

1924.



THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA
Printed on the Table by
by Senator Macdonald

Pursuant to Statute
By Command
In return to Order

G. Sturges
Clerk of the Senate.

16 JUL 1924

REPORT

FROM THE

JOINT COMMITTEE OF PUBLIC ACCOUNTS

UPON THE

EXPENDITURE ON MUNITIONS SUPPLY.

Presented pursuant to Statute; ordered to be printed, , 1924.

(Cost of Paper.—Preparation,) copies; approximate cost of printing and postbinding, .)

Printed and Published for the GOVERNMENT of the COMMONWEALTH of AUSTRALIA by H. J. GREEN, Acting Government Printer for the State of Victoria.
No. —F.14497.—PRICE

JOINT COMMITTEE OF PUBLIC ACCOUNTS.

REPORT

UPON THE

EXPENDITURE ON MUNITIONS SUPPLY.

INTRODUCTORY.

The Joint Committee of Public Accounts, recognizing the importance of Australia being assured of adequate and regular supplies of munitions, decided to investigate the question of the Expenditure on Munitions Supply, particularly in view of the amount of public money proposed to be devoted to this phase of Defence expenditure.

COMMITTEE'S PROCEEDINGS.

To acquaint itself with the work being accomplished by the Munitions Supply Branch of the Department of Defence, the Committee visited the Research Laboratories at Maribyrnong, and the various Factories controlled by the Munitions Supply Board, viz. :-

Acetate of Lime Factory at Brisbane, Queensland.
Small Arms Factory at Lithgow, New South Wales.
Cordite Factory at Maribyrnong, Victoria.
Clothing Factory at South Melbourne, Victoria.
Small Arms Ammunition Factory at Footscray, Victoria.

The work in progress in connexion with the construction of new factories at Maribyrnong and Footscray, and extensions of the Small Arms Factory at Lithgow were seen by the Committee:

The opportunity was also taken whilst in various States to see the nature of the work carried out by Government Railway Workshops and by different private engineering establishments.

The taking of evidence on this inquiry was commenced on 22nd August, 1923, and the work was carried on by the Committee concurrently with other investigations.

During the inquiry the following witnesses were examined :-

BELL, Marcus, O.B.E., F.I.C., Superintendent of Laboratories, Munitions Supply Branch, Department of Defence.
BREWSTER, Albert Frederick David, Naval Stores Officer, Garden Island, and Chairman of the District Contract Board, New South Wales.
BRODRIBB, Noel Kenric Stevens, O.B.E., Chief Chemical Engineer of the Munitions Supply Branch, Manager of the Cordite Factory, and Acting Controller-General of Munitions Supply, Department of Defence.
CARTWRIGHT, George Ambrose, Manager, Small Arms Ammunition Factory, Footscray, Munitions Supply Branch, Department of Defence.
COLLINS, James Richard, C.M.G., O.B.E., Secretary to the Commonwealth Treasury.
DE BAVAY, John Francis Xavier, Works Manager, Acetate of Lime Factory, Brisbane, Munitions Supply Branch, Department of Defence.
DESCHAMPS, Joseph Mark, Managing Director, Hadfields (Australia) Ltd., Engineers and Steel Founders, Sydney.
FORD, Arthur Samuel, A.M.I.M.E., A.M.Am.S.M.E., A.M.I.E. (Aust.), Engineer in Charge, Machine Gun and Pistol Section, Small Arms Factory, Lithgow, Munitions Supply Branch, Department of Defence.
FURLEY, Joseph Frederick, Accountant, Small Arms Factory, Lithgow, Munitions Supply Branch, Department of Defence.
GEPF, Herbert William, General Manager, Electrolytic Zinc Company of Australasia Ltd., Melbourne.
GIPPS, Lieut.-Colonel Henry Brook Lawrence, Chief Inspector, Munitions Supply Branch, Department of Defence.

MEMBERS OF THE COMMONWEALTH PARLIAMENTARY JOINT COMMITTEE OF PUBLIC ACCOUNTS.

(Fourth Committee.)

JAMES GARFIELD BAYLEY, Esquire, M.P., Chairman.

JAMES EDWARD FENTON, Esquire, M.P., Vice-Chairman.

Senate.

*§ Senator BENJAMIN BENNY.
† Senator WILLIAM KINSEY BOLTON, O.B.E.,
V.D.
‡ Senator RICHARD BUZACOTT.
¶|| Senator HAROLD EDWARD ELLIOTT, O.B., C.M.G.,
D.S.O., D.C.M.
‡ Senator JOHN DUNLOP MILLEN.
* Senator EDWARD NEEDHAM.

House of Representatives.

¶ JAMES ANTCHISON JOHNSTON HUNTER, Esquire,
M.P.
NORMAN JOHN OSWALD MAKIN, Esquire, M.P.
WALTER MOFFITT MARKS, Esquire, M.P.
THOMAS PATERSON, Esquire, M.P.
JOHN EDWARD WEST, Esquire, M.P.

* Appointed 6th July, 1923. † Retired 20th June, 1923. ‡ Resigned 28th June, 1923. § Appointed a Member of the Royal Commission on National Insurance, 4th October, 1923. ¶ Appointed a Member of the Royal Commission on Navigation Act, 10th September, 1923. ¶|| Appointed a Member of the Royal Commission on National Insurance, 4th September, 1923. ‡ Appointed a Member of the Royal Commission on National Insurance, 4th September, 1923.

HARPER, Algernon Henry, Secretary to the District Contract Board and Supervising Officer of the Inspection Branch, Munitions Supply Branch, Department of Defence, New South Wales.

JENSEN, John Klunder, Secretary to the Munitions Supply Board, and Chairman of the Contract Board, Department of Defence.

LEIGHTON, Arthur Edgar, F.I.C., Controller-General of Munitions Supply and Chairman of Munitions Supply Board, Department of Defence.

LITTLE, Andrew, Controller of Stores, Postmaster-General's Department, Victoria, and Comptroller of Stores, Commonwealth Stores Supply and Tender Board.

MACKENNA, Horace John, Works Director of Victoria, Department of Works and Railways.

MAQUIRE, Matthew Michael, O.B.E., Assistant Secretary, Department of Defence, and Member of the Munitions Supply Board.

MONASH, Lieut.-General Sir John, G.C.M.G., K.C.B., V.D., Chairman of the State Electricity Commission of Victoria.

MURDOCH, Colonel Thomas, Director of Works, Department of Defence.

PECK, Lieut.-Colonel John Henry, Staff Officer for Supply and Transport, Army Head-quarters, Department of Defence.

RANSAY, Paymaster-Commander Hugh Malcolm, R.A.N., Director of Naval Stores and Victualling, and Deputy Chairman of Contract Board, Department of Defence.

RATOLIFFE, Frederick Russell, M.Am.Soc.M.E., Manager, Small Arms Factory, Lithgow, Munitions Supply Branch, Department of Defence.

ROBINSON, John Edmund, M.I.M.E., Works Manager, Queensland Government Railway Workshops, Ipswich.

SLADE, Henry Alfred, Manager, Clothing Factory, South Melbourne, Munitions Supply Branch, Department of Defence.

SMITH, Arthur Victor Sydney, Secretary and Executive Member, Contract Board, Department of Defence.

SPILLER, Frank Cecil, M.V.I.E., Engineer, Ordnance and Shell Factory, Maribyrnong, Munitions Supply Branch, Department of Defence.

STOKES, Commander Alick, R.N., Director of Ordnance, Torpedoes and Mines, Navy Office, Department of Defence.

THOMAS, Colonel Thomas John, O.B.E., Finance Secretary, Department of Defence, Deputy Chairman, Munitions Supply Board; and Finance Member of the Naval Board.

TOPP, Arthur Albert, Dip.A.W.M.C.(Met.), A.I.C., Assistant Manager, Cordite Factory, Maribyrnong, Munitions Supply Branch, Department of Defence.

WHITE, Major-General Sir Cyril Brudenell Bingham, K.C.M.G., K.C.V.O., C.B., D.S.O., Chairman of the Commonwealth Public Service Board.

WILKINSON, William Percy, F.I.C., Commonwealth Analyst, Melbourne.

WYNGLEY, James Harold, B.E., A.M.I.E. (Aust.), Engineer, Fuze and Cartridge Case Factory, Footscray, Munitions Supply Branch, Department of Defence.

EXPLANATORY.

The first steps taken by the Commonwealth to produce its own munitions date back to 1907, when inquiries were made concerning the establishment of a Small Arms Factory in Australia. This Factory was subsequently erected and about the same time there were also established by the Commonwealth Government, factories for the manufacture of Cordite, Harness, Saddlery and Leather Accoutrements, and Clothing. These establishments were followed later by factories for the manufacture of Woollen Cloth and Acetate of Lime.

When passing through India on his way to England Mr. A. E. Leighton, then Manager of the Cordite Factory, suggested that Australia might be able to assist in the production of munitions which were then urgently required, and an expert committee from Australia was despatched to India in 1915. This Committee comprised Colonel P. T. Owen, Director-General of Works, President, the late Mr. B. T. McKay, General Manager of the engineering firm of Walkers Limited, Professor H. Payne, of the Melbourne University, Mr. Marcus Bell and Major H. B. L. Gipps, of the Defence Department. The first definite intimation that the Government proposed to embark on the manufacture of munitions in Australia on an extended scale appeared in a letter dated 14th September, 1915, addressed by the Acting Secretary for Defence to the President of the above Committee in which that body was instructed, *inter alia*, "to investigate

and report upon artillery ammunition, gun and explosive factories, testing ranges, and manufacture generally of munitions of war, with a view to the establishment of a Government Arsenal in Australia"—it being understood that such Arsenal was to be located in the Federal Territory.

Following on the Committee's Report the Government decided to establish a Commonwealth Arsenal at Tuggeranong, in the Federal Territory. In July, 1916, Mr. Leighton, who had been taken over by the British Government for munitions work and was still in England, was offered and accepted the position of General Manager of the Arsenal.

Before returning to Australia Mr. Leighton was enabled to discuss the Australian proposal with the principal officials of the British Ministry of Munitions, and so give the Commonwealth the benefit of their opinion and advice. He had also taken the opportunity during the war to arrange for a number of technical experts, comprising chemists and engineers, as well as artisans, to be brought from Australia to help in the construction and running of the various munitions factories in England so that, on their return to Australia, the Commonwealth would have men possessed of the requisite knowledge for the making of ordinary munitions of war.

War experience made it desirable to review the decision to locate the Arsenal at Tuggeranong, and, on his return to Australia in April, 1919, Mr. Leighton was informed that the Government had decided to suspend operations in that direction, and he was asked to submit a report as to the advisability of proceeding with that or some other project to ensure the necessary output of munitions in times of peace and war.

EARLY PROPOSALS.

Drawing on his experiences abroad, and guided by consultations with the experts of the British Government, Mr. Leighton prepared a comprehensive report, dated 27th May, 1919, concerning the production of munitions in Australia, and formulated proposals for setting up an organization for executing the work in the Commonwealth.

In this report Mr. Leighton pointed out that the progress of the war had brought a clearer definition of the functions of an arsenal, and had suggested an alternative treatment of the proposition which, whilst effecting all that was necessary, would do so at much less cost of both capital and time than would be incurred under the Tuggeranong scheme.

The first step to be taken to secure the manufacture of munitions in Australia was the establishment of a properly equipped Laboratory and Inspection Department with qualified chemists and engineers who would have the necessary knowledge to turn local industries and raw materials to practical use in time of need. An examination of the principal materials required for manufacture disclosed that Australia possessed or could manufacture the majority of those most essential, and could therefore look forward to reaching a relatively high degree of self-containment when it had facilities for turning those materials into articles of specific use in war.

The proposed organization embraced the then existing chemical, engineering, and other factories, and, generally speaking, the proposals took the form of a scheme for extending existing factories and establishing in close proximity co-related manufactures. It was recommended that action should be taken to establish in Australia—

- (a) Research and Inspection Departments;
- (b) Ammunition Factories;
- (c) Repair factories capable of repairing weapons such as rifles, guns, &c., which are subject to heavy losses in war; such factories to form a basis for subsequent development of production factories.

The actual scheme of operations could, however, only be determined by an expression of Government policy regarding the strength and nature of the Defence Forces, and what these forces were designed to accomplish.

The proposals outlined were estimated to cost £1,203,814. Mr. Leighton considered that the whole of the new factories could be brought to production within four years from the date of commencement, and that the total cost of construction could be expended at the following approximate rate—

1919-1920	..	..	..	£426,057
1920-1921	..	..	..	£488,979
1921-1922	..	..	..	£288,778

If it were decided to spread the expenditure over a greater number of years the annual rate of expenditure could be distributed accordingly.

A committee, comprising the Honorable G. Swinburne, as Chairman; Lieut-General Sir C. B. B. White, K.C.M.G., K.C.V.O., C.B., D.S.O.; Major-General Sir J. W. McCay, K.C.M.G., K.B.E., C.B., V.D.; Major-General J. G. Legge, C.B., C.M.G.; and Mr. C. H. Reading, which had been appointed to advise the Minister as to the necessity and advisability of proceeding with the proposed Arsenal for the Australian manufacture of munitions, after discussing the matter with Mr. Leighton, agreed, in almost all respects, with his report. Later a conference of Senior Officers, comprising Lieut-General Sir H. G. Chauvel, G.C.M.G., K.C.B.; Lieut-General Sir John Monash, G.C.M.G., K.C.B., V.D.; Major-General Sir J. W. McCay, K.C.M.G., K.B.E., C.B., V.D.; Major-General Sir J. T. Hobbs, K.C.B., K.C.M.G., V.D., and Major-General Sir C. B. B. White, K.C.M.G., K.C.V.O., C.B., D.S.O., when reporting on the military defence of Australia, endorsed practically the whole of Mr. Leighton's scheme.

At that time the Small Arms Factory, the Cordite Factory, the Acetate of Lime Factory, and the Laboratories, were under the control of Mr. Leighton. The Small Arms Ammunition Factory was operating under agreement between the Colonial Ammunition Company and the Commonwealth Government. The Clothing, Woollen Cloth, and Harness Factories were under the administration of the Secretary for Defence, who also controlled the Contract and Supply Board, whilst the Inspection Department was responsible to the Quartermaster-General. The first steps to co-ordinate the control of all the Factories were taken in September, 1920, when the "Board of Factory Administration" was created, comprising the General Manager of the Arsenal, the Assistant Secretary and the Finance Secretary, Defence Department.

As the main object of the Arsenal scheme was to secure to Australia the material required for war, Mr. Leighton proposed the substitution for the name "Arsenal" of the title "Munitions Supply Branch—Department of Defence" as being more descriptive. This suggestion was subsequently adopted.

On the 13th August, 1921, the Munitions Supply Board was constituted a statutory body under the Defence Act with the same personnel as that of the Board of Factory Administration, whose powers and functions were transferred to the new Board. The personnel of the Munitions Supply Board comprised—

<i>Chairman</i> ..	Mr. A. E. Leighton, F.I.C., Controller-General of Munitions Supply.
<i>Members</i> ..	Colonel T. J. Thomas, O.B.E., Finance Secretary, Department of Defence.
	Mr. M. M. Maguire, O.B.E., Assistant Secretary for Defence.

When Mr. Leighton left for England in September, 1923, Colonel Thomas was appointed Deputy Chairman, and Mr. N. K. S. Brodrigg, Chief Chemical Engineer and Manager of the Cordite Factory, who had been gazetted as Acting Controller-General of Munitions Supply, became a member of the Board. On the appointment of Colonel Thomas as Acting Secretary for Defence, Mr. Maguire became Deputy Chairman of the Board, and Mr. J. K. Jensen, the Secretary to the Board, was appointed a temporary member.

The Board, in addition to any other powers or functions conferred upon it by the Minister, is charged, under the Munitions Supply Regulations, with the following matters:—

- Provision of such armament, arms, ammunition, equipment, supplies and stores of all kinds as may be demanded by the responsible authorities and duly approved.
- Research.
- Inspection and examination of supplies obtained in Australia other than food, forage and fuel supplies, up to the point of issue to the service.
- Administration of establishments established or to be established under section 63 of the Act and placed under the control of the Board.

The Board is responsible for—

- The efficient and economical conduct of all munitions establishments;
- The co-ordination of the work of the several munitions establishments;
- Any matter affecting the administration of munitions establishments not governed by regulation or by any instruction issued by the Minister.

and has authority to incur expenditure upon—

- Purchase of raw materials, fuel, and maintenance stores of all kinds within the limit of available funds;
- Replacement of and repairs to existing munitions establishments, works, buildings, plant, machinery, furniture and fittings within the limit of available funds;
- New works and buildings, machinery, plant, furniture and fittings not exceeding £2,000 in any one establishment at any one time.

AMENDED PROPOSALS.

The scheme of 1919 was based on the assumption that military requirements demanded that the factories should be maintained on a pre-war output, but the arrival of large quantities of military stores from abroad brought about a lessening of demand upon existing factories.

Further, the drastic reduction of Defence Estimates made towards the end of 1921, and the curtailment of the Universal Training system, necessitated a change in policy. Up to June, 1922, it had been the practice to run existing factories largely as trading concerns. This was costing about £700,000 per annum. In order to establish new factories and obtain the necessary plant, tools, equipment, &c., an additional £400,000 would have been required, making an annual total of £1,100,000.

With the greatly reduced Defence vote it was considered that the maximum amount which could be made available annually for Munitions Supply purposes would be approximately £500,000. The existing munitions factories were costing more than that amount for upkeep, and in order to obtain sufficient funds for the erection of the new factories and their maintenance, it was decided, with the concurrence of the Military Board, to reduce existing factories to a nucleus basis, which it was estimated would absorb £200,000 annually. The balance was to be allocated—£100,000 for experimental work and for the administrative and professional staffs, and £200,000 towards the construction of new factories and the purchase of plant and equipment. These considerations, coupled with the unprecedented rise in building costs and machinery prices since the 1919 scheme was drawn up, dictated a modified programme, which was approved in 1922. Briefly the difference between the two schemes is, that the 1919 proposals were intended to meet all the estimated peace requirements of an army of 300,000 men, whereas the 1922 programme merely provides nucleus factories of output capacity sufficient to train the staff in the technique of manufacture and to act as educational institutions for commercial establishments should rapid expansion become necessary. The estimated cost of the 1919 scheme was £1,203,814, whereas owing to increased prices the modified scheme of 1922 is expected to cost £1,316,230, although the resultant factories will not be so extensive.

The 1922 programme of the Munitions Supply Board, which has received the endorsement of the Government, is based on the following assumptions—

- That under peace conditions the sum available for Munitions Supply purposes is limited to £492,000 per annum;
- That the total cost of new construction and establishments as at present proposed is spread over six years;
- That existing factories are maintained on a nucleus basis.

The new factories contemplated under (b) comprise the following groups—

Ordnance and Shell:

For the manufacture of guns (18 pounders and 4.5 inch howitzers) and carriages; and shells up to 6 inch. This group is located at the former Royal Australian Field Artillery Reserve at Maribyrnong, where the existing buildings are being converted into offices and workshops, and groups of new buildings are in course of construction. The machinery and plant to be installed will be capable of making, if necessary, 3-in. naval guns, and will be useful in the manufacture of anti-aircraft guns. In the lay-out of the buildings provision is being made to meet future expansion.

Explosives and Filling:

For the manufacture of T.N.T. (trinitrotoluene) and other high explosives, and for the filling of shells and fuzes—to be established in conjunction with the Cordite Factory at Maribyrnong. The present objective is to turn out 18 pounder shrapnel and 4.5-in. howitzer rounds. Later it is hoped to devote time to the manufacture of star shells, gas shells, &c. The Factory is being laid out so that additional shifts can be readily worked and extensions easily carried out. The plant to be installed will be purely a military one, incapable of being put to any commercial use. The necessary earthworks, mounds, &c., have been completed, and the buildings are in course of erection.

Gun Ammunition:

Comprising the manufacture of fuzes, cartridge cases, and other non-ferrous component parts of gun ammunition—located on a site near the Small Arms Ammunition Factory at Footscray, where workshops are now in course of construction. A number of fuzes has already been manufactured in an experimental fuze shop at Maribyrnong.

Machine Guns and Pistols:

For the manufacture of Vickers machine guns, Webley revolvers and signal pistols—to be established in conjunction with the Small Arms Factory at Lithgow, New South Wales. As the British War Office is experimenting with a new revolver, attention is at present being directed

solely to the manufacture of the machine gun. A new general machine shop, essential to efficient working, has just been added to the Small Arms Factory. In this shop will be installed the heavy machine tools required for the repair and manufacture of machines. This arrangement will enable the present tool room to be extended and permit of a commencement being made with the manufacture of machine guns, pending the erection of new workshops for this section. A tender for the construction of the machine gun workshop has recently been accepted, and work is expected to commence shortly.

FINANCIAL POSITION.

Of the total estimated cost of the 1919 scheme of £1,316,230, the following had already been incurred when the new programme was finally approved:—

Group.	Estimated Cost.		
	Works and Buildings.	Plant.	Total.
	£	£	£
Ordnance and Shell		174,500	174,500
Gun Ammunition		59,100	59,100
Explosives	800	6,200	7,000
Machine Gun and Pistol		42,800	42,800
Laboratory	59,500	12,400	62,900
Inspection	5,330	9,600	14,930
Total	65,630	361,600	367,230

The estimated amount required to provide nucleus munitions factories with an output capacity based upon the Military Board's peace programme is £955,000, made up as follows:—

Factory.	Estimated Cost.		
	Buildings and Works.	Plant.	Total.
	£	£	£
ORDNANCE AND SHELL.			
Ordnance and Shell Tools		35,000	35,000
Forge	26,250	34,000	60,250
Carriage Plant		15,100	15,100
Gun Plant		5,900	5,900
Grading Land	5,870		5,870
Shell Shops	5,200		5,200
Power and Light		13,500	13,500
Gun and Carriage Shop	46,000		46,000
Accessory Services, Store Buildings, Roads, Drainage, Reconditioning, &c.	31,680	21,500	53,180
Total	115,000	125,000	240,000
GUN AMMUNITION, EXCEPT SHELL.			
Gun Ammunition Tools		12,600	12,600
Brass Foundry	8,000	5,500	13,500
Cartridges	27,195	8,200	35,395
Rolling Mill	9,600	5,800	15,400
Fuze Shop	20,800	5,600	26,400
Power and Light		9,500	9,500
Accessory Services, Store Buildings, Roads, Drainage, Reconditioning, &c.	21,205	6,000	27,205
Total	86,800	58,200	140,000
T.M.T.			
Shell Filling	39,100	13,930	53,030
Fuze Filling	110,900	13,120	124,020
Small Components	18,000	16,000	34,000
	19,100	9,850	28,950
Total	187,100	52,900	240,000
MACHINE GUN AND PISTOL.			
Machine Gun Tools		75,000	75,000
Pistol Tools		22,000	22,000
Machine Gun and Pistol	82,500	55,500	138,000
Power House	10,000	45,000	55,000
Total	92,500	197,500	290,000

ESTIMATED AMOUNT REQUIRED TO PROVIDE NUCLEUS MUNITIONS FACTORIES continued.

Factory.	Estimated Cost.		
	Buildings and Works.	Plant.	Total.
	£	£	£
LABORATORY AND INSPECTION	35,000	10,000	45,000
	35,000	10,000	45,000
SUMMARY.			
Ordnance and Shell	115,000	125,000	240,000
Gun Ammunition	59,500	53,200	110,700
Explosives	187,100	62,900	250,000
Machine Gun and Pistol	92,500	197,500	290,000
Inspection and Proof Range	35,000	10,000	45,000
Grand Total	516,400	438,600	955,000

The estimated annual cost of the new factories, when in full operation, is—

Group.	Wages.	Materials.	Maintenance, Stores, &c.	Total.
				£
Gun, Carriage and Shell	23,400	28,200	5,800	57,400
Gun Ammunition	45,000	23,200	18,800	86,800
Explosives	18,600	48,000	9,700	76,300
Machine Gun	36,000	1,400	6,600	44,000
Total	123,000	106,400	43,700	273,100

The following table sets out the manner in which the Munitions Supply Board proposed to allocate the amount of £492,000 which, as already indicated, is to be regarded as the maximum sum available annually for munitions supply purposes. The actual expenditure for the financial year 1922-23 and the amount which it is estimated will have been expended during 1923-24 are also shown.

	1922-23.		1923-24.		1924-25.	1925-26.	1926-27.	1927-28.
	Expenditure provided for.	Actual Expenditure provided for.	Expenditure provided for.	Estimated Expenditure provided for.	Expenditure to be provided for.	Expenditure to be provided for.	Expenditure to be provided for.	Expenditure to be provided for.
	£	£	£	£	£	£	£	£
Non-recurring Capital Expenditure, as detailed above—								
Buildings and Works	86,480	15,117	173,887	94,787	200,000	170,000	150,000	100,000
Plant and Tools	70,000	72,795	45,000	45,000				
Total	156,480	87,912	218,887	139,787	200,000	170,000	150,000	100,000
Cost of Munitions Supply Administration—(Administration and Contract Offices, Research Laboratories, Inspection Branch and Engineering Staff)—								
Salaries	34,033	33,000	46,474	46,000	51,000	52,000	53,000	54,000
Contingencies	5,562	5,604	7,282	8,800				
Total	39,595	38,604	53,756	54,800	51,000	52,000	53,000	54,000
Cost of operating existing Factories—								
Salaries	14,573	13,259	12,744	12,000	119,000	196,000	198,000	200,000
Wages and Stores	180,611	160,074	178,000	176,500				
Total	195,184	173,333	190,744	188,500	194,000	196,000	198,000	200,000
Expenditure on Production in New Factories	100,000	96,742	26,500	26,000	47,000	74,000	91,000	138,000
Grand Total Expenditure on Munitions Supply Branch	491,259	396,591	489,887	409,087	492,000	492,000	492,000	492,000

NOTE.—The difference between the £955,000, shown in the above Summary, and this programme of annual capital expenditure will be adjusted as the expenditure proceeds.

These estimates are based solely upon the Military Board's estimated output capacity. When the factories are completed it is expected that there will be a margin of capacity available for supplying Navy and Air requirements.

The programme of construction contemplates preference to buildings during the first years, but plant and tools will be prepared for installation while building is proceeding. Where facilities can be obtained in existing factories expenditure otherwise necessary is being deferred until it is essential. For example, a tool room for producing gauges, &c., for the Ordnance and Gun Ammunition Factories will not be erected at present, because for the time being all the tools required can be made at Lithgow and Footscray.

DESCRIPTIVE.

Particulars concerning the various factories which have been established are appended. Annual reports by the factory managers, together with a complete statement of accounts, are presented to Parliament each year, and, although somewhat belated on occasions, contain details which it is not considered necessary to incorporate in this Report. In the case of factories not being run on a commercial basis, it is proposed to adopt a simpler form of accounts than that hitherto in use and to treat them as ordinary Government departments; they will, however, be debited with depreciation, so that when work is resumed on a full production basis the plant will be shown at its proper book value.

CLOTHING FACTORY.

The Clothing Factory was established at South Melbourne, and commenced operations early in January, 1912. It manufactured all the uniforms required for the Permanent Forces and the clothing required by the trainees under the Universal Training Scheme. Later it was enlarged to permit of its manufacturing the uniforms required for the Naval and Postal departments. The outbreak of war of necessity greatly increased the activities of the factory, and large consignments of clothing were manufactured at short notice for the use of the troops. Although the factory could produce only about 5 per cent. of the clothing required, it was explained, in evidence that the Defence Department was helped materially by the manufacture of standard samples for issue to private contractors, thus setting an example of the high quality demanded and placing the Department in a position to fix reasonable flat rates for purchases from outside manufacturers. It was claimed that this factory has been particularly successful from a financial point of view, and that it has saved the Commonwealth over £1,000,000 sterling.

Owing to the cessation of hostilities, and the reductions in the Universal Training Scheme, very few orders were received from the Defence Department, and the factory was kept going through its success in obtaining contracts from the Victorian Railways and Police, Melbourne and Metropolitan Tramway Board, Ballarat, Bendigo, and Launceston Tramway Trusts.

When the Harness Factory was closed the canvas manufacturing plant was transferred to the Clothing Factory, where this work, principally for the Postmaster-General's Department, is now being carried out.

The factory is at present working on a nucleus basis, but if necessity arises it could employ up to 850 operatives.

CORDITE FACTORY.

The main function of the Cordite Factory, which commenced manufacture in June, 1912, is to supply the propellants for service ammunition. The factory also makes fulminate of mercury for percussion caps and detonators, and during recent years it has been manufacturing aeroplane dope—the coating for the fabric used on the wings of aircraft. The factory is capable of meeting all the peace requirements of the Commonwealth for cordite, and by working extra shifts the output can be increased considerably without any addition to the plant. During the war the factory worked at high pressure supplying local requirements, whilst large quantities of cordite were also shipped to New Zealand. Following the cessation of hostilities, and after a reserve sufficient to meet peace demands for a number of years had been built up, the factory was placed on a nucleus basis, manufacture being at present suspended.

ACETATE OF LIME FACTORY.

In 1916 acetone, one of the essential raw materials for the production of cordite, having become unprocureable owing to the war, the Commonwealth Government decided to establish a factory for the manufacture of acetate of lime, from which acetone could be readily produced. A site on the Brisbane River was selected. But considerable difficulty was experienced at that time in obtaining the necessary building material, machinery, and plant; high prices had to be paid for everything required, and skilled labour was at a premium. In consequence, the cost of erecting the

factory was greatly increased. Operations commenced in 1919, calcium acetate and alcohol were produced from molasses. To hold stocks of the raw material required for this factory a storage depot was established at Cairns, North Queensland. After the termination of the war it was found that the stocks of acetate of lime in hand were sufficient to supply peace-time requirements for a number of years. The main portion of the factory was therefore closed down in March, 1922.

In order to maintain the plant and utilize the molasses available, it was decided to convert the molasses into methylated spirit, for which there was a great demand by hospitals and other private consumers. Objection to this course was raised by local producers, and the output of the factory for public sale was limited to 120,000 gallons per annum, which was less than half its capacity. It was then suggested that the factory should cease supplying outside requirements and extend its activities to supplying the whole of the Commonwealth departmental services with industrial spirit for motor purposes—an estimated consumption of 300,000 gallons per annum.

This would ensure the proper maintenance of the factory plant and buildings, permit of the retention of the services of the trained staff, and enable the Department to utilize the molasses for the supply and delivery of which it had entered into contracts.

A committee, consisting of Messrs. Maguire (representing the Defence Department), Wilkinson (Commonwealth Analyst), and Little (Controller of Stores, Postmaster-General's Department), was appointed to investigate this suggestion, and having, after exhaustive tests, found it to be a practicable proposition, recommended the use of the following mixture which had been used for several months quite satisfactorily as a motor fuel: 70 per cent. alcohol, 20 per cent. benzol, 10 per cent. ether, to which were added 1 per cent. wood naphtha and 1 per cent. pyridine. It was found that the addition of the benzol and ether added considerably to the efficiency of the alcohol as fuel. Wood naphtha was included purely as a denaturant as required by the Customs Department, and pyridine, whilst acting also as a denaturant, was stated to be necessary in order to neutralize the small amount of acid formed from the combustion of alcohol fuel. It was stated in evidence that the inclusion of these denaturants, which were to safeguard the revenue, added 2d. per gallon to the cost of the mixture. On the other hand, it is maintained that the addition of ether, which can be manufactured from the alcohol produced at the factory, and which is also required for munitions making, would prove an efficient denaturant at a lower cost.

As it was found that the efficiency of industrial alcohol was only about 75 per cent. of that of petrol, it was considered that the price to be charged should be on the basis of the efficiency of the fuel, the difference between the cost and the amount received to be borne by the factory as a charge against its maintenance.

SMALL ARMS FACTORY.

The Small Arms Factory was established at Lithgow, New South Wales, for the purpose of manufacturing the rifles required by the Defence Forces of Australia, and was formally opened in June, 1912. It is generally conceded by those most competent to judge that at the date of erection the machinery installed in this factory was the most up to date in the world. It is stated, also, that the men trained at this establishment are much sought after in the engineering trade generally. During the war the factory worked continuously, and employed about 1,500 men, turning out rifles, ammunition chargers, brass buckles and studs, and other metal work. The factory had also to build about 150 machines for its own use during that period. Practically all the skilled work for the artificial limb factories in Australia and New Zealand was carried out at this factory. At present, however, only about 300 men are employed, and much of the machinery is standing idle.

Since the cessation of hostilities the factory has been supplied with a list of about 300 aeroplane parts required by the Royal Australian Air Force, and the manufacture of many of these articles has already been undertaken. Some Naval requirements have also been taken in hand, and the manufacture of the high class tools, gauges, &c., required by the other munitions factories is at present being carried out.

Dealing with the question of making munitions locally, the manager of the factory pointed out that the principal obstacles at present are the large variety of articles required and the relatively small number of each. To produce many of the components in the small quantities required at a competitive price was not possible. The consideration of cost was, however, waived to some degree, as the fact of being able to make such parts in the Commonwealth and so establish their manufacture was deemed sufficient to compensate for the difference in cost.

Knowing that the plant at the factory could be utilized for the manufacture of a large number of articles required by Government departments and commercial firms, the manager in March, 1920, submitted to the Defence Department a request to be permitted to tender for such outside work as could be done at the factory conveniently, and with good prospects of proving profitable. He pointed out that the taking in of such work would enable the Small Arms Factory to avoid breaking up its skilled organization in the tool room and machine shop, got together after much trouble and expense, and would afford work to an increased number of men. He considered

that it was most wasteful to allow plant like that at Lithgow to remain only partially utilized. He recognized that it might be said that the factory, by taking in such work, would be competing with private firms, but it had to be remembered that few, if any, firms had the facilities and organization to do the class of work the factory sought, and consequently such work would have otherwise to be sent abroad. He considered that, in the event of the Small Arms Factory undertaking such work, many private firms realizing the possibilities of manufacture in this country would seek to emulate the factory, and so increase production within Australia. As a matter of fact, in many instances the factory had proved its utility to private manufacturing concerns by the guidance and advice extended to them. The reply to this request was, briefly, that in the case of requirements for Federal or State departments, where the manufacture would not require the installation or acquisition of additional machinery, and such work could be profitably carried on, it would be approved, and that with regard to other work, if it could be shown that the manufacture could not be undertaken elsewhere, or that the goods could not be reasonably imported, the manager could accept such work for a limited period.

To further utilize the factory, the manager proposed that, in connexion with the manufacture of telephone parts and other requirements of the Postmaster-General's Department, the Small Arms Factory might submit quotations, with the prices for each item subdivided into (a) tool cost and (b) manufacturing cost with the understanding that the tools remain the property of the Postmaster-General; the advantages of this system being that the purchasing Department would know the ratio of tool cost to manufacturing cost, and thus enable it to realize the importance of standardizing items and ordering them in as large a quantity as possible. This system would show what probabilities there were of a substantial reduction in price on repeat orders, and would indicate the items for the manufacture of which it would be advantageous for the Postmaster-General's Department to possess tools and equipment. The adoption of such a system would obviate the unnecessary duplication of tools, which must occur where a number of contractors each supply a small quantity of the same article. Such tools could be loaned to contractors, or could be utilized in the Department's own workshops. Up to the time of the Committee's visit to Lithgow nothing definite had been heard by the manager concerning this proposal, beyond the fact that he had been supplied by the Postal authorities with quotation and tender schedules, and informed that consideration would be given to any offers submitted by him.

SMALL ARMS AMMUNITION FACTORY.

For many years prior to the war all requirements of the Defence Department in small arms ammunition had been supplied by the Colonial Ammunition Co. Ltd., a company founded for that purpose, which had erected extensive works at Footscray about 1888. The price paid for supplies was based upon the English price, plus an amount estimated to cover the cost of local production. When the war caused heavy demands to be made on the company in the way of extensions and plant, increased cost of materials, &c., an advance in the price was agreed to, and subsequently it was arranged that the company was to receive the full cost of ammunition supplied, plus an allowance for profit. After the armistice Defence requirements decreased considerably, and the company was faced with the position that it had a highly capitalized property with a very small output. In 1920 the company informed the Department that matters had become so acute that unless the situation was relieved it would have to cease operations. As a result of negotiations the Commonwealth took over the works on lease for a period of seven years from the 1st January, 1921, at an annual rental of £20,000, plus rates, insurance, &c., the company to make its own provision for depreciation. The Committee was informed that the only alternative to leasing or purchasing the works would have been for the Commonwealth to have established its own Small Arms Ammunition Factory, as such works are essential from a Defence standpoint.

HARNESS, SADDLERY, AND LEATHER ACCOUTREMENTS FACTORY.

The Harness Factory was established in 1911 for the manufacture of harness, saddlery and leather equipment. Later the manufacture of canvas goods for the Defence and Postmaster-General's departments was started. From its inception until the outbreak of war the factory was fully employed in producing leather equipment for the Forces raised under the Universal Training Scheme. During the war the factory turned out large quantities of high quality goods for the Australian Forces abroad. Before the establishment of this factory, it is stated, the Department experienced much difficulty in obtaining from contractors goods of the high standard required for military purposes, but the factory was able to demonstrate to private firms what was possible in turning out goods of the quality and workmanship demanded by the Defence Department.

On the termination of the war Defence requirements became negligible, and, in order to keep the factory going until future policy could be determined, the manager was permitted to take work for other government and semi-government institutions, such as Railways, Tramways, Fire Brigades, &c., and to supply harness and saddlery to returned soldiers settled on the land. Towards the end of 1922 orders fell off considerably, and in January, 1923, the manager reported

that he had only a few weeks' work in hand, and saw little prospect of securing further profitable orders. As manufacture was being conducted at a loss, and as there appeared to be no likelihood of reasonable use of the factory being made for purely departmental purposes, the Government decided to close the establishment, and this occurred on the 26th February, 1923. Such machinery, plant, and stores as were considered likely to be useful to other branches of the Department were transferred, the other contents of the factory were disposed of by public auction, but it was stated that the results obtained were not considered very satisfactory. The land and buildings were handed over to the Department of Home and Territories and have been sold. The Committee was informed that on the transactions of the factory since its inception, including the proceeds of its disposal, there was a surplus of approximately £40,000.

WOOLLEN CLOTH FACTORY.

The construction of the Woollen Cloth Factory was decided upon in 1911, and the factory was established at Geelong on a site which was a free gift from the Geelong Harbour Trust Commissioners. It commenced operations towards the end of 1915, and was equipped to meet the requirements of the Defence Department for the Universal Training Scheme. During the war extensions were made, and the mill rendered valuable service by supplying large quantities of military cloth, flannel, and blankets, and in checking prices submitted by private mills. The factory was kept fully occupied until the end of 1919 in supplying tweed for returned soldiers and in turning out the cloth required for the civilian suits issued to members of the A.I.F. on demobilization, but was sold in June, 1923, as a going concern, the Government stating that, with the cessation of hostilities and the curtailment of the Defence vote, the factory had become too large for purely governmental requirements.

WORK ACCOMPLISHED.

RESEARCH LABORATORIES.

The first important work undertaken to carry out the scheme propounded by Mr Leighton was the erection of the Research Laboratories at Maribyrnong. These laboratories have been established as a nucleus for the organization of Research and Inspection departments to investigate and direct the economic use of the industrial resources of the Commonwealth for war purposes and to act as a school of direction for the factory staffs and manufacturers. The duties for which the laboratories have been equipped are to determine, by experiment, methods for utilizing Australian materials in the production of munitions, to study processes of manufacture particularly in regard to products used in connexion with high explosives and chemical warfare, to assist manufacturers to meet the high standards required by the Department of Defence, and to conduct chemical and physical examination of goods required by the Department.

The work of the laboratories is organized through the following main divisions: Explosives and ammunition, general chemical, metallurgical, physical, chemical warfare, and scientific information, each in charge of a specially trained and highly qualified expert.

The laboratories have already rendered general and useful service to various Commonwealth and State departments, as well as to private manufacturers. In the latter case, however, the policy is, that if consulting chemists in private practice are in a position to perform the work the laboratory does not undertake it. Liaison has been established with various scientific societies and those controlling key industries in Australia, and these people have therefore acquired some knowledge of the assistance they will be able to render in time of emergency.

INSPECTION.

The Inspection Department, the early establishment of which was strongly recommended by Mr Leighton, is charged with the examination of all classes of munitions during manufacture to ensure conformity with the approved service design and requirements. Its work is divided into various sections, as required by its activities and responsibilities, viz.:

Armament, which deals with arms, explosives, and ammunition, all of which are subjected to very severe tests before acceptance.

Equipment, which is responsible for the collection of all information, technical and otherwise, the filing and keeping up to date of specifications and samples for the guidance of manufacturers.

Stores, which inspects articles such as clothing, boots, canvas, timber, iron, &c.

Aircraft, which undertakes the inspection of aeroplane parts.

Danger-building, which is responsible for the compliance with all safety regulations applying to establishments for the manufacture of explosives.

As the munitions supply programme expands, it will be necessary to create a Gun and Carriage Section for the inspection of ordnance to be manufactured at Maribyrnong.

To carry out proper tests on the shells produced, it will be necessary to establish a proof range, where the shell bodies might be recovered for examination purposes. It is proposed to acquire an area at Wakefield, South Australia, for this purpose, and the designs for the range are now with Mr. Leighton in England, where he proposes to submit them, in order that the latest expert advice might be obtained.

Close liaison is maintained with the British authorities, so that any alterations or amendments in their specifications, &c., are transmitted to Australia. In the case of simple amendments, the Chief Inspector may make the necessary alteration in the local specifications; but where an amendment involves much expense or re-organization, the matter is referred to the Munitions Supply Board or to the Council of Defence. The obvious reason for accepting the standard of British Service practice is that the Australian Forces must be equipped for co-operation. But there is in addition an important economic reason. The design, specification, and the accepted principles of use of war material are the consequence of laborious and expensive research in the United Kingdom. As the results of this experience are supplied to the Australian authorities, the Commonwealth is saved considerable expense, because it is from the ground work of British design that the Munitions Supply Board proceeds to the manufacture of the various articles, required for the Defence Forces of Australia. It is the policy of the Inspection Branch to assist local manufacturers in the production of articles which are required by supplying them with such information as has been acquired from the experience of other government establishments.

At present the activities of the Inspection Branch are confined practically to military goods, although a certain amount of inspection is performed for the Air Force. Very little work, however, is done for the Navy, which insists on following the Royal Navy practice of carrying out its own inspection, notwithstanding the fact that experienced men are available on the staff of the Chief Inspector. Although the attitude of the Navy might be considered reasonable so far as explosives are concerned, due to the greater risk on board a ship, the same argument cannot be applied to the inspection of articles, such as clothing, boots, &c. When the Inspection Branch was started, it was indicated that if a Naval Inspector were attached to the staff, the whole of the inspection work could be undertaken by it, and, although the then Minister for Defence issued instructions accordingly, no action has been taken in this direction.

WORKS AND BUILDINGS.

From the outset of the Committee's inquiry, it was repeatedly emphasized, in evidence, that much delay had taken place in the provision of the works and buildings necessary for the carrying out of the scheme, and that although in many instances funds had been available the work had either not been commenced, or very little progress had been made.

It was recognized as essential that unless the buildings were ready for the installation of machinery and plant, adherence to the programme would be impossible, and the development of the whole munitions supply scheme seriously delayed.

It was explained, on behalf of the Works and Railways Department, that the delays had been due to the difficulty experienced in obtaining suitable tenders, as well as to the dearth of professional assistance. Many of the works were highly technical and entirely new to Australia, and every feature of the buildings had to be set out in exact detail to ensure a complete working unit.

It is significant that, coincident with the Committee's inquiries on this aspect of the munitions supply activities, a conference of officials of the Works and Railways Department and of the Munitions Supply Branch was held to consider means whereby the work for which money had been voted by Parliament could be expedited.

As the result of this conference it was approved that certain works be put in hand immediately by departmental labour. Since the adoption of this system better progress has been made, but the position is stated to be still far from satisfactory, as will be seen from the fact that out of a total of £86,480 voted for buildings and works in the financial year 1922-23, only £15,117 was spent; and out of an amount of £173,887 appropriated for the same purpose in the following financial year, it is estimated that only £94,787 will be expended.

PLANT.

In addition to the buildings and works estimated to cost £516,400, plant and tools of an estimated total cost of £438,600 will have to be provided. The greater part of the actual manufacturing plant has already been obtained or ordered; but there will be required a considerable amount of costly equipment, such as power and light plant, electric motors, transport plant, cranes, steam, electric, pneumatic and hydraulic fittings, furnaces, &c. Much of this equipment will be manufactured in Australia, and some orders have already been placed. Amongst the plant

already purchased there is included a quantity of machinery bought after the close of the war from the Imperial Government under a special arrangement, whereby the Commonwealth received a rebate of 50 per cent. The net amount paid for machinery so purchased was £167,060. This machinery, it was stated, would have cost at that time, according to price lists available, £617,000.

The question of the manufacture of aeroplanes and aero-engines has not yet been considered in detail by the Munitions Supply Board, but it may be stated that the Board has in stock the majority of the machines required for such work. In this connexion the Committee draws attention to the following paragraph from the recommendations it made concerning the local manufacture of aircraft, after having investigated the question of the expenditure on Air Services.

"Having regard, therefore, to all the circumstances, the Committee is of opinion that the best results will be obtained by setting up, in conjunction with a research establishment, a parent government factory, well stocked with the necessary raw materials pending their ultimate local production, which would be responsible for experimental and developmental work, and for the organization of engineering works throughout the country, so that in time of emergency the whole strength of Australia's engineering capacity could be readily turned to the efficient production of Defence requirements."

(See Report of the Joint Committee of Public Accounts on the Expenditure on Air Services Parliamentary Paper No. 19, 1923, Second Session.)

RAW MATERIALS.

Recognizing that without the necessary raw materials all efforts to produce munitions would in time of emergency, be rendered futile, the Committee made special inquiries concerning the steps being taken to ensure having within Australia adequate supplies of the materials essential in the manufacture of munitions, and was assured that special attention was being devoted to this question by the Munitions Supply Board. The Research Laboratory, with its scientific and technical staff, has been specially equipped for the purpose of investigating from the munitions standpoint the resources of Australia in this direction.

In the case of new manufactures the greater part of the raw materials required for the first year's output has been ordered from England. When these goods have been received they will be closely examined, with a view to their local production; this will apply particularly to the metals and chemicals.

Mr. Leighton, in his evidence, stated that he considered Australia was as well off in regard to raw material as any country in the world with which he was acquainted, as it would have to depend on outside supplies to only a limited extent. No country in the world, he added, was entirely self-contained; self-containment was more or less a question of degree, but whenever the problem of obtaining a necessary raw material in Australia had been faced, it had been successfully overcome. The manager of the Small Arms Factory at Lithgow explained to the Committee that, owing to the disruption of shipping during the war, he was compelled to seek more of his supplies within Australia, and it was during that period that the local manufacture of the fine grades of steel was developed at the Lithgow Steel Works, the advantage of the use of the steel having access to the Steel Works and being able to keep in close touch with the manufacturers being emphasized. He added that not only had the price of the local product compared favourably with that of the imported article, but that the quality of some of the by-products (for example, was superior.

Many industries already established in Australia can be relied upon to provide supplies of necessary raw materials, such as coal, iron, steel, copper, zinc, lead, tin, mercury, tungsten, sulphides, sulphuric acid, glycerine, coal by-products (ammonia, benzene, toluene and phenol) mineral oil, timber, cotton, &c.

COMMENCEMENT OF OPERATIONS.

It is expected that, so far as the new factories are concerned, there will be no output until 1925. Even when the buildings and accessory services have been completed and the plant installed, it is estimated that approximately a year will be occupied in developmental and experimental work before continuous output can be assured. In the passage from the approved design of an article to its mass production difficulties are met with, and particularly so in the case of Service supplies where the limits of acceptance in regard to dimensions and performance are narrowly drawn, and the problem is sometimes complicated by the fact that the original design has been determined on qualities possessed by raw materials available in England, but not perhaps obtainable in Australia. The successful pursuit of the policy of self-containment entails exhaustive comparison of Australian with British materials, and in some cases search for a satisfactory substitute, bearing in mind the permanence of physical and chemical properties under the climatic and other conditions peculiar to this country. It is considered that complete 18-pounder ammunition will be available in 1925, guns and carriages in the following year, and complete machine guns during the year 1927-28.

ORGANIZATION OF INDUSTRY.

The Committee realized that no government arsenal or group of munitions factories could be expected to produce more than a fraction of the demands for intensive warfare, but that the functions of such an establishment should be firstly to supply peace requirements, and secondly, and more importantly, serve as a school for training men who, in the event of hostilities, could go out to private engineering shops and help to bring them into action as munitions factories. Particular attention was therefore devoted by the Committee to the question of organizing existing industries. Mr Leighton was of opinion that the existing industrial resources of Australia, if taken advantage of and provided with the necessary expert knowledge, could be organized to produce munitions in the relatively near future. The first step to be taken, however, depended on the creation of nucleus factories which would serve as models to those establishments which would be converted when necessity arose. Whilst these essential departmental factories are in course of construction, the preparation of a comprehensive scheme for the utilization of Australian manufacturing resources is proceeding.

Evidence heard by the Committee from representatives of establishments, which might be regarded as almost indispensable to any such scheme of organization as is proposed, indicated that it was essential that the key industries of Australia required for Defence purposes should be consulted closely, definitely, and regularly as to what they were doing, and should be advised whether it might possibly be desirable to slightly change their policy, or adopt a modified method of working which would prove more useful in meeting the demands in an emergency. The placing of trial orders by the Department for shells or other requirements, would encourage manufacturing concerns to have available the necessary tools, gauges, plant, &c., essential for this work, and would enable the workmen to become familiar with the process of manufacture. The consensus of opinion was that the most efficient method by which Australia could reach the stage where it could produce its own munitions is the development of engineering, tool-making, and similar manufacturing industries. The massed production of armaments or munitions involves the laying down of very extensive and expensive plant, and many complex problems are involved. Consequently a manufacturer cannot be expected to put in the necessary plant unless the Commonwealth is prepared to subsidize the installation, for in many instances such plant cannot be utilized for any commercial purpose.

CONTRACT BOARD.

As the Munitions Supply Board is charged with the provision of stores of all kinds, it follows that the Contract Board, whose duty it is to invite tenders or quotations for all purchases authorized for the Defence Department, should be placed under its control. The personnel of the Contract Board consists of the Chairman and members of the Munitions Supply Board *ex officio*; an officer nominated by the Munitions Supply Board, who is Chairman of the Contract Board; and one officer each nominated by the Naval Board, Military Board, and Air Board and by the Secretary for Defence. The last-named representative is the executive member and secretary of the Board. By thus having a representative of each of the Services it has been found that mutual benefit results.

In war time the Contract Board was authorized to enter into period contracts up to £10,000, but the limit of the Board's authority has now been reduced to £2,500. Any contract above that sum must be referred to the Minister through the Munitions Supply Board.

In each State, except Victoria where the Central Board operates, District Contract Boards have been appointed to deal with single contracts not exceeding £100 or period contracts up to £250, except in the case of New South Wales, where, owing to the quantity of Naval stores handled, the limits have been fixed at £250 and £500 respectively.

All transactions of the District Boards are reported in detail each month to the Central Board which, if not satisfied with the arrangements made, indicates what action should be taken in future cases.

In the case of large contracts the Department holds security, so that in the event of the performance of the service not being to the entire satisfaction of the Department the contract can be cancelled the security forfeited, and the contractor's name removed from the official list of suppliers. Endeavours are also made to break up monopolies, and with regard to some articles the Board has been successful.

It is the policy of the Contract Board to procure Australian-made goods, wherever possible, and for this purpose a complete list of manufacturers and their capabilities has been compiled.

The Committee was informed that, although there had been a decided tendency for the Navy to import goods in preference to accepting the locally produced article, this practice was gradually being modified. Before any goods can be ordered from abroad the indents have to pass through the office of the Assistant Secretary for Defence for the Minister's signature, and it is the duty of that official to review such orders to ensure that nothing which can be obtained in Australia is imported.

Although the Defence Department utilizes the services of the Commonwealth Supply and Tender Board whenever possible, it has been found necessary to have its own inter-departmental board, owing to the technical nature of many of the articles required for the Defence Services and the urgent demands which often arise, especially in the case of the Navy.

It was stated on behalf of the Contract Board that the prices paid in all contracts and purchases were considered reasonable, and that no business had been entered into without every effort having been made to ensure the best possible value for the Commonwealth.

SURPLUS STORES.

The disposal of surplus stores is a duty which has been delegated to the Contract Board. These stores are received from the Naval, Military, and Air Forces, and comprise all descriptions of surplus or unserviceable stores in various conditions. The Board considers the state of the goods, and according to their nature and the probable demand for them, determines how the sales are to be effected—in what quantities, and whether by public auction or private treaty. Following the cessation of hostilities, retail sales were held in the various States over a period of two and a-half years with, it was stated, very satisfactory results.

COMMITTEE'S OBSERVATIONS AND RECOMMENDATIONS.

The primary duty of the people of the Commonwealth is to defend Australia, and, if that duty is to be successfully and properly performed, safety in munitions supply is an object of urgent need, and one that should be attained as quickly as is consistent with a reasonable solution of all the problems associated with it. Hitherto when Australian Forces have been engaged in war they have been supplied with the major portion of their essential munitions by the British or Allied Forces with whom they have been associated. But an Australian Defence policy demands that this country should be in a position to supply its own munitions of war.

In determining the amount to be expended on Defence, including munitions supply, whilst making adequate provision for the Nation's security, the danger must be avoided of involving the country in expense which it might be ill able to bear. A policy once decided upon should proceed systematically from year to year, and should not be departed from unless international situations create entirely new conditions.

If the required munitions can be made in Australia so much the better, but if our industrial resources do not promise early production it would be unwise to permit the laudable desire for self-containment to stand in the way of efficient defence. Self-containment is, after all, only relative, and advances with the development of raw materials and the growth of the manufacturing capabilities of a country. At the outset, therefore, the wisest policy is to concentrate on the manufacture of those goods which can be produced locally, and build up stocks of such goods as must be imported, pending their ultimate production in Australia.

The Committee is of opinion that the production of munitions to be manufactured in Australia should be based on local raw materials, and it urges the fullest utilization of the resources of the Commonwealth in this direction. The research work demanded by such a policy, and the establishment of a group of factories, controlled by experts and staffed with trained and experienced men, where the experimental and developmental work can be carried out, is essentially a function of the Government.

Provision for research work having been made and the Governmental factories having been established, the Committee is of opinion that the organization of all Government and private engineering workshops throughout Australia should be so arranged that in an emergency the whole strength of Australia's engineering capacity could be readily turned to the efficient production of Defence requirements. In the development of such a scheme the Defence authorities, through their munitions experts, should keep in close touch with those engaged in the key industries of the Commonwealth in order that they may be made acquainted with the needs of the Department, and be encouraged to adjust certain methods or processes which would permit of their works being converted to munitions plants with the least possible delay.

The present munitions supply programme, maintaining on a nucleus basis the existing factories for the manufacture of rifles, cordite, and small arms ammunition, and aiming at the production within Australia of 18-pounder guns and 4.5 inch howitzers, together with their necessary carriages and shells, and the manufacture of machine guns and pistols, is based on the foregoing considerations, and, with an annual allotment of approximately half a million pounds, will extend over a period of six years and reach finality in 1927-28.

The Committee is convinced that this programme represents a decided advance in making Australia more dependent on her own resources. The control and execution of the scheme are in the hands of chemical, engineering, and other experts who have received special training for the work in their respective spheres, and whose qualifications and experience should prove of benefit to the Commonwealth.

But if this scheme is to function, as planned, adherence to the construction programme is essential. Almost two years of the period have now expired, and the progress in this direction has been disappointing. In view of the serious consequences which might arise from delay, the Committee considers it imperative that special efforts should be made by the Department of Works and Railways to expedite the munitions supply works. In point of magnitude and cost these works represent only a small percentage of the total works requirements of the Commonwealth, yet their importance is immeasurable. If a definite assurance can be given that the constructional work will be so accelerated during the current financial year that the programme can reach the point originally contemplated for the 30th June, 1925, the Committee recommends that the Works Appropriation for the financial year 1924-25 should be increased to enable the deficiency to be made good and the new works arranged for that year to be commenced.

The Committee considers that early steps should be taken to co-ordinate the inspection of requirements for the Naval, Military, and Air Services as contemplated when the Inspection Branch was created.

Whilst the Committee is generally in accord with the decision to place on a nucleus basis those factories which can be used solely for the manufacture of munitions, some of the factories are equipped with machinery and plant capable of being put to productive use, and the Committee is of opinion that it is false economy to have valuable machines lying idle and staffs of skilled workmen employed on merely skeleton production, and considers that the principle of utilizing the existing factories to produce goods required for Governmental use should be further extended, provided, of course, that the functions of the factories as munitions plants are not unduly interfered with.

The utilization of the Acetate of Lime Factory for the manufacture of alcohol fuel for the use of Commonwealth Departments is a case in point, and the Committee is of opinion that such action is the most useful and practicable which can be adopted in order to preserve to the Commonwealth an essential link in the chain of its munitions supply. As well as possessing the economic advantages of retaining within Australia public money which would otherwise be spent abroad, the experience which will be gained by the Defence authorities in the manufacture of one of the first essentials in modern transport will prove of inestimable value to Australia should supplies of petrol be cut off in an emergency.

It appears to the Committee, however, that the necessity for a denaturant, which adds about 2d. per gallon to the cost of power alcohol produced solely for departmental purposes, is unwarranted. A more economical plan would be to utilize, as a denaturant, ether manufactured from the alcohol produced at the factory itself, and adopt for the control of the use of the spirit such measures as would adequately safeguard the revenue and prevent irregularities.

The question of producing power alcohol as a commercial proposition has been receiving earnest attention during recent years in various countries; in Great Britain a bonus is offered for the production of alcohol fuel, whilst in France, 10 per cent. of alcohol must be added to all petrol used. Having in mind Australia's annual consumption of 33,000,000 gallons of petrol, and the vital necessity for fuel for motor transport, particularly in war time, the Committee recommends that serious consideration be devoted to the question of producing within the Commonwealth greater quantities of liquid fuel, and so help to relieve Australia from its present dependence on overseas supplies.

Although not directly associated with the question of producing munitions, the problem of transportation appears to the Committee to be a matter worthy of reference. Without efficient and speedy means for conveying munitions to their required locations in time of need their production might easily be rendered futile. For military purposes, railways and roads are complementary. In Australia at present railway development is ahead of roadway construction; but railway

communication is hampered by the breaks of gauge and the great lengths of single line, whilst many of the lines are not advantageously placed from a strategical point of view. Construction of roads to provide quick and reliable means of communication, particularly for motor vehicles, is now receiving more attention, but much has yet to be accomplished before the needs of the country are met. The Committee is of opinion that the question of placing the internal communications of the Commonwealth on a sound basis to provide for the adequate defence of Australia demands early consideration and prompt action.

J. G. BAYLEY,
Chairman.

Office of the Joint Committee of Public Accounts,
Federal Parliament House,
Melbourne, 4th July, 1924.

