

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 1951 represented only about 10.4 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 uranium ore, bauxite (aluminium ore) and some other minerals have been recorded and are being investigated in detail.

Progress has been made in utilizing the sulphur content of domestic ores that were previously of only limited economic importance, and facilities for the treatment of copper, lead and zinc have been extended; in this sense, the mineral wealth of the country has expanded.

3. **Standardization of Mineral Statistics.**—Prior to the year 1950, the official statistics of mineral production in Australia were defective because of the widely different methods adopted by the Mines Departments of the several States in collecting, compiling and reporting the data. The Bureau of Mineral Resources, Geology and Geophysics had done much work in post-war years in re-arranging State data with the object of deriving satisfactory Commonwealth totals, but it was not until 1950 that some States commenced implementation of a plan which originated at the 1945 Conference of Australian Statisticians for the unification and standardization of Australian mineral statistics.

Further improvements were made in 1951 and 1952 and work is proceeding with the object of removing the remaining defects in the statistics, with particular emphasis on the problem of obtaining sound and uniform statistical value and employment data for all States and Territories.

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 tentative 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. The classification divides the industry into four major groups, viz. Metal Mining, Fuel Mining, Non-metal Mining and Construction-material Quarrying.

The adoption of revised methods of compiling and presenting mineral statistics in 1950 has 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.

4. **Quantity and Value of Minerals Produced, 1951.**—In the two tables following, particulars of the quantities and recorded values of minerals produced are shown for each State and the Northern Territory for 1951. Particulars of production data by States for 1950 may be found in *Primary Industries Bulletin No. 45, Part II., Non-Rural Industries and Value of Production*. Because of the revised bases of compiling and presenting mineral statistics referred to above, the data in the tables 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 par. 3 preceding. This has involved some re-arrangement of Mines Department official statistics for States which have not yet fully implemented the plan for standardization of mineral statistics in Australia.

In these tables individual minerals are arranged in four groups, viz., metallic minerals, fuel minerals, non-metallic minerals and construction materials, to correspond with the major groups of the tentative 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".

MINERAL PRODUCTION : QUANTITIES, 1951.

Mineral.	Unit.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
METALLIC MINERALS.									
Antimony Ore and Concentrate ..	ton	(a) 317	(a) 303	(a) 56	..	..	..	..	676
Bauxite ..	..	2,044	3,040	..	..	..	..	..	5,084
Beryllium Ore ..	lb.	(a) 25,536	..	23,111	..	203,325	..	..	251,972
Bismuth Concentrate ..	..	(a) 15,716	..	..	..	137	..	..	15,903
Copper Ore, Concentrate, etc.	ton	8,906	..	50,227	(a) 2	43	35,232	622	95,032
Gold Ore, Concentrate, etc.	..	336	1,363	892	(a) 461	..	..	..	3,058
Gold—Other Forms(d)	oz.	39,913	70,519	20,266	(e)	..	..	(e)	(e)
Ilmenite Concentrate ..	ton	(a) 1,233	..	..	..	..	..	..	1,233
Iron Ore ..	..	..	..	..	a2,400,577	35,652	..	..	2,436,229
Lead Ores, Concentrate, etc.	..	243,459	..	98,436	(a) 326	5,539	10,562	..	355,322
Manganese Ore ..	..	2,685	..	..	(a) 27	(a) 5,237	..	..	7,969
Molybdenite Concentrate ..	lb.	(a) 4,000	..	658	..	..	..	..	4,658
Monazite Concentrate ..	ton	(a) 32	..	..	..	..	..	..	32
Osmiridium—Native ..	oz.	..	..	..	..	..	33	..	33
Pyritic Ore and Concentrate ..	ton	21,725	..	32,450	(a) 1,031	46,615	39,625	..	141,446
Rutile Concentrate ..	..	23,060	..	(a)12,129	..	..	..	..	35,189
Silver Ore ..	..	(a) 111	..	..	..	..	..	..	111
Tantalite—Columbite Concentrate ..	lb.	..	..	..	..	(a) 4,614	..	511	5,125
Tin Concentrate ..	ton	(a) 578	49	(a) 490	..	61	998	37	2,213
Tungsten Concentrates—	..	..	..	..	..	..	..	..	..
Scheelite Concentrate ..	lb.	17,807	..	(a) 6,270	..	317	2,285,002	..	2,309,396
Wolfram Concentrate ..	..	31,129	764	a 340,658	..	11,038	848,589	329,080	1,561,258
Zinc Ore and Concentrate ..	ton	274,046	..	42,740	..	..	42,101	..	358,887
Zircon Concentrate ..	..	(a) 32,281	..	(a)10,129	..	..	..	..	42,410

FUEL MINERALS.

Coal, Black—	..	..	..	..	..	..	..	..	..
Semi-Anthracite ..	ton	234	..	80,722	..	..	1,470	..	82,426
Bituminous ..	..	13,508,460	147,743	2,137,994	..	..	235,418	..	16,029,615
Sub-Bituminous ..	..	4,550	..	255,059	388,303	848,475	..	..	1,496,387
Total ..	..	13,513,244	147,743	2,473,775	388,303	848,475	236,888	..	17,668,428
Coal, Brown (including Lignite) ..	..	..	7,836,056	..	..	..	..	..	7,836,056
Oil (Petroleum)—Crude ..	gal.	..	68,180	..	..	..	..	..	68,180
Shale, Oil Bearing ..	ton	78,564	..	..	..	..	..	..	78,564

NON-METALLIC MINERALS.

Alunite ..	ton	449	..	..	..	..	..	..	449
Asbestos ..	..	432	..	..	(a) 6	2,120	..	..	2,558
Barite ..	..	879	..	..	(a) 5,294	5	..	..	6,178
Clays—	..	..	..	..	..	..	..	..	..
Brick Clay and Shale ..	..	1,496,038	(c) 845,000	213,767	(a) 212,243	(c) 310,000	(d) 60,000	..	3,137,048
Kaolin ..	..	27,811	3,927	408	(a) 3,855	12	8,075	..	44,088
Stoneware Clay ..	..	73,387	(e)	2,541	(a) 25,390	1,100	(e)	..	(f) 102,418
Cuprous Ore and Concentrate—For Fertilizer ..	..	..	..	..	..	1,337	..	183	1,520
Diatomite ..	..	7,182	949	400	..	198	..	..	8,729
Dolomite ..	..	14,125	..	7,365	(a) 52,450	124	..	..	74,064
Felspar (including Cornish Stone) ..	..	9,035	..	..	(a) 4,000	1,807	..	..	14,842
Gems ..	value only	(g)	..	(g)	(g)	..	..	..	(g)
Greensand ..	ton	..	..	..	..	3,036	..	..	3,036
Gypsum ..	..	104,697	41,126	..	147,701	77,923	..	..	371,447
Limestone (h) ..	..	1,112,496	419,477	48,518	(a) 786,657	(e)	154,010	..	2,521,158
Magnesite ..	..	35,963	398	13	(a) 998	762	..	..	38,134
Mica—Muscovite ..	lb.	..	..	..	..	..	..	133,548	133,548
Min-ral Pigments ..	ton	1,186	..	..	(a) 99	688	39	84	2,096
Phosphate Rock ..	..	29	..	..	(a) 7,900	..	..	..	7,929
Salt ..	..	..	(i)	11,210	(a) 218,910	(i)	..	..	(c) 300,000
Silica (Glass, Chemical, etc.) ..	..	(f) 104,775	(e)	(e)	(a) 24,509	6,173	6,897	..	(f) 142,354
Talc (including Steatite) ..	..	2,431	..	..	(a) 9,476	690	..	..	12,597

MINERAL PRODUCTION: QUANTITIES, 1951—continued.

Mineral.	Unit.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Australia.
CONSTRUCTION MATERIALS.(f)									
Sand	ton	962,311 (j)	304,713	(e)	419,368 (j)	9,900	(e)	(e)	1,696,292
River Gravel and Gravel Boulders ..	"	903,453 (j)	130,280	(e)	661,044 (j)	128,487	(e)	(e)	1,823,264
Dimension Stone(k) ..	"	90,192 (j)	11,125	3,098	59,197 (j)	69,200	(e)	(e)	232,812
Crushed and Broken Stone	"	687,527 (j)	1,921,025	815,206	2,001,706 (j)	409,631	(e)	(e)	6,835,095
Other (Decomposed Rock, &c.)	"	7,120,072 (j)	61,813	..	..	..	..	..	7,181,885

(a) Despatches from the mine (or sales) as distinct from production. (b) Excludes Western Australia.
(c) Estimated. (d) Bullion, alluvial, retorted gold, etc. (e) Not available. (f) Incomplete.
(g) Quantities not available. (h) Excludes quantities used directly as a building or road material.
(i) Not available for publication; included in total for Australia. (j) Year 1950-51. (k) Includes some quantities of stone dressed at the quarries.

MINERAL PRODUCTION: VALUES, 1951.

(£.)

Mineral.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Aust.
METALLIC MINERALS.								
Antimony Ore and Con- centrate	31,932 (a)	13,302 (a)	6,610	..	..	..	..	51,844
Bauxite	1,945 (a)	5,798	..	..	..	..	..	7,743
Beryllium Ore	1,723	..	934	..	11,174	..	..	13,831
Bismuth Concentrate ..	3,138	..	..	..	84	..	..	3,222
Copper Ore, Concentrate, etc.	381,321	..	2,160,467 (a)	68	758	2,378,737	33,089	4,954,440
Gold Ore, Concentrate, etc.	19,389	50,698	3,936 (a)	4,308	(b)	95	..	(f) 78,426
Gold—Other Forms(c) ..	552,384 (a)	958,207 (a)	220,391 (a)	1,332	210,495,480	..	603,326	12,837,320
Ilmenite Concentrate ..	3,760	..	..	..	..	..	..	3,760
Iron Ore .. .. .	..	..	2,760,664	..	48,827	..	..	2,809,491
Lead Ore, Concentrate, etc.	22,749,456	..	7,669,404 (a)	6,791 (a)	242,262 (a)	937,601	..	31,605,514
Manganese Ore	26,301	..	..	320	33,789	..	..	60,410
Molybdenite Concentrate	910	..	203	..	..	..	..	1,113
Monazite Concentrate ..	3,154	..	..	..	..	..	..	3,154
Osmiridium—Native ..	..	..	..	..	..	(a) 1,544	..	1,544
Pyritic Ore and Concen- trate	28,665	..	74,510	2,060	296,988	48,517	..	450,740
Rutile Concentrate ..	538,872	..	278,205	..	..	..	..	817,077
Silver Ore	451	..	..	..	..	..	..	451
Tantalite—Columbite Con- centrate .. .. .	..	..	..	..	..	..	260	2,610
Tin Concentrate	413,712 (a)	35,213	309,810	..	39,493 (a)	706,527	22,446	1,527,201
Tungsten Concentrates— Scheelite Concentrate ..	16,422	..	5,134	..	215	215,957,055	..	1,978,826
Wolfram Concentrate ..	25,042	624	286,103	..	9,585 (a)	606,918	257,164	1,185,436
Zinc Ore and Concentrate	10,219,996	..	44,550,686	..	..	21,521,235	..	16,291,917
Zircon Concentrate ..	297,012	..	122,992	..	..	..	..	420,004
Other Metallic Minerals ..	33,958	..	16,959	..	..	5,083	..	56,000
Total Recorded Value, Metallic Minerals ..	35,349,543	1,063,842	15,712,544	2,775,543	11,181,005	8,163,312	916,285	75,162,074

FUEL MINERALS.

Coal, Black— Semi-Anthracite	842	..	145,011	..	..	2,976	..	148,829
Bituminous	29,317,114	600,734	4,144,521	..	..	302,572	..	34,364,941
Sub-Bituminous	7,899	..	200,622	399,628	1,716,788	..	..	2,324,937
Total	29,325,855	600,734	4,490,154	399,628	1,716,788	305,548	..	36,838,707
Coal, Brown (including Lignite) .. .. .	..	2,754,822	..	..	..	..	..	2,754,822
Oil (Petroleum)—Crude ..	..	3,409	..	..	..	..	..	3,409
Shale—Oil Bearing	181,132	..	..	..	..	..	..	181,132
Total Value, Fuel Minerals	29,506,987	3,358,965	4,490,154	399,628	1,716,788	305,548	..	39,778,070

MINERAL PRODUCTION: VALUES, 1951—continued.
(£.)

Mineral.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Aust.
NON-METALLIC MINERALS.								
Alumite	3,088	..	..	..	..	..	..	3,088
Asbestos	37,347	..	..	216	225,639	..	..	263,202
Barite	1,152	..	..	21,176	18	..	..	22,346
Clays—								
Brick Clay and Shale	423,275	(d)240,000	76,399	106,122	115,185	(d) 18,000	..	978,981
Kaolin	60,777	11,710	1,438	5,784	19	29,991	..	109,719
Stoneware Clay ..	28,491	(e)	2,356	38,088	3,300	(e)	..	(f) 72,235
Cupreous Ore and Concentrate .. .. .	..	..	..	..	16,104	..	11,337	27,441
Diatomite	18,361	12,718	1,000	..	2,700	..	..	34,779
Dolomite	21,393	..	15,757	26,225	599	..	..	63,974
Felspar (including Cornish Stone)	28,964	..	..	12,000	7,390	..	..	48,354
Gems	(f) 240	..	2,252	64,117	..	..	..	(f) 66,609
Greensand .. .. .	..	..	..	..	15,033	..	..	15,033
Gypsum	81,722	34,733	..	110,779	46,726	..	..	273,969
Limestone(g) .. .	467,398	196,214	93,392	422,026	(e)	117,605	..	f1,296,635
Magnesite	91,560	1,592	50	1,996	1,969	..	..	97,167
Mica—Muscovite ..	..	..	..	..	..	..	59,083	59,083
Mineral Pigments ..	2,766	..	..	205	7,891	..	80	797
Phosphate Rock .. .	123	..	..	12,700	..	..	..	12,823
Salt .. .. .	..	(h)	22,424	437,820	(h)	..	..	(f)460,244
Silica (Glass, Chemical, etc.)	64,998	(e)	(e)	15,626	4,417	3,675	..	(f) 88,714
Talc (including Steatite)	6,796	..	..	61,037	7,788	..	..	75,621
Other Non-Metallic Minerals	155,805	5,866	6,011	23,470	13,951	1,134	..	206,237
Total Recorded Value, Non-Metallic Minerals	1,494,256	502,833	221,079	1,359,387	468,729	170,483	71,217	f4,287,984

CONSTRUCTION MATERIALS.(f)

Sand	280,259	103,216	(e)	73,389	4,410	(e)	(e)	461,274
River Gravel and Gravel ..	..	..	..	..	..	..	..	..
Boulders	508,321	60,453	(e)	115,683	39,665	(e)	(e)	724,122
Dimension Stone(i) ..	169,847	43,846	16,404	76,481	73,571	(e)	(e)	380,149
Crushed and Broken Stone	942,993	1,584,333	358,106	657,554	369,867	(e)	(e)	3,912,853
Other (Decomposed Rock, etc.)	1,196,774	27,276	..	..	..	(e)	(e)	1,224,050
Total Recorded Value, Construction Materials	3,098,194	1,819,124	374,510	923,107	487,513	(e)	(e)	6,702,448

(a) Includes value added in smelting and/or refining. (b) Included under "Gold—Other Forms".
 (c) Bullion, alluvial, retorted gold, etc. (d) Estimated. (e) Not available. (f) Incomplete.
 (g) Excludes quantities used directly as a building or road material. (h) Not available for publication.
 (i) Includes some quantities of stone dressed at the quarries.

5. Principal Contents of Metallic Minerals, 1951.—The following table provides a summary of the principal contents of metallic minerals produced in 1951. Particulars of the metallic contents of minerals produced in earlier years are shown in the several sections dealing with individual minerals later in this chapter.

MINERAL PRODUCTION: PRINCIPAL CONTENTS OF METALLIC MINERALS, 1951.

Mineral in which contained.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Aust.
ANTIMONY (tons).								
Antimony Ore and Concentrate	151	(a) 72	(a) 32	..	..	..	..	255
Lead Ores, Concentrate, etc.	488	..	..	..	..	1	..	489
Total	639	(a) 72	(a) 32	..	..	1	..	744

MINERAL PRODUCTION: PRINCIPAL CONTENTS OF METALLIC MINERALS,
 1951—continued.

Mineral in which contained.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Aust.
BISMUTH (lb.).								
Bismuth Concentrate ..	2,492	..	..	..	(b) 128	..	..	2,620
CADMIUM (tons).								
Lead Concentrate ..	45	..	..	..	..	..	..	45
Zinc Concentrate ..	517	..	..	..	..	38	..	555
Other ..	..	..	5	..	..	..	..	5
Total ..	562	..	5	..	..	38	..	605
COBALT (tons).								
Zinc Concentrate ..	42	..	..	..	..	..	..	42
COPPER (tons).								
Copper Ore, Concentrate, etc.	1,839	..	5,085	(c)	7	8,657	151	15,739
Gold Ore, Concentrate, etc.	4	..	1	..	..	..	..	5
Lead Concentrate ..	1,528	..	346	..	..	..	..	1,874
Zinc Concentrate ..	308	..	..	..	..	..	..	308
Total ..	3,679	..	5,432	(c)	7	8,657	151	17,926
GOLD (f. oz.).								
Antimony Ore and Concentrate ..	107	17	..	..	..	..	..	124
Copper Ore, Concentrate, etc.	5,097	..	69,392	..	..	11,396	..	85,885
Gold Ore, Concentrate, etc.	1,316	3,535	241	276	(d)	3	..	(e) 5,371
Gold—Other Forms(f) ..	34,898	62,511	8,947	86	648,245	..	38,945	793,632
Lead Ores, Concentrate, etc.	5,916	..	..	..	..	1,363	..	7,279
Zinc Concentrate ..	1,563	..	..	..	..	1,124	..	2,687
Other ..	13	..	..	..	..	560	..	573
Total ..	48,910	66,063	78,580	362	648,245	14,446	38,945	895,551
IRON (tons).								
Iron Ore ..	..	..	..	(a)	1,440,154	19,025	..	1,459,179
LEAD (tons)								
Copper Concentrate ..	..	..	..	..	..	1,067	..	1,067
Lead Ores, Concentrate, etc.	165,786	..	33,243	41	1,913	6,103	..	207,086
Zinc Concentrate ..	2,780	..	..	..	..	1,080	..	3,860
Total ..	168,566	..	33,243	41	1,913	8,250	..	212,013

MINERAL PRODUCTION; PRINCIPAL CONTENTS OF METALLIC MINERALS,
1951—continued.

Mineral in which contained.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Aust.
SILVER (f. oz.).								
Copper Ore, Concentrate, etc.	70,497	..	18,663	..	116	477,341	1	566,618
Gold Ore, Concentrate, etc.	1,713	4,908	13	107	..	..	..	6,741
Gold—Other Forms (f)	1,383	3,418	7,979	..	188,942	..	..	201,722
Lead Ores, Concentrate, etc.	6,148,407	..	2,558,387	350	7,685	389,153	..	9,103,982
Zinc Concentrate	252,949	..	..	..	..	107,135	..	360,084
Other	4,544	..	..	..	..	..	..	4,544
Total ..	6,479,493	8,326	2,585,042	457	196,743	973,629	1	10,243,691
SULPHUR (tons).								
Pyritic Ore and Concentrate	10,355	..	16,225	103	(b)19,820	(a)19,549	..	66,052
Zinc Concentrate	86,816	..	(a)13,676	..	..	(a)13,472	..	113,964
Total ..	97,171	..	29,901	103	(b)19,820	(a)33,021	..	180,016
TIN (tons).								
Tin Concentrate	413	36	(a) 340	..	41	706	23	1,559
TUNGSTEN (lb., in terms of WO ₃).								
Scheelite Concentrate	12,777	..	(a) 4,838	..	194	1,398,800	..	1,416,609
Wolfram Concentrate	19,303	489	a224,834	..	7,303	591,352	202,611	1,045,892
Other	14,678	..	..	..	..	..	..	14,678
Total ..	46,758	489	a229,672	..	7,497	1,990,152	202,611	2,477,179
ZINC (tons).								
Zinc Concentrate	143,086	..	21,743	..	..	24,362	..	189,191
Other	27	..	..	..	9	(g)	..	36
Total ..	143,113	..	21,743	..	9	24,362	..	189,227

(a) Estimated. (b) Actual recoveries. (c) Less than half the unit of quantity shown.
 (d) Included under "Gold—Other Forms". (e) Excludes Western Australia. (f) Bullion,
 alluvial, retorted gold, etc. (g) Not available.

6. Value of Production, 1939, 1947 to 1951.—The defective nature of mineral statistics, generally, prior to 1950 has been referred to in para. 3, preceding. This applied particularly to the values of individual minerals recorded by Mines Departments, which from the point of view of Australian statistics were very unsatisfactory as they represented a heterogeneous collection of "values" ascribed to ores, concentrates and metal contents of untreated or partly treated minerals. In 1950 satisfactory methods of compiling mineral values (i.e. as incorporated in the plan for standardization of mineral statistics referred to in para. 3) were adopted in several States but in others the old defective procedures are still being used.

In the table below particulars of the recorded values of minerals are shown for the years 1939 and 1947 to 1951. Because of the changes in the bases of recording mineral values adopted in some States in 1950, the data for that year and 1951 are not strictly comparable with those shown for earlier years. Separate figures are shown for metallic minerals, fuel minerals and non-metallic minerals. It should be noted that the values of construction materials are excluded from the particulars of non-metallic minerals and from the total.

MINERAL PRODUCTION : VALUES.

(£'000.)

Year.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N.T.	Aust.
METALLIC MINERALS.								
1939	5,169	1,589	3,371	3,003	11,884	1,902	228	27,146
1947	13,754	943	6,301	2,478	7,867	4,040	164	35,547
1948	20,932	780	6,844	2,374	7,523	4,158	216	42,827
1949	19,469	866	8,972	1,506	8,144	4,404	547	43,908
1950(a)	24,591	1,079	12,788	2,728	9,893	4,859	628	56,566
1951(a)	35,350	1,064	15,712	2,776	11,181	8,163	916	75,162
FUEL MINERALS.								
1939	7,041	646	1,168	..	363	74	..	9,292
1947	12,295	1,237	2,238	68	840	155	..	16,833
1948	15,143	1,531	2,347	120	880	178	..	20,199
1949	16,303	1,850	2,874	173	972	182	..	22,354
1950(a)	22,306	2,091	3,562	131	1,185	232	..	29,597
1951(a)	29,507	3,359	4,490	400	1,717	305	..	39,778
NON-METALLIC MINERALS. (b)								
1939	178	13	19	317	42	81	16	666
1947	216	26	7	664	155	30	65	1,163
1948	276	36	20	767	158	31	78	1,366
1949	249	40	12	765	347	43	52	1,508
1950(a)	1,196	405	104	1,053	389	257	73	3,477
1951(a)	1,494	503	221	1,359	469	171	71	4,288
TOTAL. (b)								
1939	12,388	2,248	4,558	3,320	12,289	2,057	244	37,104
1947	26,265	2,207	8,545	3,210	8,862	4,225	229	53,543
1948	36,351	2,347	9,211	3,261	8,561	4,367	294	64,392
1949	36,021	2,756	11,858	2,444	9,463	4,629	599	67,770
1950(a)	48,093	3,575	16,454	3,912	11,467	5,348	701	89,550
1951(a)	66,351	4,926	20,423	4,535	13,367	8,639	987	119,228

(a) Because of revised methods adopted in the collection and presentation of mineral statistics, the values shown for the years 1950 and 1951 are not strictly comparable with those published for previous years.

(b) Excludes Construction Materials.

7. Total Production since the Inception of Mining in Australia.—The previous issue of the Year Book included a table showing the recorded values of principal minerals produced from the inception of mining in Australia to the end of 1949. Because of the revised methods of the collection and presentation of mineral statistics adopted in 1950 it is not possible to continue the table beyond 1949.

§ 2. Gold.

1. Discovery in Various States.—The discovery of gold in payable quantities was an epoch-making event in Australian history, for, as one writer aptly phrases it, this event “precipitated Australia into nationhood”. A more or less detailed account of the finding of gold in the various States appears under this section in Official Year Books Nos. 1 to 4.

2. *Mine Production.*—The following table shows the 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 1946 to 1952. Owing to the defective information in the earlier years the figures fall considerably short of the actual totals, for during the first stages of mining development large quantities of gold were taken out of Australia by successful miners who preferred to keep the amount of their wealth secret.

GOLD : 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	736	..	165	29	14,430
1881-90	1,014	6,689	3,259	58	42	357	168	11,587
1891-1900	2,432	7,040	5,648	52	5,252	550	214	21,188
1901-10	2,253	7,095	5,512	73	17,784	604	111	33,432
1911-20	1,145	3,067	2,263	55	10,671	202	23	17,426
1921-30	204	593	434	10	4,557	43	2	5,843
1931-40	569	1,952	1,021	53	8,474	130	84	11,383
1941-50	573	801	749	13	6,682	157	148	9,123
1946	32	87	62	1	617	15	10	824
1947	50	85	72	1	704	15	11	938
1948	52	69	70	2	665	13	15	886
1949	52	69	76	2	648	12	30	889
1950	52	68	88	1	610	16	35	870
1951	49	66	79	(b)	648	15	39	806
1952	39	68	85	(b)	727	16	45	980
Total, 1851-1952..	16,470	73,713	22,437	457	58,081	2,499	954	174,611

(a) Gold content of minerals produced.

(b) Less than half the unit of quantity shown.

The amount of gold raised in Australia in any one year attained its maximum in 1903, when Western Australia also reached its highest point. For the other States the years in which the greatest yields were obtained were as follows:—New South Wales, 1852; Victoria, 1856; Queensland, 1900; South Australia, 1904; and Tasmania, 1899.

Owing to the exhaustion of the more easily worked deposits and increased costs due to deep mining the production of gold in Australia declined from 3,837,979 fine oz. in 1903 to 427,160 fine oz. in 1929, the lowest output since the discovery of the precious metal.

Increased activity in prospecting due to prevailing economic conditions resulted in some improvement in 1930, but the marked development between that year and 1939 received its impetus from the heavy depreciation of Australian currency in terms of gold. Oversea and local capital were attracted to the industry, and the employment of advanced geological methods and technical improvements brought many difficult or abandoned propositions into profit. The output of gold rose annually from 467,742 fine oz. in 1930 to 1,645,697 fine oz. in 1939. Following the outbreak of the 1939-45 War, losses of man-power through enlistment in the Armed Services and transfers to more essential work associated with the war effort resulted in a sharp fall in gold production to 656,867 fine oz. in 1944 and 657,213 fine oz. in 1945. Following the release of man-power after the war, there was an upward trend in mine production of gold until 1947 when output was 937,654 fine oz. Output fell again in 1948 to 885,507 fine oz. and remained below 900,000 fine oz. in each of the years 1949, 1950 and 1951, notwithstanding the increase in the price of gold from £A.10 15s. 3d. to £A.15 9s. 10d. which became operative from 19th September, 1949. In 1952, mine gold output increased to 980,435 fine oz., this being the highest figure recorded since 1942. Since December, 1951, the bulk of Australian newly-won gold has been sold on overseas 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 1952. The value of the refined new gold is based on the price fixed by the Commonwealth Bank, but allowance is made in 1952 for premiums on sales of gold for industrial purposes in Australia and overseas. Particulars of the values ascribed to gold production (mine basis) in 1939 and earlier years were included in previous issues of the Year Book.

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	1,000	16,490
1946	820	8,830			

4. **Unit Values.**—Values per fine oz. in Australian currency assigned to the production of gold during recent years are : £9 14s. 5½d. in 1939, £10 13s. 1¾d. in 1940, £10 13s. 8d. in 1941, £10 9s. 0¾d. in 1942, £10 9s. 0d. in 1943, £10 10s. 1½d. in 1944, £10 13s. 11¼d. in 1945 and £10 15s. 3d. in each year 1946 to 1948. 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 adopted were the Bank's price of £15 9s. 10d. per fine oz., while in 1952 allowance was made for premiums on gold sold for industrial purposes in Australia and on premium markets overseas, the weighted average value for the year being £16 9s. 10d. per fine oz. Further information regarding the price of gold realized, including particulars of prices for newly-won gold sold on overseas premium markets since December, 1951, is given in Chapter XVI.—Private Finance.

5. **Changes in Relative Positions of States as Gold Producers.**—The figures in the table showing the quantity of gold raised explain the very large increase in the population of Victoria during the period 1851 to 1861, when an average of over 40,000 persons reached the State each year. With the exception of 1889, when its output was exceeded by that of Queensland, Victoria maintained its position as the chief gold producer for a period of forty-seven years, until its production was surpassed by that of Western Australia in 1898. From that year onward the proportion contributed by Western Australia has increased and in 1952 represented 74 per cent. of the entire yield of Australia. The proportion contributed by this State for the period 1851 to 1952 was 33 per cent. and by Victoria for the same period 42 per cent.

6. **Place of Australia in the World's Gold Production.**—The table below shows, in decennial periods from 1851 to 1950 and for each of the years 1950–51 the world's gold production (as ascertained from authoritative sources) and the share of Australia therein. The details of world production from 1940 are possibly less complete than those for earlier years, because of censorship during and after the war. The figures recorded for these years represent recorded production only and therefore omit any production for those countries not reporting. Included in this latter group are the Soviet Union and other producing countries of lesser importance.

GOLD : WORLD PRODUCTION.

Period.	World Production of Gold.		Gold Produced in Australia.		Proportion of Australian Production to Total.	Period.	World Production of Gold.		Gold Produced in Australia.		Proportion of Australian Production to Total.
	'000. fine oz.	'000. fine oz.	'000. fine oz.	%			'000. fine oz.	'000. fine oz.	%		
1851-60	64,483	24,877	38.58		1911-20	206,511	17,426	8.44			
1861-70	61,098	19,039	31.16		1921-30	183,806	5,843	3.18			
1871-80	55,671	14,430	25.92		1931-40	315,509	11,383	3.61			
1881-90	51,280	11,587	22.59		1941-50	627,400	9,122	3.66			
1891-1900 .. .	101,648	21,188	20.84		1950	a 24,200	870	3.59			
1901-10	182,892	33,432	18.28		1951	a 23,600	896	3.80			

(a) Recorded production only. See letterpress above.

The quantities of gold produced in the principal producing countries in each of the years 1938 and 1947 to 1951 are shown in the table hereunder.

GOLD : PRODUCTION IN PRINCIPAL COUNTRIES.

('000 fine oz.)

Country.	1938.	1947.	1948.	1949.	1950.	1951.
Union of South Africa ..	12,161	11,200	11,585	11,705	11,664	11,516
U.S.S.R. (Russia)	5,236	(a)7,000	(a)7,000	(a)7,000	(a)7,000	(a)7,000
Canada	4,725	3,070	3,530	(b)4,124	(b)4,431	(b)4,320
United States of America ..	4,245	2,109	2,014	1,992	2,392	1,958
Australia	1,592	938	886	889	870	896
British West Africa(c) ..	730	563	677	682	695	784
Rhodesia	815	524	516	529	513	488
Columbia	521	383	335	385	406	431
Mexico	924	465	338	406	408	393
Belgian Congo	394	301	300	334	339	352

(a) Estimated. Sierra Leone.

(b) Includes Newfoundland.

(c) Includes Gambia, Gold Coast, Nigeria,

7. **Employment in Gold-mining.**—The number of persons employed in gold-mining in each State at various intervals since 1901 is shown in the following table. The figures include prospectors, etc., so far as data are ascertainable, and include those who may not have worked during the whole of the year. The figures for Queensland in the table below include persons employed in the Mount Morgan copper-gold mining establishment. In the tables in § 13 relating to employment in the mining industry generally, employment in the Mount Morgan establishment for the years 1950 and 1951 has been classified to copper-gold mining, which is a separate industry in the Draft Classification of the Mining Industry adopted for 1950.

GOLD-MINING : PERSONS EMPLOYED.

Year.	N.S.W.	Victoria.	Q'land.(a)	S. Aust.	W. Aust.	Tas.	Nor. Terr.	Total.
1901 ..	12,064	27,387	9,438	(b)1,000	19,771	1,112	(b) 200	70,972
1903(e) ..	11,247	25,208	9,229	(b)1,000	20,716	973	(b) 200	68,573
1913 ..	3,570	11,931	3,123	800	13,445	481	175	33,525
1923 ..	1,141	2,982	603	32	5,555	119	30	10,462
1933 ..	6,913	6,126	4,161	231	9,900	229	95	27,655
1938 ..	3,764	6,315	3,378	158	15,374	141	267	29,397
1947 ..	795	1,135	1,834	50	7,649	14	176	11,653
1948 ..	702	1,064	1,627	34	7,178	15	171	10,791
1949 ..	688	1,019	1,589	52	6,800	9	238	10,395
1950 ..	695	1,050	1,738	47	7,048	12	208	10,798
1951 ..	574	761	1,653	27	6,742	12	143	9,912

(a) Includes employment in the Mount Morgan copper-gold mine, mill and smelter. (b) Estimated.

(c) Year of maximum production for Australia.

Owing to the exhaustion of the more easily worked deposits and increased costs due to deep mining, the number employed in gold-mining in 1929 had dwindled to the comparatively small figure of 6,108. Stimulated by the enhanced price of gold, employment in the industry rose over four-fold to 33,113 in 1935, but thereafter the numbers employed declined each year to 7,015 in 1944. Following the cessation of hostilities and a relaxation of manpower control, the numbers rose in each succeeding year to reach 11,653 in 1947. In the next three years they remained between 10,000 and 11,000 but in 1951 declined to 9,912.

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.* Because of revised methods adopted in the compilation and presentation of mineral statistics, data relating to the production of silver-lead-zinc minerals for the years 1950 and 1951 are not strictly comparable with those published for previous years. The following table shows for 1950 and 1951 the mine production of silver, lead and zinc in Australia, and the respective minerals in which these metals were contained.

SILVER, LEAD AND ZINC : MINE PRODUCTION IN INDIVIDUAL MINERALS.

Mineral in which contained.	Silver (fine oz.).		Lead (tons).		Zinc (tons).	
	1950.	1951.	1950.	1951.	1950.	1951.
Copper Concentrate ..	778,495	566,119	1,016	1,067	..	..
Gold Bullion, etc. ..	218,399	201,722	..	..	..	..
Lead-Silver Ore ..	104,257	148,798	2,672	2,962	..	(a)
Lead-Silver-Zinc Ore ..	100	349	22	22	3	7
Lead Concentrate ..	9,426,266	8,954,390	217,269	204,094	..	2
Silver Ore ..	25,786	4,420	..	..	..	..
Zinc Concentrate ..	427,016	360,084	4,382	3,860	197,780	189,191
Other Minerals ..	3,483	7,809	6	8	..	27
Total ..	10,983,802	10,243,691	225,367	212,013	197,783	189,227

(a) Less than half the unit of quantity shown.

The following table shows the mine production of silver, lead and zinc in Australia for the years 1947 to 1951 compared with 1939.

The totals for the years 1939 and 1947 to 1949 inclusive are from data compiled by the Australian Mines and Metals Association.

SILVER, LEAD AND ZINC : MINE PRODUCTION, AUSTRALIA.

Metal.	Unit.	1939.(a)	1947.(a)	1948.(a)	1949.(a)	1950.	1951.
Silver ..	f. oz.	15,320,110	9,527,140	10,057,519	9,849,213	10,983,802	10,243,691
Lead ..	ton	280,003	196,623	216,955	213,491	225,367	212,013
Zinc ..	..	217,256	182,258	190,469	181,998	197,783	189,227

(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 1950 and 1951 :—

SILVER, LEAD AND ZINC : MINE PRODUCTION, STATES AND AUSTRALIA.

State.	Silver (fine oz.)		Lead (tons).		Zinc (tons).	
	1950.	1951.	1950.	1951.	1950.	1951.
New South Wales ..	6,847,686	6,479,493	175,575	168,566	144,225	143,113
Victoria	9,473	8,326	..	..	..	..
Queensland	2,708,068	2,585,042	38,790	33,243	25,800	21,743
South Australia ..	1,348	457	59	41	..	..
Western Australia ..	205,313	196,743	1,302	1,913	3	9
Tasmania	1,211,575	973,629	9,626	8,250	27,755	24,362
Northern Territory ..	(a) 339	1	15	..	..	..
Australia	10,983,802	10,243,691	225,367	212,013	197,783	189,227

(a) Estimated.

Particulars of the values ascribed to the various minerals containing silver, lead and zinc for the year 1951 are shown in the detailed tables relating to mineral production on pp. 750 and 751.

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

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

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

Particulars of the New South Wales mine production of silver, lead and zinc, as reported by the Mines Department, are shown in the table below for the years 1950 and 1951. The greater part of the silver of New South Wales origin is contained in the lead ore and concentrates shown separately in the table. The greater part of this is mined at Broken Hill, with smaller quantities from Captain's Flat.

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

Mineral in which Contained.	Quantity of Contents.	
	1950.	1951.
SILVER (fine ounces).		
Bismuth Concentrate	81	124
Copper Ore, Concentrate, etc.	89,823	70,497
Gold Ore Concentrate, etc.	1,670	1,713
Gold—Other Forms	1,984	1,383
Lead Ore, Concentrate, etc.	6,431,587	6,148,407
Silver Ore	25,786	4,420
Zinc Concentrate	296,755	252,949
Total	6,847,686	6,479,493
LEAD (tons).		
Lead Ore, Concentrate, etc.	172,421	165,786
Zinc Concentrate	3,154	2,780
Total	175,575	168,566
ZINC (tons).		
Zinc Ore and Concentrate	144,225	143,113

(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 8,326 fine oz. for 1951 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. However, in February, 1953, a new copper smelter at Mt. Isa commenced production. The annual output of the smelter is estimated to be approximately 16,000 tons of blister copper.

The following table shows particulars of the Queensland mine production of silver, lead and zinc for the years 1950 and 1951.

SILVER, LEAD AND ZINC : MINE PRODUCTION, QUEENSLAND.

Mineral in which Contained.	Quantity of Contents.	
	1950.	1951.
SILVER (fine ounces).		
Copper Ore, Concentrate, etc.	18,043	18,663
Gold Ore, Concentrate, etc.	15	13
Gold—Other Forms	8,522	7,979
Lead Ore, Concentrate, etc.	2,681,488	2,558,387
• Total	2,708,068	2,585,042
LEAD (tons).		
Lead Ore, Concentrate, etc.	38,790	33,243
ZINC (tons).		
Zinc Concentrate	25,800	21,743

(v) *South Australia.* Output of lead from local ores has been very small in recent years. In 1950, 81 tons of lead-silver ore were produced (valued at £5,897 and containing 59 tons of lead and 1,348 fine ounces of silver) while in 1951, 326 tons of this ore were won (valued at £6,791 and containing 41 tons of lead and 350 fine ounces of silver). There were also 107 fine ounces of silver contained in gold ore won in South Australia in 1951.

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 1950 and 1951, lead-silver ore, lead-silver-zinc ore and lead concentrates were produced in Western Australia. Main centres of production were 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.

Particulars of the mine production of silver, lead and zinc, as reported by the Mines Department of Western Australia for 1950 and 1951, are shown below.

SILVER, LEAD AND ZINC : MINE PRODUCTION, WESTERN AUSTRALIA.

Mineral in which Contained.	Quantity of Contents.	
	1950.	1951.
SILVER (fine ounces).		
Copper Concentrate .. .. .	..	116
Gold Bullion, etc.	198,420	188,942
Lead-Silver Ore	6,551	7,164
Lead-Silver-Zinc Ore	100	349
Lead Concentrate	242	172
Total	205,313	196,743
LEAD (tons).		
Lead-Silver Ore	553	705
Lead-Silver-Zinc Ore	22	22
Lead Concentrate	727	1,186
Total	1,302	1,913
ZINC (tons).		
Lead-Silver-Zinc Ore	3	9

(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 owns the electrolytic zinc works at Risdon near Hobart.

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

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

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

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

Particulars of Tasmanian mine production of silver, lead and zinc, as reported by the Department of Mines, are shown in the following table for the years 1950 and 1951.

SILVER, LEAD AND ZINC : MINE PRODUCTION, TASMANIA.

Mineral in which Contained.	Quantity of Contents.	
	1950.	1951.
SILVER (fine ounces.)		
Copper Concentrate	672,241	477,341
Lead Ore, Concentrate, etc.	409,073	389,153
Zinc Concentrate	130,261	107,135
Total	1,211,575	973,629
LEAD (tons).		
Copper Concentrate	1,016	1,067
Lead Ore, Concentrate, etc.	7,382	6,103
Zinc Concentrate	1,228	1,080
Total	9,626	8,250
ZINC (tons).		
Zinc Concentrate	27,997	24,362

(viii) *Northern Territory*. There was no production of lead-silver ore in the Northern Territory in 1951. 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 years 1939 and 1948.

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

Particulars.	1939.	1948.	1949.	1950.	1951.	1952.
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SILVER ('000 fine oz.).

Production for year	9,552	6,466	5,858	6,882	6,879	6,773
Sold to Australian consumers (a) ..	1,794	1,375	1,019	1,095	1,693	732
Exported or sold for export (a) ..	7,518	4,998	4,205	5,745	4,924	5,576

LEAD (tons).

Refined Lead—						
Production for year	199,437	159,497	150,056	160,526	165,758	156,639
Sold to Australian consumers (a) ..	32,217	34,774	40,908	43,661	54,629	32,492
Exported or sold for export (a) ..	164,684	123,890	108,071	122,426	112,476	117,501
Lead Bullion—						
Produced for export	43,955	30,165	32,621	37,021	31,872	37,709

ZINC (tons).

Production for year	71,220	81,312	80,956	83,652	77,010	87,438
Sold to Australian consumers (a) ..	31,088	42,018	44,024	45,141	45,950	50,174
Exported or sold for export (a) ..	43,137	37,100	38,230	38,558	29,411	38,132

(a) Source : Australian Mines and Metals Association.

3. **World Production.**—The estimated world production of silver, lead and zinc during the years 1938 and 1947 to 1951, as derived from statistics compiled by the Mineral Resources Division of the Colonial Geological Surveys, is shown in the following table.

SILVER, LEAD AND ZINC : WORLD PRODUCTION.

Mineral.	Unit of Quantity.	1938.	1947.	1948.	1949.	1950.	1951.
Silver	(million fine oz.) ..	268	165	172	163	182	178
Lead	('000 tons of 2,240 lb.)	1,770	1,378	1,426	1,541	1,679	1,715
Zinc	('000 tons of 2,240 lb.)	1,870	1,730	1,864	1,930	2,192	2,326

4. **Silver, Lead and Zinc Production in Principal Countries, 1951.**—The following table shows particulars of silver, lead and zinc production (mine basis) in principal producing countries, according to data published by the Mineral Resources Division of the Colonial Geological Surveys.

SILVER, LEAD AND ZINC : MINE PRODUCTION IN PRINCIPAL COUNTRIES, 1951.

Country.	Production.	Country.	Production.
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SILVER ('000 fine oz.).

Mexico	43,798	Japan	4,506
United States of America	39,464	Belgian Congo	3,795
Canada (a)	24,245	Yugoslavia	3,032
Peru	14,856	Germany (Federal)	1,820
Australia	10,244	Union of South Africa	1,163
U.S.S.R. (Russia)	(b)	Argentina (c)	1,150
Bolivia	7,172	Chile	983

(a) Includes Newfoundland.

(b) Information not available.

(c) Year 1950.

SILVER, LEAD AND ZINC: MINE PRODUCTION IN PRINCIPAL COUNTRIES, 1951—*continued*.

Country.	Production.	Country.	Production.
LEAD (tons of 2,240 lb.).			
United States of America ..	346,575	Yugoslavia	77,506
Mexico	221,907	French Morocco	67,107
Australia	212,013	Spain	40,167
U.S.S.R. (Russia)	(b) 210,000	South-West Africa	38,611
Canada (a)	136,161	Italy	38,126
Peru	81,048	Bolivia	30,076
Germany (Federal)	(c)	Argentina	(b) 23,600

ZINC (tons of 2,240 lb.).			
United States of America ..	599,577	Belgian Congo	88,138
Canada (a)	299,157	Spain	74,353
U.S.S.R. (Russia)	(b) 240,000	Germany (Federal)	71,790
Australia	189,227	Japan	62,269
Mexico	177,220	Yugoslavia	38,798
Peru	99,699	Sweden	34,242
Italy	94,169	Bolivia	30,053

(a) Includes Newfoundland. (b) Estimated. (c) Information not available.

5. Prices of Silver, Lead and Zinc.—In view of the close association in Australia, particularly in New South Wales, of ores containing these metals, relevant particulars of the prices of each of the metals have been included in the following table. The table shows average prices in Australia and on the London Metal Exchange during the years 1938 and 1948 to 1952. Lead and zinc prices were controlled in the United Kingdom and Australia after the outbreak of war in 1939. 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. Prices of lead and zinc were decontrolled in Australia on the 21st April, 1953. Silver prices have not been controlled in the United Kingdom and Australia.

PRICES OF SILVER, LEAD AND ZINC.

(£ s. d.)

Metal.	1938.	1948.	1949.	1950.	1951.	1952.
Australian Prices, in Australian currency—						
Silver, per fine oz. (a) ..	0 2 2.0	0 4 8.4	0 5 1.6	0 6 9.2	0 8 1.7	0 7 9.1
Lead, per ton b	c22 0 0	22 0 0	35 0 0	43 12 7	65 0 0	74 15 1
Zinc, per ton b	c22 0 0	22 0 0	40 0 0	47 3 10	65 0 0	74 15 1
London Metal Exchange Prices, in sterling—						
Silver, per fine oz. ..	0 1 9.06	0 3 9.0	0 4 1.2	0 5 4.8	0 6 5.9	0 6 2.4
Lead, per ton b	15 6 6	95 10 0	103 3 11	106 8 2	161 19 10	135 9 0 d
Zinc, per ton b	14 1 7	80 0 9	87 8 6	119 4 3	171 12 3	149 10 2

(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 1st October, 1952.

6 Employment in Silver, Lead and Zinc Mining.—The average number of persons employed in mining for these metals during each of the years 1938 and 1947 to 1951 is given below :—

SILVER, LEAD AND ZINC MINING : PERSONS EMPLOYED.

Year.	N.S.W.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Terr.	Australia.
1938	5,612	530	..	4	421	3	6,570
1947	5,331	994	12	..	523	2	6,862
1948	5,918	1,411	17	114	577	6	8,043
1949	6,052	1,285	32	135	616	6	8,126
1950	6,244	1,787	33	119	618	6	8,807
1951	6,781	1,949	15	189	602	..	9,536

§ 4. Copper.

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

In view of the revised methods of compiling values of individual minerals produced, operative from 1950 (see page 748), it is not practicable to continue a table of values of mine production of copper similar to that shown in previous issues of the Year Book. The table hereunder shows the quantity of mine production of copper in Australia for the years 1950 and 1951. It should be noted that the minerals shown below contain, in addition to copper, certain other metals (see pp. 751-3 for particulars).

COPPER : MINE PRODUCTION, AUSTRALIA.

(Tons).

Mineral in which Contained.	Quantity of Contents.	
	1950.	1951.
Copper Ore, Concentrates, etc.	15,025	15,739
Gold Ore, Concentrates, etc.	2	5
Lead Concentrate	2,166	1,874
Zinc Concentrate	288	308
Total	17,481	17,926

Particulars of the copper content of ores and concentrates produced in each producing State and the Northern Territory, as published by the Australian Mines and Metals Association for the years 1938 and 1947 to 1951, and as recorded by this Bureau from data obtained from the several State Mines Departments and other sources for the years 1950 and 1951, are shown in the table below.

COPPER CONTENT OF ORES AND CONCENTRATES PRODUCED.

(Tons).

State.	1938.	1947.	1948.	1949.	1950.	1951.
New South Wales	1,963	2,391	2,515	2,453	3,893	3,679
Queensland	4,458	2,778	3,149	4,924	5,424	5,432
South Australia	254	..	4	3	..	(a)
Western Australia	5	..	..	5	1	7
Tasmania	12,729	7,954	6,574	5,229	7,884	8,657
Northern Territory	37	..	126	848	279	151
Australia	19,446	13,123	12,368	13,462	17,481	17,926

(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 1951 amounted to 3,679 tons. The principal sources of this production were ores mined at Broken Hill, Cobar, and Captain's Flat.

(ii) *Queensland.* In 1951 mine production of copper in this State amounted to 5,432 tons compared with 5,424 tons in 1950 and 4,924 tons in 1949. The bulk of the production in 1951 came from Mt. Morgan (4,960 tons) while the copper content of copper-lead dross from Mt. Isa Mines, treated overseas, yielded 346 tons.

A copper mill and smelter is under construction at Mt. Isa for the purpose of operating on copper ores at that site. Copper was produced from copper ore at Mt. Isa during the 1939-45 War, but production was suspended in 1946 and until recently operations have been confined to silver-lead-zinc ores. The production of copper in the new smelter commenced early in 1953.

(iii) *South Australia.* Deposits of copper were previously found over a large portion of South Australia, and its total production to date has been considerable, notwithstanding that output has diminished to negligible dimensions since the exhaustion of the ore reserves on the principal copper fields. Mine production of copper recorded in 1948 and 1949 was only 4 and 3 tons respectively, whilst production was nil in 1950 and less than half a ton in 1951

(iv) *Western Australia.* The ore sent to smelters in 1951 amounted to 43 tons containing 7 tons of metal. In the same year carbonate ores for use as fertilizers amounted to 1,337 tons, the average copper content being 10 per cent.

(v) *Tasmania.* The quantity of copper produced in Tasmania during 1951 was 8,657 tons, the Mount Lyell Mining and Railway Co. Ltd. providing the greater part thereof. Copper in concentrates produced by this company in 1951 was 8,190 tons. There was an accumulation of untreated concentrates at the end of the year containing an estimated 4,800 tons of recoverable copper. Output of blister copper was 7,428 tons in 1951, while production of cathode copper was 7,162 tons.

(vi) *Northern Territory.* Copper has been found at various places in the Territory. In 1950 and 1951, 1,450 tons and 805 tons, respectively, of ore were mined, the copper content of which was 279 tons and 151 tons. In 1949, 4,492 tons of copper ore were produced with a copper content of 848 tons. The main decrease in production was in the Barrow Creek area where 3,990 tons of ore were produced in 1949, 1,010 tons in 1950 and 503 tons in 1951.

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 Mount Lyell Mining and Railway Co., Mt. Lyell, Tasmania. The electrolytic process is employed in both cases. However the latter plant produces the copper in cathode form, which with 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.	1948.	1949.	1950.	1951.	1952.
Production for year	17,867	11,389	9,858	13,321	13,543	19,623
Sold to Australian consumers(b)	18,808	11,407	9,884	11,910	13,746	17,102
Exported or sold for export (b)	100	..	4	..	..	..

(a) Refined from domestic primary copper.

(b) Source : Australian Mines and Metals Association.

In recent years, local demand for copper has considerably exceeded Australian production and substantial quantities of copper have been imported. A large proportion of the imports in 1948 and later years has comprised blister copper imported mainly from South Africa and refined in Australia. Recorded imports of "pigs, ingots and other refinery shapes" (including blister copper) in 1950 and 1951 were 13,948 tons and 19,592 tons respectively.

4. **World Production of Copper.**—The world's estimated mine production of copper during the years 1938 and 1946 to 1951 is shown below.

COPPER : WORLD MINE PRODUCTION.
(^{'000} tons of 2,240 lb.).

1938.	1946.	1947.	1948.	1949.	1950.	1951.
2,000	1,806	2,180	2,280	2,250	2,490	2,630

The yields in 1951 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, 1951.
(Tons of 2,240 lb.).

Country.	Production.	Country.	Production.
United States of America ..	828,866	Union of South Africa ..	33,198
Chile	373,729	Peru	32,075
Rhodesia	314,423	Cyprus	23,700
Russia	(a) 296,000	Cuba	20,873
Canada(b)	241,503	Finland	18,018
Belgian Congo	188,927	Australia	17,926
Mexico	66,287	Sweden	14,200
Japan	41,620	Norway	13,782
Yugoslavia	35,382	Turkey	12,889

(a) Estimated.

(b) Includes Newfoundland.

During 1951 the share of the United States of America in the world's mine copper production amounted to 31 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 Regulator. Details of the average price for the years shown are given in terms of Australian currency and sterling in the following table:—

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

Country.	December 1939.	1948.	1949.	1950.	1951.	1952.
Australia — in Aust. currency	63 17 6	140 0 0	167 19 5	189 1 8	254 6 4	308 15 1
United Kingdom — in Sterling ..	62 0 0	134 0 0	133 1 11	178 17 1	220 7 1	258 19 6

(a) Ex works Port Kembla.

6. **Employment in Copper-mining.**—The numbers of persons shown in the table below have been compiled from data supplied by Mines Departments. The figures for Queensland exclude for all years, persons employed in the Mt. Morgan copper-gold mining establishment, which was classified as a gold mine up to 1949. In the tables in § 13 relating to employment in the mining industry generally, employment in the Mt. Morgan establishment for the years 1950 and 1951 has been classified to copper-gold mining, which is a separate industry in the Draft Classification of the Mining Industry adopted from 1950..

COPPER-MINING : PERSONS EMPLOYED.

Year.	N.S.W.	Q'land.	S. Aust.	W. Aust.	Tas.	Nor. Terr.	Australia.
1938	13	213	67	4	1,015	5	1,317
1947	184	48	..	2	733	15	982
1948	187	45	11	..	746	13	1,002
1949	136	57	14	3	757	32	999
1950	203	57	3	5	764	35	1,067
1951	156	34	7	..	742	6	945

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

§ 5. Tin.

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

The table of values of tin production as published in previous Year Books has been discontinued for reasons stated on page 748.

The following table shows the mine production of tin in Australia in the years 1947 to 1951 compared with 1938.

TIN : MINE PRODUCTION, AUSTRALIA.
(Tons.)

—	1938.	1947.	1948.	1949.	1950.	1951
Production ..	3,329	2,456	1,885	1,882	1,854	1,559

Production of refined tin for years 1938 and 1948 to 1952 is shown in the table hereunder. The information has been prepared from data received from the Australian Mines and Metals Association and other sources.

REFINED TIN : PRODUCTION, AUSTRALIA.
(Tons.)

—	1938.	1948.	1949.	1950.	1951.	1952.
Production	3,229	1,885	1,955	2,014	1,459	1,699

2. **Sources of Production.**—(1) *New South Wales.* Production of tin concentrates in 1951 was 578 tons, valued at £413,712, compared with 669 tons, valued at £319,531, in 1950. The tin content was 413 tons in 1951 and 482 tons in 1950. A large proportion of the output in this State is obtained in normal years by dredging and sluicing, principally in the New England district.

(ii) *Victoria*. The production of tin in this State is obtained solely as a by-product from the gold dredging operations at Eldorado. The production in 1951 amounted to 49 tons of concentrates, valued at £35,213, compared with 40 tons, valued at £21,327 in 1950. The tin content in 1951 was 36 tons and in 1950, 29 tons.

(iii) *Queensland*. The chief producing districts in Queensland during 1950 and 1951, the figures in brackets being for 1950, were Herberton, 376 (693) tons of concentrates; Cooktown, 43 (29) tons; Stanthorpe, 21 (37) tons; Chillagoe, 15 (20) tons; and Kangaroo Hills, 13 (65) tons. The total production in 1951 amounted to 490 tons, valued at £309,810, compared with 857 tons, valued at £383,313, in 1950. The tin content in 1950 and 1951 was 600 tons and 340 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 1951 amounted to 61 tons, valued at £39,493, compared with 51 tons in 1950, valued at £25,496. The tin content was 41 tons for 1951 and 36 tons for 1950. Production was mainly in the Pilbara and Greenbushes fields.

(v) *Tasmania*. For 1951 the output amounted to 998 tons of tin concentrates, valued at £706,527, an increase of 39 tons on the output of the previous year. The tin content for 1951 was 706 tons and for 1950, 685 tons.

(vi) *Northern Territory*. The production for 1951 amounted to 37 tons of concentrates, valued at £15,139, compared with 37 tons of concentrates valued at £15,139 produced during 1950. The tin content for 1951 and 1950 was 23 tons and 22 tons respectively.

3. **World Production.**—The world production of tin ore, *in terms of metal*, during each of the years 1938 and 1947 to 1951, as published by the Mineral Resources Division of the Colonial Geological Surveys, was as follows:—

TIN : WORLD PRODUCTION.
(’000 tons of 2,240 lb.).

1938.	1947.	1948.	1949.	1950.	1951.
164.0	111.4	151.4	161.9	166.3	167.3

The production of tin reached its maximum in 1941 when 241,400 tons were recorded. The following are the chief producing countries of the world:—Malayan Union, Bolivia, Indonesia, Belgian Congo, Thailand (Siam) and Nigeria. In recent years these countries have produced approximately 90 per cent. of the total production.

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 1951 was as follows:—

TIN : PRODUCTION IN PRINCIPAL COUNTRIES, 1951.
(Tons of 2,240 lb.).

Country.	Production.	Country.	Production.
Malayan Union	57,167	Australia	1,559
Bolivia	33,134	Portugal	(b) 1,450
Indonesia	30,986	Burma.. ..	(b) 1,050
Belgian Congo (a) ..	13,669	United Kingdom ..	931
Thailand (Siam)	9,502	Union of South Africa ..	767
Nigeria	8,529	Spain	(b) 716
China	(b) 4,800	Mexico	366

(a) Includes Ruanda-Urundi.

(b) Estimated.

Australia's share of the world's tin production is about 1 per cent.

4. **Prices.**—At the outbreak of war in September, 1939, the price of tin in Australia and London was fixed by regulation. London control of tin prices ceased on 14th November, 1949, while the Australian price 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 UNITED KINGDOM.

(£ s. d.)

Country.	December, 1939.	1948.	1949.	1950.	1951.	1952.
Australia — in Aust. currency	(a) 299 0 0	577 7 0	620 0 0	725 5 9	1,222 8 9	1,150 10 0
United Kingdom — in sterling ..	(b) 271 0 0	(b) 548 1 11	(b) 599 16 1	(c) 745 16 9	c 1,079 16 0	(c) 964 12 1

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

5. **Employment in Tin-mining.**—The number of persons employed in tin-mining during the years 1938 and 1947 to 1951 was as follows:—

TIN-MINING : PERSONS EMPLOYED.

Year.	N.S.W.	Victoria. (a)	Q'land.	W. Aust.	Tas.	Nor. Terr.	Australia.
1938	1,440	5	1,263	73	1,123	15	3,919
1947	523	..	528	9	627	52	1,739
1948	534	..	480	11	577	63	1,665
1949	548	..	515	24	576	82	1,745
1950	403	..	568	21	569	83	1,644
1951	334	..	609	33	551	50	1,577

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

§ 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.* 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 1942-43 to 1951-52 inclusive.

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.
1942-43..	1,399,306	1,632,825	1,583,417	1947-48..	1,235,574	1,343,153	1,221,938
1943-44..	1,395,357	1,527,564	1,393,919	1948-49..	1,044,957	1,178,010	1,101,063
1944-45..	1,117,709	1,356,913	1,236,528	1949-50..	1,097,635	1,217,971	1,103,784
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

(a) Includes pig-iron for castings.

(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 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 1950, 11,924 tons of oxide, valued at £26,940, were won, while production in 1951 was 11,886 tons, valued at £33,677.

(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 2,850 tons, valued at £6,806, for 1950 and 2,983 tons, valued at £9,205 for 1951 came mainly from the Biggenden district.

(iv) *South Australia.* The production from the deposits worked by The Broken Hill Pty. Co. Ltd. at Iron Knob reached its maximum in 1939, when 2,571,759 tons of ore, valued at £2,957,523, were raised. Production in 1950 was 2,349,824 tons (1,409,882 tons, iron content) valued at £2,702,424 and in 1951 was 2,400,577 tons (1,440,154 tons, iron content) valued at £2,760,664.

(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 valued at £203,238 were transported. The estimated iron content of this ore amounted to 128,157 tons.

The production of pig-iron was commenced at Wundowie in Western Australia in January, 1948 under the direction of the State Department of Industrial Development. The ore used is obtained from the local deposits at Wundowie and Koolyanobbing and converted to pig-iron by the use of charcoal burnt from timber obtained in the same locality. Production in 1951-52 amounted to 10,920 tons. This, in addition to meeting local requirements, provided a small quantity for export to the eastern States.

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

(vi) *Tasmania*. There has been no production of ironstone in Tasmania since 1943 when 7 tons, valued at £14 were produced. The iron pyrites concentrate produced, which in 1951 amounted to 39,625 tons, valued at £48,517 (sulphur content, 19,549 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.

3. **Production of Iron and Steel in Principal Countries.**—Particulars of the production in the principal countries during the years 1938, 1950 and 1951, according to figures published by the Mineral Resources Division, Colonial Geological Surveys, are shown in the next table.

PIG-IRON AND STEEL : PRODUCTION IN PRINCIPAL COUNTRIES.

(⁰000 Tons of 2,240 lb.)

Country.	Pig-iron and Ferro-alloys.			Steel Ingots and Castings.		
	1938.	1950.	1951.	1938.	1950.	1951.
U.S. of America ..	19,161	59,286	64,686	28,350	86,461	93,928
U.S.S.R. (Russia) ..	14,756	(a)19,200	(a)21,800	17,500	(a)24,600	(a)30,800
United Kingdom ..	6,761	9,633	9,669	10,398	16,293	15,639
Germany ..	17,760	(b) 9,655	(b)10,864	22,268	(b)12,909	(b)14,820
France ..	5,977	(c) 7,638	(c) 8,612	6,040	8,515	9,680
Japan ..	2,535	2,262	3,177	6,367	4,772	6,399
Belgium ..	2,388	3,635	4,771	2,243	3,718	4,925
Czechoslovakia ..	1,215	(a) 2,020	(a) 2,120	1,710	(a) 2,693	(a) 3,260
Canada ..	761	2,224	2,503	1,155	3,022	3,185
Luxemburg ..	1,526	2,459	3,107	1,514	2,412	3,028
Italy ..	914	564	1,033	2,271	2,325	3,015
Poland ..	948	(a) 1,368	(a) 1,552	1,527	2,470	2,748
India ..	1,571	1,680	1,824	936	1,438	1,500
Sweden ..	701	824	890	957	1,418	1,480
Australia(d) ..	930	1,098	1,313	1,230	1,255	1,476
Hungary ..	330	(a) 500	(a) 600	638	1,007	1,215
Austria ..	542	869	1,033	663	928	1,012
Union of South Africa ..	290	721	792	341	743	933
Brazil ..	..	718	760	..	767	828
Spain ..	433	656	655	567	805	806
Mexico ..	119	240	197	72	215	446
Total—All Countries	81,000	131,000	147,000	107,600	186,000	207,000

(a) Estimated. (b) Western Germany. (c) Excludes electric furnace ferro-alloys. (d) Year ended 30th June.

The principal producers in Australia are The Broken Hill Pty. 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 Pty. Co. Ltd. established a blast furnace at Whyalla in South Australia; this was blown in during May, 1941, and has since continued to operate except for the periods May, 1944 to April, 1946 and April, 1949 to September, 1949.

In Western Australia, the production of pig-iron, under the direction of the State Department of Industrial Development, commenced in January, 1948. The output for the year 1951-52 amounted to 11,087 tons.

§ 7. Other Metallic Minerals.

1. **Tungsten.**—Tungsten ores occur in all States, and on King Island in Bass Strait. Particulars of the King Island scheelite concentrates are included with Tasmanian production. Important deposits of tungsten ores occur in Queensland, New South Wales, Tasmania and Northern Territory, but production from the other States has been comparatively unimportant. Queensland has the largest total output to date, but its annual production is now much less than formerly. In recent years the largest production has come from Tasmania, followed by Northern Territory. Production of tungsten concentrates and contents during 1951 in each State etc. is shown below :—

TUNGSTEN CONCENTRATES : PRODUCTION, 1951.

(Tons.)

Particulars.	N.S.W.	Vic.	Q'land.	W. Aust.	Tas.	N. Terr.	Australia.
Wolfram Concentrate ..	14	(a)	152	5	379	147	697
WO ₃ Content	9	(a)	100	3	264	91	467
Scheelite Concentrate ..	8	..	3	..	1,020	..	1,031
WO ₃ Content	6	..	2	..	624	..	632

(a) Less than half a ton.

The following table shows production for Australia for the years 1938 and 1947 to 1951 :—

TUNGSTEN CONCENTRATES : PRODUCTION, AUSTRALIA.

(Tons.)

Particulars.	1938.	1947.	1948.	1949.	1950.	1951.
Wolfram Concentrate ..	978	388	328	375	282	697
WO ₃ Content	649	243	292	265	198	467
Scheelite Concentrate ..	40	660	651	809	800	1,031
WO ₃ Content	26	431	510	545	532	632

NOTE.—In addition to the foregoing, 7 tons of bismuth-tungsten concentrates containing 1 ton of WO₃ and 12 tons of tin-tungsten concentrates with a WO₃ content of 6 tons were produced in New South Wales during 1951.

2. **Cadmium and Cobalt.**—The sources of cadmium in Australia are lead and zinc concentrates. The cadmium content of these concentrates produced during the year 1950 is estimated at 597 tons and during 1951 at 605 tons. The greater proportion of the concentrates are 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 1950 is estimated at 43 tons and in 1951 at 42 tons.

Production of refined cadmium and cobalt oxide for the years 1938 and 1947 to 1951 is shown in the following table :—

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

Year.	Cadmium (Refined).			Cobalt Oxide.
	Extracted from Ores Mined in—			Extracted from Ores Mined in New South Wales.(a)
	New South Wales	Tasmania.	Total.	
1938	147	49	196	19
1947	171	34	205	12
1948	245	44	289	15
1949	215	44	259	14
1950	250	44	294	16
1951	195	36	231	13

(a) Excludes less than half a ton of Cobalt Oxide produced in Tasmania 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.

3. **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.

(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. and in 1951, 34 oz. Of this, 2 oz. were from New South Wales in 1950 and half an ounce in 1951.

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

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

4. **Other.**—The production, in 1951, of other metallic minerals worthy of note, is as follows :—

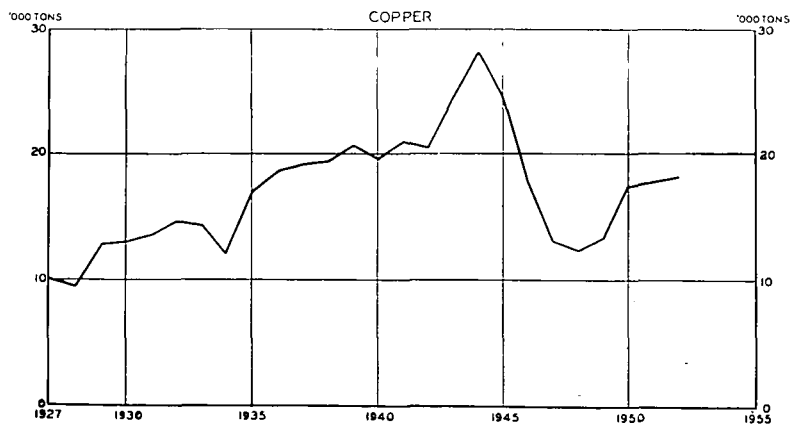
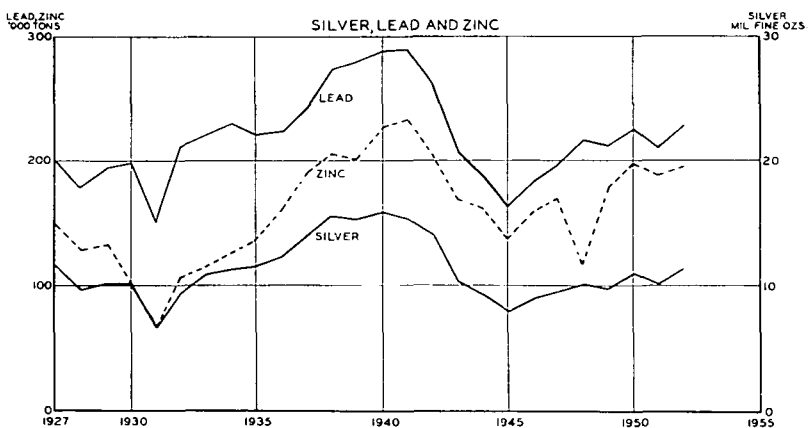
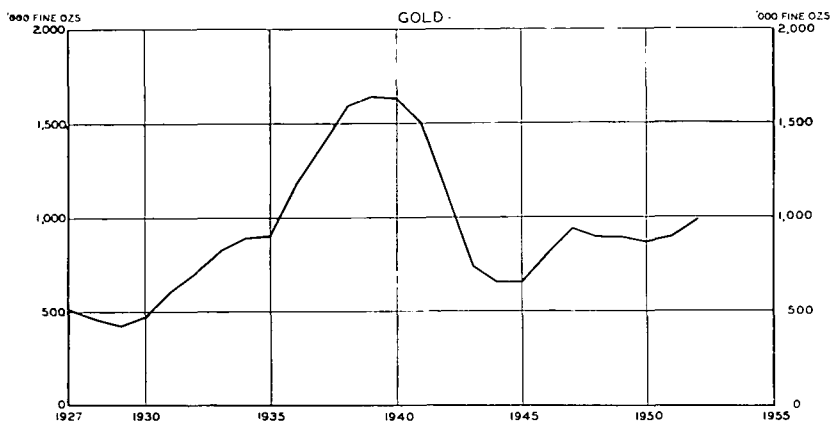
Antimony. The antimony content of antimony-bearing minerals produced was 744 tons. Of this amount 489 tons were in lead concentrates and 255 tons in 676 tons of antimony ore and concentrates.

Bismuth. Bismuth content of minerals produced was 2,620 lb., 2,492 lb. of which was contained in 7 tons of bismuth-wolfram concentrates from New South Wales.

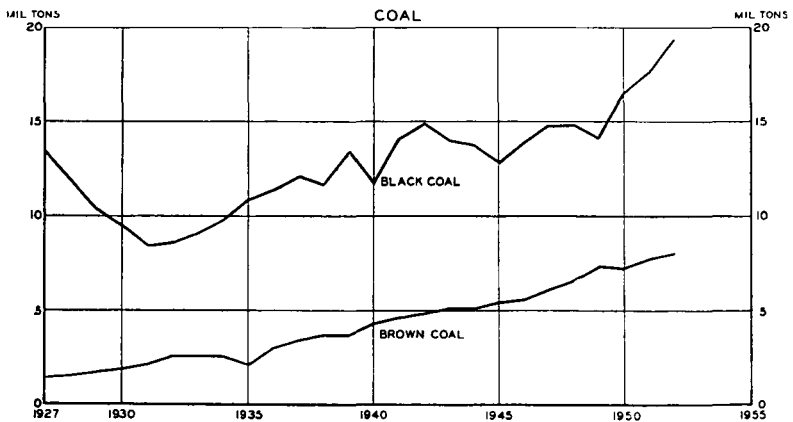
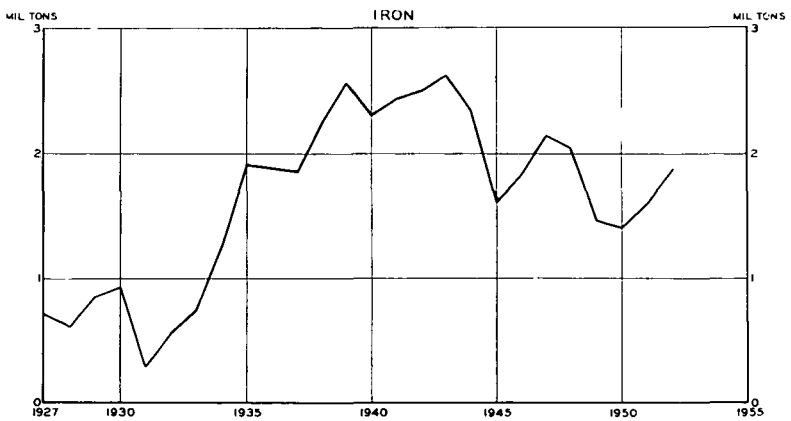
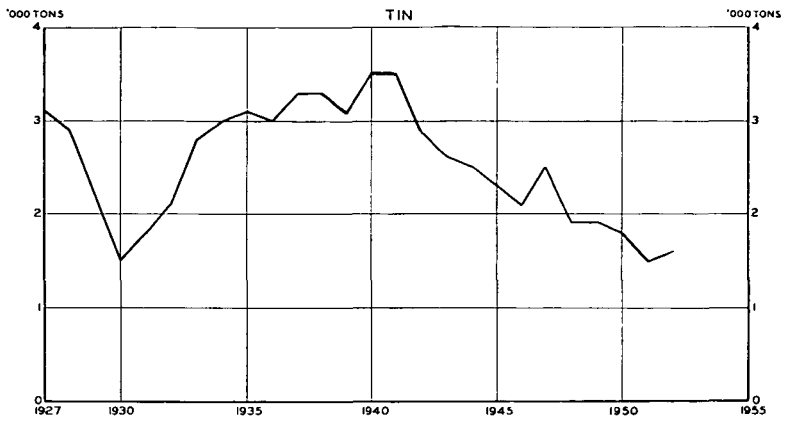
Manganese. Production of manganese ore comprised 6,311 tons of metallurgical grade (manganese content 3,042 tons), 1,543 tons of battery grade (manganese dioxide content 1,146 tons), and 115 tons of other grades (manganese dioxide content 70 tons). Manganese content of zinc concentrates produced in New South Wales was 3,435 tons.

Molybdenum. Two tons of molybdenite concentrates were produced, the molybdenum sulphide content being about 73 per cent.

MINE PRODUCTION OF MINERALS AND METALS AUSTRALIA: 1927 to 1952



MINE PRODUCTION OF MINERALS AND METALS AUSTRALIA: 1927 to 1952



§ 8. Coal.

1. **Production in each State.**—An account of the discovery of coal in each State appears in preceding issues of the Official Year Book (*see* No. 3, pp. 515-16). The quantity and value of the production in each State and in Australia during 1915, 1925, 1935, 1938, 1945 and for each of the years 1948 to 1952 are shown in the following table. Of the total production of black coal in 1952, 82,426 tons were classified as semi-anthracite, 16,029,615 tons as bituminous and 1,496,387 tons as sub-bituminous.

Of the total production of black coal in Australia in 1952, 4,072,274 tons (21 per cent.) were obtained by open-cut methods. The remainder, 15,332,824 tons (79 per cent.) came from underground mines. In 1948, 13 per cent. of black coal won in Australia came from open-cut mines while in 1951 the proportion had risen to 21 per cent., thus indicating the increased activity in the mining of black coal by this method.

BLACK COAL : PRODUCTION.

Year.	N.S.W.	Victoria. (a)	Q'land.	S. Aust.	W. Aust.	Tasmania.	Australia.
QUANTITY (tons).							
1915 ..	9,449,008	588,104	1,024,273	..	286,666	64,536	11,412,587
1925 ..	11,396,199	534,246	1,177,173	..	437,461	81,698	13,626,777
1935 ..	8,698,579	476,495	1,051,978	..	537,188	123,714	10,887,954
1938 ..	9,570,930	307,258	1,113,426	..	604,792	83,753	11,680,159
1945 ..	10,176,254	247,297	1,634,746	41,452	543,363	149,977	12,792,189
1948 ..	11,721,446	164,906	1,742,396	239,464	732,938	179,393	14,780,543
1949 ..	10,736,098	122,507	1,970,388	344,638	750,594	181,618	14,105,843
1950 ..	12,798,221	126,431	2,320,799	261,337	814,352	222,351	16,543,491
1951 ..	13,513,244	147,743	2,473,775	388,303	848,475	236,888	17,608,428
1952 ..	15,022,100	143,820	2,742,236	418,582	830,461	247,899	19,405,098
VALUE.(b) (£.)							
1915 ..	3,424,630	274,770	409,342	..	137,859	30,418	4,277,019
1925 ..	9,302,515	596,117	1,037,956	..	363,203	70,424	11,370,215
1935 ..	4,887,341	282,253	843,034	..	318,013	86,204	6,416,845
1938 ..	5,652,964	188,101	958,884	..	375,083	61,991	7,237,023
1945 ..	9,451,930	494,690	1,759,311	14,508	572,896	125,719	12,419,054
1948 ..	14,938,182	347,687	2,347,065	119,732	880,236	177,652	18,810,554
1949 ..	16,121,554	379,464	2,874,062	172,319	972,245	181,897	20,701,541
1950 ..	22,121,326	382,230	3,562,541	130,669	1,185,038	231,599	27,613,403
1951 ..	29,325,855	600,734	4,490,154	399,628	1,716,788	305,548	36,838,707
1952 ..	43,283,357	753,007	5,005,377	429,709	2,457,296	341,561	53,170,307

(a) Excludes brown coal, shown in next table.

(b) At the pit's mouth.

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

BROWN COAL : PRODUCTION IN VICTORIA.

Year.	Quantity.	Value.(a)	Year.	Quantity.	Value.(a)
	Tons.	£		Tons.	£
1915 ..	2,864	573	1948 ..	6,692,291	1,187,715
1925 ..	876,468	166,404	1949 ..	7,375,559	1,469,455
1935 ..	2,221,515	317,444	1950 ..	7,327,119	1,706,612
1938 ..	3,675,450	351,721	1951 ..	7,836,056	2,754,822
1945 ..	5,445,108	641,069	1952 ..	8,103,764	3,476,627

(a) Cost of production.

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

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

The following table shows the yields in each of the three districts during the five years 1948 to 1952 compared with 1938. Separate details are given respecting coal won underground and from open cuts—

COAL : PRODUCTION IN DISTRICTS OF NEW SOUTH WALES.

District.	1938.	1948.	1949.	1950.	1951.	1952.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Northern—Underground ..	6,294,213	7,146,524	6,244,882	7,394,554	7,313,806	8,228,374
Open Cut ..	..	635,103	575,310	931,883	1,243,858	1,398,107
Southern—Underground ..	1,831,408	1,922,467	1,908,034	2,395,160	2,505,587	2,775,820
Open Cut ..	..	..	..	8,219	2,885	..
Western—Underground ..	1,445,309	1,397,835	1,337,044	1,406,862	1,404,819	1,487,710
Open Cut ..	..	619,517	670,828	661,543	1,042,289	1,132,089
Total—Underground ..	9,570,930	10,466,826	9,489,960	11,196,576	11,224,212	12,491,904
Open Cut ..	..	1,254,620	1,246,138	1,601,645	2,289,032	2,530,196
Grand Total ..	9,570,930	11,721,446	10,736,098	12,798,221	13,513,244	15,022,100
Total Value (a) ..	5,652,964	14,938,182	16,121,554	22,121,326	29,325,855	43,283,357
Average value per ton (a) ..	11s. 10d.	25s. 6d.	30s. 0d.	34s. 0d.	43s. 5d.	57s. 7d.

(a) At the pit's mouth.

Much development has been carried out in recent years on the New South Wales coalfields. Areas receiving particular attention are those in the vicinities of Muswellbrook and Lithgow, where the open-cut mining method is being exploited more fully. In 1952, 15,022,100 tons (420 tons semi-anthracite, 15,008,489 tons bituminous and 13,191 tons sub-bituminous) were won, which is the highest production recorded for any year and was 1,508,856 tons more than in 1951.

In 1952 open-cut production accounted for 16.8 per cent. of all coal produced in this State, a considerable advance on the 10.7 per cent. of total production recorded by open-cuts in 1948 and indicative of the recent development in this sphere.

(ii) *Victoria.* (a) *Black Coal.* During 1952, production of bituminous coal decreased by 3,923 tons to a total of 143,820 tons. Of this, 128,006 tons or 89 per cent., were won from the State Coal Mines at Wonthaggi in South Gippsland, while the remaining 15,814 tons represent the total production of four small mines at Korumburra, Kilcunda and Jumbunna.

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

The output of black coal in Victoria during each of the five years ended 1952 compared with 1938 was as follows:—

BLACK COAL : PRODUCTION IN VICTORIA.

Year.	Quantities.			Total Value. (a)
	State Coal- mine.	Other Coal- mines.	Total.	
	Tons.	Tons.	Tons.	£
1938	253,065	54,193	307,258	188,101
1948	145,880	19,026	164,906	347,687
1949	108,159	14,348	122,507	379,464
1950	109,988	16,443	126,431	382,230
1951	132,396	15,347	147,743	600,734
1952	128,006	15,814	143,820	753,007

(a) At the pit's mouth.

(b) *Brown Coal. General.* The mining of brown coal is carried on only in the State of Victoria, where extensive deposits exist; estimates place the available reserves at 27,000 million tons. Large-scale developmental projects are in progress; these, when completed, will greatly reduce the dependence on fuel from other States. Brown coal produced in Victoria in 1952 amounted to 8,103,764 tons, of which 6,447,692 tons, or 79.6 per cent., were won at the State open-cut at Yallourn. During 1951-52, 6,480,723 tons of brown coal were produced at Yallourn, of which 4,151,742 tons went to the Yallourn power station, and 2,328,981 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 568,252 tons in 1951-52. 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 1947-48 to 1951-52, compared with 1938-39.

BROWN COAL : PRODUCTION AND UTILIZATION, VICTORIA.

('000 Tons.)

Year.	Total Production.	State Electricity Commission.				Brown Coal for other Industries.
		Brown Coal used as Fuel.		Brown Coal used as Material in Production of Briquettes.	Production of Briquettes.	
		Generating Station.	Briquette Factory.			
1938-39 ..	3,643	2,096	516	1,031	400	..
1947-48 ..	6,419	3,767	743	1,487	545	422
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	696	1,391	511	875
1951-52 ..	8,096	4,784	776	1,553	568	983

(iii) *Queensland.* The distribution of production of coal during the years 1938 and 1948 to 1952 was as follows:—

COAL : PRODUCTION IN QUEENSLAND.
(Tons.)

District.	1938.	1948.	1949.	1950.	1951.	1952.
Bowen	224,778	238,487	192,300	213,908	208,145	223,788
Chillagoe	19,192	18,670	..	..	..	..
Clermont	88,407	216,610	313,124	295,635	361,874	389,270
Darling Downs	76,571	117,277	..	..	..	..
Eidsvold .. ..	..	..	27,135	40,359	54,540	52,173
Ipswich	547,901	902,411	921,417	1,144,980	1,157,220	1,263,854
Mackay	1,543	..	2,646	..	..	..
Mareeba .. ..	..	..	23,564	25,331	29,393	32,241
Maryborough	77,162	132,085	136,008	151,475	160,263	158,748
Mt. Morgan	13,698	43,245	144,146	206,886	280,772	382,043
Rockhampton	64,174	73,611	76,271	84,970	89,586	84,357
Roma .. ..	..	..	15,778	18,213	16,980	21,528
Toowoomba .. ..	..	..	98,786	118,235	99,208	112,137
Warwick .. ..	..	..	19,213	20,807	15,794	22,097
Total	1,113,426	1,742,396	1,970,388	2,320,799	2,473,775	2,742,236

The production of 2,742,236 tons in 1952 represents the highest annual production to date. Of the total, 83,562 tons were semi-anthracite, 2,314,667 tons were bituminous and 344,007 tons, sub-bituminous.

The open-cut method of mining for black coal has advanced considerably in Queensland in recent years. In 1948, 224,069 tons (or 12.8 per cent. of total production) were won from open-cuts while in 1951 and 1952, 612,909 tons (24.8 per cent.) and 730,643 tons (26.6 per cent.) respectively 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 its first year of major production in 1944, 34,620 tons were won. Production has risen considerably in more recent years, and amounted to 388,303 tons (valued at £399,628) in 1951 and 418,582 tons (valued at £429,709) in 1952.

(v) *Western Australia.* The only coal deposit which has been developed on a commercial scale is at Collie in the south-west of the State. Collie coal is sub-bituminous in rank. Production in 1951 was 848,475 tons (valued at £1,716,788) and in 1952, 830,461 tons (valued at £2,457,296) compared with 604,792 tons (valued at £375,083) in 1938.

(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 1951, output amounted to 236,888 tons (value, £305,548) while 247,899 tons (value, £341,561) were produced in 1952. Production in 1938 at 83,753 tons valued at £61,991 was considerably lower than in recent years.

(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. The following table shows the actual and probable coal reserves as determined by that Committee :—

ACTUAL AND PROBABLE COAL RESERVES OF AUSTRALIA.
(^{'000,000 Tons.})

Rank of Coal.	New South Wales.	Victoria.	Queens-land.	South Australia.	Western Australia.	Tasmania.	Australia.
Anthracitic and Bituminous ..	10,000	30	4,000	..	..	240	(a)14,250
Sub-bituminous and Lignitic ..	500	40,000	53	1,025	1,002	2	(a)42,550
Total ..	10,500	40,030	4,053	1,025	1,002	242	(a)56,800

(a) Rounded figures.

3. *Production in Principal Countries.*—The following table shows the production of the principal countries during each of the three years 1950 to 1952 compared with 1938, as published by the Statistical Office of the United Nations.

COAL : PRODUCTION IN PRINCIPAL COUNTRIES.
(^{'000 tons of 2,240 lb.})

Country.	Black Coal.				Brown Coal, Lignite.			
	1938.	1950.	1951.	1952.	1938.	1950.	1951.	1952.
United States of America	349,684	512,861	515,632	465,581	2,677	3,036	(a)	(a)
United Kingdom ..	227,015	223,931	222,802	233,845	..	..	..	..
Western Germany ..	b 183,238	112,539	117,009	125,289	b 191,899	77,058	81,788	84,725
Poland ..	37,502	79,252	80,679	85,811	9	4,758	..	..
France ..	45,770	51,660	52,117	56,272	1,041	1,719	1,972	2,025
Japan ..	47,915	39,078	42,624	44,052	142	1,305	1,381	1,501
India ..	29,052	33,030	34,300	37,405	..	..	..	..
Belgium ..	29,118	27,738	29,187	30,880	..	..	..	..
Union of South Africa	16,027	26,483	25,692	27,697	..	..	..	..
Australia ..	11,680	16,543	17,608	19,405	3,875	7,327	7,836	8,104
Canada ..	9,223	15,607	14,582	14,281	3,540	2,024	1,984	1,915
Netherlands ..	13,275	12,449	12,220	12,733	168	195	248	244
Spain ..	5,559	11,217	11,146	12,196	163	1,366	1,464	1,622
Turkey ..	2,548	4,426	4,652	4,927	143	1,167	1,240	1,390
Southern Rhodesia	1,027	2,158	2,267	2,593	..	..	..	..

(a) Included with Black Coal.

(b) Pre-war Germany.

World production of coal amounted to 1,440 million tons in 1938; it rose to 1,770 million tons in 1943 and by 1951 had reached 1,872 million tons. Of these quantities, those produced in the British Commonwealth totalled 304 million or 21 per cent. in 1938, 286 million or 16 per cent. in 1943 and 332 million tons or 18 per cent. in 1951.

4. *Exports.*—(i) *General.* The quantity of coal of Australian production exported to other countries in 1951–52 was 139,140 tons, valued at £608,045, shipped mainly

from New South Wales. These figures of oversea exports exclude bunker coal supplied to oversea vessels, which in 1951-52 amounted to 54,207 tons, valued at £246,258. The quantities and values of the oversea exports of Australian coal and of bunker coal for oversea 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.	£
1913	2,098,505	1,121,505	1,647,870	1,018,375
1921-22	1,028,767	1,099,899	1,498,035	2,178,101
1931-32	344,015	341,800	506,140	534,897
1938-39	382,085	347,054	549,453	561,063
1946-47	44,375	54,754	355,428	655,207
1947-48	67,228	108,733	283,354	597,559
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

(a) Excludes bunker coal.

(ii) *New South Wales.* The distribution of the total output from New South Wales collieries during the years 1947-48 to 1951-52 compared with 1938-39, according to data compiled by the Government Statistician for that State, was as follows.

COAL : DISTRIBUTION OF OUTPUT, NEW SOUTH WALES.

(⁰⁰⁰ Tons.)

Year.	Exports.				Local Consumption. (b)	Total.
	Interstate as—		Overseas as—			
	Cargo.(a)	Bunker.	Cargo.	Bunker.		
1938-39	1,860	411	382	517	7,213	10,383
1947-48	2,537	307	59	234	8,951	12,088
1948-49	2,443	284	31	233	8,624	11,615
1949-50	1,898	231	68	135	8,961	11,293
1950-51	1,956	225	72	136	10,295	12,684
1951-52	2,494	227	127	102	11,850	14,800

(a) Excludes interstate despatches by rail. (b) Includes additions to, or withdrawal from stocks. Small quantities of coal railed interstate are also included.

5. *Consumption in Australia.*—Details of the average annual production of coal and its distribution in Australia are given in the following table for the five years ended 1938-39 and 1949-50, together with similar details of production and distribution for the year 1950-51.

COAL : PRODUCTION AND UTILIZATION IN AUSTRALIA.

Particulars.	Quantity.			Proportion of Total.		
	Average for five years ended—		1950-51.	Average for five years ended—		1950-51.
	1938-39.	1949-50.		1938-39.	1949-50.	
BLACK COAL.						
Source of Supplies—	'000 Tons.	'000 Tons.	'000 Tons.	%	%	%
Production (a)	11,169	14,350	16,418	99.7	99.0	96.5
Imports	31	143	598	0.3	1.0	3.5
Total Supplies	11,200	14,493	17,016	100.0	100.0	100.0
Disposal—						
Exported Overseas—						
Bunker	592	493	294	5.3	3.4	1.7
Other	346	58	72	3.1	0.4	0.4
Total	938	551	366	8.4	3.8	2.1
Consumed as fuel in—						
Electric Light and Power Works	1,796	3,379	4,674	16.0	23.3	27.5
Factories (b)	2,067	2,428	2,965	18.5	16.8	17.5
Railway Locomotives (c)	2,328	3,099	3,183	20.8	21.4	18.7
Total	6,191	8,906	10,822	55.3	61.5	63.7
Consumed as raw material in—						
Gas works	1,111	1,893	1,964	9.9	13.1	11.6
Coke works	1,467	1,846	2,618	13.1	12.7	15.4
Total	2,578	3,739	4,582	23.0	25.8	27.0
Balance available for other consumption and accumulation of stocks (d)	1,493	1,297	1,246	13.3	8.9	7.2
Grand Total	11,200	14,493	17,016	100.0	100.0	100.0
BROWN COAL.						
Production of Brown Coal	'000 Tons.	'000 Tons.	'000 Tons.	%	%	%
	3,064	6,499	7,300	100.0	100.0	100.0
Utilization—						
As fuel for generation of Electric Light and Power	1,673	3,899	4,338	54.6	60.0	59.4
As fuel and as a raw material by Briquette Factory	1,391	2,127	2,087	45.4	32.7	28.6
Recorded consumption as fuel in factories	(e)	410	746	(e)	6.3	10.2
Balance—Unrecorded consumption, other purposes	(e)	63	129	(e)	1.0	1.8
Total	3,064	6,499	7,300	100.0	100.0	100.0

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

In order to meet the greatly increased demands for coal in Australia, arrangements have been made in recent years to import considerable quantities to augment local supplies. The quantity imported in 1949-50 was 493,805 tons and in 1950-51, 597,866 tons.

5. **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 1951, 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 1951, 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	(b) 34 10	22 6	30 3
1950	36 5	(b) 39 1	29 4	(b) 35 10
1951	51 5	50 8	42 10	49 8

(a) Includes Commonwealth subsidy.

(b) Revised since previous issue.

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

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

Country.	1938.	1945.	1946.	1947.	1948.	1949.	1950.	1951.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
New South Wales—Bituminous(a)	12 0	18 7	18 10	20 9	25 8	30 3	35 10	49 8
Great Britain—Deep mined(b)	16 8	35 0	36 10	40 3	47 2½	47 11	47 9½	51 2½
	\$	\$	\$	\$	\$	\$	\$	\$
Canada—Bituminous (c) ..	5.417	6.788	6.980	6.980	6.980	6.980	(d)	(d)
United States of America—Bituminous (e) ..	4.327	6.356	5.776	6.873	(f)8.118	(f)8.631	(f)8.738	(g)5.698

(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. (d) Not available. (e) Wholesale price, car-lots, on tracks, destination, in United States of America currency per ton of 2,000 lb.

(f) Figures for 1948 to 1950 represent averages for nine months, nine months and ten months respectively. As a result of changes in the basis of compiling the averages, figures are not strictly comparable from year to year. (g) Prices are "f.o.b. car at mine" and are not comparable with earlier figures. Average of eleven months.

8. **Employment in Coal-mines.**—The number of persons employed, both above and below ground, in coal-mines in each of the producing States for selected years from 1915 and for the years 1947 to 1951 inclusive is shown in the following table :—

COAL-MINES : PERSONS EMPLOYED.

Year.	New South Wales.	Victoria.		Queensland.	South Australia.	Western Australia.	Tasmania.	Total.
		Black.	Brown.					
1915	17,959	1,312	(a)	2,518	..	498	161	22,448
1925	24,049	1,947	646	2,826	..	677	312	30,457
1935	13,337	1,397	615	2,455	..	689	340	18,833
1938	15,815	1,322	444	2,495	..	765	269	21,110
1945	17,427	1,016	584	2,966	100	860	279	23,232
1947	17,614	860	594	3,337	124	1,032	288	23,849
1948	18,693	824	526	3,323	237	1,064	274	24,941
1949	18,546	787	811	3,390	347	1,044	312	25,237
1950	18,540	777	889	3,495	408	1,099	334	25,542
1951	18,747	773	898	3,503	434	1,125	329	25,809

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

The year of maximum employment was 1926 when 31,774 persons were engaged in the coal-mines of Australia. Shortly after that year the industrial depression and a prolonged stoppage of work on one of the principal fields of New South Wales during 1929 and 1930 seriously affected the figures of employment. Since 1933 there has been a gradual increase, but the numbers employed in 1951 were only about three-quarters of the maximum figure already quoted. In New South Wales in 1939, 3,594,000 tons of coal, or 32.1 per cent. of the total output of underground coal, were cut by machinery, compared with 3,364,351 tons or 35.5 per cent. in 1949, 4,345,836 tons or 38.8 per cent. in 1950, 4,964,941 tons or 44.2 per cent. in 1951, and 6,243,060 tons or 50.0 per cent. in 1952. Similar details for other States are not available.

9. **Production of Coal per Man-day (or Man-shift) in New South Wales Underground Mines.**—The following table shows particulars of the estimated production of coal in New South Wales underground mines per man-day or man-shift for the years 1939 and 1944 to 1952. For 1947 and earlier years the figures relate to coal raised per man-day and have been calculated by the Government Statistician for New South Wales from data collected from mines as to production of coal, average numbers of employees, and numbers of days worked by the mines. From 1948, the table shows production per man-shift, as calculated by the Joint Coal Board from fortnightly returns from each mine showing actual numbers of shifts worked. Although the two series have not been compiled on identical bases, they may be taken as comparable for practical purposes.

PRODUCTION OF COAL PER MAN-DAY (OR MAN-SHIFT) : NEW SOUTH WALES UNDERGROUND MINES.

(Tons.)

Year.	Coal Raised per Man-day(a)		Year.	Production of Coal per Man-shift.(b)		
	Employees Below Ground.	All Employees.		Employees at Coal Face.	All Employees Below Ground.	All Employees.
1939 ..	4.42	3.35	1948 ..	9.51	4.26	2.92
1944 ..	4.13	3.09	1949 ..	9.83	4.26	2.91
1945 ..	3.97	2.98	1950 ..	10.28	4.39	2.95
1946 ..	4.05	2.99	1951 ..	10.82	(c)	2.96
1947 ..	4.11	3.01	1952 ..	10.06	(c)	3.00

(a) As compiled by Government Statistician.

(b) As compiled by Joint Coal Board.

(c) Not available.

10. **Accidents in Coal-mining.**—The following table shows the number of persons killed or injured in the coal-mining industry in Australia during 1951. Owing to the different bases of recording mining accidents in the various States of Australia the figures in the table below are not strictly comparable between States. Particulars for brown coal mining, which is confined to Victoria, are included.

COAL-MINING : EMPLOYMENT AND ACCIDENTS, 1951.

State.	Persons Employed in Coal-mining.	No. of Persons.	
		Killed.	Injured.
New South Wales	18,747	14	81
Victoria (a)	1,671	..	20
Queensland	3,593	4	183
South Australia	434	..	11
Western Australia	1,125	2	151
Tasmania	329	..	5
Total	25,809	20	451

(a) Includes brown coal.

11. **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.

12. **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 and by 1938-39 it had reached 1,164,873 tons. This increased production permitted an export of 30,000 tons in 1938-39. Imports in the same year were 9,700 tons. In recent years, imports have exceeded exports and in 1951-52, 6,508 tons were imported (5,037 tons from South Africa) and 1,396 tons exported (1,016 tons to New Zealand). In 1950-51, imports totalled 37,658 tons (29,802 tons from South Africa) and exports were 1,722 tons (1,403 tons to New Zealand).

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 1951-52 was 1,040,934 tons compared with 757,046 tons in 1938-39.

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

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 1947-48 to 1951-52. Relevant particulars of the output of coke breeze are also shown.

TOTAL COKE PRODUCTION : AUSTRALIA.

(Tons.)

Industry.	1938-39.	1947-48.	1948-49.	1949-50.	1950-51.	1951-52.
COKE.						
Coke Works ..	1,164,873	1,384,238	1,150,039	1,182,773	1,515,782	1,799,650
Gas Works ..	757,046	1,170,545	1,181,516	1,094,982	1,111,854	1,040,934
Total ..	1,921,919	2,554,783	2,331,555	2,277,755	2,627,636	2,840,584
COKE BREEZE.						
Coke Works ..	78,584	(a) 111,062	(a) 88,439	87,394	(a) 115,658	(a) 125,288
Gas Works ..	35,996	60,556	69,160	75,604	118,231	123,231
Total ..	114,580	171,618	157,599	162,998	233,889	248,519

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

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.	1947-48.	1948-49.	1949-50.	1950-51.	1951-52.
Tar—Crude (a) .. '000 gals.	34,614	41,166	40,844	33,173	41,239	42,886
Refined (a) .. "	3,752	14,996	13,534	12,324	12,449	12,514
Tar Oils (crude) .. "	1,254	4,022	5,234	3,758	3,960	4,101
Ammoniacal Liquor .. "	5,388	18,102	19,272	18,120	24,210	23,449
Ammonium Sulphate (a) tons	24,251	39,489	53,247	48,736	57,893	63,815

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

§ 10. Shale-oil and Mineral Oil.

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

(ii) *New South Wales.* Reference to the establishment of the shale-oil industry in Australia will be found in previous issues of the Official Year Book. In 1937 negotiations were completed between the Commonwealth and New South Wales Governments and the National Oil Proprietary Ltd., by which the latter company undertook to develop the shale-oil industry in the Newnes-Capertee district. The Commonwealth Government agreed to protect the industry by exempting from excise, up to 10 million gallons annually, the Company's output of petrol for a period of 25 years. Production of petrol from crude oil commenced at Glen Davis, near Newnes, in 1940.

In January, 1951, the Commonwealth Government announced that in view of the continued uneconomic operation of the project, its small contribution to Australian petroleum supplies, the doubtful prospect of raising production to a considerably higher figure and the urgent need for miners in black coal production, it would close down the works completely as soon as possible. In September, 1951, the Government appointed a receiver in National Oil Pty. Ltd., the company which has operated this project. Operations were continued on a restricted basis, but ceased entirely on 30th May, 1952. A total quantity of 26,034,403 gallons of petrol had been produced at the time of the closing of the plant.

The following table shows the production of oil shale during the years 1948 to 1952 compared with 1940 :—

OIL SHALE : PRODUCTION IN NEW SOUTH WALES.

	1940.	1948.	1949.	1950.	1951.	1952.
Quantity tons	43,805	136,352	120,956	98,487	78,564	21,661
Value £	43,805	204,528	181,437	185,084	181,132	50,902

(iii) *Tasmania*. About 38,000 gallons of crude oil were produced in 1934 from shale treated in Tasmania, while the total quantity of oil distilled from shale up to the end of 1934 was set down at 357,000 gallons. The plant owned by the Tasmanite Shale Oil Company has not operated since the end of January, 1935.

Interest in the commercial utilization of oil shales of the Mersey Valley for the extraction of fuel oils has been retarded 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 is made in previous issues of the Official Year Book. See Official Year Book No. 37, pages 844-5.

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

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

Test drilling has been carried on in two areas—Oiapu in the Gulf District of Papua and Nerrima in the Kimberley District of Western Australia. At Oiapu, further geological surveys did not indicate favourable conditions, drilling operations were terminated and the permit was not extended. At Nerrima, the Frenay Kimberley Oil Company N.L. was unable to clear the borehole and again suspended operations; negotiations led to a tripartite arrangement whereby the Commonwealth, State and company would share equally in the cost of drilling a new bore at Nerrima subject to geophysical surveys confirming the suitability of the area for test drilling. The geophysical survey results were decidedly unfavourable and, in the face of constantly rising costs, the Commonwealth and State decided not to go ahead with the project.

(ii) *Victoria*. Production of crude oil by Lakes Oil Limited at Lakes Entrance was discontinued in 1951 because of economic considerations. In the Avon area of Gippsland near the Lakes Oil Limited shaft, a small seismic survey was made by the Commonwealth Bureau of Mineral Resources, Geology and Geophysics to investigate a possible structure indicated by a previous gravity survey. In East Gippsland, the previous gravity reconnaissance surveys by Robert H. Ray Company of the United States of America and by the Bureau were extended eastward as far as Orbost in search of structures suitable for further investigation.

Geological surveys have been carried out in the Portland-Nelson-Mt. Gambier area of Western Victoria and the eastern part of South Australia by the Departments of Mines of Victoria and South Australia. Geophysical surveys (gravity) were made in Western Victoria by the Bureau of Mineral Resources, Geology and Geophysics.

(iii) *Queensland*. At Roma, Queensland, Associated Australia Oilfields N.L. drilled a hole on a structure indicated by a seismic survey made by the Bureau of Mineral Resources, Geology and Geophysics. The hole reached basement at a depth of 3,892 feet without significant indications of oil or natural gas. Another hole was begun in October, 1952 and had reached basement at a depth of about 3,600 feet. Production tests are being carried out on this well.

(iv) *South Australia.* Under prescribed conditions, the South Australian Government offers a bonus of £5,000 to the person or body corporate which first obtains from a local bore or well 100,000 gallons of crude petroleum containing not less than 90 per cent. of products obtainable by distillation. Geophysical surveys were undertaken by private interests during 1947, and continued into 1948, in the north-east corner of the State and extending over the border into New South Wales, and Queensland, but with little success. Assistance given by the Commonwealth included equipment and a geophysical survey party.

(v) *Western Australia.* 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 Giralia Cape Range and Rough Range Anticlines during 1952. In the Fitzroy Basin, South Kimberley area, the Bureau has carried out geological and geophysical (seismic and gravity) surveys.

(vi) *Papua.* Australasian Petroleum Company and Island Exploration Company continued surface and sub-surface exploration. In the western and eastern parts of the Delta District, and between the Fly and Wawoi Rivers, Western District, field parties conducted seismic and refraction surveys. In the foothills area of the eastern and western parts of the Gulf District, three parties carried out geological surveys during 1952. Australasian Petroleum Company's Hohoro Well No. 2, which was spudded in during February, 1951, was abandoned as a dry hole in May, 1952, when it has reached a depth of 10,642 feet. Island Exploration Company's Omati Well, which was spudded in during November, 1950, was drilled to 11,915 feet during 1952.

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

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

§ 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. The sulphur content of zinc concentrate averages 32 per cent. and of pyrites, approximately 47 per cent. 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 amounts to only about 40 per cent. of total requirements, it is necessary to import elemental sulphur to meet the balance. Every effort is being made by increasing and improving plant to step up recovery from local sulphides, thereby making Australia less dependent on importation of elemental sulphur.

The following table shows for the years 1939, 1950 and 1951, 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.
Sulphur contained in—			
Zinc Concentrate	123,968	119,736	113,964
Pyrites	27,040	57,177	65,962
Spent Oxide Roasted	(a)	(b) 2,930	(b) 3,200
<hr/>			
Total Sulphur Content	151,008	179,843	183,126
Recoverable Sulphur (b)	129,709	156,095	159,050
<hr/>			
Monohydrate Acid Produced	(c) 184,493	639,600	652,125
<hr/>			
Quantity of Sulphur in Monohydrate Acid produced from—			
Sulphur (Elemental) (d)	(b) 114,500	134,000	135,683
Zinc Concentrate	25,300	32,000	32,850
Pyrites	27,040	45,000	50,300
Spent Oxide	(a)	2,050	2,230
<hr/>			
Total	166,840	213,050	221,063

(a) Not available. (b) Estimated. (c) Year ended 30th June, 1939. (d) All imported.

§ 12. Gems and Gemstones.

1. **General.**—Among the gems and precious stones discovered from time to time in the different States are agate, amethyst, beryl, chiolite, 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 previous issues of the Official Year Book.

2. **Opal.**—Opal of a recorded value of £65,474 was produced in Australia in 1951. The recorded value in 1950 was £56,219. The main producing centres are in South Australia on the Andamooka and Coober Pedy fields. Recorded output in this State was valued at £64,117. Queensland production in 1951 (£1,117) came from the Quilpie district while the opal in New South Wales (£240) was won at Lightning Ridge.

3. **Sapphire.**—The production of sapphire in Australia in 1951 was valued at £1,135 and was won at Rubyvale and Sapphire in Queensland.

§ 13. Persons Engaged, Wages Paid and Accidents in Mining.

1. **Total Employment in Mining.**—The number of person engaged in the mining industry in Australia fluctuates according to the season, the price of industrial metals, the state of the labour market, and according to the permanence of new finds and the development of the established mines. The following table shows the numbers engaged in the various mining industries in each State and Australia, as a whole in 1951, compared with the total employment for each industry in Australia in 1950. Attention is drawn to § 1. para. 3 Standardization of Mineral Statistics (pp. 747-8) which outlines the nature of changes adopted in reporting mineral statistics from 1950.

EMPLOYMENT IN MINING.

Mining Industry.	1951.								Australia, 1950.
	N.S.W. (a)	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	N. Terr.	Aust.	
Metallic Minerals—									
Gold	415	761	551	27	6,742	8	143	8,647	9,478
Iron Ore .. .. .	..	..	..	214	124	..	..	338	372
Silver-Lead-Zinc	6,781	..	1,949	15	189	602	..	9,536	8,307
Copper-Gold	156	..	1,136	7	..	742	6	2,047	2,184
Tin	334	..	609	..	33	551	50	1,577	1,644
Tungsten—									
(i) Scheelite	16	..	5	..	2	165	..	188	215
(ii) Wolfram	75	..	318	3	4	..	300	700	90
Antimony	41	17	22	..	..	..	..	80	78
Mineral Sands	289	..	191	..	..	..	..	480	322
Bauxite	5	9	..	..	..	..	..	14	14
Manganese	24	..	4	3	1	..	..	32	57
Pyrites .. .. .	..	..	..	7	138	..	..	145	104
Other Metals	31	..	5	..	6	9	..	51	27
Total	8,167	787	4,790	276	7,239	2,077	499	23,835	23,392
Fuel Minerals—									
Black Coal	18,697	773	3,503	434	1,125	329	..	24,861	24,653
Brown Coal .. .. .	..	898	..	..	..	..	..	898	889
Other Fuel	147	..	..	..	..	..	..	147	183
Total	18,844	1,671	3,503	434	1,125	329	..	25,906	25,725
Non-metallic Minerals (c)	1,219	277	209	963	268	17	82	3,035	3,117
Total, All Mining (d)	28,230	2,735	8,502	1,673	8,632	2,423	581	52,776	52,234

(a) Average employment during period of operation: excludes fossickers for gold (117), tin (344), tungsten (67) and opals (17). (b) Excludes fossickers for gold. (c) Excluding construction materials, particulars for which are not available. (d) Incomplete, excludes construction materials.

The following table shows employment in mining industries for the years 1945 to 1951 inclusive:—

EMPLOYMENT IN MINING : AUSTRALIA.

Mining Industry.	1945	1946.	1947.	1948.	1949.	1950.	1951.
Copper, Copper-Gold and Gold							
.. .. .	9,010	11,746	12,635	11,793	11,394	11,662	10,694
Silver-Lead-Zinc	4,380	6,176	6,862	8,043	8,126	8,807	9,536
Iron Ore	210	198	190	230	368	372	338
Tin	2,080	1,994	1,739	1,665	1,745	1,644	1,577
Black Coal—							
Above ground	5,969	6,173	6,588	7,727	7,755	8,123	8,778
Below ground	16,679	16,192	16,667	16,688	16,671	16,530	16,083
Total, Black Coal	22,648	22,365	23,255	24,415	24,426	24,653	24,861
Brown Coal	584	655	594	526	811	839	898
All other (a)	3,123	3,228	3,717	3,186	3,630	4,207	4,872
Total (a)	42,035	46,362	48,992	49,858	50,500	52,234	52,776

(a) Excludes construction material quarrying.

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 of this Year Book (page 283).

3. Accidents in Mining.—The following table shows particulars of the number of men killed and injured in accidents in the various mining industries during 1950 and 1951 :—

MINING ACCIDENTS.

Mining Industry.	1951.							Australia, 1950.	
	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	N. Terr.		Aust.
KILLED.									
Metallic Minerals—									
Gold ..		1			15		1	17	18
Iron Ore ..									
Silver-Lead-Zinc ..	3		1					4	4
Copper-Gold ..	1					1		1	2
Tin ..								1	2
Other Metal ..	1							1	2
Total ..	5	1	1		15	2	1	25	26
Fuel Minerals—									
Black Coal ..	14		4		2			20	16
Other Fuel ..									
Total ..	14		4		2			20	16
Non-metallic Minerals—									
All Non-metallic ..	1	3						4	1
Total, All Mining ..	20	4	5		17	2	1	49	43
INJURED.									
Metallic Minerals—									
Gold ..	10	1	4		493		2	510	618
Iron Ore ..				2	5			7	24
Silver-Lead-Zinc ..	202		56		7	9		274	165
Copper-Gold ..	25		35			9		69	71
Tin ..			6			11		17	9
Other Metal ..	2		73		9			84	43
Total ..	239	1	174	2	514	29	2	961	930
Fuel Minerals—									
Black Coal ..	81	17	183	11	151	5		448	337
Other Fuel ..		3						3	
Total ..	81	20	183	11	151	5		451	337
Non-metallic Minerals—									
All Non-metallic ..	3	3		8	12			26	19
Total, All Mining ..	323	24	357	21	677	34	2	1,438	1,286

(a) Excludes construction material quarrying, particulars of which are not available.

NOTE.—Owing to the varying bases of recording mining accidents in the several States of Australia, the figures in this table are not strictly comparable between States.

§ 14. 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. These rewards will be paid as follows :—(1) £1,000 for the discovery of a deposit containing sufficient ore to be of economic importance; (2) £1,000 for the discovery of a deposit capable of producing 25 tons or more of uranium oxide and £2,000 for each 25 tons in excess of the first 25 tons; and (3) a maximum of £25,000 for any one deposit.

(b) *Bureau of Mineral Resources, Geology and Geophysics.* The Bureau of Mineral Resources, Geology and Geophysics has sections dealing with geology and 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; problems connected with exploration for coal, oil and water; regional magnetic and gravity surveys; engineering and military geophysics; and the operation of geophysical (magnetic and seismic) 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 also assumed full responsibility for scout-boring to prove deposits of coal in New South Wales suitable for working by open-cut methods.

(c) *Diamond Drills.* Three of the heavy diamond drills mentioned in the previous Official Year Book have been on hire to various mining companies. Four 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. A modern diesel-driven rotary drilling plant has been procured for deep test-drilling on suitable geological structures.

The Commonwealth Government has encouraged the search for oil in Australia, Papua and New Guinea; details of the efforts made are outlined in previous issues of the Official Year Book and in § 10. Shale-oil and Mineral Oil of this issue. A considerable amount of geological and geophysical work and test drilling has been conducted under the provision 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 are included in an investigational vote approved annually for the Commonwealth Scientific and Industrial Research Organization. In 1948 the Government expended approximately £5,000 on ore-dressing and £6,100 on mineragraphic investigations.

(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.

(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 all mica produced on the fields. Roads and water supply services are provided and maintained for all mines and mineral-producing areas throughout the Territory.

2. **Control of Minerals.**—(i) *Minerals Committee, and Controller of Minerals Production.* With the 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; it has about ten years of operation in sight.

(ii) *Mica Production.* The Bureau, for the Department of Supply, operates the Commonwealth Mica Pool which purchases all mica won in the Harts Range, Northern Territory, thus ensuring the miners of a ready market for their product at fixed prices and also permitting an orderly distribution of mica to the trade. Under a recent Cabinet decision, the Commonwealth Mica Pool will operate until the end of 1953 when the position will be reviewed.

(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, manganese and bauxite);
- (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. The amount of reward to be paid for the discovery of any deposit will be determined by the Minister for Supply, but will not exceed £25,000.

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 Consolidated Zinc Corporation Limited, to carry on the investigations on its behalf and to mine and treat the ore. 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.

During 1953, the Bureau of Mineral Resources will carry 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 will be responsible, in an overall sense, for the production and utilization of uranium in Australia. This Act 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.