mount Torrens, Peterborough, Mongolata, Tarcoola and Glenloth, and assays for public purposes are made at the School of Mines. Advances to prospectors in 1937 amounted to £3,767.

6. **Western Australia.**—Under the Mining Development Act of 1902 assistance was granted in 1937 in accordance with the subjoined statement:—Aid to prospectors, £6,619; subsidies on stone crushed for the public, £92; advances in aid of mining work and equipment of mines with machinery, £106. Other assistance granted from the vote on various matters during the year amounted to £483. The total amount involved was £7,300.

In 1937 there were 24 State batteries in operation of which three were leased. The amount expended thereon up to the end of 1937 was £91,981 from revenue, £378,314 from loan fund and £41,793 from other sources giving a total of £512,088. The working expenditure up to the end of 1937 exceeded the revenue by £93,038. The total value of gold and tinf produced to the end of 1937 at the State plants was £9,596,744. Free assays and determinations of mineral values for prospectors are made at the Kalgoorlie School of Mines and at the Government laboratory at Perth.

7. **Tasmania.**—Aid to Mining in 1937 amounted to £3,224, of which £354 was expended as sustenance, £1,984 as assistance to companies and individuals, and £886 on construction of roads and tracks.

METALLIC CONTENTS OF ORES, ETC., PRODUCED AND EXPORTED. 581

Tributers' assays are made at a nominal charge, and all tribute surveys are carried out free of charge by the Assay and Survey Office at Zeehan.

8. Northern Territory.—During the year 1936–37 the assistance granted to prospectors amounted to £444. In addition a sum of £11,912 was also granted to assist mining companies and mine owners.

The Government maintains batteries at Maranboy, Pine Creek and Tennant Creek. Government Assayers situated at Darwin and Alice Springs make free assays for prospectors, and arrange for the sampling, storage and sale of ores.

§ 17. Metallic Contents of Ores, etc., Produced and Exported.

1. Local Production.—According to returns compiled from various sources by the Australian Mines and Metals Association, the quantities of the principal metals (exclusive of gold) extracted in Australia during the five years 1934 to 1938 were as follows:—

REFINED METALS PRODUCED IN AUSTRALIA.

Metal.		1934.	1935.	1936.	1937.	1938.
Silver	oz.	8,674,549	8,983,950	8,498,674	9,510,509	9,357,139
Lead, pig	tons	160,201	181,211	159,504	186,757	182,214
Zinc	"	54,629	67,666	70,509	69,750	69,820
Copper	"	7,970	11,768	13,313	17,400	17,098
Tin	"	2,330	2,837	2,717	2,907	3,229

The local production of pig iron during the quinquennium 1923–27 ranged between 330,000 tons in 1923 and 517,000 tons in 1927. Complete information for the later years is not available from the returns published by the Association, but according to the metal extraction returns published in the *Statistical Register of New South Wales*, the production of pig iron in that State amounted in 1933–34 to 487,259 tons, in 1934–35 to 698,493 tons, in 1935–36 to 783,233 tons, in 1936–37 to 913,406 tons and in 1937–38 to 929,676 tons. As pointed out previously, the iron ore used is now obtained from South Australia.

2. Metallic Contents of Ores, Concentrates, etc., Exported.—The estimated metallic contents of ores, concentrates, etc. exported during the five years 1934 to 1938 as supplied by the Australian Mines and Metals Association, are given in the following table:—

METALLIC CONTENTS OF ORES, CONCENTRATES, ETC., EXPORTED.

Metal.	Contained in—	1934.	1935.	1936.	1937.	1938.
Silver	oz. { Lead-Silver-Gold Bullion Lead Concentrates and Ores Zinc Concentrates and Ores Copper and Gold Ores ..	1,819,546	2,506,015	2,810,828	3,505,293	3,400,581
		612,014	275,154	444,052	557,438	831,809
		147,522	217,266	222,536	204,840	306,012
	
	Total	2,579,082	2,998,435	3,477,416	4,267,571	4,538,402
Lead	tons { Lead-Silver-Gold Bullion Lead Concentrates and Ores Zinc Concentrates and Ores	35,804	36,723	33,450	41,773	40,369
		21,075	9,819	17,497	10,086	15,049
		803	1,658	1,587	1,420	1,958
	
	Total	57,682	48,000	52,534	53,279	57,376
Zinc	tons { Lead Concentrates and Ores Zinc Concentrates and Ores	..	..	..	..	..
		26,963	54,693	75,391	76,990	93,561
	
	Total	26,963	54,693	75,391	76,990	93,561
Copper	tons Ores, Matte, etc. ..	1,122	1,361	2,770	2,389	3,228
Tin	tons Concentrates and Ores ..	198	289	246	192	102

§ 18. Oversea Exports of Ores, Metals, etc.

The following table shows the quantities and values of the principal overseas exports of ores, concentrates and metals, the produce of Australia, together with the countries to which the respective products were forwarded, for the year 1937-38:—

OVERSEA EXPORTS OF AUSTRALIAN ORES, METALS, ETC., 1937-38.

Article.	Exports to—							Other Countries.
	Total Exports.	United Kingdom.	U.S. America.	Belgium.	Germany.	Japan.	New Zealand.	
QUANTITY.								
Ores—	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.
Copper ..	38,004	..	32,639	280	..	5,085	..	..
Silver and Silver-lead ..	37,953	20,031	724	15,983	..	..	..	1,215
Iron ..	3,358,370	4,375	1,597,640	2,935	..	1,752,020	..	1,400
Wolfram ..	19,037	2,828	1,211	1,549	7,349	..	..	6,100
Tin ..	728	26	..	702	..	..	..	..
Zinc ..	..	..	..	..	..	..	..	..
Other ..	153,659	803	83,198	14,891	53,756	40	64	907
Concentrates—								
Silver and Silver-lead ..	647,528	119,350	274,501	252,964	713	..	..	..
Zinc ..	4,467,635	4,004,155	..	393,062	200	..	..	(b) 70,218
Copper ..	236,452	64	233,008	..	3,380	..	..	..
Tin ..	6,436	4,690	..	788	..	..	..	958
Lead Slime Residue ..	13,599	10,151	..	2,915	..	..	..	533
Gold Ore, Quartz and Concentrates ..	23,489	62	15,482	7,753	..	..	192	..
Other ..	4,412	449	3,695	..	..	..	..	268
Cadmium—Blocks, Ingots, etc. ..	3,406	2,140	..	..	..	..	6	1,260
Copper—								
Matte ..	37,471	..	..	37,471	..	..	..	..
Ingot ..	650	..	..	..	..	..	650	..
Tin—Ingot ..	14,665	9,243	400	400	..	..	4,360	262
Lead—								
Pig ..	4,255,297	4,062,042	16,936	30,037	..	71,685	35,279	39,318
Matte ..	..	..	..	..	..	..	..	..
Zinc—Bars, Blocks, etc. ..	618,777	308,206	..	..	..	162,047	2,958(d)	145,566
Platinum, Osmium, etc. ..	(a) 404	404	..	..	..	..	..	..
Gold—								
Bar, Dust, etc. ..	1,599,318	880,905	672,067	37	..	..	..	(c) 46,309
Silver—								
Bar, Ingot, etc. ..	9,056,428	3,351,061	48,825	200	64,493	..	2,209(e)	5,589,640
VALUE.								
Ores—	£	£	£	£	£	£	£	£
Copper ..	6,965	..	5,229	364	..	1,372	..	..
Silver and Silver-lead ..	49,818	38,928	950	9,825	..	..	..	115
Iron ..	95,626	604	45,812	403	..	48,614	..	193
Wolfram ..	284,565	42,531	16,677	25,466	108,499	..	..	91,392
Tin ..	2,034	74	..	1,960	..	..	..	..
Zinc ..	..	..	..	..	..	..	..	..
Other ..	70,131	9,280	23,234	11,594	20,324	4,840	134	725
Concentrates—								
Silver and Silver-lead ..	496,504	71,109	208,798	216,561	36	..	..	..
Zinc ..	1,316,990	1,149,832	..	136,109	30	..	(b)	31,019
Copper ..	380,372	547	375,393	..	4,432	..	..	..
Tin ..	50,746	33,402	..	8,275	..	..	..	9,069
Lead Slime Residue ..	9,075	5,637	..	3,200	..	..	..	238
Gold Ore, Quartz and Concentrates ..	35,363	7,566	24,577	3,161	..	..	59	..
Other ..	11,159	7,712	3,395	..	..	..	..	52
Cadmium—Blocks, Ingots, etc. ..	105,573	58,660	..	..	..	..	205	46,708
Copper—								
Matte ..	31,651	..	..	31,651	..	..	..	..
Ingot ..	1,988	..	..	..	..	..	1,988	..
Tin—Ingot ..	187,469	113,165	5,470	6,272	..	..	59,567	2,995
Lead—								
Pig ..	4,913,762	4,678,597	25,837	36,166	..	79,177	43,715	50,270
Matte ..	..	..	..	..	..	..	..	..
Zinc—Bars, Blocks, etc. ..	752,090	356,793	..	..	..	211,986	3,634(d)	179,677
Platinum, Osmium, etc. ..	6,843	6,843	..	..	..	..	..	..
Gold—								
Bar, Dust, etc. ..	13,823,124	7,610,252	5,812,878	318	..	..	..	(c) 399,676
Silver—								
Bar, Ingot, etc. ..	984,576	369,458	4,782	17	7,187	..	256(e)	602,876
Total	23,616,424	14,560,990	6,553,032	491,342	140,508	345,989	109,558	1,415,005

(a) Mainly osmiridium exported from Tasmania and platinum from New South Wales. (b) France, 70,175 cwt., £31,009. (c) France. (d) India, 117,984 cwt., £145,441; Kwantung Peninsula, 12,799 cwt., £14,840; Burma, 11,999 cwt., £15,381. (e) Ceylon, 4,029,366 fine ozs., £430,829; India, 1,560,274 fine ozs., £172,047.