

LABORATORY REPORT

REF. NO. 27.06.94

LABORATORY ACCREDITATION *Origins of a Concept*

Keith Stanton

Neoprene
A.S. 1646-1
Cured 5' @ 160°C, Tested @ 23 ± 2°C

METHOD
AS1683.15.1
AS1683.11
AS1683.11

AS1683.13B
AS1683.13B

BS 903.A19
AS1683.15.1
AS1683.11
AS1683.11

AS1683.23

AS1683.23

SPECIFICATION

15 To 54
1 Min.
500 Min.

12 MAX.

20 MAX.

5 Max.

20 Max.

30 Max.

4 Max.

15 Max.



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LABORATORY ACCREDITATION

Origins of a Concept

Keith Stanton



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CHAPTER 1 - Introduction

The world's first national laboratory accreditation system was established in Australia in 1947. The second national system was established in New Zealand in 1972. Today, most developed countries have established national systems.

Why did Australia establish its system so many years in advance of other countries? This report traces the events which resulted in establishment of the National Association of Testing Authorities (NATA) in 1947. It is based on a range of reports, papers and minutes and on the author's recollection of discussions with Mr G Lightfoot, Sir John Madsen and Mr W R Hebblewhite in the period 1947 to 1950.

The term "laboratory accreditation" was not in general usage prior to the 1970's. Today, it has international recognition for the concept previously described by terms such as "test house approval" and "laboratory registration."



K N STANTON

(August 1994)

ACKNOWLEDGEMENTS

This report is dedicated to the memory of Mr J G (Jack) Ritchie, OBE, who suggested this project.

Mr Ritchie was an active participant in the technical work of NATA for many years. He was Chairman of NATA Council from 1961 to 1979 and was made an Honorary Member of the Association in 1990.

Many organisations and individuals assisted the author. Special thanks are due to:

The CSIRO Archives, Canberra.

Mr J A Birch, Executive Director, National Standards Commission.

The National Association of Testing Authorities, Australia.

THE MAJOR CONTRIBUTORS

There are frequent references in this report to three people - Mr G Lightfoot, Sir John Madsen and Mr W R Hebblewhite. All three were professional engineers but they had very different personalities.

Lightfoot was an elegant and rather aloof Englishman. Madsen seemed to delight in hiding his considerable intellect behind a rugged exterior. Hebblewhite was a precise person with the demeanour of a judge.

Mr G Lightfoot



Gerald Lightfoot graduated with First Class Honours in the Mechanical Sciences Tripos and was elected Foundation Scholar, Pembroke College, Cambridge in 1898. He acquired several years of engineering experience after graduation. In 1902, he was called to the Bar at the Middle Temple, London and specialised in patent and technical legal work.

He migrated to Australia in 1906 with the intention of specialising in patent and technical legal work. But this work was scarce and he joined the professional staff of the Census and Statistical Bureau. He was elected a Fellow of the Royal Statistical Society, London in 1915.

Lightfoot was appointed chief executive officer of the Commonwealth Advisory Council of Science and Industry in 1916. He retired as Secretary of CSIR in 1944. It is surprising that he was not awarded a formal honour by his adopted country.

Sir John Madsen



John Madsen graduated from the University of Sydney in Science with First Class Honours in 1900, and in Engineering with First Class Honours from the University of Sydney in 1901.

After a distinguished career as a lecturer at universities in Adelaide and Sydney, he was appointed Professor of Electrical Engineering, University of Sydney in 1920. He was knighted in 1941. He retired from the Chair of Electrical Engineering in 1949.

Mr W R Hebblewhite, OBE

Rayner Hebblewhite graduated in Mechanical Engineering with Honours from the University of Sydney in 1911.

After a lecturing career at the Royal Military College, Duntroon and the University of Sydney, he was appointed as the first full-time officer of the Australian Commonwealth Engineering Standards Association in 1924. He was appointed as the first Director of the Standards Association of Australia in 1929. He was elected President of The Institution of Engineers, Australia in 1949. Hebblewhite retired as SAA Director in 1953.

CHAPTER 2 – The Commonwealth of Australia

In the late nineteenth century, Australia had no national identity. There were six states - New South Wales, Queensland, South Australia, Tasmania, Victoria and Western Australia. Each state was a colony of the United Kingdom. Each state had its own weights and measures statutes and facilities and its own testing laboratories (mainly chemical laboratories). The six weights and measures authorities relied on the United Kingdom for traceability of their standards of measurement (mass and length). Agriculture and mining were the major productive activities and secondary industries were of minor importance.

In 1890, the Warden of Standards South Australia, Mr R B Lucas, proposed a federal system of weights and measures and adoption of the metric system.

In January 1893, the six colonies agreed to form a union of states under a central federal government. This agreement became effective on 1 January 1901 when the six colonies were federated under the name "Commonwealth of Australia." The new Commonwealth was given specific powers. All other powers were retained by the colonies which became sovereign states.

The specific powers vested in the new Commonwealth included:

- (1) trade and commerce with other countries and among the states
- (2) the naval and military defence of the Commonwealth and of the several states
- (3) weights and measures (legal metrology).

Other powers related to standardisation, testing and measurement were retained by the sovereign states. (Subsequent amendments to the Constitution of the Commonwealth have not affected this division of powers). The nett result was that an effective Australian infrastructure for standardisation, testing and measurement could not be achieved without the support of the Commonwealth and of the six sovereign states.

CHAPTER 3 – From Federation to 1920

In 1910, the Department of Defence established the Chemical Adviser's Laboratory at Victoria Barracks, Melbourne. This modest laboratory became the Munitions Supply Laboratories which played a major role in the development of testing and measurement in Australia.

In 1913, the Government Astronomer for Victoria, Mr P Barrachi, advocated creation of a national institution "to secure uniformity throughout the Commonwealth in measurements of all kinds for both scientific and practical purposes."

In 1914, Madsen delivered the Presidential address to the Electrical Association of New South Wales. In his address he referred to the national measurement laboratories of Europe and USA and said:

"There are many difficulties in the way of establishing a Federal institution and although we must recognise that such an institution must eventually be established, it would seem advisable for the individual States to pave the way by making suitable provisions for State laboratories."

Madsen went on to say:

"I am personally of opinion that the prospects of electrical development in this State are sufficiently assured to warrant the establishment of such an institution which shall deal not only with electrical matters but with those of weights and measures and the testing of materials generally."

Thus, Madsen brought together the issues of weights and measures (legal metrology) and testing and measurement for industry. He also emphasized the need for cooperation between the Commonwealth and the States.

During World War I (1914-18), Australia's inability to assist the United Kingdom by providing munitions of war was an acute embarrassment to the Commonwealth Government and to the leaders of Australian industry. Australia's professional engineers recognised that two of the basic problems were the lack of national standards of measurement and the lack of a national standardising body.

In June 1916, the Commonwealth Government established the Commonwealth Advisory Council of Science and Industry with Lightfoot as its chief executive officer. This was a temporary body to prepare the way for a permanent Institute of Science and Industry. In its 1916-17 report the Council recommended that arrangements be made for:

- (1) the standardisation of scientific apparatus and instruments
- (2) the testing of electric lamps, apparatus and machinery

- (3) the testing of instruments of precision used in industry
- (4) the physical testing and standardisation of materials used by industry and by the Commonwealth Government.

It would seem that the Council used the term "standardisation" for both standards of measurement and standard specifications. Lightfoot clarified this issue in 1919 when he advocated:

- (1) development of agreed standard specifications for manufactured articles and establishment of a Commonwealth Engineering Standards Association, and,
- (2) a national measurement system based on an institution similar to the National Physical Laboratory of the United Kingdom.

In September 1920, the Commonwealth Government assented to *The Institute of Science and Industry Act, No 22 of 1920*, which established a permanent Institute in place of the temporary Advisory Council. This act stated the powers and functions of the new Institute including:

"the testing and standardisation of scientific apparatus and instruments and of apparatus, machinery, materials and instruments used in industry."

This was the thought starter which led eventually to the concept of laboratory accreditation. It may also have led to the subsequent treatment of weights and measures (legal metrology) as a separate issue from testing and measurements for industry.

Lightfoot was of the opinion that it was not appropriate for a scientific research organisation to engage in activities such as standardization and testing. But he considered it to be a responsibility of the new Institute to sponsor a national infrastructure to perform these functions. He saw the need for:

- (1) a national authority to prepare standard specifications, codes of practice and standard test methods
- (2) a national standards mark
- (3) national standards of measurement
- (4) a comprehensive range of testing and measurement facilities with national recognition.

Lightfoot had firm ideas on the solutions to (1), (2) and (3). His background as a patent attorney probably influenced his emphasis on a national standards mark. His reports on overseas visits explained in considerable detail the "official" testing laboratories of other countries including the United Kingdom and USA but they did not propose an Australian solution to (4). Many years were to pass before this solution was found.

CHAPTER 4 – From 1921 to 1935

There were many developments from 1921 to 1929 which influenced the subsequent decisions on national standards of measurement and laboratory accreditation. Because of the severe economic depression which began in 1929, there were no significant developments from late 1929 to late 1935.

In April 1921, the Director of The Institute of Science and Industry, Mr G Knibbs (later Sir George Knibbs) recommended to the Commonwealth Government:

- (1) a program of research related to both primary and secondary industries, including research in metrology
- (2) establishment of legal standards of measurement
- (3) formation of an Australian Engineering Standards Association.

Finance for (1) and (2) was not forthcoming but the Australian Commonwealth Engineering Standards Association was established in 1922, due mainly to the efforts of Knibbs and Lightfoot.

Also in 1922, the Chemical Adviser's Laboratory of the Department of Defence moved to more spacious premises at Maribyrnong, Victoria, and its name was changed to Munitions Supply Laboratories (MSL). All the MSL professional officers were chemists until a physicist, Mr N A Esserman, was appointed in 1923. His appointment began a period of sixteen years during which MSL acquired high quality standards of measurement traceable to the National Physical Laboratory (United Kingdom). These standards of measurement were technically superior to those held by the State Weights and Measures authorities and covered a wider range of physical quantities. MSL also acquired the staff and the facilities to perform the calibrations needed by those secondary industries which produced munitions to defence specifications.

In 1924, Hebblewhite was appointed as the first full-time officer of the Australian Commonwealth Engineering Standards Association (ACESA). In 1925, Mr A E Leighton, Controller-General of Munitions Supply and ACESA raised the issue of establishment-of a national standards laboratory but there was no response from the Commonwealth Government.

In June 1926, the Commonwealth Government assented to *The Science and Industry Research Act No 20* of 1926, which amended *The Institute of Science and Industry Act No 22* of 1920. The 1926 Act replaced The Institute of Science and Industry with the Council for Scientific and Industrial Research (CSIR). It prescribed that a representative Council would control CSIR and that an Executive Committee would conduct its affairs between Council meetings.

The CSIR Executive Committee comprised Sir George Julius (Chairman), Sir David Rivett, Dr AEV Richardson and Lightfoot (Secretary). Lightfoot held this position until his retirement in 1944.

Shortly after its appointment, the CSIR Executive Committee recommended to the Commonwealth Government that, pending establishment of a national standards laboratory, the standards of measurement held at Munitions Supply Laboratories should be recognised as the common standards of measurement of Australia. This eminently sensible recommendation was ignored by the Commonwealth Government.

Also in 1926, the CSIR Executive Committee hosted a conference on the scientific resources needed for secondary industries and defence. The conference concluded that they needed facilities comparable to those of the national physical laboratories of other countries. It rejected the proposal for a national standards laboratory on the grounds that this would be a wasteful duplication of the facilities of existing Australian laboratories. It supported immediate action on uniform legal standards of measurement throughout Australia.

In October 1926, Madsen wrote to the CSIR Executive Committee suggesting that a small committee be formed to advise on ways and means to meet the nation's needs for national standards of measurement. The CSIR Executive Committee appointed an ad-hoc committee comprising Madsen (Chairman), Professor T Laby of the University of Melbourne, Professor Kerr Grant of the University of Adelaide and Mr N A Esserman of Munitions Supply Laboratories. This committee recommended that:

- (1) it would be premature to establish a national standards laboratory
- (2) standards of time should be the responsibility of the observatories
- (3) standards of mass and length should be the responsibility of Munitions Supply Laboratories
- (4) electrical standards should be the responsibility of the universities

The Council of CSIR decided that a more comprehensive enquiry was needed and in 1927 appointed a "Committee on the Maintenance of Standards." Its members were Madsen (Chairman), Messrs M Bell and N A Esserman of Munitions Supply Laboratories and Professor O U Vonwiller of the University of Sydney. In 1929, this committee recommended:

- (1) a Commonwealth Standards or Weights and Measures Act

- (2) that CSIR be responsible for maintenance of the Commonwealth standards of measurement
- (3) that CSIR Council establish a Standards Board
- (4) that arrangements be made with the following organisations to carry out the work required until a Commonwealth Standards Laboratory was established:
 - (a) Metrology - Munitions Supply Laboratories
 - (b) Physics - University of Melbourne, Department of Physics
 - (c) Electricity & Wireless - University of Sydney, Department of Physics
 - (d) Electro-technics & Photometry - University of Sydney, Department of Electrical Engineering.

No action was taken on these recommendations.

Meanwhile, in April 1928, Sir George Julius (CSIR Chairman and a consulting engineer) told CSIR Council that Australia's future was in agriculture rather than in secondary industries.

Another event, in 1928, soured the relationship between CSIR and the Department of Defence and had consequential effects on the introduction of Australia's national laboratory accreditation system some twenty years later. The CSIR Executive Committee proposed to the CSIR Council that a Forest Products Division be established. A Member of the CSIR Council, Mr A E Leighton, Controller-General of Munitions Supply, strongly opposed this proposal. He argued that the laboratories of the Department of Defence had the facilities and staff to undertake this research and that establishment of a CSIR Forest Products Division would be a waste of scarce national resources. Despite his advocacy, the CSIR Council decided to establish a Forest Products Division. Mr Leighton resigned from CSIR Council, and CSIR and the Department of Defence went their separate ways.

In July 1929, the Australian Commonwealth Engineering Standards Association and the Australian Commonwealth Association of Simplified Practice amalgamated as the Standards Association of Australia (SAA). Sir George Julius was appointed as SAA Chairman and Hebblewhite was appointed as its General Secretary.

In November 1935, the Associated Chambers of Commerce wrote to the Prime Minister proposing legislation for uniform weights and measures. The CSIR Executive Committee supported this proposal. The Commonwealth Government approved the proposal in principle and decided to refer it to the next conference of Commonwealth and State Ministers. No further action was taken.

CHAPTER 5 – The Secondary Industries Testing and Research Committee

The issue of research for secondary industries was raised at a meeting of the CSIR Executive Committee in May 1936 when two letters were tabled:

- (1) A rather bizarre letter from the Brisbane City Engineer requesting CSIR financial support for research on storm-water drains.
- (2) A letter from Prime Minister's Department seeking CSIR advice on the establishment of an engines research laboratory in Australia.

The Executive Committee decided to recommend to the Commonwealth Government that a committee be established to consider the research requirements of secondary industries. The Commonwealth Government accepted this recommendation and decided that:

- (1) the Chairman of the committee should be Sir George Julius
- (2) the Secretary of the committee should be Hebblewhite, on secondment from SAA
- (3) the Controller-General of Munitions Supply, Mr A E Leighton, should be made available as a member of the committee
- (4) the CSIR Executive Committee should arrange membership of the committee
- (5) Sir David Rivett, a CSIR Executive Committee member, then in the UK, should obtain relevant information from British institutions including the National Physical Laboratory and the Air Ministry Laboratory at Farnborough.

Mr Leighton, who had resigned from CSIR Council in 1928 on the issue of forest products research, declined nomination to the committee. Hebblewhite was a Branch President of the political party of the Minister for Defence and his branch was in the Minister's electorate. Hebblewhite persuaded the Minister that his department should cooperate and the department promptly nominated Mr J T McCormick, Chief Superintendent, Munitions Supply Laboratories, for membership of the committee. Membership of the committee was finalised in July 1936. In addition to Sir George Julius (Chairman), Hebblewhite (Secretary), Lightfoot and Madsen the members were:

Professor Sir Henry Barraclough, *University of Sydney*

W E Bassett, *Consulting Engineer*

I H Boas, *CSIR Division of Forest Products*

L Bradford, *The Broken Hill Proprietary Company Limited*
M T W Eady, *Victorian Chamber of Manufactures and McPherson's Limited*
A J Gibson, *Consulting Engineer*
R Grimwade, *Felton Grimwade and Duerdins Pty Ltd*
L J Hartnett, *General Motors Holdens Ltd*
F P Kneeshaw, *Associated Chambers of Manufactures and Kandos Cement Co Ltd*
A Maughan, *The Liverpool Electric Cable Co Ltd*
J T McConnick, *Munitions Supply Laboratories*
Professor A E V Richardson, *CSIR Executive Committee*
Sir David Rivett, *CSIR Executive Committee*
H Tindale, *The Australian Gas Light Company*
JP Tivey, *Australian General Electric Ltd*
Professor O U Vonwiller, *University of Sydney*

The choice of members of this committee is open to criticism on the following grounds:

- (1) the States were not represented
- (2) the weights and measures (legal metrology) authorities were not represented
- (3) all members were residents of New South Wales or Victoria
- (4) all academic members were from University of Sydney
- (5) significant secondary industries, including textiles and food processing, were not represented.

The committee tackled its difficult task with enthusiasm and presented a comprehensive report in July 1937. The report recommended:

- (1) legislation for Australian legal standards of measurement
- (2) establishment of an Australian Standards Laboratory
- (3) that CSIR bring into being a co-ordinated scheme for the organization of gauging, calibration, testing and certification services
- (4) that CSIR survey the availability of raw materials and methods by which they could be used to facilitate establishment of new industries
- (5) establishment of an aircraft and engine testing laboratory in Australia

- (6) that CSIR explore the need for research in certain branches of secondary industry such as metallurgy, chemistry, physics and engineering
- (7) that CSIR extend its information service to include subjects of interest to secondary industries
- (8) expansion of the resources and facilities for the training of research personnel to meet the requirements of research into problems affecting secondary industries.

Recommendations (4), (5), (6), (7) and (8) are not of direct relevance to the subject of this report and the remainder of this chapter discusses recommendations (1), (2) and (3).

LEGAL STANDARDS OF MEASUREMENT (RECOMMENDATION 1)

The committee recommended:

"That legislation be introduced in order to provide for the adoption of the legal standards of measurement in Great Britain as the legal standards for the Commonwealth of Australia. A draft bill for this purpose, substantially as prepared by the British Board of Trade, is given in Appendix II."

No action was taken on this recommendation prior to World War II. After World War II, Australia had a more independent outlook and the Weights and Measures (National Standards) Act of 1948 established Commonwealth (Australian) standards of measurement for physical quantities. This act provided also for establishment of a National Standards Commission. This Commission was established later in 1948. Its functions included:

- (1) to co-ordinate the use in Australia of a uniform system of units and standards of measurement of physical quantities
- (2) to co-operate with appropriate State and Territory authorities on matters relating to weights and measures (legal metrology).

Thus, Australia achieved the legal framework for a federal system of weights and measures as proposed by Mr R B Lucas in 1890. Another thirty years were to pass before Australia achieved complete integration into this system of the standards of measurement held by State Weights and Measures authorities and by Munitions Supply Laboratories.

AUSTRALIAN STANDARDS LABORATORY (RECOMMENDATION 2)

The committee recommended:

"that approval be given:

- (a) for the establishment with the least possible delay of an Australian Standards Laboratory generally as outlined in Appendix I of this report, with a building possessing the special characteristics necessary for such a purpose, with standards and equipment installed therein and operated and maintained by a suitable staff, and,*
- (b) for CSIR to take immediate steps to appoint the necessary senior officers in consultation with whom a detailed scheme for the erection of the laboratory and the organisation of the work would be prepared."*

Appendix I to the committee's report shows that it envisaged a central laboratory which controlled branch laboratories, presumably one in each capital city. The central laboratory, the "Australian Standards Laboratory," would control Australian reference standards which would be "systematically and regularly checked and recalibrated by the National Physical Laboratory" of the United Kingdom. The branch laboratories would provide calibration and testing services for Australia's main industrial centres. The committee's recommendation on testing laboratories (Recommendation 3) was less specific on ownership and control of these branch laboratories, but it is probable that the committee intended that they be operated by CSIR.

When CSIR Council considered the committee's report in 1937, it gave high priority to the recommendation for establishment of an "Australian Standards Laboratory." Madsen recommended that the laboratory comprise three sections:

- (1) Metrology
- (2) Physics
- (3) Electrotechnology

Late in 1937, CSIR recommended to the Minister in Charge of Development and Scientific and Industrial Research, Mr R G Casey, that a National Standards Laboratory be established. The CSIR presentation said that the National Standards Laboratory should be responsible for establishment and maintenance of national standards of measurement and for associated research, but that testing of industrial standards and measurements in general should be the function of other institutions. This was the first indication that CSIR did not support the committee's proposal for branch laboratories which would provide comprehensive calibration and testing services.

In January 1938, the Commonwealth Government approved establishment of a National Standards Laboratory (NSL) as part of CSIR. In March 1938, the Prime Minister announced that NSL would be located in Sydney and expressed the hope that it would be built in the grounds of the University of Sydney. In June 1938, Madsen was appointed Chairman of a committee to advise CSIR on the planning, construction, equipment and staffing of the new NSL. He tackled this challenging task with great enthusiasm. In September 1938, the University of Sydney agreed to provide a site within its grounds. In November 1938, officers-in-charge were appointed for the three NSL sections:

- (1) Metrology - Mr N A Esserman, Munitions Supply Laboratories
- (2) Physics - Dr G H Briggs, University of Sydney
- (3) Electrotechnology - Dr D M Myers, University of Sydney

In addition to their pioneering work at NSL, these officers-in-charge and the other senior officers appointed in 1938-39 (Messrs G A Bell, W K Clothier, P M Gilet, R G Giovanelli, A F A Harper and A M Thompson) were to make major contributions in later years to the technical work of Australia's laboratory accreditation system.

The outbreak of World War II in September 1939 seriously delayed the procurement of equipment for the new NSL. This problem was made worse by the strained relations between CSIR and the Department of Defence. The relevant facilities at Munitions Supply Laboratories were not transferred to NSL until 1977-78. It is ironic that this transfer resulted in the establishment of NSL branch laboratories in Melbourne and Adelaide as envisaged by the Committee in its 1937 report.

TESTING LABORATORIES (RECOMMENDATION 3)

The committee recommended:

"That CSIR be authorised to negotiate with authorities controlling testing laboratories with a view to the incorporation of such laboratories, on a basis of co-operation with the authorities concerned, in a co-ordinated scheme for the organization of gauging, calibration, testing and certification services in those centres of industrial activity immediately in need of such services, and to arrange for such services to be operated and in the event of the erection and equipment of new buildings being found necessary, to submit specific recommendations thereon to the Government."

Supporting information for this recommendation was provided in Section III of the report entitled *Requirements with Regard to Testing and Certification* and in Section B of Appendix I which was prepared by the committee's "Standards and Testing Sub-Committee." There were differences in the views expressed in Section III and Appendix I, but these differences had no significant effect on the ultimate result.

It seems that the committee favoured branch laboratories of the Australian Standards Laboratory with some mechanism for co-ordination of the existing "independent" testing laboratories as an interim measure. Section III and Appendix I included the following observations:

- (1) *"A great deal of testing is carried out by industry. This, however, is mainly as a measure of quality control in manufacture, though when carried out under supervision on the finished product it may be accepted by the purchaser. As a rule, however, a manufacturer's test is not regarded as sufficient for the purpose of an acceptance test." (Section III).*
- (2) *"Most universities and many technical colleges possess a fairly wide range of testing equipment and a great deal of testing work has been done in their laboratories ...
... their services are not adequate for the needs of industry ... a vast amount of routine testing would be prejudicial to the effectiveness of their teaching." (Section III).*
- (3) *"Many departments of government and public utility authorities possess testing laboratories for the purpose of checking their own purchasing or manufacture and maintaining efficiency in operation ... Whilst it has been necessary, in the absence of national testing houses, to take advantage of this valuable expedient, the departmental laboratory does not meet the needs of industry adequately". (Section III).*
- (4) *"The committee has made a review of the facilities available in the laboratories existing in Australia ... Whilst much of the equipment is obsolete and unreliable" (Section III).*
- (5) *"That steps be taken to establish or organise in the main industrial centres of the Commonwealth, suitable laboratories for testing and calibration services, to be operated as branches of the central standards laboratory." (Appendix I).*
- (6) *"With regard to the cost of establishing Branch testing laboratories, it is not possible at this stage to furnish even an approximate estimate". (Appendix I).*

Thus the committee:

- (1) had expressed the strong opinion that Australia's existing laboratories could not meet the testing and calibration requirements of secondary industries
- (2) in Recommendation 3 and in its report had proposed an upgrading and co-ordination of, presumably, some of the existing laboratories

- (3) had also expressed the view that there should be branch laboratories of the "Australian Standards Laboratory" to meet the calibration requirements of secondary industries, and perhaps also their testing requirements.

In effect, the committee had recognised the need for testing and calibration facilities with national status but had not proposed a clear-cut solution.

Late in 1937, Sir David Rivett told the Commonwealth Government that CSIR did not want to operate laboratories for the testing of industrial standards and measuring equipment in general. Also late in 1937, Lightfoot made an extensive overseas tour primarily to seek information on an expanded CSIR information service. He took the opportunity to seek a solution to the committee's recommendations on testing and calibration laboratories. He based his enquires on the infrastructure he had supported since 1920:

- (1) an authority for standard specifications and standard test methods
- (2) a national standards mark
- (3) national standards of measurement
- (4) testing and calibration facilities with national recognition.

After studying the arrangements in the United Kingdom, Canada and the United States of America, he recommended that CSIR establish a "Committee on National Standards Marks and Testing Stations." The functions of this committee would include "to advise CSIR on action to be taken for establishment of testing houses in the Commonwealth." It would seem that no action was taken on this recommendation.

On 15 February 1938 CSIR, through the Prime Minister, wrote to the six State Premiers advising them of the decision to establish a National Standards Reference Laboratory. The New South Wales Government reacted to the Prime Minister's letter and established a small committee on 20 June 1938 to consider establishment of a National Standards sub-laboratory in New South Wales. The other states took no action.

On 20 October 1938, Lightfoot presented a comprehensive paper on *The National Standards Laboratory – Its Relation to Commerce, Industry and Science* to The Institute of Public Administration. In this paper Lightfoot discussed the needs and possible arrangements with respect to:

- (1) the calibration of measuring instruments
- (2) the testing of materials for quality or performance.

With regard to calibration of measuring instruments, Lightfoot said *"The position in this country at present is little short of chaotic"*. He did not mention the calibration and gauging service provided by Munitions Supply Laboratories to defence contractors and sub-contractors. Lightfoot proposed co-ordination of the work of the State Departments and Universities which provided *"facilities of one sort or another"*. He proposed that CSIR *"acquire the sole right to control the use of prescribed marks as national test marks. These marks would be applied to sub-standards calibrated at the National Standards Laboratory but they would also be applied by approved State testing laboratories which possess sub-standards calibrated with the national standards. In this way a body of co-ordinated and approved testing stations would be established under the authority of the National Standards Laboratory thus ensuring uniformity throughout the Commonwealth"*.

With regard to testing of materials and articles for quality or performance, Lightfoot cited three reasons *"for the creation of a national authority for the control of industrial and commercial testing"*:

- (1) *"Whilst existing laboratories possess such equipment as has been found to be necessary for the particular purposes to be served by them, there is at present no authority charged with the responsibility of ensuring that all the testing needs of the community are met."*

(Lightfoot quoted testing of textiles and testing of flame-proof enclosures as examples of testing needs which had not been met).

- (2) *"There is an urgent need for an organised testing service which will be recognised as quite impartial and whose certificate of test will be mutually acceptable to purchaser and vendor."*

(Lightfoot quoted construction materials as an example).

- (3) *"Australian industry is handicapped by the lack of a national testing authority whose certificates of test will be accepted without question by parties in all States of the Commonwealth and will be regarded as a hall-mark of approval."*

- (4) *(Lightfoot quoted electrical appliances and materials as examples).*

Lightfoot went on to say "steps will have to be taken to organise a system of testing, in association with the control of the national reference standards, by a body whose status will carry recognition throughout the Commonwealth".

Thus Lightfoot envisaged two co-ordinating authorities:

- (1) The National Standards Laboratory for co-ordination of the calibration of measuring instruments.

- (2) An unspecified authority, acceptable to the Commonwealth and the States, for co-ordination of the testing of materials and articles for quality or performance.

The views expressed by Lightfoot are reflected in the letter dated 22 June 1939 from the Prime Minister to the State Premiers which opens the next chapter of this report.

CHAPTER 6 – State Standards and Testing Committees

On 22 June 1939, the Prime Minister sent the following letter to the six State Premiers:

"Further to my predecessor's letter of 15th February 1938, in which you were advised that the Commonwealth Government proposed to establish a National Standards Reference Laboratory, I now desire to inform you that the Council for Scientific and Industrial Research anticipates that the laboratory will come into effective operation within a period of from twelve to eighteen months. As from that time the laboratory will be in a position to certify and to maintain such copies of the national reference standards as will be necessary for the purpose of State sub-standards. These sub-standards will be required in each State for the following purposes, viz:

- (1) The calibration and certification of standards used by Government departments and industrial establishments. These standards will in turn be used for the periodical checking of working standards.*
- (2) The testing of precision measuring appliances used for scientific and industrial purposes.*
- (3) The provision of equipment and apparatus which will be required for the establishment of an organised testing service to ensure that materials and articles comply with the provisions of standard specifications issued by the Standards Association of Australia. Most of these tests are for quality or performance and are, therefore, quite distinct from the measuring instrument calibration tests referred to in (1) and (2).*

The objective in regard to (1) and (2) above is to establish a body of coordinated and accredited State standards authorities which would issue certificates of test under the aegis of the National Standards Laboratory. Similarly in regard to (3), although the organisation of testing services for quality and performance is not the function of CSIR, the facilities and assistance, which the National Standards Laboratory will be able to accord, will be essential to the establishment of a co-ordinated and accredited body of State testing stations, a matter which is of first importance to the efficient development of many secondary industries. Moreover CSIR is closely concerned with this matter as the Council is the means of liaison between the Commonwealth Government and the Standards Association of Australia.

In order to give effect to the foregoing proposals, it is desirable that each State Government should establish a State Standards and Testing Committee, the functions of which would be as follows:

- (1) To establish and maintain co-operation with the Australian National Standards Laboratory in regard to standards and to develop facilities whereby it will be possible for the State to issue certificates which shall bear Commonwealth authority.*

- (2) *To co-ordinate as far as is desirable, existing testing facilities within the State.*
- (3) *To maintain a continuous examination of the requirements in regard to standards and testing necessary for the development of secondary industries within the State, and to report and make recommendations from time to time to the State Government or deputed authority.*
- (4) *To act as an advisory body in regard to all matters affecting standards and testing.*

From the point of view of ultimate developments in each State and from considerations of economy and efficiency, great advantage would be derived from the establishment of a State standards and testing laboratory concentrated in one group of buildings. As against this it will be found that individual groups of small testing departments have already been developed in certain States. Where it is found impracticable at the present time to concentrate these into one unit, an attempt can be made with advantage to concentrate them into possibly two or three groups which may be more readily unified later on.

The necessity for the immediate development of the State standards and testing laboratories is seen when such a question as that of the manufacture of aero-planes, engines and munitions is considered. In the Empire system of defence it would be essential that parts of the equipment made in Australia should be interchangeable with those made abroad, many of the parts being required possibly for replacement in equipment originally manufactured in Great Britain. This can only be ensured by gauging processes being used in Australia, the accuracy of which is maintained in accordance with the standards used in Great Britain. The Commonwealth is establishing this link through its Australian National Standards Laboratory and it can provide the means whereby the national reference standards may be made available to the States and thence to industrial enterprises within the States.

I should be grateful if you would give these proposals your early consideration and advise me of the steps which will be taken to establish an organization complementary in character to that which the Commonwealth is now setting up."

Before the reactions of the States to this letter are considered, the following should be noted:

- (1) The States were ignored when CSIR set up the committee on "Secondary Industries Testing and Research - Extension of Activities of CSIR" in 1936.
- (2) The letter does not mention weights and measures (legal metrology).
- (3) The letter does not mention the work done by Munitions Supply Laboratories to achieve interchangeability of arms and munitions with those made in Great Britain.

- (4) The letter does not mention the significant public testing facilities provided at that time by universities and technical colleges throughout Australia.
- (5) The letter implies that testing of materials and articles for compliance with standard specifications is merely an extension to a state calibration service. It does not indicate the range of materials and articles to be tested or the fields of testing involved. It implies that all articles can be taken to a central testing station for testing and that all secondary industries in a State will be in close proximity to that State's capital city.
- (6) The letter refers to a "co-ordinated and accredited body of State testing stations" but gives no indication as to how co-ordination and accreditation will be achieved.
- (7) The letter proposes that the State Governments should make very significant capital expenditures, but offers no financial assistance from the Commonwealth Government.

NEW SOUTH WALES

As noted in the previous chapter, the NSW Government appointed a small committee on 20 June 1938 in response to the Commonwealth Government's letter of 15 February 1938 on the establishment by the States of National Standards sub-laboratories. Members of this committee were Sir Henry Barraclough (Chairman), J M Main, M J Lacey and M R Downie (Secretary). This committee was given the brief to consider the wider issues raised in the Commonwealth Government's letter of 22 June 1939. It inspected NSW Government laboratories and major NSW private sector laboratories. After discussions with the NSW Chamber of Manufactures, the committee conducted a survey of NSW manufacturers and received 150 replies. Highlights from this survey were:

- (1) Manufacturers using NSW Government testing facilities:
Yes- 82, No - 68.
- (2) Manufacturers using testing facilities of other private firms:
Yes- 56, No - 94.
- (3) Manufacturers having difficulty getting tests performed:
Yes - 29, No - 121.
- (4) Manufacturers with own testing facilities:
Yes - 115, No - 35.

Most respondents to the survey emphasised the need for Australia-wide recognition of test certificates.

On 18 April 1940, the committee presented an interim report to the NSW Government which recommended:

- (1) that a State Standards and Testing Laboratory be established and that it be the state authority for calibration and certification of standards for Government and industry and a testing and proving centre particularly for precision engineering
- (2) that the laboratory be a separate activity of a department under Ministerial direction and that it NOT be part of NSW Railways
- (3) that the following facilities be incorporated in the State Standards and Testing Laboratory:
 - (a) Testing Branch, Department of Works and Local Government
 - (b) Weights and Measures Branch
 - (c) Gas Examiner's Branch
 - (d) Laboratory of Government Analyst
 - (e) The Micro-biological Laboratory
- (4) that a general amalgamation of state facilities should not take place
- (5) that the initial sections of the State Standards and Testing Laboratory be:
 - (a) Metrology
 - (b) Physical
 - (c) Chemical
 - (d) Electro-technology,and that the first priority be given to metrology. Further, that provision be made for testing of textiles and later for testing of plastics and ceramics
- (6) that the State Standards and Testing Laboratory be operated as a public service and not as a paying concern
- (7) that the State Standards and Testing Laboratory be the NSW testing and proving centre for Standards Association of Australia
- (8) that arrangements be made for co-ordination of the laboratories of Newcastle Technical College and Wollongong Technical College with the State Standards and Testing Laboratory
- (9) that the NSW Government aim at national test certificates and that a standards authority with representatives of the National Standards Laboratory and the State Standards and Testing Laboratory be established.

In 1941, the NSW Government decided that funds were not available for establishment of a State Standards and Testing Laboratory.

On 26 October 1943, a conference was held to discuss the relations between the National Standards Laboratory and testing laboratories in NSW. NSW Railways, the Standards Association of Australia and CSIR were represented at this conference. Despite extensive enquiries, the author has not succeeded in locating a record of this conference.

QUEENSLAND

The author has not found any evidence of action taken by the Queensland Government on the Commonwealth Government's letter of 22 June 1939.

SOUTH AUSTRALIA

On 3 July 1939, the South Australian Government appointed a committee comprising Sir Robert Chapman, Sir William Goodman and F Shea to consider the letter from the Commonwealth Government. The author understands that this committee did not submit a report to the South Australian Government.

TASMANIA

The Tasmanian Government decided that a State Standards and Testing Laboratory was not required and that, if need be, the existing government testing facilities should be improved. It did not appoint a State Standards and Testing Committee.

VICTORIA

The Victorian Government held a conference in September 1939 to consider the letter from the Commonwealth Government. It established a State Standards and Testing Committee with the following functions:

- (1) to investigate laboratory work undertaken in Victoria
- (2) to investigate the establishment of a State Standards Laboratory and the cost of its establishment
- (3) to establish and maintain co-operation with the National Standards Laboratory
- (4) to co-ordinate existing State facilities
- (5) to act as an advisory committee to the Victorian Government on standards and testing.

The Chairman of the committee was Professor T Laby of University of Melbourne. There were six other members including E Bate (State Electricity Commission of Victoria), W R Jewell (Victorian State Laboratories), E L Sayee (Munitions Supply Laboratories) and L J Hartnett (Victorian Chamber of Manufactures).

The committee decided to seek the views of Victorian manufacturers and, in December 1939, the Victorian Chamber of Manufactures sent a questionnaire to its members. There were some 400 replies, but many of the respondents did not answer some of the questions. Highlights from the replies were:

- (1) Is there a need for standards and testing facilities carrying official approval?

Yes – 241, No – 99

- (2) Is immediate establishment of these standards and testing facilities warranted?

Yes – 191, No – 57

- (3) Have you a need for reference of tests to a neutral authority?

(a) Metrology	(b) Electrical
(c) Thermal	(d) Photometry

	(a)	(b)	(c)	(d)
Yes	77	32	75	17
No	149	167	133	175

- (4) Apart from the National Standards Laboratory do you need a State laboratory to approve and certify your products?

Yes – 107, No – 116

The committee concluded that there was not sufficient support from manufacturing industry to warrant the establishment of a State Standards and Testing Laboratory. No further action was taken by the committee or the Victorian Government.

WESTERN AUSTRALIA

The letter of 22 June 1939 from the Commonwealth Government was sent to various state departments. They advised the Premier that the cost of a State Standards and Testing Laboratory would be exceedingly high.

On 21 September 1939, the letter was tabled at a meeting of the WA State Committee of CSIR. At the insistence of Professor A D Ross of University of Western Australia, the committee appointed a sub-committee comprising Professor A D Ross (Convenor), Professor N S Bayliss of University of Western Australia and H Bowley, the Government Analyst.

This sub-committee reported that work required within the State could be performed by existing laboratories subject to limited expenditure on additional equipment. The report's emphasis was on sub-standards of measurement and it did not address the wider issue of testing of materials and articles. The CSIR committee forwarded its sub-committee's report to the Premier in November 1939 with the recommendation that the State Government establish a small State Standards and Testing Committee. In April 1940, the Premier established a State Standards and Testing Committee comprising J A Ellis and F J Mills (WA Railways), E Tindale (Department of Works), Professors a F Blakey and A D Ross (University of Western Australia), H Bowley (Government Analyst) and N Fernie (Department of Industrial Development).

THE IMPACT OF WORLD WAR II

When World War II impacted on Australia in 1940, the various State Standards and Testing Committees cease to function. They were not revived at the conclusion of World War II in 1945.

Before moving to developments during World War II, it is appropriate to review briefly the progress made since 1920 when Lightfoot advocated an infrastructure comprising:

- (1) a national authority to prepare standard specifications, codes of practice and standard test methods
- (2) a national standards mark
- (3) national standards of measurement
- (4) a comprehensive range of testing and measurement facilities with national recognition.

Items (1) and (3) had been solved by formation of the Standards Association of Australia in 1929 and by establishment of the National Standards Laboratory in 1938. No action had been taken on item (2). Despite much discussion, no practical solution had been found for item (4).

CHAPTER 7 - The Approved Test House Scheme

Prior to the outbreak of World War II in September 1939, practically all equipment and supplies for Australia's Navy, Army and Air Force were produced overseas or in factories operated by the Commonwealth Government. Specification testing of such equipment and supplies was performed by the Munitions Supply Laboratories.

In 1938, MSL had a staff of only 80 people but it was able to cope with specification testing in addition to its other functions. Fortunately the management of MSL saw the early signs of war in 1938 and by September 1939 its staff had been increased to about 240 people. Nevertheless, MSL was overwhelmed by the demands placed on it after September 1939.

There was an enormous increase in the demand for defence equipment and supplies. The Commonwealth Government's factories could not cope and practically all of Australia's manufacturing plants were diverted to production of defence equipment and supplies.

At that time, the author was a junior engineer with the Melbourne City Council Electric Supply Department. This department accepted the responsibility for the manufacture and testing of a range of electrical equipment for the defence services. It assembled equipment in its workshops and tested equipment in its laboratories. It sub-contracted work to many Melbourne manufacturers. For example, the armatures for generators were wound in a factory which manufactured jewellery in peace time. The M.C.C. Electric Supply Department delivered 725 generating sets, 435 electrostatic voltmeters and 1075 moving iron electrical instruments to the defence services. This is but one small example of the manufacturing activity in Australia during that period.

MSL faced many demands, including urgent research and investigational work and the production of specialised equipment such as anti-gas respirators. It could not cope with the enormous increase in the volume of specification testing. It was also recognised that concentration of all specification testing at MSL was not the answer and that delegation of much of this work to other laboratories would:

- (1) bring into use additional technical manpower and laboratory facilities
- (2) enable MSL to concentrate on its important research and investigational functions
- (3) save valuable time by enabling tests to be performed closer to the point of manufacture
- (4) in many instances, avoid duplication of testing by using manufacturers' quality assurance test results for acceptance testing.

In February 1940, the Director of Aeronautical Inspection asked MSL to provide the technical resources for a scheme of "Approved Test Houses." The Director also asked the fledgling National Standards Laboratory in Sydney to assist. At about the same time the Inspector – General of Munitions (Army) lodged a similar request with MSL.

On 9 July 1940, representatives of Munitions Supply Laboratories, the National Standards Laboratory and the Australian Chemical Institute met to consider how to operate an "Approved Test House Scheme." They agreed that responsibility for the assessment and supervision of test houses should be distributed on the following basis:

Chemical Analysis:	Munitions Supply Laboratories.
Mechanical Testing:	National Standards Laboratory.
Measurement of Gauges:	Munitions Supply Laboratories.

Also in July 1940, Hebblewhite was scolded from the Standards Association of Australia to the National Standards Laboratory to administer its contribution to the assessment and supervision of test houses. This temporary appointment gave the National Standards Laboratory invaluable administrative support and gave Hebblewhite valuable experience which he was able to apply in later years to implementation of the concept of a national laboratory accreditation system.

In November 1940, CSIR requested that the National Standards Laboratory be relieved of the assessment and supervision of test houses for mechanical testing in states other than New South Wales and Queensland. Subsequently the approved test house scheme was expanded to include:

- Radiographic examination of castings.
- Calibration of pyrometers.
- Testing of products such as paints and corrosion preventives.

Finally the assessment and supervision of test houses were allocated between MSL and NSL as follows:

Chemical Analysis:	MSL
Mechanical Testing:	(i) MSL - SA, TAS, VIC, WA. (ii) NSL - NSW, QLD.
Measurement of Gauges:	MSL
Radiographic Examination of Castings:	MSL
Calibration of Pyrometers:	MSL

Testing of Products including,
Paints, Corrosion Preventives,
Liquid Fuels and Lubricants: MSL

Management of the scheme was entrusted to a senior MSL chemist, E A Goode, who subsequently was a major contributor to development of the technical criteria and assessment procedures for Australia's laboratory accreditation system.

At its peak, the "Approved Test House Scheme" had some 160 approved test houses.



Mr E A Goode

APPROVAL OF TEST HOUSES

Approvals of test houses were issued by the Inspection Branches of the Services (Air, Army and Navy) on receipt of recommendations from MSL or NSL. The Director of Aeronautical Inspection accepted applications from testing authorities for approval of their test houses. The other Inspection Branches (Army and Navy) selected the test houses which they desired to be considered for approval. In other respects, the three Inspection Branches adopted common procedures.

They requested MSL or NSL, as appropriate, to investigate a test house. One or more officers of MSL or NSL visited the test house to assess its facilities and procedures. In most instances these assessments concentrated on:

- (1) the qualifications and experience of staff
- (2) the suitability of the equipment including, where relevant, its calibration status
- (3) the system for checking and recording of test results
- (4) the test procedures, especially when the test results were dependent on the test procedure.

In some areas, such as chemical analysis, sample residues were tested at MSL. In other areas such as radiographic examination of aircraft castings, the test house was required to test and report on samples provided by MSL.

After the assessment MSL, or NSL, reported to the Inspection Branch. Normally these reports included:

- (1) the recommended scope of approval for the test house
- (2) the staff members recommended as signatories for test reports
- (3) the recommended conditions for continuance of approval of the test house - often a calibration schedule for the equipment.

Finally the Inspection Branch issued an approval of the test house.

SUPERVISION OF APPROVED TEST HOUSES

Close supervision of approved test houses was practicable because only test reports on defence equipment and supplies were issued under these approvals. Copies of all such test reports were required to be sent to the supervisory authority, MSL or NSL. Requirements for retention of the residues of test samples also made it practicable, in many testing areas, for the Inspection Branches to send samples to MSL or NSL for check testing. The supervision procedures varied with the area of testing:

- (1) Chemical Analysis

Check testing was the prime method of supervision. Samples for check testing were taken by Service Inspectors from batches of material which had been analysed by the test house. These samples were analysed at MSL and the results reported to the Inspection Branch with comments on any significant differences between the MSL results and those reported by the test house.

Whenever a significant difference was found, an MSL chemist visited the test house to find the cause. Frequently the MSL chemist gave advice to the test house on selection of analytical procedures.

- (2) Mechanical Testing

The approach to supervision of test houses engaged in mechanical testing varied with the likelihood of significant variations between test pieces:

- (a) *Metals* - Because of the inherent variability between metal test pieces, supervision put the emphasis on calibration of testing equipment. However, there was some check testing of metal test pieces.

- (b) *Rubber* - Because there was less variability between rubber test pieces, compared with metal test pieces, the main emphasis was on check testing. However, attention was directed also to regular calibration of equipment.
- (c) *Textiles* - For textile testing, there was about equal emphasis on check testing and on calibration of equipment.
- (3) *Measurement of Gauges*

Supervision was based on regular calibration of measuring equipment and visits to test houses by MSL officers.

- (4) *Radiographic Examination of Castings*

MSL performed check tests on a percentage of the castings examined by each test house.

- (5) *Calibration of Pyrometers*

Supervision was based on regular calibration of equipment and visits to test houses by MSL officers.

- (6) *Testing of Products such as Liquid Fuels, Lubricants, Paints and Corrosion Preventives*

Check testing was the main method of supervision.

PERFORMANCE OF APPROVED TEST HOUSES

There were some 160 approved test houses at the scheme's peak, but only a few test houses did not perform satisfactorily. In most instances, the problems related to selection of test procedures.

The scheme resulted in a significant improvement in the quality of products supplied to the defence services. Perhaps its most significant achievement was to show that the customer could accept test reports from the test house of a manufacturer when there was an adequate scheme for approval and supervision of such test houses. Duplication of testing was avoided and considerable time was saved in delivery of equipment and supplies to the defence services.

The Inspection Branches continued the scheme after the end of World War II. When Australia introduced a national laboratory accreditation system, the Army and Navy Inspection Branches discontinued their approval of test houses. But the Director of Aeronautical Inspection continued with the approval of test houses for some time.

CHAPTER 8 – The CSIR Standards and Testing Committee

Early in 1945, the CSIR Executive Committee decided that the time was appropriate to take action on some of the outstanding recommendations from the report of the 1936 - 37 "Secondary Industries Testing and Research Committee."

In April 1945, it established an advisory committee with the title "CSIR Standards and Testing Committee" and the following functions:

- (1) To consider the original scheme for the establishment of State Testing Laboratories and to advise CSIR whether this policy should be followed in future and what action CSIR should take in the matter.
- (2) To review the requirements of industry from the point of view of the facilities which are needed immediately for a co-operative scheme for testing and to advise CSIR as to what action need be taken to bring such a scheme into being. (This will involve discussions with the various State and Commonwealth bodies which are in a position to help in a co-ordinated scheme for the Commonwealth).
- (3) To consider and advise on arrangements to be made for the issue of certificates of test.
- (4) To consider any matter arising out of the proposed Commonwealth Bill on weights and measures.
- (5) To consider and advise on the policy to be followed by the Commonwealth for national certification marks.
- (6) To consider all such matters as may affect the general question of calibration and testing.

The Committee appointed by the CSIR Executive Committee comprised Madsen (Chairman), Lightfoot and Hebblewhite plus:

H P Breen, Director, Secondary Industries Division, Ministry of Post-War Reconstruction

N K S Brodribb, Controller-General of Munitions Supply, Ministry of Munitions.

J E Cummins, CSIR.

M T W Eady, Chambers of Manufactures of Australia.

Dr F W G White, CSIR



Mr M T W Eady

The Secretary of the committee was F G Nicholls of CSIR. With regard to the Committee's membership, it should be noted that:

- (1) The States were not represented.
- (2) The relevant professional institutes (chemistry, engineering and physics) were not represented.
- (3) It was the practice of CSIR to appoint individuals to its committees and not the nominees of organisations.

The committee held two meetings, on 21 and 29 June 1945. Mr Eady was unable to attend the first meeting. All members attended the second meeting. The committee concentrated its attention on the issue of calibration and testing facilities. With regard to national certification marks, it took the view that the appropriate authority was the Standards Association of Australia and that SAA, the Department of Post-War Reconstruction, the Department of Commerce and manufacturers should confer on this subject. With regard to weights and measures (legal metrology) the committee supported the CSIR view that this was a separate issue from calibration and testing facilities for secondary industries.

This left the committee with one basic question, whether calibration and testing were one issue or two separate issues. The minutes of the two committee meetings suggest that CSIR had not thought through this question. It wanted its National Standards Laboratory to have some involvement in lower level calibrations without being deluged by this work. It did not appreciate the importance of the calibration services already provided to Australia's secondary industries by Munitions Supply Laboratories. Consequently, the committee's resolutions on a national authority to co-ordinate existing testing facilities failed to indicate whether this authority should co-ordinate calibration facilities in addition to facilities for the testing of materials and products.

At the committee's first meeting, Hebblewhite said that co-ordination of testing should be by an organisation other than SAA. He had consulted the British Standards Institution which was emphatically of the view that the body responsible for co-ordination of testing should be separate from the body which issued national certification marks.

At one stage, the title "National Union of Testing Stations" was suggested for the co-ordinating body but this title was discarded when committee members realised that its acronym would be "NUTS".

There was general agreement within the committee that the pre-war concept of State Testing Laboratories could not be realised in the foreseeable future.

Committee discussion was concentrated on the desirability of achieving Australia-wide recognition of the certificates of test issued by government laboratories engaged in public testing such as New South Wales Railways Laboratories and Munitions Supply Laboratories. There is no indication in the records of the two meetings that committee members contemplated the possibility of recognition of certificates of test issued by private sector laboratories. Also there is no indication that committee members, apart from Mr Brodribb, appreciated the significance of the achievements of "The Approved Test House Scheme."

The committee adopted the following resolutions at its two meetings:

(1) Meeting on 21 June 1945

- (a) *"That this Committee is of the opinion that in organising a national testing authority the scope of the work should be limited in the first instance to those materials or products for which there are in existence specifications issued by the Standards Association of Australia or which are in common usage in Australia."*
- (b) *"That the schedule of testing facilities prepared in 1937 by the Secondary Industries Testing and Research Committee should be brought up-to-date as soon as possible."*
- (c) *"That pending further action with a view to the establishment of State testing laboratories as originally proposed, it is desirable that action be taken to bring into being a co-ordinated scheme for testing using existing facilities."*
- (d) *"That the Committee advise the Executive Committee of CSIR to arrange for letters to be sent by the Prime Minister to the State Premiers advising them of the steps which had been taken since the last communication was sent to them in June 1939 on the matter of State Standards and Testing laboratories and asking them to appoint technically qualified representatives to attend a provisional conference to review the situation in regard to testing and to prepare plans for a co-operative effort between the Commonwealth and States for the coordination of testing throughout the Commonwealth with a view to the preparation of a submission for discussion at a Premiers Conference."*

(2) Meeting on 29 June 1945

- (a) *"That action in regard to resolution (d) passed at the first meeting of the Committee should be postponed until the Committee had given further consideration to the formulation of plans for a co-operative testing scheme."*

- (b) *"That Mr Eady should be invited to endeavour to arrange for an approach from the Chambers of Manufactures to the Premiers of the various States in regard to the co-ordination of testing on a national basis."*
- (c) *"That it be recommended to the Executive Committee that CSIR provide the Chambers of Manufactures with the necessary information to state their case in regard to co-ordination of testing to the Premiers and that the services of Mr Lightfoot be made available to the Chambers in this connection."*
- (d) *"That any communications to the States should make the suggestion that there might be a National Union of Testing Laboratories which would elect a Committee or Board which would be the national testing authority."*
- (e) *"That it should recommend to the (CSIR) Executive Committee that Mr Lightfoot should continue his discussions with State Weights and Measures authorities."*

So far as the author has been able to ascertain, no action was taken to brief Mr Eady so that the Chambers of Manufactures could approach the Premiers of the States.

On 2 August 1945, the Minister-in-Charge of Scientific and Industrial Research, the Hon J J Dedman, wrote to the Prime Minister supporting the CSIR proposal *"that the State Premiers should be invited to arrange for representatives to attend a conference in October next to prepare the basis for a plan for establishing a national testing authority for consideration at a meeting of Commonwealth and State Ministers."*

On 16 August 1945, the Prime Minister wrote to the six Premiers as follows:

"On the 22nd June 1939, the then Prime Minister wrote to the Premiers of the several States advising them that the Commonwealth Government intended to establish a National Standards Laboratory and that the Council for Scientific and Industrial Research anticipated that the laboratory would come into effective operation within a period of from 12 to 18 months when it would be in a position to maintain the national reference standards of measurement for the purpose, among other things, of calibrating State sub-standards. It was indicated that such sub-standards would be necessary for the calibration and certification of standards used by Government Departments and industrial establishments for the testing of precision measuring appliances, used for scientific and industrial purposes, and for the provision of equipment and apparatus required for the establishment of an organised testing service to meet the needs of industry and commerce."

It was suggested that the several States should establish organisations complementary to that which the Commonwealth was setting up.

Following the outbreak of war it was necessary to divert activities from the original objectives and to concentrate attention on matters connected with the application of standards and testing which became vitally urgent in connection with the prosecution of the war. In view, however, of the favourable war situation and of the importance of affording every possible help to industry and commerce in the post-war period, my Government now desires, with the assistance and collaboration of the State Governments, to take steps for establishing a national testing service.

As you are aware, of course, extraordinary progress has been made during the war not only in the field of high precision engineering, but also in other industries in which efficient and economic production can be maintained and the processes of manufacture controlled by accurate measurements or precise determinations of one kind and another and by tests to ensure that the products are maintained at a high standard of quality and performance.

In other industrial countries adequate calibrating and testing facilities have been provided either through Governmental or other agencies. In Australia the necessary facilities have been provided to a considerable extent and control has been exercised during the war mainly in conformity with the requirements of the Ministry of Munitions. My Government considers that the necessary calibration and testing facilities cannot adequately be developed and utilised after the war unless some national authority is brought into existence.

No doubt your Government is desirous of rendering every reasonable facility for the development and maintenance of secondary industries and in that connection the provision of calibrating and testing facilities is of great importance. In the opinion of my Government it is most desirable - in fact, essential - that the provision of such facilities should be organised on a national basis and that there should be complete coordination throughout the scheme and uniformity with respect to methods of calibration and testing thus permitting of the issue of certificates of test which will be acceptable to all concerned and will have validity in all the States. The developments which have taken place during the war in mass production methods, in the establishment of new wartime industries and in the geographical spread of industry, and the importance of facilitating the change over from wartime to peace activities, make the need for a uniform scheme of calibration and testing greater than ever before.

It has been suggested that the necessary organisation for establishing a uniform scheme should be provided by a National Union of Testing Authorities, which would elect a Board or Committee comprising representatives of Commonwealth and State cooperating laboratories to act as a national testing authority. It is felt that if such an organisation were established it should operate on a purely voluntary basis through the prestige it would acquire from its collaborating laboratories. My Government would be glad to assist by providing,

free of charge, facilities so far as they are available not only for the calibration of physical equipment used by cooperating laboratories, but also for uniform standards in tests concerned with branches of work other than physics or engineering.

The Council for Scientific and Industrial Research proposes to hold a conference in Melbourne in October next of representatives of Commonwealth and State testing laboratories to prepare the basis for a plan for establishing a national testing authority. Following this conference you might agree that the most appropriate procedure would be for my Government to submit the plan to a meeting of Commonwealth and State Ministers.

I therefore desire to ask if you will kindly arrange for the appointment of representatives to attend the proposed conference; it is not desired to restrict representation to Government Department laboratories, but to include also representatives of the more important testing laboratories controlled by Commissions, Boards and other quasi-Government bodies. If you will be good enough to advise me of the names, official designations, and addresses of the representatives from your State, the Council for Scientific and Industrial Research will communicate direct with them regarding the arrangements for the conference."

In this letter, drafted by CSIR, the scope was widened from testing of materials and products as proposed by the CSIR Standards and Testing Committee to cover all calibration and testing services. It implied that the participating laboratories would be laboratories operated by Commonwealth and State Government departments and the laboratories of Commissions, Boards and other quasi-government bodies. It placed the emphasis on calibration of testing equipment and uniformity of test procedures. It did not acknowledge the importance of laboratory management.

The emphasis on calibration of equipment probably derived from the CSIR desire to ensure that Australia received full benefit from establishment of the National Standards Laboratory.

Despite these short comings, the work of the CSIR Standards and Testing Committee and the letter from the Prime Minister to the Premiers were of paramount importance because, for the first time, they put forward the concept of coordination on a national basis of existing laboratories so as to provide an organised testing service to meet the needs of industry and commerce.

The next step was preparation of a brief for the delegates to the proposed conference. This brief was prepared by Lightfoot. It supported the concept of coordination on a national basis of existing laboratories but:

- (1) whereas the Prime Minister's letter to the Premiers referred to coordination of calibration and testing services, the brief narrowed the scope to coordination of testing services

- (2) the brief did not mention "The Approved Test House Scheme."

The author's discussions with Lightfoot in 1947-49 did not explain these discrepancies. It could be that Lightfoot remained of the view that the National Standards Laboratory would make other arrangements for the coordination of calibration services. It is possible that Lightfoot had little knowledge of "The Approved Test House Scheme" because of the limited communication between CSIR and the defence departments dating back to 1928.

Lightfoot's brief invited discussion of the following issues:

- (1) Is it desirable and possible to bring into being, by mutual collaboration between the various authorities concerned, a scheme, which might be called the National Union of Testing Authorities, to ensure common validity of measurements, methods of testing, and qualifications of staff?
- (2) What fields of testing is this scheme to cover? Is it, in the first place, to be confined to physics and engineering, and later broadened to include other forms of industrial and scientific testing?
- (3) If such a scheme is desired, how can it best be organised? Is it, for instance, desirable to bring into being a Board or Committee to manage the affairs of the proposed Union, and should the Union be established as a separate independent body or should it be attached to or merged with some existing institution?

Conference invitations were issued to:

- (1) The State Governments
- (2) Commonwealth Departments
- (3) Standards Association of Australia
- (4) Mr M T W Eady

It should be noted that:

- (1) an invitation was issued to Mr Eady on a personal basis but not to the Chambers of Manufactures of Australia
- (2) the universities and major technical colleges were not invited
- (3) the relevant professional institutes, such as The Royal Australian Chemical Institute and The Institution of Engineers, Australia, were not invited.

The conference, originally scheduled for October 1945, was held in Melbourne on 27 November 1945.

CHAPTER 9 – The CSIR Conference on Co-ordination of Testing Services

Fifty-two delegates attended the "Conference on Co-ordination of Testing Services" held at the Commonwealth Offices, Melbourne on 27 November 1945. They comprised 25 Commonwealth delegates, 24 delegates from the six States and three delegates from the Standards Association of Australia.

The Commonwealth delegation was not balanced. It included seven delegates from Department of Health and seven CSIR delegates including Madsen and Lightfoot. The State delegations ranged from seven Victorian delegates to one delegate from Tasmania.

Hebblewhite was overseas in November 1945. The SAA delegation comprised its Chairman (A J Gibson), its Acting Chief Executive Officer (D Mills) and its Secretary, Southern Section (A L Stewart). The SAA delegates were briefed by Hebblewhite and by members of the CSIR Executive Committee before the conference.

CSIR did not issue conference invitations to the universities or major technical colleges but four State Governments (Queensland, South Australia, Victoria, Western Australia) included university professors in their delegations.

Mr M T W Eady had another engagement on 27 November 1945 and did not attend the conference. As there was no delegate from the private sector at the conference, Mr Eady sent the following message to the conference:

"On behalf of the Chambers of Manufactures of Australia, I should like to express the hope that a satisfactory arrangement will be the outcome of the Testing Conference's deliberations for it is going to be vital to manufacturing interests that a Commonwealth-wide set-up is arranged. Today, manufacturing facilities are largely based on being able to rely on keeping to definite standards."

Madsen was elected as Chairman of the conference. The conference Secretary was F G Nicholls of CSIR.

Early in the deliberations of the conference, it became clear that there was strong support for the concept of co-ordination of testing services and for Australia-wide recognition of certificates of test. The important issue of the provision of lower level calibration services for manufacturing industry was not raised at the conference. It is highly probable that this issue would have been raised if the private sector had been represented.

There was considerable discussion on three issues:

- (1) The appropriate organisation to co-ordinate testing services.
- (2) The types of test to be covered by co-ordination.
- (3) Whether or not the scheme should include private sector laboratories.

THE APPROPRIATE ORGANISATION TO CO-ORDINATE TESTING SERVICES

Delegates expressed a range of views including co-ordination by CSIR, co-ordination by SAA and the establishment of a new organisation. There was significant support for a new arm of SAA, but the majority of delegates took the view that this could result in a conflict of interest and could submerge the interests of participating laboratories. Finally, the conference decided to propose the establishment of a new organisation.

TYPES OF TEST TO BE COVERED BY CO-ORDINATION

Some delegates opposed the inclusion of chemistry, bio-chemistry and biological tests. Other delegates pointed out that exclusion of these tests would prevent the issue of recognised certificates of test with respect to compliance with the requirements of the majority of Australian Standards. Finally, the conference decided to leave the scope of testing to the new co-ordinating organisation.

A number of delegates made the point that chemical, bio-chemical, biological and radiographic test results are more dependent on the competence of the testing staff than on the testing equipment and its calibration.

The relevant professional institutes, such as The Royal Australian Chemical Institute, were not represented at the conference. (So far as the author has been able to ascertain, CSIR did not consult with these institutes during its long search for a solution to the problem of national recognition of testing and measurement services.)

PRIVATE SECTOR LABORATORIES

Lightfoot's briefing notes for the conference did not mention the highly successful "Approved Test House Scheme." Presumably, he did not envisage the inclusion of manufacturer's laboratories or other private sector laboratories in the scheme for co-ordination of testing services. His briefing notes also did not mention the important role, at that time, of the testing laboratories operated by universities and some technical colleges.

Some delegates raised the issue of participation of private sector laboratories in the scheme. There was no consensus on this issue and finally it was sidestepped. The outcome may have been different if Mr Eady had been present. He was the Managing Director of McPherson's Limited which operated a substantial testing and research laboratory. This laboratory provided a comprehensive testing service to the metals industry in addition to meeting its own testing needs. The officer in charge of this laboratory was Mr J G Ritchie (to whom this report is dedicated.)

THE CONFERENCE RESOLUTIONS

The conference carried the following resolutions:

(1) Desirability of Co-ordination of Testing Services

"That in view of the importance of encouraging the efficient development of Australian secondary industries and of providing adequate means whereby facilities can be provided for the testing of manufactured products, it is desirable that action be taken for the co-ordination of testing services throughout Australia."

(2) General Principles on which Co-ordination should be based

"That this Conference is of opinion that the desired objective could be obtained by formation on a purely voluntary basis of a Union of testing laboratories which desire to collaborate in the work. Such laboratories would retain their present autonomy, and would continue to perform their existing functions, but in addition would be licensed to endorse certificates of test, which would have Commonwealth-wide recognition indicating that such tests had been carried out in accordance with procedures agreed on by members of the Union."

(3) Scope of Tests to be covered by Co-ordinating Authority

"That the scope of the testing to be covered by the proposed organization should not be restricted, but it should be left to the proposed organisation to determine from time to time the types of tests for which it would authorise co-operating laboratories to endorse certificates of test."

(4) Name of Co-ordinating Authority

"That the authority referred to in resolution (2) above as a Union of testing laboratories be known as the National Association of Testing Authorities."

(5) Management of Affairs of National Association of Testing Authorities

"That this Conference recommends that the affairs of the Association be managed by a Committee composed of representatives of the collaborating laboratories in each State, and of the Standards Association of Australia, the Council for Scientific and Industrial Research, the Associated Chambers of Manufactures, and Munitions Supply Laboratories."

(6) Finance

"That this Conference recommends to the Commonwealth Government that the cost of maintaining the Association be a charge on Commonwealth funds, and that provisionally it is estimated that it will require an amount of approximately £7,000 per annum, the detailed requirements will, however, be worked out by the Committee of Management when constituted."

CHAPTER 10 – The National Association of Testing Authorities

The next step, after the conference on 27 November 1945, was to seek the approval of the Commonwealth Government for formation of a "National Association of Testing Authorities" funded by the Commonwealth Government.

CSIR prepared a draft Cabinet Agendum for the Minister in Charge of Scientific and Industrial Research, the Hon J J Dedman. On 21 March 1946, Mr Dedman presented Cabinet Agendum 1125 to the Federal Cabinet. This Cabinet Agendum briefly summarised events prior to November 1945, quoted the resolutions of the Conference on 27 November 1945 and recommended:

- (1) *That the principles for establishing a National Association of Testing Authorities as set out in the above Resolutions should be endorsed.*
- (2) *That the cost of maintaining the Association should be a charge on Commonwealth funds. (It is anticipated that the funds required will not exceed £7,000 per annum. No funds would be required in 1945 - 46.)*
- (3) *That a provisional Committee of Management should be appointed consisting of one representative of each State, the Standards Association of Australia, the Munitions Supply Laboratories, the Commonwealth Department of Health and the Council for Scientific and Industrial Research, to prepare a draft constitution for the National Association of Testing Authorities and to make a recommendation as to the financial provision necessary.*
- (4) *That the State Premiers should be asked:*
 - (a) to approve of the principles for establishing a National Association of Testing Authorities, and,
 - (b) to appoint a representative to act on the provisional Committee of Management.
- (5) *That the draft constitution when prepared by the provisional Committee should be transmitted to the Commonwealth and State Governments for approval."*

The Cabinet Agendum was considered at a meeting of Federal Cabinet on 26 March 1946 which approved the recommendations. There were two significant differences between the resolutions passed at the conference on 27 November 1945 and the recommendations approved by Federal Cabinet:

- (1) The Cabinet Agendum referred to a "co-ordinated scheme of calibration and testing" whereas the conference of 27 November 1945 did not discuss co-ordination of calibration.
- (2) The membership of the provisional Committee of Management was changed by deletion of the representative of the Associated Chambers of Manufactures and by inclusion of a representative of Commonwealth Department of Health.

On 16 April 1946, the Prime Minister wrote to the six State Premiers asking them to approve of the principle of establishing a National Association of Testing Authorities and to appoint a representative to the provisional Committee of Management. All State Premiers replied in the affirmative and nominated their representatives.

The provisional Committee of Management met on 3 July 1946 to consider a draft constitution prepared by Lightfoot and F G Nicholls of CSIR. Madsen was overseas and Lightfoot chaired the meeting. Nicholls was the minute secretary. Present at the meeting were:

New South Wales - H Young

Queensland - Professor R W Hawken

South Australia - Professor Kerr Grant

Tasmania - A J Benjamin

Victoria - W R Jewell

Western Australia - Professor A D Ross

Commonwealth Department of Health - Dr C E Eddy

Commonwealth Department of Post-War Reconstruction - H P Breen

Munitions Supply Laboratories - A E Dawkins

Standards Association of Australia - Hebblewhite

The final membership of the provisional Committee of Management included a representative of Commonwealth Department of Post-War Reconstruction and thus departed from the membership approved by Federal Cabinet. It differed significantly from the membership recommended by the November 1945 conference, the changes being addition of two Commonwealth representatives (Health and Post-War Reconstruction) and deletion of the representative of the Associated Chambers of Manufactures.

The minutes of the meeting on 3 July 1946 are brief. They state "*discussion ensued on the various clauses of the constitution and a number of amendments were adopted*" but they do not indicate the nature of these amendments. The meeting resolved:

"That this meeting approve of the draft Constitution, as amended and that it be recommended to the Commonwealth and State Governments that the Constitution, as now revised be adopted by those Governments."

The "membership" clause of the draft constitution was as follows:

"The Association shall comprise as members those Commonwealth and State Departments, other instrumentalities, organisations, and persons operating testing laboratories which desire their laboratories to act as collaborating laboratories in providing a national testing service and the laboratories of which are accepted by the Association for registration."

The full text of the draft constitution is reproduced in Appendix 1 to this report.

On 28 August 1946, Federal Cabinet:

- (1) approved the draft Constitution
- (2) decided that the three Commonwealth representatives on the Council of the new Association should be from:
 - (a) CSIR
 - (b) Commonwealth Department of Health
 - (c) Commonwealth Department of Post-War Reconstruction
- (3) appointed CSIR as the liaison between the new Association and the Commonwealth Government
- (4) decided that funds for the new Association should be provided by the Prime Minister's Department.

Late in 1946, the six State Governments approved the draft Constitution of the new Association and appointed their representatives to its Council. On 29 November 1946, CSIR requested the Associated Chambers of Manufactures to nominate a representative to the Council of the new Association. In February 1947, the Chambers nominated Mr M T W Eady.

The representatives appointed to the Council were:

Commonwealth:	Lightfoot, H P Breen, Dr C E Eddy.
New South Wales:	P C Pecover, R A Holloway.
Queensland:	Professor R W Hawken, H P Singleton.
South Australia:	Professor Sir Kerr Grant, R M Wigg.
Tasmania:	A H Benjamin, Professor E E Kurth.
Victoria:	W R Jewell, E Bate.

Western Australia: Professor A D Ross, D B Sugden.

Associated Chambers of Manufactures: M T W Eady.

Standards Association of Australia: Hebblewhite.

The first meeting of the Council of the new Association was held on 5 and 6 February 1947. At this meeting Madsen and Mr A E Dawkins were co-opted to the Council. The Council appointed Lightfoot as its Chairman and Madsen as its Vice-Chairman. Also it appointed an Executive Committee comprised of Lightfoot, Madsen, Hebblewhite, M T W Eady and A E Dawkins.

The world's first national laboratory accreditation system had commenced its operations.

CHAPTER 11 - In Retrospect

The introduction to this report posed the question "why did Australia establish its system so many years in advance of other countries?" In retrospect there were four main reasons:

- (1) Australia had three distinguished engineers (Lightfoot, Madsen and Hebblewhite) who devoted their talents and energy over many years to finding the most appropriate arrangement for recognition of test documents throughout Australia.
- (2) The European solution of large specialised "official" test houses was not appropriate for Australia with its large area, small population and decentralised industries.
- (3) The Australian Constitution divided the responsibilities with respect to testing and measurement between the Commonwealth and the six sovereign States. Therefore, any arrangement for recognition of test documents throughout Australia required the approval of the Commonwealth and the six States.
- (4) The Approved Test House Scheme, introduced in 1940, demonstrated that it was a practicable proposition to operate a nationwide laboratory accreditation scheme in Australia.

This report has noted inadequate consultation with some interested parties and some unexplained changes in scope and in the membership of committees. Some of these happenings posed problems for the new Association. In particular, the new Association faced these problems:

- (1) Its scope was uncertain because:
 - (a) the term "testing" was not defined in any of the documents produced by CSIR
 - (b) some of these documents referred to "testing and calibration" but other documents referred only to "testing".
- (2) Communications between CSIR and the Department of Defence had been less than adequate for many years for reasons detailed in this report.
- (3) At no time had CSIR formally invited the major industry organisations to participate in the discussions and conferences. Executives from the private sector, such as Mr M T W Eady, had participated as individuals selected by CSIR. (The sudden death of Mr Eady shortly after formation of the new Association exacerbated this problem).

- (4) The relevant professional institutes such as The Royal Australian Chemical Institute and The Institution of Engineers, Australia had not been invited by CSIR to participate in any of the discussions or conferences.

Resolution of the doubts and misunderstandings arising from these problems delayed development of the new Association. Over time, these problems were overcome. But that is another story!

APPENDIX 1 – The 1946 Constitution

This appendix reproduces the full text of the Constitution adopted by the provisional Committee of Management on 3 July 1946 and subsequently approved by the Commonwealth Government and the six State Governments.

1. NAME

The name of the Association is the National Association of Testing Authorities, hereinafter referred to as the Association.

2. MEMBERSHIP

The Association shall comprise as members those Commonwealth and State Departments, other instrumentalities, organisations, and persons operating testing laboratories which desire their laboratories to act as collaborating laboratories in providing a national testing service and the laboratories of which are accepted by the Association for registration.

3. OBJECTS

The objects for which the Association is established are:-

- (i) To organise a national service which will provide testing facilities to meet the needs of Government, industry, and commerce and thus assist in maintaining the products of industry at a high standard.
- (ii) To secure the collaboration on a voluntary basis of testing laboratories throughout the Commonwealth.
- (iii) To investigate the standard of staff and equipment possessed by laboratories submitted for registration, and to approve and register such laboratories in respect of specified classes of tests for which this standard is deemed to be satisfactory. Laboratories so registered are hereinafter referred to as registered laboratories.
- (iv) To authorise the registered laboratories to endorse in the name of the Association certificates of test issued by them for those classes of tests for which they are registered.
- (v) To ensure that the testing equipment at registered laboratories is calibrated and checked periodically either with the national reference standards at the CSIR National Standards Laboratory or in such other ways as may be deemed appropriate, and that the standard of competence of the testing staff is periodically examined.

- (vi) To secure uniformity in methods of test at registered laboratories where desirable.
- (vii) To assist in securing additional testing facilities when necessary.
- (viii) To promote the recognition of registered laboratories as impartial authorities whose certificates of test will be accepted throughout Australia.
- (ix) To encourage the utilisation of the testing facilities available at registered laboratories.
- (x) To encourage the installation of testing equipment in industry and the greater use of routine testing where this would be conducive to better production control.
- (xi) To encourage and assist in the formulation and adoption of Australian Standard Methods of Test.
- (xii) To procure the recognition of the Association throughout the British Commonwealth of Nations and in other countries.
- (xiii) To co-operate with any other organisations with kindred objects.

4. COUNCIL

- (i) The affairs of the Association shall be directed and managed by a Council which shall take all such action as may be necessary to achieve the objects for which the Association is established and shall do all such other things as are incidental or conducive to the attainment of the above objects or any of them.
- (ii) The Council shall control the funds of the Association.
- (iii) The Council shall consist of:
 - (a) six Members, one nominated by each of the State Governments;
 - (b) three Members, nominated by the Commonwealth Government;
 - (c) one Member nominated by the Associated Chambers of Manufactures;
 - (d) one Member nominated by the Standards Association of Australia;

- (e) six Members, one elected by each of the State Committees, provided that the Council may at its discretion coopt as Members not more than two persons.
- (iv) Pending the election by the State Committees of the six Members of Council referred to under Clause 4 (iii) (e), each State Government shall nominate a Member to act until a Member has been elected by the State Committee in the State concerned.
- (v) The Members of Council, other than the six Members to be elected by the State Committees, shall take necessary action as soon as practicable for the election of these six Members.
- (vi) The tenure of office of a Member of Council shall be for three years, provided that the first nominated and elected Members shall hold office until the 31st December in the third year following the year in which the first meeting of the Council is held.
- (vii) A retiring Member of Council shall be eligible for reappointment.
- (viii) In the event of the death or resignation of a Member of Council his successor shall hold office until the expiration of the term of the Member who has died or resigned.
- (ix) There shall be a Chairman and Vice-Chairman of the Council elected from the Members of Council and such election shall not be deemed to create vacancies on the Council. The Chairman and Vice-Chairman shall retire on the 31st December of each year and shall be eligible for re-election. A retiring Chairman or Vice-Chairman shall continue to act until his successor is elected.
- (x) In the absence of both the Chairman and the Vice-Chairman the Members of Council present at any meeting of the Council shall elect from amongst themselves a Chairman of the meeting.
- (xi) A Member of Council may with the approval of the Chairman nominate a person to act as his substitute. In the absence of a Member of Council his substitute shall enjoy the full privileges of membership.
- (xii) Notice of any meeting of Council shall be posted to the last known address of Members of Council not less than twenty-one days prior to the meeting and shall be accompanied by an agenda paper. Business not appearing on such agenda paper shall not be transacted at a meeting of Council except by a decision of an absolute majority of Members of Council.

- (xiii) Questions arising at any meeting of the Council shall be determined by a majority of votes of those Members of Council present. In the case of an equality of votes the Chairman of the meeting shall have a second or casting vote.
- (xiv) Unless otherwise determined by the Council ten Members of Council present shall be a quorum at meetings of the Council.
- (xv) In the absence of a quorum at a meeting of the Council the meeting shall proceed but all business dealt with will be subject to ratification by postal ballot conducted as provided under Clause 5 (iv) below.
- (xvi) The Chairman of the Council may at any time, and shall at the request of not less than five Members of Council within two months of the receipt of such request, call a special meeting of the Council. The provisions of Clause 4 (xii) above shall apply to all such meetings.
- (xvii) The first meeting of the Council shall be held as soon as practicable after the appointment of Members of Council other than the six Members to be elected by the State Committees and all subsequent meetings shall be held at such times and places as the Council may fix.

5. EXECUTIVE COMMITTEE

- (i) There shall be an Executive Committee of the Council, consisting of the Chairman and four Members of the Council elected by the Council.
- (ii) The functions of the Executive Committee shall be to deal with matters referred to it by the Council and with all matters in which the Council has jurisdiction which arise from time to time and in regard to which action should not, in the opinion of the Executive Committee, be postponed until a meeting of the Council, and on all such matters the Executive Committee shall have and may exercise between meetings of the Council all the powers and functions of the Council.
- (iii) Three members shall be a quorum at meetings of the Executive Committee.
- (iv) The Executive Committee may refer any matter to all Members of Council for a referendum by postal ballot. The ballot paper shall state clearly the matter on which a decision is desired. The final

date for receipt of the recorded votes shall be specified in the ballot paper and shall not be less than twenty-one days from the despatch of the ballot paper. The decision of a majority of Members of Council voting, provided that not less than ten Members vote, shall constitute a decision of the Council without the necessity for any subsequent ratification.

- (v) A copy of the Minutes of each meeting of the Executive Committee shall be forwarded to each Member of Council as soon as possible after the meeting and shall be brought forward, together with any comments recorded by Members of Council, for consideration at the next following meeting of the Council, which shall have power to amend, veto or annul any resolution passed or action taken by the Executive Committee.

6. OTHER COMMITTEES

- (i) There shall be a State Committee in each State, which shall act in an advisory capacity to the Council and shall, subject to the direction of the Council, assist in achieving in its own State the objects for which the Association is established.
- (ii) The Council may establish other Committees to assist it in the performance of its functions and may appoint such persons as it may deem fit to be members of any such Committees.

7. CANCELLATION OF REGISTERED LABORATORIES

- (i) If any member of the Association desires that a laboratory operated by that member should cease to be a registered laboratory, and a notification to that effect is made to the Council, the Council shall expunge the name of the laboratory from the register.
- (ii) If in the opinion of the Council after due enquiry it appears desirable for any reason that a laboratory should cease to be accepted as a registered laboratory, the Council may on the decision of an absolute majority of Members of Council expunge the name of the laboratory from the register and the decision of the Council in that respect shall be final.

8. HEADQUARTERS

- (i) Until otherwise determined by the Council the headquarters of the Association shall be in Melbourne.

- (ii) For an initial period CSIR will provide necessary secretarial assistance and, subject to the direction and authorisation of the Council, will operate on the funds of the Association and will keep an account of its expenditure.

9. FINANCE

- (i) A statement of income and expenditure shall be prepared and placed before the Council at least once in each financial year.

10. STAFF

- (i) The Council may appoint such officers and employees as it may deem necessary.
- (ii) Power to appoint and dismiss officers and employees and to fix and vary their respective salaries and terms of appointment shall be vested in the Council.

11. REGULATIONS

The Council shall have power to issue Regulations of the Association to regulate its own procedures, the appointment and operation of Committees and staff, and such other matters as the Council may decide.

APPENDIX 2 – References

This appendix lists the main references used in the preparation of this report:

- (1) Lucas, R B, *Review of Existing Legislation on Weights and Measures in the Australian Colonies*, Government Printer, Adelaide, 1891.
- (2) Gleeson J, *From Horseshoe Nails to High-power Lasers, the Changing Role of the Materials Research Laboratories*, Australian Government Publishing Service, 1981.
- (3) Wright J F H, *Measurement in Australia 1938-1988*, CSIRO Division of Applied Physics, 1988.
- (4) Lightfoot G, *Engineering Standardisation*, Pamphlet No 2, Advisory Council of Science and Industry, 1919.
- (5) Committee on Maintenance of Standards, Final Report and Recommendations, Journal of CSIR, Vol 2, No 3, August 1929.
- (6) Currie G and Graham J, *G A Julius and Research for Secondary Industry*, Records of the Australian Academy of Science, Vol 2, No 1, November 1970.
- (7) Secondary Industries Testing and Research - Extension of Activities of Council for Scientific and Industrial Research, The Parliament of the Commonwealth of Australia, Parliamentary Paper No 30, February 1937.
- (8) Lightfoot G, *Standards Laboratories and Testing Houses - Report on observations made during a visit abroad*, CSIR, January 1938.
- (9) Lightfoot G, *The National Standards Laboratory - Its Relation to Commerce, Industry and Science*, Journal of CSIR, Vol 12, No 1, February 1939.
- (10) Report of Departmental Supervision of Approved Test Houses, Munitions Supply Laboratories, November 1944.
- (11) Minutes of CSIR Committee on Standards and Testing, First Meeting, 21 June 1945.
- (12) Minutes of CSIR Committee on Standards and Testing, Second Meeting, 29 June 1945.
- (13) Record of Conference on Coordination of Testing Services, CSIR, November 1945.

- (14) Minutes of Meeting to Draft a Constitution for the National Association of Testing Authorities, 3 July 1946.
- (15) Minutes of NATA Council, First Session, 5/6 February 1947.