CHAPTER XXIX.

MISCELLANEOUS.

This chapter comprises miscellaneous statistics and other descriptive information not directly related to the subjects of the preceding chapters, arranged in sections as follows :—

§ 1. Valuation of Australian Production.

1 General.—The value of production for Australia is computed in accordance with the decisions reached at the Conferences of Australian Statisticians and principally at the Conference held in 1935. The figures published below have been compiled by the State Statisticians from the best data available, and relate to 1953–54. The adoption of substantially uniform methods of valuing production and of estimating elements of costs of production and marketing renders the results comparable as between States.

Attention is directed to the fact that the values shown in the tables herein refer only to production of primary industries and factories and exclude the building and construction industry, those industrial establishments not classified as factories, and certain agricultural and farmyard produce obtained from areas of less than one acre.

The following is a brief explanation of the terms used :—

(a) *Gross Value of Production* is the value placed on recorded production at the wholesale price realized in the principal markets. (In cases where primary products are consumed at the place of production or where they become raw material for a secondary industry, these points of consumption are presumed to be the principal markets.)

(b) *Local Value* (i.e. the gross production valued at the place of production) is ascertained by deducting marketing costs from the gross value. (Marketing costs include freight, costs of containers, commission and other charges incidental thereto.)

(c) *Net Value of Production* represents local value less value of materials used in the process of production. Materials used in the process of production include seed, power, power kerosene, petrol and other oils, fodder consumed by farm stock, manures, dips, sprays and other costs. No deductions have been made for depreciation or certain maintenance costs as particulars are not available for all States. The Net Value of Production is the only satisfactory measure to use when comparing or combining the value of primary industries with those of other industries.

Power costs (power, power kerosene, petrol and other oils) have not been deducted in New South Wales since 1940–41 when they amounted to £1,892,000 and in Tasmania since 1941–42, whe they amounted to £86,510. Consequently net values of production for later years in these two States are overstated. Costs of materials used in the process of production are not available for all States in respect of Bee-farming, Trapping, Forestry and Fisheries, and local values have been used for these industries with consequent overstatement in net values.

2. **Value of Production, Australia, 1953-54.**—The following table shows particulars of the gross, local and net values of production in Australia by industries during the year 1953-54 :—

GROSS, LOCAL AND NET VALUE OF PRODUCTION OF PRIMARY INDUSTRIES AND FACTORIES : AUSTRALIA, 1953-54.

(£'000.)

Industry.	Gross Production valued at Principal Markets.	Local Value—Gross Production valued at Place of Production.	Net Value of Production (without deduction of depreciation or maintenance).
Agriculture	371,962	314,162	268,460
Pastoral	557,653	518,212	491,716
Dairying	173,547	163,111	136,956
Poultry	54,965	49,838	34,782
Bee-farming	1,593	1,426	(a) 1,426
Total, Rural ..	1,159,720	1,046,749	933,340
Trapping	5,763	5,074	(a) 5,074
Forestry	45,055	41,720	(a) 41,720
Fishing and whaling ..	8,865	7,741	(a) 7,741
Mines and Quarries ..	(a) 134,542	134,542	104,875
Total, Non-rural ..	194,225	189,077	159,410
Total, All Primary ..	1,353,945	1,235,826	1,092,750
Factories	(b) 1,227,045	(b) 1,227,045	1,227,045
Total, All Industries ..	2,580,990	2,462,871	2,319,795

(a) Local value. (b) Net value.

3. **Net Value of Production, States, 1953-54.**—The following tables show the total net value of production, and the net value per head of population, for each industry and State during the year 1953-54 :—

NET(a) VALUE OF PRODUCTION OF PRIMARY INDUSTRIES AND FACTORIES, 1953-54.

(£'000.)

Industry.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Australia.
Agriculture ..	68,342	65,624	55,471	41,700	28,119	9,204	268,460
Pastoral	202,439	108,930	81,989	47,423	43,784	7,151	491,716
Dairying	43,598	46,202	28,444	10,257	3,695	4,760	136,956
Poultry	14,923	13,991	1,176	2,079	1,634	979	34,782
Bee-farming(b) ..	464	402	138	189	211	22	1,426
Total, Rural ..	329,766	235,149	167,218	101,648	77,443	22,116	933,340
Trapping(b) ..	1,798	2,047	296	411	304	218	5,074
Forestry(b) ..	12,905	9,475	7,797	4,373	3,615	3,555	41,720
Fishing and whaling b	2,642	834	951	1,015	1,867	432	7,741
Mines and Quarries	58,042	7,277	12,906	5,051	13,998	6,392	(c) 104,875
Total, Non-rural	75,387	19,633	21,950	10,850	19,784	10,597	(c) 159,410
Total, All Primary	405,153	254,782	189,168	112,498	97,227	32,713	(c)1,092,750
Factories	520,043	408,314	110,255	100,221	55,147	33,065	1,227,045
Total, All Industries	925,196	663,096	299,423	212,719	152,374	65,778	(c)2,319,795

(a) *See* letterpress on page 1061. (b) Local value. (c) Includes Mines and Quarries for the Australian Capital Territory and the Northern Territory.

NET(a) VALUE OF PRODUCTION OF PRIMARY INDUSTRIES AND FACTORIES PER HEAD OF POPULATION, 1953-54.

(£ s. d.)

Industry.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Australia
Agriculture ..	20 1 4	27 1 8	42 13 1	53 1 1	44 11 8	29 14 11	30 6 4
Pastoral	59 8 11	44 19 2	63 0 11	60 6 9	69 8 5	23 2 2	55 10 7
Dairying	12 16 1	19 1 5	21 17 5	13 1 0	5 17 2	15 7 8	15 9 4
Poultry	4 7 8	5 15 6	0 18 1	2 12 11	2 11 10	3 3 4	3 18 7
Bee-farming(b) ..	0 2 8	0 3 4	0 2 2	0 4 9	0 6 8	0 1 5	0 3 2
Total, Rural ..	96 16 8	97 1 1	128 11 8	129 6 6	122 15 9	71 9 6	105 8 0
Trapping(b) ..	0 10 7	0 16 11	0 4 7	0 10 6	0 9 8	0 14 1	0 11 6
Forestry(b) ..	3 15 10	3 18 3	5 19 11	5 11 3	5 14 7	11 9 10	4 14 3
Fishing and Whaling(b)	0 15 6	0 6 10	0 14 7	1 5 10	2 19 2	1 7 11	0 17 6
Mines and Quarries	17 0 10	3 0 1	9 18 6	6 8 6	22 3 11	20 13 2	(c) 11 16 10
Total, Non-rural	22 2 9	8 2 1	16 17 7	13 16 1	31 7 4	34 5 0	(c) 18 0 1
Total, All Primary	118 19 5	105 3 2	145 9 3	143 2 7	154 3 1	105 14 6	(c) 123 8 1
Factories	152 14 3	168 10 7	84 15 8	127 10 3	87 8 8	106 17 3	138 11 5
Total, All Industries ..	271 13 8	273 13 9	230 4 11	270 12 10	241 11 9	212 11 9	(c) 261 19 6

(a) *See* letterpress on page 1061. (b) Local value. (c) Includes Mines and Quarries for the Australian Capital Territory and the Northern Territory.

4. **Net Value of Production, Australia, 1938-39 and 1949-50 to 1953-54.**—The following table shows the net value of production for Australia during the years 1949-50 to 1953-54 compared with 1938-39.

NET(a) VALUE OF PRODUCTION OF PRIMARY INDUSTRIES AND FACTORIES: AUSTRALIA.

(£'000.)

Industry.	1938-39.	1949-50.	1950-51.	1951-52.	1952-53.	1953-54.
Agriculture	41.679	218,703	208,130	246,685	276,398	268,466
Pastoral	63.820	337,121	704,809	400,493	493,745	491,716
Dairying	33.782	81,102	89,352	103,776	135,745	136,956
Poultry	7.302	22,228	24,614	31,554	35,213	34,782
Bee-farming(b)	123	743	831	774	1,066	1,426
Total, Rural	146.706	659.897	1.027.736	783,282	942,167	933,340
Trapping(b)	1.422	5.716	6.029	6,713	5,595	5,074
Forestry(b)	7.811	23,195	28,428	37,005	41,864	41,720
Fishing and Whaling(b) ..	1.654	4,234	4,869	5,729	6,897	7,741
Mines and Quarries	27.375	52,327	71,150	97,199	109,671	104,875
Total, Non-rural	38.262	85.472	111.076	147,546	164,027	159,410
Total, All Primary ..	184.968	745,369	1,138,812	930,828	1,106,194	1,092,750
Factories	203.417	661.532	843,872	1.024.867	1.082,862	1,227,045
Total, All Industries ..	388.385	1.406.901	1.982.684	1.955.695	2,189,056	2,319,795

(a) *See* letterpress on page 1061. (b) Local value.

In the chapters dealing with the respective industries (except trapping and mines and quarries) tables will be found showing the total and per head values of production for the industry by States for a series of years up to 1953-54.

§ 2. Indexes of Production.

In the first two tables below, indexes of price and quantum of production are given for the following industrial groups, namely:—Agriculture, Pastoral, Farmyard and Dairying, and All Farming combined (including separate indexes for Wool and Products other than Wool). In the third table, indexes of quantum of production, exports and consumption of farm products for food use are shown. Indexes previously published in respect of Gold and Other Minerals, and All Mining combined, are under review and pending completion of investigations the publication of these results has been temporarily discontinued.

1. **Farm Production Price Indexes.**—The Farm Production Price Indexes shown in the following table relate to average "prices" of agriculture, pastoral, farmyard and dairying products realized in the principal markets of Australia. The "price" data used are average unit values for the total quantities of the relevant commodities produced or marketed in each year and the index-numbers therefore measure both the effects of changes in prices (as such) and of variations in the quality, type, usage,

etc. of products marketed. The index-numbers for any year relate to the average values of products produced or marketed in that year, irrespective of the periods in which payment is received by producers.

The indexes have been calculated by the fixed-base weighted aggregative method. "Prices" for each commodity in any year are obtained by dividing gross value of production by the quantity produced in that year. In the original published series of Production Price Index-Numbers the average quantities of the relevant commodities *produced* in the period 1923–24 to 1927–28 were used as fixed weights. This series has been retained for years up to 1935–36, but re-computed to the base, average 1936–37 to 1938–39 = 100. For 1936–37 and later years, the original series was replaced in December, 1952 by a revised series in which average quantities of each product *marketed* during the period 1946–47 to 1950–51 are used as fixed weights. In the revised series, the regimen was extended and modified to include farm products (as defined by Australian Statisticians) in all cases. Certain other refinements were also incorporated in the revised indexes, the principal of which was the omission from the weights used for the All Farming Index of quantities of crops marketed for livestock feeding in Australia.

FARM PRODUCTION: INDEXES OF PRICES AT PRINCIPAL MARKETS, AUSTRALIA.

(*Base: Average* 1936–37 *to* 1938–39 = 100.)

Year.	Agriculture.	Pastoral.	Farmyard and Dairying.	All Farming.	Wool (Shorn and Dead).	Products other than Wool.
1911–12	92	66	70	76	..	..
1912–13	86	77	78	81	..	..
1913–14	85	76	74	79	..	..
1914–15	143	85	80	105	..	..
1915–16	100	113	98	106	..	..
1916–17	96	127	103	112	..	..
1917–18	112	139	101	123	..	..
1918–19	133	139	111	132	..	..
1919–20	197	146	134	161	..	..
1920–21	170	137	170	155	..	..
1921–22	130	96	118	112	..	..
1922–23	136	127	125	130	..	..
1923–24	119	161	120	139	..	..
1924–25	139	159	105	142	(a) 206	..
1925–26	145	130	120	133	126	..
1926–27	129	125	120	125	129	..
1927–28	129	146	120	136	148	..
1928–29	117	129	122	123	125	..
1929–30	110	104	116	108	78	..
1930–31	76	82	93	82	65	..
1931–32	84	71	83	78	64	..
1932–33	79	69	74	74	66	..
1933–34	79	103	73	89	120	..
1934–35	88	77	79	81	74	..
1935–36(b)	94	99	87	95	107	..
1936–37	114	115	93	109	126	(a) 104
1937–38	98	98	102	99	95	100
1938–39	88	87	105	92	79	96
1939–40	100	105	105	104	102	105
1940–41	106	107	105	107	102	108
1941–42	111	108	107	110	102	113
1942–43	131	123	130	128	118	132
1943–44	149	128	147	139	118	146
1944–45	151	128	152	142	118	150
1945–46	174	133	159	157	118	169
1946–47	194	182	157	185	187	185
1947–48	267	263	183	247	301	230
1948–49	234	313	197	260	366	225
1949–50	272	396	228	316	483	261
1950–51	291	818	258	505	1,098	308
1951–52	355	501	332	410	552	363
1952–53	364	531	387	440	623	379
1953–54(c)	323	534	395	428	621	364
1954–55(d)	325	495	371	406	540	362

(a) Not available for previous years. (b) *See* letterpress preceding table. (c) Revised (d) Subject to revision.

2. **Indexes of Quantum of Farm Production.**—The indexes shown in the following table relate to gross output of farm products. They have been calculated by the fixed-base weighted aggregative method, the weights used being weighted average unit values obtained by dividing total gross value by total quantity produced for each commodity for the base period.

In the original published series, the period 1923–24 to 1927–28 was adopted as the base for weighting purposes. This series has been retained for years up to 1935–36, but the index-numbers have been re-computed to the base, average 1936–37 to 1938–39 = 100. For 1936–37 and later years, the original series was replaced in December, 1952 by a revised series in which average unit values for the period 1936–37 to 1938–39 are used as fixed weights. The regimen used for the revised series was extended and modified to include farm products (as defined by Australian Statisticians) in all cases. Certain other refinements were incorporated in the revised indexes, the principal of which was the omission, in calculating the All Farming Index, of quantities of crops fed to live-stock in Australia.

INDEXES OF QUANTUM OF FARM PRODUCTION, AUSTRALIA.

(*Base : Average* 1936–37 *to* 1938–39 = 100.)

Year.	Agri-culture.	Pastoral.	Farm-yard and Dairying.	All Farming.	Wool (Shorn and Dead).	Products other than Wool.
1911–12	51	76	52	63	71	..
1912–13	64	70	50	64	62	..
1913–14	67	79	52	70	68	..
1914–15	30	77	50	57	62	..
1915–16	99	63	40	71	53	..
1916–17	80	61	49	65	54	..
1917–18	67	61	57	62	58	..
1918–19	53	69	56	61	73	..
1919–20	44	77	52	61	73	..
1920–21	87	62	57	69	62	..
1921–22	78	72	67	73	71	..
1922–23	74	76	61	73	71	..
1923–24	80	68	62	71	67	..
1924–25	95	80	76	84	81	..
1925–26	73	84	71	78	86	..
1926–27	90	89	68	86	95	..
1927–28	75	86	73	80	90	..
1928–29	91	92	75	89	99	..
1929–30	79	87	75	82	95	..
1930–31	111	84	82	93	92	..
1931–32	100	92	89	94	102	..
1932–33	110	99	94	102	106	..
1933–34	102	95	100	98	98	..
1934–35	88	98	104	96	102	..
1935–36(*a*)	91	95	99	94	98	..
1936–37	97	98	97	97	99	(*b*) 96
1937–38	107	103	101	104	103	105
1938–39	96	99	102	99	98	99
1939–40	120	107	108	107	115	105
1940–41	74	109	107	97	115	91
1941–42	104	112	104	104	118	99
1942–43	97	114	103	102	116	98
1943–44	86	115	100	100	119	94
1944–45	68	101	99	88	101	84
1945–46	100	86	103	92	92	92
1946–47	84	92	103	91	95	90
1947–48	122	98	107	109	101	111
1948–49	108	105	111	109	108	109
1949–50	117	112	111	115	115	115
1950–51	108	109	106	109	116	107
1951–52	103	105	97	103	112	100
1952–53	121	126	108	121	131	118
1953–54(*c*)	129	123	107	122	128	120
1954–55(*d*)	120	126	116	122	132	119

(*a*) *See* letterpress preceding table. (*b*) Not available for previous years. (*c*) Revised. (*d*) Subject to revision.

3. **Farm Products for Food Use: Indexes of Quantum of Production, Exports and Consumption.** The indexes shown in the following table have been calculated by the fixed-base weighted aggregative method, the weights used being constant unit gross values of each farm product for the years 1936–37 to 1938–39. The items included comprise products in the form in which they are sold from farms in all cases except livestock sold for slaughter for meat which are included in terms of dressed carcass weight of meat. Quantity data relating to exports include exports of processed food in terms of farm product equivalent. The indexes of production relate basically to gross output of farm products for food use, including crops exported for stock-feeding overseas. Particulars are not available prior to 1946–47 except for the base years.

FARM PRODUCTS FOR FOOD USE: INDEXES OF QUANTUM OF PRODUCTION, EXPORTS AND CONSUMPTION.

(*Base: Average* 1936–37 *to* 1938–39 = 100.)

Year.	Production.		Exports.		Consumption in Australia.	
	Total.	Per Head of Total Population.	Total.	Per Head of Total Population.	Total.	Per Head of Total Population.
1946–47 ..	90	82	73	66	107	98
1947–48 ..	113	102	113	102	110	99
1948–49 ..	110	97	112	99	111	98
1949–50 ..	116	99	116	99	114	98
1950–51 ..	109	90	104	86	120	99
1951–52 ..	100	81	70	57	119	96
1952–53 ..	118	93	113	89	119	94
1953–54 ..	122	94	102	79	124	96
1954–55(*a*) ..	121	91	117	89	126	95
1955–56(*b*) ..	127	94	118	87	128	94

(*a*) Subject to revision. (*b*) Estimated.

§ 3. New Building.

1. **General.**—The statistics in this section relate to the operations of private contractors, Government authorities and owner-builders, with the exception of those relating to employment, which exclude the numbers of persons working on owner-built houses. In general, they relate to *new* building only, and data on alterations, additions, renovations and repairs to buildings are excluded, because of the difficulty in obtaining complete lists of persons who engage in these operations. Figures for houses exclude converted military huts, flats and shop dwellings. Some houses built on farms are excluded but these do not affect the figures materially.

These statistics are available for each quarter from the September quarter, 1945.

More detailed information on building activity may be found in the Quarterly Bulletin of Building Statistics.

The following definitions of terms used in this section are necessary for interpretation of the data presented :—

Owner-Built. An " owner-built " house is one actually erected or being erected by the owner or under the owner's direction without the services of a contractor who is responsible for the whole job.

Contract-Built. Includes the operations of all Building Contractors and Government instrumentalities which undertake the erection of new buildings.

Commenced. A building is regarded as having been commenced when work on foundations has begun. Owing to the difficulty of defining the exact point that this represents in building operations, it is probable that interpretations placed upon it by informants are not entirely uniform.

Completed. A building is regarded as having been completed when the builder has fulfilled the terms of the contract. As with commencements, the interpretations placed upon this definition may vary.

Under Construction. A building remaining uncompleted at the end of a period is regarded as being under construction, regardless of whether construction was actively proceeding on that particular date.

Employment. Figures relate to persons actually working on the jobs of contractors who undertake the erection of new buildings and of Government instrumentalities which erect new buildings on their own account. They include persons actually engaged on alterations, additions, repairs and maintenance when these jobs are undertaken by such contractors and instrumentalities. The figures include working principals and their employees, men working as or for sub-contractors, and men temporarily laid off on account of weather.

Contractors are asked to give details of the persons employed *on a specified day*, but because of frequent movement between jobs and because some persons (such as electricians, etc.) may work on several jobs which are under construction simultaneously, some duplication may occur.

The figures *exclude* persons working on owner-built houses, and employees of builders who undertake only alterations, additions, repairs and maintenance.

Values. All values shown exclude the value of land and represent the estimated value of buildings on completion.

2. **Value of New Buildings.**—(i) *Completed*, 1954–55. The following table shows the value of all new buildings completed in each State during 1954–55, according to the kind of building. It should be remembered that all values shown exclude the value of land and represent the estimated value of buildings on completion.

NEW BUILDINGS COMPLETED : VALUE, 1954–55.

(Including Estimated Value of Owner-built Houses.)

(£'000.)

Kind of Building.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	A.C.T.	Aust
Houses—								
Brick, Brick Veneer, Concrete and Stone..	24,812	25,527	2,267	16,211	10,854	1,726	1,370	82,767
Wood (Weatherboard, etc.)	19,848	37,903	13,010	2,309	535	4,592	389	78,586
Fibro Cement ..	33,278	3,038	2,103	1,986	12,819	94	4	53,342
Other	149	480	187	150	3	..	..	969
Total Houses ..	78,087	66,968	17,567	20,656	24,211	6,412	1,763	215,664
Flats	1,552	1,744	581	222	588	134	35	4,856
Shops with Dwellings ..	1,004	1,057	1,078	719	159	398	121	10,622
Shops without Dwellings	2,552	2,587			947			
Hotels, Guest Houses, Boarding Houses, etc.	2,334	513	232	287	198	59	52	3,675
Factories	7,719	9,894	878	1,167	3,125	562	179	23,524
Other New Buildings ..	17,446	14,453	7,982	4,030	4,868	3,084	793	52,656
Total Other Buildings..	32,607	30,248	10,751	6,425	9,885	4,237	1,180	95,333
Total New Buildings ..	110,694	97,216	28,318	27,081	34,096	10,649	2,943	310,997

(ii) *Completed, 1947–48 to 1954–55.* The following table shows the value of all new buildings completed in Australia for the years 1947–48 to 1954–55.

NEW BUILDINGS COMPLETED : VALUE.

(Including Estimated Value of Owner-built Houses.)

(£'000.)

Kind of Building.	1947–48.	1948–49.	1949–50.	1950–51.	1951–52.	1952–53.	1953–54.	1954–55.
Houses—								
Brick, Brick Veneer, Concrete and Stone..	(a)25,833	(a)35,523	(a)40,480	(a)50,050	66,084	75,093	73,264	82,767
Wood (Weatherboard, etc.)	(a)13,492	(a)19,918	(a)28,609	(a)47,785	69,979	73,038	74,849	78,586
Fibro Cement ..	(a)13,360	(a)17,234	(a)19,687	(a)26,104	34,895	39,765	44,694	53,342
Other	(a) 542	(a) 649	(a) 1,006	(a) 947	1,483	2,159	1,014	969
Total Houses ..	(a)53,227	(a)73,324	(a)89,782	a 124,886	172,441	190,055	193,821	215,664
Flats	1,057	2,102	2,588	2,849	4,297	6,636	4,791	4,856
Shops with Dwellings ..	373	584	1,023	1,395	1,735	2,349	3,007	10,622
Shops without Dwellings	253	372	434	650	1,233	2,057	5,290	
Hotels, Guest Houses, Boarding Houses, etc.	134	472	961	561	678	1,213	1,989	3,675
Factories	3,497	5,098	6,444	6,444	9,813	19,788	22,018	23,524
Other New Buildings ..	4,241	7,098	9,555	13,135	25,747	40,631	46,752	52,656
Total Other Buildings..	9,555	15,726	21,005	25,034	43,503	72,674	83,847	95,333
Total New Buildings ..	(a)62,782	(a)89,050	a 110,787	a 149,920	215,944	262,729	277,668	310,997

(a) Partly estimated.

(iii) *Commenced, Completed and Under Construction, 1947–48 to 1954–55.* The following table summarizes the values of all new buildings commenced, completed and under construction for each State for the years 1947–48 to 1954–55.

NEW BUILDINGS : VALUE.

(Including Estimated Value of Owner-built Houses.)

(£'000.)

Year.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	A.C.T.	Aust.
COMMENCED.								
1947–48	a 36,196	27,891	12,093	5,341	4,420	3,607	2,606	a 92,154
1948–49	a 45,154	37,935	13,192	7,599	5,825	5,371	1,792	a 116,868
1949–50	a 51,277	44,218	16,994	11,301	8,459	8,379	1,492	a 142,120
1950–51	a 79 750	74.750	21,082	17.827	14,186	10,336	2,439	a 220,370
1951–52	83.460	78,740	27,605	22,606	18,724	11,004	2.559	244,698
1952–53	71,005	60,244	25.680	25,819	20,919	6,611	2,788	213.066
1953–54	111,097	87,733	27.839	25.649	26,369	9.224	2.856	290,767
1954–55	124,420	101,995	32,073	29,946	35,458	10,836	5,932	340,660
COMPLETED.								
1947–48	a 24,305	17,891	10,390	4,080	3.328	2,279	509	a 62,782
1948–49	a 33,737	27,357	12,199	6,483	4,707	3,810	757	a 89.050
1949–50	a 40.920	34.684	13.953	9,074	5,352	5,342	1,462	a 110.787
1950–51	a 49,466	52,058	17,286	12,042	8,948	8,403	1,717	a 149.920
1951–52	76,207	68.615	25,339	18,123	14,426	10,511	2,723	215,944
1952–53	98,049	76,107	26,233	25,882	22,918	10,665	2,875	262,729
1953–54	101.545	84.747	25.913	26,108	25,785	9,692	3.878	277,668
1954–55	110,694	97,216	28,318	27,081	34,096	10,649	2,943	310,997
UNDER CONSTRUCTION AT END OF YEAR.								
1947–48	a 44,461	30.623	7,232	6,170	4,452	4,146	3,013	a 100,097
1948–49	a 59.172	44.267	8.479	7,735	6,416	5,872	4,026	a 135.967
1949–50	a 75.006	56,096	11,805	10,519	10,022	8,989	4,396	a 176,833
1950–51	a 102,708	85.058	15.653	17,272	15.942	12,178	5,302	a 254,113
1951–52	a 125,674	102,670	18,728	23,813	22,302	13,770	6,208	a 313.165
1952–53	a 105.261	94.017	17.838	25,253	23,189	10,494	7,161	a 283.213
1953–54	a 120,463	100,753	19.699	23.730	25.701	11,782	7,249	a 309,374
1954–55	a 136,522	108,247	23,446	26,854	29,102	12,399	10,643	a 347,213

(a) Partly estimated.

3. Numbers of New Houses.—(i) *Completed, 1954–55.* The following table shows the numbers of new houses completed in each State during 1954–55, classified according to the material of their outer walls.

NEW HOUSES COMPLETED : NUMBER, 1954–55.

(Including Owner-built Houses.)

Material of Outer Walls.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	A.C.T.	Aust.
Brick, Brick Veneer, Concrete and Stone ..	6,306	7,221	741	5,661	3,106	515	302	23,852
Wood (Weatherboard, etc.)	7,479	14,612	5,822	734	209	1,898	94	30,848
Fibro Cement	15,050	1,554	1,277	860	5,474	67	2	24,284
Other	47	173	85	68	3	..	..	376
Total	28,882	23,560	7,925	7,323	8,792	2,480	398	79,360

(ii) *Completed, 1947–48 to 1954–55.* The following table shows the number of new houses completed in each State for the years 1947–48 to 1954–55, by Contractors and Owner-Builders separately.

NEW HOUSES COMPLETED : NUMBER.

Year.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	A.C.T.	Aust.
CONTRACT-BUILT(*a*).								
1947–48	(*b*)	9,946	6,296	2,659	2,465	1,143	268	(*b*)
1948–49	(*b*)	11,379	6,713	3,402	2,534	1,563	313	(*b*)
1949–50	(*b*)	12,326	6,807	4,190	2,591	1,919	402	(*b*)
1950–51	(*b*)	15,210	7,423	5,656	3,461	2,501	560	(*b*)
1951–52	14,987	15,849	8,056	6,117	4,208	2,342	566	52,125
1952–53	13,151	12,619	7,763	7,179	4,932	1,829	568	48,041
1953–54	14,296	12,062	7,149	5,802	4,569	1,536	530	45,944
1954–55	16,658	14,450	6,419	5,672	5,766	1,504	369	50,838
OWNER-BUILT.								
1947–48	(*b*)	1,900	2,908	350	306	401	3	(*b*)
1948–49	(*b*)	2,899	2,641	587	710	724	10	(*b*)
1949–50	(*b*)	3,285	2,640	714	918	933	2	(*b*)
1950–51	(*b*)	5,951	2,852	1,069	1,699	1,413	14	(*b*)
1951–52	8,364	8,102	3,747	1,594	2,369	1,657	18	25,851
1952–53	11,739	8,414	2,835	1,761	3,033	1,485	22	29,289
1953–54	12,217	9,323	1,812	1,720	3,058	1,094	22	29,246
1954–55	12,224	9,110	1,506	1,651	3,026	976	29	28,522
TOTAL.								
1947–48	(*c*) 14,858	11,846	9,204	3,009	2,771	1,544	271	(*c*) 43,503
1948–49	(*c*) 17,864	14,278	9,354	3,989	3,244	2,287	323	(*c*) 51,339
1949–50	(*c*) 18,766	15,611	9,447	4,904	3,509	2,852	404	(*c*) 55,493
1950–51	(*c*) 19,771	21,161	10,275	6,725	5,160	3,914	574	(*c*) 67,580
1951–52	23,351	23,951	11,803	7,711	6,577	3,999	584	77,976
1952–53	24,890	21,033	10,598	8,940	7,965	3,314	590	77,330
1953–54	26,513	21,385	8,961	7,522	7,627	2,630	552	75,190
1954–55	28,882	23,560	7,925	7,323	8,792	2,480	398	79,360

(*a*) Includes operations of Government Authorities. (*b*) Not available. (*c*) Partly estimated.

(iii) *Commenced, Completed and Under Construction, 1947–48 to 1954–55.* The next table provides a summary, by States, of the numbers of new houses commenced, completed and under construction for the years 1947–48 to 1954–55.

NEW HOUSES : NUMBER.

(Including Owner-built Houses.)

Year.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	A.C.T.	Aust.
COMMENCED.								
1947–48	(a) 19,807	15,478	9,528	3,580	3,075	2,062	393	(a) 53,923
1948–49	(a) 21,291	16,487	9,361	4,561	3,843	2,849	534	(a) 58,926
1949–50	(a) 22,055	19,643	10,009	6,109	5,031	3,664	389	(a) 66,900
1950–51	(a) 25,162	26,949	10,698	7,966	6,970	4,122	877	(a) 82,744
1951–52	24,364	23,506	11,995	8,510	7,730	3,584	312	80,001
1952–53	21,030	16,254	9,381	7,967	7,012	2,285	528	64,457
1953–54	28,395	20,015	8,513	6,792	7,608	2,665	355	75,243
1954–55	25,502	22,674	7,784	7,190	8,575	2,867	640	75,232
COMPLETED.								
1947–48	(a) 14,858	11,846	9,204	3,009	2,771	1,544	271	(a) 43,503
1948–49	(a) 17,864	14,278	9,354	3,989	3,244	2,287	323	(a) 51,339
1949–50	(a) 18,766	15,611	9,447	4,904	3,509	2,852	404	(a) 55,493
1950–51	(a) 19,771	21,161	10,275	6,725	5,160	3,914	574	(a) 67,580
1951–52	23,351	23,951	11,803	7,711	6,577	3,999	584	77,976
1952–53	24,890	21,033	10,598	8,940	7,965	3,314	590	77,330
1953–54	26,513	21,385	8,961	7,522	7,627	2,630	552	75,190
1954–55	28,882	23,560	7,925	7,373	8,792	2,480	398	79,360
UNDER CONSTRUCTION AT END OF YEAR.								
1947–48	(a) 19,686	15,312	3,951	3,203	1,841	2,065	491	(a) 46,549
1948–49	(a) 23,113	17,521	3,958	3,940	2,439	2,575	696	(a) 54,242
1949–50	(a) 26,402	21,553	4,520	5,241	3,957	3,357	678	(a) 65,708
1950–51	(a) 31,793	27,341	4,943	6,529	5,764	3,558	981	(a) 80,909
1951–52	(a) 32,806	26,896	5,135	7,395	6,917	3,143	708	(a) 83,000
1952–53	(a) 28,946	22,053	3,918	6,464	5,951	2,114	646	(a) 70,092
1953–54	(a) 30,828	21,531	3,470	5,750	5,932	2,149	449	(a) 70,159
1954–55	(a) 27,448	20,692	3,129	5,622	5,715	2,536	601	(a) 66,013

(a) Partly estimated.

4. **Numbers of New Flats.**—The figures in the foregoing two tables do not include particulars of new flats. The summary below shows the numbers of new flats commenced, completed and under construction in Australia for the years 1948–49 to 1954–55, together with State details for 1954–55. It should be noted : (i) that the figures are additional to the numbers of houses shown in other tables, (ii) that each flat is counted as a separate unit, and the numbers shown therefore relate to individual flats, and (iii) that new flats only are included, i.e., the conversions of old buildings into flats are omitted.

NEW FLATS : NUMBER.

(Individual Flats.)

State or Territory.	Commenced during Period.	Completed during Period.	Under Construction at end of Period
1954–55—			
New South Wales	782	701	739
Victoria	1,183	781	1,173
Queensland	278	309	92
South Australia	72	105	82
Western Australia	380	316	538
Tasmania	85	48	85
Australian Capital Territory	130	12	146
Total	2,910	2,272	2,855
Total, 1953–54	2,446	2,180	2,235
„ 1952–53	1,055	2,627	1,979
„ 1951–52	1,811	2,006	3,426
„ 1950–51	2,096	1,684	3,621
„ 1949–50	2,292	1,494	3,210
„ 1948–49	2,021	1,345	2,416

5. **Persons engaged in New Building.**—The following table shows, by States, the number of persons (including contractors and sub-contractors actually working on jobs) engaged on jobs *carried out by builders of new buildings* at 30th June of the years 1949 to 1955. Particulars for 30th June, 1955 show the numbers of tradesmen, contractors, sub-contractors and wage earners engaged. For an explanation of the field of employment covered *see* para. 1 of this section.

PERSONS ENGAGED ON JOBS CARRIED OUT BY BUILDERS ON NEW BUILDINGS.

(Excluding Persons working on Owner-built Houses.)

Particulars.	N.S.W.	Vic.	Q'land.	S. Aust.	W. Aust.	Tas.	A.C.T.	Aust.
30th June, 1955—								
Carpenters	14,582	14,075	8,958	3,251	3,903	2,719	670	48,158
Bricklayers	3,652	2,695	928	1,724	942	343	199	10,483
Painters	3,165	2,604	1,699	942	848	461	176	9,895
Electricians	2,043	1,118	898	424	357	212	78	5,130
Plumbers	3,446	2,154	1,319	774	746	318	116	8,873
Builders' Labourers ..	6,498	6,124	3,156	1,965	2,103	1,220	396	21,462
Other	4,823	3,626	1,697	1,796	1,538	631	278	14,389
Contractors(a) .	3,818	2,519	2,322	767	808	499	72	10,805
Sub-contractors(a) .	5,633	4,124	1,607	1,673	1,324	630	138	15,129
Wage earners ..	28,758	25,753	14,726	8,436	8,305	4,775	1,703	92,456
Total	38,209	32,396	18,655	10,876	10,437	5,904	1,913	118,390
Total 30th June, 1954..	36,600	28,476	17,269	10,038	9,245	4,826	1,341	107,795
" " " 1953..	31,790	26,564	16,074	9,371	8,820	5,180	1,812	99,611
" " " 1952..	39,779	31,653	17,037	10,371	8,654	5,267	2,229	114,990
" " " 1951..	45,470	34,420	16,623	10,168	7,985	6,700	2,075	123,441
" " " 1950..	42,393	31,684	15,643	8,743	6,908	5,700	2,022	113,093
" " " 1949..	41,982	28,442	14,030	7,727	6,220	4,920	1,389	104,710

(a) Actually working on jobs.

§ 4. Consumption of Foodstuffs and Beverages.

1. **Quantities Consumed.**—Previous issues of the Official Year Book up to No. 36 included a statistical survey of the movement in the consumption in Australia, in total and per head of population, of a selected number of commodities over a period of years up to 1940–41 (*see* Official Year Book No. 36. pp. 1098–1100). In issue No. 37 these long-term comparisons were replaced by more detailed information covering consumption of the principal foodstuffs and beverages in annual periods since 1944 in comparison with average annual consumption during the three years ended 1938–39. In this issue the annual periods extend from 1950–51 to 1954–55.

The estimates of total consumption and consumption per head of population in Australia in the two tables following have been compiled by deducting net exports from production and allowing for recorded movements in stocks of the respective commodities. While the estimates may generally be accepted as reasonably accurate, there are some deficiencies to which attention should be directed. These relate chiefly to the quantities of poultry, game and fish (fresh and shell) and the quantities of visible oils and other fats entering consumption. In addition, little information is available on the quantities of vegetables, fruit, eggs, etc., which householders produce for their own requirements and the extent of wastage occurring in the marketing of foodstuffs. In all these cases careful estimates have been compiled from the best available data, and the quantities shown as entering consumption in Australia have been adjusted to allow for these circumstances. The absence of particulars of stocks for certain commodities has resulted in some inaccuracies in the estimates of annual consumption. Consumption of foodstuffs is measured in general " at producer " level. As a result no allowance is made for wastage before the foodstuffs are consumed, and except in a few special cases no adjustment has been made for changes in stocks held by wholesalers and retailers. In recent years, wastage of foodstuffs has possibly been less than hitherto because of more efficient distribution and storage methods. In addition, it is likely that the quantities of foodstuffs shown in the following pages as available for consumption have been supplemented by increased " back-yard " production. Neither of these factors has been taken into account, and it is possible that, as a result, some understatement has occured in the following consumption estimates. Estimates have been made in certain cases to allow for changes in wholesalers' and retailers' stocks. Where no allowance is made it is considered unlikely that these stocks would make any appreciable difference to consumption estimates. Allowance has not been made for the purchase of foodstuffs for

dispatch overseas as gifts in bulk and by parcel post. These deficiencies, however, do not seriously impair the accuracy of the estimates compiled.

The estimates of consumption per head of population shown in the second table following have been checked, wherever possible, with data from other sources which confirm the reliability of the methods used. The data were obtained principally from the Food Consumption Survey conducted in 1944 by the Nutrition Committee of the National Health and Medical Research Council.

More detailed information on the consumption of foodstuffs and beverages is contained in the Statistical Bulletin: *Food Production and the Consumption of Foodstuffs and Nutrients in Australia*, issued by this Bureau.

ESTIMATED QUANTITY OF FOODSTUFFS AND BEVERAGES AVAILABLE FOR CONSUMPTION ANNUALLY: AUSTRALIA.

Commodity.	Unit of Quantity.	Average 1936–37 to 1938–39.	1950–51.	1951–52.	1952–53.	1953–54.	1954–55. (a)
Milk and Milk Products—							
Fluid Whole Milk	Mil. gals.	161	236	240	243	253	255
Fresh Cream	'000 tons	19.7	8.9	7.6	7.8	8.0	8.1
Condensed Milk (Sweetened and Unsweetened)	,,	9.9	15.8	21.4	13.1	15.7	16.6
Concentrated Whole Milk	,,	3.4	18.3	16.8	14.5	19.5	11.0
Powdered Milk—							
Full Cream	,,	8.1	9.9	10.8	9.7	10.4	9.4
Skim	,,		2.6	2.9	2.4	3.9	2.9
Infants' and Invalids' Foods (including Malted Milk)	,,	3.0	6.8	6.6	5.7	7.6	6.0
Cheese	,,	13.4	24.2	22.8	23.0	26.2	23.8
Total (in terms of Milk Solids)	,,	120.5	176.7	179.8	177.0	189.5	184.9
Meat—							
Beef (bone-in weight)	,,	442.0	488.2	452.8	466.7	455.2	466.2
Mutton (bone-in weight)	,,	183.4	142.5	155.6	193.0	204.4	204.5
Lamb (bone-in weight)	,,	46.1	91.2	91.6	112.4	106.8	104.7
Pork (bone-in weight)	,,	31.8	25.2	27.6	22.7	30.5	39.6
Offal	,,	25.7	32.5	34.7	40.4	41.9	43.3
Canned Meat (canned weight)	,,	(b)	11.8	9.5	7.8	7.9	9.9
Bacon and Ham (cured weight)	,,	31.4	30.8	27.5	28.3	28.5	32.0
Total (in terms of carcass weight)	,,	776.1	840.8	817.9	888.3	887 8	912.2
Poultry, Game and Fish—							
Poultry and Rabbits (carcass weight)	,,	29.8	56.2	57.7	59.1	60.2	61.4
Fish(c)—							
Fresh	,,	19.7	18.6	21.0	20.2	22.5	22.0
Cured (including Smoked and Salted)	,,	(d)	3.7	3.5	3.3	3.2	4.0
Crustaceans and Molluscs	,,	2.1	3.1	2.5	2.6	3.3	4.3
Canned – Australian origin	,,	12.4	2.9	2.7	2.7	3.1	2.5
Imported	,,		9.9	10.0	2.5	6.8	8.8
Total(c)	,,	51.5	70.6	73.0	65.4	73.7	77.0
Eggs and Egg Products—							
Shell Eggs	,,	78.7	84.7	82.4	80.4	82.8	85.9
Liquid Whole Egg(e)	,,	2.9	7.9	8.2	6.4	5.4	6.5
Egg Powder(e)	,,	..	0.2	0.3	0.2	0.2	0.1
Total (Shell Egg equivalent)	,,	81.6	92.8	90.9	87.0	88.4	92.5
	Mil. doz.	139.3	158.4	155.1	148.5	150.7	157.9
Fats and Oils—							
Butter	'000 tons	101.0	114.6	118.9	114.5	121.6	122.8
Margarine—							
Table	,,	2.8	1.7	4.7	6.2	8.5	9.6
Other	,,	12.2	22.5	24.9	21.8	22.3	22.2
Lard	,,	5.2	3 8	3.9	3.9	3.9	5.0
Vegetable Oils and Other Fats	,,	14.4	14 8	15.2	15.6	15.9	16.2
Total (Fat Content)	,,	115.5	133.7	142.4	137.8	146.3	149.6

See next page for notes.

ESTIMATED QUANTITY OF FOODSTUFFS AND BEVERAGES AVAILABLE FOR CONSUMPTION ANNUALLY: AUSTRALIA—*continued.*

Commodity.	Unit of Quantity.	Average 1936–37 to 1938–39.	1950–51.	1951–52.	1952–53.	1953–54	1954–55. (*a*)
Sugar and Syrups—							
Refined Sugar—							
As Sugar	'000 tons	216.5	251.9	244.4	250 9	257.9	251.2
In manufactured products..	,,	110.1	194.1	203.2	174.2	187.9	205.9
Honey, Glucose and Syrups ..	,,	21.9	28.9	21.4	21.7	25.1	21.4
Total (Sugar Content) ..	,,	343.9	468.9	464.5	442.4	474.9	474.2
Potatoes—							
White	,,	318.5	341.7	412.9	376.1	485.4	417.1
Sweet	,,	7.4	5.2	5.3	5.5	5.6	5.7
Total	,,	325.9	346.9	418.2	381.6	491.0	422.8
Pulse and Nuts—							
Dried Pulse	,,	4.5	11.8	12.4	8.9	14.9	12.3
Peanuts (weight without shell)	,,	2.8	5.8	5.5	5.3	7.5	12.0
Edible Tree Nuts (weight without shell)	,,	2.6	8.6	5.1	5.6	6.8	7.2
Cocoa (Raw Beans).. ..	,,	6.3	12.3	11.2	9.6	11.3	11.9
Total	,,	16.2	38.5	34.2	29.4	40.5	43.4
Tomatoes and Fruit—							
Tomatoes (*f*)	,,	(*g*) 48.0	83.5	82.7	84.1	73.1	87.4
Citrus Fruit(*f*)	,,	97.8	149.3	117.5	113.7	150.7	143.6
Other Fresh Fruit	,,	288.2	281.9	286.8	253.5	316.3	303.8
Jams	,,	35.1	41.7	37.8	33.7	36.1	36.2
Dried Fruit	,,	24.8	35.1	30.6	28.0	29.3	30.1
Canned Fruit	,,	31.9	44.7	54.6	47.9	48.3	55.8
Total (Fresh Fruit equivalent)	,,	580.3	724.9	687.0	630.6	730.5	741.0
Vegetables—							
Leafy, Green and Yellow Vegetables	,,	(*h*)	182.6	175.4	173.0	166.5	164.3
Other Fresh Vegetables ..	,,	(*h*)	260.4	273.5	249.5	245.9	238.4
Canned Vegetables	,,	(*h*)	18.3	20.3	13.1	18.2	18.9
Total	,,	(*h*)	461.3	469.2	435.6	430 6	421.6
Grain Products—							
Flour—							
White	,,	} 574.0	692.0	719.2	720.4	721.2	721.8
Sharps	,,		1.9	2.8	1.5	2.1	1.6
Wheatmeal for baking ..	,,		34.0	32.7	31.4	31.4	29.4
Breakfast Foods(*i*)	,,	32.5	42.6	46.2	51.3	51.7	50.8
Rice (Milled)	,,	12.2	14.7	17.9	15.2	14.7	14.2
Tapioca, Sago, etc. ..	,,	3.7	2.9	2.3	1.9	1.6	1.4
Pearl Barley	,,	3.0	2.3	2.4	2.2	2.1	2.2
Barley Meal and Polished Wheat (Rice substitute) ..	,,	..	1.1	0.8	0.8	0.8	0.8
Edible Starch (Cornflour) ..	,,	4.3	5.7	3.5	3.0	3.9	3.6
Total	,,	629.7	797.2	827.8	827.7	829.5	825.8
Beverages—							
Tea	,,	21.1	27.8	24.8	25.3	27.0	24.3
Coffee	,,	2.0	2.7	3.2	2.6	4.3	4.5
Beer	Mil. gals.	80.1	169.5	181.0	190.7	205.2	220.5
Wine	,,	4.2	13.4	15.3	11.9	12.4	11.1

(*a*) Subject to revision. (*b*) Included with fresh meat at its carcass weight. (*c*) Edible weight. (*d*) Included with fresh. (*e*) In terms of weight of shell eggs. (*f*) Includes fresh equivalent of manufactured products. (*g*) Probably understated owing to lack of complete data. (*h*) Not available. (*i*) Excludes invalid and health foods, semolina and wheat germ prior to 1951–52.

ESTIMATED QUANTITY OF FOODSTUFFS AND BEVERAGES AVAILABLE FOR CONSUMPTION ANNUALLY PER HEAD OF POPULATION: AUSTRALIA.

Commodity.	Unit of Quantity.	Average 1936–37 to 1938–39.	1950–51.	1951–52.	1952–53.	1953–54	1954–55. (a)
Milk and Milk Products—							
Fluid Whole Milk	Gallon	23.4	28.4	28.1	27.8	28.4	28.0
Fresh Cream	lb.	6.4	2.4	2.0	2.0	2.0	2.0
Condensed Milk (Sweetened and Unsweetened)	,,	3.2	4.2	5.6	3.4	3.9	4.1
Concentrated Whole Milk	,,	1.1	4.9	4.4	3.7	4.9	2.9
Powdered Milk—							
Full Cream	,,	2.6	2.7	2.8	2.5	2.6	2.3
Skim	,,		0.7	0.8	0.6	1.0	0.7
Infants' and Invalids' Foods (including Malted Milk)	,,	1.0	1.8	1.7	1.4	1.9	1.5
Cheese	,,	4.4	6.5	6.0	5.9	6.6	5.9
Total (in terms of Milk Solids)	,,	39.3	47.8	47.2	45.3	47.8	45.5
Meat—							
Beef (bone-in weight)	,,	144.1	131.6	118.9	119.7	114.6	114.9
Mutton (bone-in weight)	,,	59.8	38.4	40.9	49.5	51.4	50.4
Lamb (bone-in weight)	,,	15.0	24.6	24.0	28.8	26.9	25.8
Pork (bone-in weight)	,,	10.4	6.8	7.3	5.8	7.7	9.8
Offal	,,	8.4	8.8	9.1	10.3	10.6	10.7
Canned Meat (canned weight)	,,	(b)	3.2	2.5	2.0	2.0	2.4
Bacon and Ham (cured weight)	,,	10.2	8.3	7.2	7.3	7.2	7.9
Total (in terms of carcass weight)	,,	253.0	226.6	214.8	227.7	223.5	224.8
Poultry, Game and Fish—							
Poultry and Rabbits (carcass weight)	,,	9.7	15.1	15.1	15.1	15.1	15.1
Fish (c)—							
Fresh	,,	6.4	5.0	5.5	5.2	5.7	5.4
Cured (including Smoked and Salted)	,,	(d)	1.0	0.9	0.9	0.8	1.0
Crustaceans and Molluscs	,,	0.7	0.9	0.7	0.7	0.8	1.1
Canned—							
Australian origin	,,	4.1	0.8	0.7	0.7	0.8	0.6
Imported	,,		2.7	2.6	0.6	1.7	2.2
Total (c)	,,	16.8	19.1	19.1	16.8	18.5	19.0
Eggs and Egg Products—							
Shell Eggs	,,	25.7	22.9	21.6	20.6	20.8	21.2
Liquid Whole Egg (e)	,,	0.9	2.1	2.2	1.6	1.4	1.6
Egg Powder (e)	,,	..	0.1	0.1	0.1	0.1	0.0
Total (Shell Egg equivalent)	..	26.6	25.1	23.9	22.3	22.3	22.8
	No.	243	229	219	204	204	209
Fats and Oils—							
Butter	lb.	32.9	30.9	31.2	29.4	30.6	30.3
Margarine—							
Table	,,	0.9	0.5	1.2	1.6	2.1	2.4
Other	,,	4.0	6.1	6.5	5.6	5.6	5.5
Lard	,,	1.7	1.0	1.0	1.0	1.0	1.2
Vegetable Oils and other Fats	,,	4.7	4.0	4.0	4.0	4.0	4.0
Total (Fat Content)	,,	37.6	36.0	37.3	35.4	36.8	36.9
Sugar and Syrups—							
Refined Sugar—							
As Sugar	,,	70.6	67.9	64.2	64.3	64.9	61.9
In manufactured products	,,	35.9	52.3	53.4	44.7	47.3	50.7
Honey, Glucose and Syrups	,,	7.1	7.7	5.6	5.6	6.3	5.3
Total (Sugar Content)	,,	112.0	126.2	122.0	113.5	117.2	116.8

See next page for notes.

ESTIMATED QUANTITY OF FOODSTUFFS AND BEVERAGES AVAILABLE FOR CONSUMPTION ANNUALLY PER HEAD OF POPULATION: AUSTRALIA—*continued.*

Commodity.	Unit of Quantity.	Average 1936–37 to 1938–39.	1950–51.	1951–52.	1952–53	1953–54.	1954–55. (a)
Potatoes—							
White	lb.	103.8	92.1	108.3	96.4	122.2	102.8
Sweet	,,	2.4	1.4	1.4	1.4	1.4	1.4
Total	,,	106.2	93.5	109.7	97.8	123.6	104.2
Pulse and Nuts—							
Dried Pulse	,,	1.5	3.2	3.3	2.3	3.7	3.0
Peanuts (weight without shell)	,,	0.9	1.6	1.4	1.3	1.9	3.0
Edible Tree Nuts (weight without shell)	,,	0.8	2.3	1.3	1.4	1.7	1.8
Cocoa (Raw Beans)	,,	2.1	3.3	2.9	2.5	2.8	2.9
Total	,,	5.3	10.4	8.9	7.5	10.1	10.7
Tomatoes and Fruit—							
Tomatoes (f)	,,	(g) 15.7	22.5	21.7	21.6	18.4	21.5
Citrus Fruit (f)	,,	31.9	40.2	30.8	29.2	37.9	35.4
Other Fresh Fruit	,,	94.0	76.0	75.3	65.0	79.6	74.9
Jams	,,	11.4	11.2	9.9	8.6	9.1	8.9
Dried Fruit	,,	8.1	9.5	8.0	7.1	7.3	7.4
Canned Fruit	,,	10.7	12.1	14.4	12.3	12.2	13.8
Total (Fresh Fruit equivalent)	,,	189.2	195.6	180.0	161.7	183.8	182.6
Vegetables—							
Leafy, Green and Yellow Vegetables	,,	(h)	49.2	46.1	44.3	42.0	40.5
Other Fresh Vegetables ..	,,	(h)	70.1	71.8	63.9	61.9	58.8
Canned Vegetables	,,	(h)	4.9	5.3	3.4	4.6	4.7
Total	,,	(h)	124.2	123.2	111.6	108.5	104.0
Grain Products—							
Flour—							
White	,,	187.1	186.7	188.9	184.8	181.5	177.9
Sharps	,,		0.5	0.7	0.4	0.5	0.4
Wheatmeal for baking ..	,,		9.2	8.6	8.0	7.9	7.2
Breakfast Foods (i)	,,	10.6	11.4	12.1	13.2	13.0	12.4
Rice (milled)	,,	4.0	4.0	4.7	3.9	3.7	3.5
Tapioca, Sago, etc.	,,	1.2	0.8	0.6	0.5	0.4	0.3
Pearl Barley	,,	1.0	0.6	0.6	0.6	0.5	0.5
Barley Mca and Polished Wheat (Rice substitute) ..	,,	..	0.3	0.2	0.2	0.2	0.2
Edible Starch (Cornflour) ..	,,	1.4	1.5	0.9	0.8	1.0	0.9
Total	,,	205.3	215.0	217.3	212.4	208.7	203.3
Beverages—							
Tea	,,	6.9	7.5	6.5	6.5	6.8	6.0
Coffee	,,	0.6	0.7	0.8	0 7	1.1	1.1
Beer	Gallon	11.7	20.4	21.2	21.8	23.1	24.3
Wine	,,	0.6	1.6	1.8	1.4	1.4	1.2

(a) Subject to revision. (b) Included with fresh meat at its carcass weight. (c) Edible weight. (d) Included with fresh. (e) In terms of weight of shell eggs. (f) Includes fresh equivalent of manufactured products. (g) Probably understated owing to lack of complete data. (h) Not available. (i) Excludes invalid and health foods, semolina and wheat germ prior to 1951–52.

2. **Level of Nutrient Intake.**—The table below shows details of the estimated supplies of nutrients available for consumption in Australia during annual periods since 1950-51 in comparison with the annual average for the three years 1936–37 to 1938–39. The table has been compiled by the Nutrition Section of the Commonwealth Department of Health and is based on the estimates of the quantity of foodstuffs consumed per head of population shown in the preceding table.

ESTIMATED SUPPLIES OF NUTRIENTS AVAILABLE FOR CONSUMPTION: AUSTRALIA.

(Per Head per Day.)

Nutrient.	Unit.	Average 1936–37 to 1938–39.	1950–51.	1951–52.	1952–53.	1953–54.	1954–55. (a)
Calories ..	No.	3,117	3,269	3,240	3,261	3,338	3,296
Protein—							
Animal ..	gm.	58.7	59.9	57.6	56.5	57.3	56.8
Vegetable ..	,,	30.9	33.5	34.2	33.0	33.8	33.1
Total ..	,,	89.6	93.4	91.8	89.5	91.1	89.9
Fat	,,	133.5	128.0	125.6	129.5	132.5	133.1
Carbohydrate ..	,,	377.4	411.6	414.5	421.1	426.8	416.1
Calcium	mgm.	642	790	784	758	£00	758
Iron	,,	15.4	15.3	14.9	14.0	14.2	13 9
Vitamin A ..	I.U.	8,457	8,161	8,083	7,200	7,254	7,084
Ascorbic Acid ..	mgm.	86	87	83	80	90	83
Thiamin ..	,,	1.4	1.4	1.4	1.3	1.3	1.3
Riboflavin ..	,,	1.7	1.9	2.0	1.7	1.8	1.7
Niacin	,,	18.7	18.0	19.9	18.1	18.6	18.5

(a) Subject to revision.

NOTE.—For the years 1952–53 to 1954–55, new conversion factors have been used based on factors contained in the "*Table of Composition of Australian Foods*" (Anita Osmond and Winifred Wilson, Canberra, 1954), but the comparison with previous years has not been significantly affected. Vitamin A is on a revised basis for all years shown.

§ 5. Patents, Trade Marks and Designs.

1. **Patents.**—(i) *General.* Patents for inventions are granted under the Patents Act 1952–1955, which applies to the Commonwealth of Australia and the Territories of Norfolk Island, Papua and New Guinea. The Act is administered by a Commissioner of Patents. The principal fees payable up to and including the grant of a patent amount to £17 10s. Renewal fees are payable as follows:—£5 before the expiration of the fourth year, and an amount progressively increasing by £1 before the expiration of each succeeding year up to the final fee of £16, payable before the expiration of the fifteenth year. An extension of time for six months for payment of a renewal fee may be obtained. Patents granted under the repealed Acts (Patents Act 1903–1950) are subject to the renewal fees under those Acts.

(ii) *Summary.* The number of separate inventions in respect of which applications were filed and the number of letters patent sealed during the years 1939 and 1951 to 1955 are shown in the following table.

PATENTS: AUSTRALIA.

Particulars.	1939.	1951.	1952.	1953.	1954.	1955.
Applications	5,740	7,135	8,073	8,917	9,073	8,869
Applications accompanied by provisional specifications ..	3,161	2,894	3,406	3,973	3,590	3,220
Letters patent sealed ..	3,141	4,291	5,248	5,181	5,464	5,931

2. Trade Marks and Designs.—(i) *Trade Marks.* Under the Trade Marks Act 1905-1948 the Commissioner of Patents is also Registrar of Trade Marks. This Act has been amended from time to time, the last amendment having been made in 1948. Special provisions for the registration of a "Commonwealth Trade Mark" are contained in the Act of 1905, and are applicable to all goods included in or specified by a resolution passed by both Houses of Parliament that the conditions as to remuneration of labour in connexion with the manufacture of such goods are fair and reasonable. The Act of 1948 provides for the registration of users of trade marks, and also for assignment of trade marks with or without the goodwill of the business concerned.

(ii) *Designs.* Under the Designs Act 1906-1950 the Commissioner of Patents is also Registrar of Designs.

(iii) *Summary.* The following table shows the applications for trade marks and designs received and registered during the years 1939 and 1951 to 1955.

TRADE MARKS AND DESIGNS: AUSTRALIA.

Particulars.	1939.	1951.	1952.	1953.	1954.	1955.
Trade Marks—						
Received	1,992	3,583	3,988	4,305	4,730	4,630
Registered	1,580	2,649	4,044	1,469	1,400	1,848
Designs—						
Received	865	773	1,186	1,504	1,373	1,330
Registered	736	579	1,388	802	900	819

3. Revenue.—The following table shows the revenue of the Commonwealth Patent Office, Trade Marks and Designs Office, and revenue obtained from Copyright for the years 1939 and 1951 to 1955. From 1st July, 1954 a system of payment of fees by "fee stamps" was introduced and fees have since been collected under one head of revenue. Consequently separate figures are not available for the years 1954 and 1955.

PATENTS, TRADE MARKS AND DESIGNS AND COPYRIGHT, REVENUE: AUSTRALIA.

(£.)

Particulars.	1939.	1951.	1952.	1953.	1954.	1955.
Patents	47,409	109,788	126,288	130,292	202290	234,125
Trade Marks and Designs ..	17,052	29,480	49,538	45,113		
Copyright	411	368	577	1,156		
Total	64,872	139,636	176,403	176,561	202,290	234,125

§ 6. Copyright.

1. Legislation.—Copyright is regulated by the Commonwealth Copyright Act 1912-1950 wherein, subject to modifications relating to procedure and remedies, the British Copyright Act of 1911 has been adopted and scheduled to the Australian law.

Reciprocal protection of unpublished works was extended in 1918 to citizens of Australia and of the United States of America, under which copyright may be secured in the latter country by registration at the Library of Congress, Washington. The Commonwealth Government promulgated a further Order in Council which came into

operation on 1st February, 1923, and extended the provisions of the Copyright Act to the foreign countries of the Copyright Union, subject to the observance of the conditions contained therein.

2. **Applications and Registrations.**—The following table shows under the various headings the number of applications for copyright received and registered for the years 1939 and 1951 to 1955.

COPYRIGHT: AUSTRALIA.

Particulars.	1939.	1951.	1952.	1953.	1954.	1955.
Applications received—						
Literary	1,438	1,399	1,434	1,134	1,044	1,005
Artistic	53	38	34	21	25	17
International	3	..	..	..	..	..
Applications registered—						
Literary	1,359	766	1,337	1,411	943	869
Artistic	38	..	36	15	20	12
International	1	..	..	..	..	..

3. **Revenue.**—Revenue obtained from copyright during the years 1939 and 1951 to 1955 is shown in §5, para. 3 above.

§ 7. Australian Shipbuilding Board.

1. **Constitution.**—Previous reference to the constitution of the Australian Shipbuilding Board appeared in Official Year Book No. 37, page 1170. Originally established in 1941 under National Security Regulations, the Board has been reconstituted a number of times since its inception and in 1948 was constituted on a permanent basis under the Supply and Development Act. At present it operates under the control of the Minister for Shipping and Transport. In order to link the activities of the Board more closely with the Department of Shipping and Transport, the constitution of the Board was altered in April, 1952, to provide for representation by senior departmental officers. The present membership of the Board consists of a Chairman who is the General Manager, a Deputy Chairman, a Finance Member and two other members, one of whom represents the Naval Board and one the Australian Shipping Board.

2. **Functions.**—The functions of the Board in relation to merchant shipbuilding are—(i) to report on the capacity of the industry; (ii) to control building, repair and maintenance of ships and shipyards, etc; (iii) to arrange construction of vessels and yards, etc.; (iv) to order and direct repair and docking of vessels; and (v) to arrange supply of engines and other equipment for ships.

The first actions of the Board were to survey existing shipbuilding potentials and decide upon a construction programme. (*See* Official Year Book No. 37, p. 1170).

The Board also established facilities for the manufacture of marine engines at Rocklea in Queensland, and at Port Melbourne. The Rocklea plant, which produced engines for "A", "B" and "D" class freighters, was closed in 1949, but the Port Melbourne works are still in operation and to December, 1955 had constructed eleven steam and six Doxford diesel propelling engines, and also numerous steering and auxiliary engines and winches. At 31st December, 1955 five Doxford diesel propelling engines were under construction.

To bring the cost to purchasers of Australian tonnage more into line with the cost of comparable vessels built in the United Kingdom the Board is empowered to sell new Australian-built tonnage to private owners at prices up to 25 per cent. below their total construction cost. In order to take advantage of this, private shipowners are required to place their orders for vessels through the Board, which has thus become the ordering authority for all vessels built in Australian yards on which a subsidy is paid.

The Board has also undertaken the preparation of plans and drawings for the various yards, as the level of ship construction in Australia does not warrant each yard employing specialists in naval architecture. In this way the Board has assisted in raising the efficiency of the industry as a whole and also in the development of individual yards.

In the exercise of its functions the Board is responsible for—(i) the design of vessels; (ii) calling of tenders and placements of orders; (iii) co-ordination of the Board's supplies to shipbuilders, e.g., machinery and certain equipment; (iv) supervision of construction; (v) acceptance of vessels after sea trials; and (vi) administration associated with ship repairs, marine engines, spare parts, etc.

In September, 1954, the Tariff Board commenced an inquiry into the level and method of assistance which should be given to the Australian Shipbuilding Industry, with evidence being heard in Melbourne, Sydney and Brisbane. The findings of the Board are not expected to be made public until some time in 1956.

3. **Construction Programme.**—At 31st December, 1955 the Board had 17 vessels under construction or on order in Australian shipbuilding yards. These comprised: 5 "M.B.C." class, 10,000 tons d.w. motor bulk carriers; 3 "S.B.C." class, 10,000 tons d.w. steam bulk carriers; 3 "B.H.T." class, 10,000 tons d.w. steam iron-ore carriers; 2 "M.C." class, 7,000 tons d.w. motor colliers; 1 "B" class, 6,500 tons d.w. freighter; 1 "P.C.V." class, 3,000 tons d.w. passenger/cargo vessel; and 2 "M.G.C." class, 2,000 tons d.w. motor bulk grain carriers. At the same date. 47 vessels exceeding 300 gross tons had been built to the order of the Board, as follows:—1 "B.H.T." class, 10,000 tons d.w. steam iron-ore carrier; 13 "A" class, 9,000 tons d.w. freighters; 1 "M.C." class, 7,000 tons d.w. motor collier; 10 "B" class 6,000 tons d.w. freighters; 2 "S.C.O. 4" class, 4,000 tons d.w. steam colliers; 9 "D" class, 3,000 tons d.w. freighters; 2 "U/S" class, 3,000 tons d.w. freighters; 2 "D/A" class, 3,000 tons d.w. freighters; 1 passenger/cargo vessel of 3,000 tons d.w.; 1 "M/M" class, 2,000 tons d.w. motor collier; and 5 "E" class, 700 tons d.w. freighters.

Since its inception, the Board has been responsible also for the construction of 24 wooden vessels of 300 tons gross, together with a 1,000 ton floating dock. It was also responsible for the foundation of the small craft construction during the 1939–45 War. This function was, however, later transferred to the Small Craft Construction Directorate, Department of Supply.

§ 8. War Service Homes Division.

The provision of War Service Homes is a function of the War Service Homes Division of the Department of National Development, and the administration of the War Service Homes Act is under the control of the Director of War Service Homes.

The War Service Homes Act 1918–1954 is a measure for the provision of homes for Australian ex-servicemen who served during the 1914–18 War or during any war in which His Majesty became engaged on or after 3rd September, 1939, including, subject to the statutory provision of the Act, service in Korea or Malaya. Provision is also made for assistance to the female dependants of Australian ex-servicemen and other classes of eligible persons as defined in the Act. Assistance may be granted to an eligible person and the wife or husband of that person, as the case may be, as joint tenants.

The maximum amount of loan or advance which may be granted under the Act is £2,750. The period of repayment may be approved up to 45 years. In the case of a widow or widowed mother of an Australian ex-serviceman the period may be extended to a maximum of 50 years.

The War Service Homes Division does not provide homes for occupation on a purely tenancy basis.

Since the inception of operations under the War Service Homes Act (figures in parentheses indicate cases where eligibility has been established as a result of service during the 1939–45 War or in Korea or Malaya) 147,860 (97,985) applications have been approved; 54,998 (32,299) homes have been built, or assistance to build them has been given; 58,015 (42,871) homes have been purchased; and 15,502 (12,025) mortgages have been discharged. The total number of homes provided under the War Service Homes Act to 30th June, 1955 was 128,515, including 87,195 to persons who served during the 1939–45 War or in Korea or Malaya.

In addition, the Division had approved 11,958 transfers and resales, of which 3,614 were in respect of persons whose eligibility had been established as a result of service during the 1939–45 War or in Korea or Malaya.

During 1954–55, 15,007 (14,230) applications were approved; 5,628 (5,424) homes were built or assistance to build them was given; 5,665 (5,341) homes were purchased; and 1,498 (1,418) mortgages were discharged. The total number of homes provided during the financial year 1954–55 was 12,791 (12,183). Transfers and resales approved numbered 1,070 (939).

At 30th June, 1955, 3,547 homes, including 417 group projects, were in course of construction; 1,221 contracts, of which 124 were for group homes, had been let but work had not started; and 1,288 tenders, including 116 for group homes, had been called but not finally dealt with. The majority of these homes are being provided for persons who served during the 1939–45 War.

The total capital expenditure from inception to 30th June, 1955, was £199,419,769, including £30,086,585 for 1954–55. Receipts from inception to 30th June, 1955 amounted to £82,993,472, including £10,778,768 during 1954–55. Of the total receipts, £43,203,015 has been paid to the National Debt Sinking Fund, including £5,734,270 for 1954–55.

At 30th June, 1955 the total amount of insurances in force, including cover notes, amounted to £236,062,281. From 1st July, 1954 to 30th June, 1955 the premium income amounted to £145,933, and expenditure from the War Service Homes Insurance Trust Account to £394,229.

At 30th June, 1955 arrears of instalments outstanding amounted to £318,776, or 0.40 per cent. of the total instalments due.

§ 9. Commonwealth Scientific and Industrial Research Organization.

1. **General.**—By the Science and Industry Research Act 1949, the previously existing Commonwealth Council for Scientific and Industrial Research was reorganized under the title of the Commonwealth Scientific and Industrial Research Organization. An account of the organization and work of the former Council, and of the earlier Commonwealth Institute of Science and Industry from which the Council was formed, was given in earlier issues of the Official Year Book. (*See* No. 14, p. 1061 and No. 37, p. 1183).

2. **Science and Industry Research Act 1949.**—This Act provides for—

(*a*) an Executive of the Organization consisting of five members to be appointed by the Governor-General, at least three of whom shall be persons possessing scientific qualifications; and

(*b*) an Advisory Council of the Organization, consisting of the members of the Executive, the Chairman of each State Committee constituted under the Act, and such other members as the Advisory Council, with the consent of the Minister, co-opts by reason of their scientific knowledge.

The powers and functions of the Organization are as follows :—(*a*) To initiate and carry out scientific researches in connexion with primary or secondary industries in Australia ; (*b*) to train research workers and to establish industrial research studentships and fellowships ; (*c*) to make grants in aid of pure scientific research ; (*d*) to establish and make grants to industrial research associations in any industry ; (*e*) to test and standardize scientific apparatus and instruments ; (*f*) to collect and disseminate scientific and technical information ; (*g*) to publish scientific and technical reports and periodicals ; and (*h*) to act as a means of liaison between Australia and other countries in matters of scientific research.

3. **Science and Industry Endowment Act 1926–1949.**—Under this Act, the Government established a fund of £100,000, the income from which is used to provide assistance (*a*) to persons engaged in scientific research ; and (*b*) in the training of students in scientific research. Provision is made for gifts or bequests to the fund, which is controlled by a trust consisting of the Executive of the Organization. In accordance with the Act, arrangements have been made to send a number of qualified graduates abroad for training in special fields of work.

4. **Work of the Organization.**—The activities of the Commonwealth Scientific and Industrial Research Organization have necessitated a widespread and adaptable arrangement of its research laboratories. Undesirable centralization has been avoided mainly in two ways. In the first place, the policy has been followed of establishing laboratories in different places in the Commonwealth wherever the necessary facilities, contacts and other suitable conditions could best be found. Secondly, the Act provides for the establishment of a State Committee in each of the six States. These Committees are widely representative of scientific and industrial interests, and advise the Executive or the Advisory Council on general matters and on particular questions of investigation and research.

For about twelve years after its establishment, the work of the previous Council was devoted mainly to the solution of problems affecting the agricultural and pastoral industries. Unlike manufacturing concerns, which can often employ their own scientific staffs, the farmers and the pastoralists are dependent on outside help for the solution of their problems which require research. It was a recognition of the greater need of the primary producer which directed the Council's early policy. However, in 1937, the Commonwealth Government decided to extend the activities of the C.S.I.R. so as to provide assistance to secondary industries, and several laboratories have been established for work in that field ; it was thus in the fortunate position of being able to render to these industries assistance of vital importance almost immediately after the outbreak of war. In fact, the remarkable technological advances and developments in secondary industrial production during the war would to a large extent have been impossible had it not been for the assistance rendered by scientific research, and this may well serve as a forceful illustration of what may be accomplished in times of peace.

For the purpose of carrying out its research work there are established within the Organization a number of Divisions and Sections. The Divisions, of which there are now seventeen, comprise the major establishments for which special laboratory buildings have been erected and equipped ; the Sections generally include establishments which have not reached a stage of development, so far as the scope and magnitude of their operations are concerned, to justify their designation as Divisions. As the Organization's investigations extend on a Commonwealth-wide basis and as many of the investigations which are being conducted—particularly those concerned with problems affecting the agricultural and pastoral industries—necessitate experimental work in the field, a number of field stations are established in various parts of Australia.

The Divisions which have been established are as follows :—

(1) Plant Industry, with main laboratories at Canberra and Brisbane and field stations.
(2) Entomology, with main laboratories at Canberra and field stations
(3) Animal Health and Production, with main laboratories in Melbourne, Sydney and Brisbane and field stations.

(4) Biochemistry and General Nutrition, with main laboratories at Adelaide and field stations.
(5) Soils, with main laboratories at Adelaide and extensive operations in the field.
(6) Forest Products, with main laboratories in Melbourne and field experiments.
(7) Food Preservation and Transport, with main laboratories at Homebush, New South Wales, and a subsidiary laboratory in Brisbane.
(8) Fisheries and Oceanography, with main laboratories at Cronulla, New South Wales, subsidiary laboratories in Perth, Western Australia, Dunwich, Queensland, and Thursday Island, and experimental work in coastal waters of Australia.
(9), (10), (11) Metrology, Physics and Electrotechnology, comprising the National Standards Laboratory at Sydney.
(12) Radiophysics, with main laboratory at Sydney.
(13) Industrial Chemistry, with main laboratories in Melbourne.
(14) Tribophysics, with laboratories in Melbourne.
(15) Building Research, with laboratories in Melbourne.
(16) Mathematical Statistics, with main laboratory in Adelaide.
(17) Meteorological Physics, with main laboratory in Melbourne and field station.

The following are the Sections :—

(1) Commonwealth Research Station, Murray Irrigation Area, Merbein, Victoria.
(2) Irrigation Research Station, Griffith, New South Wales.
(3) Radio Research Board, Sydney.
(4) Dairy Research, Melbourne.
(5) Mineragraphic Investigations, Melbourne.
(6) Ore-dressing Investigations, Melbourne and Kalgoorlie.
(7) Plant Fibre, Melbourne.
(8) Physical Metallurgy, Melbourne.
(9) Wool Textile Research Laboratories, Geelong, Melbourne and Sydney.
(10) Coal Research, Sydney.
(11) Mathematical Instruments, Sydney.
(12) Wildlife Survey, with main laboratory in Canberra, subsidiary laboratory at Albury, and field experiments.
(13) Land Research and Regional Survey, with headquarters in Canberra, and field stations at Ayr (Queensland), Katherine (Northern Territory) and Ivanhoe (Kimberley, Western Australia).
(14) Animal Genetics, Sydney.

In addition to its investigational work, the Organization deals with inquiries covering a wide range of scientific and technical subjects and maintains Scientific Research Liaison Offices in London and Washington.

An Agricultural Research Liaison Section established at the Organization's Head Office assists in making results in agricultural research speedily available to State Departments of Agriculture for use in their extension work.

Recently an Industrial Research Liaison Section has also been established at Head Office to foster liaison in the secondary and manufacturing fields.

The Organization's Head Office, with administrative and executive staff, is in Melbourne, and associated with it are the Organization's Central Library, Agricultural Research Liaison Section and Central Experimental Workshops. The funds for the Organization are provided from two main sources, namely, from Commonwealth revenue by Parliamentary appropriation, and from industry directly or indirectly by way of contributions and special grants. The fact that contributions and grants account for over one-eighth of the total annual expenditure indicates that the C.S.I.R.O. has succeeded in a very large measure in gaining the confidence of the public.

The activities of the C.S.I.R.O. are now so comprehensive in their scope and so widely distributed that it is not an easy matter to present an adequate picture of them in a concise form. For details of the investigations in progress, reference should be made to the Annual Report of the Organization.

§ 10. Commonwealth Observatory.

1. Foundation of Observatory.—The Observatory was founded primarily to prosecute astrophysical research, including the study of the relations between solar and terrestrial phenomena. A short history of the foundation of the Observatory appears in Official Year Book No. 19, p. 979.

2. Site of Observatory.—The Observatory is situated on Mount Stromlo, which forms part of a ridge of hills about seven miles west of Canberra. The highest point in the ridge is 2,560 feet above sea level, that is about 700 feet above the general level of the surrounding country.

3. Equipment.—The major items of equipment at Mount Stromlo comprise a 74-inch reflector, a 50-inch reflector, which is the re-built Melbourne 48-inch telescope, a 30-inch reflector donated by the late J. H. Reynolds, Esq., a 20-inch reflector once the property of the late J. H. Catts, M.P., as well as a 9-inch refractor, a solar tower telescope of 45 feet focal length and other smaller telescopes. A photographic refractor of 26-inch aperture belonging to the Universities of Yale and Columbia is now installed in a dome provided by the Commonwealth Government.

4. Functions of Observatory.—Investigations in the fields of stellar spectroscopy, stellar photometry and variable stars are being carried out. In addition to covering the type of astrophysical research for which the Observatory was founded, the field of work has been extended to include experimental and theoretical investigations of the ionosphere, and the determination of time. The observatory is now responsible for the accuracy of the Australian Time Service. Considerable attention is being given to the development of this work, and a highly accurate quartz clock system has been installed. A photographic zenith tube has been acquired for time determination.

5. International Co-operation.—The Commonwealth Observatory works in close liaison with oversea observatories and major equipment has been or is being installed at Mt. Stromlo in co-operation with the University Observatories of Yale and Columbia (U.S.A.), Uppsala (Sweden), and Munich (Germany).

§ 11. Standards Association of Australia.

The Standards Association of Australia is the national standardizing organization of Australia, and issues Australian standard specifications for materials and codes of practice.

The Association was established in July, 1929 by the amalgamation of the Australian Commonwealth Engineering Standards Association and the Australian Commonwealth Association of Simplified Practice. It is an independent body in close touch with modern industrial requirements and has the full recognition and support of the Commonwealth and State Governments and industry. It was incorporated by Royal Charter in 1950.

The sole executive authority of the Association is vested in the Council, on which industry is fully represented, together with official representatives of the Commonwealth and State Governments and their technical departments, and of scientific, professional and commercial organizations. Voluntary assistance is rendered in the drafting of specifications and codes by several thousand individuals who are experts in their particular fields, and are organized into some hundreds of committees. These committees are grouped under broad industry headings including civil engineering and building construction, mechanical engineering, electrical engineering, chemical industry, timber industry, transportation, aircraft materials, ferrous and non-ferrous metallurgy, textiles, mining, ceramics, medical and dental materials, household and domestic economy, miscellaneous and general.

These committees are comprised of nominated representatives of manufacturing, distributing and purchasing organizations, and of scientific and other expert authorities in the particular field of the project being dealt with. The operations of these committees are co-ordinated and supervised by committees broadly representative of the whole industry within which the respective projects are included.

The specifications of the Association provide a suitable standard of performance, quality and dimension and an equitable basis for tendering. They help to eliminate

redundant qualities and sizes. They enable purchasers to obtain their requirements with greater assurance of satisfaction, with more rapid delivery and without the necessity of drafting individual specifications.

The underlying principles covering the preparation of the specifications and codes are that they shall be in accordance with the needs of industry; that the common interests of producer and consumer be maintained; that periodical revision should keep the work abreast with progress; and that standardization be arrived at by general consent without coercion.

Organizations, companies, firms and individuals interested in the work of the Association are eligible for subscription membership. Members are entitled to free copies of the publications of the Association and to the use of the library and its Special Information Service. Bibliographical research is undertaken for committees, members of the Association, and industry in general. Many hundreds of inquiries are answered each year.

The Association has international affiliations and the standards of all British and foreign countries are filed in the library and are accessible to members. It is a member, representing Australia, of the International Organization for Standardization (I.S.O.). The Association also administers the Australian National Committees of the International Electrotechnical Commission, the World Power Conference and the International Commission on Large Dams.

The Association is also the representative of the British Standards Institution, and all British standards may be purchased from headquarters and branch offices in the various States.

The headquarters of the Association are at Science House, Gloucester Street, Sydney, and branches of the Association are situated at Temple Court, 422 Collins Street, Melbourne; School of Arts Building, 162 Ann Street, Brisbane; Alliance Building, Grenfell Street, Adelaide; Gledden Building, Hay Street, Perth; c/o Engineering Department, Hobart Technical College, Hobart; Department of Works, Canberra; and Howard Smith Chambers, Watt Street, Newcastle.

§ 12. Film Censorship Board.

1. **Legislation.**—The Censorship of imported films derives its authority from Section 52 (*g*) of the Customs Act which gives power to prohibit the importation of goods. Under this section, regulations have been issued prohibiting the importation of films except under certain conditions and with the consent of the Minister. The regulations provide, *inter alia*, that no film shall be registered which in the opinion of the Censor is (*a*) blasphemous, indecent or obscene; (*b*) likely to be injurious to morality, or to encourage or incite to crime; (*c*) likely to be offensive to the people of any friendly nation; (*d*) likely to be offensive to the people of the British Empire; or (*e*) depicts any matter the exhibition of which is undesirable in the public interest.

The regulations governing the exportation of Australian-made films are similar with the addition that no film may be exported which in the opinion of the Censorship is likely to prove detrimental or prejudicial to the Commonwealth of Australia.

The Censorship consists of a Censorship Board of three persons and an Appeal Censor, the headquarters being in Sydney. There is also a right of appeal to the Minister.

In addition to the censorship of moving pictures, the Censorship may refuse to admit into Australia any advertising matter proposed to be used in connexion with the exhibition of any film. In regard to films and advertising matter produced in Australia, legislation of a uniform nature is now operative in all States except South Australia. Under the State legislation the Commonwealth Film Censorship Organization acts as censor for the States concerned by virtue of agreements entered into between the Commonwealth and the respective State Governments.

2. **Import of Films.**—Imported standard size (35-millimetre) films dealt with by the Censorship for the year 1955 were as follows:—1,148 films of 3,178,017 feet passed without elimination, 120 films of 945,286 feet passed after eliminations and 4 films of 30,485 feet rejected, making a total of 1,272 films of 4,153,788 feet. Appeals were lodged against the rejection of two films, one of which was upheld, whilst the other was disallowed

The countries of origin were as follows :—United States of America, 687 films of 2,249,702 feet ; United Kingdom, 275 films of 960,493 feet ; and other countries, 310 films of 943,593 feet.

The films which chiefly concern the Censorship are the feature or dramatic films. Of these, 412—3,391,605 feet were imported during 1955 (223—1,866,087 feet from the United States of America and 104—787,533 feet from the United Kingdom). Two hundred and ninety-four—2,441,743 feet were passed without eliminations, 114—919,377 feet were passed with eliminations and four films of 30,485 feet were rejected in the first instance. In two instances an appeal was lodged, one of which was upheld, whilst the other was disallowed. During 1953, 401 feature films were dealt with, 278 being passed without eliminations and 122 passed with eliminations, while one film rejected in the first instance was subsequently passed for public exhibition.

There were also imported, during 1955, 5,661 miniature films (16 millimetres) of 3,963,628 feet and 4,413 miniature films (9.5 and 8 millimetres) of 1,637,612 feet. Six 8-millimetre films and three 16-millimetre films were rejected. No appeals were lodged against rejection of the films.

3. Export of Films.—The number of films exported for the year 1955 was 2,505 of 1,721,034 feet, of which 1,988 films of 1,335,072 feet were sent to British countries, including Trust Territories and 293 films of 209,044 feet were sent to the United States of America.

§ 13. Australian National Film Board and the Film Division.

1. The Australian National Film Board.—The Australian National Film Board was inaugurated in April, 1945, on the recommendations of a Commonwealth Government inter-departmental committee which considered the suggestions of a conference of interested individuals and Commonwealth and State officials, including Directors of Education, called in November, 1944 by the Ministers for Information and Post-war Reconstruction. It was attached, for administrative purposes, to the Department of Information.

With the abolition of the Department of Information in March, 1950, administration of the Board was transferred to the News and Information Bureau, Department of the Interior.

In November, 1950, the Board was reconstituted as an advisory body to the Minister for the Interior on matters concerned with the production, distribution and acquisition of films required by Commonwealth departments for the following purposes :—

(a) for use within Australia on important matters of national interest and welfare, such as school and adult education, rehabilitation, social development, international understanding, trade and tourist expansion, and immigration ;

(b) for dissemination abroad to expand trade and commerce with other countries, encourage tourist traffic with Australia, improve Australia's relations with other countries and, where necessary, to explain Australia's national policies, and to encourage immigration.

The constitution provides for a membership of ten, with the Secretary of the Department of the Interior, Chairman, the Director of the News and Information Bureau, Deputy Chairman, and the remainder representative of Commonwealth Departments, State Government instrumentalities and organizations interested in the production, distribution or utilization of films for national publicity.

2. The Film Division of the News and Information Bureau.—Production and distribution of all films required by Commonwealth Departments is undertaken by the staff of the Film Division, News and Information Bureau, Department of the Interior, or by commercial enterprises under the supervision of officers of the Film Division. Theatrical distribution in Australia, and both theatrical and non-theatrical distribution overseas, of all Film Division productions are organized by the News and Information Bureau's home office or its oversea representatives. Non-theatrical distribution in Australia is organized through the National Library, Canberra, in co-operation with State film distribution agencies.

The first Australian Government organization for the production of motion pictures for national publicity purposes was the Cinema and Photographic Branch of the Department of Commerce, set up in Melbourne in 1920. Early in the 1939–45 War the newly-established Department of Information was made responsible for the operation of the Cinema Branch and for an Official War Photography Unit.

Since 1946 the Film Division has produced 239 films for general exhibition, as well as training and special purpose films. Prints are dispatched to 40 oversea centres where distribution is arranged by News and Information Bureau officers or other Australian representatives. In Britain there is regular distribution through more than a thousand theatres, and a large non-theatrical and educational series of circuits. By arrangement with the British Broadcasting Corporation, items of topical interest photographed by the Film Division are flown to London for television. In the United States of America there is wide non-theatrical distribution and considerable use of the films by television networks. An exchange arrangement with the National Film Board of Canada secures extensive distribution in Canada. French versions, prepared in Paris under the supervision of the Australian Embassy, circulate through France and French-speaking countries. Selected films have also been recorded in Dutch, German, Italian, Japanese, Hindustani, Tamil and other Indian dialects.

In addition to films made on the initiative of the News and Information Bureau, the Film Division has produced, or is producing, films under the sponsorship or with the co-operation of Commonwealth Departments and many other bodies such as the Commonwealth Bank of Australia, the Road Safety Council, Overseas Telecommunications Commission, Snowy Mountains Hydro-electric Authority, Australian Wine Board, the Australian National University and the Australian Broadcasting Commission.

The co-operation of the Australian motion picture industry with the Commonwealth spontaneously offered at the outset of the 1939–45 War, continues. Special films for urgent national appeals are planned, produced and distributed with the assistance of the National Films Council of the motion picture industry and its Film Production Advisory Committee.

§ 14. National Safety Council of Australia.

The National Safety Council of Australia was founded in Melbourne in 1927 for the purposes of developing, mainly by means of education, safety on the road, at work and in the home, and its activities have developed in other directions wherever the need for reducing the toll of accidents has been shown. To this end it conducts continuous propaganda through the press and in other ways. It also forms Junior Safety Councils in the schools for developing a safety conscience among children. The children themselves are officers of these Councils and patrol the roads in the neighbourhood of the schools and conduct the scholars across in safety. Posters are available to schools in connexion with Health and Safety lessons. Films specially taken are available for children's and road safety instruction.

A "Safe Driving" campaign for individual motor drivers is conducted as well as a "Freedom from Accidents" competition among employee drivers, those completing a year free from any accident for which they were responsible being given a certificate to that effect. An industrial service of four posters per month, together with slips for pay envelopes, constitutes a regular service for the dissemination of safety advice, and was supplied to over 100,000 workers in factories in 1954-55. Committees deal with specific problems regarding traffic, films, safety in industry, air safety and home dangers. The Air Safety Committee has issued a 32-page booklet "Air Sense" for distribution with pilots' private licences through the Civil Aviation Department, and has a plan for assistance to aircraft in distress which is being implemented throughout Australia.

The Council is supported by Government grants, public subscriptions and sales of service, and is a non-profit organization. Its work is carried on by a small staff controlled by committees and governed by an executive. The following committees, whose work is of an entirely honorary nature, are in operation, namely, Executive, Traffic, Industrial Safety, Home, Air Safety and Publicity.

§ 15. Australian Road Safety Council.

1. Origin and Organization.—The Australian Road Safety Council was formed in June, 1947, through the instrumentality of the Australian Transport Advisory Council.

The prime movers for the establishment of the Council were the Australian Automobile Association, which submitted a comprehensive plan; the New South Wales Minister for Transport, who advocated expansion, on a nation-wide basis, of road safety activities on lines similar to those of the Road Safety Council of New South Wales; and the National Safety Council of South Australia, which conveyed recommendations from a Special Safety Convention held in Adelaide in 1946.

At that time, in addition to the above-mentioned organizations in New South Wales and South Australia, there was a road safety organization in Victoria. Steps were immediately taken to form Councils in Queensland, Western Australia and Tasmania, and subsequently for the internal Territories.

The Australian Road Safety Council is the composite body of Road Safety Councils of the following States and Territories of Australia:—

Governmental.—New South Wales, Road Safety Council of New South Wales; Queensland, Road Safety Council of Queensland; Tasmania, Road Safety Council of Tasmania; the Australian Capital Territory and the Northern Territory, Road Safety Councils of the Australian Capital Territory and the Northern Territory respectively.

Non-Governmental.—Victoria, Victorian Road Safety Division, National Safety Council of Australia; South Australia, Road Safety Division, National Safety Council of South Australia; Western Australia, Road Safety Division, National Safety Council of Western Australia.

The Council is representative, geographically and technically, of the whole Commonwealth, and comprises nominees of practically all classes of road users, together with representatives of road transport, the Department of Defence and police administrations from each State. National organizations represented on the Council are:—The Federal Chamber of Automotive Industries, Council of Fire and Accident Underwriters, Australian Road Transport Federation, Australian Automobile Association, Transport Workers' Union of Australia, Federation of Motor Cycle Importers and Distributors of Australia, and Auto Cycle Council of Australia.

The Council meets annually, and an Executive Committee operates between conferences. The principal effort of the Council is directed through educational, advertising and public relations media.

An annual grant is made available by the Commonwealth Government under the Commonwealth Aid Roads Act for the promotion of road safety. Hitherto £100,000 annually, it has been increased to £150,000 for the five years commencing 1st July, 1955. Of this, £90,000 is allocated to State Road Safety Councils for local activities in the following proportions:—New South Wales, £22,500; Victoria, £18,000; Queensland, £16,650; Western Australia, £14,850; South Australia, £11,250; and Tasmania, £6,750. The remaining £60,000 is applied to the National Campaign, spread equitably over the entire Commonwealth.

2. Mode of Operation.—The role of the Australian Road Safety Council is primarily in the field of education and public relations. Its task is to inculcate the habit of safe use of the roads by all who travel on them and to promote the cause of road safety as a humanitarian and community ideal of the highest importance. To this end it constantly strives to increase public awareness of the road accident problem, which for the year ended 30th June, 1955 resulted in 97,758 accidents involving casualties or damage in excess of £10 to property, the deaths of 2,042 persons and injuries to 46,465 persons. (For further information on the subject of Traffic Accidents *see* pp. 249-251 of this Year Book.)

The Council works in close collaboration with two other committees also established by the Australian Transport Advisory Council, namely, the Australian Motor Vehicle Standards and the Australian Road Traffic Code Committees. All three committees are administered by the Commonwealth Department of Shipping and Transport, which is the executive department for the Australian Transport Advisory Council.

The Australian Motor Vehicle Standards Committee develops and promulgates essential basic motor vehicle standards, such as maximum lengths, weights, height, carrying capacity of vehicles, and minimum lighting, braking and other mechanical efficiencies. In addition to ensuring a greater safety factor, these standards have helped to eliminate many conflicting State requirements which had an adverse effect on design and production costs.

The Australian Road Traffic Code Committee is charged with the responsibility of progressively preparing a " blue print " uniform national traffic code for incorporation in State legislation. Speed limits, right hand turns, rules governing approaches to intersections, qualifications of drivers, and pedestrian behaviour, are a few of the numerous aspects which come within its purview, and a high degree of uniformity has been achieved.

The campaign for road accident prevention resolves broadly into three main elements relating to (i) the Road User, (ii) the Road, and (iii) the Vehicle. Similarly, the attack falls into three main divisions—(i) Education, (ii) Enforcement, and (iii) Engineering. The link between the components is, broadly :—

The Road User	Education (public relations media, instruction in schools, homes, etc.).
	Enforcement (of correct road usage—through the police and the courts, uniform traffic laws, etc.).
The Road .. The Vehicle ..	Engineering (technical improvements of all kinds, safer roads and vehicles, improved illumination, uniform vehicle standards, etc.).

In addition to the foregoing activities, the Council convenes special national conferences, as required by the Australian Transport Advisory Council, to consider specific road safety problems. Typical of these have been the special committee appointed in 1951 to discuss level crossing accidents which recommended, among other measures, the appointment in each State of a committee to investigate level crossings and report on safety provisions, the elimination of some railway level crossings and the closure of others where practicable and desirable; a special meeting held in June, 1953 to discuss methods of reducing the high incidence of motor cycle accidents, at which various measures to offset the greater vulnerability of both the machine and its rider were recommended; and special meetings held in May, 1954 and April, 1955 to consider the problems of " Youth and Road Safety " and " Pedestrian Behaviour " respectively. Through the Road Safety Council of New South Wales, the Australian Road Safety Council has pioneered the advocacy of voluntary blood tests for intoxication in cases of suspected driving under the influence of drugs or alcohol.

§ 16. Australian Atomic Energy Commission.

In November, 1952 a Commission of three members was appointed to control the Commonwealth's activities in relation to uranium and atomic energy, and in April, 1953, upon the enactment of the Atomic Energy Act 1953, the Commission was established as a statutory authority, with powers and functions as defined in the Act. The Commission is a corporate and autonomous body, controlling its own service. It functions under the direction of the Minister for Supply.

Commonwealth arrangements for securing collective advice on atomic energy matters date from 1949, when the Industrial Atomic Energy Policy Committee was established to study possible industrial applications of atomic energy, and to recommend a programme of development. This committee functioned until 1952, when it was disbanded at its own suggestion and succeeded by the Atomic Energy Policy Committee, a reconstituted body with enlarged terms of reference. In the light of recommendations by the 1952 Committee, and of scientific and organizational developments overseas in relation to atomic energy, the Government decided on the establishment of the Commission, and legislation was enacted in 1953 to give effect to this decision.

The functions of the Commission fall under two main headings. Firstly, it is responsible for undertaking and encouraging the search for and mining of uranium, and is empowered to co-operate with the appropriate authorities of the States in connexion with these and related matters. Secondly, it is authorized to develop the practical uses of atomic energy, by constructing and operating plant for this purpose, carrying out research, and generally fostering the advancement of atomic energy technology. These powers and functions are set out in detail in Part II. of the 1953 Act. In general, and subject to the Commonwealth's defence powers and particular provisions of the Act, they are exercisable only in or in relation to the Territories of the Commonwealth.

The search for and mining of uranium in the Territories of the Commonwealth are freely open to private enterprise, subject to the *Atomic Energy Act* 1953 and the Ordinances of the Territories. For the assistance of private prospectors, and with the object of ascertaining the uranium resources of the Territories, aerial and geological surveys are carried out to identify areas favourable to uranium occurrences. These surveys are undertaken for the Commission by the Bureau of Mineral Resources of the Department of National Development, and the results are published from time to time in map form for general information. As incentives to private enterprise to engage in the search for uranium, rewards have been paid for discoveries. Taxation concessions are allowed in respect of income derived from uranium mining. In addition, the Atomic Energy Commission, the Bureau of Mineral Resources and other Commonwealth agencies make available to prospectors and mining companies a wide range of technical and advisory services.

The development of the uranium resources of the States is a State matter, governed by the legislation and policies of the States. Commonwealth aerial survey facilities are made available to the States for the radiometric examination of areas within the States, and work is undertaken by the State Mines Departments for the Commonwealth on the testing of uranium ores and research on ore treatment problems. At the request of the State Governments, aerial radiometric surveys of approximately 43,000 square miles of selected country within the States had been carried out by the Bureau of Mineral Resources to 30th June, 1955. Prospectors and mining companies in the States have available to them technical and advisory services provided by the State Mines Departments.

Uranium oxide is being produced in Australia from large ore deposits at Rum Jungle, in the Northern Territory, and Radium Hill, in South Australia. The Rum Jungle deposits are being developed under arrangements between the Commonwealth and the Combined Development Agency, a joint procurement organization of the United States and United Kingdom Governments. The actual mining and treatment operations are being conducted for the Commonwealth by an Australian mining company. A treatment plant was brought into operation on the field in September, 1954, the substantial production from which is being sold to the Agency for defence purposes. The Radium Hill deposits are being developed by the South Australian Government, which has established an ore concentration plant on the field and a plant for the treatment of the concentrates at Port Pirie. Like the Rum Jungle project, the operations at Radium Hill and Port Pirie are carried out under arrangements with the combined Development Agency, and the output from the operations is sold to the Agency.

Uranium ores have also been found elsewhere in the Commonwealth, most notably at the Mary Kathleen lease in the Mt. Isa-Cloncurry district in Queensland. The Mary Kathleen lease, containing a large body of ore, is being developed by commercial interests, which are proceeding with the erection of a treatment plant in the area at a cost of several million pounds. Production from the plant will be sold to the United Kingdom Atomic Energy Authority, under arrangements approved by the Commonwealth Government. Amongst other known ore occurrences, some in the Northern Territory are of considerable interest. These are being examined by the mining companies which discovered them, and may prove to justify commercial development.

Arrangements for an extensive programme of research in Australia on the development of the industrial and other peaceful uses of atomic energy are at an advanced stage. A specialized research establishment, which will include a high-flux nuclear reactor of the latest type, is under construction at Lucas Heights, near Sydney, and is expected to be completed in 1957. Meanwhile the Atomic Energy Commission is maintaining a group of about fifty research officers at the United Kingdom Atomic Energy Research Establishment at Harwell, where some Australian scientific workers have been participating in the United Kingdom research and development programme since 1947. Most of the officers at Harwell will return to Australia when facilities for their work are available at Lucas Heights. Within Australia, in addition to its programme at Lucas Heights, the Commission is supporting atomic energy research on a considerable scale in the various universities, and it has established a wide range of post-graduate research studentships and undergraduate scholarships in the universities to train scientists for future work in atomic energy fields.

The broad objects of the Commission's research programme are to develop the production of electric power from nuclear fuels, and to investigate and promote the application of atomic energy and radioactive isotopes in industry, agriculture, medicine and biological research and other fields. In these endeavours the Atomic Energy Commission is working in close co-operation with the United Kingdom Atomic Energy Authority, under arrangements which give Australia access to the results of the very large United Kingdom programme of research on peaceful atomic energy uses. The results of research in Australia will in like manner be made available to the United Kingdom. Work in Australia, while constituting a self-contained programme, will be co-ordinated with the United Kingdom programme, to avoid overlapping of research objectives and duplication of investigations.

In the light of the vast amount of research now going forward overseas, and the programmes of many nations for the establishment of full-scale power producing reactors, it seems clear that nuclear power is rapidly approaching the stage of being economically

practicable. When that stage is reached, the implications for industry will be of great importance. The planned Australian research effort will enable Australia to make a full contribution to the advancement of atomic energy technology, both in power production and in other fields, and will at the same time place the country in a position to take advantage of the practical uses of atomic energy as they are developed.

§ 17. The United Nations.

1. **General.**—The Moscow Declaration of 1943 concerning a new international organization for the maintenance of international peace and security marked the end of the League of Nations. The dissolution of the League, and the transfer of certain of its functions to the new body, the United Nations, took place over subsequent years. Information concerning the League of Nations was given in issue No. 35 and earlier issues of the Official Year Book.

The Charter of the United Nations was drawn up by the delegates of fifty nations at the United Nations Conference on International Organization at San Francisco from 25th April to 26th June, 1945. Australia's ratification was deposited on 1st November, 1945. Following the admission in December, 1955 of 16 new countries there are now* 76 member States:—Afghanistan, Albania, Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Bulgaria, Burma, Byelorussia, Cambodia, Canada, Ceylon, Chile, China, Colombia, Costa Rica, Cuba, Czechoslovakia, Denmark, the Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Finland, France, Greece, Guatemala, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, the Republic of Ireland, Israel, Italy, Jordan, Laos, Lebanon, Liberia, Libya, Luxemburg, Mexico, Nepal, the Netherlands, New Zealand, Nicaragua, Norway, Pakistan, Panama, Paraguay, Peru, the Philippines, Poland, Portugal, Romania, Saudi Arabia, Spain, Sweden, Syria, Thailand, Turkey, the Ukraine, the Union of South Africa, the Union of Soviet Socialist Republics, the United Kingdom, the United States of America, Uruguay, Venezuela, Yemen, Yugoslavia.

The full record of the Conference is contained in the Report by the Australian Delegates on the United Nations Conference on International Organization held at San Francisco, from 25th April to 26th June, 1945.

At San Francisco an Executive Committee and a Preparatory Commission were established, and when these bodies had completed their work of preparation for the first meeting of the United Nations, the General Assembly met in London on 10th January, 1946.

The principal organs of the United Nations are the General Assembly, the Security Council, the Economic and Social Council, the Trusteeship Council, the International Court of Justice, and the Secretariat.

2. **General Assembly.**—This is the forum of the United Nations. In it each member state is represented and has one vote. It meets in regular annual sessions and has provision for special sessions. With the exception of disputes which are before the Security Council and matters essentially within the domestic jurisdiction of any State, it has power to discuss any matter within the scope of the Charter and to make recommendations upon it. The Assembly elects the non-permanent members of the other major organs and considers annual reports from them. Upon the recommendation of the Security Council, it may expel a member which has persistently violated the principles of the Charter.

* June, 1956.

3. **The Security Council.**—This has the primary responsibility for the maintenance of international peace and security. It is composed of five permanent members, namely China, France, the United Kingdom, the Union of Soviet Socialist Republics and the United States of America, and six non-permanent members with two-year periods of office, of whom three retire at the end of each year. At the initial election three countries, including Australia, were elected for a term of two years and three others for a term of one year only. The following are the non-permanent members of the Security Council at present*: Belgium, Iran and Peru (whose terms commenced on 1st January, 1955) and Australia, Cuba and Yugoslavia (whose terms commenced on 1st January, 1956). On procedural matters, decisions are taken by an affirmative vote of any seven members. But on all other matters decisions can only be made on the affirmative vote of seven members, including the concurring votes of all the permanent members. However, the powers which are parties to a dispute for peaceful settlement do not vote.

The Security Council is assisted by a Military Staff Committee consisting of the Chiefs of Staff of the permanent members of the Council or their representatives.

4. **The Economic and Social Council.**—This body consists of eighteen members, each elected for a period of three years. Its main functions are to make, or initiate, studies and reports, and to make recommendations to the General Assembly or to members of the United Nations, upon international, economic, social, cultural, educational, health and related matters. It may make recommendations for the purpose of promoting respect for, and observance of, human rights and fundamental freedoms for all.

The present* members of the Economic and Social Council are: the United Kingdom, the Union of Soviet Socialist Republics, Ecuador, Pakistan, Czechoslovakia and Norway (retiring 1956), France, China, Egypt, Argentina, the Dominican Republic and the Netherlands (retiring 1957) and Brazil, Canada, Greece, Indonesia, the United States of America and Yugoslavia (retiring 1958).

5. **The Trusteeship Council.**—The Charter declares the political, social, cultural and economic advancement of the Trusteeship Territories to be a sacred trust. A Trusteeship Council has been set up composed of those members of the United Nations who are administering trust territories and an equal number of members who are not administering trust territories (including any permanent members of the Security Council who are not administering trust territories). Territories which may be placed under trusteeship in accord with individual trusteeship agreements are those previously held under mandate, those detached from enemy states as a result of the second World War and those dependent territories placed under the system by the states responsible for their administration. Australia is automatically a member of the Trusteeship Council, as the Power administering the Trust Territories of New Guinea and Nauru. The present* members of the Trusteeship Council are: Australia, Belgium, France, Italy, New Zealand, the United Kingdom, the United States of America (administering States), and Burma, China, Guatemala, Haiti, India, Syria and the Union of Soviet Socialist Republics. China and the Union of Soviet Socialist Republics are eligible for permanent membership of the Trusteeship Council by virtue of their permanent membership of the Security Council.

The Council has among its duties the consideration of annual reports submitted by the trustee state, the carrying out of periodic inspections by agreement with it, and the formulation of questionnaires on the welfare and advancement of the dependent peoples.

* June, 1956.

6. **The International Court of Justice.**—This consists of fifteen judges, no two of whom may be nationals of the same state. Its jurisdiction comprises all cases which the parties refer to it, and all matters especially provided for in the Charter or in treaties and conventions in force. Provision exists in the Statute of the Court whereby States parties to the Statute may accept the jurisdiction of the Court as compulsory, either conditionally, or unconditionally in certain international disputes.

The present* members of the Court are: Judges Badawa (Egypt), Hsu Mo (China), Read (Canada), Winiarski (Poland), Zoricic (Yugoslavia)—all retiring in 1958; Judges Hackworth (United States of America), Sir Zafrullah Khan (Pakistan), Klaested (Norway), Kozhevnikov (U.S.S.R.), and Ugon (Uruguay)—all retiring in 1961; and Judges Lauterpacht (United Kingdom), Basdevant (France), Guerrero (El Salvador), Cordova (Mexico), and Quintana (Argentina)—all retiring in 1964.

Sir Zafrullah Khan was elected to replace Sir Benegal Rau (India), who died in 1953.

7. **The Secretariat.**—The Secretary-General is the head of the Secretariat of the organization. He is appointed by the General Assembly upon the recommendation of the Security Council, and he appoints his staff in accordance with the rules approved by the General Assembly. Mr. Trygve Lie (Norway) was appointed first Secretary-General, and at the Sixth Session of the General Assembly in 1950 was re-appointed for three further years as from 1st February, 1951. In November, 1952 Mr. Lie announced his intention of retiring and in April, 1953, Mr. Dag Hammarskjold (Sweden) was appointed in his place.

8. **Specialized Agencies.**—In addition to these organs of the United Nations there are specialized agencies which co-operate closely with the United Nations in many fields on economic and social questions.

Those now* in operation are: The International Labour Organization; Food and Agriculture Organization; United Nations Educational, Scientific and Cultural Organization; International Civil Aviation Organization; International Bank for Reconstruction and Development; International Monetary Fund; Universal Postal Union; World Health Organization; International Telecommunication Union; World Meteorological Organization.

To enable co-ordination of the work of the specialized agencies, arrangements have been made for them to submit reports on their activities and budgets to the United Nations where they are discussed by the Economic and Social Council and the General Assembly.

§ 18. Diplomatic and other Representatives Overseas and in Australia

1 **General.**—The following statements show particulars of the various diplomatic and other representatives overseas and in Australia at 30th June, 1956. Full details of British and foreign representation in Australia—diplomatic and consular—and of permanent Australian missions overseas may be obtained from publications issued by the Department of External Affairs, Canberra. A statement is issued each quarter by the Department of Trade, showing the latest particulars of the Australian Trade Commissioner Service overseas.

* June, 1956.

2. Australian Representation Overseas.—

AUSTRALIAN DIPLOMATIC AND OTHER REPRESENTATIVES OVERSEAS.

Her Majesty's Australian Ambassador Extraordinary and Plenipotentiary to—

Burma (Rangoon)—C. T. Moodie.
France (Paris)—A. Stirling, C.B.E.
Germany, Federal Republic of (Bonn)—P. Shaw.
Indonesia (Djakarta)—W. R. Crocker, C.B.E.
Ireland (Dublin)—(Vacant); S. Jamieson (Chargé d'Affaires *ad interim*).
Japan (Tokyo)—Sir Alan Watt, C.B.E.
The Netherlands (The Hague)—H. A. McClure-Smith.
The Phillipines (Manila)—K. C. O. Shann.
Thailand (Bangkok)—D. O. Hay, D.S.O., M.B.E.
United States of America (Washington, D.C.)—The Hon. Sir Percy Spender, K.B.E., Q.C.

Her Majesty's Australian Envoy Extraordinary and Minister Plenipotentiary to—

Brazil (Rio de Janeiro)—C. V. Kellway.
Cambodia (Phnom Penh)—D. W. McNicol.
Egypt (Cairo)—A. R. Cutler, V.C.
Israel (Tel Aviv)—B. C. Bailard.
Italy (Rome)—D. P. McGuire, C.B.E.
Laos (Vientiane)—D. W. McNicol.
Vietnam (Saigon)—D. W. McNicol.

High Commissioners for Australia in—

Canada (Ottawa)—T. A. Pyman (acting).
Ceylon (Colombo)—A. J. Eastman.
India (New Delhi)—P. R. Heydon.
New Zealand (Wellington)—Vice-Admiral Sir John Collins, K.B.E., C.B.
Pakistan (Karachi)—Major-General W. J. Cawthorn, C.B., C.I.E., C.B.E.
Union of South Africa (Pretoria and Cape Town)—Lt.-Col. W. R. Hodgson, C.M.G., O.B.E.
United Kingdom of Great Britain and Northern Ireland (London)—The Rt. Hon. Sir Eric Harrison, K.C.V.O.

Australian Military Mission—

Germany, Federal Republic of (Berlin) Head—P. Shaw.

Australian Mission—

United Nations (New York)—Ambassador, Dr. E. R. Walker, C.B.E.
United Nations (Geneva)—Permanent Delegate, G. A. Jockel.

Australian Commissioner in—

Malaya, Federation of (Kuala Lumpur)—T. K. Critchley.
Singapore, Brunei, Sarawak and North Borneo (Singapore)—R. L. Harry.

Consuls-General—

Greece (Athens)—H. G. Brooks (acting).
Switzerland (Geneva)—G. A. Jockel.
United States of America (New York)—The Hon. J. Francis.
United States of America (San Francisco)—M. H. Marshall.

Consuls—

Denmark (Copenhagen)—G. T. Pretyman.
New Caledonia (Noumea)—Dr. J. S. Cumpston, E.D.
Portuguese Timor (Dili)—F. J. A. Whittaker.

Trade Commissioner Service of the Commonwealth of Australia—

British West Indies—B. T. Connolly (Port of Spain).
Burma—L. C. Holmes, Commercial Secretary and Acting Trade Commissioner (Rangoon).
Canada—C. L. Steele (Montreal); H. Wrigley (Vancouver).
Central African Federation—W. S. Lowe (Salisbury).
Ceylon—H. W. Goodger (Colombo).
Egypt—S. D. Shubart, Commercial Counsellor and Trade Commissioner (Cairo).
France—C. J. Carne, O.B.E., Commercial Counsellor and Trade Commissioner (Paris).
Germany, Federal Republic of—R. R. Ellen, Commercial Counsellor and Trade Commissioner (Bonn).
Hong Kong—K. T. Ridley (Hong Kong).
India—P. R. Searcy (Calcutta); D. L. Crawford (Bombay).
Indonesia—D. R. McPhee, Commercial Counsellor and Trade Commissioner (Djakarta).
Italy—S. F. Lynch, Commercial Counsellor and Trade Commissioner (Rome).
Japan—N. F. Stuart, Commercial Counsellor and Trade Commissioner (Tokyo).
Malaya—H. M. Le Marchand, Commercial Counsellor and Trade Commissioner (Singapore).
New Zealand—W. R. Hudspeth (Wellington).
Pakistan—R. K. Scott, Commercial Counsellor and Trade Commissioner (Karachi).
Philippines, The—E. E. Jarvis (Manila).
Union of South Africa—A. J. S. Day, Commercial Counsellor and Trade Commissioner (Johannesburg).
United Kingdom of Great Britain and Northern Ireland—G. R. B. Patterson. Senior Trade Commissioner; E. B. Gilbert (London).
United States of America—J. B. Todd, Commercial Secretary and Trade acting Commissioner (Washington); F. R. Gullick (New York); W. D. Hardy (San Francisco).

3. **Oversea Representation in Australia.**—Consular representatives are not included in the following statement. Particulars of these are contained in a publication *Consular Representatives and Trade Commissioners in Australia*, issued by the Department of External Affairs, Canberra. There are more than 150 such representatives in Australia, and 40 countries are represented.

DIPLOMATIC REPRESENTATIVES IN AUSTRALIA.

Ambassador Extraordinary and Plenipotentiary of—

Burma—(Vacant); U Sain Bwa (Minister, Chargè d'Affaires *ad interim*) (Canberra U 1451).
China—(Vacant); Dr. Chen Tai Chu (Chargé d'Affaires *ad interim*) (Canberra U 2368).
France—His Excellency Monsieur Renaud Sivan (Canberra X 2925).
Federal Republic of Germany—His Excellency Dr. Walther Hess (Canberra X 3575).
Indonesia—His Excellency Dr. A. Y. Helmi (Canberra U 1221).
Ireland—(Vacant); Mr. M. L. Skentelbery (Charge d'Affaires *ad interim*) (Canberra J 3251).
Japan—His Excellency Mr. Tadakatsu Suzuki (Canberra U 1251).
The Netherlands—His Excellency Mr. A. M. L. Winkelman (Canberra U 1256).
The Philippines—His Excellency Dr. Roberto Regala (Sydney FA 1938).
Thailand—His Excellency Nai Konthi Suphamongkhon (Canberra, U 8101).
United States of America—His Excellency Mr. D. M. Moffat (Canberra U 1351).

Envoy Extraordinary and Minister Plenipotentiary of—

Austria—Dr. J. Manz (Chargé d'Affaires) (Canberra U 8167).
Belgium—His Excellency Monsieur Jean Querton (Sydney FB 1325).

Brazil—(Vacant); His Excellency Senhor Q. S. de Seta (Chargé d'Affairs *ad interim*) (Canberra X 2680).
Chile—Senor Don Juan Domeyko (Chargé d'Affaires) (Sydney FU 3353).
Denmark—(Vacant); Mr. F. Henning Hergel, O.B.E. (Chargé d'Affairs *ad interim*) (Sydney BW 3547).
Finland—(Vacant); Mr. P. I. Simelius (Chargé d'Affaires) (Sydney FM 3116).
Greece—His Excellency Monsieur Dimitri N. Lambros (Canberra J 3159).
Israel—His Excellency Mr. Mordekhai Nurock (Sydney BW 2082).
Italy—His Excellency Signor Silvio Daneo (Canberra J 3263).
Sweden—His Excellency Mr. J. Martin Kastengren (Canberra U 1421).

High Commissioner for—

Canada—His Excellency Mr. W. Arthur Irwin (Canberra U 1304).
Ceylon—His Excellency Mr. P. R. Gunasekara (Canberra X 1021).
India—Shri P. A. Menon (High Commissioner) (Canberra J 3209).
New Zealand—His Excellency Mr. G. E. L. Alderton, C.M.G. (Canberra U 1030).
Pakistan—(Vacant); Mr. M. A. Alvie (Acting High Commissioner) (Sydney BL 3305).
Union of South Africa—His Excellency Mr. J. K. Uys (Canberra U 2370).
United Kingdom of Great Britain and Northern Ireland—His Excellency Sir Stephen Holmes, K.C.M.G., M.C. (Canberra U 2211).

Commissioner for—

Malta—Captain George F. L. Stivala, O.B.E. (Melbourne MU 1291).

TRADE COMMISSIONERS OF OVERSEA GOVERNMENTS IN AUSTRALIA.

Canada—Senior Canadian Government Trade Commissioner—Mr. J. C. Britton (Sydney BW 5696-7).
Canadian Government Trade Commissioner—Mr. R. W. Blake (Melbourne MU 4716).

India—Indian Trade Commissioner—Mr. S. V. Patel (Sydney BW 9518).

New Zealand—Senior New Zealand Government Trade Commissioner—Mr. J. A. Malcolm (Sydney BL 3941).
New Zealand Government Trade Commissioners—Mr. R. J. Inglis (Melbourne MU 8111); Mr. E. J. Sutch (Sydney BL 3941).

United Kingdom of Great Britain and Northern Ireland—United Kingdom Senior Trade Commissioner—Mr. H. J. Gray, C.M.G. (Canberra U 2211).
United Kingdom Trade Commissioners—Messrs. J. N. McKelvie and N. L. Hibbs (Canberra U 2211); Messrs. A. R. Bruce, O.B.E., A. Hartland, O.B.E., and L. F. Hope (Sydney BW 8086); Messrs. A. R. Starck, O.B.E. and K. R. Allen (Melbourne MU 5556); Mr. R. Fell (Brisbane B 8588); Mr. J. D. Leithead (Perth BA 2042).

§ 19. Retail Trade.

1. **General.**—The statistics in this section relate to the number of retail establishments throughout Australia and the turnover of these establishments.

Information of this nature was first collected in respect of the year ended 30th June, 1948 by a full Census of all retail establishments. As this was the first Census of its type in Australia its scope and the data sought were the minima consistent with the objective of securing a record of the number of such establishments, their type, their geographical distribution, their aggregate sales of goods and a simple commodity dissection together with a record of the value of certain services provided. This Census was followed by a second Census of all retail establishments trading during the year

ended 30th June, 1949, and a third Census was taken for the year ended 30th June, 1953. In this latest Census, retailers were asked to furnish more detailed information concerning the dissection of their turnover into commodity groups and questions were asked about stocks of goods on hand, the number of persons engaged in the business and credit sales.

In general terms, the Censuses covered those establishments which normally sell goods by retail in shops, rooms, kiosks and yards. Certain types of establishments which sell services by retail (including repairs and materials therein) were also included, e.g., boot repairers, hairdressers, motor garages and service stations and cafés. The Censuses included the retail sales of those factories or wholesalers who conducted a regular retail business, but excluded those who only occasionally sold goods by retail. Both new and second-hand goods were included in sales recorded by relevant retail establishments.

During the period between Censuses variations in the value of retail sales have been measured by means of quarterly sample surveys. Annual totals derived from these surveys and some of the results of the 1952-53 Census are contained in this section.

2. **Value of Retail Sales in Each Commodity Group, 1948-49 to 1954-55, Australia.**—The following table shows the value of retail sales of goods in each of the commodity groups specified in the years 1948–49 to 1954–55 on a comparable basis throughout. The figures for the years 1948–49 and 1952–53 were obtained from Censuses taken in respect of those years, whereas figures for the other years shown are estimates based on sample surveys.

VALUE OF RETAIL SALES: COMMODITY GROUPS, AUSTRALIA.
(£ million.)

Commodity Group.	Year ended 30th June—						
	1949.(a)	1950.(b)	1951.(b)	1952.(b)	1953.(a)	1954.(c)	1955.(b)
Groceries	143.4	161.1	186.1	232.9	261.5	275.1	308.7
Butchers' Meat	65.3	75.4	92.3	118.7	127.8	133.9	147.5
Other Food(d)	116.6	131.7	155.5	187.8	206.8	223.7	246.6
Total Foodstuffs	325.3	368.2	433.9	539.4	596.1	632.7	702.8
Beer, Wine and Spirits	95.3	105.0	123.2	153.9	173.0	186.7	202.0
Clothing, Drapery, Piece-goods and Footwear	237.8	263.8	328.5	351.6	355.1	387.4	419.5
Hardware(e)	55.7	66.4	91.2	109.6	113.8	124.7	141.7
Electrical Goods	33.8	43.3	64.7	77.5	75.8	91.2	102.0
Furniture	46.4	54.5	76.9	76.1	72.8	81.0	86.6
Other Goods(f)	167.9	204.2	252.4	307.5	315.5	336.9	365.9
Total (excluding Motor Vehicles, etc.)	962.2	1,105.4	1,370.8	1,615.6	1,702.1	1,840.6	2,020.5
Motor Vehicles, Parts, Petrol, etc.(g)	166.1	273.3	382.0	433.3	417.3	492.3	581.4
Total	1,128.3	1,378.7	1,752.8	2,048.9	2,119.4	2,332.9	2,601.9

(a) Census figures. (b) Survey figures. (c) Survey figures revised since previous issue. (d) Includes fresh fruit and vegetables, confectionery, soft drinks, ice cream, cakes, pastry, cooked provisions, fish, etc., but excludes some delivered milk and bread. (e) Excludes basic building materials (e.g., timber, roofing tiles, bricks, etc.). (f) Includes tobacco, cigarettes, etc., newspapers, books and stationery, chemists' goods, grain and produce, jewellery, office equipment, etc. (g) Excludes farm machinery and implements, earth-moving equipment, etc.

In the foregoing table, figures for the years ended 30th June, 1949 to 1952 relate to establishments with total retail sales of £50 or more; for the years ended 30th June, 1953 to 1955 they relate to establishments with total retail sales of £500 or more. The total amount of retail sales of establishments so excluded in 1952–53 was not significant (less than 0.1 per cent. of total), and their omission does not affect the validity of the comparisons shown.

3. **Takings for Certain Services, Australia.**—The following table shows the amounts of "Other takings" recorded for the services specified in respect of establishments covered by the Retail Censuses of 1948–49 and 1952–53. The figures for the year ended 30th June, 1949 relate to establishments with "Other takings" of £50 or more recorded for the services specified; for the year ended 30th June, 1953 they relate to establishments

with retail sales or "Other takings" of £500 or more. The amount of "Other takings" of establishments so excluded in 1952–53 was less than one per cent. of total takings shown for Repair Work Done and Meals in Cafés, Restaurants, etc., and less than three per cent. of total takings shown for Hairdressing.

TAKINGS FOR CERTAIN SERVICES, AUSTRALIA.
(£'000.)

Service.	1948–49.	1952–53.
Repair, Servicing and Maintenance Work Done(a)—		
Motor	25,273	56,864
Other	9,365	16,044
Total	34,638	72,908
Meals in Cafés, Restaurants, etc.	21,256	32,765
Meals and Accommodation in Hotels	11,263	24,936
Hairdressing	6,684	9,874

(a) Includes value of materials used and cost of labour.

4. **Number of Establishments with Sales in each Commodity Group, 1952-53, States.**— The following table shows the number of establishments with sales in each of the commodity groups specified during the year ended 30th June, 1953 for each State. Many establishments recorded sales in more than one commodity group. Thus the aggregate of the number of establishments by commodity group is greater than the total number of individual establishments.

NUMBER OF RETAIL ESTABLISHMENTS WHICH SOLD GOODS IN EACH COMMODITY GROUP: STATES, 1952-53.(a)

Commodity Group.	N.S.W.	Vic.	Qld.	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Foodstuffs—									
Groceries (including Bacon, Butter, etc.)	11,650	7,181	4,447	2,700	2,320	1,227	50	36	29,611
Butchers' Meat	2,833	2,120	1,150	826	606	346	10	12	7,903
Fresh Fruit and Vegetables	6,124	3,113	3,132	1,356	1,587	889	25	18	16,244
Bread, Cakes and Pastry	8,160	4,665	3,552	1,830	1,587	657	18	26	20,495
Confectionery, Ice Cream, Soft Drinks (including Milk Drinks)	12,226	7,246	4,860	2,798	2,617	1,284	44	33	31,108
Other Food (Fish, Poultry, Cooked Meats, Wrapped Lunches, etc.)	5,496	2,689	1,923	1,264	1,160	288	9	20	12,849
Beer, Tobacco, etc.—									
Beer, Wine and Spirits	3,004	2,191	1,400	709	734	318	35	25	8,416
Tobacco, Cigars and Cigarettes	17,013	10,080	6,543	3,714	3,539	1,689	60	58	42,696
Clothing, Drapery, etc.—									
Clothing—									
Men's and Boys' Wear	2,861	2,188	1,384	999	957	412	41	18	8,860
Women's, Girls' and Infants' Wear (including Hand Bags)	4,297	3,484	1,417	1,092	925	459	35	22	11,731
Drapery, Piece-goods, Manchester and Soft Furnishings	2,343	1,699	1,099	847	786	295	31	14	7,114
Footwear—									
Men's and Boys'	1,878	1,399	1,030	721	614	347	31	12	6,032
Women's, Girls' and Infants'	1,761	1,258	851	654	557	305	24	12	5,422
Hardware, Electrical Goods, Furniture—									
Builders' Hardware and Supplies (including Tools of Trade)(b)	1,715	1,472	806	664	692	172	14	13	5,548
Domestic Hardware, Kitchenware, China and Glassware	3,235	2,428	1,464	1,278	1,120	415	32	15	10,017
Domestic Refrigerators, Electrical Goods and Accessories, Radios and Musical Instruments	2,530	1,929	1,167	872	914	301	19	15	7,747
Furniture (including Bedding)	1,113	962	518	394	419	147	13	9	3,575
Floor Coverings	820	666	310	311	261	135	(c)	(c)	2,511
Business Machines and Equipment	120	80	72	28	52	22	(c)	(c)	308

For footnotes *see* next page.

NUMBER OF RETAIL ESTABLISHMENTS WHICH SOLD GOODS IN EACH COMMODITY GROUP: STATES, 1952-53(a)—*continued.*

Commodity Group.	N.S.W.	Vic.	Qld.	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Other Goods—									
Newspapers, Periodicals, Books and Stationery	3,510	2,667	2,014	1,209	1,021	484	25	14	10,943
Chemists' Goods (including Toiletries, Cosmetics and Dispensing)	4,052	2,394	1,814	1,088	1,315	432	36	15	11,146
Sporting and Travel Goods	1,494	1,062	686	448	461	157	15	10	4,333
Jewellery, Watches, Clocks, Silverware, etc.	1,551	1,130	675	520	519	192	19	9	4,615
Grain, Feed, Fertilizers	1,527	1,066	1,029	539	604	248	(c)	(c)	5,026
Other Goods (not specified)	2,691	2,876	966	776	732	308	20	22	8,391
Total (excluding Motor Vehicles, etc.)	(d)	(d)	(d)	(d)	(d)	(d)	(d)	(d)	(d)
Motor Vehicles, etc.(e)—									
Tractors (including parts)	575	389	356	230	196	44	(c)	(c)	1,791
New Motor Vehicles (including Motor Cycles, etc.)	1,273	848	563	456	241	77	9	11	3,478
Used Motor Vehicles (including Motor Cycles, etc.)	1,267	824	612	466	293	83	(c)	(c)	3,561
Motor Parts, Accessories, Tyres, Tubes, etc.	2,960	2,252	1,440	1,031	947	291	27	14	8,962
Petrol, Oil, Motor Lubricants, etc.	3,899	2,891	1,943	1,252	1,010	429	31	15	11,509
Grand Total	(f)	(f)	(f)	(f)	(f)	(f)	(f)	(f)	(f)

(a) All figures refer to establishments with total retail sales in 1952–53 of £500 or more. The number of establishments in each State with retail sales in 1952–53 of less than £500 but more than £100 was as follows:—New South Wales, 1,126; Victoria, 989; Queensland, 449; South Australia, 279; Western Australia, 294; Tasmania, 100; Northern Territory and Australian Capital Territory, 5; Total, 3,242 (b) Excludes basic building materials (e.g., timber, roofing tiles, etc.). (c) Not available for publication. (d) Not available. (e) Excludes farm machinery and implements, earth-moving equipment, etc. (f) Many establishments showed sales in more than one commodity group. Thus, the number of establishments selling goods in each commodity group does not add down to the total number of individual establishments which is as follows:—New South Wales, 40,523; Victoria, 32,864; Queensland, 15,051; South Australia, 9,673; Western Australia, 7,911; Tasmania, 3,637; Northern Territory, 146; Australian Capital Territory, 180; Total, 109,985.

5. **Value of Retail Sales of Goods in each Commodity Group, 1952-53, States.**—The following table shows the value of retail sales of goods in each of the commodity groups specified during the year ended 30th June, 1953.

VALUE OF RETAIL SALES IN EACH COMMODITY GROUP: STATES, 1952-53.(a) (£'000.)

Commodity Group.	N.S.W.	Vic.	Qld.	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Foodstuffs—									
Groceries (including Bacon, Butter, etc.)	104,479	64,727	42,357	20,549	20,670	8,687	709	827	263,005
Butchers' Meat	50,858	36,663	17,006	10,443	8,150	4,607	231	382	128,340
Fresh Fruit and Vegetables	22,157	15,854	7,104	4,437	4,420	1,582	76	99	55,729
Bread, Cakes and Pastry	22,529	16,940	7,607	4,789	3,563	1,999	71	149	57,647
Confectionery, Ice Cream, Soft Drinks (including Milk Drinks)	24,918	20,289	7,710	5,293	3,751	1,936	89	148	64,134
Other Food (Fish, Poultry, Cooked Meats, Wrapped Lunches, etc.)	12,593	8,912	3,570	2,301	1,918	555	35	128	30,012
Beer, Tobacco, etc.—									
Beer, Wine and Spirits	70,623	45,612	22,233	14,827	14,445	5,357	664	641	174,402
Tobacco, Cigars and Cigarettes	28,200	19,967	8,830	5,851	5,233	2,405	182	251	70,919
Clothing, Drapery, etc.—									
Clothing—									
Men's and Boys' Wear	36,486	25,964	12,107	8,634	6,336	3,328	135	256	93,244
Women's, Girls' and Infants' Wear (including Hand Bags)	56,515	41,914	16,780	13,589	9,403	5,761	124	386	144,472
Drapery, Piece-goods, Manchester and Soft Furnishings	27,587	18,501	10,144	6,269	4,793	2,039	94	132	69,559
Footwear—									
Men's and Boys'	6,678	4,779	2,257	1,593	1,319	659	41	51	17,377
Women's, Girls' and Infants'	12,846	9,058	3,621	2,805	2,282	1,117	24	87	31,840

For footnotes *see* next page.

VALUE OF RETAIL SALES IN EACH COMMODITY GROUP: STATES, 1952-53(a)—*continued.*

(£'000.)

Commodity Group.	N.S.W.	Vic.	Qld.	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Hardware, Electrical Goods, Furniture—									
Builders' Hardware and Supplies (including Tools of Trade)(b)	28,069	16,317	8,577	4,433	5,164	1,588	117	212	64,477
Domestic Hardware, Kitchenware, China and Glassware	18,372	14,172	6,000	5,325	4,127	1,580	98	166	49,840
Domestic Refrigerators, Electrical Goods and Accessories, Radios and Musical Instruments	28,821	20,837	10,795	7,000	6,104	2,277	99	208	76,141
Furniture (including Bedding)	18,090	15,081	6,040	4,972	3,348	1,555	16	155	49,257
Floor Coverings	8,610	7,734	2,007	2,680	1,867	882	(c)	(c)	23,859
Business Machines and Equipment	4,739	3,751	1,684	948	795	298	(c)	(c)	12,218
Other Goods—									
Newspapers, Periodicals, Books and Stationery	22,221	16,497	6,292	3,310	3,277	1,539	21	191	53,348
Chemists' Goods (including Toiletries, Cosmetics and Dispensing)	21,278	14,374	6,422	4,068	3,247	1,458	35	177	51,059
Sporting and Travel Goods	4,756	3,049	1,441	781	839	381	9	65	11,321
Jewellery, Watches, Clocks, Silverware, etc.	9,751	6,292	3,055	2,026	1,818	649	37	86	23,714
Grain, Feed, Fertilizers	17,754	11,263	6,045	2,526	6,553	1,152	(c)	(c)	45,351
Other Goods (not specified above)	15,801	17,776	5,285	4,314	3,852	1,756	69	84	48,937
Total (excluding Motor Vehicles, etc.)	674,731	476,323	224,969	143,763	127,274	55,147	2,995	5,002	1,710,204
Motor Vehicles, etc.(d)—									
Tractors (including parts)	5,837	5,560	6,587	3,099	3,379	820	(c)	(c)	25,306
New Motor Vehicles (including Motor Cycles, etc.)	58,830	44,635	26,049	19,339	14,950	5,840	253	249	170,145
Used Motor Vehicles (including Motor Cycles, etc.)	31,846	18,112	11,358	10,785	8,579	2,691	(c)	(c)	83,547
Motor Parts, Accessories, Tyres, Tubes, etc.	20,909	15,731	8,823	5,340	4,629	1,874	161	91	57,563
Petrol, Oil, Motor Lubricants, etc.	32,541	24,020	10,046	6,699	5,812	2,479	147	195	81,939
Grand Total	824,694	584,381	287,837	189,025	164,623	68,851	3,611	5,682	2,128,704

(a) All figures refer to establishments with total retail sales in 1952-53 of £500 or more. The total retail sales of the establishments with retail sales in 1952-53 of less than £500 but more than £100 were as follows:—New South Wales, £312,000; Victoria, £283,000; Queensland, £128,000; South Australia, £88,000; Western Australia, £85,000; Tasmania, £27,000; Northern Territory and Australian Capital Territory, £1,000; Total, £924,000. (b) Excludes basic building materials (e.g. timber, roofing tiles, etc.). (c) Not available for publication. (d) Excludes farm machinery and implements, earth-moving equipment, etc.

6. **Number of Retail Establishments and Value of Retail Sales Classified According to Main Type of Business, 1952-53, States.**—The following tables show the number of establishments and the value of retail sales made in 1952-53 in each State classified according to the main type of business. In classifying establishments by type of business, the description given by the proprietor was used as a guide but the classification was based mainly on the commodity group for which the largest item of turnover was recorded.

NUMBER OF RETAIL ESTABLISHMENTS CLASSIFIED ACCORDING TO MAIN TYPE OF BUSINESS: STATES, 1952-53.(a)

Main Type of Business.	N.S.W.	Vic.	Qld.	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Food Stores—									
Grocers	9,698	5,284	3,756	1,889	1,837	1,042	40	23	23,569
Butchers	2,474	1,938	1,026	724	525	247	8	11	6,953
Fruiterers	2,130	1,845	458	574	295	112			5,424
Bakers	1,845	1,503	693	395	337	163	9	21	4,946
Confectioners and Milk Bars	2,053	2,802	580	578	300	203			6,526
Cafés	728	345	366	79	138	21			1,688
Fishmongers and Poulterers	548	421	190	93	79	21	8	8	1,354
Other Food Stores	511	521	80	146	76	19			1,356
Hotels, Tobacconists, etc.—									
Hotels, Wine Saloons	2,303	1,855	1,261	633	529	306	18	7	6,912
Tobacconists	536	490	206	108	143	36	(b)	(b)	1,523
Tobacconists and Hairdressers	1,058	1,126	188	284	201	71	(b)	(b)	2,931

For footnotes *see* next page.

NUMBER OF RETAIL ESTABLISHMENTS CLASSIFIED ACCORDING TO MAIN TYPE OF BUSINESS: STATES, 1952–53(a)—*continued.*

Main Type of Business.	N.S.W.	Vic.	Qld.	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Clothiers, Drapers, etc.—									
Clothiers	4,106	3,502	1,175	793	657	302	13	22	10,570
Drapers, Haberdashers, etc.	544	465	250	138	112	16	7	20	1,531
Footwear Stores	589	621	162	158	81	55			1,674
Hardware, Electrical Goods, Furniture, etc., Stores—									
Domestic and Builders' Hardware Stores	1,005	1,209	433	357	314	67	6	10	3,401
Electrical Goods, Radios and Musical Instruments Stores	1,088	854	528	265	248	123	7	7	3,120
Furniture and Floor Coverings Stores	626	681	281	163	176	64	(b)	(b)	1,998
Business Machines Stores	66	47	38	24	21	17	..	..	213
Other Goods Stores—									
Newsagents and Booksellers	1,024	877	418	197	271	77			2,872
Chemists	1,308	1,025	406	302	201	90			3,341
Sports Goods Stores	199	140	78	26	18	15			480
Watchmakers and Jewellers	667	509	217	133	96	47	10	40	1,679
Grain and Produce Merchants	389	267	116	94	94	18			979
Cycle Stores	181	232	93	67	47	13			633
Florists and Nurserymen	396	371	67	68	65	38			1,007
Other Types of Business	839	1,218	323	254	210	114			2,974
Total (excluding Motor Vehicle Dealers, etc.)	36,911	30,148	13,389	8,542	7,071	3,297	131	165	99,654
Motor Vehicle Dealers, etc.—									
Tractor Dealers	107	57	46	30	28	11	..	..	279
New Motor Vehicle (including Motor Cycle) Dealers	250	174	129	93	86	27	(b)	(b)	763
Garages and Service Stations	2,600	2,094	1,268	821	587	243	10	11	7,634
Motor Parts and Tyre Dealers	396	219	137	98	80	47	(b)	(b)	979
Used Motor Vehicle Dealers	259	172	82	89	59	12	(b)	(b)	676
Total	40,523	32,864	15,051	9,673	7,911	3,637	146	180	109,985

(a) All figures refer to establishments with total retail sales in 1952–53 of £500 or more. (b) Not available for publication.

VALUE OF RETAIL SALES OF GOODS CLASSIFIED ACCORDING TO MAIN TYPE OF BUSINESS: STATES, 1952-53.(a)

(£'000.)

Main Type of Business.	N.S.W.	Vic.	Qld.	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Food Stores—									
Grocers	143,876	79,717	60,269	27,877	31,795	13,367	1,487	928	359,316
Butchers	50,557	36,728	16,923	10,469	7,994	4,562	235	382	127,850
Fruiterers	20,548	16,266	4,814	4,647	3,191	1,115			50,716
Bakers	18,316	14,444	5,874	4,116	2,860	1,667	91	401	47,478
Confectioners and Milk Bars	16,247	20,065	3,930	4,278	1,874	1,293			47,843
Cafés	3,982	1,222	1,775	518	371	53			7,974
Fishmongers and Poulterers	3,663	2,537	1,151	531	642	181	53	75	8,719
Other Food Stores	5,630	5,023	556	1,292	598	184			13,344
Hotels, Tobacconists, etc.—									
Hotels, Wine Saloons	69,922	46,050	22,772	15,269	14,573	5,716	603	584	175,489
Tobacconists	5,825	4,490	1,906	1,592	1,089	435	(b)	(b)	15,421
Tobacconists and Hairdressers	3,827	5,368	363	1,213	614	179	(b)	(b)	11,577
Clothiers, Drapers, etc.—									
Clothiers	137,517	103,876	39,681	34,807	21,682	12,482	165	1,227	351,437
Drapers, Haberdashers, etc.	21,933	10,340	9,466	2,572	6,930	576	86	119	51,892
Footwear Stores	10,979	9,679	3,116	2,657	2,759	1,235			30,055
Hardware, Electrical Goods, Furniture, etc., Stores—									
Domestic and Builders' Hardware Stores	35,506	24,924	11,227	7,985	5,552	2,466	200	211	88,071
Electrical Goods, Radios and Musical Instruments Stores	20,587	16,273	8,592	4,797	4,703	1,839	71	156	57,018
Furniture and Floor Coverings Stores	25,368	19,625	7,887	5,663	3,523	1,904	(b)	(b)	64,228
Business Machines Stores	4,626	3,646	1,716	999	669	317	..	..	11,973

For footnotes *see* next page.

VALUE OF RETAIL SALES OF GOODS CLASSIFIED ACCORDING TO MAIN TYPE OF BUSINESS: STATES, 1952–53(*a*)—*continued.*

(£'000.)

Main Type of Business.	N.S.W.	Vic.	Qld.	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Other Goods Stores—									
Newsagents and Booksellers	21,080	14,421	5,206	2,236	2,950	1,300			47,406
Chemists	18,150	11,911	5,377	3,159	2,354	1,115			42,239
Sports Goods Stores	2,376	1,883	700	258	224	315			5,826
Watchmakers and Jewellers	8,790	5,130	2,609	1,569	1,584	697	50	606	20,509
Grain and Produce Merchants	17,208	11,543	5,012	2,656	6,621	987			44,046
Cycle Stores	1,177	946	543	360	262	69			3,357
Florists and Nurserymen	1,941	1,979	401	395	333	260			5,312
Other Types of Business	7,198	8,960	2,888	1,794	2,361	824			24,079
Total (excluding Motor Vehicle Dealers, etc.)	(*c*) 676,829	(*c*) 477,046	(*c*) 224,760	(*c*) 143,709	(*c*) 127,609	(*c*) 55,137	(*c*) 3,075	(*c*) 5,004	(*c*) 1,713,169
Motor Vehicle Dealers, etc.—									
Tractor Dealers	3,454	2,617	3,470	1,990	1,987	666	..	..	14,184
New Motor Vehicle (including Motor Cycle) Dealers	41,366	34,835	19,115	18,110	15,099	4,554	(*b*)	(*b*)	133,463
Garages and Service Stations	75,811	53,290	32,547	17,678	13,987	7,382	219	491	201,405
Motor Parts and Tyre Dealers	6,851	5,675	2,375	2,018	1,257	522	(*b*)	(*b*)	18,738
Used Motor Vehicle Dealers	20,383	10,918	5,570	5,520	4,684	590	(*b*)	(*b*)	47,745
Total	824,694	584,381	287,837	189,025	164,623	68,851	3,611	5,682	2,128,704

(*a*) All figures refer to establishments with total retail sales in 1952–53 of £500 or more, and are the *total* value of *all* commodities sold by the types of business shown. (*b*) Not available for publication. (*c*) These figures differ from their counterparts in the table on page 1100 because they include retail sales of motor vehicles, etc., made by establishments whose *main* type of business is other than motor vehicles, and exclude retail sales of goods other than motor vehicles, etc., made by establishments whose *main* type of business is motor vehicles.

7. Takings for Certain Services: States, 1952-53.—The following table shows the amounts of "Other takings" recorded for the services specified for each State in respect of the establishments covered by the Census of Retail Establishments, 1952–53. The figures relate to establishments with retail sales or "Other takings" of £500 or more.

TAKINGS FOR CERTAIN SERVICES, STATES, 1952-53.

(£'000.)

Service.	N.S.W.	Vic.	Qld.	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust
Repair, Servicing and Maintenance Work Done(*a*)—									
Motor	19,916	15,394	9,373	5,290	4,755	1,905	89	142	56,864
Other	5,565	4,125	2,406	1,654	1,507	657	17	113	16,044
Total	25,481	19,519	11,779	6,944	6,262	2,562	106	255	72,908
Meals in Cafés, Restaurants, etc.	14,739	8,468	4,507	1,910	2,427	584	63	67	32,765
Meals and Accommodation in Hotels	9,053	6,696	3,708	1,949	1,937	1,169	109	315	24,936
Hairdressing	3,974	3,024	1,023	862	719	244	7	21	9,874

(*a*) Includes value of materials used and cost of labour.

§ 20. The Snowy Mountains Scheme.

The following article covering the history and development of the Snowy Mountains Scheme has been contributed by the Commissioner of the Snowy Mountains Hydro-electric Authority—Sir William Hudson, K.B.E., and deals with the various phases of the Scheme under the following headings :—

1. Introduction.
2. The Snowy Mountains Scheme in relation to Australian Power and Water Resources.
3. Historical.
4. Joint Commonwealth-State action on the Utilization of the Snowy River.
5. The Snowy Mountains Act.
6. Relationships between Commonwealth and States in regard to the Scheme.
7. The Essential Features of the Scheme.
8. The Catchments and Principal Rivers of the Snowy Mountains Area.
9. Conservation of the Catchment.
10. The Hydrology of the Area.
11. The Geology of the Area.
12. Description of the Scheme—
    - A. THE SNOWY-TUMUT DEVELOPMENT—
        - (i) Adaminaby Dam.
        - (ii) The Eucumbene-Tumut Diversion.
        - (iii) Tumut Pond Dam and T1 Pressure Tunnel.
        - (iv) T1 Power Station.
        - (v) T2 Power Station.
        - (vi) Developments on the lower reaches of the Tumut River.
        - (vii) The Tooma-Tumut Diversion.
        - (viii) The Murrumbidgee-Eucumbene Diversion.
    - B. THE SNOWY-MURRAY DEVELOPMENT—
        - (i) Jindabyne Dam.
        - (ii) The Snowy-Murray Tunnel (Jindabyne to Geehi).
        - (iii) The Snowy-Murray Tunnel (Geehi to Swampy Plains).
13. Operation of the Scheme and its relationship to the Thermal System—
    - (i) The Load Factor of the Hydro Stations.
    - (ii) Regulation of energy output by storage reservoirs.
    - (iii) Transmission of energy from the Scheme.
14. Irrigation Features of the Scheme.
15. Defence Aspects of the Scheme.
16. Progress already achieved on the Scheme.
17. The Programme for the Immediate Future.
18. Summary.

Explanatory Plans and Diagrams.

Table of Principal Features.

1. **Introduction.**—In south-eastern New South Wales and the adjacent areas of Victoria, the Great Dividing Range rises to its highest elevation to form the central section of the Australian Alps. Snow-clad for five or six months each year, this area is the source of the westward flowing Murray and Murrumbidgee Rivers which cross dry but otherwise fertile plains stretching for hundreds of miles to the coast of South Australia. Irrigation farming on these plains is already a well-established and prosperous industry, with food and other primary production greater than in any other region in Australia, but further substantial expansion of production depends on augmenting the flow of the Murray and Murrumbidgee Rivers. The Snowy River, which receives the greatest share of the run-off from the winter snow-fields, flows in the opposite direction from the Murray and the Murrumbidgee to the near-by south-east coast, traversing an area of reliable and adequate rainfall where water is not required for irrigation.

The Snowy Mountains Scheme, begun in August, 1949, provides for the diversion of the Snowy waters through two trans-mountain tunnels to the western river systems

These diversions will give large quantities of additional water so urgently needed for irrgiation. In addition, large quantities of electric power will be generated by utilizing the fall of the waters as they pass through the diversion tunnels and shafts. The additional regulated flow of irrigation water supplied by the Scheme will be nearly twice the amount diverted for irrigation from the Murrumbidgee and Murray Rivers in New South Wales during the year 1953–54. The capacity of the proposed power stations will be about 3,000,000 kW which is more than the total generating capacity installed in the whole of Australia to-day, or about one-third of the total generating capacity which will be installed in New South Wales and Victoria by the time the Scheme is completed. The location of the Scheme and its relationship to the Murray and Murrumbidgee Irrigation Areas are shown on pages 1107-8.

2. **The Snowy Mountains Scheme in relation to Australian Power and Water Resources.**—The generally dry nature of the Australian continent limits the water resources of the mainland for hydro-electric power and irrigation. There are possible sites for development on some of the coastal streams on the north-eastern perimeter of the continent and in the far north but the principal power potential lies in the central section of the Australian Alps now being developed by the Snowy Mountains Scheme. It is estimated that the total quantity of hydro-electric energy which can be developed economically on the mainland is in the vicinity of 8,500 million kWh per annum, of which nearly 6,000 million kWh will come from the Snowy Scheme.

The relatively limited extent of Australia's hydro-electric resources is of significance in determining the way in which these resources should be developed. Thermal stations are generally better suited to base load than peak load operation. Conversely, there is considerable advantage in using hydro-electric stations to take peak load, particularly in a predominantly thermal system. The stations of the Snowy Mountains Scheme are being planned on this basis. They will play a very important part in meeting the peak load of the growing New South Wales and Victorian power systems.

The principal sources of irrigation water in the States of New South Wales, Victoria, and South Australia are the Murray and Murrumbidgee River systems. The total present diversion from the Murray and Murrumbidgee Rivers and their tributary streams in New South Wales and Victoria is approximately 2,500,000 acre feet per annum, measured at the main diversion points. To this total the Snowy Scheme, with re-regulation at Hume Reservoir and at the future Blowering Reservoir, will add by diversion and regulation some 1,800,000 acre feet per annum. The contribution of the Scheme to the development of this prosperous irrigation area is therefore very significant, particularly as much of the additional water will be available within the next ten years.

3. **Historical.**—Proposals for development of the Snowy River date back to 1884. In that year, following heavy stock losses through drought in New South Wales a proposal was put forward for a limited diversion of Snowy water into the Upper Murrumbidgee. No action was taken to implement the proposal and the matter was left in abeyance until 1915 when the New South Wales Department of Public Works examined another proposal for using the Snowy River, on this occasion for the development of hydro-electric power. From the Public Works Department's investigations it was concluded that a dam at Jindabyne and an aqueduct leading to a power station on Biddi Point further downstream could provide a power capacity of 150,000 kW. Again, nothing was done and in the 1920's other schemes were put forward, one being for supplying water to Sydney.

In 1937, the Department of Public Works, assisted by oversea consultants, reviewed the possible power development which had been examined in 1915. On this occasion a more extensive scheme with an installed capacity of 250,000 kW was suggested. But, like the 1915 proposal, there was no provision for diversion of the Snowy water to the Murray or Murrumbidgee Rivers for irrigation.

All these early proposals were local developments. Most of them were for a single purpose only, either for power production or for the diversion of water.

In 1944 a dual-purpose development was proposed to the New South Wales Government, involving the diversion of the Snowy River from a reservoir near Jindabyne through a 22½ mile tunnel north-eastwards to the Upper Murrumbidgee River near Cooma. A power station of 21,000 kW capacity was planned at the downstream end of the tunnel, discharging into a storage reservoir on the Murrumbidgee formed by a dam at Billilingra. A capacity of 1,100,000 acre feet was proposed for this storage and a second power station of 25,000 kW was to be located immediately downstream of the Billilingra Dam.

4. **Joint Commonwealth-State action on the Utilization of the Snowy River.**—In the immediate post-war years there was urgent need for both increased electric power and increased food production. The development of the Snowy River became a matter of national importance and in 1946 the Commonwealth Government and the Governments of New South Wales and Victoria jointly initiated a further technical study of the Snowy River. This study indicated that the diversion from the Upper Snowy to the River Murray was both practicable and attractive from the viewpoint of power production. On the other hand, diversion of the Snowy to the Murrumbidgee River also possessed considerable advantages from the irrigation viewpoint.

At a Premier's Conference in August, 1947, reports on power and irrigation proposals were considered and further investigations recommended. A Technical Committee, with representatives from the Commonwealth, New South Wales and Victoria, was set up under the chairmanship of Dr. L. F. Loder, Director-General of the Commonwealth Department of Works and Housing. The Committee's main function was to obtain information necessary to make a decision on which of the alternative schemes, namely diversion to the Murray or diversion to the Murrumbidgee, should be adopted.

In its first report of November, 1948, the Committee established that the potential value of the waters of the Snowy Mountains was much greater than previously assumed. It recommended that neither of the alternative schemes mentioned in the preceding paragraph should be adopted, but that another proposal providing for the diversion of a substantial quantity of water from the Snowy, the Murray and the Murrumbidgee catchments to the Tumut River should be commenced as soon as possible. The Committee also recommended that further investigations be carried out before a decision was made on the use of the remainder of the Snowy flow. These recommendations were approved by Ministers representing the Commonwealth and the States of New South Wales and Victoria in February, 1949.

A few months later, in June, 1949, the Technical Committee presented a second report recommending that the balance of the Snowy River waters should be diverted to the Murray. This report covered the full range of the Committee's investigations, which extended far beyond the specific comparison of the original proposals and included an examination of the water resources of the whole Snowy Mountains area. The examination brought out the great significance of the Scheme and lifted it to the level of one of major national importance for both irrigation and power development. It established that, in addition to the diversion of water from the Snowy and Tooma Rivers, storages should be constructed to regulate the Tumut and Murrumbidgee Rivers so that an increased proportion of their flows would become available for irrigation in the Murrumbidgee Irrigation Area.

Ministers of the Commonwealth, New South Wales and Victorian Governments met in Canberra in July, 1949 and approved the Committee's recommendations.

5. **The Snowy Mountains Act.**—Since increased power production and irrigation were regarded as matters directly connected with national defence, it was decided that the construction of the Scheme should be carried out with Commonwealth resources. The urgent need to make a start on the Scheme caused the Commonwealth Government to pass the Snowy Mountains Hydro-electric Power Act in July, 1949. This Act established the Snowy Mountains Authority and cleared the way for work to begin.

The functions and powers of the Authority as defined in the Act are :—

(*a*) to generate electricity by means of hydro-electric works in the Snowy Mountains Area.

(*b*) to supply electricity generated to the Commonwealth :—

(i) for defence purposes

(ii) for consumption in the Australian Capital Territory.

The Authority is also empowered to sell to a State, or to a State Authority, electricity not immediately required for defence purposes or for consumption in the Australian Capital Territory.

To enable it to perform its functions, the Authority is given power to construct, maintain, operate, protect, manage and control works :—

(*a*) for the collection, diversion and storage of water in the Snowy Mountains area ;

(*b*) for the generation of electricity in that area ;

(*c*) for the transmission of electricity generated by the Authority ;

(*d*) incidental or related to the construction, maintenance, operation, protection, management or control of any works otherwise specified in the Act.

The Authority is constituted by a Commissioner appointed by the Governor-General. He is assisted by two Associate Commissioners, each of whom is also appointed by the Governor-General.

6. **Relationships between Commonwealth and States in regard to the Scheme.**—The constitutional rights of the Commonwealth to engage in the construction of the Snowy Mountains Scheme stem largely from the defence powers of the Commonwealth and from the Seat of Government Acceptance Act. This Act gives the Commonwealth the right to use electrical energy generated from the waters of the Snowy River and to construct works for that purpose. The defence powers of the Commonwealth are wide in their application and empower the Commonwealth Government to carry out at any time works necessary to national defence.

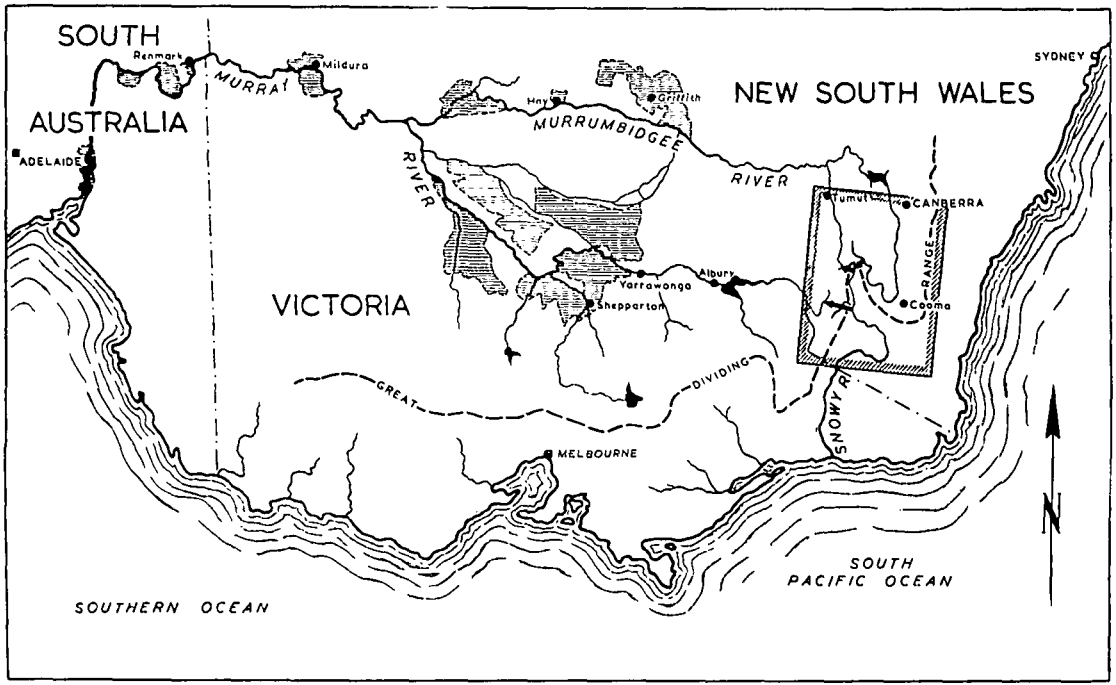
The Snowy Mountains Act will be supported by a detailed agreement between the States of New South Wales and Victoria and the Commonwealth in regard to the construction and operation of the Scheme, the distribution of power and water and other such matters. Negotiations on this agreement have reached their final stage.

The interests of the States are at present expressed through meetings of the Interim Snowy Mountains Advisory Council, on which Electricity Commissions and Irrigation Authorities of the two States are represented, together with the Commonwealth and the Authority. The Commonwealth-States agreement will provide for the continued operation of such a Council which will have power to direct the operation of completed portions of the Scheme.

The cost of constructing the Scheme is being met initially by Commonwealth funds, repayment being effected through the sale of electric power to the State Electricity Commissions. This reflects a most unusual financial arrangement determined at the Premier's Conference in 1949, namely that the cost of supplying irrigation water will be met by increasing the charges for the supply of power.

7. **The Essential Features of the Scheme.**—The essential features of the Scheme are the diversion of the Snowy River to the Murray and Murrumbidgee valleys for irrigation and the use of its waters, together with the regulated flow of the Tooma, Tumut and Upper Murrumbidgee Rivers, for power production.

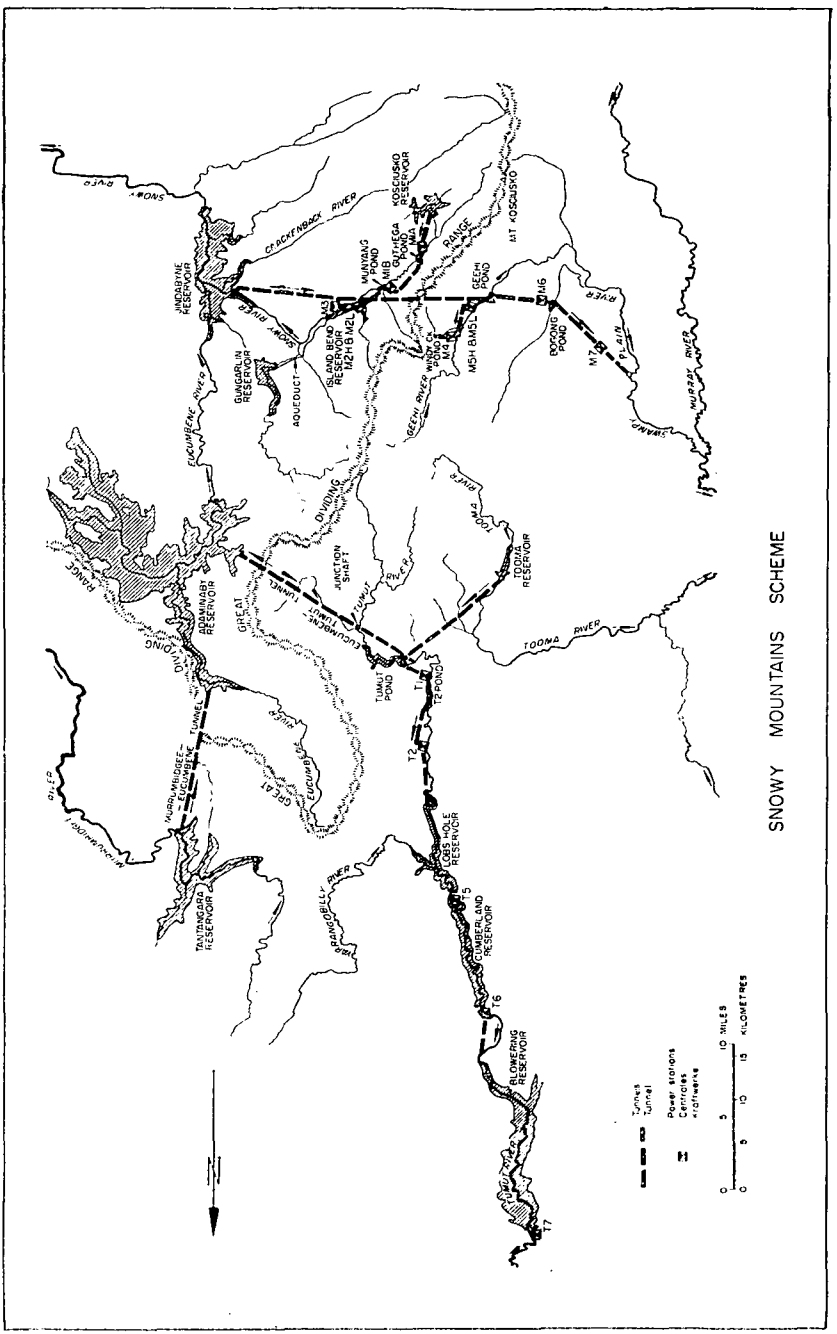
The main stream of the Snowy River will be collected in the proposed Jindabyne Reservoir and diverted through the mountains to Swampy Plains River, a tributary of the Upper Murray River. The Snowy's tributary, the Eucumbene, will be diverted from Adaminaby Reservoir to the Upper Tumut River, a tributary of the Murrumbidgee.

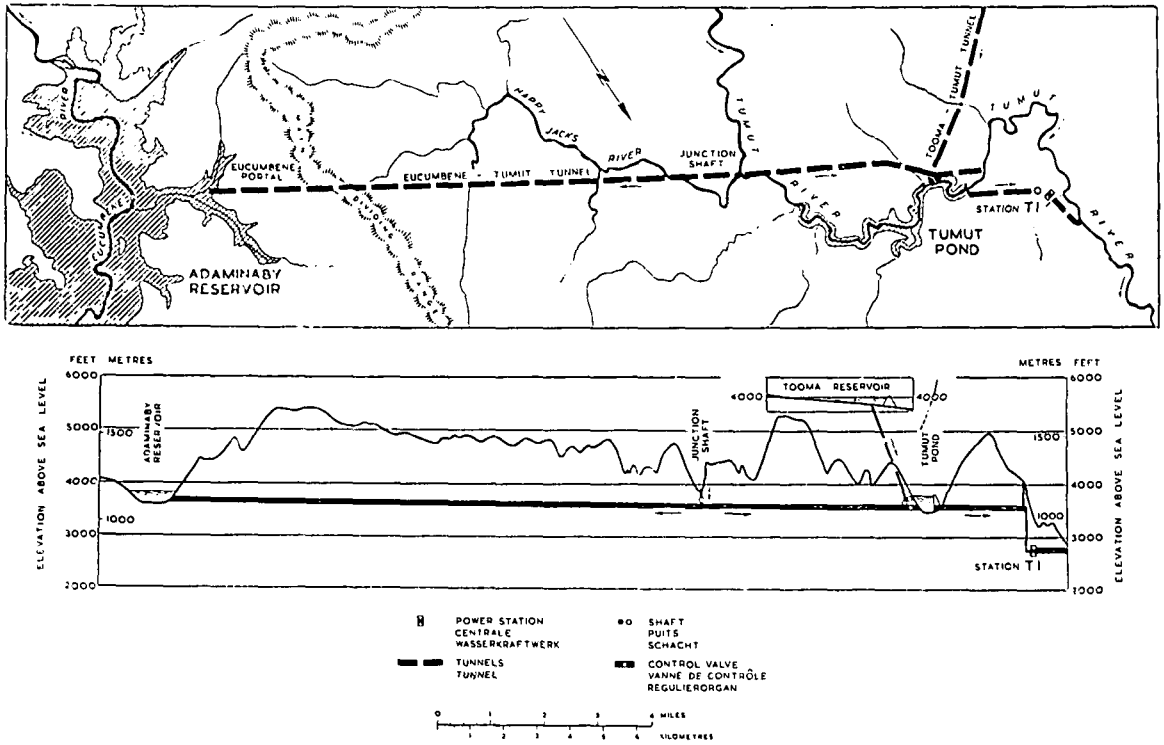


SNOWY MOUNTAINS AREA
RÉGION DES SNOWY MOUNTAINS
SNOWY MOUNTAINS GEBIET

IRRIGATION AREAS
ZONES D'IRRIGATION
BEWÄSSERUNGSGEBIETE

SOUTH – EASTERN AUSTRALIA

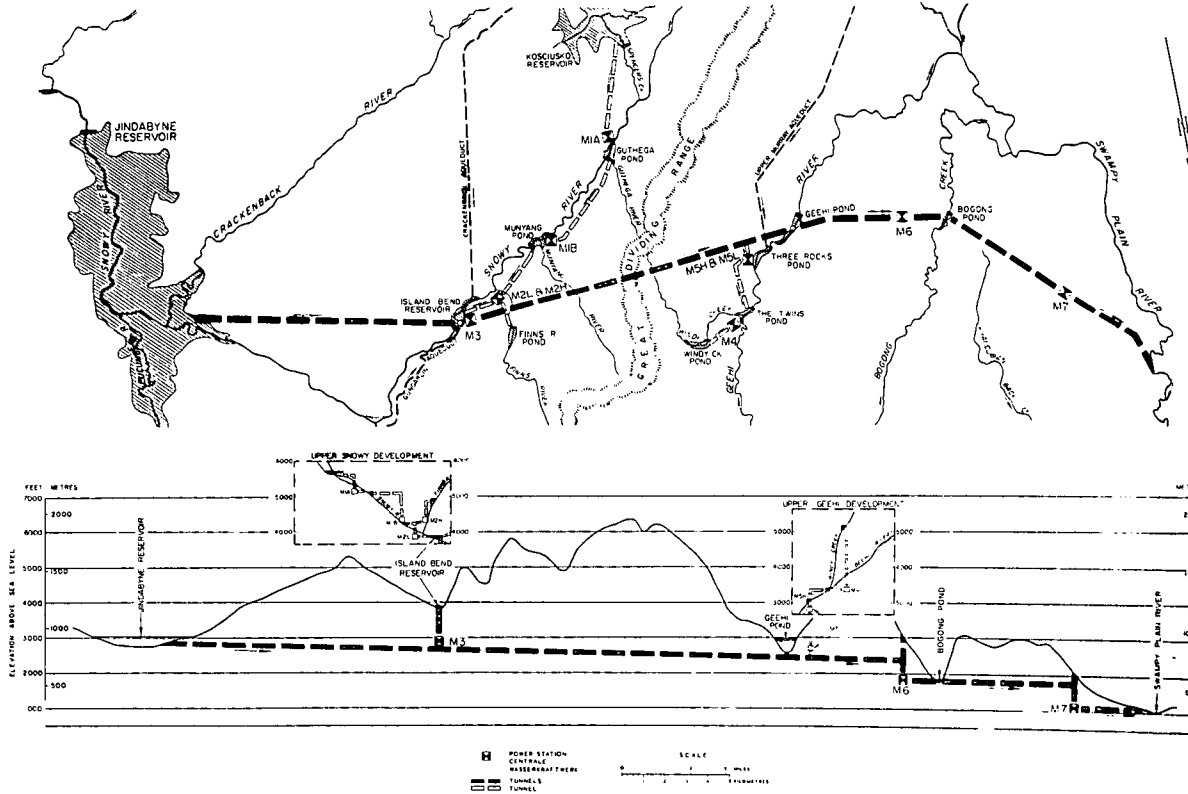

SNOWY MOUNTAINS SCHEME
SNOWY RIVER
CRACKENBACK RIVER
KOSCIUSKO RESERVOIR
MT KOSCIUSKO
JINDABYNE RESERVOIR
EUCUMBENE RIVER
EUCUMBENE-TUMUT TUNNEL
TUMUT POND
TUMUT RIVER
TOOMA RIVER
MURRAY RIVER
TANTANGARA RESERVOIR
CUMBERLAND RESERVOIR
BLOWERING RESERVOIR
TOOMA RESERVOIR
BOROPONG POND
Tunnels
Power stations
Conduits
Aqueducts
MILES
KILOMETRES



SNOWY MOUNTAINS SCHEME

SNOWY – TUMUT DEVELOPMENT

EUCUMBENE – TUMUT TUNNEL

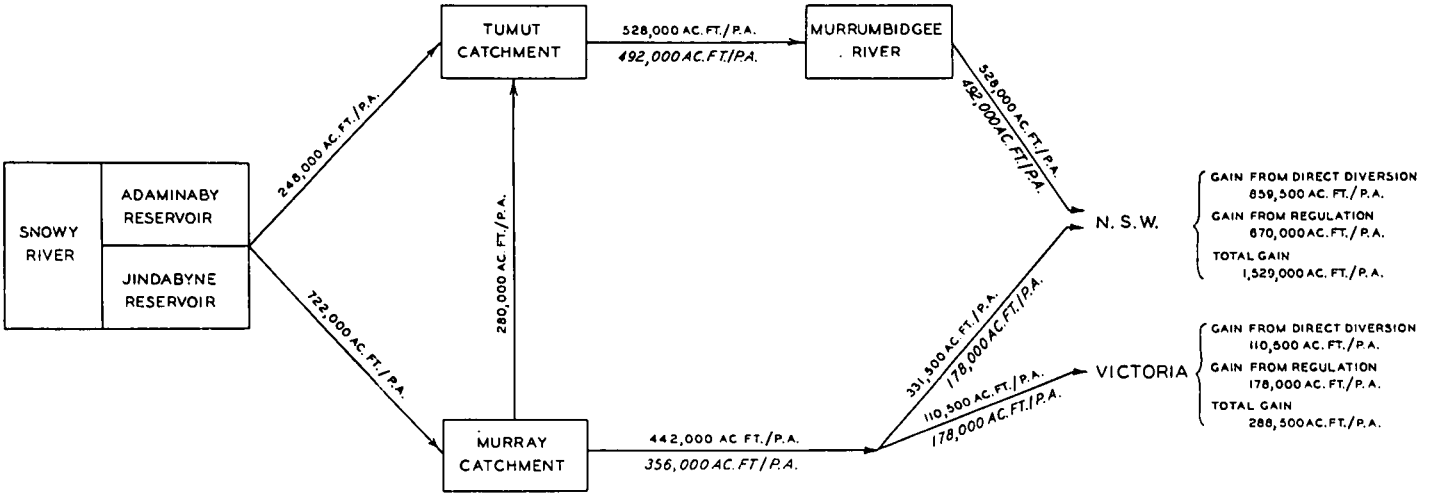


SNOWY MOUNTAINS SCHEME

SNOWY – MURRAY DEVELOPMENT

SNOWY MOUNTAINS SCHEME

DISTRIBUTION OF WATER



NOTES: (1) DIVERSION QUANTITIES 442,000 AC. FT / P.A.
GAIN FROM REGULATION *356,000 AC. FT./P.A.*

(2) NET GAIN TO MURRAY FROM DIVERSION (442,000 AC. FT /P.A.) IS TO BE DIVIDED BETWEEN N.S.W AND VICTORIA RESPECTIVELY IN THE PROPORTION 3:1.
GAIN TO MURRAY FROM REGULATION (356,000 AC FT./P.A.) IS TO BE DIVIDED BETWEEN N.S.W AND VICTORIA RESPECTIVELY IN THE PROPORTION 1:1.

To give increased power production and achieve the desired division of irrigation waters between the Murray and Murrumbidgee Valleys, the Upper Tooma River, a tributary of the Murray, will be diverted to the Tumut River and thence to the Murrumbidgee. A further increase in power production will be obtained by diverting the Upper Murrumbidgee River to Adaminaby Reservoir on the Eucumbene River, thence to the Upper Tumut River. The general arrangement of the works is shown in plans and sections on pages 1108, 1109 and 1110.

Storage and regulation of the waters of the Snowy, Tumut, Upper Tooma and Upper Murrumbidgee Rivers in three large reservoirs (Jindabyne, Adaminaby and Tantangara) is an important feature of the proposals. These reservoirs will assure an almost uniform total output of electrical energy from the Scheme, and will also have a considerable influence on the continuity of supply of irrigation water during drought conditions.

On the Snowy-Murray section of the Scheme the principal power stations will be M6 and M7 on the western end of the Snowy-Murray diversion tunnel. An additional four-stage development is planned, extending down the length of the Upper Snowy River and into the Snowy-Murray tunnel. The Guthega Project, completed early in 1955, is one of these developments on the Upper Snowy. On the western side of the Alps a further supplementary development is proposed leading from the upper catchment of the Geehi River down to the level of the main diversion tunnel.

The principal power stations of the Snowy-Tumut section of the Scheme will be the Upper Tumut Stations, T.1 and T.2. These will later be supplemented by the Lower Tumut Stations T.5, T.6 and T.7.

The separate features of the Scheme are described in further detail in later sections.

8. **The Catchments and Principal Rivers of the Snowy Mountains Area.**—The works of the Snowy Mountains Scheme lie in a mountainous area intersected by a series of ranges which form the boundaries between the headwaters of three main river systems, the Upper Murray, the Upper Murrumbidgee, and the Snowy. The ranges rise to an altitude of 7,313 feet at Mount Kosciusko, the higher portion of the area forming a central belt 15 to 20 miles wide, trending in a north-north-easterly direction. The western side of the area is bounded by steeply sloping fault escarpments; on the eastern side the descent is much more gradual.

On the Snowy-Murray section of the Scheme water-power will be developed from an elevation of over 5,700 feet on the upper reaches of the Snowy down to an elevation of 1,000 feet at Swampy Plains River, a tributary stream of the Murray. The Snowy-Tumut development will extend from an elevation of 3,800 feet on the Upper Tumut down to an elevation of less than 1,000 feet on the lower reaches of that river.

Much of the catchment on the northern and eastern sections of the Scheme consists of sub-alpine basins at an elevation of between 4,000 and 5,000 feet. These are partly under a cover of snow grass and native shrubs and partly in woodland. The flood plains and valley bottoms contain extensive swamp areas which contribute to the natural regulation of the snow-melt. The rivers in this area often flow for considerable distances over elevated tablelands before becoming entrenched in steep walled valleys up to 2,500 feet in depth.

A total area of 550 square miles of the catchment lies at an elevation above 4,750 feet, and an area of 750 square miles is snow covered during the winter.

9. **Conservation of the Catchment.**—The preservation of the catchment of the Snowy Mountains Area is essential not only to the operation of the Scheme but also to the continued supply of irrigation water in the Murray and Murrumbidgee valleys.

Prior to the commencement of work on the Scheme, a number of State and Commonwealth agencies were already devoting a considerable amount of study to this vital catchment area. Although disturbance of the general surface by the Authority's construction operations affects only a very small proportion of the catchment, the Authority nevertheless recognizes its interest in the conservation of soil throughout the area as a

whole. Accordingly, although the soil conservation activities of the Authority are directed particularly towards the prevention of damage from its construction operations, a good deal of attention is given to the area as a whole.

Work in this field is closely co-ordinated with that of existing agencies with responsibilities in the area, including the Soil Conservation Service of New South Wales, the Lands Department of New South Wales, the Kosciusko State Park Trust, and the Division of Plant Industry of the Commonwealth Scientific and Industrial Research Organization.

10. **The Hydrology of the Area.**—Compared with Australian conditions generally, the most unusual feature of the precipitation in the area is the occurrence of a considerable depth of snow over much of the catchment during winter months. Summer and winter precipitation is profoundly affected by the relative altitude of the Alps and the lower areas to the west and south-east. This results in comparatively heavy snow or rainfall from moisture-laden air moving across the ranges from either of these directions. The heavy winter precipitation occurring at high altitudes on the western side of the Great Dividing Range is due to moist air from the Indian Ocean being lifted sharply in crossing the main divide. Precipitation on the eastern side of the range originates mainly from the Tasman and Coral Seas and is much more evenly distributed than the precipitation from the west. As the Snowy Mountains area benefits from both of these sources of moisture, it is less affected by the failure of either than are the adjacent areas of lower altitude.

The nature of the run-off experienced in the Snowy Mountains Area is strongly influenced by the retention of precipitation both within the snow cover which normally remains until late November and as ground water stored in the peaty areas of the higher tablelands. On the other hand, the reverse effect is apparent in certain other sections of the area where the very steep valley slopes lead to extremely rapid run-off and marked local seasonal variations in flows.

The hydrographic data on which much of the earlier study of the Scheme was based was obtained from the following river flow gauges :—

River.	Flow Gauge Location.	Period of Records.	
		From.	To.
Crackenback ..	The Creel ..	June, 1944 ..	To date
Eucumbene ..	Eastbourne ..	June, 1944 ..	To date
Indi (Upper Murray)	Bringenbrong ..	September, 1905 ..	December, 1920
Mowamba ..	Upper Bridge ..	February, 1908 ..	November, 1909
Murray	Bringenbrong ..	September, 1905 ..	December, 1920
Murrumbidgee ..	Yaouk	February, 1939 ..	December, 1945
Murrumbidgee ..	Mittagang Crossing	April, 1926 ..	To date
Snowy	Jindabyne ..	May, 1902 ..	To date
Swampy Plains ..	Khancoban ..	December, 1926 ..	To date
Swampy Plains ..	Bringenbrong ..	September, 1905 ..	December, 1913
Tooma	Possum Point ..	January, 1927 ..	December, 1945
Tooma	Warbrook ..	August, 1909 ..	December, 1920
Murray	Jingellic ..	1891	To date

To obtain more detailed hydrographic information, the Authority has carried out an intensive programme of installation of gauges, a total of 75 having been established since the Scheme began. Records are also obtained from a further 40 gauging stations for purposes of correlation with the shorter-term readings from the gauging stations established by the Authority in the Snowy Mountains Area. Average flows to the power stations of the Scheme are set out in the appended Table of Principal Features of the Scheme (*see* page 1130).

11. **The Geology of the Area.**—The Snowy Mountains Area includes the highest and most deeply dissected parts of the Australian South-Eastern Highlands. The Area has been formed from an earlier extensive peneplain by faulting, flexuring and up-doming of the earth's crust, in a later series of movements. The final period of disturbance causing the greatest uplift occurred during the Kosciusko epoch, at the end of the Tertiary period about 1,000,000 years ago, when the mountains were raised to their present elevations.

Parts of the original land-form are still evident as plateau remnants, lying at different elevations and often abruptly separated by distinct scarps. A very marked fault-scarp descends from an elevation of over 7,300 feet in the Mount Kosciusko area to an elevation of about 1,000 feet immediately to the west. To the east the descent from the high plateau to the lower tablelands occurs more gradually, in part along the broad warped zone, and in part along a series of step-like fault escarpments. The valleys of the Crackenback River and the Upper Snowy River on the eastern side of the Main Range, and of the Geehi River and Bogong Creek on the western side, have generally straight, almost parallel, courses following along major fault zones.

The greater part of the area is composed of granitic rocks, consisting of several distinct masses of intrusive granite, and also granitic gneisses. The remainder is mainly highly folded sedimentary and metamorphosed sedimentary rocks.

A belt 4,000 feet wide and 6 miles long of highly cavernous limestone occurs in the vicinity of the Upper Yarrangobilly Valley. Limestone also occurs in the Pocket Creek area of the Tantangara Reservoir basin on the Upper Murrumbidgee River.

Scattered areas of almost horizontal flows of basalt lava of early Tertiary age, up to 120 feet in thickness, occur in the vicinity of Cabramurra, capping some of the highest ground. The basalt often overlies and protects beds of unconsolidated sand, clay, lignite and gravel, up to 300 feet in thickness. These sediments are the remnants of former extensive river valley bottom and lake deposits, over which the basalt lavas flowed.

Deposits of alluvium along the present-day streams are quite limited in extent. Within the main mountain block, where the streams are chiefly in narrow steep-sided valleys, alluvium is either absent or consists of poorly sorted boulder gravels. Fairly extensive flats containing gravel deposits occur along the more open valleys at lower levels.

The only region on the mainland of Australia in which evidence remains of glaciation is in the highest part of the Kosciusko tableland, where the Upper Spencers Creek and its tributaries occupy broad flat-bottomed valleys shaped by valley glaciers of the second stage of Pleistocene glaciation. The proposed Kosciusko Dam on Spencers Creek will be situated partly on a residual glacial moraine.

Much of the undulating plateau country, the broad mature valleys, and even most of the higher slopes of the steep-walled valleys below the plateau surface, are covered with a mantle of residual soil often of great thickness, formed by *in situ* weathering of the bed-rock. Only along the beds of actively degrading streams, and the lower 100 feet or so of the major valleys, is it common to find fresh rock exposed on the surface. This considerable depth of weathering has a marked effect on the nature and location of most of the engineering structures of the Scheme.

The Authority's team of geologists is carrying out detailed mapping, trenching, diamond drilling and seismic refraction studies. Much attention is being paid to the correlation of the geological evidence obtained by such means with actual conditions encountered during the construction of tunnels and underground works.

12. **Description of the Scheme.**—The Snowy Mountains Scheme is a complex one, both in regard to the types of engineering structures involved and the nature of the river diversions. Particular features of the Scheme are the large amount of tunnelling required, the underground location of many of the power stations and the use of very high voltage transmission lines to convey the energy produced to the load centres in

New South Wales and Victoria. This 330,000 volt transmission system will be the first of its kind in the southern hemisphere and it will form an important link between the power distribution systems of the two States.

An essential feature of the Scheme is the provision of a number of large regulating storages. While, as already pointed out, the annual snow-cover affords some retention and regulation of run-off, the flow in the rivers in the Snowy Mountains Area is nevertheless quite seasonal and it also varies considerably from year to year. For purposes of both power production and irrigation it is necessary to provide a considerable degree of regulation of run-off. The most notable storage basin available at a suitable elevation is on the Eucumbene River near the town of Adaminaby. A second large reservoir is also proposed on the Snowy River near Jindabyne, and a third major storage is planned on the Upper Murrumbidgee at the Tantangara dam site. Of these three storages, Adaminaby Reservoir is considerably the largest. The use of this reservoir to regulate the inflows from the Eucumbene, Tumut, Upper Murrumbidgee and Tooma Rivers and its use virtually to regulate the energy output from the whole Snowy development are central features of the proposals.

As previously noted, the Scheme involves two main diversions, the diversion of the main stream of the Snowy River at Jindabyne to the Upper Murray River and the diversion of the Snowy's tributary, the Eucumbene, to the Upper Tumut River. These two diversions divide the Scheme geographically into two sections, the Snowy-Tumut Development and the Snowy-Murray Development.

A. THE SNOWY-TUMUT DEVELOPMENT (*see* plans on pages 1108–9).

These works comprise the diversion and regulation of the Eucumbene, Upper Tooma, Upper Murrumbidgee and Upper Tumut Rivers and their combined development through a series of power stations down the length of the Tumut Valley. All four rivers have their origin in the northern section of the catchment of the Snowy Mountains Area.

To the west of the group the Tooma River, on the western side of the Dividing Range, has its origin on the slopes of the Strumbo Range, roughly 20 miles north of Mount Kosciusko. It flows generally northward for a distance of some 26 river miles before turning westwards towards its confluence with the Murray, 20 miles further downstream.

The catchment of the Upper Tumut River lies parallel to, and to the east of, the Upper Tooma catchment, being separated from it by the Toolong Range. It is drained by the Tumut River and its tributaries, the Doubtful and Happy Jacks Rivers, which combine to flow northwards, descending through a steeply sloping valley for a distance of some 20 miles before entering the more gently graded lower reaches. The Tumut River joins the Murrumbidgee River further downstream near the town of Gundagai.

The catchment of the Eucumbene River lies to the north-east of the catchment of the Upper Tumut, the boundary between the two being the Great Dividing Range. The river flows generally southwards from this area for a distance of approximately 60 miles to join the Snowy about one mile upstream from the town of Jindabyne.

Further to the north-east and across a continuation of the Dividing Range is the source of the Upper Murrumbidgee. From this area the river flows south-eastwards for some 75 miles to a point near Cooma, before turning northwards towards Burrinjuck Reservoir 120 miles further downstream.

(i) *Adaminaby Dam.* The site chosen for Adaminaby Dam, which will form the principal storage reservoir of the Scheme, is at Eaglehawk, 8 miles to the south of Adaminaby township and 20 miles upstream from the junction of the Eucumbene River with the Snowy. At this point the Eucumbene flows through a steep-sided valley ideally suited to the construction of a high earth and rock fill dam. The storage area itself is the broad basin of Buckanderra Creek which drains into the Eucumbene River near the present site of Adaminaby township. On completion of the dam, which is now under construction, a net storage capacity of 3,500,000 acre feet, which is eight times the volume of Sydney

Harbour, will be available for regulation of the Eucumbene and the diverted Tooma, Tumut and Murrumbidgee waters. The dam will be 390 feet in height and one of the highest of this type yet to be built. Its construction will involve the placing of 9,500,000 cubic yards of earth and rock fill.

Although under most circumstances the capacity of Adaminaby Reservoir is sufficient to hold the flood waters from the Eucumbene catchment, provision is being made in the case of floods of exceptional volume for water to be discharged through a low saddle on the north-eastern perimeter of the reservoir basin, into the adjacent Murrumbidgee catchment.

The reservoir will be operated initially with maximum storage level at Elevation 3810 feet, providing a net capacity of 3,000,000 acre feet during the early stages of the Scheme. At a later stage this level can be raised to Elevation 3822 feet, giving a net storage capacity of 3,500,000 acre feet. Some protective works on the emergency spillway will be constructed at that stage.

(ii) *The Eucumbene-Tumut Diversion.* The Eucumbene-Tumut tunnel, which will be approximately 14 miles in length and 21 feet in diameter, will convey Eucumbene, Tumut, Tooma and Upper Murrumbidgee waters, stored in Adaminaby Reservoir, north-westward through the Great Dividing Range to Tumut Pond. From this point they will flow down the Tumut gorge, passing through Stations T1 and T2, and later through Stations T5, T6 and T7. The tunnel will also divert surplus waters from the Tumut and the diverted Tooma Rivers in the reverse direction to Adaminaby Reservoir for storage when they are not required for immediate use.

After passing through the Eucumbene-Tumut tunnel, water drawn from Adaminaby Reservoir will discharge into a balancing reservoir at Tumut Pond which in turn will supply the heavy draw-off required for operating Stations T1 and T2 during peak load periods. The pondage will be replenished by inflow from the Eucumbene-Tumut tunnel during off-peak hours.

It has not been found practicable to carry Tumut Pond Dam up to a sufficient height to cause, under all circumstances, a reversal of flow back to Adaminaby Reservoir for storage. Provision has therefore been made for closing the north-western end of the Eucumbene-Tumut tunnel by means of a valve to divert the Tooma and Tumut waters directly into the tunnel from higher levels. When this is necessary, water from the Tumut river will enter the tunnel by a 300 feet shaft constructed at the confluence of the Upper Tumut and Happy Jacks Rivers. This shaft is also a point of access for the construction of the Eucumbene-Tumut tunnel.

Approximately 40 per cent. of the length of the tunnel will be driven through granite, and 40 per cent. through metamorphosed sedimentary rocks. The remaining 20 per cent. will pass through varied cherts, andesites, slates, etc.

(iii) *Tumut Pond Dam and T1 Pressure Tunnel.* Tumut Pond Dam at the north-western end of the Eucumbene-Tumut tunnel will be a concrete arch structure 290 feet in height and 650 feet in crest length, providing a gross storage of 43,000 acre feet. Full supply level will be at Elevation 3800 feet. The dam site is in a V-shaped gorge with relatively sound granite outcropping on both abutments. The spillway, located on the right abutment of the dam, will be controlled by two radial gates with a total discharge capacity of 68,000 cusecs. River outlets of 7,000 cusecs capacity will also be provided in the dam.

Immediately downstream from Tumut Pond Dam the river enters a steep-sided rocky valley looping westwards and then eastwards, and descending a vertical distance of 954 feet in a total of 7.6 river miles to the site of the outlet of the tailrace tunnel from Power Station T1. Water from Tumut Pond storage will flow through a pressure tunnel 8,000 feet long by 21 feet in diameter, to a surge chamber immediately above T1 Power Station.

(iv) *T1 Power Station.* Station T1 will be located in an underground chamber excavated in granite 1,200 feet below ground level, immediately downstream of the underground surge chamber at the end of the T1 pressure tunnel. The extremely rugged nature of the Tumut Valley in this area and the relative instability of the weathered material on the valley slopes above, made it impossible to locate the power station on the surface.

Twin vertical pressure shafts 12 feet in diameter will lead down from the surge chamber for a vertical distance of 800 feet to the turbo-generators in the power station gallery. From the turbines the water will enter a 4,000 feet tailrace tunnel leading back into the Tumut River further downstream. This underground station is typical of a number of similar stations proposed for the Scheme. It closely follows present day European and Scandinavian practice for underground power stations in country of this nature.

The power station machine hall will be a chamber 305 feet long by 59 feet wide with a maximum height of 105 feet. Access will be through a 1,340 feet long vehicular tunnel on a 1 in 8 grade, or alternatively by a 1,200 feet personnel access lift.

The four turbo-generators to be installed in T1 Power Station will have a total capacity of 320,000 kW, and will operate under an average net head of 1,050 feet. The flow through the station when operating on full load under average head will be nearly 4,200 cusecs.

Power will be delivered from the generators at 12,500 volts to a bank of underground transformers which will raise the voltage to 330,000 volts. From the transformers, power will be led through high tension cables to the surface and across a bridge to the left bank of the Tumut River. High voltage overhead lines will take the power from this point to a central switching station high on the right bank of the Tumut River, then on to load centres in New South Wales and Victoria.

(v) *T2 Power Station.* Station T2 will utilize the water discharged from Station T1, developing a gross head of 935 feet between the outlet from that Station and the upper end of the future Lob's Hole Reservoir.

The outflow from Station T1 will be impounded by a dam 140 feet in height, located 1.4 miles downstream from the outlet from T1 tailrace tunnel. The net available storage capacity of the pondage will be 1,350 acre feet. From this pondage a tunnel will lead for a distance of 15,700 feet to a point on the right bank of the Tumut River near its junction with Eight Mile Creek, where Station T2 surge chamber will be constructed. The water will be led from the surge chamber through two sloping pressure shafts to an underground power station located 650 feet beneath the surface. The Station will comprise four turbo-generators, each of 70,000 kW capacity, giving a total capacity of 280,000 kW. After passing through the turbines the water will be discharged into a tailrace tunnel 19,000 feet in length leading back into the Tumut River at the head of the future Lob's Hole Reservoir.

Both the headrace and the tailrace tunnels will be concrete lined and 21 feet in internal diameter. The headrace tunnel will be entirely in granite. The tailrace tunnel will also be mainly in granite, but near its lower end it will cross through a regional contact between granites and sediments.

The power station chamber will be excavated in granite. Its machine hall will be approximately 300 feet long, 55 feet wide and 100 feet maximum height. Access will be gained by a sloping vehicular tunnel, and by a lift shaft. As in the case of Station T1. the high voltage transformers will be placed underground, power being brought from them to the surface by high tension cables.

(vi) *Development on the lower reaches of the Tumut River.* Downstream from Station T2 the further development of the Tumut River will take the form of a series of three reservoirs, with a power station immediately downstream of the dam in each case.

The first of these developments will be the T5 Project, which includes Lob's Hole Reservoir. This reservoir will be formed by an earth and rock fill dam some 240 feet in height and will extend down the Tumut Valley from the outlet from Station T2 for a length of 9.6 river miles. The total storage capacity of the reservoir will be 104,000 acre feet. Station T5 will be located immediately downstream of the dam and will have an installed capacity of 180,000 kilowatts operating on an average net head of 220 feet.

Downstream from Station T5 the next reservoir will extend for 12.7 river miles along the Tumut Valley to Cumberland Dam. The dam will be an earth and rock fill structure some 300 feet in height, located about 6.4 river miles upstream from Talbingo. Power Station T6 at the foot of Cumberland Dam will have an installed capacity of 230,000 kW. Under the present proposals, the station will be located underground with a 21,000 feet tailrace tunnel leading downstream to the head of the Blowering Reservoir, the third storage of the group.

Blowering Reservoir will function primarily to store water passed through the Upper Tumut projects during the winter, and to hold it for release to the Murrumbidgee River during the summer irrigation season. It will be an earth and rock fill embankment approximately 250 feet in height. The total storage capacity of Blowering Reservoir will be in the vicinity of 860,000 acre feet. Full supply level will be at Elevation 1,200 feet. Station T7 at the foot of Blowering Dam will utilize these releases for power production. It will have a capacity of 60,000 kW on an average net head of 200 feet.

(vii) *The Tooma-Tumut Diversion.* The function of the Tooma-Tumut Diversion will be to provide additional water to the series of power stations on the Tumut River and to divide the additional irrigation water to be supplied by the Scheme between the Murray and Murrumbidgee Rivers in the required proportions.

Diversion of the Upper Tooma River will be from a reservoir at a point near its confluence with Toolong Creek. The proposed Tooma Dam will be an earth and rock fill structure with full supply level at Elevation 4,000 feet. The height of the embankment will be approximately 220 feet and the net storage capacity of the reservoir 22,000 acre feet. From this reservoir a tunnel will lead north-eastwards for a distance of about 9 miles to the Tumut River at Tumut Pond. The tunnel will be in granite for most of its length and will be excavated to a section equivalent of 14 feet diameter. At intermediate points along the length of the tunnel tributary streams of the Tooma will be diverted through shafts into the tunnel to supplement the main diversion. The quantity of water diverted from the Tooma catchment will average approximately 285,000 acre feet per annum.

Provision will be made for the diversion of Tooma water either into Tumut Pond or alternatively directly into the Eucumbene-Tumut tunnel on the Eucumbene side of the main control gate at the Tumut Pond end of that tunnel. The latter procedure will enable the whole head available between Tooma Reservoir and Adaminaby Reservoir to be utilized, thus ensuring the diversion of the maximum quantity of Tooma water to storage in Adaminaby Reservoir.

(viii) *The Murrumbidgee-Eucumbene Diversion.* Under the original plans, prepared by the Commonwealth-States Technical Committee, it was proposed to divert the Upper Murrumbidgee River westwards into the Yarrangobilly Valley, and then to the Tumut River at Lob's Hole. Two power stations were to be built, developing the full available head between the Upper Murrumbidgee and the Tumut River. It is now proposed to amend that lay-out by diverting the Upper Murrumbidgee southwards into Adaminaby Reservoir on the Eucumbene River. Under the latter arrangement, Murrumbidgee water will pass through Adaminaby Reservoir and augment the flow through power stations T1, T2, T5, T6 and T7 on the Tumut River.

The dam on the Upper Murrumbidgee, known as Tantangara Dam, will be located at the Gulf where the river leaves a wide basin and enters a narrow gorge. It will be approximately 200 feet in height. The reservoir will have a net storage of about 500,000 acre feet.

The tunnel through the Main Divide from Tantangara Reservoir to Adaminaby Reservoir will be 9½ miles long. Its route passes through alternating granites and sediments, the maximum depth of rock over the tunnel line being 1,500 feet. It will be approximately 10 feet by 12 feet in section.

The average quantity of water diverted from the Upper Murrumbidgee will be approximately 230,000 acre feet per annum.

B. THE SNOWY-MURRAY DEVELOPMENT (*see* plans on pages 1108 and 1110).

The principal feature of the Snowy-Murray Development is the diversion of the main stream of the Snowy River at Jindabyne by tunnels, totalling nearly 30 miles in length, westwards through the Great Dividing Range into the Swampy Plain River in the catchment of the Upper Murray River. A balancing pondage will be constructed at the point where the tunnel route crosses the Geehi River, a headwater tributary of the Murray. From this pondage down to the lower Swampy Plain River the diverted Snowy water will fall about 2,000 feet, developing in two power stations approximately 1 million kW. The outflow from the last of these stations will pass into a regulating pondage on the lower Swampy Plain River before flowing into the Upper Murray and on to the Hume Reservoir.

Associated with the main Snowy-Murray Diversion are the power developments of the Upper Snowy River and the Upper Geehi River. The Upper Snowy group will comprise a series of four power projects, utilizing the fall in the waters of the Snowy River from Kosciusko Reservoir at Elevation 5,770 feet to Island Bend at Elevation 3,930 feet, then down a 1,100 feet shaft into the main Snowy-Murray tunnel. One of these developments, the Guthega Project, came into operation in February, 1955.

On the western side of the Divide, developments on the Upper Geehi will similarly utilize the upper reaches of that river from an altitude of 5,190 feet through a series of three power stations down to the level of the Geehi Pondage.

(i) *Jindabyne Dam.* The Snowy River emerges from the mountains into a broad open valley some 5 miles upstream from the town of Jindabyne. Immediately below the town, the valley again narrows and from that point southwards to the sea its course is generally through hilly and rather rugged country. Jindabyne Dam, which will impound the Snowy River and divert it westwards under the main range into the Murray catchment, will be located about one mile downstream from the present township. The storage area will cover the whole of the Jindabyne basin and extend upstream above the junction of the Crackenback River with the Snowy. The dam will be an earth and rock fill embankment, 275 feet in height, impounding a net storage of 1,100,000 acre feet.

(ii) *The Snowy-Murray Tunnel (Jindabyne to Geehi).* The first section of the Snowy-Murray tunnel, leading from Jindabyne Reservoir under the Dividing Range to Geehi Pond, will be 19 miles in length, the longest single tunnel in the Snowy Mountains Scheme. The cross-section dimensions of the tunnel have yet to be determined but it is expected that its diameter will be in the vicinity of 20 feet. Where it passes beneath the crest of the Dividing Range the tunnel will be about 3,800 feet below surface level.

At Island Bend, about half way along the length of the tunnel, the route crosses beneath the Snowy River and at this point the tunnel will be intercepted by a shaft about 1,100 feet in depth. The shaft will serve as a point of access for the construction of the tunnel. In addition it is probable that Station M3 will later be built into the base of the shaft, to generate power from the Upper Snowy waters as they pass from the shaft into the Snowy-Murray tunnel.

(iii) *The Snowy-Murray Tunnel (Geehi to Swampy Plain).* The section of the development between Geehi Pondage and Swampy Plain River is still under investigation and therefore can only be described in general terms. There are a number of possible

alternatives. One of these developments is that suggested by the original Commonwealth-States Technical Committee in its examination of the Scheme (*see* plans on pages 1108 and 1110).

This proposal involves a two-stage development, the first section, which includes M6 Power Station, utilizing about 975 feet of head between Geehi Pond and a pondage on Bogong Creek. The second section, which includes M7 Power Station, extends from the Bogong Creek pondage to the lower Swampy Plain River. Under this proposal, both Stations M6 and M7 would be located underground.

To supplement the flow of the diverted Snowy and Geehi Rivers, it is proposed to divert part of the run-off from the western slopes of the Great Dividing Range by means of a series of surface aqueducts and tunnels.

13. **Operation of the Scheme and its Relationship to the Thermal System.**—The future electric power installations on the mainland of Australia will be predominantly thermal or possibly thermo-nuclear installations. When compared with future requirements, the amount of hydro-electric energy that can be developed is very limited. It is important, therefore, to make the most of our hydro-electric potential by using it to the utmost advantage.

(i) *The Load Factor of the Hydro Stations.* In an electrical system in which the greater part of the energy is generated in thermal plants, it is usually found that the hydro installations operate to the best advantage on peak load. In a hydro installation the increase in energy cost with reduction in load factor is much less marked than for thermal plants, and as the load factor decreases the economy of hydro plant becomes increasingly favourable compared with that of thermal plant.

There are a number of reasons for this. One, from the operation viewpoint, is that thermal units are not well suited to a constantly varying output. It is not always possible to predict the exact time of day at which the peak of the load will occur. Therefore, if the peak is to be taken by thermal units it is necessary for these units either to remain on stand-by, in which case there are unavoidable heat losses, or for the plant to operate on part-load in readiness to meet the peak when it occurs. In either case this type of operation is not conducive to efficiency. Hydro units, on the other hand, are well adapted to following the very rapid changes in load which occur during peak hours. The combined use of thermal and hydro equipment, with the former operating on virtually constant output and the latter adjusting itself to varying load, is the ideal arrangement.

This general conclusion must be qualified to take into account a number of factors which can influence the desirable inter-operation of hydro and thermal plant in any particular case. For instance, the relative cost of production of energy as between old thermal plant and new thermal plant is of particular significance in the case of the New South Wales and Victorian generating systems at the present time. Recent technical developments in thermo-electric generation have brought about a considerable improvement in efficiency, with a consequent marked difference between the cost of energy from new and from old plant. The existing New South Wales and Victorian systems comprise a proportion of relatively old and less efficient installations, generally situated in the metropolitan area, and utilizing relatively expensive transported fuel. These installations operate in conjunction with a proportion of newer, more efficient equipment, generally situated close to the coalfields. While it may always be desirable to have a limited proportion of the thermal generating capacity located in metropolitan areas and therefore operating with higher cost fuel, the future trend will be to concentrate the bulk of the thermal generating plant outside metropolitan areas and close to the fuel source. For the time being, however, and as long as a considerable proportion of existing older type metropolitan plant remains in operation, there will be an incentive to use this equipment on peak load in the interests of fuel economy. While this situation obtains it is desirable for any hydro stations introduced into the system to operate on a rather higher load factor than would otherwise be the case, leaving the relatively expensive thermal plant to take the extreme peak load until it is finally withdrawn from service.

Two factors contribute to making this state of affairs a relatively short-term one. Firstly, much of this older-type plant is reaching the end of its economic life and will be withdrawn progressively over the next 10 or 15 years. Secondly, the system load is increasing at a very rapid rate, more than doubling itself every 10 years. The proportion of the peak load which the existing high-cost metropolitan stations can take is therefore rapidly decreasing. As the load increases and the proportion of the peak taken by these thermal stations becomes progressively less, a larger section of the peak load will require to be taken either by relatively new thermal installations or preferably by hydro plant. Hydro-electric developments such as those at Kiewa, Eildon and Hume now under construction by the State Electricity Commissions will contribute to meeting the peak load, but these are limited in total capacity. The hydro stations of the Snowy Mountains Scheme will be relied upon principally for this function in the future.

To utilize the potential of the Snowy Mountains Scheme most effectively, it is proposed to arrange the order of development so that the early stations will operate initially somewhat below the peak of the system load, with a progressive change to predominantly peak load operation as construction proceeds and as the load increases in magnitude.

(ii) *Regulation of energy output by storage reservoirs.* It is desirable, under most circumstances, for the day by day output of electrical energy from the Scheme to be reasonably constant. As there is a marked seasonal variation in the flow in the rivers of the area, considerable emphasis has been placed on the construction of very large storages, notably at Adaminaby and Jindabyne, to reduce the effect of these variations. Certain of the power stations will necessarily operate on inflows not regulated by the main storages and the output from these stations will vary considerably. A feature of the design and the proposed operation of the Scheme, however, is that the variable output from these stations on uncontrolled streams will be balanced by corresponding variations in the output of other stations operating on flows controlled by the main reservoirs. In this way the total output from the Scheme will be kept almost constant, and the energy delivered from operating stations on uncontrolled streams will, in effect, be regulated by the main storages. This method of operation, which shows a marked change from that envisaged by the original Commonwealth-States Technical Committee, will not only considerably increase the quantity of electricity the Scheme can guarantee to its customers, but it will also greatly improve the irrigation value of the Scheme.

(iii) *Transmission of energy from the Scheme.* The Snowy Mountains Scheme is situated geographically about midway between the principal load centres of Sydney and Melbourne and, as already mentioned, will be connected to these centres by high-tension 330,000 volt transmission lines. It will consequently be in a strategic position to take advantage of the diversity in the power requirements of these two load systems, a most important factor in so far as it affects the economy of operation of the supply systems of the two States.

Although, as already indicated, most of the output from the Scheme will go to the States of New South Wales and Victoria, the Commonwealth Government also has rights, vested in the Seat of Government Act, to draw from the Scheme its requirements of power and energy for the Australian Capital Territory and for defence purposes. For convenience, the Commonwealth share of power and energy will be drawn from the New South Wales transmission network by an exchange arrangement between the Commonwealth and the Electricity Commission of New South Wales. The remaining power and energy from the Scheme, after fulfilling the Commonwealth rights, will be divided between the States of New South Wales and Victoria in the average ratio of 2 : 1.

14. **Irrigation Features of the Scheme.**—Since the inception of the Scheme, the diversion of the waters of the Snowy River inland to supplement irrigation developments in the Murray and Murrumbidgee river valleys has been regarded as one of its primary features.

The irrigation at present carried out in the valleys of the Murray and Murrumbidgee Rivers provides a considerable proportion of the total Australian irrigation production, but further increases are strictly limited by the availability of additional water.

The supply to Victorian irrigation schemes has been increased in recent years by additions to the storage capacity of Hume Weir and by the construction of the enlarged Eildon Dam and storages at Cairn Curran and elsewhere. Amplifications of supply are now reaching their limit and there is very little room for further large scale addition to the supply of irrigation water in Victoria other than by the diversion of the Snowy River.

The New South Wales irrigation areas on the Murray River, which will also benefit from the additional capacity being provided at Hume Reservoir, have not reached the same critical stage, but the position in the Murrumbidgee Irrigation Area is similar to that in Victoria. On the Murrumbidgee River and its tributaries, the principal works in progress or in prospect are the provision of increased storage capacity at Burrinjuck Reservoir and the proposed control works at Menindee Lakes. The latter works will provide a considerable part of the New South Wales quota of the South Australian share of Murray water, and will thereby increase the amount of water which may be diverted for use in the Murrumbidgee Irrigation Area further upstream. On the completion of these works, however, there will be little possibility of further significant increases in irrigation development in the important Murrumbidgee Irrigation Area other than by the supply of additional water from the Snowy Scheme.

The total additional regulated supply of irrigation water in the Murray and Murrumbidgee Rivers, directly resulting from the operation of the Scheme and the re-regulating storages, will be approximately 1,800,000 acre feet per annum, or an increase of 70 per cent. on the total present diversions from these rivers and their tributary streams in the States of New South Wales and Victoria. The increase in New South Wales will be more than 150 per cent. on the present diversions from the Murrumbidgee and Murray Rivers in that State.

The additional regulated irrigation water to be supplied to the State of Victoria will probably be used largely to provide for more intensive development of areas already reticulated with channels and served from the diversion weirs at Yarrawonga and Torrumbarry. There will be some extension of channels to high quality lands adjoining existing irrigation districts and some further developments by pumping from diversion points along the river.

The New South Wales Government has for some time been carrying out studies on soils, drainage and other matters which could affect the use of the additional waters in the Murrumbidgee Valley from the Snowy Scheme. It is understood that special attention is being given to the Billabidgee area between the Murrumbidgee and Billabong Creek, and to the country north of the Murrumbidgee between Griffith and Hay. Extensive work on distribution canals and preparation of land will be required in the immediate future if advantage is to be taken of the additional irrigation water which will shortly be available.

The value of increased irrigation production resulting from the additional supplies of water to be provided by the Scheme will amount to nearly £30,000,000 per annum based on present-day figures. It will have a very marked effect on stabilizing rural production in the irrigation areas of the Murray and Murrumbidgee Valleys and will substantially increase export revenues.

Apart from the direct diversion of new irrigation water from the Snowy River, a considerable advantage will be gained from the regulation afforded to the Snowy, Eucumbene, Tooma, Tumut and Murrumbidgee Rivers by the operation of the Scheme. As previously mentioned, the development is being so designed that the total output of energy is reasonably constant from season to season, and from year to year. With the method of operation now proposed in which the stations supplied from the main storages will balance the varying output from the stations on uncontrolled rivers, the actual releases of water from the principal reservoirs will be greater in dry seasons than in wet seasons. In the case of Adaminaby Reservoir this effect could extend over several years.

For the fullest advantage to be taken of the outflows from the power stations, it is essential that releases during the winter months be held for use during the summer

irrigation season. As already indicated, it is proposed to accomplish this by means of re-regulation in the enlarged Hume Reservoir on the Murray River and in the proposed Blowering Reservoir on the Lower Tumut River.

Blowering Reservoir will have a storage capacity of some 860,000 acre feet. This will be sufficient to retain almost the whole of the releases from the Snowy-Tumut section of the Scheme during the non-irrigation months. The construction of Blowering Reservoir will be undertaken by the Water Conservation and Irrigation Commission of New South Wales.

The principal diversions and the allocation of additional regulated irrigation water between the States of New South Wales and Victoria are shown diagrammatically on page 1111. It is noted that there will be a period during the early stages of construction of the Scheme during which the Tooma-Tumut diversion will be in operation prior to the completion of the compensating Snowy-Murray diversion. During these initial years the diverted Tooma water will be regarded as a part of the share of the State of New South Wales in the waters of the Murray River. In effect this share of the Murray water will become available to New South Wales as additional water in the Murrumbidgee River instead of as a part of the New South Wales allocation of Murray water. In relatively dry years, this diverted Tooma water will probably be used to meet part of the New South Wales quota of the water required to flow down to South Australia.

On completion of the Snowy-Murray Diversion, water turned into the Murray will more than compensate for the Tooma Diversion.

In the formal Agreement between the States of New South Wales and Victoria and the Commonwealth Government now being negotiated provisions are included which will assure the two States of increases in the supply of water during the initial as well as in the final stages of the Scheme. Thus, during a declared period of water supply restrictions in the Murray Valley, the Irrigation Commission of New South Wales will be able to call for releases of water from Adaminaby Reservoir via the Tumut River, sufficient in quantity to compensate fully for the effect of the diversion of the Tooma River from the Murray catchment to the Murrumbidgee catchment. This provision will not apply after the completion of the compensating Snowy-Murray Diversion. It will then be replaced by a similar provision which will ensure certain minimum releases of additional water into the Murray River during periods of restriction. A further provision will assure the State of New South Wales of certain minimum releases from Tumut River stations at all stages of the Scheme.

A principle was established at the Premier's Conference in 1949 that the cost of providing irrigation water from the Scheme would be defrayed by charges for power. Although the considerable increase in interest rates since that time has added greatly to the annual charges to be carried by the Scheme insistence on the application of this unusual principle has been maintained. It is estimated that over £60,000,000 of the cost of the Scheme is attributable to the provision of irrigation water. In this respect the arrangements for financing the Snowy Mountains Scheme differ considerably, and much to the Snowy Scheme's disadvantage, from those of other notable dual-purpose power and irrigation developments constructed overseas in recent years, particularly in the United States. It has generally been considered in such developments that the costs attributable to irrigation works should be treated separately. This is the present policy in the case of irrigation headworks constructed by the State Irrigation Commissions in Australia. Most of the cost of these structures will also ultimately be met from public revenues. In the case of the Snowy Scheme, however, it is proposed that the whole cost of the irrigation features of the Scheme will be financed by the sale of power.

The first release of new irrigation water from the Scheme will become available on completion of the Eucumbene-Tumut tunnel late in 1959. Before that date, the water of the Eucumbene River, a tributary of the Snowy, will have been stored in advance of the diversion for a period of approximately 1½ years. On the present construction programme, the main stream of the Snowy River at Jindabyne will be impounded in 1965 and diversion of the Snowy to the Murray will be accomplished in 1966. By that date

most of the additional irrigation water from the Scheme will be available. If the construction of distribution systems in the irrigation areas has kept pace with the construction of the Scheme a very great increase in irrigation production in the Murrumbidgee and Murray areas will then be apparent.

15. **Defence Aspects of the Scheme.**—The joint State-Commonwealth action to initiate construction of the Scheme in 1949 was prompted by the urgent need to build up power resources and primary production in the interests of national defence. The lag in construction of new generating plant during the war years has not yet been overtaken, and it is evident that provision of adequate power for industry will continue to be a problem for many years to come.

In addition to its general contribution to power and irrigation production, the Scheme has certain features which add considerably to its value from the defence viewpoint. The experience of the 1939–45 War has shown that thermal power stations are particularly susceptible to damage under light as well as heavy attack, because much of the equipment can be put out of service relatively easily. The damage which would result to thermal power stations in exposed positions on the coastline or near the main cities in a concerted attack with modern weapons could be very great indeed. On the other hand, the strategic location of the Scheme in a mountainous region, distant from the coastline, would make a concerted attack difficult to carry out. The power stations are mainly sited in deep underground galleries and it is most unlikely that they would be affected by any form of aerial bombardment. The tunnels, too, would be relatively safe.

With regard to the water storages on the Snowy Scheme, it was the experience of the last war that a systematic attack on dams could bring about their destruction. In the case of relatively low-head hydro schemes, the destruction of headworks reservoirs would effectively put such stations out of operation, but in the case of high-head developments such as those of the Snowy Mountains Scheme the destruction of reservoirs would merely result in a reduction in the amount of controlled energy; it would not result in the stations being put completely out of service.

The position of the Scheme midway between the two main load centres of Sydney and Melbourne is of particular significance as the output from the Scheme could be used to support the load in either of these centres if one of them suffered war damage. The transmission lines also traverse areas in both States suitable for the establishment of dispersed industries.

Although the design of the Scheme is based largely on economic and geographic considerations, it is very similar in many respects to certain recent European and Scandinavian developments which have been designed with protection against damage from modern weapons as a primary consideration. The power potential of the Scheme is certain to play an essential part in future national defence planning.

16. **Progress already achieved on the Scheme.**—During the six years since the passing of the Snowy Mountains Act, the Authority has established an organization comprising a staff of approximately 1,060 officers, including 340 engineers, geologists, physicists, soil conservationists and other professional men, many recruited overseas. It has erected three new townships and a number of large construction camps, involving the establishment of 800 houses, messes, hostels, office buildings, shops, stores, recreation facilities, water and electricity supplies, workshops, and probably the largest civil engineering laboratories in Australia.

About 100 miles of public roads have been reconstructed. One hundred and ten miles of new heavy duty roads and 150 miles of light roads and access tracks have also been built. A feature of the Authority's roadwork has been the opening up of a potentially valuable tourist and recreation area. It is believed that some of the Authority's new roads will later form important links in the inter-state transport systems of New South Wales and Victoria. In particular, the Alpine Way now being constructed across the Main Divide within five miles of Mount Kosciusko will traverse an alpine scenic area unequalled in Australia.

Following the opening up of the area by the construction of roads, two regional townships were established, one at Island Bend in the southern section of the Scheme and one at Cabramurra in the northern section. These served as bases for further preliminary works. A system of radio and telephone communications and a construction power network had to be established throughout the Area. Much of this early work was carried out during winter conditions when snow and low temperatures made working very difficult.

The original Snowy River Committee had only a very short time in which to carry out the preliminary investigation and planning of the Scheme. It was also seriously handicapped by lack of data. Access for surveys was difficult and much of the work had to be based on aerial photographs and unreliable maps. The available hydrological records were also limited. It was necessary, therefore, for the Authority to confirm the work of the Committee and extend it in much greater detail. With the objectives of generation of power and diversion of irrigation water at the earliest possible time, the Authority began an intensive programme for the collection and analysis of field data. Unsurveyed country had to be mapped and hydrological and geological information had to be gathered, all in mountainous country, some of which was inaccessible except on foot and by pack horse.

Due to the comprehensive nature of the Scheme it was necessary to investigate on broad lines the whole of the development and its inter-related components before any section could be designed in detail. This work involved, amongst other things, a study of the inter-operation of the stations of the Scheme with those of the State thermal systems, and an analysis of the effect of the proposed diversions on the availability of irrigation water in the Murray and Murrumbidgee Rivers. The problem of integrating the operation of the components of the Scheme was one of considerable complexity, requiring consideration of a large number of power stations, storages and diversions.

General investigations of the whole Scheme had to be followed closely by studies to determine the basis for the development of each project, and the detailed investigation of the sites of proposed structures. Designs followed the detailed investigations and by August, 1951, construction had commenced on the first of the Authority's power projects, the Guthega Project.

Faced with the problems of building up a large organization and commencing major construction work at the earliest possible date, the Authority sought and obtained the assistance of the Bureau of Reclamation of the Department of the Interior, United States of America, in the preparation of designs and specifications. The Bureau with its 50 years of experience in the construction of reclamation works by contract, was in a unique position to advise the Authority, to give technical assistance in the preparation of designs and specifications and to advise on staff training. This technical assistance enabled the Authority to proceed with confidence and to achieve a much greater rate of progress than would otherwise have been possible. In addition to the preparation of designs and specifications for about two-thirds of the Authority's contracts and the training of the Authority's staff on large construction works in the United States, the Bureau of Reclamation has also made available the services of a group of experienced engineering advisors who are now resident in the Snowy Mountains Area.

The first section of the Scheme chosen for construction was the Guthega Project on the Upper Snowy River. This project was selected because it offered the possibility of developing power within a comparatively short space of time. It could also be undertaken with much less preparatory work than would have been required in the case of the other larger projects. Construction began in August, 1951, and proceeded through winter and summer until its completion in February, 1955, when the first power from the Scheme was fed into the New South Wales transmission system. The civil engineering work was carried out by the Norwegian firm, Selmer Engineering Pty. Ltd.

Because of the acute shortage of manpower when the project was commenced, the contract specifications required the successful tenderer to import 90 per cent. of his labour and staff, and all materials then in short supply in Australia. About 400 Norwegians

were brought to Australia to work on the project. Later, when the labour market improved, numbers were supplemented by the employment of Australians, particularly for tunnelling.

The Guthega works area is at an elevation of approximately 5,200 feet and is only 8 miles from the summit of Mount Kosciusko. It is normally under snow from May to October, falls of over 3 feet being quite common. Low temperatures and snow condition added greatly to the difficulty and hazard of the work.

The Authority's own forces have constructed more than 84,000 feet of concrete aqueducts to divert additional waters from downstream of the works into the Guthega pondage and the surge chamber. As the elevation and the exposed position of these aqueduct lines makes winter construction uneconomic, if not impossible, the work is carried out in the summer in conjunction with a winter programme of road building and other work at lower elevations.

The Authority has constructed 47 miles of 132,000 volt lines from Guthega Power Station to Cooma and over 100 miles of 66,000 and 11,000 volt lines for distribution of construction power within the area.

Adaminaby Dam, on the Eucumbene River is being designed and constructed for the Authority by the Public Works Department of New South Wales. Construction on a large scale commenced in 1953. More than 220 homes and several barrack blocks for employees have been erected in the works township of Eaglehawk, adjacent to the site of the dam. The 2,300 feet long by 25 feet diameter diversion tunnel around the dam site was completed in 1955 by Allied Constructions Pty. Ltd., as sub-contractors to the Public Works Department. Stripping of the abutments of the dam and foundation consolidation grouting were completed by the Department in 1955, permitting a commencement to be made on the placement of earth and rock fill immediately after the diversion of the river. Tenders closed in March, 1956 for the construction of the major part of the embankment and a contract was placed in May with the Kaiser-Walsh-Perini-Raymond group of American contractors. Storage of the Eucumbene River behind the partially completed wall is scheduled to begin by mid-1957. The dam will be completed in 1959.

The deviation of the Snowy Mountains Highway, formerly the Monaro Highway, around the eastern side of Adaminaby Reservoir has already been almost completed over a length of 25 miles. This work is being carried out by the Department of Main Roads, with the Authority's construction force assisting during the winter. Thirty-one miles of new road construction is involved. As most of the existing township of Adaminaby will be inundated when the reservoir is filled, the Authority is building a new township near the eastern perimeter of the reservoir and about four miles from the existing township.

In October, 1954, the Kaiser-Walsh-Perini-Raymond group began to drive the Eucumbene-Tumut tunnel from the Adaminaby Reservoir through the Great Dividing Range to the Tumut River. In preparation for the tunnel works, the Authority constructed 15 miles of first-class road from the Snowy Mountains Highway over the Great Dividing Range to Eucumbene Portal at the southern end of the tunnel; also a 13-mile branch road across the elevated Happy Jacks Plain to the site of Junction Shaft, a working point on the tunnel at the confluence of the Tumut and Happy Jacks Rivers. Initial accommodation was provided for the contractors' forces, as well as construction power.

At the end of March, 1956, the contractors had driven a distance of over 2½ miles from the Eucumbene Portal. The 300 feet junction shaft had been completed and tunnellers driving from the bottom of the shaft had progressed over 3,000 feet in each direction. The existing world's record for excavation of a tunnel of this size has been broken on at least four occasions by the Kaiser-Walsh-Perini-Raymond group, a footage of 474 feet having been achieved in one week of six working days during March, 1956.

A 4,000 feet long access and drainage adit leading to the downstream end of the main tunnel from a point downstream of Tumut Pond dam was driven during 1955 by

the Australian firm of Allied Constructions Pty. Ltd., sub-contractors to Kaiser-Walsh-Perini-Raymond. It is anticipated that the Eucumbene-Tumut tunnel will be in service by the end of 1959.

As already mentioned, Tumut Pond Dam will regulate and control waters from the Tumut, the Tooma, the Eucumbene and the Murrumbidgee Rivers and pass them through a pressure tunnel to T1 Power Station. Both the dam and the pressure tunnel are being constructed by the Kaiser-Walsh-Perini-Raymond group of American contractors. Construction commenced on the 8,000 feet pressure tunnel in January, 1955, and by the end of March, 1956 excavation had progressed for a distance of approximately 1¼ miles. Preparatory work is already well under way for the construction of Tumut Pond Dam. The dam and pressure tunnel will be in service by the end of 1958.

The construction of T1 Power Station is being carried out by a group of French contractors, the sponsoring company being the firm of Etudes et Entreprises. The turbines are being manufactured by the English Electric Company and the generators by A.S.E.A. Electrics, Vasteras, Sweden. The first two units of the power station should be in service by the end of 1958, and the second two units about one year later.

Preparatory work for the construction of the next power station on the Tumut River, T2, is already well advanced. All investigations have been completed and designs are now in progress in preparation for calling tenders for the civil engineering works early in 1957. The Authority's field construction forces are building a road from the Regional Centre of Cabramurra to the power station site. This road traverses very difficult country, passing down the side of a 2,000 feet gorge.

Designs for the Tooma-Tumut diversion are well advanced and tenders will be called in 1956. The construction of a road leading from Tumut Pond to the site of the Tooma Dam has already been completed, giving direct access from the Regional Centre at Cabramurra. It is anticipated that construction of the Tooma Dam and the Tooma-Tumut tunnel will commence early in 1957, with completion scheduled for the end of 1959.

Office and field investigation of the Murrumbidgee-Eucumbene Diversion is nearing completion and it is anticipated that designs will be sufficiently advanced for construction to begin in 1957. The diversion works will be in service in 1962, Murrumbidgee water probably being stored in Tantangara Dam for at least one year in advance of that date.

Investigations and preparatory work are now proceeding on the Snowy-Murray section of the Scheme. These include detailed studies of the main diversion works and the principal power stations, together with an extensive programme of geological, diamond drilling, and survey field work. A new road, which will link the Authority's Head-quarters at Cooma on the eastern side of the Great Dividing Range with the Snowy-Murray works on the western side of the mountains is already in use.

In the Geehi area access roads for investigation work have been constructed from the Swampy Plain River to the Upper Geehi Valley and to the Upper Bogong Creek Valley. The nucleus of a regional centre has also been established. The existing regional centre at Island Bend on the eastern side of the range, used in the construction of the Guthega Project, will also be an important centre for the driving of the Snowy-Murray tunnel.

17. **The Programme for the Immediate Future.**—The immediate objective of the Snowy Mountains Authority will be to press on with the Upper Tumut Diversion Works and the T1 and T2 Projects, in accordance with the following schedule.

Adaminaby Dam	Commencement of storage, mid-1957 Completion of dam, 1959.
Eucumbene-Tumut Tunnel	Completion date, 1959.
Tooma-Tumut Diversion	Completion date, 1959.
Tumut Pond Dam	Completion date, 1958.
T1 Pressure Tunnel	Completion date, 1958.

Murrumbidgee-Adaminaby Diversion ..	Completion date, 1962.
T1 Power Station	Two units in operation, 1958.
	Four units in operation, 1959.
T2 Project	Commencement of contract, 1957.
	Two units in operation, 1962.
	Four units in operation, 1963.

Under the schedule set out above, power will become available as follows :—

Guthega Project (already in operation)..	60,000 kW.
T1 Power Station—	
1958	160,000 kW., total 220,000 kW.
1959	160,000 kW., total 380,000 kW.
T2 Power Station—	
1962	140,000 kW., total 520,000 kW.
1963	140,000 kW., total 660,000 kW.

Additional water for irrigation will be supplied to the Murrumbidgee as follows :—

1959	300,000 acre feet per annum.
1961	200,000 acre feet per annum.
Total	500,000 acre feet per annum.

(NOTE.—With the completion of Blowering Dam by the State of New South Wales, these water quantities will be almost doubled.)

Detailed investigations and other preparatory work on the Snowy-Murray section of the Scheme will proceed actively during the next three years, so as to enable full scale construction operations on the Snowy-Murray Diversion to commence in 1959, on the 540,000 kW. M6 Power Station at Bogong Creek in 1960, and on the 540,000 kW. M7 Power Station at Swampy Plains shortly afterwards.

Office and field investigations for the Scheme as a whole will continue to receive the highest priority, in order to bring about refinements and improvements to the various future developments and so ensure the most economical use of the water resources of the area.

18. **Summary.**—The Snowy Scheme is one of the largest engineering works ever undertaken in the world, comparing in magnitude with the great Tennessee Valley Authority's development in the United States of America. It involves the construction of 7 major dams, 15 power stations with possibly two more to be built later—most of which will be hundreds of feet underground, over 80 miles of tunnelling and more than 300 miles of aqueducts along the mountain sides to pick up streams and lead them to reservoirs and tunnels.

New South Wales and Victoria will receive from the Snowy 3,000,000 kW of power and nearly 6,000 million kWh per annum of energy to meet the needs of expanding industry and rapidly increasing population. Perhaps of even greater importance, it will make available to the fertile plains of the Murray and Murrumbidgee Valleys nearly 2,000,000 acre feet of urgently needed water, so enabling this already prosperous area to produce additional foodstuffs to the value of nearly £30,000,000 per annum. The indirect benefits from the supply of water are equally important, irrigation development for instance, will bring about an increase in revenue from taxation of well over £12,000,000 per annum.

The Scheme is economically sound without receiving any financial return for the enormous capital outlay involved in the supply of additional water for irrigation. Few, if any, development works ever carried out in Australia can show a comparable return on capital invested.

The development is not solely a long-term one undertaken for the benefit of future generations. Power is already being produced and 300,000 acre feet per annum of additional water for irrigation will be flowing into the Murrumbidgee in less than 4 years. More power and more water will be supplied progressively, project by project, right throughout the construction period.

SNOWY MOUNTAINS SCHEME.

TABLE OF PRINCIPAL FEATURES.

(NOTE.—Where structures not yet under construction are referred to, the dimensions and data are tentative only and subject to revision on more detailed investigation).

A. Main Storages.

Dams.	Height.	Volume of Fill.	Approximate net Storage Capacity.
	Feet.	Cubic yds.	Acre ft.
Adaminaby	390	9,500,000	3,500,000
Jindabyne	274	3,700,000	1,100,000
Tantangara	200	1,750,000	500,000
Tooma	222	1,400,000	22,400

B. Main Diversions.

Tunnels.	Length.	Diameter.
	Feet.	
Eucumbene–Tumut	72,860	21′ diameter (lined) (under construction)
Snowy-Murray—		
Snowy-Geehi	96,000	Not yet determined
Geehi-Murray	53,000	Not yet determined
Tooma–Tumut	47,000	14′ diameter (mainly unlined)
Murrumbidgee–Eucumbene	54,900	12′ x 10′ (mainly unlined)

C. Power Stations.

Station.	Capacity.	Average Net Head.	Average Flow.	Total Length Headrace plus Tailrace Tunnels.	Headwater Dam.	
					Type.	Height.
	kW.	Feet.	Cusecs.	Feet.		Feet.
M1A ..	60,000	555	248	14,400	Earth ..	90
M1B ..	90,000	800	410	14,500	Gravity ..	110
M2L ..	60,000	415	450	15,500	Gravity ..	145
M2H ..	10,000	605	28	5,000	Earth ..	50
M3 ..	265,000	900	770	1,000	Arch ..	143
M4 ..	75,000	1,775	127	6,700	Gravity ..	110
M5L ..	20,000	145	655	2,500	Gravity ..	276
M5H ..	40,000	285	320	11,800	Gravity ..	80
M6 ..	540,000	950	1,710	21,200	Arch ..	296
M7 ..	540,000	930	1,820	34,000	Gravity ..	180
T1 ..	320,000	1,065	1,300	12,000	Arch ..	290
T2 ..	280,000	863	1,420	36,200	Gravity ..	140
T5 ..	180,000	220	1,680	..	Earth ..	245
T6 ..	230,000	378	1,800	14,900	Earth ..	300
T7 ..	60,000	195	1,880	..	Earth .	250

NOTES.—Initial capacity at present installed in Station M1B is 60,000 kW. Dam heights are height from river-bed to crest of dam. Total length of headrace and tailrace tunnels includes length of tailrace surge chamber.