CHAPTER XVIII.

MINERAL INDUSTRY.

§ 1. The Mineral Wealth of Australia.

1. **Place of Mining in Australian Development.**—The discovery of gold in payable quantities first attracted population to Australia in large numbers and was thus a significant factor in its early development. In more recent times the rapid growth of Australia's secondary industries has been associated with considerable expansion in mining for silver-lead-zinc, copper and iron ores, and for coal. However, the value of mineral production has lagged behind that recorded for Australia's large rural industries and in 1949 represented only about 7.3 per cent. of the net value of production of all primary industries.

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 geological surveys. More detailed reference to this matter will be found in preceding issues of the Official Year Book. (*See* No. 22, p. 755.)

During the years 1934 to 1940 a survey of certain areas in Australia north of the 22nd parallel of south latitude was undertaken by the Governments of the Commonwealth, Queensland and Western Australia. This survey is referred to in § 14 below.

3. **Quantity and Value of Production in 1949.**—The quantities (where available) and the values of certain of the principal minerals produced in each State, and in Australia as a whole, during 1949, are shown 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. New South Wales is, of course, in normal times a large producer of iron and steel from iron ore mined in South Australia. As the table shows, the latter State receives credit for this iron ore 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, cadmium, cobalt 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.

The quantities of cadmium and cobalt recovered in Tasmania from zinc ores mined in New South Wales during 1949 are shown in § 7, par. 2 (page 875).

MINERAL PRODUCTION: QUANTITIES, 1949.

Mineral.	Unit.	N.S.W.	Vic.	Q'land.	S. Aust.	W.Aust.	Tas.	N.T.	Australia.
Metallic—									
Antimony Ore and Concentrate ..	ton	307	16	48	..	22	..	..	393
Arsenic Oxide ..	,,	..	(a)	..	..	33	..	..	(b) 33
Bauxite	,,	1,264	4,028	..	..	..	..	..	5,292
Bismuth Concentrate	cwt.	10	..	18	..	..	..	..	28
Cadmium	ton	(c)	..	..	..	..	38	..	(b) 38
Copper—Ingot and Matte ..	,,	2,453	..	4,925	3	..	5,229	..	} 17,405
Ore ..	,,	..	..	..	..	303	..	4,492	}
Gold	fine oz.	51,793	68,426	76,282	2,198	648,426	12,152	29,781	889,058
Iron Ore	ton	10,313	..	2,101	1,447,731	12,524	..	..	1,472,669
Lead	,,	(d)	..	37,697	99	..	7,874	..	(b) 45,670
Manganese Ore ..	,,	1,580	..	233	1,856	9,420	..	..	13,089
Molybdenite Concentrate	cwt.	2	..	116	..	..	..	..	118
Pyritic Ore and Concentrate	ton	(a)	..	(a)	..	31,299	(a)	..	(b) 31,299
Silver	fine oz.	(d) 99,158	12,316	2,872,577	1,749	(e) 194,721	1,011,032	..	b4,191,553
Silver-lead Ores, Concentrate, etc. ..	ton	220,046	..	..	..	2,922	..	23	222,991
Tantalite	lb.	..	..	..	..	2,606	..	896	3,502
Tin Concentrate ..	ton	616	49	1,051	..	35	883	27	2,661
Tungsten—Scheelite Concentrate ..	,,	4	..	2	..	1	803	..	810
Wolfram Concentrate ..	,,	7	..	50	..	..	264	55	376
Zinc and Concentrate	,,	257,040	..	21,241	..	..	20,286	..	298,567
Zircon-Rutile-Ilmenite-Monazite Concentrate	,,	30,397	..	11,061	..	72	..	..	41,530
Fuel—									
Coal, Black—									
Semi-Anthracite and Bituminous ..	,,	10,728,373	122,507	} 1,970,388	{ ..	..	181,618	..	} 14,105,843
Sub-Bituminous ..	,,	7,725	..		{344,638	750,594	..	..	
Coal—Brown (including Lignite) ..	,,	..	7,375,559	..	..	..	..	..	7,375,559
Oil (Crude Petroleum)	gal.	..	34,410	..	..	..	..	..	34,410
Shale (Oil)	ton	120,956	..	..	..	..	..	..	120,956
Non-Metallic—									
Asbestos	,,	280	..	..	17	1,297	..	..	1,594
Barytes	,,	1,969	..	..	3,495	..	..	..	5,464
Clay(b)—Bentonitic ..	,,	..	..	24	..	150	..	..	174
Damourite ..	,,	..	..	..	692	..	..	..	692
Fireclay ..	,,	..	..	..	8,827	..	..	..	8,827
Fuller's Earth	,,	119	..	..	..	..	..	..	119
Kaolin ..	,,	..	9,051	60	2,858	80	7,316	..	19,365
Ochre and Pigments..	,,	680	..	85	32	44	21	100	962
Other ..	,,	..	..	..	29,300	10,047	..	..	39,347
Diatomite	,,	2,752	854	403	..	540	..	..	4,549
Felspar	,,	7,248	..	..	2,433	1,049	..	..	10,730
Graphite	,,	25	..	25	69	..	5	..	124
Gypsum	,,	82,653	30,985	..	147,698	25,907	..	..	287,243
Limestone Flux ..	,,	58,782	3,952	..	379,854	..	22,000	..	464,588
Magnesium—Dolomite	,,	37,078	..	(f)	..	50	..	..	(b) 37,128
Magnesite	,,	30,991	..	..	565	2,034	..	..	33,590
Mica	lb.	6,720	..	..	..	1,254	..	64,473	(b) 72,447
Phosphates ..	ton	11	..	..	..	..	..	..	11
Salt	,,	..	(f)	(f)	168,450	(f)	..	..	(b) 168,450
Silica	,,	35,806	..	..	24,344	986	3,095	..	64,231
Talc and Soapstone (Steatite).. ..	,,	1,685	..	..	6,643	181	..	..	8,509

(a) Not available. (b) Incomplete. (c) Excludes cadmium and cobalt extracted in Tasmania from zinc ores and concentrates produced at Broken Hill. (d) The bulk of silver and lead is contained in the concentrates, etc., despatched from the Broken Hill field and treated outside the State. (e) Silver as a by-product from gold mining: *see also* Silver-lead Ores, Concentrates, etc. (f) Not reported.

The values of the minerals raised in each State in 1949 are shown in the following table :—

MINERAL PRODUCTION : VALUES, 1949.

(£.)

Mineral.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
Metallic—								
Antimony Ore and Concentrate	19,737	1,129	4,039	..	954	..	..	25,859
Arsenic Oxide	..	(a)	..	..	983	..	..	(b) 983
Bauxite	606	5,879	..	..	..	..	..	6,485
Bismuth Concentrate	360	..	436	..	..	..	..	796
Cadmium	(c)	..	..	..	..	43,841	..	(b) 43,841
Copper—Ingot and Matte	433,363	..	758,374	394	..	735,365	..	2,076,786
Ore	..	..	..	..	3,451	..	145,839	
Gold (d)	638,994	835,848	930,626	25,512	7,858,791	152,841	369,027	10,811,639
Iron Ore	10,149	..	4,662	1,465,005	4,365	..	..	1,484,181
Lead	(e)	..	4,136,607	8,406	..	796,701	..	b 4,941,714
Manganese Ore	14,807	..	2,543	5,981	56,289	..	..	79,620
Molybdenite Concentrate	40	..	1,527	..	..	..	..	1,567
Pyritic Ore and Concentrate	(a)	..	(a)	.	125,857	(a)	..	(b) 125,857
Silver	(e) 25,442	3,054	584,075	391	(f) 49,246	207,238	..	(b) 869,446
Silver-lead Ores, Concentrate, etc.	14,307,964	..	..	..	154,777	..	973	14,463,714
Tantalite	..	..	..	..	286	..	240	526
Tin Concentrate	261,067	20,109	396,412	..	13,079	380,942	10,138	1,081,747
Tungsten—Scheelite Concentrate	2,028	..	700	..	219	272,668	..	275,615
Wolfram Concentrate	2,400	..	20,301	..	..	100,738	20,521	143,960
Zinc and Concentrate	3,438,949	..	1,954,199	..	..	1,713,499	..	7,106,647
Zircon-Rutile-Ilmenite-Monazite Concentrate	313,218	..	177,110	..	255	..	..	490,583
Other Metallic Minerals	170	..	385	70	1,497	124	..	2,246
Total, Metallic	19,469,294	866,019	8,971,996	1,505,759	8,270,049	4,403,957	546,738	44,033,812
Fuel—								
Coal, Black—								
Semi-Anthracite and Bituminous	(g) 16,121,554	379,464	2,874,062	..	..	181,897	..	20,701,541
Sub-Bituminous	..	..		172,319	972,245	..	..	
Coal—Brown (including Lignite)	..	1,469,455	..	..	..	..	..	1,469,455
Oil (Crude Petroleum)	..	1,004	..	..	..	..	..	1,004
Shale (Oil)	181,437	..	..	..	..	..	..	181,437
Other Fuel Minerals	206	..	..	..	..	..	..	206
Total, Fuel	16,303,197	1,849,923	2,874,062	172,319	972,245	181,897	..	22,353,643
Non-Metallic—								
Asbestos	16,123	..	..	458	125,332	..	..	141,913
Barytes	4,164	..	..	19,915	..	..	..	24,079
Clay(b)—Bentonitic	..	..	96	..	450	..	..	546
Damourite	..	..	..	2,993	..	..	..	2,993
Fireclay	..	..	..	5,520	..	..	..	5,520
Fuller's Earth	214	..	..	..	..	..	..	214
Kaolin	..	13,372	173	4,994	160	24,621	..	43,320
Ochre and Pigments	1,171	..	556	50	366	67	501	2,711
Other	..	..	..	12,911	11,813	..	..	24,724
Diatomite	3,269	4,604	1,540	..	950	..	..	10,363
Felspar	17,148	..	..	7,350	3,934	..	..	28,432
Graphite	250	..	148	2,164	..	10	..	2,572
Gypsum	55,476	18,124	..	110,773	18,610	..	..	202,983
Limestone Flux	29,130	3,551	..	157,628	..	16,000	..	206,309
Magnesium—Dolomite	25,696	..	(h)	..	248	..	..	(b) 25,944
Magnesite	60,287	..	..	1,853	4,714	..	..	66,854
Mica	21	..	..	..	1,343	..	52,014	53,378
Opal	1,592	..	1,200	39,798	..	..	..	42,590
Phosphates	28	..	..	..	..	..	..	28
Salt	..	(h)	(h)	336,900	(h)	..	..	(b) 336,900
Silica	16,555	..	..	13,267	1,014	2,219	..	33,055
Talc and Soapstone (Steatite)	5,866	..	..	44,333	2,375	..	..	52,574
Other Non-Metallic Minerals	12,128	..	8,499	3,878	49,751	..	..	74,256
Total, Non-Metallic	249,118	39,651	12,212	764,785	221,060	42,917	52,515	1,382,258
Total, All Minerals	36,021,609	2,755,593	11,858,270	2,442,863	9,463,354	4,628,771	599,253	67,769,713

(a) Not available. (b) Incomplete. (c) Excludes cadmium and cobalt extracted in Tasmania from zinc ores and concentrates produced at Broken Hill. (d) Gold values calculated on current price of gold in Australian currency. (e) The bulk of silver and lead is contained in the concentrates, etc., despatched from the Broken Hill field and treated outside the State. (f) Silver as a by-product from gold mining : *see also* Silver-lead Ores, Concentrates, etc. (g) Includes small tonnage of sub-bituminous coal. (h) Not reported.

The figures in the foregoing table exclude certain materials, such as stone for building and industrial uses, sand, gravel, brick and pottery and other clays and limestone which usually are included under the generic term "mineral". Particulars of the production of some of these items are given in par. 6, Quarries, below. Items normally included in mine or quarry production by the Mines Departments of some States, such as cement, carbide and sulphuric acid, are omitted therefrom and included in manufacturing production. As far as possible, the mineral materials used in the manufacture of these products are included in mine or quarry production.

4. **Value of Production, 1938, 1945 to 1949.**—The values of the minerals produced in each State during the years 1938 and 1945 to 1949 are given in the table hereunder :—

MINERAL PRODUCTION : VALUES.

(£.)

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
1938 ..	10,786,157	1,884,015	3,966,119	2,932,473	10,844,469	1,889,804	214,724	32,517,761
1945 ..	16,879,131	1,830,374	4,355,127	2,309,991	5,804,238	1,934,066	176,197	33,289,124
1946 ..	20,327,962	2,079,353	4,761,403	2,776,145	7,586,707	2,855,674	166,543	40,553,787
1947 ..	26,264,688	2,206,628	8,545,299	3,209,382	8,862,277	4,224,756	229,437	53,542,467
1948 ..	36,350,972	2,346,855	9,211,588	3,260,309	8,561,269	4,366,730	294,078	64,391,801
1949 ..	36,021,609	2,755,593	11,858,270	2,442,863	9,463,354	4,628,771	599,253	67,769,713

The value of mineral production in Australia reached its highest level in 1949 at £67,769,713 compared with £64,391,803 in 1948 and £32,517,761 in 1938. Although this marked increase since 1938 was due to some extent to higher quantity output the main contributing factors were the increased prices paid in 1949 for coal, silver, lead and zinc.

Since 1938 the greatest increase has occurred in New South Wales, £25,235,452 ; followed by Queensland, £7,892,151 ; Tasmania, £2,738,967 ; Victoria, £871,578. Because of the reduced output of gold in Western Australia, the value of minerals produced in that State was £1,381,115 lower in 1949 than in 1938. The value of mineral output decreased in South Australia between 1938 and 1949 by £489,610.

5. **Total Production to end of 1949.**—In the next table will be found the estimated value of the total mineral production in each State up to the end of 1949. The items excluded from the preceding table are also omitted here, and consequently the total for New South Wales is considerably less than that published by the State Department of Mines. The principal items excluded from the table below are coke, cement, lime, marble, slate, granite, chert, gravels, etc., which the State Department now includes in the returns for quarries.

MINERAL PRODUCTION : VALUES TO END OF 1949.

(£'000.)

Mineral.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
Gold ..	74,653	320,931	102,198	2,208	305,249	11,669	4,331	821,239
Silver and lead ..	219,088	290	27,211	405	3,025	15,885	70	265,974
Copper ..	18,968	217	36,284	33,314	1,827	32,249	414	123,273
Iron ..	9,452	16	546	39,218	43	97	..	49,372
Tin ..	20,230	1,313	14,754	..	1,733	22,183	732	60,935
Wolfram	436	19	1,551	..	7	1,240	863	4,116
Zinc ..	40,095	..	9,326	16	5	11,320	..	60,762
Coal ..	342,159	29,316	45,815	435	15,788	3,865	..	437,378
Other ..	12,440	1,157	3,660	17,914	2,482	3,979	453	42,085
Total ..	737,521	353,259	241,345	93,510	330,149	102,487	6,863	1,865,134

The "other" minerals in New South Wales include alunite, £234,000 ; antimony £479,000; arsenic, £212,000; bismuth, £264,000; chrome, £143,000 ; diamonds, £151,000; magnesite, £907,000 ; molybdenite, £232,000 ; opal, £1,646,000 ; scheelite, £264,000 ; and shale oil, £4,201,000. In the Victorian returns antimony ore was responsible for

£638,000. The value for coal in this State includes £10,230,000 for brown coal. Included in "other" in the Queensland production were opal, £190,000; gems, £662,000; bismuth, £147,000; cobalt, £158,000; molybdenite, £632,000; limestone flux, £903,000; and arsenic, £124,000. The chief items in South Australian "other" minerals were salt, £7,443,000; limestone flux, £1,247,000; gypsum, £2,038,000; phosphate, £196,000; and opal, £458,000. In Western Australia arsenic, £747,000; gypsum, £253,000; and asbestos, £432,000 were the principal items included with "other" minerals. In the Tasmanian returns osmiridium was responsible for £665,000, scheelite for £1,486,000 and limestone flux for £1,416,000.

6. Quarries.—Statistics giving details of the output of quarries were first published in Official Year Book No. 33, 1940. The details were collected following a resolution of the Conference of Australian Statisticians held in 1935.

The Conference decided that quarries, for the purpose of these statistics, should be confined to establishments in which four persons or more are employed, or in which power other than hand-power is used. The Conference, however, did not define the types of establishments which should be included as quarries, either according to the nature of the product or the method of obtaining the "mineral" material. Further difficulties have arisen owing to collection being made wholly or in part by Mines Departments in some States on bases inconsistent with those adopted by Statisticians. Consequently, the statistics which have been collected and reported as quarry production lack uniformity in many respects, while practices have varied considerably in classifying such materials as limestone and clays to mining or quarrying. The gathering of sand for various purposes has in general been omitted from quarry production.

The quarrying of limestone for use as a flux has for many years been included in "Mineral" production for all States (*see* para. 3 preceding). Limestone used for other purposes (cement, lime, chemicals, etc.) has been reported as quarry production but the figures are incomplete for most States. In 1949–50 limestone used by Australian factories for the manufacture of cement and lime and for general chemical purposes amounted to 1,939,449 tons, valued at £1,007,645.

The production of certain types of clays is included in "mineral" production, particulars being shown in the tables in para. 3 preceding. In addition, considerable quantities of clays are reported under quarry production, totals furnished for 1949 being as follows:—New South Wales, 1,251,606 tons, £289,927; Victoria, 81,336 tons, £32,468; Queensland, 109 tons, £652; South Australia, 251,333 tons, £58,765; Western Australia, 10,321 tons, £12,789; Tasmania, 7,337 tons, £24,688; Total, 1,602,042 tons, £419,289.

Particulars of the reported output of establishments engaged in the quarrying of building stone, macadam, ballast, etc. during 1949 (or other appropriate year) are shown in the table below.

BUILDING STONE, MACADAM, BALLAST, ETC., QUARRIED, 1949.

Particulars.	N.S.W.	Vic.(a)	Q'land.(b)	S. Aust.	W. Aust. (a)	Total.(c)
			QUANTITY (TONS).			
Building Stone ..	847,540	8,678	24,123	122,102	27,374	1,029,817
Macadam, Ballast, etc.	5,749,477	1,125,107	800,192	2,911,700	300,344	10,886,820
			VALUE (£.).			
Building Stone ..	489,953	33,666	10,780	85,742	29,551	649,692
Macadam, Ballast, etc.	1,734,819	610,856	248,966	728,287	195,355	3,518,283

(a) 1948–49. (b) 1949–50. (c) Excludes Tasmania, Northern Territory and Australian Capital Territory, particulars for which are not available.

§ 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.**—(i) *Quantities.* The following table shows the quantity of gold produced in the several States and in Australia as a whole during each of the nine decennial periods from 1851 to 1940, and in single years from 1941 to 1949. 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 miners who preferred to keep the amount of their wealth secret.

GOLD : QUANTITY PRODUCED.

('000 fine oz.)

Period.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
1851–60 ..	2,715	21,973	3	..	..	186	..	24,877
1861–70 ..	3,220	15,327	489	..	..	3	..	19,039
1871–80 ..	2,019	9,564	2,527	136	..	165	19	14,430
1881–90 ..	1,014	6,689	3,259	58	42	357	168	11,587
1891–1900 ..	2,432	7,040	5,648	52	5,252	550	214	21,188
1901–10 ..	2,253	7,095	5,512	73	17,784	604	111	33,432
1911–20 ..	1,145	3,067	2,263	55	10,671	202	23	17,426
1921–30 ..	204	593	434	10	4,557	43	2	5,843
1931–40 ..	569	1,052	1,021	53	8,474	130	84	11,383
1941	88	150	109	2	1,109	20	19	1,497
1942	77	101	95	2	848	19	12	1,154
1943	64	56	63	1	546	17	4	751
1944	63	54	51	1	466	17	5	657
1945	43	62	63	..	469	13	7	657
1946	32	87	62	1	617	15	10	824
1947	50	85	72	1	704	15	11	938
1948	52	69	70	2	665	13	15	886
1949	52	69	76	2	648	12	30	889
Total, 1851–1949	16,092	73,133	21,817	449	52,852	2,381	734	167,458

The amount of gold raised in Australia in any one year attained its maximum in 1903, when 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, 1904; and Tasmania, 1899.

Owing to the exhaustion of the more easily worked deposits and increased costs due to deep mining the production of gold in Australia declined from 3,837,979 fine oz. in 1903 to 427,160 fine 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 between that year and 1939 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

abandoned propositions into profit. The output of gold rose annually from 467,742 fine oz. in 1930 to 1,645,697 fine oz. in 1939. Following the outbreak of war in 1939, production fell very slightly in 1940, and rapidly thereafter, due to the diversion of manpower, until in 1944 it was only 656,867 fine oz. In 1945, the year in which hostilities in the 1939–45 War ceased, production showed practically no change, but in 1946 a marked increase of 167,267 fine oz. or 25 per cent. was recorded. A further increase occurred in 1947, but production fell in 1948 and remained at much the same level in 1949. Output in this year, 889,058 fine oz. was 35 per cent. higher than the war-time trough of 657,000 fine oz. in 1944 and 1945 but was 46 per cent. less than output in 1939.

(ii) *Values.* In the next table the gold produced since 1851 is valued in Australian currency. For the years 1851 to 1918 and 1925 to 1930 the price used was £4 4s. $11^5/_{11}$d. per fine oz. For the years 1919 to 1924 the price ranged between £5 12s. 6d. in 1920 and £4 8s. 6d. in 1923. The value applied for 1931 and to June, 1932 was the export parity calculated directly from London prices. Since then the average price paid by the Australian branches of the Royal Mint has been used.

GOLD : VALUE OF PRODUCTION.

(£.)

Period.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
1851–60..	11,530,583	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	75,540,415	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	(b) 11,545	26,354,869
1931–40..	5,115,397	9,444,570	9,118,903	459,330	74,391,204	1,164,492	786,790	100,480,686
1941 ..	941,243	1,600,016	1,164,623	17,907	11,852,046	212,709	201,599	15,990,143
1942 ..	807,436	1,060,910	994,214	13,931	8,865,632	191,835	126,035	12,059,993
1943 ..	666,491	590,540	656,657	5,424	5,710,664	180,210	40,880	7,850,866
1944 ..	657,161	568,305	538,177	5,661	4,899,129	174,889	57,804	6,901,126
1945 ..	461,304	661,430	676,712	2,970	5,009,548	139,573	76,811	7,028,348
1946 ..	344,497	936,262	675,164	6,760	6,640,075	165,334	105,376	8,873,468
1947 ..	539,008	911,681	777,924	6,770	7,575,573	161,986	118,560	10,091,502
1948 ..	561,415	738,100	749,565	21,912	7,156,912	138,889	163,482	9,530,275
1949 ..	638,994	835,848	930,626	25,512	7,842,604	152,841	369,027	10,795,452
Total, 1851–1949	74,653,762	320,946,322	102,204,899	2,208,296	305,242,107	11,670,106	4,331,787	821,257,279

(a) Period July, 1911 to June, 1920. (b) Period July, 1920 to December, 1930.

Values per fine oz. in Australian currency assigned to the production of gold during recent years are: £9 14s. $5\frac{3}{4}$d. in 1939, £10 13s. $1\frac{3}{4}$d. in 1940, £10 13s. 8d. in 1941, £10 9s. $0\frac{3}{4}$d. in 1942, £10 9s. od. in 1943, £10 10s. $1\frac{1}{2}$d. in 1944, £10 13s. $11\frac{1}{2}$d. in 1945 and £10 15s. 3d. in 1946, at which level it remained until 19th September, 1949. On that date, following the alteration in the rate of exchange, the value of gold rose to £15 9s. 10d. per fine oz. in terms of Australian currency. Further information regarding the price of gold is given in Chapter XVI.—Private Finance.

3. Changes in Relative Positions of States as Gold Producers.—The figures in the table showing the quantity of gold raised explain the very large increase in the population of Victoria during the period 1851 to 1861, when an average of over 40,000 persons reached the State each year. With the exception of 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 the proportion contributed by Western Australia has increased and in 1949 represented 73 per cent. of the entire yield of Australia. The proportion contributed by this State for the period 1851 to 1949 was 32 per cent. and by Victoria for the same period 43 per cent.

4. **Place of Australia in the World's Gold Production.**—The table below shows, in decennial periods from 1851 to 1940 and the quinquennium 1941–45, the world's gold production (as ascertained from authoritative sources) and the share of Australia therein. The details of world production shown for the years 1941 to 1945 are possibly less complete than those shown for other years, because of censorship during the war. The figures recorded for these years represent recorded production only and therefore omit any production for those countries not reporting. Included in this latter group are the Soviet Union and other producing countries of lesser importance.

GOLD : WORLD PRODUCTION.

Period.	World Production of Gold.	Gold Produced in Australia.	Proportion of Australian Production to Total.
	Fine oz.	Fine oz.	%
1851–60	64,482,933	24,877,012	38.58
1861–70	61,098,343	19,038,661	31.16
1871–80	55,670,618	14,429,601	25.92
1881–90	51,280,184	11,586,625	22.59
1891–1900	101,647,521	21,187,662	20.84
1901–10	182,891,525	33,432,069	18.28
1911–20	206,511,263	17,426,466	8.44
1921–30	183,805,900	5,843,052	3.18
1931–40	315,508,597	11,383,487	3.61
1941–45	(a) 134,100,000	4,715,844	3.52
1946	21,600,000	824,480	3.82
1947	21,800,000	937,654	4.30
1948	22,300,000	885,507	3.97
1949	30,107,000	889,058	2.95

(a) Recorded production only. *See* letterpress above.

The quantities of gold produced in the principal producing countries in each of the years 1938 and 1945 to 1949 are shown in the table hereunder.

GOLD: PRODUCTION IN PRINCIPAL COUNTRIES.

('000 fine oz.)

Country.	1938.	1945.	1946.	1947.	1948.	1949.
Union of South Africa	12,161	12,225	11,927	11,200	11,585	11,705
U.S.S.R. (Russia) ..	5,236	(a) 5,000	(a) 6,000	(a) 7,000	(a) 7,000	(a) 7,000
Canada	4,725	2,697	2,833	3,070	3,530	(b) 4,124
United States of America ..	4,245	997	1,625	2,321	2,099	1,996
Australia	**1,592**	**657**	**824**	**938**	**886**	**889**
British West Africa(c)	730	548	590	563	677	682
Rhodesia	815	568	552	523	514	528
Mexico	924	499	421	465	339	406
Colombia	521	507	437	383	335	359
Belgian Congo ..	394	347	331	301	300	334

(a) Estimated. (b) Includes Newfoundland. (c) Includes Gambia, Gold Coast, Nigeria, Sierra Leone.

5. **Employment in Gold-mining.**—The number of persons employed in gold-mining in each State at various intervals since 1901 is shown in the following table. The figures include prospectors, etc., so far as data 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. Terr.	Total.
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
1933 ..	6,913	6,126	4,161	231	9,900	229	95	27,655
1938 ..	3,764	6,315	3,378	158	15,374	141	267	29,397
1945 ..	509	643	1,256	16	4,818	15	46	7,303
1946 ..	772	1,282	1,651	38	6,961	13	106	10,823
1947 ..	795	1,135	1,834	50	7,649	14	176	11,653
1948 ..	702	1,064	1,627	34	7,178	15	171	10,791
1949 ..	688	1,019	(c) 1,589	52	6,800	9	238	10,395

(a) Estimated. (b) Year of maximum production for Australia. (c) Mainly mining for copper-gold ore.

Owing to the exhaustion of the more easily worked deposits and increased costs due to deep mining, 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, employment in the industry rose by almost five-fold to 33,113 in 1935, but thereafter the numbers employed declined each year to 7,015 in 1944. Following the cessation of hostilities and a relaxation of manpower control, the numbers rose in each succeeding year to 11,653 in 1947 but fell to 10,791 in 1948 and to 10,395 in 1949.

6. **Tax on Gold.**—(i) *General.* The Commonwealth Government imposed a tax on gold produced in Australia or in any Territory under its jurisdiction and delivered to the Commonwealth Bank on or after 15th September, 1939. The rate of tax was fixed at 50 per cent. of the price payable by the Bank in excess of £A.9 per fine oz.

The tax on gold yielded £1,214,621 during 1939–40; £1,452,260 during 1940–41; £1,030,425 in 1941–42; £524,694 in 1942–43; £317,720 in 1943–44; £342,457 in 1944–45; £383,552 in 1945-46; and £556,435 in 1946–47. This tax was suspended as from 20th September, 1947 by the Gold Tax Suspension Act 1947.

(ii) *Development of Gold Mining Industry.* Assistance amounting to £150,000 was given to the gold-mining industry, through the medium of the States, during 1940–41. In addition, an amount approximating £150,000 was paid during 1942 and subsequent years for the maintenance of those mines where, under manpower control, miners were transferred to other activities more directly associated with the war effort.

The suspension of the tax on gold referred to above was designed to assist the gold-mining industry in meeting higher costs and to encourage greater output.

7. **Bounty on Production.**—A reference to the bounty provided by the Commonwealth on gold production in Australia appears in Official Year Book No. 32, p. 579.

§ 3. Silver, Lead and Zinc.

1. **Production.**—(i) *General.* The values of production of silver, silver-lead ores, concentrates, etc., zinc and concentrates, as reported by Mines Departments for each of the years 1938 and 1945 to 1949, are shown in the following table :—

SILVER, LEAD AND ZINC: VALUE OF PRODUCTION.

(£.)

Year.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Terr.	Australia.
1938 ..	3,751,454	647	1,256,078	70	29,477	624,225	..	5,661,951
1945 ..	5,699,005	1,622	17,788	601	22,757	666,867	..	6,408,640
1946 ..	8,378,736	2,687	1,355,993	224	43,860	1,328,009	..	11,109,509
1947 ..	12,355,617	1,910	4,605,580	1,676	48,751	2,125,812	..	19,139,346
1948 ..	19,282,007	2,091	5,111,721	9,862	158,466	2,335,161	1,407	26,900,715
1949 ..	17,772,355	3,054	6,674,881	8,406	204,023	2,717,438	973	27,381,130

(ii) *New South Wales.* By far the greater amount of silver-lead-zinc ore in New South Wales, in fact in Australia, is won from the massive silver-lead-zinc sulphide deposit at Broken Hill. Those concerned in operating this gigantic lode are North Broken Hill Limited (which mines the northern limb of the ore-bearing structure), Broken Hill South Ltd., and Zinc Corporation Ltd. with which is associated New Broken Hill Consolidated (which are conducting operations on the southern limb).

The oxidized lead ores were directly smelted at Broken Hill prior to 1897, when smelting operations were transferred to Port Pirie in South Australia. The present-day sulphide ores are concentrated by gravity and flotation methods at Broken Hill. The lead (galena) concentrates (averaging approximately 76 per cent. lead, 4 per cent. zinc, 30 oz. silver per ton, 9.0 grains of gold per ton, 0.22 per cent. antimony and 0.64 per cent. copper) are railed to Port Pirie, and smelted to produce lead bullion which is later refined by a continuous lead refining process for the elimination of arsenic and antimony and the recovery of silver and gold. A large proportion of the zinc concentrates produced at Broken Hill are roasted by fertilizer plants in South Australia for the recovery of sulphur dioxide for sulphuric acid manufacture, the calcines after roasting being sent to Risdon in Tasmania for refining. The balance of the concentrates is either exported overseas or sent to Risdon in Tasmania for roasting and refining.

At Captain's Flat, Lake George Mines Limited is operating a lode of similar constitution. Concentration of the ore is carried out at the mine itself, after which process individual concentrates of zinc and lead (containing silver) are despatched to Port Kembla, New South Wales, for further treatment. Copper, pyrites and gold are also produced at this mine.

Silver-lead-zinc ore has been mined in small quantities in various other parts of the State, the more important localities being Yerranderie, Howell and Kangiara.

Particulars of the New South Wales mine production of silver, lead and zinc, as reported by the Mines Department, are shown in the table below for the years 1938 and 1945 to 1949. The particulars shown for silver relate, in the main, to the silver content of copper concentrates. The greater part of silver of New South Wales origin is contained in the silver-lead ore and concentrates shown separately in the table. Further particulars of the production of silver, lead and zinc by the Broken Hill and Lake George Mines are given in par. 1 (ix) hereafter.

Despite some reduction in the output of silver-lead ore and concentrates and zinc concentrates since 1938, the reported value of New South Wales production of silver, lead and zinc rose from £3,751,454 in 1938 to £17,772,355 in 1949, because of substantial increases in prices for these metals, particularly export prices (*see* par. 5 hereafter).

SILVER, LEAD AND ZINC: PRODUCTION, NEW SOUTH WALES.

Year.	Silver.(a)		Silver-lead Ore and Concentrates.		Zinc Concentrates.		Total Value.
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
	Fine oz.	£	tons.	£	tons.	£	£
1938	83,822	7,357	317,230	3,513,108	265,296	230,989	3,751,454
1945	131,309	20,703	205,805	4,604,962	265,284	1,073,340	5,699,005
1946	122,364	28,297	215,928	6,971,256	273,781	1,379,183	8,378,736
1947	112,471	26,242	212,410	10,554,416	249,420	1,774,959	12,355,617
1948	105,314	24,573	228,590	16,643,612	259,260	2,613,822	19,282,007
1949	99,158	25,442	220,046	14,307,964	257,040	3,438,949	17,772,355

(a) Mainly silver content of copper concentrates; most of the silver of New South Wales origin is contained in the silver-lead ore and concentrates shown in the next column.

(iii) *Victoria.* Small quantities of lead sulphide ore occur on most of Victoria's goldfields and in minor amounts in the Omeo, Bethanga and Cassilis districts. There has been no production of lead ore in recent years, the total recorded production being about 800 tons valued at £5,892.

The whole of the Victorian silver production of 12,316 fine oz. valued at £3,054 for 1949 was won as a by-product of the gold mining industry.

(iv) *Queensland.* In the far north-west of Queensland at Mt. Isa, some 600 miles west of Townsville, is operated the mining, milling and smelting enterprise of Mt. Isa Mines Ltd. Here, mining is carried out on extensive silver-lead-zinc ore lodes. After concentration by flotation in the concentrating mill, the silver-lead concentrate is converted to bullion in the smelter. All Mt. Isa bullion is exported overseas, where certain impurities, such as antimony, arsenic, and copper, as well as silver are removed to yield a pure lead suitable for commercial use.

Zinc concentrates and copper-lead dross produced by Mt. Isa are also exported overseas. During the 1939-45 War, operations on silver-lead-zinc ores at Mt. Isa were suspended while the mine was engaged in mining copper, but normal operations of the mine were resumed in 1946.

In 1949 approximately 87 per cent. of Queensland's production of both silver and lead and all the State's output of zinc were produced by the Mt. Isa mines.

The following table shows particulars of Queensland mine or smelter production of silver, lead and zinc, as reported by the Mines Department for the years 1938 and 1945 to 1949. The reduction in output in 1945 and 1946 was due to the suspension of silver-lead-zinc mining at Mt. Isa during the war. The lower output in 1949 compared with 1938 is more than offset by the higher prices received for these metals, the total value for the group having risen from £1,256,078 in 1938 to £6,674,881 in 1949.

SILVER, LEAD AND ZINC: PRODUCTION, QUEENSLAND.

Year.	Silver.(a)		Lead.(a)		Zinc.(a)		Total Value.
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
	Fine oz.	£	Tons.	£	Tons.	£	£
1938	3,533,490	298,589	41,196	628,025	23,735	329,464	1,256,078
1945	112,710	17,788	..	..	..	..	17,788
1946	980,538	209,094	12,754	627,775	11,361	519,124	1,355,993
1947	2,100,966	380,038	29,590	2,486,942	25,212	1,738,600	4,605,580
1948	2,306,869	422,015	30,779	3,002,381	21,593	1,687,325	5,111,721
1949	2,872,577	584,075	37,697	4,136,607	21,241	1,954,199	6,674,881

(a) Metal content of ores, concentrates and bullion produced.

(v) *South Australia.* Output of lead from local ores has been very small in recent years. In 1949, the lead content of concentrates produced amounted to 99 tons, valued at £8,406. Silver production was 1,749 fine oz., valued at £391, which was also contained in the above lead concentrates.

There has been no recorded zinc production since 1903, when the zinc was contained in lead ores and concentrates which came mainly from the Glen Osmond and Strathalbyn districts.

(vi) *Western Australia.* During 1949, a total of 2,922 tons of silver-lead-zinc ores and concentrates were exported from the State. These shipments contained 1,966 tons of lead, 35 tons of zinc and 9,992 fine oz. of silver. The value of the ores and concentrates was £154,777. The principal producer was the Prothero mine at Nabawa, while the Northampton Mineral Field also provided a large portion of the total ores and concentrates. Other centres of production are in the Naroo, Kooline, Wyloo and Napier Range areas.

In addition to the silver contained in the silver-lead-zinc ores and concentrates, 194,721 fine oz., valued at £49,246, was obtained as a by-product from the gold bullion despatched to the Perth Mint from the various goldfields.

Particulars of silver, lead and zinc production, as reported by the Mines Department of Western Australia for the years 1938 and 1945 to 1949, are shown below.

SILVER, LEAD AND ZINC: PRODUCTION, WESTERN AUSTRALIA.

Year.	Silver-lead-zinc Ores and Concentrates.		Silver in Gold Bullion.		Total Value.
	Quantity.	Value.	Quantity.	Value.	
	Tons.	£	Fine oz.	£	£
1938	352	625	271,346	28,852	29,477
1945	..	..	146,025	22,757	22,757
1946	36	1,068	171,452	42,792	43,860
1947	22	937	199,302	47,814	48,751
1948	2,192	114,268	187,818	44,198	158,466
1949	2,922	154,777	194,721	49,246	204,023

(vii) *Tasmania.* There are two large centres of silver-lead-zinc mining in Tasmania. The more important is the field operated by the Electrolytic Zinc Company of Australasia, Ltd. at Read-Rosebery. These are primarily zinc mines, although lead and copper-lead concentrates are also produced. This company also owns the electrolytic zinc works at Risdon near Hobart.

The lead concentrates and copper-lead concentrates produced at Rosebery are exported overseas.

The zinc concentrates, which are the principal product from the mine, also contain some lead. This concentrate is sent to Risdon for roasting and refining, portion of the resultant lead residue being sent to Port Pirie in South Australia for refining, the balance being dumped. In addition to the refining of zinc concentrates produced at Rosebery, the Risdon plant also treats considerable quantities of zinc concentrates from the Broken Hill mines.

Of secondary importance to Rosebery is the Mount Farrell field, situated 6 miles north-east of Rosebery. These ore-bodies are mainly silver-lead lodes which yield a lead concentrate with high silver content. The zinc content is insufficient to warrant recovery.

Most of the State's silver is contained in concentrates produced at Rosebery and Mount Farrell. Some silver is obtained from the Mount Lyell copper refinery tank house slimes which are treated at Port Kembla in New South Wales.

Particulars of Tasmanian mine production of silver, lead and zinc, as reported by the Department of Mines, are shown in the following table for the years 1938 and 1945 to 1949. As with New South Wales and Queensland, increased prices for these metals have resulted in a considerable rise in total values from £624,225 in 1938 to £2,717,438 in 1949.

SILVER, LEAD AND ZINC: PRODUCTION, TASMANIA.

Year.	Silver.(a)		Lead.(a)		Zinc.(a)		Total Value.
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
	Fine oz.	£	Tons.	£	Tons.	£	£
1938	1,219,550	104,671	10,652	163,102	25,366	356,452	624,225
1945	816,157	102,101	6,298	157,459	15,609	407,307	666,867
1946	896,293	187,428	6,891	340,509	17,990	800,072	1,328,009
1947	918,791	169,068	7,719	660,861	18,513	1,295,883	2,125,812
1948	907,216	168,726	7,328	697,194	18,504	1,469,241	2,335,161
1949	1,011,032	207,238	7,874	796,701	20,286	1,713,499	2,717,438

(a) Metal content of ores and concentrates of Tasmanian origin.

(viii) *Northern Territory.* During 1949, 23 tons of silver-lead ore, valued at £973, were mined. In 1948, 26 tons of ore, valued at £1,407, were raised. The output in each case came mainly from a few old mines in the northern part of the Territory, abandoned since the early days of mining. The principal centres are Boomlera, Mount Shoobridge, McArthur River and Jervois Range.

(ix) *Australia.* The table at the commencement of this section shows particulars for each State and for Australia as a whole of the total values ascribed to silver-lead-zinc mining by State Departments of Mines. Owing to lack of uniformity in the bases of reporting quantity output adopted by Mines Departments, data from those sources do not give a satisfactory picture of total output of the industry in Australia. A better indication is given in the following table, which shows the estimated silver, lead and zinc *content* of ores and concentrates produced in Australia according to data compiled by the Australian Mines and Metals Association. Comparable figures for 1938 are not available.

SILVER, LEAD AND ZINC CONTENTS OF ORES AND CONCENTRATES PRODUCED.

Year.	Broken Hill, N.S.W.	Captain's Flat, N.S.W.	Mt. Isa, Q'land.	Rosebery, Tas.	Mt. Farrell, Tas.	Other.	Total, Australia.
			SILVER (fine oz.).				
1939	9,367,951	144,066	3,707,908	969,797	..	1,130,394	15,320,116
1945	6,004,172	137,543	..	681,905	136,390	1,116,730	8,076,740
1946	5,994,445	213,324	932,408	757,253	134,450	1,013,400	9,045,280
1947	5,429,536	171,063	2,069,273	768,419	140,585	948,264	9,527,140
1948	6,026,314	118,978	2,235,562	803,654	82,320	790,691	10,057,519
1949	5,792,157	71,371	2,485,473	916,530	77,300	506,382	9,849,213
1950	6,037,103	227,582	2,748,655	1,072,234	94,040	497,842	10,677,456
			LEAD (tons).				
1939	215,198	7,919	43,955	9,104	..	3,827	280,003
1945	148,891	6,646	..	5,632	1,161	2,411	164,741
1946	152,407	9,041	12,288	6,249	1,167	2,683	183,835
1947	147,656	7,543	29,437	6,990	1,222	3,775	196,623
1948	164,645	5,518	30,165	7,001	765	8,861	216,955
1949	160,645	2,871	32,621	7,573	747	9,034	213,491
1950	156,842	9,137	37,021	8,579	894	6,703	219,176
			ZINC (tons).				
1939	145,207	11,850	29,092	31,107	..	..	217,256
1945	118,566	11,893	..	19,854	..	..	150,313
1946	122,776	15,187	11,269	22,678	..	..	171,910
1947	120,993	12,667	24,994	23,604	..	..	182,258
1948	136,144	9,445	21,578	23,151	..	151	190,469
1949	129,894	5,077	21,252	25,740	..	35	181,998
1950	130,147	15,972	25,800	30,462	..	3	202,384

2. **Production, Sales and Stocks of Refined Silver, Lead and Zinc.**—In the following table, details are given of the quantities of *refined* silver, lead and zinc produced in Australia, and of the quantities sold and stocks held for the years 1939 and 1946 to 1950, according to data compiled by the Australian Mines and Metals Association. Comparable figures for 1938 are not available.

REFINED SILVER, LEAD AND ZINC: PRODUCTION, SALES AND STOCKS, AUSTRALIA.

Particulars.	1939.	1946.	1947.	1948.	1949.	1950.
SILVER ('000 fine oz.)						
Stocks from previous year ..	122	465	241	445	284	633
Production for year ..	9,552	6,183	6,658	6,212	5,573	6,653
Total Available Supply ..	9,674	6,648	6,899	6,657	5,857	7,286
Sold to Australian consumers	1,794	6,407	3,561	1,375	1,019	1,095
Exported or sold for export..	7,518	..	2,893	4,998	4,205	5,744
Stocks on hand at end of year	362	241	445	284	633	447
Total Disposals and Stocks	9,674	6,648	6,899	6,657	5,857	7,286
LEAD (tons).						
Stocks from previous year ..	10,290	17,418	24,726	(a)5,028	5,861	8,635
Production for year ..	199,437	137,459	158,548	159,497	151,753	161,572
Total Available Supply ..	209,727	154,877	183,274	164,525	157,614	170,207
Sold to Australian consumers	32,217	42,040	33,242	34,774	40,908	43,661
Exported or sold for export	164,684	88,111	138,378	123,890	108,071	122,426
Stocks on hand at end of year	12,826	24,726	11,654	(a)5,861	8,635	4,120
Total Disposals and Stocks	209,727	154,877	183,274	164,525	157,614	170,207
ZINC (tons).						
Stocks from previous year ..	3,225	4,786	531	3,685	5,879	4,581
Production for year ..	71,220	76,316	69,421	81,312	80,956	83,652
Total Available Supply ..	74,445	81,102	69,952	84,997	86,835	88,233
Sold to Australian consumers	31,088	35,984	47,442	42,018	44,024	45,141
Exported or sold for export	43,137	44,587	18,825	37,100	38,230	38,558
Stocks on hand at end of year	220	531	3,685	5,879	4,581	4,534
Total Disposals and Stocks	74,445	81,102	69,952	84,997	86,835	88,233

(a) Prior to 1948 stock on hand represented physical stock; for the year 1948 this figure represents unsold stock.

3. **World Production.**—The estimated world production of silver, lead and zinc during the years 1938 and 1945 to 1949, as derived from statistics compiled by the American Bureau of Metal Statistics, is shown in the following tables.

SILVER, LEAD AND ZINC: WORLD PRODUCTION.

1938.	1945.(a)	1946.(a)	1947.(a)	1948.(a)	1949.(a)
SILVER ('000 fine oz.).					
267,765	151,173	131,177	144,292	(b) 146,344	(b) 180,000
LEAD (tons of 2,240 lb.).					
1,677,258	1,123,319	1,132,305	1,273,361	1,355,246	(b) 1,460,367
ZINC (tons of 2,240 lb.).					
1,920,000	1,525,006	1,549,508	1,671,007	1,767,809	(b) 1,818,879

(a) Output of reporting countries. (b) Subject to revision.

4. **Silver, Lead and Zinc Production in Principal Countries, 1949.**—The following table shows particulars of silver, lead and zinc production (*mine basis*) in principal producing countries, according to data published by the American Bureau of Metal Statistics.

SILVER, LEAD AND ZINC: MINE PRODUCTION IN PRINCIPAL COUNTRIES, 1949.

Country.	Production.	Country.	Production.
SILVER ('000 fine oz.).			
Mexico	49,454	Bolivia	6,623
United States of America	34,559	Belgian Congo	4,549
Canada(a)	17,641	Japan	3,591
British India (excluding Burma)	14,749	Yugoslavia	(c) 2,500
Peru	10,609	Argentina	1,249
Australia	**9,849**	Union of South Africa	1,159
U.S.S.R. (Russia)	(b) 7,000	Chile	800
Germany	(c) 7,000		

(a) Includes Newfoundland. (b) Year 1940. (c) Year 1939.

LEAD (tons of 2,240 lb.).			
United States of America	365,989	French Morocco	36,251
Mexico	229,987	Italy	34,415
Australia	**213,491**	South-West Africa	31,471
Canada	142,656	Spain	28,985
U.S.S.R. (Russia)	(a) 88,600	Bolivia	25,936
Yugoslavia	71,071	Sweden	23,522
Peru	64,324	Argentina	17,752
Western Germany	40,298		

(a) Estimated.

SILVER, LEAD AND ZINC: MINE PRODUCTION IN PRINCIPAL COUNTRIES, 1949—*continued.*

Country.	Production.	Country.	Production.
Zinc (tons of 2,240 lb.).			
United States of America ..	529,645	Belgian Congo	54,544
Canada	257,377	Spain	49,088
Mexico	188,554	Japan	43,613
Australia	181,938	Yugoslavia	36,000
U.S.S.R. (Russia)	(*a*)108,000	Sweden	34,603
Peru	70,898	Rhodesia	22,850
Italy	60,759	Bolivia	17,350
Western Germany	56,905		

(*a*) Estimated.

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, relevant particulars of the prices of each of the metals have been included in the following table. The table shows average prices in Australia and on the London Metal Exchange during the years 1938 and 1946 to 1950. Lead and zinc prices have been controlled in the United Kingdom and Australia since the outbreak of war in 1939. Silver prices have not been controlled.

PRICES OF SILVER, LEAD AND ZINC.
(£ s. d.)

Metal.	1938.	1946.	1947.	1948.	1949.	1950.
Australian Prices, in Australian currency—						
Silver, per fine oz.(*a*) ..	0 2 2.0	0 5 0.8	0 4 7.6	0 4 8.4	0 5 1.6	0 6 9.2
Lead, per ton*b*	*c*22 0 0	22 0 0	22 0 0	22 0 0	35 0 0	43 12 7
Zinc, per ton*b*	*c*22 0 0	22 0 0	22 0 0	22 0 0	40 0 0	47 3 10
London Metal Exchange Prices, in sterling—						
Silver, per fine oz. ..	0 1 9.06	0 4 0.7	0 3 8.4	0 3 9.0	0 4 1.2	0 5 4.8
Lead, per ton*b*	15 6 6	48 1 7	85 1 7	95 10 0	103 3 11	106 8 2
Zinc, per ton*b*	14 1 7	43 1 11	70 0 0	80 0 9	87 8 6	119 4 3

(*a*) Silver prices have not been fixed by regulation in Australia, the prices shown representing export parity calculated from London Metal Exchange prices. (*b*) Prices fixed by regulation. (*c*) From February, 1940.

6. **Employment in Silver, Lead and Zinc Mining.**—The average number of persons employed in mining for these metals during each of the years 1938 and 1945 to 1949 is given below :—

SILVER, LEAD AND ZINC MINING: PERSONS EMPLOYED.

Year.	N.S.W.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Terr.	Australia.
1938	5,612	530	..	4	421	3	6,570
1945	3,929	34	..	..	417	..	4,380
1946	4,713	1,003	2	5	453	..	6,176
1947	5,331	994	12	..	523	2	6,862
1948	5,918	1,411	17	114	577	6	8,043
1949	6,052	1,285	32	135	616	6	8,126

§ 4. Copper.

1. **Production.**—Copper is widely distributed throughout Australia. However, the principal producing States are at present Tasmania, Queensland and New South Wales, in that order.

The values of the local production, as reported and credited to the mineral industry for the years 1938 and 1945 to 1949, are shown hereunder. Quantities for Australia as a whole, as returned by the several State Mines Departments, are appended at the foot of the table :—

COPPER : PRODUCTION.

State.	1938.	1945.	1946.	1947.	1948.	1949.
	£	£	£	£	£	£
New South Wales ..	87,905	305,000	344,682	290,905	377,250	433,363
Queensland.. ..	203,967	1,500,662	648,122	338,508	475,548	758,374
South Australia ..	15,333	11,674	..	..	502	394
Western Australia ..	1,275	364	105	6,071	259	3,451
Tasmania	580,238	463,294	716,212	1,057,825	881,363	735,365
Northern Territory ..	4,362	3,811	6,282	..	7,370	145,839
Australia	893,080	2,284,805	1,715,403	1,693,309	1,742,292	2,076,786
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Ingot, Matte, etc. ..	18,751	25,850	19,160	14,040	12,782	17,405
Ore and Concentrates	935					

Particulars of the copper *content* of ores and concentrates produced in each producing State and the Northern Territory, as published by the Australian Mines and Metals Association for the years 1938 and 1945 to 1949, are shown in the table below.

COPPER CONTENT OF ORES AND CONCENTRATES PRODUCED.

(Tons).

State.	1938.	1945.	1946.	1947.	1948.	1949.
New South Wales ..	1,963	1,830	1,768	2,391	2,515	2,453
Queensland.. ..	4,458	15,007	6,481	2,778	3,149	4,924
South Australia ...	254	134	..	..	4	3
Western Australia ..	5	12	1	..	..	5
Tasmania	12,729	7,472	9,380	7,954	6,574	5,229
Northern Territory ..	37	65	125	..	126	848
Australia ..	19,446	24,520	17,755	13,123	12,368	13,462

2. **Sources of Production.**—(i) *New South Wales.* The copper content of ores and concentrates produced in New South Wales in 1949 amounted to 2,453 tons. The principal sources of this production were Broken Hill, New Occidental (Cobar) and Captain's Flat ores.

(ii) *Queensland.* In 1949 the yield of metallic copper in this State amounted to 4,924 tons compared with 3,149 tons in 1948 and 2,778 tons in 1947. The bulk of the production in 1949 came from Mt. Morgan (3,126 tons) while 1,588 tons represented the copper content of copper-lead dross from Mt. Isa Mines, treated overseas.

A copper mill and smelter is under construction at Mt. Isa for the purpose of operating on copper ores at that site. Copper was produced from copper ore at Mt. Isa during the 1939–45 War, but production was suspended in 1946 and operations since have been confined to silver-lead-zinc ores.

(iii) *South Australia.* Deposits of copper are found over a large portion of South Australia, and its total production to date exceeds that of any other State, notwithtanding that output has diminished to negligible dimensions since the exhaustion of the ore reserves on the principal copper fields. No production was recorded in 1946 or 1947, while in 1948 and 1949 only 4 and 3 tons respectively, of metallic copper were produced.

(iv) *Western Australia.* The ore sent to smelters in 1949 amounted to 49 tons containing 4.8 tons of metal, valued at £630. In the same year carbonate ores for use as fertilizers amounted to 254 tons, valued at £2,821.

(v) *Tasmania.* The quantity of copper produced in Tasmania during 1949 was 5,229 tons, valued at £735,365, the Mount Lyell Mining and Railway Co. Ltd. accounting for the greater part of the production. Copper in concentrates produced by this company in 1949 was 7,940 tons, but much of this remained unsmelted at the end of the year. Output of cathode copper was 4,430 tons in 1949, while production of blister copper was seriously affected by shortage of smelting coke from Newcastle and Port Kembla during the coal strike.

(vi) *Northern Territory.* Copper has been found at various places in the Territory. In 1947 there was no production, but during 1946 279 tons were produced compared with 96 tons in 1939. In 1948 and 1949 281 tons and 4,492 tons, respectively, of ore were mined. The large increase in 1949 was due to an active developmental programme carried out at Barrow Creek and Jervois Range.

3. **Production, Sales and Stocks of Refined Copper.**—In the following table, details of the production, sales and stocks of *refined* copper, as compiled by the Australian Mines and Metals Association, are given for the years indicated. Comparable figures for the year 1938 are not available.

REFINED COPPER: PRODUCTION, SALES AND STOCKS, AUSTRALIA.

(Tons.)

Particulars.	1939.	1945.	1946.	1947.	1948.	1949.	1950.
Stocks from previous year..	1,342	800	2,611	1,313	409	391	361
Production for year ..	17,867	20,498	22,659	19,505	11,389	9,858	13,509
Total Available Supply ..	19,209	21,298	25,270	20,818	11,798	10,249	13,870
Sold to Australian consumers	18,808	18,687	22,957	20,409	11,407	9,884	11,910
Exported or sold for export	100	..	1,000	..	..	4	..
Stocks on hand at end of year	301	2,611	1,313	409	391	361	1,960
Total Disposals and Stocks	19,209	21,298	25,270	20,818	11,798	10,249	13,870

The particulars above relate to copper refined from Australian ores. In recent years, local demand for copper has considerably exceeded Australian production and substantial quantities of copper have been imported. A large proportion of the imports in 1947–48 and later years has comprised blister copper imported mainly from South Africa and refined in Australia. Recorded imports of "pigs, ingots and other refinery shapes" (mainly blister copper) in 1949–50 were 16,369 tons.

4. **World Production of Copper.**—The world's estimated production of copper during the years 1938 and 1946 to 1950 is shown below.

COPPER: WORLD PRODUCTION.
(Tons of 2,240 lb.)

1938.	1946.	1947.	1948.	1949.	1950.
2,020,000	1,811,000	2,218,000	2,302,000	2,246,223	(a) 2,465,000

(a) Subject to revision.

The yields in 1950 from the principal copper-producing countries reporting, as published in the *Year Book of the American Bureau of Metal Statistics*, were as follows :—

COPPER: PRODUCTION IN PRINCIPAL COUNTRIES, 1950.
(Tons of 2,240 lb.)

Country.	Production.	Country.	Production.
United States of America ..	817,362	Union of South Africa ..	32,900
Chile	357,024	Cyprus	28,468
Rhodesia	280,883	Peru	27,412
Canada(a)	233,852	Cuba	20,235
Russia	(b) 214,000	Finland	16,958
Belgian Congo	173,140	Sweden	15,845
Mexico	58,273	Norway	15,156
Yugoslavia	39,400	**Australia**	**14,905**
Japan	38,701	Turkey	11,422

(a) Includes Newfoundland. (b) Estimated.

During 1950 the share of the United States of America in the world's copper production amounted to 41.2 per cent. while the Australian proportion was less than 1 per cent.

5. **Prices.**—Since the outbreak of war in 1939, the price of copper in Australia and the United Kingdom has been fixed by Regulation. Details of the average price for the years shown are given in terms of Australian currency and sterling in the following table :—

AVERAGE PRICE PER TON OF ELECTROLYTIC COPPER IN AUSTRALIA AND UNITED KINGDOM.
(£ s. d.)

Country.	December, 1939.	1946.	1947.	1948.	1949.	1950.
Australia — in Aust. currency(a)	63 17 6	95 0 0	123 5 9	140 0 0	167 19 5	189 1 8
United Kingdom —in Sterling	62 0 0	77 4 0	130 12 4	134 0 0	133 1 11	178 17 1

(a) *Ex* works Port Kembla.

6. **Employment in Copper-mining.**—The number of persons employed in copper-mining, as recorded by Mines Departments for each of the years 1938 and 1945 to 1949, was as follows :—

COPPER-MINING : PERSONS EMPLOYED.

Year.	N.S.W.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Terr.	Australia.
1938	13	213	67	4	1,015	5	1,317
1945	145	814	3	2	738	5	1,707
1946	134	59	11	1	709	9	923
1947	184	48	..	2	733	15	982
1948	187	45	11	..	746	13	1,002
1949	136	57	14	3	757	32	999

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

§ 5. Tin.

1. **Production.**—The values of the production of tin, as reported to the Mines Departments in producing States during the years 1938 and 1945 to 1949, are shown in the following table. A separate line is appended showing the production of *refined* tin from ores and concentrates smelted, as recorded by the Australian Mines and Metals Association for the years indicated.

TIN : PRODUCTION.

State.	1938.	1945.	1946.	1947.	1948.	1949.
	£	£	£	£	£	£
New South Wales ..	286,768	291,788	257,153	246,423	302,045	261,067
Victoria	28,650	9,869	14,917	25,397	20,695	20,109
Queensland	141,547	207,948	220,901	390,833	224,579	396,412
Western Australia ..	7,421	4,370	5,838	5,565	12,985	13,079
Tasmania	244,037	240,369	240,584	353,045	427,372	380,942
Northern Territory ..	3,205	5,026	3,228	4,698	12,055	10,138
Total ..	711,628	759,370	742,621	1,025,961	999,731	1,081,747
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Refined Tin ..	3,229	2,359	2,225	2,371	1,885	1,955

2. **Sources of Production.**—(i) *New South Wales.* Production of tin concentrates in 1949 was stated at 616 tons, valued at £261,067, compared with 760 tons, valued at £302,045 in 1948. A large proportion of the output in this State is obtained in normal years by dredging and sluicing, principally in the New England district.

(ii) *Victoria.* The production of tin in this State is obtained solely as a by-product from the gold dredging operations at Eldorado. The production in 1949 amounted to 49 tons of concentrates, valued at £20,109, compared with 54 tons, valued at £20,695, in 1948.

(iii) *Queensland.* The chief producing districts in Queensland during 1949 were Herberton, 923 tons of concentrates; Cooktown, 37 tons; Stanthorpe, 33 tons; Chillagoe, 20 tons; and Kangaroo Hills, 33 tons. The total production in 1949 amounted to 1,051 tons, valued at £396,412, compared with 683 tons, valued at £224,579, in 1948. It is interesting to compare these production figures with those recorded in the early years of this century in this State when the output ranged between 2,000 and 5,000 tons per annum.

(iv) *Western Australia.* The quantity of tin concentrates reported in this State in 1949 amounted to 35 tons, valued at £13,079, and was obtained mainly in the Pilbara and Greenbushes fields.

(v) *Tasmania.* For 1949 the output amounted to 883 tons of tin concentrates, valued at £380,942, a decrease of 146 tons on the output of the previous year.

(vi) *Northern Territory.* The production for 1949 amounted to 27 tons of concentrates, valued at £10,138, compared with 33 tons of concentrates valued at £12,055 produced during 1948.

3. **World Production.**—The world's production of tin ore, *in terms of metal,* during each of the years 1938 and 1944 to 1949 was as follows :—

TIN : WORLD PRODUCTION.(*a*)

(Tons of 2,240 lb.)

1938.	1944.	1945.	1946.	1947.	1948.	1949.
148,649	99,700	87,700	88,800	112,200	151,600	162,000

(*a*) As reported by the International Tin Study Group and United States of America Bureau of Mines.

The production of tin reached its maximum in 1941 when 241,400 tons were recorded. The following are the chief producing countries of the world :—Malayan Union, Bolivia, Indonesia, Belgian Congo and Nigeria. Normally these countries produce about three-quarters of the total production.

The production of tin ore, in *terms of metal,* for the principal producing countries in 1949 were as follows :—

TIN : PRODUCTION IN PRINCIPAL COUNTRIES, 1949.

(Tons of 2,240 lb.)

Country.	Production.	Country.	Production.
Malayan Union	54,910	**Australia**	**1,955**
Bolivia	34,123	Burma	1,906
Indonesia	28,965	Portugal	1,400
Belgian Congo	13,539	United Kingdom	1,217
Nigeria	8,823	Union of South Africa ..	465
Thailand (Siam)	7,817	Mexico	309
China	4,200	Spain	300

Australia's share of the world's tin production in 1949 was about 1.2 per cent.

4. **Prices.**—At the outbreak of war in September, 1939, the price of tin in Australia and London was fixed by Regulation. London control of tin prices ceased on 14th November, 1949, while the Australian price is still controlled. Details of the movement in average prices for the years shown are given in terms of Australian currency and sterling in the following table :—

AVERAGE PRICE PER TON OF TIN IN AUSTRALIA AND UNITED KINGDOM.

(£ s. d.)

Country.	December, 1939.	1946.	1947.	1948.	1949.	1950.
Australia—in Aust. currency	*a*299 0 0	376 0 0	438 15 0	577 7 0	620 0 0	725 5 9
United Kingdom —in sterling..	*b*271 0 0	*b*336 2 10	*b*425 18 7	*b*548 1 11	*b*599 16 1	*c*745 16 9

(*a*) *Ex* smelters for sales of 10 cwt. or more or in ingots of 70 lb. or more. (*b*) Average official prices for standard tin. (*c*) Tin, standard, spot.

5. **Employment in Tin-mining.**—The number of persons employed in tin-mining during the years 1938 and 1945 to 1949 was as follows :—

TIN-MINING : PERSONS EMPLOYED.

Year.	N.S.W.	Victoria. (*a*)	Q'land.	W. Aust.	Tas.	Nor. Terr.	Australia.
1938	1,440	5	1,263	73	1,123	15	3,919
1945	814	4	465	13	736	(*b*) 48	2,080
1946	778	..	462	10	695	49	1,994
1947	523	..	528	9	627	52	1,739
1948	534	..	480	11	577	63	1,665
1949	548	..	515	24	576	82	1,745

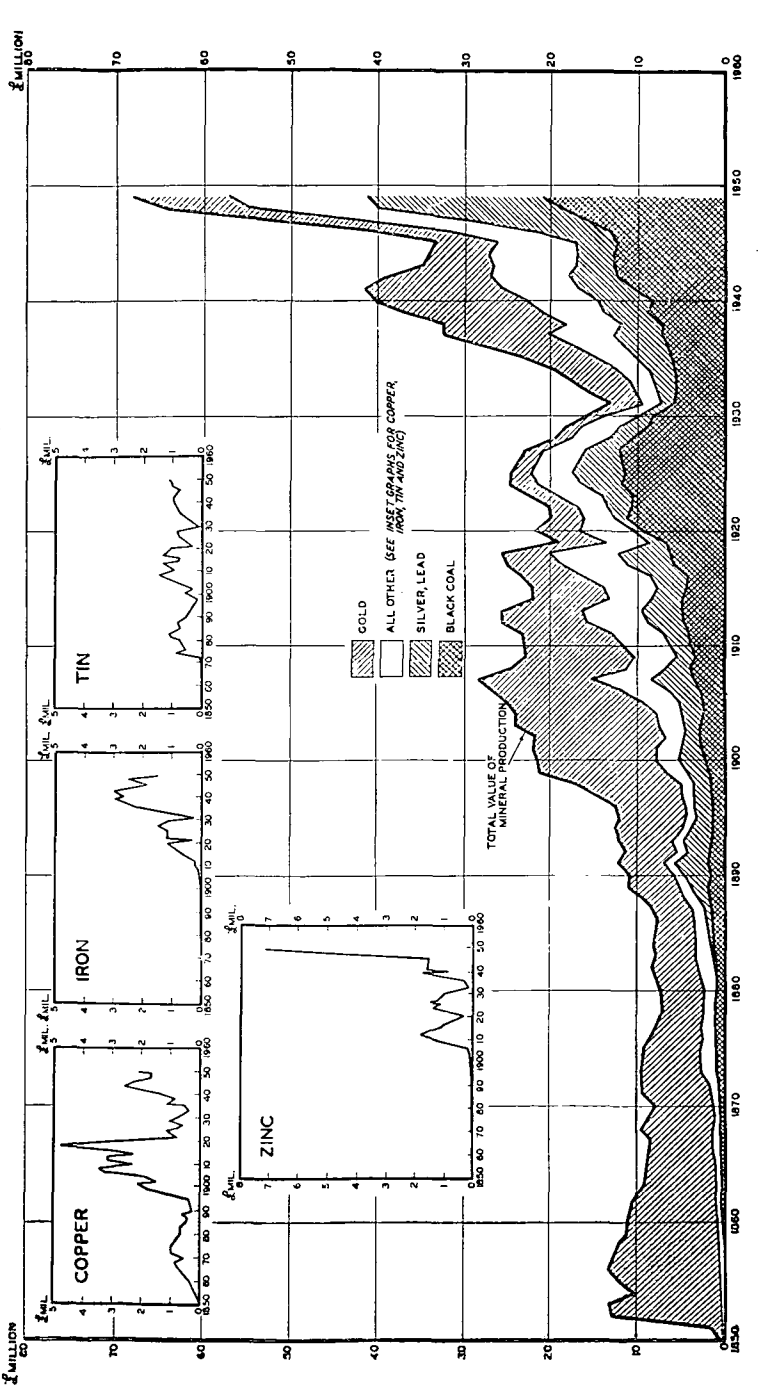
(*a*) The tin produced in Victoria was raised by a dredging company operating primarily for gold. (*b*) Includes some engaged in mining for tantalite.

§ 6. Iron.

1. **General.**—Although iron ore is widely distributed throughout Australia, the only known ore bodies of large extent and high grade which are easy of access are those situated at Iron Knob, South Australia and at Yampi Sound, Western Australia. Estimates of the reserves at these centres place the quantities available at approximately 150 million tons and 100 million tons respectively. Bearing in mind the expansion of the iron industry in Australia, and the limitations of these reserves, the Commonwealth Government prohibited the export of iron ore from 1st July, 1938. A survey of the iron ore resources of Australia undertaken by the Commonwealth Geologist was completed at the end of 1940.

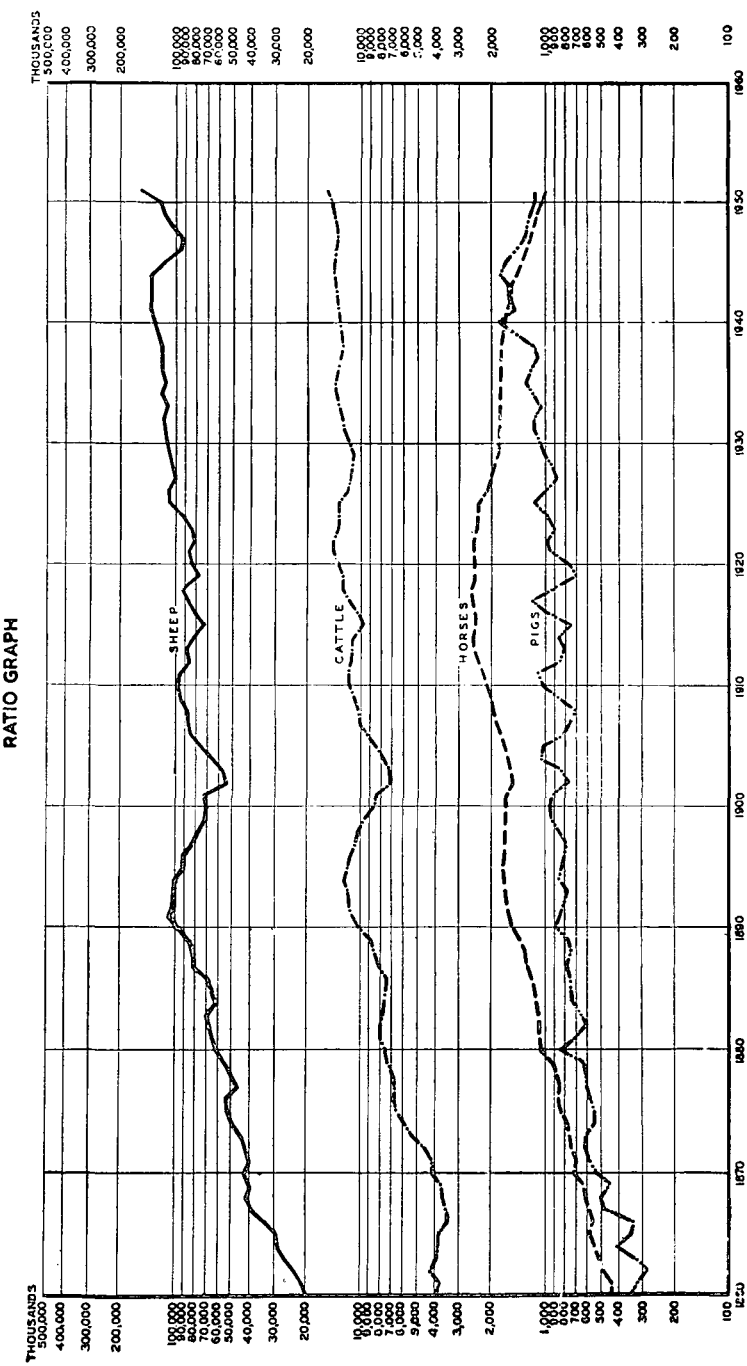
2. **Production.**—(i) *New South Wales.* The production in 1935 of pig-iron from ores mined in New South Wales amounted to 4,580 tons, valued at £18,320. No iron ores were produced from 1935 until 1941, when 202,180 tons of ore were mined. In 1942, 375,297 tons were mined, but only 86,185 tons in 1945. Since that year there has been no iron-ore mined in this State for conversion into pig-iron. For many years the chief source of supply has been South Australia.

VALUE OF PRINCIPAL MINERALS PRODUCED: AUSTRALIA, 1850 TO 1949



LIVESTOCK: AUSTRALIA, 1860 TO 1951

RATIO GRAPH



NOTE:- VERTICAL SCALE IS LOGARITHMIC, AND THE CURVES RISE AND FALL ACCORDING TO RATE OF INCREASE OR DECREASE, ACTUAL NUMBERS ARE INDICATED BY SCALE.

Small quantities of iron oxide produced in New South Wales are used by the various gas-works 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 1949, 10,313 tons of oxide, valued at £10,149, were won.

(ii) *Queensland.* Extensive deposits of iron ore are known to exist in Queensland. Their location and size, however, in comparison with the more favourable deposits of South Australia and Western Australia, preclude their exploitation. The output of 2,101 tons, valued at £4,662, for 1949 came mainly from the Biggenden district.

(iii) *South Australia.* The production from the deposits worked by the Broken Hill Pty. Co. Ltd. at Iron Knob reached its maximum in 1939, when 2,571,759 tons of ore, valued at £2,957,523, were raised. The production of 1,447,731 tons, valued at £1,465,005, for 1949 was below normal post-war output. This decrease was caused by an industrial dispute in South Australia followed by a coal strike in New South Wales in the same year.

(iv) *Western Australia.* The development of the deposits at Yampi Sound was discontinued in 1938 as a result of the embargo on exports. However, in 1942, production of iron ore was reported for the first time since 1938; it amounted to 150 tons, valued at £225. Production in 1943 amounted to 84 tons, valued at £128, but up to 1947 no further production had been recorded.

Developmental work at the iron ore deposits on Cockatoo Island in Yampi Sound reached a climax on 24th July, 1951, when one specially designed vessel of the Broken Hill Proprietary Co. Ltd. left the island with 10,384 tons of ore for Port Kembla, New South Wales.

The production of pig-iron was commenced at Wundowie in Western Australia in January, 1948 under the direction of the State Department of Industrial Development. The ore used is obtained from the local deposits and converted to pig-iron by the use of charcoal burnt from timber obtained in the same locality. The production, which amounted to 771 tons for the six months ended June, 1948, had grown to 7,727 tons of pig iron for the year 1950. This, in addition to meeting local requirements, provided a small quantity for export to the eastern States.

The whole iron pyrites production of Western Australia is won at the Iron King and Norseman mines and is railed, in the form of ores and concentrates, to superphosphate manufacturers at Bassendean and Bayswater on the coast.

(v) *Tasmania.* There has been no production of ironstone in Tasmania since 1943 when 7 tons, valued at £14 were produced. The production of pyrites, which in 1950–51 amounted to 55,604 tons, valued at £111,549, 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.

Reference to the iron ore deposits in the various States appears in preceding issues of the Official Year Book (*see* No. 22, pp. 777–9).

3. **Iron and Steel Bounties.**—During 1948–49 the bounties paid under the Bounties Acts on articles manufactured from locally produced materials were as follows:—Wire-netting, nil; traction engines, £37,146. Corresponding amounts paid during 1947–48 were £321 and £19,978 respectively.

4. **Production of Iron and Steel in Principal Countries.**—(i) *General.* Particulars of the production in the principal countries during the years 1938, 1948 and 1949, according to figures published by the Imperial Institute and the Statistical Office of the United Nations, are shown in the next table.

PIG-IRON AND STEEL : PRODUCTION IN PRINCIPAL COUNTRIES.
('000 Tons of 2,240 lb.)

Country.	Pig-iron and Ferro-alloys.			Steel Ingots and Castings.		
	1938.	1948.	1949.	1938.	1948.	1949.
United States America	19,161	54,312	48,385	28,350	79,120	69,603
U.S.S.R. (Russia) ..	14,756	(a)	(a)	17,500	(a)	(a)
United Kingdom ..	6,761	9,269	9,493	10,398	14,877	15,562
France	5,977	6,459	8,206	6,040	7,120	9,009
Germany	17,760	(b) 4,593	(b) 7,025	22,268	(b) 5,467	(b) 9,009
Belgium	2,388	3,861	3,684	2,243	3,849	3,778
Japan	2,535	827	1,582	6,367	1,688	3,058
Canada	761	2,102	2,113	1,155	2,857	2,846
Czechoslovakia ..	1,215	(a)	(a)	1,710	(a)	(a)
Poland	948	(a)	(a)	1,527	1,925	2,267
Luxemburg ..	1,526	2,586	2,338	1,514	2,409	2,232
Italy	914	517	438	2,271	2,890	2,019
India	1,571	1,464	1,606	936	1,252	1,358
Sweden	701	780	827	957	1,240	1,346
Australia (c) ..	**930**	**1,236**	**1,045**	**1,230**	**1,382**	**1,214**
Austria	542	604	824	663	638	822
Spain	433	528	619	567	614	708
Union of South Africa	290	641	697	341	590	626
Hungary	330	(a)	(a)	638	(a)	(a)
Brazil	..	543	491	..	476	599
Mexico	119	279	353	72	264	340
Total—All Countries	81,000	(d)90,605	(d)89,720	107,600	(d)128,622	(d)126,339

(a) Not available. (b) Western Germany. (c) Year ended 30th June. (d) Incomplete.

The principal producers in Australia are the Broken Hill Pty. Co. Ltd. and the Australian Iron and Steel Ltd., both in New South Wales, the former situated at Newcastle and the latter at Port Kembla. The Broken Hill Pty. Co. Ltd. established a blast furnace at Whyalla in South Australia ; this was blown in during May, 1941, and has since continued to operate except for the periods May, 1944 to April, 1946 and April, 1949 to September, 1949.

In Western Australia, the production of pig-iron, under the direction of the State Department of Industrial Development, commenced in January, 1948. The output for the year 1950 amounted to 7,727 tons.

(ii) *Australia.* The production of steel and pig-iron in Australia, of which New South Wales is the main producing State, is shown in the following table for each of the years 1940–41 to 1949–50 inclusive.

PIG-IRON AND STEEL : AUSTRALIAN PRODUCTION.
(Tons.)

Year.	Pig-iron. (a)	Steel Ingots.	Blooms and Billets.	Year.	Pig-iron. (a)	Steel Ingots.	Blooms and Billets.
1940–41..	1,475,707	1,656,742	1,631,679	1945–46..	906,283	1,061,918	1,036,501
1941–42..	1,557,641	1,699,793	1,699,447	1946–47..	1,143,132	1,312,439	1,255,703
1942–43..	1,399,306	1,632,825	1,583,417	1947–48..	1,235,574	1,343,153	1,221,938
1943–44..	1,305,357	1,527,564	1,393,919	1948–49..	1,044,957	1,178,010	1,101,063
1944–45..	1,117,709	1,356,913	1,236,528	1949–50..	1,097,635	1,217,971	1,103,619

(a) Includes pig-iron for castings.

§ 7. Other Metallic Minerals.

1. **Tungsten.**—Tungsten ores occur in all States, and on King Island in Bass Strait. Particulars of the King Island scheelite concentrates are included with Tasmanian production. Important deposits of tungsten ores occur in Queensland, New South Wales, Tasmania and Northern Territory, but production from the other States has been comparatively unimportant. Queensland has the largest total output to date, but its annual production is now much less than formerly. In recent years the largest production has come from Tasmania, followed by Northern Territory. Production during 1938 and the five years 1945 to 1949 is shown in the following table :—

TUNGSTEN CONCENTRATES : PRODUCTION.

Particulars.		1938.	1945.	1946.	1947.	1948.	1949.
WOLFRAM CONCENTRATES.							
New South Wales	cwt.	1,877	620	240	460	500	140
	£	25,740	9,604	3,859	9,184	9,175	2,400
Queensland ..	cwt.	3,015	2,599	1,295	1,261	1,957	988
	£	30,779	48,176	20,773	28,283	47,351	20,301
Tasmania ..	cwt.	5,982	4,220	3,140	4,020	2,680	5,280
	£	63,348	69,896	44,553	82,928	103,193	100,738
Northern Territory	cwt.	8,694	2,540	1,455	2,020	1,420	1,096
	£	78,277	42,937	21,696	41,020	30,780	20,521
Australia ..	cwt.	19,568	9,979	6,130	7,761	6,557	7,504
	£	198,144	170,613	90,881	161,415	190,499	143,960
SCHEELITE CONCENTRATES.							
New South Wales	cwt.	184	340	440	300	140	80
	£	2,472	7,111	8,680	6,847	3,408	2,028
Queensland ..	cwt.	13	101	9	156	2	34
	£	93	2,018	98	3,166	38	700
Western Australia	cwt.	..	16	100	120	145	12
	£	..	8,946	1,552	3,840	3,913	219
Tasmania ..	cwt.	611	10,560	12,560	12,620	12,740	16,060
	£	6,193	158,093	165,264	240,006	254,517	272,668
Australia ..	cwt.	808	11,017	13,109	13,196	13,027	16,186
	£	8,758	176,168	175,594	253,859	261,876	275,615

2. **Cadmium and Cobalt.**—Production of cadmium metal began in Australia in 1922 when the electrolytic zinc works at Risdon, Tasmania, came into operation. In Australia, cadmium is produced as a by-product in the treatment of lead and zinc concentrates from ores mined at Broken Hill in New South Wales and Read-Rosebery in Tasmania. In 1938, which is the last year for which relatively complete world production figures are available, Australia produced 196 tons of cadmium, amounting to about five per cent. of the world output.

Cobalt as cobalt oxide is recovered from the treatment of silver-lead-zinc concentrates of Broken Hill and Tasmanian origin in the same way as is cadmium. The production of cobalt and cadmium is shown for the years 1938 and 1945 to 1949 in the following table :—

CADMIUM AND COBALT OXIDE : PRODUCTION.

Year.	Cadmium.				Cobalt Oxide.			
	Extracted in Tasmania from Ores mined in—,				Extracted in Tasmania from Ores mined in—			
	New South Wales.	Tasmania.	Total.		New South Wales.	Tasmania.	Total.	
	Cwt.	Cwt.	Cwt.	£	Cwt.	Cwt.	Cwt.	£
1938	2,943	980	3,923	79,406	377	12	389	8,084
1945	3,818	588	4,406	98,671	274	5	279	6,427
1946	3,737	675	4,412	98,823	305	4	309	7,106
1947	3,076	691	3,767	84,335	239	4	243	5,102
1948	3,724	880	4,604	103,145	300	5	305	11,183
1949	3,426	880	4,306	248,653	280	5	285	11,780

The figures shown above do not include the metallic contents of cadmium and cobalt oxide contained in the ores and concentrates exported overseas.

3. **Platinoid Metals.**—(i) *Platinum.* (*a*) *New South Wales.* The deposits worked in the State are situated in the Fifield division, near Parkes, and in the Ballina division. The production in 1945 from all divisions amounted to 2 oz., valued at £22. The total production recorded to the end of 1945 amounted to 20,555 oz., valued at £130,667. There has been no production in New South Wales since that year.

(*b*) *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.

(*c*) *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.

(ii) *Osmium, Iridium, etc.* (*a*) *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. There has been no production in recent years.

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

(*c*) *Tasmania.* The yield of osmiridium was returned as 99 oz. in 1947, valued at £2,700, compared with the record production in 1925 of 3,365 oz., valued at £103,570. The decrease in later years was largely due to the decline in price from £31 per oz. in 1925 to £15 os. 4d. per oz. in 1938 (although the price rose to £24 19s. 1d. per oz. in 1940 and reached £27 5s. 5d. in 1947), but the depletion of the known alluvial deposits was also a factor. However, 92 oz., valued at £2,094, was produced in 1948, while in 1949 production dropped to 39 oz., valued at £1,136.

4. **Other.**—Metallic minerals other than those mentioned above, but which are worthy of note are (with particulars of 1949 production shown in brackets) :—Antimony (393 tons of ore and concentrates valued at £25,859) ; Arsenic (33 tons of oxide valued at £983) ; Bismuth (28 cwt. of concentrates valued at £796) ; Manganese (13,089 tons of ore valued at £79,620) ; and Molybdenum (118 cwt. of concentrates valued at £1,567).

§ 8. Coal.

1. **Production in each State.**—An account of the discovery of coal in each State appears in preceding issues of the Official Year Book (*see* No. 3, pp. 515-16). The quantity and value of the production in each State and in Australia during 1915, 1925, 1935, 1938, and for each of the years 1945 to 1950 are shown in the following table :—

BLACK COAL : PRODUCTION.

Year.	N.S.W.	Victoria.(a)	Q'land.	S. Aust.	W. Aust.	Tasmania.	Australia.
			QUANTITY (tons).				
1915 ..	9,449,008	588,104	1,024,273	..	286,666	64,536	11,412,587
1925 ..	11,396,199	534,246	1,177,173	..	437,461	81,698	13,626,777
1935 ..	8,698,579	476,495	1,051,978	..	537,188	123,714	10,887,954
1938 ..	9,570,930	307,258	1,113,426	..	604,792	83,753	11,680,159
1945 ..	10,176,254	247,297	1,634,746	41,452	543,363	149,077	12,792,189
1946 ..	11,186,383	191,290	1,567,520	135,460	642,287	158,751	13,881,691
1947 ..	11,683,123	173,683	1,883,414	193,351	730,506	167,140	14,831,217
1948 ..	11,721,446	164,906	1,742,396	239,464	732,938	179,393	14,780,543
1949 ..	10,736,098	122,507	1,970,388	344,638	750,594	181,618	14,105,843
1950 ..	12,798,221	126,431	2,320,799	261,337	814,352	222,351	16,543,491
			VALUE.(b) (£.)				
1915 ..	3,424,630	274,770	409,342	..	137,859	30,418	4,277,019
1925 ..	9,302,515	596,117	1,037,956	..	363,203	70,424	11,370,215
1935 ..	4,887,341	282,253	843,034	..	318,013	86,204	6,416,845
1938 ..	5,652,964	188,101	958,884	..	375,083	61,991	7,237,023
1945 ..	9,451,930	494,690	1,759,311	14,508	572,896	125,719	12,419,054
1946 ..	10,534,914	392,812	1,692,272	47,411	730,104	137,736	13,535,249
1947 ..	12,101,178	299,784	2,237,738	67,777	840,249	154,725	15,701,451
1948 ..	14,938,182	347,687	2,347,065	119,732	880,236	177,652	18,810,554
1949 ..	16,121,554	379,464	2,874,062	172,319	972,245	181,897	20,701,541
1950 ..	22,121,326	382,230	3,562,541	130,669	1,185,038	231,599	27,613,403

(a) Excludes brown coal, shown in next table. (b) At the pit's mouth.

The figures for Victoria already quoted exclude the quantities and values of brown coal which were as follows :—

BROWN COAL : PRODUCTION IN VICTORIA.

Year.	Quantity.	Value.(a)	Year.	Quantity.	Value.(a)
	Tons.	£		Tons.	£
1915	2,864	573	1946	5,707,039	706,504
1925	876,468	166,404	1947	6,140,140	937,429
1935	2,221,515	317,444	1948	6,692,291	1,187,715
1938	3,675,450	351,721	1949	7,375,559	1,469,455
1945	5,445,108	641,069	1950	7,327,119	1,706,612

(a) Cost of production.

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

The coal from the various districts differs in quality or, geologically speaking, rank—that from the Northern district being especially suitable for gas-making, household purposes and steam, while the product of the Southern and Western districts is essentially a steaming coal. The Permian Coal Measures in the Northern district are being worked extensively in the Hunter River Valley area, particularly in the vicinity of Maitland, Cessnock and, more recently, Muswellbrook. The Northern district of New South Wales is the most important, from the aspect of coal mining, in Australia.

The following table shows the yields in each of the three districts during the five years 1946 to 1950 compared with 1938. Separate details are given respecting coal won underground and from open cuts—

COAL : PRODUCTION IN DISTRICTS OF NEW SOUTH WALES.

District.	1938.	1946.	1947.	1948.	1949.	1950.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Northern—Underground ..	6,294,213	7,176,652	7,325,874	7,146,524	6,244,882	7,394,554
Open Cut ..	..	513,449	553,597	635,103	(c) 575,310	931,883
Southern—Underground ..	1,831,408	1,738,058	1,915,899	1,922,467	1,908,034	2,395,160
Open Cut ..	..	..	..	..	..	8,219
Western—Underground ..	1,445,309	1,515,297	1,482,696	1,397,835	1,337,044	1,406,862
Open Cut ..	..	242,927	405,057	619,517	670,828	661,543
Total—Underground ..	9,570,930	10,430,007	10,724,469	10,466,826	9,489,960	11,196,576
Open Cut	..	756,376	958,654	1,254,620	1,246,138	1,601,645
Grand Total	9,570,930	11,186,383	11,683,123	11,721, (	10,736,098	12,798,221
Total Value (a) .. £	5,652,964	10,534,914	12,101,178	14,938,182	16,121,554	22,121,326
Average value per ton(a) ..	11s. 10d.	18s. 9d.	20s. 8¼d.	25s. 6d.	30s. 0d.	34s. 0d.

(a) At the pit's mouth. (b) Subject to revision.

Much development has been carried out in recent years on the New South Wales coalfields. Areas receiving particular attention are those in the vicinities of Muswellbrook and Lithgow, where the open-cut mining method is being exploited more fully. Consequently, in 1950, 12,798,000 tons of bituminous and sub-bituminous coal were won, which is 2,062,000 tons more than in 1949, when production was reduced because of the prolonged strike by miners in that year.

Open-cut production accounted for 11.6 per cent. of all coal produced in this State in 1949, and for 12.5 per cent. in 1950, an appreciable advance on the 10.7 per cent. for 1948 and indicative of the extent of the recent development in this sphere.

(ii) *Victoria.* (a) *Black Coal.* During 1950, production of bituminous coal rose by 3,924 tons to a total of 126,431 tons. Of this, 109,988 tons or 87.0 per cent., were won from the State Coal Mines at Wonthaggi in South Gippsland, while the remaining 16,443 tons represent the total production of four small mines at Korumburra, Kilcunda, Outtrim and Jumbunna.

The Department of Mines considers that future prospects at the State Coal Mines are doubtful, as seams are becoming increasingly faulted and it is difficult to induce men to work under existing conditions.

The output of black coal in Victoria during each of the five years ended 1950 compared with 1938 was as follows :—

BLACK COAL : PRODUCTION IN VICTORIA.

Year.	Quantities.			Total Value. (a)
	State Coal-mine.	Other Coal-mines.	Total.	
	Tons.	Tons.	Tons.	£
1938	253,065	54,193	307,258	188,101
1946	169,650	21,640	191,290	392,812
1947	153,236	20,447	173,683	299,784
1948	145,880	21,660	167,540	347,687
1949	108,159	14,348	122,507	379,464
1950	109,988	16,443	126,431	382,230

(a) At the pit's mouth.

(b) *Brown Coal—General.* The mining of brown coal is carried on only in the State of Victoria where extensive deposits exist; estimates place the available reserves at 27,000 million tons. Large-scale development projects are in progress; these, when completed, will greatly reduce the dependence on fuel from other States. Brown coal produced in Victoria in 1949 amounted to 7,375,559 tons, of which 6,965,478 tons or 94.4 per cent. was won at the State open cut at Yallourn. During 1949–50, 6,404,059 tons of brown coal were produced by Yallourn, of which 4,075,075 tons went to the Yallourn power station, and 2,328,984 tons to the briquette factory.

Production of Briquettes. The briquetting plant of the State Electricity Commission started operations in November, 1924, and the output, which in 1926 was 95,477 tons, had increased to 180,905 tons in 1930 and to 588,564 tons in 1949–50. Two and a half tons of brown coal are required to make one ton of briquettes.

The table following shows the production and distribution of brown coal, and the production of briquettes in Victoria for the years 1945–46 to 1949–50, compared with 1938–39.

BROWN COAL : PRODUCTION AND UTILIZATION, VICTORIA.

('000 Tons.)

Year.	Total Production.	State Electricity Commission.				Brown Coal for other Industries.
		Brown Coal used as Fuel.		Brown Coal used as Material in Production of Briquettes.	Production of Briquettes.	
		Generating Station.	Briquette Works.			
1938–39 ..	3,643	2,096	516	1,031	400	..
1945–46 ..	5,534	3,525	641	1,282	493	86
1946–47 ..	5,882	3,667	651	1,303	490	261
1947–48 ..	6,419	3,767	743	1,487	545	414
1948–49 ..	7,027	4,130	733	1,467	559	697
1949–50 ..	7,637	4,408	776	1,553	589	900

(iii) *Queensland.* The distribution of production of coal during the years 1938 and 1946 to 1950 was as follows :—

COAL : PRODUCTION IN QUEENSLAND.

(Tons.)

District.	1938.	1946.	1947.	1948.	1949.	1950.
Bowen	224,778	234,512	267,417	238,487	192,300	213,908
Chillagoe	19,192	22,193	23,907	18,670	..	..
Clermont	88,407	161,777	240,564	216,610	313,124	295,635
Darling Downs ..	76,571	107,555	123,758	117,277	..	..
Eidsvold	..	..	..	..	27,135	40,359
Ipswich	547,901	823,737	967,007	902,411	921,417	1,144,980
Mackay	1,543	..	..	..	2,646	..
Mareeba	..	..	..	..	23,564	25,331
Maryborough ..	77,162	103,929	139,635	132,085	136,008	151,475
Mt. Morgan ..	13,698	31,118	35,586	43,245	144,146	206,886
Rockhampton ..	64,174	82,699	85,540	73,611	76,271	84,970
Roma	..	..	..	..	15,778	18,213
Toowoomba ..	..	..	..	..	98,786	118,235
Warwick	..	..	..	..	19,213	20,807
Total ..	1,113,426	1,567,520	1,883,414	1,742,396	1,970,388	2,320,799

The production of 2,320,799 tons in 1950 represents the highest annual production to date.

(iv) *South Australia.* Coal mined in South Australia is won by open cut methods at Leigh Creek, some 380 miles by rail north of Adelaide. This important deposit yields a low grade sub-bituminous coal of Triassic age, and has known reserves of about 380 million tons. However, this State relies to a great degree on bituminous coal from New South Wales to supplement the demand created by industrial expansion. In its first year of major production in 1944, 34,620 tons were won. However, in 1950, the output had risen to 261,337 tons, valued at £130,669.

Details of production are given in the following table for the years 1946 to 1950.

COAL : PRODUCTION IN SOUTH AUSTRALIA.

Particulars.		1946.	1947.	1948.	1949.	1950.
Quantity ..	tons	135,460	193,351	239,464	344,638	261,337
Value	£	47,411	67,777	119,732	172,319	130,669

(v) *Western Australia.* The only coal deposit which has been developed on a commercial scale is at Collie in the south-west of the State. Collie coal is sub-bituminous in rank. Details of production for the years 1946 to 1950 compared with 1938 are given in the following table :—

COAL : PRODUCTION IN WESTERN AUSTRALIA.

Particulars.		1938.	1946.	1947.	1948.	1949.	1950.
Quantity ..	tons	604,792	642,287	730,506	732,938	750,594	814,352
Value ..	£	375,083	730,104	840,249	880,236	972,245	1,185,038

(vi) *Tasmania.* Two periods of coal formation are represented in Tasmania. The older (Permo-Carboniferous) seams contain fairly high ranking semi-anthracitic coal, with a high sulphur content, but production from these mines represents less than one per cent. of Tasmanian black coal output. The more recent Mesozoic coal of bituminous rank is mined in the north-east of the island, the Cornwall and Mt. Nicholas mines being the most prolific producers. Details of production for the years 1946 to 1950 compared with 1938 are shown in the following table :—

COAL : PRODUCTION IN TASMANIA.

Particulars.		1938.	1946.	1947.	1948.	1949.	1950.
Quantity ..	tons	83,753	158,751	167,140	179,393	181,618	222,351
Value ..	£	61,991	137,736	154,725	177,652	181,897	231,599

(vii) *Australia's Coal Reserves.* The latest available estimate of the actual and probable coal reserves of Australia is that prepared by the Coal and Lignites Panel of the Power Survey Sectional Committee of the Standards Association of Australia in May, 1950. The following table shows the actual and probable coal reserves as determined by that Committee :—

ACTUAL AND PROBABLE COAL RESERVES OF AUSTRALIA.

('000,000 Tons.)

State.	Rank of Coal.	
	Anthracitic and Bituminous.	Sub-bituminous and Lignitic.
New South Wales	11,770	100
Victoria	33	37,000
Queensland	2,000	67
South Australia	..	650
Western Australia	..	1,000
Tasmania	241	..
Total	(a) 14,000	(a) 39,000

(a) Rounded figures.

3. **Production in Various Countries.**—The total known coal production of the world in 1949 amounted to about 1,600 million tons, towards which Australia contributed about 21 million tons. The following tables show the production of the chief British and foreign countries during each of the three years 1948 to 1950 compared with 1938, as published by the Statistical Office of the United Nations.

COAL : PRODUCTION IN BRITISH COUNTRIES.

('000 Tons of 2,240 lb.)

Country.	Black Coal.				Brown Coal, Lignite.			
	1938.	1948.	1949.	1950.	1938.	1948.	1949.	1950.
United Kingdom ..	227,015	216,237	222,102	223,931	..	..	..	..
India	29,052	30,787	32,481	33,030	..	..	..	..
Union of South Africa ..	16,027	23,934	25,410	26,483	..	..	..	..
Australia	**11,680**	**14,781**	**14,106**	**16,543**	**3,675**	**6,692**	**7,376**	**7,327**
Canada	9,223	15,547	15,899	15,007	3,540	1,463	1,719	2,024
New Zealand	2,090	984	966	961	132	1,878	1,939	1,805
Southern Rhodesia ..	1,027	1,731	1,951	2,158	..	..	..	..

COAL : PRODUCTION IN FOREIGN COUNTRIES.

('000 Tons of 2,240 lb.)

Country.	Black Coal.				Brown Coal, Lignite.			
	1938.	1948.	1949.	1950.	1938.	1948.	1949.	1950.
United States of America	349,684	605,282	442,960	512,861	2,677	2,755	2,761	3,036
Western Germany ..	*b* 183,238	88,434	104,894	112,539	*b* 191,899	65,901	73,424	77,058
Poland	37,502	71,388	75,265	79,252	9	5,121	4,694	(*a*)
France	45,770	43,991	52,026	51,660	1,041	1,865	1,878	1,719
Japan	47,915	34,408	38,675	39,078	(*a*)	2,597	2,122	1,305
Belgium	29,118	27,104	28,299	27,738	..	..	..	..
Czechoslovakia	15,900	18,033	17,277	18,752	15,779	2,397	2,695	2,795
Netherlands	13,275	11,205	11,888	12,449	168	280	207	195
Spain	5,559	10,595	10,815	11,217	163	1,414	1,341	1,366
Turkey	2,548	4,085	4,255	4,426	143	1,013	1,292	1,167
Chile	2,011	2,268	2,109	2,219	..	..	..	..
Brazil	871	2,061	2,158	1,987	..	..	..	..
Italy	1,505	988	1,122	1,047	886	922	846	793
Mexico	879	1,077	1,089	957	..	..	..	..
Indonesia	1,480	546	673	812	..	..	..	..
Nigeria	374	628	568	604	..	..	..	..
Portugal	303	393	451	433	18	105	113	96
Malaya	494	388	400	429	..	..	..	..
Norway	304	444	463	390	..	..	..	..

(*a*) Not available. (*b*) Pre-war Germany.

World production of coal amounted to 1,440 million tons in 1938; it rose to 1,770 million tons in 1943, but declined to 1,668 million tons in 1948. Of these quantities, those produced in the British Commonwealth totalled 304 million or 21 per cent. in 1938, 286 million or 16 per cent. in 1943 and 307 million tons or 18.4 per cent. in 1948.

4. **Exports.**—(i) *General.* The quantity of coal of Australian production exported to other countries in 1949–50 was 68,404 tons, valued at £206,460, shipped mainly from New South Wales. These figures of oversea exports exclude bunker coal supplied to oversea vessels, which in 1949–50 amounted to 135,059 tons, valued at £418,939. The quantities and values of the oversea exports of Australian coal for the years specified are shown in the following table. Similar details for the coal taken for bunker purposes on oversea vessels are shown below in a separate table.

COAL : OVERSEA EXPORTS, AUSTRALIA.

(EXCLUDING BUNKER COAL.)

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Tons.	£		Tons.	£
1913 ..	2,098,505	1,121,505	1946-47 ..	44,375	54,754
1921-22 ..	1,028,767	1,099,899	1947-48 ..	67,228	108,733
1931-32 ..	344,015	341,800	1948-49 ..	36,913	97,353
1938-39 ..	382,085	347,054	1949-50 ..	68,404	206,460
1945-46 ..	75,883	92,764			

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

BUNKER COAL SUPPLIED TO OVERSEA VESSELS, AUSTRALIA.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Tons.	£		Tons.	£
1913 ..	1,647,870	1,018,375	1946-47 ..	355,428	655,207
1921-22 ..	1,498,035	2,178,101	1947-48 ..	283,354	597,559
1931-32 ..	506,140	534,897	1948-49 ..	293,707	836,117
1938-39 ..	549,453	561,063	1949-50 ..	135,059	418,939
1945-46 ..	228,977	415,167			

(ii) *New South Wales.* The distribution of the total output from New South Wales collieries during the years 1945-46 to 1949-50 compared with 1938-39, according to data compiled by the Government Statistician for that State, was as follows.

COAL : DISTRIBUTION OF OUTPUT, NEW SOUTH WALES.

('000 Tons.)

Year.	Exports.				Local Consumption.	Total.
	Interstate as—		Overseas as—			
	Cargo.	Bunker.	Cargo.	Bunker.		
1938-39 ..	1,860	411	382	517	7,213	10,383
1945-46 ..	2,499	287	75	173	6,994	10,028
1946-47 ..	2,378	290	44	289	8,218	11,219
1947-48 ..	2,537	307	59	234	8,951	12,088
1948-49 ..	2,443	284	31	233	8,624	11,615
1949-50 ..	1,898	231	68	135	8,961	11,293

5. **Consumption in Australia.**—Details of the average annual production of coal and its distribution in Australia are given in the following table for the five years ended 1938-39 and 1948-49, together with similar details of production and distribution for the year 1949-50.

Under normal circumstances the production and consumption of coal move in the same direction, but in times of short supplies or abnormal consumption consumers may be compelled to rely upon accumulated stocks, and, consequently annual figures may move out of alignment. For this reason the following table has been prepared on a five-yearly basis in order to smooth out any variations from the normal.

COAL : PRODUCTION AND UTILIZATION IN AUSTRALIA.

Particulars.	Quantity.			Proportion of Total.		
	Average for five years ended—		1949–50.	Average for five years ended—		1949–50.
	1938–39.	1948–49.		1938–39.	1948–49.	
BLACK COAL.						
	'000 Tons.	'000 Tons.	'000 Tons.	%	%	%
Source of Supplies—						
Production (*a*)	11,169	14,095	14,918	99.72	99.68	96.79
Imports	31	45	494	0.28	0.32	3.21
Total Supplies ..	11,200	14,140	15,412	100.00	100.00	100.00
Disposal—						
Exported Overseas—						
Bunker	592	274	(*b*) 135	5.29	1.94	0.88
Other	346	83	68	3.09	0.58	0.44
Total	938	357	203	8.38	2.52	1.32
Consumed as fuel in—						
Electric Light and Power Works	1,796	3,190	3,687	16.03	22.56	23.92
Factories (*c*)	2,067	2,392	2,530	18.46	16.91	16.42
Railway Locomotives (*d*)	2,328	3,115	3,099	20.78	22.03	20.11
Total	6,191	8,697	9,316	55.27	61.50	60.45
Consumed as raw material in—						
Gas works	1,111	1,867	1,865	9.92	13.20	12.10
Coke works	1,467	1,807	1,973	13.10	12.78	12.80
Total	2,578	3,674	3,838	23.02	25.98	24.90
Balance available for other consumption and accumulation of stocks (*e*) ..	1,493	1,412	2,055	13.33	9.99	13.33
Grand Total ..	11,200	14,140	15,412	100.00	100.00	100.00
BROWN COAL.						
	'000 Tons.	'000 Tons.	'000 Tons.	%	%	%
Production of Brown Coal ..	3,064	6,022	7,637	100.00	100.00	100.00
Utilization—						
As fuel in Electric Light and Power Works ..	1,673	3,722	4,408	54.60	61.81	57.72
As fuel and as a raw material by Briquette Works	1,391	2,006	2,317	45.40	33.31	30.34
Recorded consumption as fuel in factories ..	(*f*)	257	764	(*f*)	4.27	10.00
Balance—Unrecorded consumption, other purposes	(*f*)	37	148	(*f*)	0.61	1.94
Total	3,064	6,022	7,637	100.00	100.00	100.00

(*a*) Includes miners' and colliery coal. (*b*) Incomplete. (*c*) Estimated when details not available. (*d*) Government railways only. (*e*) Includes bunker coal for interstate and intrastate shipping. (*f*) Not available.

In order to meet the greatly increased demands for coal in Australia, arrangements have been made in recent years to import considerable quantities to augment local supplies. The quantity imported in 1949–50 was 493,805 tons.

6. **Coal Value at Pit's Mouth in New South Wales.**—Particulars of the average value at the pit's mouth of the saleable output of coal for each district and for New South Wales as a whole are shown in the following table for the years 1938 and 1946 to 1950, according to figures compiled by the State Statistician. The figures relate to the pit head value (including subsidy). Excise duty operative from 1st November, 1949 is also included.

AVERAGE VALUE(*a*) AT THE PIT'S MOUTH PER TON OF SALEABLE COAL(*b*): NEW SOUTH WALES.

(s. d.)

Year.	Northern District.	Southern District.	Western District.	Average for State.
1938	12 0	14 0	9 6	12 0
1946	18 8	23 1	15 7	18 10
1947	20 11	23 11	16 10	20 9
1948	26 1	29 11	20 6	25 8
1949	31 8	33 4	22 6	30 3
1950	36 5	34 5	29 4	34 11

(*a*) Includes subsidy from 1943 and excise duty from November, 1949. (*b*) "Saleable" output represents "gross" output, less coal used in operating the mines, and miner's coal.

7. **Prices in New South Wales, Great Britain, Canada and the United States of America.**—In the following table the prices of coal in Canada and the United States of America are compared with the average value per ton of coal in New South Wales and Great Britain.

AVERAGE PRICES OF COAL PER TON: NEW SOUTH WALES, GREAT BRITAIN, CANADA AND UNITED STATES OF AMERICA.

Country.	1938.	1944.	1945.	1946.	1947.	1948.	1949.	1950.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
New South Wales—Bituminous(*a*)	12 0	17 10	18 7	18 10	20 9	25 8	30 3	34 11
Great Britain—Deep mined(*b*)	16 8	31 3	35 0	36 10	40 3	47 2½	47 11	47 9½
	$	$	$	$	$	$	$	$
Canada—Bituminous(*c*) ..	5.417	6.650	6.788	6.980	6.980	6.980	6.980	(*d*)
United States of America—Bituminous (*e*) ..	4.327	5.239	6.356	5.776	6.873	(*f*)8.118	(*f*)8.631	(*f*)8.738

(*a*) Average pit head value per ton of 2,240 lb.; the figures relate to saleable coal and include subsidy from 1943 and excise duty from November, 1949. (*b*) Average value in sterling at the mine per ton of 2,240 lb. (*c*) Wholesale price in Canadian currency per ton of 2,000 lb. (*d*) Not available. (*e*) Wholesale price, car-lots, on tracks, destination, in United States of America currency per ton of 2,000 lb. (*f*) Figures for 1948 to 1950 represent averages for nine months, nine months and ten months respectively. As a result of changes in the basis of compiling the averages, figures are not strictly comparable from year to year.

8. **Employment in Coal-mines.**—The number of persons employed, both above and below ground, in coal-mines in each of the producing States is given for selected years from 1915 and for the years 1945 to 1950 inclusive :—

COAL-MINES : PERSONS EMPLOYED.

Year.	New South Wales.	Victoria.		Queensland.	South Australia.	Western Australia.	Tasmania.	Total.
		Black.	Brown.					
1915	17,959	1,312	(a)	2,518	..	498	161	22,448
1925	24,049	1,947	646	2,826	..	677	312	30,457
1935	13,337	1,397	615	2,455	..	689	340	18,833
1938	15,815	1,322	444	2,495	..	765	269	21,110
1945	17,427	1,016	584	2,966	100	860	279	23,232
1946	17,448	924	655	2,641	121	955	276	23,020
1947	17,614	860	594	3,337	124	1,032	288	23,849
1948	18,693	824	526	3,323	237	1,064	274	24,941
1949	18,546	787	811	3,390	347	1,044	312	25,237
1950	18,540	777	889	3,495	408	1,099	334	24,653

(a) Included with black coal; production prior to 1925 was of little significance.

The year of maximum employment was 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 1933 there has been a gradual increase, but the numbers employed in 1950 were only about three-quarters of the maximum figure already quoted. In New South Wales in 1939, 3,594,000 tons of coal, or 32.1 per cent. of the total output of underground coal, was cut by machinery, compared with 3,819,000 tons or 36.6 per cent. in 1946, 4,150,000 tons or 38.7 per cent. in 1947, 3,805,357 tons or 36.4 per cent, in 1948, 3,364,351 tons or 35.5 per cent. in 1949, and 4,345,836 tons or 38.8 per cent. in 1950. Similar details for other States are not available.

9. **Accidents in Coal-mining.**—The following table gives the number of persons killed or injured in the coal-mining industry in Australia during 1949, with the proportion per 1,000 employed, a factor which must be reckoned with in any consideration of the degree of risk attending mining operations. Due to the different bases of recording mining accidents in the various States of Australia the figures in the table below are not strictly comparable between States.

COAL-MINING : EMPLOYMENT AND ACCIDENTS, 1949.

State.	Persons Employed in Coal-mining.	No. of Persons.		Proportion per 1,000 Employed.	
		Killed.	Injured.	Killed.	Injured.
New South Wales ..	18,546	(a) 24	(a) 75	1.29	4.04
Victoria(b)	1,598	..	3	..	1.88
Queensland	3,390	..	156	..	46.02
South Australia	347	..	12	..	34.58
Western Australia ..	1,044	1	175	0.96	167.62
Tasmania	312	..	4	..	12.82
Total	25,237	25	425	0.99	16.84

(a) Includes shale. (b) Includes brown coal.

The next table shows for the five-yearly period 1945 to 1949 annual averages respecting the number employed in mining and the number of fatalities, and the proportion of fatalities per 1,000 employed.

COAL-MINING: AVERAGE ANNUAL FATALITIES, 1945 TO 1949.

State.	Average No. of Coal-miners Employed.	Average Annual No. of Fatalities.	Proportion per 1,000 Employed.
New South Wales	17,946	16.0	0.89
Victoria	1,268	1.4	1.10
Queensland	3,131	3.8	1.21
South Australia	185	0.2	1.08
Western Australia	991	0.6	0.61
Tasmania	286	0.2	0.70
Total	23,807	22.2	0.93

10. **Commonwealth Board of Inquiry into the Coal-mining Industry.**—Reference to the appointment in 1945 of the Commonwealth Board of Inquiry, its terms of reference and the report issued in 1946 is given in Official Year Book No. 37, page 842.

11. **Joint Coal Board.**—(i) *General.* Under war-time emergency legislation, the Commonwealth had wide powers to control the production, distribution and price of coal in Australia. Under peace-time conditions, however, the constitutional powers of the Commonwealth were less effective and in order to ensure the maintenance of supplies of coal to meet the peace-time needs of industry it was necessary to seek wider powers.

With this objective in view, the Governments of the Commonwealth and New South Wales, the chief coal-producing State, mutually agreed to create jointly an authority with powers similar to and in some respects wider than those possessed under Commonwealth war-time legislation. Following this agreement, the Joint Coal Board was created and has functioned as from 1st March, 1947.

(ii) *Constitution.* The legislative authority of the Joint Coal Board is contained in the Coal Industry Act No. 40 of 1946 passed by the Commonwealth Parliament and in the Coal Industry Act No. 44 of 1946 passed by the Parliament of New South Wales. Both Acts are identical for all practical purposes except that the New South Wales Act granted to the Board powers to control collieries and compulsorily to requisition and resume land, buildings, plant, machinery and equipment.

(iii) *Powers.* Under Section 14 of the Commonwealth Act and Section 11 of the New South Wales Act, the powers and functions of the Board are stated to include the taking of such action as is necessary or desirable—(*a*) to ensure that coal is produced in the State in such quantities and with such regularity as will meet requirements throughout Australia and in trade with other countries; (*b*) to ensure that the coal resources of the State are conserved, developed, worked and used to the best advantage in the public interest; (*c*) to ensure that coal produced in the State is distributed and used in such manner, quantities, classes and grades and at such prices as are calculated best to serve the public interest and secure the economical use of coal and the maintenance of essential services and industrial activities; and (*d*) to promote the welfare of workers engaged in the coal industry in the State. In addition, the Board has full power with regard to health matters but does not exercise any basic responsibilities as regards safety measures or inspection of mines; these duties remain the responsibility of the New South Wales Department of Mines.

§ 9. Coke.

1. **General.**—The production of metallurgical coke in Australia was limited to about 250,000 tons per annum prior to the 1914–18 War. This was below local requirements and necessitated an annual import of about 27,000 tons from abroad. By 1920, production had risen to more than 500,000 tons and by 1938–39 it had reached 1,164,873 tons. This increased production permitted an export of 30,000 tons in 1938–39. Imports in the same year were 9,700 tons. In 1949–50 the quantity exported was 2,791 tons, valued at £15,661, of which 2,217 tons, valued at £12,362, went to New Zealand. In the same year 21,269 tons, valued at £125,173, were imported, of which 12,203 tons, valued at £59,411, came from the Union of South Africa.

In addition to metallurgical coke referred to above (which is produced by specialized coke works), considerable quantities of coke are produced in gas works as a by-product of the manufacture of gas. Output in gas works in 1949–50 was 1,094,982 tons compared with 757,046 tons in 1938–39.

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.

2. **Total Production, Australia.**—In the following table, particulars of the production of coke in coke works and gas works in Australia are shown for the years 1938–39 and 1945–46 to 1949–50. Relevant particulars of the output of coke breeze are also shown.

TOTAL COKE PRODUCTION : AUSTRALIA.

(Tons.)

Industry.	1938–39.	1945–46.	1946–47.	1947–48.	1948–49.	1949–50.
COKE.						
Coke Works ..	1,164,873	986,005	1,197,636	1,384,238	1,150,039	1,182,773
Gas Works ..	757,046	1,027,157	1,072,906	1,170,545	1,181,516	1,094,982
Total ..	1,921,919	2,013,162	2,270,542	2,554,783	2,331,555	2,277,755
COKE BREEZE.						
Coke Works ..	78,584	(*a*) 80,466	93,403	(*a*) 111,062	(*a*) 88,439	87,394
Gas Works ..	35,996	51,845	55,546	60,556	69,160	75,604
Total ..	114,580	132,311	148,949	171,618	157,599	162,998

(*a*) Includes a small quantity produced in other works.

§ 10. Other By-Products from Coal.

In addition to coke, other products are obtained from the treatment of coal by coke and gas works. Details of some of these are given in the following table.

OTHER BY-PRODUCTS FROM COAL : AUSTRALIA.

Commodity.	1938–39.	1945–46.	1946–47.	1947–48.	1948–49.	1949–50.
	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.
Tar—Crude ..	34,614,313	34,754,021	39,143,025	41,166,231	40,844,166	38,178,353
Refined(*a*) ..	3,752,201	13,185,119	14,631,470	14,996,193	13,533,750	12,324,454
Tar Oils (crude) ..	1,254,396	3,176,381	3,868,652	4,021,552	5,233,702	3,758,406
Ammoniacal Liquor ..	5,387,638	17,153,833	16,336,785	18,102,385	19,271,830	18,119,657
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Ammonium Sulphate(*a*)	24,251	21,823	29,266	39,489	53,247	48,736

(*a*) Includes production in other works.

§ 11. Shale-oil and Mineral Oil.

1. **Shale-oil.**—(i) *General.* Reference to the deposits of shale and the search for mineral oil in Australia will be found in Official Year Book No. 22, pp. 791–3.

(ii) *New South Wales.* Reference to the establishment of the shale-oil industry in Australia will be found in previous issues of the Official Year Book. In 1937 negotiations were completed between the Commonwealth and New South Wales Governments and the National Oil Proprietary Ltd., by 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 annually, the Company's output of petrol for a period of 25 years.

Production of petrol from crude oil commenced at Glen Davis, near Newnes in 1940 and a total of 24,501,186 gallons of petrol had been produced to the end of 1950.

In January, 1951, the Commonwealth Government announced that in view of the continued uneconomic operation of the project, its small contribution to Australian petroleum supplies, the doubtful prospect of raising production to a considerably higher figure and the urgent need for miners in black coal production, it would close down the works completely as soon as possible. In September, 1951, the Government appointed a receiver in National Oil Pty. Ltd., the company which has operated this project.

The following table shows the production of oil shale during the years 1943 to 1949 compared with 1940 :—

OIL SHALE : PRODUCTION IN NEW SOUTH WALES.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Tons.	£		Tons.	£
1940	43,805	43,805	1946	121,654	139,902
1943	116,875	160,215	1947	138,427	193,798
1944	137,458	165,285	1948	136,352	204,528
1945	123,170	164,648	1949	120,956	181,437

(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 owned by the Tasmanite Shale Oil Company has not operated since the end of January, 1935.

Interest in the commercial utilization of oil shales of the Mersey Valley for the extraction of fuel oils has been retarded due to structural and physical conditions for underground mining and the low-grade nature of the shale.

2. **Coal Oil.**—Reference to investigations made into the possibility of establishing plants for the production of oil from coal is made in previous issues of the Official Year Book.

3. **Natural Oil.**—(i) *Australia.* Natural oil has been proved to exist in Queensland, Victoria and Western Australia, the best indications being found in Victoria and Queensland. Many of the conditions favourable to the accumulation of oil in commercial quantities have been shown to be present in Queensland, Western Australia and New South Wales. In the latter State, however, no strong positive evidence of its existence has been recorded.

Reference is made in § 14 below to the assistance afforded by the Commonwealth Government in the search for petroleum oil.

(ii) *Victoria.* There has been a small production of crude oil from Lakes Entrance. For the year ended 31st December, 1950, production was 40,000 gallons. Gravity and aeromagnetic surveys have been carried out by the Bureau of Mineral Resources* in

* References to this Bureau in this and succeeding paragraphs relate to the Commonwealth Bureau of Mineral Resources, Geology and Geophysics—*see* § 14 para. 1. following.

East Gippsland and it is proposed to extend the gravity surveys and carry out seismic surveys. Geological surveys have been carried out in the Portland–Nelson–Mt. Gambier area of Western Victoria and the eastern part of South Australia by the Departments of Mines of Victoria and South Australia. Geophysical surveys (gravity) were made in Western Victoria by the Bureau of Mineral Resources.

(iii) *Queensland.* A test bore was drilled at Rolleston by Shell (Queensland) Development Pty. Ltd., but was abandoned early in 1951 after igneous rock had been penetrated. The Bureau of Mineral Resources has conducted geophysical surveys in the Comet and Roma areas. In the case of Comet, the Shell company decided against further bores but it is expected that drilling operations will be undertaken at Roma.

(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.

Geophysical surveys were undertaken by private interests during 1947, and continued into 1948, in the north-east corner of the State and extending over the border into New South Wales and Queensland, but with little success. Assistance given by the Commonwealth included equipment and a geophysical survey party.

(v) *Western Australia.* Geological and geophysical surveys by the Bureau of Mineral Resources in connexion with the search for oil have been in progress since 1947 in the North West Basin and Desert Basin areas. The deep drilling operation which commenced in 1939 on the Nerrima Dome in the Kimberley district was suspended in 1942, for security reasons, at a depth of 4,271 feet. Operations were resumed in 1948, but were abandoned in 1950. Proposals are under consideration for drilling another bore on the structure.

(vi) *Papua.* After the 1939–45 War, test drilling by the Australasian Petroleum Company Pty. Ltd. was resumed in 1946. At the end of 1950 four bore-holes had been completed and two were in progress, but no oil had been produced. Geological and geophysical surveys and test drilling are being continued by this company and also the Island Exploration Pty. Ltd.

(vii) *General.* During 1939 efforts were made to secure greater uniformity in State legislation governing the search for oil. A draft Bill based on modern legislation in other countries was prepared by the Commonwealth and submitted to the State Governments. As a result amending legislation was passed in Victoria, Queensland, South Australia and Western Australia. There was immediate response to this in Queensland, where an agreement has been reached between the State Government and one of the major oil companies, whereby the company has undertaken to spend up to £400,000 in the search for oil in that State.

Further details of action taken by the Commonwealth Government in connexion with the search for oil will be found in § 14. "Government Aid to Mining, and Mineral Control".

§ 12. 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 1949 in New South Wales was estimated at 5 carats, valued at £15. The majority of diamonds are won in the Inverell district. The total production to the end of 1949 is stated as 206,957 carats, valued at £150,814.

2. **Sapphires.**—The production of sapphires in New South Wales during 1929 was returned as 65 oz., valued at £450, obtained wholly at Sapphire in the Inverell district. From 1941 to 1949 inclusive, a total of 3,970 oz., valued at £2,803, was won, of which 1,200 oz., valued at £600, were recorded in 1941. Production in 1949 was only 10 oz., valued at £5.

In Queensland, the value of gems won in 1948 was £6,059 and in 1949, £4,868. There were about 120 miners operating on the fields during 1934 but only 32 at the end of 1949. Production has declined very considerably since 1920, when the yield was valued at £66,000.

3. **Precious Opal.**—The estimated value of the opal won in New South Wales during 1949 was £1,592. This is not regarded as the total output of the State, however, because 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 sometimes 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 a fine adamantine lustre. Occasionally black opals of very fine quality are found, one specimen from the Wallungulla field, weighing 6½ 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 1890 is estimated at about £1,645,500 but, as pointed out above, the figures are to some extent understated.

In Victoria small quantities of precious opal have been found in the Beechworth district.

The opal bearing district in Queensland stretches over a considerable area of the western interior of the State, from Kynuna and Opalton as far south as Cunnamulla. The yield in 1949 was estimated at £1,200, and up to the end of that year, at about £189,200. These figures are, however, merely approximations, as large quantities of opal, of which no record is obtained, are disposed of privately. 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. The production rose in 1937 to £11,887, but declined to £6,020 in 1939, and rose again to £11,568 in 1941. After a further drop in 1942, to less than £6,000, the value of production rose in 1947 to £61,569, the greatest annual production ever recorded. However, the value of production dropped to £39,798 in 1949. The field is extremely prolific, a large quantity of precious white opal having been raised therefrom, and only a small portion of the known opal-bearing area has been thoroughly tested.

4. **Other Gems.**—Various other gems and precious stones have from time to time been discovered in the different States, the list including agate, amethyst, beryl, chiastolite, emerald, garnet, moonstone, olivine, ruby, topaz, tourmaline, turquoise and zircon. 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. During the three years 1939, 1940 and 1941, 10 tons of beryl ore, valued at £83, were produced in Western Australia. There was no production in 1942, but in the period 1943–49, 1,051 tons were produced, valued at £33,755. The largest production was registered in 1943 when 515 tons were won, valued at £14,564. The most recent production figures show a marked decrease to 35 tons, valued at £2,122, in 1949.

Until recently, beryl was chiefly sought as a gemstone—the emerald variety being particularly valuable. However, research over the past few years has shown that the metal beryllium has wide applications in industrial alloys with copper, aluminium and iron. These alloys possess unusual hardness, tensile strength and resistance.

§ 13. Number 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 market, and according to the permanence of new finds and the development of the established mines. During 1949 the number so engaged was as follows :—

NUMBER OF PERSONS ENGAGED IN MINING, 1949.

State.	Number of Persons engaged in Mining for—						Total.
	Gold.	Silver, Lead and Zinc.	Copper.	Tin.	Coal.	Other.	
New South Wales ..	688	6,052	136	548	18,546	1,566	27,536
Victoria	1,019	..	..	..	a 1,598	241	2,858
Queensland	1,589	1,285	57	515	3,390	330	7,166
South Australia	52	32	14	..	347	1,103	1,548
Western Australia ..	6,800	135	3	24	1,044	496	8,502
Tasmania	9	616	757	576	312	158	2,428
Northern Territory ..	238	6	32	82	..	104	462
Australia	10,395	8,126	999	1,745	25,237	3,998	50,500

(a) Includes 811 engaged in mining brown coal.

Included in the figures for " other " in South Australia were 175 engaged in mining iron ore, 87 gypsum miners, 269 salt gatherers, and 70 opal miners. The Tasmanian figures include 137 scheelite miners. The Northern Territory figures include 44 wolfram and 55 mica miners.

The following table shows, at intervals since 1911, the number of persons engaged in mining in each State and the proportion so engaged of the total population :—

NUMBER ENGAGED IN MINING AND PROPORTION PER 100,000 OF POPULATION.

State.	1911.		1921.		1931.	
	Miners engaged.	No. per 100,000 of Population.	Miners engaged.	No. per 100,000 of Population.	Miners engaged.	No. per 100,000 of Population.
New South Wales ..	37,017	2,225	29,701	1,410	30,682	1,200
Victoria	15,986	1,210	5,211	339	6,463	359
Queensland	13,201	2,147	5,847	766	6,753	730
South Australia	6,000	1,457	2,020	406	518	90
Western Australia	16,596	5,787	7,084	2,122	7,147	1,653
Tasmania	5,247	2,760	3,170	1,486	3,397	1,512
Northern Territory ..	715	21,595	131	3,356	145	2,918
Australia	94,762	2,109	53,164	974	55,105	844

NUMBER ENGAGED IN MINING AND PROPORTION PER 100,000 OF POPULATION—*continued.*

State.	1941.		1948.		1949.	
	Miners engaged.	No. per 100,000 of Population.	Miners engaged.	No. per 100,000 of Population.	Miners engaged.	No. per 100,000 of Population.
New South Wales ..	27,554	984	27,571	910	27,536	884
Victoria	4,839	250	2,484	119	2,858	134
Queensland	6,541	631	7,222	643	7,166	624
South Australia	940	156	1,130	172	1,548	230
Western Australia	14,021	2,958	8,700	1,690	8,502	1,595
Tasmania	2,974	1,237	2,357	891	2,428	899
Northern Territory ..	424	4,125	394	3,233	462	3,428
Australia	57,293	807	49,858	648	50,500	638

The upward movement in the number of miners engaged which commenced in 1930 reached a peak of 998 per 100,000 of population in 1937, but thereafter the ratio declined continuously to the level of 569 in 1945. After the 1939–45 War the ratio increased to 646 in 1947 and remained at much the same level during the next two years.

2. **Wages Paid in Mining.**—Information regarding rates of wages paid in the mining industry is shown in the *Labour Report* issued by this Bureau.

3. ***Accidents in Mining, 1949.***—*The following table shows particulars of the number of men killed or injured in mining accidents during 1949 :—*

MINING ACCIDENTS, 1949.

Mining for—	N.S.W.	Victoria.	Q'land	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
KILLED.								
Coal ..	(a) 24	..	..	..	1	..	..	25
Copper ..	..	..	(b) 1	..	..	..	..	1
Gold ..	1	2	2	..	9	..	1	15
Iron ..	..	..	..	..	..	..	..	..
Silver, lead and zinc ..	5	..	2	..	..	1	..	8
Tin	..	..	..	..	..	..	1	1
Other minerals	5	..	..	..	..	..	..	5
Total ..	35	2	5	..	10	1	2	55
INJURED.								
Coal ..	(a) 75	3	156	12	175	4	..	425
Copper ..	..	..	(b) 51	..	..	3	..	54
Gold	16	6	11	..	662	..	2	697
Iron ..	..	..	..	5	..	..	..	5
Silver, lead and zinc ..	23	..	51	..	..	3	..	77
Tin	..	..	5	..	..	6	4	15
Other minerals	13	6	1	7	..	..	..	27
Total ..	127	15	275	24	837	16	6	1,300

(a) Includes shale. (b) Copper and gold.

§ 14. Government Aid to Mining, and Mineral Control.

1. **Aid to Mining.**—(i) *Commonwealth.* (*a*) *General.* The Precious Metals Act 1926, the Gold Bounty Act 1930, the Loan Appropriation (Unemployment Relief) Act 1934, the Northern Australian Survey Act 1934 and the Gold Mining Encouragement Act 1940, mentioned in the previous issue of the Official Year Book, either have become inoperative or have been superseded. The Petroleum Oil Search Act 1936 is still in force. Further expenditure under the Gold Mining Encouragement Act is not contemplated, as an entirely new method of providing financial assistance to the mining industry is in operation, and is described below. Similarly no further expenditure is contemplated under the Petroleum Oil Search Act 1936, except for two projects not yet completed, and the Government policy now is to conduct geological and geophysical surveys of possible oil fields (*see* below).

Applications for financial assistance for the development of mining projects which offer promise of contributing materially to the economic welfare of the Commonwealth may be considered by the Bureau of Mineral Resources and the Treasury after consultation with the State concerned. This policy supersedes that set out in Official Year Book No. 37, page 849—the Australian Mining Council which was to have been set up under the previous policy has not met or fulfilled any of its functions and its creation was not finalized.

The Commonwealth Government in 1948 decided to provide financial assistance to certain gold mines in remote and isolated parts of Western Australia. These mines were experiencing difficulty because income from the fixed price for gold was insufficient to cover higher operating costs due to a number of factors, including the general rise in the level of wages and prices. Before granting assistance, the mine, its financial position and its relation to the economic and social welfare of the district were investigated by officers of the Bureau of Mineral Resources and the Treasury in collaboration with the State Mines Department, and conditions which should be observed in order to obtain financial assistance were laid down. Assistance as decided in 1948 was in the form of periodical payments sufficient to cover the difference between revenue and expenditure and to provide a return of 4 per cent. on the paid-up capital of the Company, but in 1949 this was increased to 6 per cent. At the same time the assistance scheme was extended to enable gold mines in remote areas of other States to participate. The scheme was terminated on the devaluation in September, 1949 of the Australian pound in terms of the United States of America dollar, which had resulted in a rise of £4 14s. 7d. per fine ounce in the Australian price of gold. Officially, the scheme of assistance operated to 31st December, 1950, but, because of the higher gold price, all mines made profits and so did not qualify for the 6 per cent. profit subsidy.

(*b*) *Rewards for discovery of Uranium Ore.* To encourage the search for and discovery of deposits of uranium ore, the Commonwealth Government has approved the granting of monetary rewards. These rewards will be paid as follows:—(1) £1,000 for the discovery of a deposit containing sufficient ore to be of economic importance; (2) £1,000 for the discovery of a deposit capable of producing 25 tons or more of uranium oxide and £2,000 for each 25 tons in excess of the first 25 tons; and (3) a maximum of £25,000 for any one deposit.

(*c*) *Bureau of Mineral Resources, Geology and Geophysics.* The Bureau of Mineral Resources, etc. has sections dealing with geology and geophysics, mining engineering, fuel technology and mineral economics. The geological section conducts all surveys required in Commonwealth Territories, detailed and regional surveys in conjunction with or by arrangement with the State Mines Departments, surveys of possible oil-fields in Australia and New Guinea, surveys of mines for which financial assistance is sought, and investigations of deposits of radio-active minerals. The geophysical section conducts investigations throughout Australia and New Guinea connected with the search for metalliferous, radio-active and other mineral deposits; problems connected with exploration for coal, oil and water; regional magnetic and gravity surveys; engineering and military geophysics; and the operation of geophysical (magnetic and seismic) observations. The Bureau works in close co-operation with the Mines Departments of

the States. It has assumed full responsibility for geological and geophysical surveys in Commonwealth Territories, but suitable arrangements have been made to ensure that the local Administrations have the necessary technical advice directly available to them. The Bureau has also assumed full responsibility for scout-boring to prove deposits of coal in New South Wales suitable for working by open-cut methods.

(*d*) *Diamond Drills.* The four diamond drills mentioned in the previous Official Year Book have arrived in Australia and are now in use. Further light drills have been purchased and special equipment for alluvial prospecting has been ordered.

(*e*) *Search for Oil.* No variation has been made in the policy described in Official Year Book No. 37, page 850, regarding the search for petroleum throughout Australia and its Territories. In addition to its activities set out in that Year Book, the Bureau of Mineral Resources, Geology and Geophysics furnishes field laboratories and trained personnel to assist small companies in recording scientific information obtained while drilling for oil. A modern diesel-driven rotary drilling plant has been ordered for deep test-drilling on suitable geological structures.

The Commonwealth Government has encouraged the search for oil in Australia, Papua and New Guinea; details of the efforts made are outlined in previous issues of the Official Year Book. A considerable amount of geological work and test drilling was conducted under the provision of the Petroleum Oil Search Act 1936 and, at the outbreak of the 1939–45 War, two tests were partially completed, one at Oiapu in the Gulf district of Papua and the other at Nerrima in the Kimberley district of Western Australia. At Nerrima the Freney Kimberley Oil Co. (1932) N.L. rejected a Commonwealth offer of financial assistance. The company is now drilling with financial assistance from the Government of Western Australia, using a drilling plant hired from the Commonwealth; technical advice and assistance is also provided by the Commonwealth.

(*f*) *Survey of North Australia.* Reference to this survey which was completed at the end of 1940 appears in Official Year Book No. 35, page 744. A few reports on individual areas remain to be printed.

(*g*) *Mining Industry Advisory Panel.* This panel has not functioned since 1946. The Bureau of Mineral Resources completed the draft of a uniform Act dealing with health and safety in mines, recommended by the Panel. A meeting of the Chief Inspectors of Mines of all States and Territories was held in November, 1950, to consider this draft and considerable progress was made in achieving uniformity. A committee has been set up to advise on non-destructive testing of wire ropes used in the mining industry.

(*h*) *Ore-dressing and mineragraphic investigations.* These investigations are conducted by the Commonwealth Scientific and Industrial Research Organization as required by the industry. Ore-dressing investigations are carried out conjointly with appropriate State institutions, the three laboratory centres being the School of Mines, Kalgoorlie, the School of Mines and Industries, Adelaide, and the University of Melbourne.

The grant of £22,000 mentioned in Official Year Book No. 37, page 851, was expended by 1947; since that year funds to continue the investigations are included in an investigational vote approved annually for the Commonwealth Scientific and Industrial Research Organization. In 1948 the Government expended approximately £5,000 on ore-dressing and £6,100 on mineragraphic investigations.

(*i*) *Petroleum Legislation.* The petroleum ordinances of Papua and New Guinea have been amended and combined in a single ordinance, No. 6 of 1951, entitled Petroleum (Prospecting and Mining) Ordinance 1951.

(ii) *States.* (*a*) *General.* In addition to free assays and determinations of rocks and minerals carried out for prospectors by the Mines Departments of the States and Territories, technical officers of these departments provide advice to the mining industry where required, carry out field examinations of mining prospects, advise on exploration and development, select sites for water supply, and in general give a free technical service to the mining industry.

(*b*) *New South Wales.* State aid to assist metalliferous mining consisted of grants to assist the prospecting and/or mining for gold and minerals and for the purchase, removal and installation of mining plant or equipment. In 1949, this assistance totalled £2,448, the greater part of which was granted to prospect or mine for either tin or gold.

(*c*) *Victoria.* Grants may be made to assist prospecting and development or the purchase of machinery. The Mines Department has 24 stamp batteries in different parts of the State to crush ore for prospectors at nominal rates. Small mining companies may avail themselves of these facilities.

(*d*) *Queensland.* The Mines Department maintains a treatment works for tin ores, etc. at Irvinebank, an assay office at Cloncurry and diamond-drilling plants in several parts of the State. The Venus State Mill at Charters Towers is available for the treatment of gold-bearing ores and another State battery is located at Kidston. In addition, many departmental compressor plants, pumping plants and other mining equipment are provided and made available on hire on the principal mining fields. Financial aid granted to prospectors for 1949 amounted to £15,847, whilst other forms of aid for mining granted by the State amounted to £294,590 for the same period.

(*e*) *South Australia.* During 1940 the Premier announced that assistance would be given to copper mining in the form of financial help towards such development work as was absolutely necessary for a mine to enter upon reasonably continuous production. On 5th November, 1942, the Leigh Creek Coal Act was passed to develop the Leigh Creek Coalfield. As a result of extensive drilling operations, development of open-cut mining was commenced in January, 1943. State aid to mining during 1948 totalled £79,194, of which £14,928 was for coal, £7,074 for copper, £8,394 for gold, and the balance, £48,798, for other minerals. 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.

(*f*) *Western Australia.* Financial aid granted to prospectors and others in 1949 amounted to £26,226; this sum was allotted as follows:—coal, £11,169; gold, £4,420; lead, £2,131; tin, £498; other forms of assistance, £8,008. The Mines Department has about twenty batteries throughout the mining fields where prospectors and others can have their ore treated.

(*g*) *Tasmania.* During 1948 the Department of Mines reported that the policy of assistance to mining was maintained to the extent provided for under the provisions of the Aid to Mining Act but no material advantage was taken thereof. In that year £485 was expended and £314 was repaid against advances previously made.

Other assistance rendered to the industry is provided by a well-equipped metallurgical laboratory at Launceston where ore-dressing and other metallurgical problems can be investigated for the mine-owner, and advice given regarding the most suitable type of plant to install.

(*h*) *Northern Territory.* The Commonwealth Government has maintained a ten-head battery at Tennant Creek for the treatment of ore by miners. Another battery has been leased. A ten-head battery is situated on the Maranboy tin-field and crushes ore for all parties on the field. Assistance has been given to miners on the mica fields to purchase air-compressors and other mining plant on liberal terms. The Commonwealth Government has purchased all mica produced on the fields. Roads and water supply services are provided and maintained for all mines and mineral-producing areas throughout the Territory.

2. **Control of Minerals.**—(i) *Minerals Committee, and Controller of Minerals Production.* With the termination of the war the activities of the Controller of Minerals Production, appointed under the provision of the National Security (Minerals) Regulations, were reduced. In 1948, operations conducted by the Controller were the Dorset Tin Dredge in Tasmania and the acquisition and sale of mica produced in Australia. The Dorset Tin Dredge is in active operation and produces about 150 tons of tin concentrates yearly. It has about ten years of operation in sight.

(ii) *Mica Production.* The Commonwealth Government, through the Department of Supply and Development, operates a Mica Pool which purchases all mica won, thus ensuring the miners of a ready market for their product at fixed prices, and also permits an orderly distribution of mica to the trade. Under a recent Cabinet decision, the Commonwealth Mica Pool will operate until the end of 1953.

(iii) *Control of Exports of Metals and Minerals.* In order to conserve supplies and to direct surpluses to destinations where most needed, export controls were initiated in 1946. Metals, etc., controlled include copper and copper alloys; iron, steel and scrap; all non-ferrous scrap; zinc dross and dust; antimony metal and concentrates; metallic tin, tin concentrates and ores; and pig lead and scrap and manufactured lead.

(iv) *Atomic Energy (Control of Materials) Act 34 of* 1946. This Act provides for control of substances which could be used for production or use of atomic energy. It gives the Commonwealth power to acquire such substances in their natural state and in waste materials from mining operations, to carry on mining and other operations necessary for the recovery of such substances, and to pay compensation for such acquisition. It also gives the Commonwealth power to obtain possession of such substances held by any person.

The Act provides for the notification of discovery of any such substances or mineral containing such substance.