

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 coal. However, the value of mineral production has lagged behind that recorded for Australia's large rural industries and in 1952 represented only about 10 per cent. of the net value of production of all primary industries.

2. *Extent of Mineral Wealth.*—The extent of the mineral wealth of Australia has not been determined fully, and large areas of the country still await geological survey. Regional and detailed investigations are being carried out by the Commonwealth Bureau of Mineral Resources, Geology and Geophysics, by the Geological Surveys of the State Governments and by the exploration departments of mining companies. No major discoveries have been made in recent years, although important prospects of oil, uranium ore, bauxite (aluminium ore) and some other minerals have been recorded and are being investigated in detail.

3. *Standardization of Mineral Statistics.*—At the 1945 Conference of Australian Statisticians, consideration was given to the defective nature of Australian mineral production statistics arising from the widely different methods adopted by individual States in collecting, compiling and publishing the data. Further attention was given to the problem by a conference in 1948 of officers of the Bureau of Mineral Resources, Geology and Geophysics, State Mines Departments and State and Commonwealth Statistical Bureaux. Following work subsequently undertaken by the Bureau of Mineral Resources, the Commonwealth Bureau of Census and Statistics and other authorities concerned, a specific plan for standardization of Australian mineral production statistics was adopted in 1950. In accordance with the plan, numerous improvements have been introduced and with the establishment of the Australia-wide industrial censuses for mining and quarrying in 1952, Australian mineral statistics are now considered to be adequate for present needs. It should be noted that the statistics included in this chapter omit particulars relating to uranium-bearing minerals.

The fundamental provision of the plan for standardization of Australian mineral statistics is that quantities and values of individual minerals produced should be reported in terms of the products in the form in which they are despatched from the locality of each mine. This involves the inclusion in the mining industry of ore-dressing and elementary smelting of metallic minerals (e.g., in the case of gold) and miscellaneous treatment of non-metallic minerals, where these operations are carried out in an associated plant at or near the mine. For example, in the case of a metal mine, the output is recorded as ore when no treatment is undertaken at the mine or as a concentrate where ore-dressing operations are carried out in associated works in the locality of the mine. In addition to the basic quantity data, the plan provides for the reporting of contents of metallic minerals and of contents or average grade of selected non-metallic minerals. Wherever practicable, contents (based on assay) of metallic minerals are shown for each metal which is a "pay metal" or a "refiners' prize" when present in the particular mineral.

For the purpose of compiling and publishing data relating to employment, value of output, value of production, etc., a detailed statistical classification for the mining industry has been used in Australia from 1950. For the purpose of this classification, the "Mining Industry" includes all mining and quarrying and the recovery of minerals from ore dumps, tailings, etc. As mentioned above, ore dressing and miscellaneous treatment of non-metallic minerals (where these are carried out in an associated plant at or near the mine) are included in the Mining Industry. However, establishments primarily engaged in smelting and/or refining (including the large plants operated at Mt. Morgan and Mt. Isa in Queensland and at Mt. Lyell in Tasmania) are omitted and classified to the Manufacturing Industry. The classification divides the industry into four major groups, viz., Metal Mining, Fuel Mining, Non-metal (excluding Fuel) Mining and Construction Material Quarrying.

The adoption of revised methods of compiling and presenting mineral statistics in 1950 caused a break in continuity of the data published for earlier years. For this reason, it has not been possible to continue some of the comparative tables beyond 1949, while in other tables comparisons have been continued, but data for 1950 and 1951 are in general not strictly comparable with those for 1949 and earlier years. The establishment of industrial censuses of the mining and quarrying industry in all States in 1952 has caused a further break in continuity of data, particularly those relating to values.

4. **Quantity and Value of Minerals Produced, 1952.**—(i) *Quantities.* In the following table particulars of the quantities of principal minerals produced are shown for each State and the Northern Territory for 1952. Because of the revised bases of compiling and presenting mineral statistics referred to above, the data in the table differ considerably as to form and content from corresponding data for 1949 and earlier years published in previous issues of the Year Book.

In the main, the data consist of official statistics of Mines Departments furnished to this Bureau by the Statisticians of the several States and by the Northern Territory Mines Branch. These statistics have been supplemented, as necessary, by data obtained from the Australian Mines and Metals Association (Inc.), the Bureau of Mineral Resources, Geology and Geophysics and several other sources. The particulars shown have been compiled as far as practicable on the standardized basis outlined in para. 3 above. This has involved some re-arrangement of official statistics published by Mines Departments for some States.

In these tables individual minerals are arranged in four groups, viz., metallic minerals, fuel minerals, non-metallic (excluding fuel) minerals and construction materials, to correspond with the major groups of the statistical classification of the mining industry.

The particulars shown in the group "construction materials" cover, broadly, data similar to those previously included under the heading of "Quarries".

QUANTITIES OF PRINCIPAL MINERALS PRODUCED, 1952.

Mineral.	Unit.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Aust.
METALLIC MINERALS.									
Antimony Ore and Concentrate ..	ton	(a) 164	8	43	..	265	..	..	480
Bismuth Concentrate ..	lb.	(a) 7,926	..	56	..	..	..	..	7,982
Copper Ore, Concentrate and Precipitate ..	ton	9,165	..	(b)62,436	51	16.	35,062	1,166	108,150
Gold Ore, Concentrate, etc.	oz.	186	893	..	..	..	11	..	1,090
Gold—Other Forms(d)	'000 tons	28,827	73,419	(e)	(e)	(e)	26	(e)	(e)
Iron Ore ..	..	..	..	..	2,684	224	..	..	2,908
Lead Ore, Concentrate ..	ton	246,347	..	121,310	214	7,449	11,130	..	356,450
Manganese Ore ..	..	(a) 2,024	..	..	..	5,045	..	..	7,069
Pyritic Ore and Concentrate ..	..	23,965	..	66,750	70	53,577	54,421	..	198,783
Rutile Concentrate ..	..	24,450	..	13,564	..	..	..	..	38,014
Silver Ore ..	..	(a)(f) 181	..	..	..	..	..	..	181
Tin Concentrate ..	..	(a) 560	52	476	..	98	1,115	17	2,318
Tungsten Concentrates—	..	..	..	..	..	..	..	..	..
Scheelite Concentrate ..	..	(a) 8	..	9	..	21	970	..	989
Wolfram Concentrate ..	..	(a) 33	2	230	..	27	481	262	1,035
Zinc Ore and Concentrate ..	..	283,621	..	46,574	..	..	46,709	..	376,904
Zircon Concentrate ..	..	17,156	..	10,510	..	..	..	..	27,660

FUEL MINERALS.									
Coal, Black—	'000 tons	..	..	83	..	..	..	..	85
Semi-Anthracite ..	..	1	..	..	..	..	..	..	..
Bituminous ..	..	15,008	144	2,312	..	..	247	..	17,711
Sub-Bituminous ..	..	13	..	347	418	830	..	..	1,608
Total ..	..	15,022	144	2,742	418	830	248	..	19,404
Coal, Brown (including Lignite) ..	..	..	8,104	..	..	..	..	..	8,104

NON-METALLIC (EXCLUDING FUEL) MINERALS.									
Asbestos ..	ton	466	..	..	..	3,592	..	..	4,058
Clays—	'000 tons	1,286 (b)	670	195	218 (b)	260 (b)	42	..	(c) 2,671
Brick Clay and Shale ..	..	364 (g)	55 (g)	10 (g)	70 (g)	27 (g)	8	..	(g) 534
Other ..	..	..	..	..	..	..	..	..	..
Cupreous Ore and Concentrate—For Fertilizer ..	ton	..	..	..	..	1,644	..	103	2,047
Diatomite ..	..	4,655	1,261	450	..	..	..	..	6,366
Dolomite ..	..	2,939	..	8,074	83,873	555	1,003	..	96,464
Felspar (including Cornish Stone) ..	..	6,467	..	..	4,619	2,504	..	..	13,590
Greensand ..	..	..	..	..	..	4,380	..	..	1,380
Gypsum ..	..	89,226	47,295	..	164,825	50,332	..	..	351,678
Limestone(h) ..	'000 tons	1,150	481	52	837	(e)	171	..	(g) 2,721
Magnesite ..	ton	40,333	164	13	572	1,055	..	..	42,137
Mica—Muscovite ..	lb.	..	..	..	203,486	(i)	..	71,929	71,929
Salt ..	ton	..	(i)	..	..	..	..	..	b 277,000
Silica (Glass, Chemical, etc.) ..	..	94,944	(e)	(e)	24,913	7,669	9,393	..	g 136,919
Talc (including Steatite) ..	..	987	..	..	5,109	1,224	..	..	7,320

CONSTRUCTION MATERIALS.(g)									
Sand ..	'000 tons	1,057 (j)	652	(e)	597 (j)	12	(e)	(e)	2,318
River Gravel and Gravel Boulders ..	..	975 (j)	140	(e)	598 (j)	185	(e)	(e)	1,898
Dimension Stone(k) ..	..	76 (j)	7	4	57 (j)	92	(e)	(e)	236
Crushed and Broken Stone ..	..	1,662 (j)	2,579	548	2,365 (j)	406	(e)	(e)	7,560
Other (Decomposed Rock, etc.) ..	..	6,361	(i)(j)	(e)	26	(i)(j)	(e)	(e)	6,420

(a) Despatches from the mine (or sales) as distinct from production. (b) Estimated. (c) Partly estimated. (d) Bullion, alluvial, retorted gold, etc. (e) Not available. (f) Includes silver flange and silver bullion. (g) Incomplete. (h) Excludes quantities used directly as a building or road material. (i) Not available for publication; included in total for Australia. (j) Year 1952-53. (k) Includes some quantities of stone dressed at the quarries.

(ii) *Principal Contents of Metallic Minerals.* The following table provides a summary of the principal contents of metallic minerals produced in 1952. Further particulars, including data for earlier years, are shown in the several sections dealing with individual minerals later in this chapter.

PRINCIPAL CONTENTS OF METALLIC MINERALS PRODUCED, 1952.

Content of Metallic Minerals Produced.	Unit.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Aust.
Antimony	ton	584	5	(a) 22	..	130	2	..	743
Cadmium .. .. .	..	592	..	..	..	..	42	..	634
Cobalt .. .. .	..	54	..	..	..	..	..	..	54
Copper .. .. .	..	3,562	..	6,966	(a) 2	7	7,722	319	18,578
Gold	fine oz.	39,030	66,777	85,756	437	727,469	16,072	44,894	980,435
Iron	'000 tons	..	..	..	a 1,744.6	138.5	..	..	a 1,883.1
Lead	ton	173,433	..	40,793	(a) 51	5,495	8,424	..	228,196
Silver	'000 fine oz.	6,756.3	5.8	3,223.5	0.6	209.6	1,078.3	4.3	11,278.4
Sulphur	ton	101,203	..	47,116	7	23,765	(a) 41,940	..	213,031
Tin .. .. .	..	396	39	330	..	65	771	9	1,610
Tungsten(b) .. .. .	..	33 ¹	1	158	..	18	907	165	1,282
Zinc .. .. .	..	147,655 ¹	..	23,683	..	47	25,065	..	196,450

(a) Estimated.

(b) In terms of WO₃.

(iii) *Values.* Particulars of the estimated values of minerals (mine and quarry products) produced in 1952 are shown in the following table. The values represent the estimated selling value at the mine or quarry of minerals produced during the year and are not comparable with recorded values of minerals for earlier years, particularly in the case of copper, lead and zinc minerals and some other metallic minerals.

VALUE OF MINERALS PRODUCED, 1952.
(£'000.)

Mineral.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Aust.
METALLIC MINERALS.								
Copper Ore, Concentrate and Precipitate	417	..	(a)	(b)	1	(a)	55	(c) 4,414
Gold Ore, Concentrate, etc.	14	29	..	..	..	(b)	..	43
Gold—Other Forms	394	1,084	243	7	11,913	(b)	681	14,322
Iron Ore .. .. .	..	..	..	3,087	229	..	..	3,316
Lead, Silver, Silver and Lead and Silver Zinc Ores	80	..	66	6	124	1	..	277
Lead Concentrate	17,963	..	(a)	..	623	(a)	..	(c) 24,405
Manganese Ore	16	..	..	..	36	..	..	52
Pyritic Ore and Concentrate	35	..	186	(b)	422	144	..	787
Rutile Concentrate	1,013	..	500	..	..	..	..	1,513
Tin Concentrate	432	42	332	..	66	886	10	1,768
Tungsten Concentrates—	..	..	..	..	..	..	..	..
Scheelite Concentrate	14	..	10	..	4	1,682	..	1,710
Wolfram Concentrate	54	(d)	233	..	46	731	413	1,477
Zinc Ore and Concentrate	7,671	..	(a)	..	..	(a)	..	(c) 11,823
Zircon Concentrate	130	..	90	..	..	..	..	220
Other Metallic Minerals	84	(d)	6	(b)	35	7	..	132
Total, Metallic Minerals	28,317	1,155	11,078	3,100	13,499	7,953	1,157	66,259
FUEL MINERALS.								
Coal, Black	43,283	728	5,956	430	2,457	475	..	53,329
Coal, Brown .. .. .	..	3,255	..	..	..	..	..	3,255
Other Fuel Minerals	51	..	..	..	..	..	..	51
Total, Fuel Minerals	43,334	3,983	5,956	430	2,457	475	..	56,635
NON-METALLIC (EXCLUDING FUEL) MINERALS.								
Total, Non-metallic (excluding Fuel) Minerals	1,714 (e)	442 (e)	155	1,439 (e)	972	708 (e)	125 (e)	5,055
CONSTRUCTION MATERIALS. (e)								
Total, Construction Materials	3,732 (f)	2,955	240	1,078 (f)	776	114	(g)	8,895
TOTAL. (e)								
Total, All Minerals and Construction Materials	77,097	8,535	17,429	6,047	17,704	8,750	1,282	136,844

(a) Not available for publication. (b) Less than £500. (c) Includes particulars of items marked "(a)". (d) Not available for publication; included with "Non-metallic (excluding Fuel) Minerals". (e) Incomplete. (f) Year ended 30th June, 1953. (g) Not available.

5. Mine Production of Principal Metals and Production of Coal and Sulphur, 1939 and 1948 to 1952.—Particulars of the mine production of principal metals (i.e., metallic contents of minerals produced) and production of coal and sulphur in the years 1939 and 1948 to 1952 are shown in the following table.

MINE PRODUCTION OF PRINCIPAL METALS AND PRODUCTION OF COAL AND SULPHUR.

Particulars.	Unit.	1939.	1948.	1949.	1950.	1951.	1952.
Metallic Content of Minerals Produced(a)—							
Copper	ton	20,560	12,368	13,462	17,481	17,926	18,578
Gold	fine oz.	1,645,697	885,507	839,058	869,537	895,551	980,435
Lead	ton	280,003	216,955	209,292	225,367	212,013	228,196
Iron(b)	"	1,548,031	1,273,231	924,830	1,417,608	1,605,400	1,883,087
Silver	'000 fine oz.	15,320	10,058	10,102	10,984	10,244	11,278
Tin	ton	3,007	1,885	1,886	1,854	1,559	1,610
Zinc	"	214,823	178,404	175,988	197,783	189,227	196,450
Production of—							
Coal—Black ..	'000 tons	13,535	14,783	14,106	16,543	17,608	19,404
Brown ..	"	3,951	6,692	7,376	7,327	7,836	8,104
Sulphur(c) ..	ton	151,008	(d)126,270	158,777	179,843	183,126	217,242

(a) Mine production of metals. (b) Estimated. (c) Total sulphur content of zinc concentrates and pyrites produced and of spent oxide roasted. (d) Recoverable sulphur.

6. Value of Output and Value of Production for Mining and Quarrying.—(i) *Individual Industries*, 1952. The following two tables show particulars of the value of output and value of production of individual mining and quarrying industries and for all mining and quarrying for the year 1952. The data were obtained from industrial censuses of the mining and quarrying industry which were made on a substantially uniform basis in all States and the Northern Territory for the year 1952.

MINING AND QUARRYING : VALUE OF OUTPUT(a), 1952. (£'000.)

Industry.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Aust.
Metal Mining—								
Gold Mining ..	401	1,155	(b)	(b)	11,913	..	681	(c) 14,400
Silver-Lead-Zinc Mining ..	25,992	..	(b)	..	(b)	(b)	..	(c) 37,477
Copper-Gold Mining ..	180	..	(b)	..	(b)	(b)	..	53 (c) 4,004
Tin Mining ..	418	..	152	..	72	1,402	10	2,654
Other Metal Mining ..	1,326	(d)	839	(b)	766	(b)	413	e e 8,333
Total, Metal Mining	28,317	1,155	(c) 11,078	(c) 3,100	(c) 13,499	(c) 7,062	1,157	(e) 66,268
Fuel Mining—								
Black Coal Mining ..	43,283	728	5,956	430	2,457	475	..	53,329
Brown Coal Mining ..	..	3,255	..	..	..	..	..	3,255
Other Fuel Mining ..	51	..	..	..	..	..	..	51
Total, Fuel Mining	43,334	3,983	5,956	430	2,457	475	..	56,633
Non-metal (excluding Fuel) Mining—								
Clays	612 (e)	17	(f)	204	201	57	..	(e) 1,091
Gypsum	88	(b)	..	124	(b)	..	..	(c) 277
Limestone(g) ..	705	(b)	127	482	(b)(h)	139	(f)	e e 1,962
Salt .. ..	..	(f)	(f)	405	(f)	..	..	(e) 405
Other Non-metal (excluding Fuel) Mining	305 (f)	19	(e) 28	224	603	3	125	(e) 1,307
Total, Non-metal (excluding Fuel) Mining ..	1,710 (c)(e)	442 (e)	155	1,439 (c)(e)	972 (e)	199 (e)	125 (e)	(e) 5,042
Total, All Mining ..	73,361 (e)	5,580 (e)	(e) 17,189	4,969 (e)	16,928 (e)	8,636 (e)	1,282 (e)	e 127,945
Construction Material Quarrying ..								
.. ..	3,736 e h	2,955 (e)	240	1,078 (h)	776	114	(f)	(e) 8,809
Total, All Mining and Quarrying ..	77,097 (e)	8 535 (e)	17,420	6,047 (e)	17,704	8,750 (e)	1,282 (e)	e 136,844

(a) Selling value at point of sale of mine or quarry products less transport costs from mine or quarry to point of sale. i.e., value of output at mine or quarry. (b) Not available for publication. (c) Includes particulars of items marked "(b)". (d) Not available for publication; included with "Other Non-metal (excluding Fuel) Mining". (e) Incomplete. (f) Not available. (g) Excluding quarries primarily engaged in obtaining construction material. (h) Year ended 30th June, 1953. (i) Includes particulars for "Other Metal Mining".

MINING AND QUARRYING : VALUE OF PRODUCTION(a), 1952.
(£'000.)

Industry.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust. (b)	Tas.	N.T.	Aust.
Metal Mining—								
Gold Mining ..	163	844	(c)	(c)	7,792	..	605	d 9,585
Silver-Lead-Zinc Mining ..	20,568	..	(c)	5	(c)	(c)	..	(d) 30,276
Copper-Gold Mining ..	79	..	(c)	..	(c)	(c)	37	(d) 2,359
Tin Mining ..	357	..	89	..	54	1,294	(d) 8	1,802
Other Metal Mining ..	1,033	(e)	f.i.i	(c)	575	(c)	354	d f 7,235
Total, Metal Mining	22,200	844	(d) 8,535	(d) 2,942	(d) 9,060	(d) 6,672	1,004	(f) 51,257
Fuel Mining—								
Black Coal Mining ..	35,785	587	5,046	366	2,054	405	..	44,243
Brown Coal Mining ..	..	2,906	..	..	..	..	..	2,906
Other Fuel Mining ..	27	..	..	..	..	..	..	27
Total, Fuel Mining	35,812	3,493	5,046	366	2,054	405	..	47,176
Non-metal (excluding Fuel) Mining—								
Clays ..	(g) 612	(f) 16	(h)	182	198	47	..	(f) 1,055
Gypsum ..	61	(c)	..	82	(c)	..	..	(d) 194
Limestone(i) ..	504	(c)	88	375	(c)(j)	102	(h)	d f 1,405
Salt ..	..	(h)	(h)	346	(h)	..	..	(f) 346
Other Non-metal (excluding Fuel) Mining	241	(k) 17	(f) 28	201	369	2	121	(f) 979
Total, Non-metal (excluding Fuel) Mining	1,418	(d)(f) 201	(f) 116	1,186	(d)(f) 696	151	(f) 121	(f) 3,079
Total, All Mining ..	50,430	(f) 4,638	(f) 13,697	4,474	(f) 11,810	7,228	(f) 1,125	(f) 102,412
Construction Material Quarrying ..	(g) 3,736	f f 2,004	(f) 163	659	(j) 600	97	(h)	(i) 7,259
Total, All Mining and Quarrying ..	63,166	(f) 6,642	(f) 13,860	5,133	(f) 12,410	7,325	(f) 1,125	f 109,671

(a) Value of output at mine, less cost of power, fuel, light and other materials and stores used; depreciation and maintenance costs have not been deducted. (b) In the case of Metal, Non-metal (excluding Fuel) and Fuel Mines employing less than 5 persons, costs of power, fuel, light and other materials and stores have not been deducted. (c) Not available for publication. (d) Includes particulars of items marked "(e)". (e) Not available for publication; included with "Other Non-metal (excluding Fuel) Mining". (f) Incomplete. (g) Costs of power, fuel, light and other materials have not been deducted. (h) Not available. (i) Excluding quarries primarily engaged in obtaining construction material. (j) Year ended 30th June, 1953. (k) Includes particulars for "Other Metal Mining".

(ii) *States, 1939 and 1948 to 1952.* Values for individual minerals produced based on estimated selling value at the mine or quarry are shown for the year 1952 in para. 4 (iii) above. These data are not available on a comparable basis for earlier years. Australian State and Commonwealth Statisticians however, have for many years used values for mine and refinery products as recorded by Mines Departments and other relevant data (including censuses of the industry in some States) to estimate value of output and value of production for the mining and quarrying industry as a whole. The following table shows estimates on this basis for the years 1939 and 1948 to 1951 together with the values ascertained from the Australia-wide mineral industry census of 1952. The estimates for 1951 and the earlier years shown are approximate and as value added in ore-dressing and similar treatment plants situated at or near the mine was excluded in some cases, they are not strictly comparable with the 1952 valuations which consistently include the value of such mine treatment. The Northern Territory is omitted for years prior to 1952.

MINING AND QUARRYING : VALUE OF OUTPUT AND VALUE OF PRODUCTION.
(£'000.)

Year.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	Total.
VALUE OF OUTPUT.(a)							
1939	12,914	2,789	3,438	3,648	12,496	2,145	37,430
1948	32,870	3,452	5,243	3,757	8,681	4,369	58,372
1949	35,295	4,215	7,096	3,118	9,799	4,629	64,152
1950	46,102	5,274	10,829	4,428	12,037	7,049	85,719
1951	67,877	6,949	10,922	4,938	13,474	10,552	114,712
1952	77,097	8,535	17,420	6,047	17,704	8,750	(b) 136,844

For footnotes see next page.

MINING AND QUARRYING: VALUE OF OUTPUT AND VALUE OF PRODUCTION—continued.
(£'000.)

Year.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	Total
VALUE OF PRODUCTION.(c)							
1939	10,927	2,111	2,688	3,444	9,268	(a) 2,145	30,583
1948	28,198	2,173	4,143	3,597	5,873	(d) 4,369	48,353
1949	30,191	2,263	5,606	2,941	6,697	(d) 4,629	52,327
1950	39,634	2,969	8,559	4,188	8,751	(d) 7,049	71,150
1951	59,385	4,209	8,632	4,646	9,775	(d) 10,552	97,199
1952	63,166	6,632	13,860	5,153	12,410	7,325	(b) 109,671

(a) Selling value of mine and quarry products at the mine or quarry. (b) Includes Northern Territory. (c) Value of output less cost of power, fuel, light and other materials and stores used; depreciation and maintenance costs have not been deducted. (d) Value of output; value of production not available.

7. Industrial Census of the Mining and Quarrying Industry, 1952.—Industrial censuses of the mining and quarrying industry (covering employment, salaries and wages paid, fixed assets, value of output, costs of materials used, etc.) have been taken in some Australian States for many years, but on different bases. In 1952 censuses were taken in all States and the Northern Territory on a substantially uniform basis, thus providing important Australian statistics on mining and quarrying operations which were not previously available. A summary of the statistics collected is shown in the following table. The statistics show that there were 2,339 mines and quarries operating in Australia in 1952, of which 874 were metal mines, 299 fuel mines (mainly coal mines), 636 non-metal (excluding fuel) mines and 530 construction material quarries. The total number of persons employed (average for period worked) was 56,299, value of output £136,844,000 and value of production £109,671,000. Of the total value of production, £51,257,000 (46.8 per cent.) was contributed by metal mines, £47,176,000 (43.0 per cent.) by fuel mines, £3,979,000 (3.6 per cent.) by non-metal (excluding fuel) mines and £7,259,000 (6.6 per cent.) by construction material quarries.

MINING AND QUARRYING: SUMMARY OF OPERATIONS, AUSTRALIA, 1952.

Particulars.	Unit.	Metal Mining.	Fuel Mining.	Non-metal (excluding Fuel) Mining. (a)	Total, All Mining.	Construction Material Quarrying.(b)	Total, All Mining and Quarrying.
Mines and Quarries ..	No.	874	299	636	1,809	530	2,339
Persons Employed(c) ..	"	21,411	27,656	3,070	52,137	4,162	56,299
Salaries and Wages Paid d e	£'000	22,367	24,408	1,617	48,392	2,020	50,412
Value of—							
Power, Fuel and Light Used(d)	"	3,726	2,159	249	6,134	234	6,368
Materials and Stores Used(d)(f)	"	11,097	7,296	740	19,133	7,304	20,437
Total Power, Fuel, Light and Materials and Stores Used(g)	"	15,011	9,459	1,063	25,533	1,640	27,173
Output(h)	"	66,268	56,635	5,042	127,945	8,899	136,844
Production(i)	"	51,257	47,176	3,979	102,412	(j) 7,259	109,671
Value of Fixed Assets d k—							
Land and Buildings ..	"	7,480	5,540	1,141	14,161	(l)	(l)
Plant and Machinery ..	"	20,239	19,817	2,327	42,383	(l)	(l)
Mine Development ..	"	8,738	6,658	382	15,778	(l)	(l)
Total Value of Fixed Assets ..	"	36,457	32,015	3,850	72,322	(l)	(l)

(a) Incomplete for some non-metal (excluding fuel) mining industries outside the normal administrative control of State Mines Departments (e.g., clays and salt). (b) Incomplete in some States. (c) Average number employed (including working proprietors) during period worked by mine or quarry. (d) Excludes mines and quarries employing less than four persons (less than five persons in Western Australia). (e) Excludes drawings by working proprietors; the amounts are net after deducting value of explosives sold to own employees. (f) Includes value of explosives sold to own employees. (g) Includes estimates for mines and quarries employing less than four persons (less than five persons in Western Australia). (h) Value at mine or quarry. (i) Value of output less cost of power, fuel, light and other materials and stores used; depreciation and maintenance costs have not been deducted. (j) Costs of power, fuel, light and other materials and stores used have not been deducted in all cases. (k) Depreciated value (i.e., book value less any depreciation reserves) at end of year. (l) Not available.

In the next table statistics of numbers of mines and quarries, numbers employed, value of output and value of production are shown for each State and the Northern Territory for the year 1952. Of the New South Wales total value of production, £35,785,000 (56.7 per cent.) was contributed by black coal mining and £20,568,000 (32.6 per cent.) by silver-lead-zinc mining.

MINING AND QUARRYING : SUMMARY OF OPERATIONS, 1952.

State or Territory.	Number of Mines and Quarries.	Persons Employed. (a)	Value of Output.(b)	Value of Production.(c)	
				Total.	Proportion of Total.
			£'000.	£'000.	%
New South Wales ..	(d) 692	30,894	77,097	63,166	57.6
Victoria(e) ..	263	4,252	8,535	6,632	6.1
Queensland(e) ..	476	7,853	17,429	13,860	12.6
South Australia ..	541	2,381	6,047	5,153	4.7
Western Australia(e) ..	262	7,686	17,704	12,410	11.3
Tasmania ..	71	2,829	8,750	7,325	6.7
Northern Territory(e) ..	34	404	1,282	1,125	1.0
Australia ..	2,339	56,299	136,844	109,671	100.0

(a) Average number employed during period worked by mine or quarry ; includes working proprietors. (b) Value of output at mine or quarry. (c) Value of output less cost of power, fuel, light and other materials and stores used ; depreciation and maintenance costs have not been deducted. (d) Excludes construction material quarrying. (e) Incomplete for some non-metal (excluding fuel) mining industries outside the normal administrative control of the State Mines Department (e.g., clays and salt) and/or for construction material quarrying.

§ 2. Gold.

1. **Discovery in Various States.**—A more detailed account of the discovery of gold in the various States appears under this section in Official Year Books Nos. 1 to 4.

2. **Mine Production.**—The following table shows the recorded mine production of gold (i.e., gold content of minerals produced) in the several States and in Australia as a whole during each of the ten decennial periods from 1851 to 1950, and in single years from 1951 to 1953. Owing to defective information in the earlier years it is likely that the recorded production falls considerably short of the actual totals.

GOLD : MINE PRODUCTION.(a)

('000 fine oz.)

Period.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Aust.
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 ..	560	1,052	1,021	53	8,474	130	84	11,383
1941-50 ..	573	801	749	13	6,682	157	148	9,123
1951 ..	49	66	79	(b)	648	15	39	896
1952 ..	39	68	85	(b)	727	16	45	980
1953 ..	26	64	92	(b)	823	17	53	1,075
Total, 1851-1953 ..	16,256	73,398	22,162	450	55,662	2,444	906	171,278

(a) Gold content of minerals produced.

(b) Less than 500 ounces.

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 its discovery.

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. Following the outbreak of the 1939–45 War there was a sharp fall in gold production to 656,867 fine oz. in 1944 and 657,213 fine oz. in 1945, but with the release of man-power after the war, there has been a slight upward trend in mine production of gold which exceeded one million fine ounces in 1953 for the first time since 1942. From December, 1951, to June, 1954 the bulk of Australian newly-won gold was sold on oversea premium markets.

3. **Refinery Production.**—The quantities and values of the refinery production of new gold of Australian origin are shown in the following table for each of the years 1940 to 1953. The value of the refined new gold is based on the price fixed by the Commonwealth Bank, but allowance is made in the 1952 and 1953 figures for premiums on sales of gold overseas and for industrial purposes in Australia. Particulars of the values ascribed to gold production (mine basis) in 1939 and earlier years were included in Official Year Book No. 36 and previous issues.

GOLD : REFINERY PRODUCTION OF NEWLY-WON GOLD OF AUSTRALIAN ORIGIN.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	'000. fine oz.	£'000.		'000. fine oz.	£'000.
1940	1,637	17,445	1947	969	10,430
1941	1,441	15,393	1948	884	9,517
1942	1,168	12,210	1949	879	10,670
1943	754	7,878	1950	844	13,077
1944	636	6,679	1951	850	13,172
1945	613	6,556	1952	979	16,037
1946	820	8,830	1953	1,053	16,780

4. **Unit Values.**—The unit value of gold production rose to £12 2s. 10d. in 1949, as a result of the increase in the price to £15 9s. 10d. per fine oz. fixed by the Commonwealth Bank on 19th September, 1949, consequent upon alteration in the rate of exchange. In 1950 and 1951, the unit values were the Bank's price of £15 9s. 10d. per fine oz., while in 1952 and 1953 allowance was made for premiums on gold sold for industrial purposes in Australia and on premium markets overseas, the average value for these years being £16 9s. 10d. and £15 18s. 9½d. per fine ounce respectively. Further information regarding the price of gold realized, including particulars of prices for newly-won gold sold on oversea premium markets since December, 1951, is given in Chapter XVI.—Private Finance.

5. **Changes in Stocks of Gold held in Australia.**—The following table shows particulars of production, imports and exports of gold and changes in stocks of gold held in Australia for each of the years 1948–49 to 1952–53.

CHANGES IN STOCKS OF GOLD HELD IN AUSTRALIA.

(Fine oz.)

Particulars.	1948-49.	1949-50.	1950-51.	1951-52.	1952-53.
Mine Production of Gold (a)	898,832	859,353	891,428	908,813	1,037,885
Imports of Gold (b)(c)	103,005	139,208	158,661	208,143	228,407
Total	1,001,837	998,561	1,050,089	1,116,956	1,266,292
Exports of Gold (b)	395	84	19	416,652	1,250,162
Gold Content of Ores and Concentrates Ex- ported	5,592	8,257	10,662	14,503	23,204
Net Industrial Absorption of Gold	63,019	54,200	40,425	33,838	37,816
Total	69,006	62,541	51,106	464,993	1,311,182
Changes in Stocks of Gold held in Australia d	+932,831	+936,020	+998,983	+651,963	-44,890

(a) Gold content of minerals produced in Australia. (b) Includes gold contained in matte.
(c) Excludes gold imports in some minor minerals. (d) Includes gold content of mineral products awaiting refining; excludes gold specie.

6. **Production in Principal Countries.**—The quantities of gold produced in the principal producing countries in each of the years 1939 and 1948 to 1952 are shown in the table herunder.

GOLD : PRODUCTION IN PRINCIPAL COUNTRIES.

('000 fine oz.)

Country.	1939.	1948.	1949.	1950.	1951.	1952.
Union of South Africa ..	12,822	11,585	11,705	11,664	11,516	11,819
Canada	5,094	3,530	(a)4,124	(a)4,431	(a)4,333	(a)4,472
United States of America ..	4,673	2,014	1,902	2,394	1,958	1,886
Australia	1,646	886	889	870	886	980
British West Africa(b) ..	843	677	682	695	784	695
Rhodesia	800	516	529	513	488	499
Mexico	842	338	406	408	393	459
Columbia	570	335	385	406	431	422
Belgian Congo	465	300	334	339	352	369

(a) Includes Newfoundland.

(b) Includes Gold Coast, Nigeria and Sierra Leone.

7. **Employment in Gold Mining.**—Particulars of the numbers of persons employed in gold-mining are shown in §13 (page 700). For 1949 and earlier years it has been necessary to combine numbers employed in gold mining and copper-gold mining, as separate data are not available.

8. **Assistance to Gold Mining Industry.**—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 being fixed at 50 per cent. of the price payable by the Bank in excess of £A.9 per fine oz. This tax was suspended as from 20th September, 1947, by the Gold Tax Suspension Act 1947 in order to assist the gold mining industry in meeting higher costs and to encourage greater output.

§ 3. Silver, Lead and Zinc.

1. Mine Production.—(i) *Australia.* The following table shows for 1951 and 1952 the mine production (metallic contents of ores and concentrates produced) of silver, lead and zinc in Australia, and the respective minerals in which these metals were contained.

SILVER, LEAD AND ZINC : CONTENT OF ORES AND CONCENTRATES PRODUCED.

Mineral in which contained.	Silver (fine oz.)		Lead (tons).		Zinc (tons).	
	1951.	1952.	1951.	1952.	1951.	1952.
Copper Concentrate ..	566,119	656,786	1,067	1,098	..	..
Gold Concentrate, etc. ..	208,463	218,374	..	..	..	..
Lead-Silver Ore ..	148,798	81,570	2,962	2,422	(a)	..
Lead-Silver-Zinc Ore ..	349	2,286	22	133	7	46
Lead Concentrate ..	8,954,390	9,944,610	204,094	220,628	2	1
Silver Ore ..	4,420	10,255	..	..	..	..
Zinc Concentrate ..	360,084	356,920	3,860	3,901	189,191	196,398
Other Minerals ..	1,068	7,573	8	14	27	5
Total ..	10,243,691	11,278,374	212,013	228,196	189,227	196,450

(a) Less than half a ton.

The following table shows the mine production of silver, lead and zinc in Australia for the years 1948 to 1952 compared with 1939.

SILVER, LEAD AND ZINC : CONTENT OF ORES AND CONCENTRATES PRODUCED, AUSTRALIA.

Metal.	Unit.	1939.(a)	1948.(a)	1949.(a)	1950.	1951.	1952.
Silver ..	'000 fine oz.	15,320	10,058	9,849	10,984	10,244	11,278
Lead ..	ton	280,003	216,955	213,491	225,367	212,013	228,196
Zinc ..	"	217,256	190,469	181,998	197,783	189,227	196,450

(a) Source : Australian Mines and Metals Association.

The following table shows the quantities of silver, lead and zinc contained in minerals won in the several States of Australia in the years 1951 and 1952 :—

SILVER, LEAD AND ZINC : CONTENT OF ORES AND CONCENTRATES PRODUCED, STATES.

State.	Silver (fine oz.)		Lead (tons).		Zinc (tons).	
	1951.	1952.	1951.	1952.	1951.	1952.
New South Wales ..	6,479,493	6,756,254	168,566	173,433	143,113	147,655
Victoria ..	8,326	5,846	..	..	..	..
Queensland ..	2,585,042	3,223,462	33,243	40,793	21,743	23,683
South Australia ..	457	644	41	(a) 51	..	..
Western Australia ..	196,743	209,581	1,913	5,495	9	47
Tasmania ..	973,629	1,078,268	8,250	8,424	24,362	25,065
Northern Territory ..	1	4,319	..	..	..	..
Australia ..	10,243,691	11,278,374	212,013	228,196	189,227	196,450

(a) Estimated.

Particulars of the values ascribed to the various minerals containing silver, lead and zinc for the year 1952 are shown in the detailed table relating to mineral production on pages 668.

(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 present-day sulphide ores are concentrated by gravity and flotation methods at Broken Hill. The lead (galena) concentrates 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 concentrate produced at Broken Hill is 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 concentrate is either exported overseas or sent to Risdon 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. Concentrates of 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.

(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.

Practically the whole of the Victorian mine production of silver of 5,846 fine oz. for 1952 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.

(v) *South Australia.* Output of lead from local ores has been very small in recent years. In 1953, 214 tons of lead-silver ore were produced, valued at £5,663 and containing 51 tons of lead and 644 fine ounces of silver.

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 recent years, lead-silver-zinc ore and lead concentrates have been produced in Western Australia. Main centres of production have been the Northampton area, Nabawa, the Ashburton area and the West Kimberley district. The lead concentrates won at Nabawa and in the Northampton area do not contain payable amounts of silver. Silver-lead-zinc ore is produced by the Devonian Lead Mine in the West Kimberley district.

The bulk of the mine production of silver in Western Australia is obtained as a by-product of the gold mining industry.

(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 Limited at Read-Rosebery. These are primarily zinc mines, although lead and copper-lead concentrates are also produced. This company also operates 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. These concentrates are 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.

(viii) *Northern Territory*. There was no production of lead-silver ore in the Northern Territory in 1951 and 1952. However, 41 tons of ore valued at £883 and with a content of 339 fine ounces of silver and 15 tons of lead were won in 1950. The output in 1950 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.

2. **Production and Sales of Refined Silver, Lead and Zinc.**—In the following table, details are given of the production and sales of refined primary silver, lead and zinc as recorded from data received from the Australian Mines and Metals Association and from other sources. The figures shown for refined silver production include small quantities recovered from imported materials. The data relating to lead production include small quantities recovered from scrap for the year 1939.

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

Particulars.	1939.	1949.	1950.	1951.	1952.	1953.
SILVER ('000 fine oz.).						
Production	9,552	5,858	6,882	6,879	6,773	6,606
Sold to Australian consumers (a) ..	1,794	1,019	1,095	1,693	739	1,129
Exported or sold for export (a) ..	7,518	4,205	5,745	4,924	5,876	4,755
LEAD (tons).						
Refined Lead—						
Production	199,437	150,056	160,526	165,758	156,639	172,468
Sold to Australian consumers (a) ..	32,217	40,908	43,661	54,629	31,566	31,663
Exported or sold for export (a) ..	164,684	108,071	122,426	112,476	122,626	144,002
Lead Bullion—						
Produced for export	43,955	32,621	37,021	31,872	37,709	34,050
ZINC (tons).						
Production	71,220	80,956	83,652	77,010	87,438	90,178
Sold to Australian consumers (a) ..	31,088	44,024	45,141	45,950	50,174	58,524
Exported or sold for export (a) ..	43,137	38,230	38,558	29,411	38,132	32,881

(a) Source : Australian Mines and Metals Association.

3. **Silver, Lead and Zinc : Production in Principal Countries and World Total, 1952.**—The following table shows, for the year 1952, particulars of silver, lead and zinc production (mine basis) in principal producing countries, together with the estimated world total, according to data published by the Mineral Resources Division of the Colonial Geological Surveys.

SILVER, LEAD AND ZINC : MINE PRODUCTION IN PRINCIPAL COUNTRIES AND WORLD TOTAL, 1952.

Country.	Silver.	Lead.	Zinc.
	'000 fine oz.	Tons.(a)	Tons.(a)
Mexico	50,354	242,142	223,784
United States of America	39,452	348,358	594,644
Canada	25,222	150,752	331,966
Peru	19,180	96,520	125,844
Australia	11,278	228,196	196,450
U.S.S.R.	(b)	(c) 200,000	(c) 200,000
Bolivia	7,066	29,539	35,056
Italy	694	38,014	103,272
Estimated World Total	188,000	1,828,000	2,530,000

(a) Long tons.

(b) Not available.

(c) Estimated.

4. **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 1949 to 1953. Lead and zinc prices were controlled in Australia and the United Kingdom after the outbreak of war in 1939. Prices of lead and zinc were decontrolled in Australia on 21st April, 1953. Free trading in lead in the United Kingdom, after thirteen years of Government control, was resumed on 1st October, 1952, while the price of zinc, fixed by regulation, was abandoned from 1st January, 1953. Silver prices have not been controlled in Australia and the United Kingdom.

PRICES OF SILVER, LEAD AND ZINC.

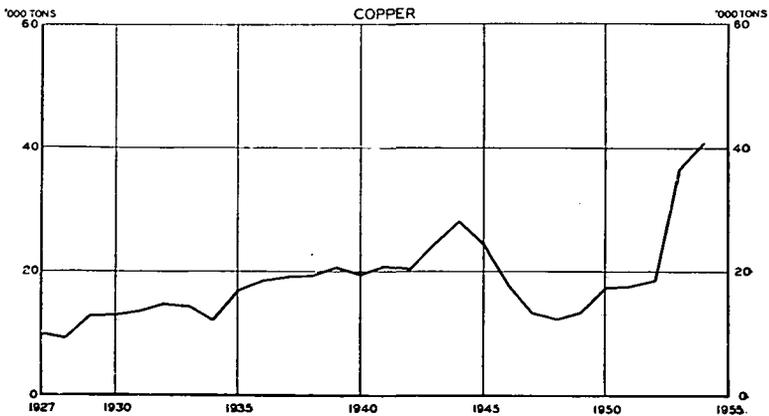
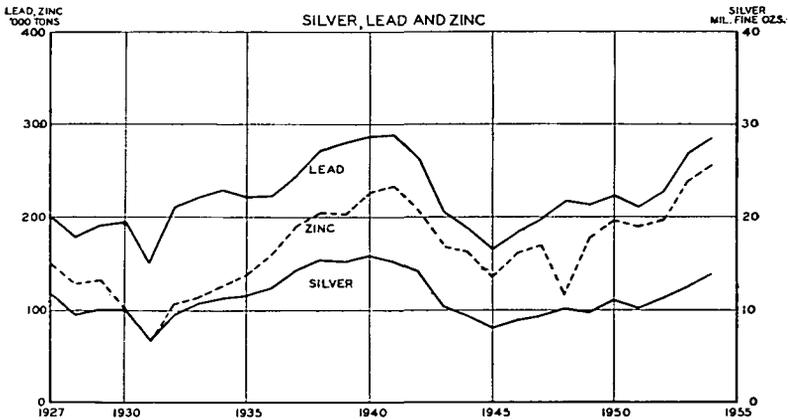
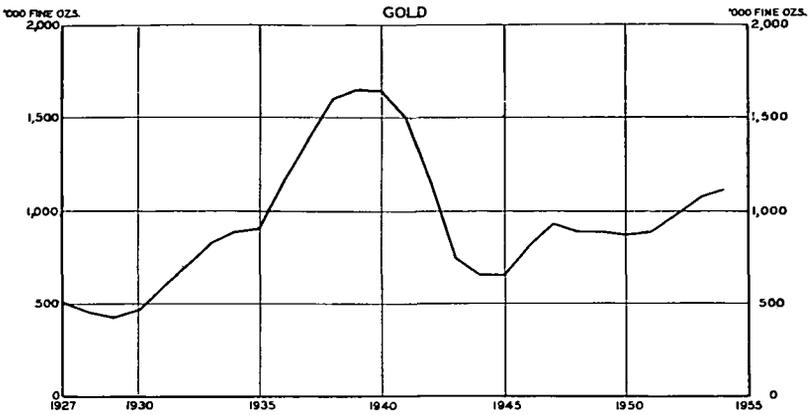
(£ s. d.)

Metal.	1938.	1949.	1950.	1951.	1952.	1953.
Australian Prices, in Australian currency—						
Silver, per fine oz. (a) ..	0 2 2	0 5 2	0 6 9	0 8 2	0 7 9	0 7 8
Lead, per ton ..	b c 22 0 0	b 35 0 0	b 43 12 7	b 65 0 0	b 74 15 1	d 103 9 1
Zinc, per ton ..	b c 22 0 0	b 40 0 0	b 47 3 10	b 65 0 0	b 74 15 1	d 91 10 7
London Metal Exchange Prices, in sterling—						
Silver, per fine oz. (e) ..	0 1 9	0 4 1	0 5 5	0 6 6	0 6 2	0 6 2
Lead, per ton ..	b 15 6 6	b 103 3 11	b 106 8 2	b 161 19 10	f 135 9 0	g 91 7 2
Zinc, per ton ..	b 14 1 7	b 87 8 6	b 119 4 3	b 171 12 3	b 149 10 2	g 75 1 3

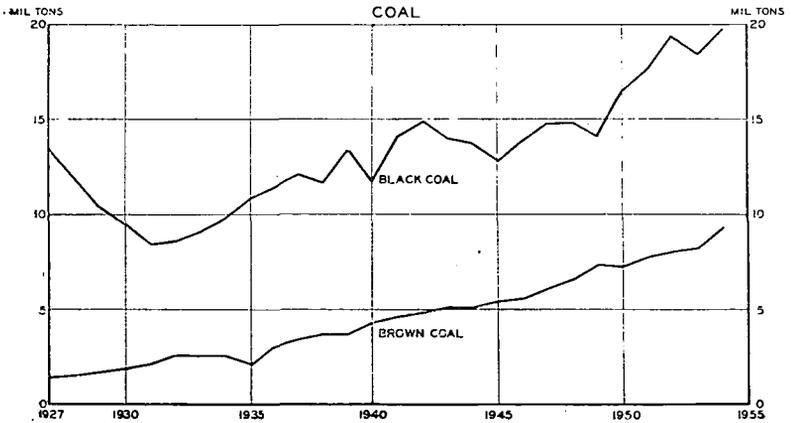
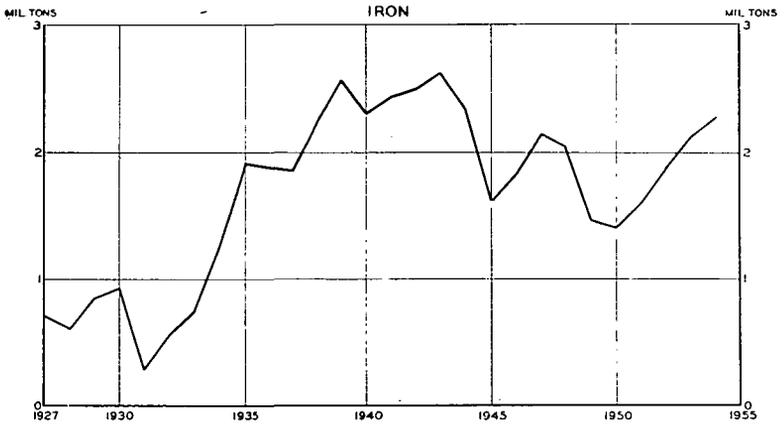
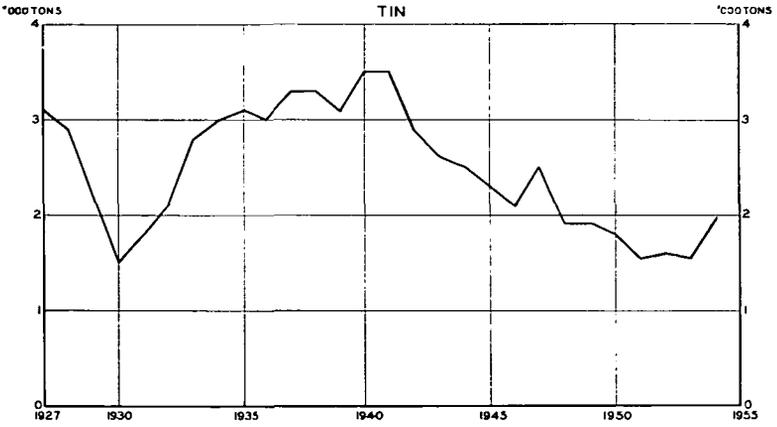
(a) Silver prices have not been fixed by regulation in Australia, the prices shown representing export parity calculated from London Metal Exchange prices. (b) Prices fixed by regulation. (c) From February, 1940. (d) Price regulation was abandoned from 21st April, 1953; average market prices have been used for balance of year. (e) Average market prices. (f) Price regulation was abandoned from 1st October, 1952; average market prices have been used for balance of year.

5. **Employment in Silver, Lead and Zinc Mining.**—Particulars of the number of persons employed in mining for these metals are shown in § 13, page 700.

MINE PRODUCTION OF MINERALS AND METALS AUSTRALIA: 1927 TO 1954



MINE PRODUCTION OF MINERALS AND METALS AUSTRALIA: 1927 to 1954



§ 4. Copper.

1. **Production.**—Copper is widely distributed throughout Australia. However, the principal producing States in 1952 were Tasmania, Queensland and New South Wales, in that order of magnitude.

In view of the revised methods of compiling values of individual minerals produced, operative from 1950 (see page 666), it is not practicable to continue a table of values of mine production of copper similar to that shown in issues of the Official Year Book prior to No. 40. The table hereunder shows the quantity of mine production of copper (copper content of ores and concentrates produced) in Australia for the years 1951 and 1952. It should be noted that the minerals shown below contain, in addition to copper, certain other metals.

COPPER : CONTENT OF ORES AND CONCENTRATES PRODUCED, AUSTRALIA.
(Tons.)

Mineral in which Contained.	1951.	1952.
Copper Ore, Concentrate and Precipitate	15,739	16,125
Gold Ore, Concentrate, etc.	5	1
Lead Ore and Concentrate	1,874	2,163
Zinc Concentrate	308	289
Total	17,926	18,578

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 1939, 1948 and 1949, and as recorded by this Bureau from data obtained from the several State Mines Departments and other sources for the years 1950 to 1952, are shown in the table below.

COPPER : CONTENT OF ORES AND CONCENTRATES PRODUCED, STATES.
(Tons.)

State.	1939.	1948.	1949.	1950.	1951.	1952.
New South Wales ..	1,155	2,515	2,453	3,893	3,679	3,562
Queensland ..	5,798	3,149	4,924	5,424	5,432	6,966
South Australia ..	110	4	3	..	(a)	2
Western Australia ..	1	..	5	1	7	7
Tasmania ..	13,433	6,574	5,229	7,884	8,657	7,722
Northern Territory ..	43	126	848	279	151	319
Australia	20,560	12,368	13,162	17,481	17,926	18,578

(a) Less than half a ton.

2. **Sources of Production.**—(i) *New South Wales.* The copper content of ores and concentrates produced in New South Wales in 1952 amounted to 3,562 tons. The principal sources of this production were ores mined at Broken Hill and Captain's Flat.

(ii) *Queensland.* In 1952 mine production of copper in this State amounted to 6,966 tons compared with 5,432 tons in 1951 and 5,424 tons in 1950. The bulk of the production in 1952 came from Mt. Morgan while the copper content of copper-lead dross from Mt. Isa Mines, treated overseas, yielded 562 tons.

A copper mill and smelter is now in operation 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 until recently operations have been confined to silver-lead-zinc ores. The production of copper in the new smelter commenced early in 1953, resulting in a considerable increase in Australia's total copper output for that year.

(iii) *South Australia.* Deposits of copper were previously found over a large portion of South Australia but the principal fields have been exhausted and output in recent years has been negligible.

(iv) *Western Australia.* The ore sent to smelters in 1952 amounted to 16 tons containing 7 tons of metal. In the same year carbonate ores for use as fertilizers amounted to 1,644 tons, the average copper content being 10.7 per cent.

(v) *Tasmania.* The quantity of copper produced in Tasmania during 1952 was 7,722 tons, The Mount Lyell Mining and Railway Co. Ltd. providing the greater part thereof (7,490 tons). Most of the balance consisted of copper in copper-lead concentrates exported from Read-Rosebery.

(vi) *Northern Territory.* Copper has been found at various places in the Territory. In 1952, 1,466 tons were mined, containing 319 tons of copper, compared with 805 tons of ore containing 151 tons of copper in 1951. The increase in 1952 was due mainly to mining of high-grade copper ore at the Peko Mine, Tennant Creek.

3. **Production and Sales of Refined Copper.**—There are two refining plants in Australia, one operated by Electrolytic Refining and Smelting Co., Port Kembla, New South Wales, and the other by The Mount Lyell Mining and Railway Co. Ltd., Mt. Lyell, Tasmania. The electrolytic process is employed in both cases. However, the latter plant produces the copper in cathode form, which with the exception of a quantity sold to the trade in Tasmania is shipped to Port Kembla for conversion into the various customary refinery shapes. In the following table, details are given of the production and sales of refined domestic primary copper, as recorded from data received from the Australian Mines and Metals Association and other sources.

REFINED COPPER(a) : PRODUCTION AND SALES, AUSTRALIA.

(Tons.)

Particulars.	1939.	1949.	1950.	1951.	1952.	1953.
Production	17,867	9,955	13,231	13,543	19,623	16,682
Sold to Australian consumers(b)	18,808	9,884	11,910	13,746	17,102	13,412
Exported or sold for export (b)	100	4	..	..	..	2,607

(a) Refined from domestic primary copper.

(b) Source : Australian Mines and Metals Association.

Up to 1952, local demand for copper considerably exceeded Australian refinery production and substantial quantities of copper were imported. A large proportion of the imports in 1948 and later years comprised blister copper imported mainly from South Africa and refined in Australia. However, in 1953 the large increase in blister copper production from the Mt. Isa smelter could not be handled with available refining capacity and considerable quantities of blister copper were exported for treatment overseas. During that year, imports of copper were very small.

4. **World Production of Copper.**—The world's estimated mine production of copper during the years 1939 and 1947 to 1952 is shown below.

COPPER : WORLD MINE PRODUCTION.

('000 Tons.)

1939.	1947.	1948.	1949.	1950.	1951.	1952.
2,160	2,180	2,280	2,250	2,490	2,630	2,720

The yields in 1952 from the principal copper-producing countries reporting, as published by the Mineral Resources Division of the Colonial Geological Surveys, were as follows:—

COPPER : MINE PRODUCTION IN PRINCIPAL COUNTRIES, 1952.
(Tons.)(a)

Country.	Production.	Country.	Production.
United States of America ..	826,229	Union of South Africa ..	34,558
U.S.S.R. Chile ..	402,179	Peru	30,687
Russia	(b) 329,000	Cyprus	24,900
Rhodesia	324,382	Turkey	22,962
Canada(c)	230,939	Australia	18,578
Belgian Congo	202,499	Finland	18,386
Mexico	57,540	Cuba	17,059
Japan	52,706	Sweden	13,554
Yugoslavia	36,386	Norway	13,417

(a) Long tons. (b) Estimated. (c) Includes Newfoundland.

During 1952 the share of the United States of America in the world's mine production of copper amounted to 30 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. Private trading in copper in the United Kingdom was resumed on 5th August, 1953. 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 THE UNITED KINGDOM.
(£ s. d.)

Country.	December, 1939.	1949.	1950.	1951.	1952.	1953.
Australia — in Aust. currency	63 17 6	167 19 5	189 1 8	254 6 4	308 15 1	329 16 4
United Kingdom — in sterling ..	62 0 0	133 1 11	178 17 1	220 7 1	258 19 6	253 6 9

(a) *Hz* works Port Kembla. (b) Average market prices from 5th August, 1953.

6. Employment in Copper Mining.—Particulars of the numbers of persons engaged in the mining of copper and copper-gold ores are shown in § 13 below. Data for 1949 and earlier years are combined with those for gold mining as separate particulars are not available.

§ 5. Tin.

1. Production.—Tasmania, Queensland and New South Wales are the principal producing States.

The table of values of tin production published in issues of the Official Year Book prior to No. 40 has been discontinued for reasons stated above (*see* p. 666).

The following table shows the production of tin in Australia in the years 1948 to 1952 compared with 1939.

TIN : PRODUCTION, AUSTRALIA.
(Tons.)

Particulars.	1939.	1948.	1949.	1950.	1951.	1952.
Mine Production ..	3,067	1,885	1,886	1,854	1,559	1,610
Production of Refined Tin(a)	3,294	1,885	1,955	2,014	1,459	1,700

(a) This information has been prepared from data received from the Australian Mines and Metals Association and other sources.

2. Sources of Production.—(i) *New South Wales*. Production of tin concentrates in 1952 was 560 tons, with a tin content of 396 tons, compared with 578 tons (tin content 413 tons) in 1951. 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 tin produced in this State is obtained solely as a by-product from the gold dredging operations at Eldorado. The production in 1952 amounted to 52 tons of concentrates, with a tin content of 39 tons, compared with 49 tons (tin content 36 tons) in 1951.

(iii) *Queensland*. The chief producing districts in Queensland during 1952 were Herberton, 347 tons of concentrates; Cooktown, 43 tons; Kangaroo Hills, 26 tons; Chillagoe, 23 tons; and Stanthorpe, 20 tons. The total production in 1952 amounted to 476 tons, compared with 490 tons in 1951. The tin content in 1951 and 1952 was 340 tons and 330 tons respectively. 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 1952 amounted to 98 tons (tin content 65 tons), compared with 61 tons in 1951 (tin content 41 tons). Production was mainly in the Pilbara and Greenbushes fields.

(v) *Tasmania*. For 1952 the output amounted to 1,115 tons of tin concentrates, an increase of 117 tons on the output of the previous year. The tin content for 1952 was 771 tons and for 1951, 706 tons.

(vi) *Northern Territory*. The production for 1952 amounted to 17 tons of concentrates, compared with 37 tons of concentrates produced during 1951. The tin content for 1952 and 1951 was 9 tons and 23 tons respectively.

3. World Production.—The world production of tin ore, *in terms of metal*, during each of the years 1939 and 1948 to 1952, as published by the Mineral Resources Division of the Colonial Geological Surveys, was as follows:—

TIN : WORLD PRODUCTION.
(*000 Tons.)

1939.	1948.	1949.	1950.	1951.	1952.
174.0	151.6	161.5	167.2	167.3	171.0

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:—Federation of Malaya, Indonesia, Bolivia, Belgian Congo, Thailand and Nigeria. In recent years these countries have produced approximately 90 per cent. of the total production. Australia's share of the world's tin production is about 1 per cent.

The production of tin ore, *in terms of metal*, as published by the International Tin Study Group and other authorities, for the principal producing countries in 1952 was as follows:—

TIN : PRODUCTION IN PRINCIPAL COUNTRIES, 1952.
(Tons.) (a)

Country.	Production.	Country.	Production.
Malaya, Federation of ..	56,838	Australia	1,610
Indonesia	35,003	Portugal	1,462
Bolivia	32,216	Burma	1,103
Belgian Congo	13,995	Union of South Africa	935
Thailand	9,474	United Kingdom	822
Nigeria	8,303	Spain	733
China	(b) 5,400	Mexico	413

(a) Long tons.

(b) Estimated.

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 was decontrolled on the 21st April, 1953. 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 THE UNITED KINGDOM.
(£ s. d.)

Country.	December, 1939.	1949.	1950.	1951.	1952.	1953.
Australia — In Aust. currency (a)	299 0 0	620 0 0	725 5 9	1,222 8 9	1,150 10 0	(b) 919 10 5
United Kingdom — In sterling ..	(c) 271 0 0	(c) 599 16 1	(d) 745.16 9	d 1,079 16 0	(d) 964 12 1	(d) 730 14 11

(a) Prices fixed by regulation ex smelters for sales of 10 cwt. or more or in ingots of 70 lb. or more.
(b) Average market prices from 21st April, 1953.
(c) Prices fixed by regulation for standard tin.
(d) Average spot market prices for standard tin.

5. **Employment in Tin Mining.**—The number of persons employed in tin mining is shown in § 13 (page 700).

§ 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 easily accessible 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) *Australia.* Production of iron ore for smelting purposes and estimated iron ore content are shown below for the years 1939 and 1948 to 1952:—

IRON ORE : PRODUCTION, AUSTRALIA.
(Tons.)

Particulars.	1939.	1948.	1949.	1950.	1951.	1952.
Production of Iron Ore	2,575,758	2,053,599	1,472,669	2,364,719	2,436,229	2,907,754
Estimated Iron Content	1,548,031	1,273,231	924,836	1,417,608	1,605,400	1,883,087

(ii) *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 for New South Wales blast furnaces has been South Australia.

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 1952, 12,315 tons of oxide were won.

(iii) *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 1,253 tons of iron oxide for 1952 came mainly from the Biggenden district.

(iv) *South Australia.* The production from the deposits worked by The Broken Hill Proprietary Co. Ltd. in the Middleback Ranges reached its pre-war maximum in 1939, when 2,571,759 tons of ore were raised. Production in 1952 reached a new peak of 2,683,966 tons (estimated iron content, 1,744,578 tons).

(v) *Western Australia.* Plans drawn up in 1927 to develop the rich iron ore deposits on Cockatoo Island in Yampi Sound were realized 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. Since that date, regular shipments of ore have proceeded for smelting at Port Kembla. In 1952, 204,945 tons with an estimated iron content of 128,157 tons were transported while in 1953 687,895 tons (iron content, 436,057 tons) were shipped. Iron ore is also obtained from deposits at Wundowie and Koolyanobbing. Total production of iron ore during 1952 was 223,788 tons with an estimated iron content of 138,509 tons.

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 Bassendene and Bayswater on the coast.

(vi) *Tasmania*. There has been no production of ironstone in Tasmania since 1943 when 7 tons were produced. The iron pyrites concentrate produced, which in 1952 amounted to 54,421 tons (sulphur content, 26,950 tons), is a by-product from the flotation of copper ores at Mount Lyell. This product is exported to the mainland, where it is used in the manufacture of chemical fertilizers.

In 1952, 4,675 tons of iron oxide were produced for gas purification and fluxing purposes.

3. **Production of Iron and Steel.**—(i) *Australia*. The production of pig-iron and steel in Australia, of which New South Wales is the main producing State, is shown in the following table for each of the years 1944-45 to 1953-54 :—

PIG-IRON AND STEEL : PRODUCTION, AUSTRALIA.

(Tons.)

Year.	Pig-iron. (a)	Steel Ingots.	Blooms and Billets.	Year.	Pig-iron. (a)	Steel Ingots.	Blooms and Billets.
1944-45 ..	1,117,709	1,356,913	1,236,528	1949-50 ..	1,097,635	1,217,971	1,103,784
1945-46 ..	906,283	1,061,918	1,036,501	1950-51 ..	1,313,332	1,443,831	1,297,260
1946-47 ..	1,143,132	1,312,439	1,255,703	1951-52 ..	1,430,027	1,521,386	1,361,342
1947-48 ..	1,235,574	1,344,692	1,222,938	1952-53 ..	1,691,693	1,801,028	1,687,891
1948-49 ..	1,044,957	1,178,010	1,101,063	1953-54 ..	1,829,812	2,129,633	1,779,845

(a) Includes pig-iron for castings ; excludes ferro-alloys.

The principal producers in Australia are The Broken Hill Proprietary Co. Ltd. and Australian Iron and Steel Ltd., both in New South Wales, the former situated at Newcastle and the latter at Port Kembla. The Broken Hill Proprietary 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 at Wundowie. The output for the year 1952-53 amounted to 10,280 tons.

(ii) *Principal Countries*. Particulars of the production in the principal countries and the estimated world total production during the years 1939, 1951 and 1952, according to figures published by the Mineral Resources Division of the Colonial Geological Surveys, are shown in the next table.

PIG-IRON AND STEEL : PRODUCTION IN PRINCIPAL COUNTRIES.

('000 Tons.) (a)

Country.	Pig-iron and Ferro-alloys.			Steel Ingots and Castings.		
	1939.	1951.	1952.	1939.	1951.	1952.
U.S. of America	31,855	64,686	56,566	47,142	93,928	83,186
U.S.S.R.(b)	15,000	21,800	24,900	18,500	30,800	33,900
United Kingdom	7,980	9,669	10,728	13,221	15,639	16,418
Germany (Federal Republic) c	17,202	10,528	12,673	22,123	13,293	15,556
France	7,304	8,612	9,615	7,783	9,680	10,695
Japan	3,144	3,177	3,529	6,588	6,399	6,878
Belgium	3,010	4,791	4,713	3,955	4,974	4,987
Estimated World Total	100,000	147,700	149,900	134,000	207,000	207,000

(a) Long tons.

(b) Estimated.

(c) Pre-war Germany.

§ 7. Other Metallic Minerals.

1. **Tungsten.**—Tungsten ores occur in all States. Particulars of scheelite concentrates from King Island, in Bass Strait, the major producer, are included with Tasmanian production. Other important deposits of tungsten ores occur in Queensland, New South Wales, the Tasmanian mainland and the Northern Territory, but production from Victoria, South Australia and Western Australia has been comparatively unimportant. In recent years the largest producer has been Tasmania, followed by the Northern Territory. Production of tungsten concentrates and contents during 1952 in each State, etc., is shown below :—

TUNGSTEN CONCENTRATES : PRODUCTION, 1952.

(Tons.)

Particulars.	N.S.W.	Vic.	Q'land.	W. Aust.	Tas.	N. Terr.	Australia.
Scheelite Concentrate ..	8	..	9	2	970	..	989
WO ₃ Content	6	..	6	1	589	..	602
Wolfram Concentrate ..	33	2	230	27	481	262	1,035
WO ₃ Content	21	1	150	17	318	165	672

The following table shows production for Australia for the years 1939 and 1948 to 1952 :—

TUNGSTEN CONCENTRATES : PRODUCTION, AUSTRALIA.

(Tons.)

Particulars.	1939.	1948.	1949.	1950.	1951.	1952.
Scheelite Concentrate ..	191	651	810	800	1,031	989
WO ₃ Content	124	510	545	532	632	602
Wolfram Concentrate ..	726	328	376	282	697	1,035
WO ₃ Content	482	292	265	198	467	672

2. **Mineral Sands.**—The recovery of mineral sands from beaches in northern New South Wales and Queensland commenced in 1934. The industry was expanded considerably following the 1939-45 War and Australia is now one of the world's largest producers of the two principal minerals obtained from treatment of the sands, namely, rutile and zircon. Small quantities of ilmenite and monazite are also produced. Particulars of the quantity of rutile and zircon concentrates produced are shown in the following table for the years 1947 to 1953 :—

RUTILE AND ZIRCON PRODUCTION, AUSTRALIA.

(Tons.)

Year.	Rutile Concentrates.		Zircon Concentrates.	
	Quantity.	TiO ₂ Content.	Quantity.	Zircon Content.
1947	(a) 20,448	12,725	(a) 27,375	21,509
1948	(a) 18,992	15,007	(a) 24,668	21,889
1949	(a) 16,454	13,982	(a) 22,233	20,970
1950	18,312	18,089	21,805	21,536
1951	35,189	33,432	42,410	41,420
1952	38,014	36,861	27,696	27,371
1953	38,039	37,067	27,207	26,858

(a) Includes mixed Zircon-Rutile concentrates ; 1947, 11,984 tons ; 1948, 5,605 tons ; 1949, 3,360 tons.

3. **Cadmium and Cobalt.**—The sources of cadmium in Australia are lead and zinc concentrates. The cadmium content of these concentrates produced during the year 1952 is estimated at 634 tons. The greater proportion of the concentrates is treated at Risdon, Tasmania, and at Port Pirie, South Australia, for the extraction of cadmium. The remainder of the concentrates are exported. In 1938, which is the latest year for which relatively complete world production figures are available, Australia produced 196 tons of refined cadmium, amounting to about 5 per cent. of world output.

Cobalt is present in zinc concentrates produced at Broken Hill, New South Wales, and at Rosebery, Tasmania. The cobalt is recovered in the form of cobalt oxide at the zinc refining plant at Risdon, Tasmania, and is sold as such to industry. The cobalt metal content of zinc concentrate produced in 1952 is estimated at 54 tons.

Production of refined cadmium and cobalt oxide for the years 1939 and 1948 to 1952 is shown in the following table:—

CADMIUM (REFINED) AND COBALT OXIDE : PRODUCTION.
(Tons.)

Year.	Cadmium (Refined).			Cobalt Oxide. Extracted from Ores Mined in New South Wales.(a)
	Extracted from Ores Mined in—			
	New South Wales.	Tasmania.	Total.	
1939	124	48	172	20
1948	245	44	289	15
1949	216	44	260	14
1950	250	44	294	16
1951	195	36	231	13
1952	245	41	286	16

(a) Excludes less than a ton of cobalt oxide produced from Tasmanian ores in each of the years shown.

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

4. **Platinum Group Metals.**—(i) *Platinum.* The only production in Australia in recent years has been from deposits worked at Fifield, New South Wales. In 1950 the output of concentrates was 24 oz., containing 16 oz. of platinum, and in 1951 the quantity of concentrates produced was 13 oz., the platinum content being 8 oz. There was no production in 1952.

(ii) *Osmiridium.* Practically all the production of osmiridium is from the west coast of Tasmania, the only other production being a very small quantity contained in platinum concentrates produced at Fifield, New South Wales. Total production in 1950 was 48 oz., in 1951, 34 oz. and in 1952, 51 oz. Of this, 2 oz. were from New South Wales in 1950 and half an ounce in 1951, and in 1952 the whole of production was from Tasmania.

(iii) *Palladium.* In 1951 less than half an ounce of palladium was recovered from concentrates produced at Fifield, New South Wales, and production was nil in 1952.

(iv) *Osmium, iridium, etc.* There has been no production recorded in recent years.

5. **Other.**—The production, in 1952, of other metallic minerals worthy of note, is as follows:—

Antimony. The antimony content of antimony-bearing minerals produced was 743 tons. Of this amount 502 tons were in lead concentrates and 239 tons in 480 tons of antimony ore and concentrates.

Bismuth. Bismuth content of minerals produced was 3,152 lb., of which 3,124 lb. were contained in 7,926 lb. of bismuth concentrates from New South Wales.

Manganese. Production of manganese ore comprised 6,026 tons of metallurgical grade (manganese content 2,762 tons), 573 tons of battery grade (manganese dioxide content 423 tons), and 470 tons of other grades (manganese dioxide content 333 tons). Manganese content of zinc concentrates produced in New South Wales was 3,452 tons.

Molybdenum. 283 lb. of molybdenite concentrates were produced, the molybdenum sulphide content being 256 lb.

§ 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 for 1939, and for each of the years 1949 to 1953 are shown in the following table. Of the total production of black coal in 1953, 81,909 tons were classified as semi-anthracite, 16,764,287 tons as bituminous and 1,564,649 tons as sub-bituminous.

Of the total production of black coal in Australia in 1953, 3,138,976 tons (17 per cent.) were obtained by open-cut methods. The remainder, 15,271,869 tons (83 per cent.), came from underground mines. In 1946, only 8 per cent. of black coal won in Australia came from open-cut mines while in 1952 the proportion reached a maximum of 21 per cent.

COAL PRODUCTION.

Year.	Black Coal.							Brown Coal.
	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	Australia.	Victoria.
QUANTITY ('000 tons).								
1939 ..	11,196	365	1,317	..	558	99	13,535	3,651
1949 ..	10,736	122	1,970	345	751	182	14,106	7,376
1950 ..	12,798	127	2,321	261	814	222	16,543	7,327
1951 ..	13,513	148	2,474	388	848	237	17,608	7,836
1952 ..	15,022	144	2,742	418	830	248	19,404	8,104
1953 ..	14,174	152	2,517	448	886	234	18,411	8,257
VALUE (a) (£'000).								
1939 ..	7,027	260	1,168	..	363	74	8,892	386
1949 ..	16,122	380	2,874	172	972	182	20,702	1,469
1950 ..	22,121	382	3,562	131	1,185	232	27,613	1,707
1951 ..	29,326	601	4,490	400	1,717	305	36,839	2,755
1952 ..	43,283	728	5,956	430	2,457	475	53,329	3,255
1953 ..	41,030	946	5,861	461	3,073	453	51,824	3,628

(a) At the mine.

2. **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 division are being worked extensively in the Hunter River Valley area, particularly in the vicinity of Maitland, Cessnock and, more recently, Muswellbrook. This district is the most important, from the aspect of coal mining, in Australia.

The following table shows particulars of New South Wales coal production classified according to type of mining and rank during the five years 1949 to 1953 compared with 1939. Small quantities of semi-anthracite coal produced in some years are included with bituminous.

COAL : PRODUCTION, NEW SOUTH WALES.

('000 Tons.)

Particulars.	1939.	1949.	1950.	1951.	1952.	1953.
Underground Mines	11,196	9,388	11,196	11,224	12,492	12,452
Open Cut Mines .. ..	..	1,348	1,602	2,289	2,530	1,722
Total	11,196	10,736	12,798	13,513	15,022	14,174
Bituminous	11,194	10,729	12,786	13,508	15,009	14,165
Sub-bituminous	2	7	12	5	13	9

(ii) *Victoria. (a) Black Coal.* Production of black coal in Victoria is restricted to the Gippsland district. The State Coal Mines at Wonthaggi is the main producer, the remaining production coming from small privately-owned mines. In 1953, production of bituminous coal was 151,907 tons which was 8,087 tons higher than 1952 production of 143,820 tons.

(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 40,000 million tons. Large-scale developmental projects are in progress: these, when completed, will greatly reduce the dependence on fuel from other States. Brown coal produced in Victoria in 1953 amounted to 8,257,299 tons, of which 7,717,318 tons, or 93 per cent., were won at the State open-cuts at Yallourn. During 1952-53, 7,571,940 tons of brown coal were produced at Yallourn, of which 4,933,459 tons went to the Yallourn power station, and 2,186,170 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 545,063 tons in 1952-53. Approximately 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 1948-49 to 1952-53, 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 Stations.	Briquette Factory.			
1938-39 ..	3,663	2,096	516	1,031	400	20
1948-49 ..	7,027	4,130	733	1,467	559	697
1949-50 ..	7,637	4,408	776	1,553	589	900
1950-51 ..	7,300	4,338	606	1,391	511	875
1951-52 ..	8,006	4,784	776	1,553	568	983
1952-53 ..	8,075	4,933	729	1,457	545	956

(iii) *Queensland.* The production of coal classified according to type of mining and rank during the years 1939 and 1949 to 1953 was as follows:—

COAL : PRODUCTION IN QUEENSLAND.
(Tons.)

Particulars.	1939.	1949.	1950.	1951.	1952.	1953.
Underground Mines ..	1,274	1,548	1,860	1,857	2,006	1,942
Open-cut Mines ..	43	422	461	617	736	575
Total ..	1,317	1,970	2,321	2,474	2,742	2,517
Semi-anthracite ..	1,317	1,861	99	81	83	81
Bituminous ..			2,057	2,138	2,312	2,215
Sub-bituminous ..			109	165	255	347	221

The principal coal-producing districts in Queensland are Ipswich, Clermont, Mt. Morgan and Bowen; output from these areas in 1953 amounted to 2,092,587 tons or 83 per cent. of the total.

The open-cut method of mining for black coal has advanced considerably in Queensland in recent years. In 1946, 106,444 tons (or 7 per cent. of total production) were won from open-cuts while in 1953, 575,181 tons (23 per cent.) were mined in this manner.

(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 the first year of major production of the Leigh Creek mine in 1944, 34,620 tons were won. Production has risen considerably in more recent years, and amounted to 448,484 tons in 1953.

(v) *Western Australia.* The only coal deposits which have been developed on a commercial scale are at Collie in the south-west of the State. Collie coal is sub-bituminous in rank. Production in 1953 was 886,182 tons, compared with 557,535 tons in 1939.

(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. In 1953, output amounted to 233,629 tons compared with 99,392 tons in 1939.

(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 March, 1953. This places total Australian reserves at about 56,800 million tons, of which 14,250 million tons are of anthracitic and bituminous rank and 42,550 million tons of sub-bituminous and lignitic rank. New South Wales has the largest reserves of anthracitic and bituminous coal (about 10,000 million tons) while the greater part of the sub-bituminous and lignitic reserves comprise brown coal in Victoria (40,000 million tons).

3. *Production in Principal Countries.*—The following table shows the production of the principal countries during each of the three years 1951 to 1953 compared with 1939, as published by the Statistical Office of the United Nations.

COAL : PRODUCTION IN PRINCIPAL COUNTRIES.

('000 Tons.) (a)

Country.	Black Coal.				Brown Coal, Lignite.			
	1939.	1951.	1952.	1953.	1939.	1951.	1952.	1953.
United States of America	395,800	515,632	465,581	431,266	2,716	(b)	(b)	(b)
United Kingdom	231,335	222,802	233,845	223,518				
Germany (Federal Republic) ^c	171,937	117,009	125,269	122,506	208,757	81,788	84,725	83,218
France	61,419	52,117	56,272	67,917	1,084	1,972	2,025	1,918
Poland	(d)22,818	80,679	85,811	51,371				
Japan	51,581	42,624	44,052	45,789	192	1,381	1,561	1,459
India	27,769	31,300	37,405	35,846				
Belgium	29,372	29,187	30,880	29,580				
Union of South Africa	16,623	25,602	27,697	28,013				
Australia	13,535	17,603	19,401	18,411	3,651	7,836	8,104	8,257
Canada	13,153	14,582	14,281	12,405	858	1,984	1,915	1,808
Netherlands	12,658	12,220	12,733	12,103	194	248	244	249
Spain	6,502	11,146	12,196	11,963	1,571	1,464	1,622	1,763

(a) Long tons.
to June only.

(b) Included with Black Coal.

(c) Pre-war Germany.

(d) January

World production of coal amounted to 1,550 million tons in 1939; it rose to 1,770 million tons in 1943 and by 1952 had reached 1,880 million tons. Of these quantities, those produced in the British Commonwealth totalled 312 million or 20 per cent. in 1939, 286 million or 16 per cent. in 1943 and 340 million tons or 18 per cent. in 1952.

4. Exports.—(i) *General.* The quantity of coal of Australian production exported to other countries in 1952-53 was 255,832 tons, valued at £1,178,466, shipped mainly from New South Wales. These figures of overseas exports exclude bunker coal supplied to overseas vessels, which in 1952-53 amounted to 42,623 tons, valued at £215,776. The quantities and values of the overseas exports of Australian coal and of bunker coal for overseas vessels for a series of years are shown in the following table.

COAL : OVERSEA EXPORTS AND BUNKERS, AUSTRALIA.

Year.	Oversea Exports.(a)		Bunker Coal for Oversea Vessels.	
	Quantity.	Value.	Quantity.	Value.
	Tons.	£	Tons.	£
1938-39	382,085	347,054	549,453	561,063
1948-49	36,913	97,353	293,707	836,117
1949-50	68,404	206,460	135,059	418,939
1950-51	72,283	242,649	69,299	284,824
1951-52	139,140	608,045	54,207	246,258
1952-53	255,832	1,178,466	42,623	215,776

(a) Excludes bunker coal.

(ii) *New South Wales.* New South Wales is the principal Australian coal-producing State and in addition to meeting requirements within the State, supplies considerable quantities of coal to other States and for export overseas as well as bunker coal for vessels calling at New South Wales ports. According to figures compiled by the Government Statistician, of the total New South Wales coal production in 1952-53 (14,289,711 tons), 11,448,830 tons (80.1 per cent.) were available for consumption in the State, 2,334,104 tons (16.3 per cent.) were exported interstate and 506,777 tons (3.6 per cent.) were exported overseas or supplied as bunker coal for interstate and overseas vessels.

5. Consumption in Australia.—Details of the average annual production of coal and its utilization in Australia are given in the following table for the five years ended 1938-39 and 1951-52, together with similar details of production and utilization for the year 1952-53.

COAL : PRODUCTION AND UTILIZATION IN AUSTRALIA.

Particulars.	Quantity.			Proportion of Total.		
	Average for five years ended—		1952-53.	Average for five years ended—		1952-53.
	1938-39.	1951-52.		1938-39.	1951-52.	

BLACK COAL.

	'000 Tons.	'000 Tons.	'000 Tons.	%	%	%
Source of Supplies—						
Production (a)	11,158	16,117	18,545	99.7	98.1	99.2
Imports	31	319	146	0.3	1.9	0.8
Total Supplies	11,189	16,436	18,691	100.0	100.0	100.0
Utilization—						
Exported Overseas ..	346	77	256	3.1	0.5	1.4
Bunker Coal—						
Oversea Vessels ..	592	167	43	5.3	1.0	0.2
Intrastate and Interstate Vessels	377	254	288	3.4	1.6	1.6
Total	969	421	331	8.7	2.6	1.8
Consumed as fuel in—						
Electric Light and Power Works	1,796	4,174	5,071	16.0	25.4	27.1
Factories (b)	2,067	2,749	3,098	18.5	16.7	16.6
Railway Locomotives (c)	2,328	3,185	3,110	20.8	19.4	16.6
Total	6,191	10,108	11,279	55.3	61.5	60.3
Consumed as raw material in—						
Gas works	1,111	1,986	2,081	9.9	12.1	11.1
Coke works	1,467	2,277	3,071	13.1	13.8	16.4
Total	2,578	4,263	5,152	23.0	25.9	27.5
Balance—Unrecorded consumption, other purposes (d)	1,105	1,567	1,673	9.9	9.5	9.0
Grand Total	11,189	16,436	18,691	100.0	100.0	100.0

BROWN COAL.

	'000 Tons.	'000 Tons.	'000 Tons.	%	%	%
Production of Brown Coal ..	3,094	7,296	8,075	100.0	100.0	100.0
Utilization—						
As fuel for generation of Electric Light and Power	1,673	4,286	4,933	54.1	58.8	61.1
As fuel and as a raw material by Briquette Factory	1,391	2,235	2,186	44.9	30.6	27.0
Recorded consumption as fuel in factories	(e)	672	837	(e)	9.2	10.4
Balance—Unrecorded consumption, other purposes (d)	30	103	119	1.0	1.4	1.5
Total	3,094	7,296	8,075	100.0	100.0	100.0

(a) Includes miners' and colliery coal. (b) Estimated when details not available. (c) Government railways only. (d) Includes net change in stocks. (e) Not available; included in "Balance—Unrecorded consumption".

In order to meet the greatly increased demands in Australia, arrangements have been made in recent years to import coal from overseas to augment local supplies. The quantity imported reached a post-war peak of 597,866 tons in 1950-51, but declined in 1951-52 and 1952-53 when local production increased considerably.

6. Coal Value at the Mine in New South Wales.—Particulars of the average values at the mine (or at screens where these are at a distance from the mine) of saleable coal for each district and for New South Wales as a whole are shown in the following table for the years 1938 and 1947 to 1953, according to figures compiled by the State Statistician. Saleable coal is taken to exclude miners' coal, coal consumed at the mines and other producer-consumed coal. For the years 1951 to 1953, stocks of coal held at grass by the Commonwealth Government are also excluded. The figures for the years 1947 and 1948 include Commonwealth subsidy on coal. No deduction has been made in respect of excise duty operative from 1st November, 1949.

AVERAGE SELLING VALUE AT THE MINE PER TON OF SALEABLE COAL : NEW SOUTH WALES.

(s. d.)

Year.	Northern District.	Southern District.	Western District.	Average for State.
1938	12 0	14 0	9 6	12 0
1947 (a)	20 11	23 11	16 10	20 9
1948 (a)	26 1	29 11	20 6	25 8
1949	31 8	34 10	22 6	30 3
1950	36 5	39 1	29 4	35 10
1951	51 5	50 8	42 10	49 8
1952	62 3	60 3	56 7	61 2
1953	61 6	61 0	50 10	59 9

(a) Includes Commonwealth subsidy.

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 OR PRODUCTION VALUES OF COAL PER TON : NEW SOUTH WALES, GREAT BRITAIN, CANADA AND UNITED STATES OF AMERICA.

Country.	1938.	1947.	1948.	1949.	1950.	1951.	1952.	1953.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	<i>s. d.</i>
New South Wales—Bituminous (a)	12 0	20 9	25 8	30 3	35 10	49 8	61 2	59 9
Great Britain—Deep mined (b)	16 8	40 3	47 2½	47 11	47 9½	51 2½	57 3	61 1½
	\$	\$	\$	\$	\$	\$	\$	\$
Canada—Bituminous (c)	4.279	6.748	7.850	8.175	8.200	8.550	9.767	9.800
United States of America—Bituminous (d)	4.327	6.873	(e)8.118	(e)8.631	(e)8.738	(f)5.698	5.748	5.791

(a) Average selling value at the mine per ton of 2,240 lb.; the figures relate to saleable coal and include subsidy from 1945 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. for domestic bituminous coal, 4" lump, f.o.b. mine Alberta. (d) Wholesale price, car-lots, on trucks, destination, in United States of America currency per ton of 2,000 lb. (e) 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. (f) Prices from February, 1951 onwards are "f.o.b. car at mine" and are not comparable with earlier figures. Average for 1951 relates to eleven months, February to December.

8. Employment in Coal-mines.—The number of persons employed, both above and below ground, in coal-mines in each State for 1939 and each of the years 1949 to 1953 is shown in the following table :—

COAL-MINES : PERSONS EMPLOYED.

Year.	New South Wales.	Victoria.		Queensland.	South Australia.	Western Australia.	Tasmania.	Australia.
		Black.	Brown.					
1939	16,581	1,376	449	2,615	..	752	238	22,011
1949	18,546	787	811	3,390	347	1,044	312	25,237
1950	18,540	777	889	3,495	408	1,099	334	25,542
1951	18,747	773	898	3,503	434	1,125	329	25,809
1952	20,151	851	932	3,715	220	1,326	349	27,544
1953	19,961	900	797	3,701	250	1,478	345	27,432

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 1952 were only 87 per cent. of the maximum figure already quoted. In New South Wales in 1953, 6,552,201 tons of coal, or 53.4 per cent. of the total output of underground coal, were cut by machinery, compared with 3,594,000 tons or 32.1 per cent. in 1939. Similar details for other States are not available.

9. Production of Black Coal per Man-shift.—(i) *Underground Mines.* The following table shows particulars of estimated black coal output per man-shift worked (a) at the coal face and (b) by all employees in respect of underground mines for each State concerned and for Australia for the years 1949 to 1953. These estimates have been calculated by the Joint Coal Board from data collected fortnightly in respect of coal production and the numbers of man-shifts actually worked. They are not available for years prior to 1948. In South Australia black coal is won only by open-cut mining.

PRODUCTION OF BLACK COAL PER MAN-SHIFT : UNDERGROUND MINES.(a)

(Tons.)

Year.	N.S.W.	Vic.	Q'land.	W. Aust.	Tas.	Australia.
PRODUCTION PER MAN-SHIFT WORKED AT COAL FACE.						
1949	9.83	2.39	5.85	8.40	5.30	8.58
1950	10.28	2.41	6.18	8.80	5.40	9.01
1951	10.82	2.43	6.40	8.22	6.01	9.39
1952	^b 10.06	2.24	6.36	6.82	6.03	8.88
1953	9.72	2.11	6.37	4.86	6.15	8.50
PRODUCTION PER MAN-SHIFT WORKED BY ALL EMPLOYEES.						
1949	2.91	0.94	2.46	2.22	2.80	2.74
1950	2.95	0.91	2.52	2.17	2.76	2.78
1951	2.96	0.93	2.55	1.85	3.03	2.78
1952	3.00	0.83	2.55	1.64	3.01	2.81
1953	3.08	0.81	2.53	1.67	3.00	2.84

(a) As calculated by Joint Coal Board. (b) In April, 1952, persons working "at coal face" were re-defined resulting in a considerable increase in persons in this category in New South Wales.

(ii) *Open-cut Mines.* In the next table, the Joint Coal Board's estimates of production of black coal per man-shift worked by all employees in open-cut mines are shown for the years 1949 to 1953. There are no open-cuts producing black coal in Victoria.

PRODUCTION OF BLACK COAL PER MAN-SHIFT : OPEN-CUT MINES.(a)

Year.	N.S.W.	Q'land.	S. Aust.	W. Aust.	Tas.	Australia.
1949	7.49	10.62	3.03	7.63	..	6.41
1950	8.33	10.16	2.17	7.17	5.74	6.57
1951	8.02	11.80	3.05	6.73	5.28	7.03
1952	7.92	11.78	3.22	6.13	4.63	7.07
1953	8.51	10.97	3.57	5.37	..	6.92

(a) Production per man-shift worked by all employees, as calculated by Joint Coal Board.

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.**—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. Briefly, it is the responsibility of the Board to ensure that the coal of the State is conserved, developed, worked, distributed and used to the best advantage in the public interest, and to promote the welfare of the workers in the industry. Further details of the powers and functions of the Board are contained in previous issues of the Year Book.

§ 9. Coke and Other By-products from Coal.

1. **Coke.**—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. By 1920, production had risen to more than 500,000 tons, by 1938-39 to 1,164,873 tons and in 1952-53 reached the record level of 1,858,428 tons. In recent years, imports have exceeded exports but in 1952-53, exports amounted to 17,069 tons (14,338 tons to New Caledonia) while only 685 tons were imported.

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 1952-53 was 1,071,106 tons compared with 757,046 tons in 1938-39.

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

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 1948-49 to 1952-53. The figures exclude output of coke breeze, which in 1952-53 amounted to 164,100 tons.

COKE PRODUCTION(a) : AUSTRALIA.
(Tons.)

Industry.	1938-39.	1948-49.	1949-50.	1950-51.	1951-52.	1952-53.
Coke Works ..	1,164,873	1,150,039	1,182,773	1,515,782	1,636,982	1,858,428
Gas Works ..	757,046	1,181,516	1,094,982	1,111,854	1,203,602	1,071,106
Total ..	1,921,919	2,331,555	2,277,755	2,627,636	2,840,584	2,929,534

(a) Excludes coke breeze; see letterpress above.

2. **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.	1948-49.	1949-50.	1950-51.	1951-52.	1952-53.
Tar—Crude (a) .. '000 gals.	34,614	40,844	38,178	41,239	42,886	44,408
Refined (a) .. "	3,752	13,534	12,324	12,449	12,514	15,609
Tar Oils (crude) .. "	1,254	5,234	3,758	3,960	4,101	3,674
Ammoniacal Liquor .. "	5,388	19,272	18,120	24,210	23,449	21,950
Ammonium Sulphate (a) .. tons	24,251	53,247	48,736	57,893	63,815	70,174

(a) Includes production in works other than coke and gas works.

§ 10. Mineral Oils.

1. **Shale-oil.**—(i) *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 National Oil Proprietary Ltd., by which the latter company undertook to develop the shale-oil industry in the Newnes-Capertee district of New South Wales. Production of petrol from crude oil commenced at Glen Davis, near Newnes, in 1940. However, because of the continuing uneconomical operation of the project, its small contribution to Australian petroleum supplies, and the doubtful prospect of raising production to a considerably higher figure the company, by arrangement with the Commonwealth Government, ceased to operate on 30th May, 1952. A total quantity of 26,934,403 gallons of petrol had been produced at the time of the closing of the plant.

(ii) *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 about 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 owing 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 was made in previous issues of the Official Year Book. (See Official Year Book No. 37, pages 844-5.) Although no plants are operating specifically in recovering oil from coal, considerable quantities of benzol are produced as a by-product of coke and gas manufacture and made available for blending into motor spirit. Total production in 1952-53 was 5,000,373 gallons.

3. **Natural Oil and Gas.**—(i) *Australia.* Natural oil has been proved to exist in Queensland, Victoria and Western Australia, and in the latter State in 1953, potential oil production was found at Rough Range. 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, but in the latter State no strong positive evidence of its existence has been recorded.

Reference is made in § 15 below to the assistance afforded by the Commonwealth Government in the search for oil.

Structure control drilling has been carried out following the Rough Range discovery and field exploration increased enormously, and the drilling of a number of wells has commenced at various places throughout the Commonwealth. These include all the States with the exception of South Australia and Tasmania.

(ii) *Victoria.* Production of crude oil by Lakes Oil Ltd. at Lakes Entrance was discontinued in 1951 because of economic considerations. A seismic survey was carried out near Woodside in South-Eastern Victoria by the Bureau of Mineral Resources, Geology and Geophysics to confirm evidence of an anomaly found in a previous gravity survey. A geological survey of the Murray River Basin was carried out by the State Geological Survey.

(iii) *Queensland.* At Roma, Queensland, Associated Australian Oilfields N.L. completed in February, 1953, the well commenced in October, 1952, but production tests proved the sands to be uneconomical. Another well was drilled in the same area to 3,604 ft. and this also proved uneconomical. Operations then moved to Hospital Hill where gas production at the rate of 870 m.c.f. per day was found at about 3,700 feet. Further drilling is being carried out in this district with a view to extending this reservoir.

Drilling has commenced on Reid's Dome, near Springsure, at Longreach, and in the Maryborough region.

(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.

Airborne geophysical surveys over the Eucla Basin in the south-western part of the State were made and extended into Western Australia.

(v) *Western Australia.* Systematic geological mapping and stratigraphic and structural studies have been continued in the Carnarvon area by the Commonwealth Bureau of Mineral Resources, Geology and Geophysics. Western Australian Petroleum Company (an exploration Company formed by Caltex in partnership with Ampol Petroleum Company) landed drilling equipment in the Exmouth Gulf area. This company also continued seismic exploration of the Giralalia, Cape Range, Grant Range and Rough Range Anticlines from 1952. Drilling on the Rough Range Structure commenced in September, 1953 and oil was found in the first well at 3,605 to 3,622 ft. later in that year. Wells drilled to exploit the reservoir have shown that the structural conditions at depth are apparently different from those shown at the surface and further drilling will be necessary before the complete picture will be seen.

In the Fitzroy basin, South Kimberley area, geological surface and geophysical surveys have been continued by the Bureau of Mineral Resources, Geology and Geophysics. Freney Kimberley Oil Co. (1932) N.L. became associated with Associated Australian Oilfields N.L. and have recommenced drilling on the Nerrima Dome.

(vi) *Papua.* Australasian Petroleum Co. Pty. Ltd. and Island Exploration Company continued extensive geological and geophysical surveys over the western areas of Papua. During 1953, three geological parties and 4 geophysical parties (3 seismic and 1 gravity) were operating, and a regional airborne magnetometer survey of the western part was flown. Island Exploration Co's. Omati No. 1 well had reached 13,743 feet where a strong

gas flow was encountered. The drill pipe became stuck as a result of this and, after sidetracking, operations were eventually abandoned. A second well at Omati was commenced on April 7, 1954 and has reached a depth of 9,731 feet.

(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 § 15. Government Aid to Mining, and Mineral Control, p. 703.

§ 11. Sulphur.

Sulphur, although produced in Australia as a content of certain metallic minerals, is itself non-metallic in character. Sulphides such as zinc concentrate and pyrites, which contain sulphur, are produced in appreciable quantities. There is no production of elemental sulphur (brimstone) in Australia. A large proportion of zinc concentrate produced is exported and therefore lost to Australia for utilization of the sulphur content. The sulphur recovered in Australia is in the form of acid, most of which is used in the manufacture of fertilizers, mainly superphosphate. As this recovery does not at present satisfy local requirements, it is necessary to import elemental sulphur to meet the balance.

A new mine and treatment works is being established at Nairne in South Australia, which, it is estimated, will treat 365,000 tons of pyrite ore a year, producing pyrite concentrate containing 42 per cent. sulphur, equivalent to 33,000 tons of elemental sulphur. The output of this mine will be used in a new sulphuric acid plant, with a capacity of 100,000 tons of sulphuric acid a year, being constructed at Port Adelaide.

The following table shows for the years 1939 and 1950 to 1953, the sulphur content of sulphur-bearing minerals produced, quantities of sulphur recoverable therefrom, production of monohydrate acid (100 per cent. sulphuric acid), and sulphur content of monohydrate acid produced. It will be noted that particulars regarding spent oxide roasted have been included. This has been done to complete the statistics relating to recovery of sulphur and monohydrate acid production.

SULPHUR : PRODUCTION, AUSTRALIA.
(Tons.)

Item.	1939.	1950.	1951.	1952.	1953.
Sulphur contained in—					
Zinc Concentrate	123,968	119,736	113,964	119,515	141,968
Pyrites	27,040	57,177	65,962	93,516	77,811
Spent Oxide Roasted	(a)	(b) 2,930	(b) 3,200	(b) 4,211	(b) 5,432
Total Sulphur Content	151,008	179,843	183,126	217,242	225,211
Recoverable Sulphur(b)	129,709	156,095	159,050	189,436	195,483
Monohydrate Acid Produced	c 484,493	639,600	652,125	628,302	671,471
Quantity of Sulphur in Mono- hydrate Acid produced from—					
Sulphur (Elemental)(d)	b 114,500	134,000	135,683	112,225	123,469
Zinc Concentrate	25,300	32,000	32,850	33,115	31,270
Pyrites	27,040	45,000	50,300	57,891	60,811
Spent Oxide	(a)	2,050	2,230	3,231	3,973
Total	166,840	213,050	221,063	206,462	219,523

(a) Not available.

(b) Estimated.

(c) Year ended 30th June, 1939.

(d) All imported.

§ 12. Other Non-Metallic Minerals.

1. **Salt.**—Salt is obtained in Australia from evaporation of saline lakes and clay pans. Local production satisfies local requirements and provides a considerable surplus for export. Recorded production in South Australia (the chief producing State) is shown in the following table for the years 1939 and 1949 to 1953. Available estimates of total Australian production are also shown.

SALT PRODUCTION.

('000 Tons.)

Particulars.	1939.	1949.	1950.	1951.	1952.	1953.
South Australia	79	168	191	219	203	239
Estimated Australian Total ..	(a)	(a)	273	300	277	310

(a) Not available.

2. **Mica.**—Muscovite mica is produced in the Harts Range-Plenty River area of the Northern Territory, output in 1953 being 72,226 lb. valued at £102,243. Mica was formerly produced in Western Australia and some of the other States but no output has been recorded in recent years.

3. **Gems and Gemstones.**—Among the gems and precious stones discovered from time to time in the different States are agate, amethyst, beryl, chialstolite, diamond, emerald, garnet, moonstone, olivine, opal, ruby, sapphire, topaz, tourmaline, turquoise and zircon. The following paragraphs, however, deal only with opal and sapphire, the most important of the more commonly found precious stones in Australia. Reference in some detail to the production of gems and gemstones in earlier years is made in issues of the Official Year Book prior to No. 40.

Opal of a recorded value of £78,014 was produced in Australia in 1953. The recorded value in 1952 was £64,148. The main producing centres are in South Australia on the Andamooka and Coober Pedy fields. Recorded output in this State in 1953 was valued at £76,460. Queensland production in 1953 (£1,350) came from the Quilpie district while opal in New South Wales (£204) was won at Lightning Ridge.

The production of sapphire in Australia in 1953 was valued at £725 and was won at Rubyvale and Sapphire in Queensland. Production in 1952, valued at £6,990, was mainly due to the discovery of a yellow sapphire weighing 322 carats at the Willows field in Central Queensland (this stone, named the "Golden Willow", was subsequently sold for £6,000).

4. **Other Minerals.**—Other minerals produced in Australia include asbestos, barite, clays, diatomite, dolomite, felspar, greensand (glauconite), limestone, magnesite, mineral pigments, phosphate rock, silica and talc. Considerable quantities of sand, gravel, and dimension and broken stone are obtained for direct constructional purposes.

§ 13. Persons 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 economic conditions generally, 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. The following table shows the numbers engaged in the various mining industries in each State and Australia as a whole in 1952. Attention is drawn to § 1, para. 3, Standardization of Mineral Statistics, (pp. 665-6) which outlines the nature of changes adopted in 1950 and 1952 in the reporting of mineral statistics.

EMPLOYMENT IN MINING, 1952. (a)

Industry.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N. Terr.	Aust.
Metal Mining—								
Gold Mining ..	319	738	(b)	(b)	(c) 5,100	..	149	c d 6,563
Silver-Lead-Zinc Mining ..	7,146	..	(b)	6	(b)	(b)	..	(d) 9,497
Copper-Gold Mining ..	152	..	(b)	(b)	(b)	(b)	(b)	(d) 2,112
Tin Mining ..	288	..	227	..	(b)	..	(b)(c)	(d) 999
Other Metal Mining ..	546	(e)	655	(b)	(c) 328	(b) 424	(c) 174	c d 2,220
Total, Metal Mining	8,451	738	(d) 3,694	(d) 273	c d 5,636	(d) 2,237	(c)(d) 382	(c) 21,411
Fuel Mining—								
Black Coal Mining ..	20,151	851	3,715	220	1,326	349	..	26,612
Brown Coal Mining ..	..	932	..	..	..	..	..	932
Other Fuel Mining ..	112	..	..	..	..	..	..	112
Total, Fuel Mining	20,263	1,783	3,715	220	1,326	349	..	27,656
Non-metal (excluding Fuel) Mining ..	1,167	(c)(f) 238	(c) 135	955	(c)(d) 382	(d) 171	(r) 22	(e) 3,070
Total, All Mining ..	29,881	(c) 2,759	(c) 7,544	1,444	(c) 7,344	2,757	(c) 404	(r) 52,137
Construction Material Quarrying ..	1,013	(g) 1,493	309	933	(g) 342	72	(h)	(r) 4,162
Total, All Mining and Quarrying ..	30,894	(c) 4,252	(c) 7,853	2,381	(c) 7,686	2,829	(c) 404	(c) 56,299

(a) Average employment during period of operation of mines and quarries. (b) Not available for publication. (c) Incomplete. (d) Includes particulars of relevant items marked "(b)". (e) Not available for publication; included with "Non-metal (excluding Fuel) Mining". (f) Includes particulars of "Other Metal Mining". (g) Year ended 30th June, 1953. (h) Not available.

The particulars in the foregoing table exclude the following estimated numbers of fossickers:—Gold mining 277; Tin mining 538; Other mining 1,964.

The following table shows particulars of mining employment in Australia for the years 1938 and 1948 to 1952. Complete particulars of employment in construction material quarrying are not available prior to 1952. The details for 1951 and earlier years include estimates by State Mines Departments of numbers of fossickers which are excluded for 1952. Changes in the bases of collecting and compiling the statistics introduced in 1950, 1951 and 1952 have resulted in some lack of comparability of the data in other respects, particularly in the case of metal mining.

EMPLOYMENT IN MINING : AUSTRALIA.

Industry.	1939.	1948.	1949.	1950.	1951.	1952.
Metal Mining—						
Gold Mining ..	28,840	10,791	10,395	9,478	8,647	6,583
Silver-Lead-Zinc Mining ..	6,095	8,043	8,126	8,807	9,536	9,497
Copper-Gold Mining ..	1,291	1,002	999	2,184	2,047	2,112
Tin Mining ..	4,113	1,665	1,745	1,644	1,577	999
Other Metal Mining ..	(a) 353	(a) 230	(a) 368	1,279	2,028	2,220
Total, Metal Mining ..	40,692	21,731	21,633	23,392	23,835	21,411
Fuel Mining—						
Black Coal Mining ..	21,562	23,740	24,269	24,451	24,861	26,612
Brown Coal Mining ..	449	526	811	889	898	932
Other Fuel Mining ..	71	(b)	(b)	183	147	112
Total, Fuel Mining ..	22,082	24,266	25,080	25,523	25,906	27,656
Non-metal (excluding Fuel) Mining ..	(c) 3,015	c d 3,186	c d 3,825	3,117	3,035	3,070
Total, All Mining ..	65,789	49,183	50,538	52,032	52,776	52,137
Construction Material Quarrying ..	(e)	(e)	(e)	(e)	(e)	4,162
Total, All Mining and Quarrying ..	(e)	(e)	(e)	(e)	(e)	56,299

(a) Incomplete; some metal mining included with "Total Non-metal (excluding Fuel) Mining". (b) Not available separately; included with "Non-metal (excluding Fuel) Mining". (c) Includes some Metal Mining. (d) Includes Other Fuel Mining. (e) Not available.

NOTE.—Estimates of the numbers of fossickers are included for years up to 1951 but are excluded for 1952.

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 and in Chapter VIII.—Labour, Wages and Prices (page 260).

3. *Accidents in Mining.*—Particulars of numbers of persons killed and injured in accidents in mines and associated treatment plants are recorded by State Mines Departments. Numbers injured are not reported on a uniform basis from State to State as varying criteria are used in determining what constitutes injury for the purpose of these records. In 1952, 38 persons were recorded as having been killed and 1,485 as having been injured in mining accidents (excluding accidents in construction material quarrying). Of the total of 38 persons killed, 17 were in black coal mines, 13 in gold mines and 8 in other mines. Reported injuries were highest in black coal mines (475), gold mines (458) and silver-lead-zinc mines (353).

§ 14. Oversea Trade in Minerals and Metals.

Particulars of the quantity and value of imports and exports of the principal minerals and metals for Australia are shown in the following table for the years 1950–51, 1951–52 and 1952–53. In addition to the unfabricated metals shown, considerable quantities of partly fabricated metals (bars, rods, wire, etc.) enter into Australia's overseas trade.

IMPORTS AND EXPORTS OF PRINCIPAL MINERALS AND METALS : AUSTRALIA.

Item.	Unit of Quantity.	Quantity.			(Value £A.).		
		1950–51.	1951–52.	1952–53.	1950–51.	1951–52.	1952–53.
IMPORTS.							
Minerals—							
Antimony Ore and Concentrate	cwt.	19,236	18,234	5,404	133,944	189,253	39,763
Asbestos	ton	650,492	493,725	575,757	1,712,796	1,546,998	1,888,651
Coal	ton	597,866	285,409	145,634	1,865,737	873,738	488,093
Coke and other Hydrocarbons .. ..	..	37,789	38,830	27,673	249,226	564,908	395,275
Industrial Diamonds	carat	178,032	196,406	240,556	362,762	442,482	541,912
Sulphur	cwt.	3,318,686	1,682,588	2,644,058	3,515,936	981,146	2,550,325
Metals—							
Aluminium (Pigs, Ingots, etc.) .. ..	..	171,363	233,214	135,919	1,368,948	2,065,925	1,384,631
Copper (Pigs, Ingots, etc.) .. ..	..	412,045	441,066	367,205	4,206,374	6,173,984	4,753,878
Gold Bullion (Ingot, Bar, etc.)	fine oz.	158,661	208,127	228,387	2,457,994	3,259,138	3,595,656
Iron and Steel—	..	..	..	..	..	..	..
Pig Iron	cwt.	401,488	185,061	11	401,133	348,630	10
Ingots, Blooms, Slabs, etc. .. ..	..	14,432	47,539	18,693	37,985	192,081	99,096
Nickel (Pigs, Ingots, Blocks, etc.) .. ..	..	3,796	9,591	11,659	95,287	270,896	346,817
Tin (Ingots) .. ..	..	23,794	30,061	3,600	1,602,566	2,336,028	205,375
EXPORTS.							
Minerals—							
Coal	ton	72,283	139,140	255,832	242,649	608,045	1,178,466
Silver-Lead and Zinc Ores and Concentrates—	..	..	..	..	..	..	..
Silver-Lead Ore and Concentrate	cwt.	266,634	801,410	824,429	814,759	3,420,642	2,722,797
Zinc Concentrate .. ..	..	2,974,321	3,829,915	4,896,311	6,202,983	11,092,409	11,054,881
Other .. ..	..	358,716	97,477	3,133	1,333,155	484,735	12,597
Titanium and Zirconium Concentrate .. ..	..	1,152,504	1,355,892	1,369,914	934,823	1,535,486	2,270,465
Tungsten (Scheelite and Wolfram) Concentrate .. ..	..	24,335	37,548	44,101	1,380,711	3,320,996	3,444,003
Metals—							
Gold Bullion (Ingot, Bar, Dust, Sheet, etc.)	fine oz.	19	416,652	1,250,162	294	6,989,188	20,397,933
Lead (Pig)	cwt.	2,145,798	2,136,439	2,840,756	15,756,312	20,721,505	17,171,800
Lead (Bullion) .. ..	..	716,001	475,491	977,760	5,728,960	4,949,779	7,955,453
Zinc (Ingots, Blocks, etc.) .. ..	..	641,402	619,331	899,293	5,282,783	6,867,260	6,086,302

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

1. Aid to Mining.—(i) *Commonwealth.* (a) *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 up to a maximum of £25,000 for any one deposit.

(b) *Bureau of Mineral Resources, Geology and Geophysics.* The Bureau of Mineral Resources, Geology and Geophysics has sections dealing with geology, geophysics, mining engineering, petroleum 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; investigations 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) observatories. 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 recently carried out extensive scout boring in New South Wales to prove deposits of coal suitable for working by open-cut methods.

(c) *Diamond Drills.* Two of the heavy diamond drills mentioned in Official Year Book No. 37, page 849, have been on hire to various mining companies. Five more light drills are on order and will be used in prospecting for uranium in the Northern Territory.

(d) *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.

The Commonwealth Government has encouraged the search for oil in Australia, Papua and New Guinea; details of the efforts made are outlined in earlier issues of the Official Year Book and in § 10. Mineral Oils (p. 698). A considerable amount of geological and geophysical work and test drilling has been conducted under the provisions of the Petroleum Oil Search Act 1936.

(e) *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.

(f) *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 have been 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.

(g) *Petroleum Legislation.* The petroleum ordinances of Papua and New Guinea have been amended and combined in a single ordinance entitled Petroleum (Prospecting and Mining) Ordinance 1951. Further minor amendments were passed early in 1954. A new Petroleum Ordinance for the Northern Territory was brought into force on 27th May, 1954.

(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.

(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.

(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. 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.* The Mines Department has about twenty batteries throughout the mining fields where prospectors and others can have their ore treated.

(g) *Tasmania.* During 1951 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 little advantage was taken thereof.

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 most of the 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 ending of the 1939-45 War, the activities of the Minerals Committee and Controller of Minerals Production were merged with the Bureau of Mineral Resources, Geology and Geophysics. Operations conducted by the Controller taken over by the Director of the Bureau were the Dorset Tin Dredge and the Commonwealth Mica Pool. The Dorset Tin Dredge is in active operation and produces about 150 tons of tin concentrate annually.

(ii) *Mica Production.* The Bureau, for the Department of Supply, operates the Commonwealth Mica Pool which purchases mica won in the Harts Range, Northern Territory, thus ensuring the miners a ready market for their product at fixed prices and also permitting an orderly distribution of mica to the trade. Under a Cabinet decision, the Commonwealth Mica Pool will operate until the end of 1959.

(iii) *Control of Exports of Metals and Minerals.* Certain metals and minerals produced in Australia are subject to export control for one or more of the following reasons :—

- (a) the necessity to conserve resources (e.g., iron ore and manganese) ;
- (b) inadequacy of local production to fulfil domestic demand (e.g., tin ore, concentrates and metal ; mica, manganese ore, copper, iron and steel) ;
- (c) the strategic importance of the minerals (e.g., beryllium ores, concentrates and metal ; monazite ; tantalite and tantalum products ; uranium ore, concentrates, residues and metal ; mica).

Mixed concentrates of beach sand minerals are prohibited exports, but rutile, zircon and ilmenite may be exported. Non-ferrous scrap is also subject to control.

(iv) *Radio-active Minerals.* Since the discovery of the possibility of using atomic energy considerable attention has been paid to the occurrence of uranium in Australia. To encourage the search for and discovery of deposits of uranium ore, the Commonwealth Government has approved the granting of monetary rewards for such discoveries.

Up to the end of 1949 important deposits had been found only in the northern part of South Australia where the Mt. Painter and Radium Hill fields had been investigated, largely by the South Australian Government, but in that year the presence of uranium was discovered in the Rum Jungle district of the Northern Territory, and investigations carried out by the Commonwealth Bureau of Mineral Resources, Geology and Geophysics in the years 1949-1952 proved that these deposits are of substantial importance.

Towards the end of 1952 the Commonwealth Government placed the Rum Jungle deposits, together with other deposits which are known to occur, but which have not yet been adequately investigated, under the control of Territory Enterprises Pty. Ltd., a subsidiary of Consolidated Zinc Corporation Limited, to carry on the investigations on its behalf and to mine and treat the ore. The treatment plant at Rum Jungle was officially opened by the Prime Minister on 17th September, 1954. Investigation of an area adjacent to Rum Jungle was carried out by the Bureau, using an airborne scintillometer. This survey indicated the presence of many radio-active anomalies, and demonstrated the effectiveness of this method of search. During 1952, arrangements were completed between the Governments of the United States of America, South Australia and the Australian Commonwealth, for the purchase of ores by the United States.

In South Australia, the South Australian Government extensively explored the Radium Hill deposit by underground development and diamond drilling. The production of ore is now proceeding and treatment plants are being erected.

The Bureau of Mineral Resources is carrying out further airborne scintillometer surveys and extensive geological, geophysical and geochemical surveys and diamond drilling operations, with a view to discovering further deposits and to assessing the value of known deposits.

During 1953 Commonwealth Legislation was enacted to set up an Atomic Energy Commission which is responsible, in an overall sense, for the production and utilization of uranium in Australia. This Act, the Atomic Energy Act No. 31 of 1953, supersedes the Atomic Energy (Control of Materials) Act No. 34 of 1946, but contains a provision of that Act which 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.

Further reference to the Atomic Energy Commission appears in Chapter XXVII.—Defence.