ISSUE FOUR | NOVEMBER 2013

TECHNICAL ASSESSORS' NEWS

TECHNICAL ASSESSORS NEEDED FOR ROLES IN FORENSIC SCIENCE

NATA relies heavily on the specialised knowledge and experience of its volunteer technical assessors. The quality of the assessment is very much dependent on the quality of the Technical Assessors involved.

Technical Assessors work closely with and provide support to the NATA Lead Assessor during the assessment of facilities.

The role of a Technical Assessor benefits not only the audited facility but also the Assessor themselves and their employer. Participation in a NATA assessment via a peer reviewed process can provide the following benefits to the employer:

- Professional development of the individual
- Networking potential between organisations
- Exchange of ideas between professionals

Employers support the NATA accreditation process by releasing staff to participate as volunteers in assessments. Whilst Assessors are not paid, all their travel and expenses are met by NATA.

Within Forensic Science, there is currently a need for new Assessors across all disciplines, however, the need is greatest within Ballistics, Parentage testing and Document Examination.

To be considered to become a Technical Assessor, the following essential criteria must be met:

- Minimum of five years practical experience in the technical discipline
- Holding or having held the role of reporting scientist for that discipline
- Involvement in continuing education activities (for example, attending conferences and workshops, writing scientific papers, conducting presentations, training activities)

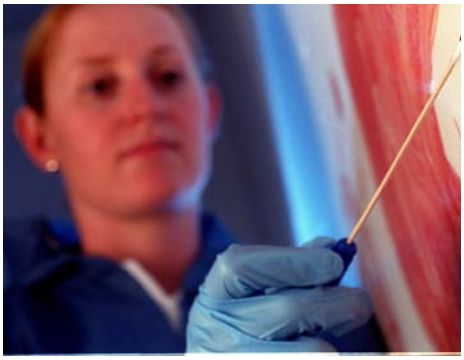

Photo: Queensland Police Service

Additionally, it is important that candidates exhibit good communication and interpersonal skills.

Nominees are required to be approved by senior management within their organisation and it is also desirable to have this nomination seconded by a current NATA Technical Assessor. The Forensic Science Accreditation Advisory Committee (FSAAC) reviews and approves new Technical Assessors based on the criteria above

New Technical Assessors are required to attend a one-day training course within two years of being appointed, which NATA runs regularly throughout the country. On-line courses may also be utilised for Assessors in more remote areas or those unable to attend a face to face course within the two years.

If you know anyone within your organisation who meets these requirements and you would like further information on how to progress with a potential applicant, please contact Lisa Bartlett, Deputy Sector Manager, Life Sciences on (03) 9274 8200 or via email: lisa.bartlett@nata.com.au

CMT TECHNICAL ASSESSOR GUIDANCE

INTRODUCTION

General guidelines regarding the role of the Technical Assessor and NATA lead assessor are included in NATA's Assessor Resource Kit (ARK), which has been provided to each Technical Assessor and is maintained on NATA's web site. Some additional material has been prepared specifically for CMT Technical Assessors in fulfilling their role in determining the competency of CMT facilities. It is intended that this material be published in three parts, with this second part dealing with the following topic:

- Equipment (refer ISO 17025 Clause 5.5)

Feedback from Assessors on these guidelines is welcome and may be forwarded to the Sector Manager Infrastructure

EQUIPMENT (GENERAL)

Often the equipment checks and calibra-

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VALE EDDIE DIGBY

NATA has lost a good friend and a highly experienced, very active Technical Assessor with the passing of Edwin (Eddie) Digby on 20th September after a short but brave battle with cancer.

Eddie was a Metallurgist whose capabilities covered a wide range of activities within Non-destructive Testing, Mechanical Testing and Inspection. He was a strong supporter of NATA and his decades of experience, firstly with BHP in their Newcastle steelworks and then in a major commercial testing and inspection company gave him a vast spread of technical knowledge.

This knowledge coupled with his easy-going, personable, yet thorough manner gained the respect and esteem of all who knew him, or who participated in an assessment with him.

He was appointed as a Technical Assessor in 1986 and was actively assessing for NATA until very recently, his last two assessments being in May and June 2013, thereby drawing to a close his meritorious record of 71 NATA assessments.

Eddie was also actively involved in preparation of Australian Standards for many years, having been a member of Standards Committee MT/7 - NDT of Metals and had chaired its sub-committee on Acoustical Methods.

His passing will be felt by many in the metallurgical industry, particularly in the Newcastle area. The Association extends its sincere sympathy to Eddie's family at this time of loss.

(by Cliff Simmons, NATA Technical Consultant NDT and Mechanical Testing)

Eddie Digby

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tion schedule may follow those detailed in the NATA General Equipment Table, or the Construction Materials Testing Field Application Document. However, the facility may have adopted equipment assurance schedules which differ from that document and the Technical Assessor needs to ensure that the schedules are reasonable.

The lead assessor will normally assist by providing a list of equipment in the briefing notes, if it has been provided by the facility within the Assessment Information Document. The lead assessor will also usually review the schedule for equipment calibration/checking and assist you by establishing whether or not this plan has been followed, e.g. single point checks and repeatability checks on balances, but a selection of records should also be reviewed by the Technical Assessor to determine the adequacy of the equipment assurance.

Similarly, the lead assessor may also review external calibration certificates to ensure that the calibrations have been performed as scheduled and that they have been verified as meeting the test method requirements by the facility. However the Technical Assessor has a role in determining whether the calibration actually meets the test method and equipment schedule requirements. This is commonly done whilst witnessing the test being performed, e.g. a balance used for moisture content (readability and limit of performance), a testing load ring used for CBR testing (Grade C AS 2193).

During the assessment, the Technical Assessor needs to determine the availability of equipment, its condition and should mark the items they have viewed on the equipment list or record the details on the assessor record sheet.

If it is found that additional equipment is used, or out-of-service equipment is not so marked or equipment is being used outside its calibrated range, the Technical Assessor needs to record the item description and number on the assessor record sheet and bring this to the lead assessor's and facility's attention during the course of the assessment.

Equipment assurance programs

As laboratories adopt Laboratory Equipment Assurance Programs to best suit their needs, the assessment of the adequacy of such programs will require more input from Technical Assessors.

Some facilities will follow the minimum requirements set out in the Construction Materials Testing Field Application Document as they have done for many years. This is often a very appropriate way of developing a calibration and checking schedule.

However, laboratories may elect to modify the time intervals between checks and calibration depending on the use of equipment and the values of previous checks. When these modifications are made, the Technical Assessor needs to be assured that the changes are justified and ensure that the facility continues to produce test results using equipment that is accurate and meeting the test method requirements.

CALIBRATION

Is an equipment item 'critical' to the particular test?

Where an item is critical to the test result the formal evidence of measurement traceability is required, ie, calibration, and must be substantiated by a NATA endorsed report or equivalent approach. Where the same equipment item is used for a range of different tests then the most critical application of the equipment item must be allowed for.

For example a load measuring device used a combined CBR and Marshall testing machine will need to meet Class B requirements as this is required for the Marshall test, but Class C is OK for CBR tests. Similarly the deflection measuring device for measurement of flow is more critical than that for measuring the penetration into the specimen for CBR using the same machine.

The range of the calibration may also vary between test, for example, concrete may require a Class A testing machine up to 1500 kN but when used for testing aggregate this class A capacity may only be up to 400 kN.

Critical equipment

Section 5.5.2 of ISO/IEC17025 states:

> "Equipment and its software used for testing, calibration and sampling shall be capable of achieving the accuracy required and shall comply with specifications relevant to the tests and/or calibrations concerned. Calibration programs shall be established for key quantities or values of the instruments where these properties have a significant effect on the results".

Non-critical equipment

Section 5.6.2.2.1 of ISO/IEC17025 states:

> "For testing laboratories, the requirements given in 5.6.2.1 apply for measuring and test equipment with measuring functions used, unless it has been established that the associated contribution from the calibration contributes little to the total uncertainty of the test result. When this situation arises the laboratory shall ensure that the equipment used can provide the uncertainty of measurement needed.
>
> Note: The extent to which the requirements of 5.6.2.1 should be followed depends on the relative contribution of the calibration uncertainty to the total uncertainty. If the calibration is the dominant factor, the requirements should be strictly followed."

To illustrate, take the example of a thermometer used for measuring the temperature of water when performing a particle density test. According to the uncertainty analysis provided in Table 1, it can be seen that the contribution of the change in density of water is minor with respect to other factors. The end result is that demonstration of measurement traceability for

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CMT TECHNICAL ASSESSOR GUIDANCE (cont)

the thermometer is probably not required in this instance.

PERFORMANCE CHECKS

While a formal calibration may not be required for a particular equipment item, some form of performance checking may still be warranted. Also, where an equipment item is subject to a formal calibration regime, periodic performance checks in between calibrations often contribute to the overall equipment assurance. Indeed, the frequency and rigour of performance checks may be a relevant factor in the determination of the appropriate frequency for formal calibration.

FREQUENCY OF CALIBRATION OR PERFORMANCE CHECKING

In a concrete testing laboratory, it may be necessary to decrease the calibration interval for a testing machine due to:

- considerable numbers of tests;
- shock unloading when testing high strength concrete; and
- high risk (e.g. increase in use of cement or structural failures) from incorrect results.

In a compaction control laboratory, compaction moulds can be subject to different amounts of wear so the performance checks (for mould volume) may need to be more frequent than the annual check suggested in the CMT FAD, particularly if hard rock materials are being tested.

On the other hand, some laboratories may rarely use the larger 150 mm diameter moulds and possibly could extend the period when this occurs.

DEFERRING CALIBRATIONS OR PERFORMANCE CHECKING

In some cases, particularly for infrequently performed tests, equipment calibrations are deferred until the apparatus is actually needed. This can reduce costs, but it does cause delay in performing such tests until the equipment is recalibrated. If a laboratory is remote from a calibration facility, this may not be an option.

In other cases, it could be found that equipment is rarely used and that, due to the manner in which it is stored, its calibration is unlikely to have changed. This may need to be verified from previous calibrations over a number of years. Similarly, if a nuclear gauge is only used at a few depths, once the initial checks have been made within a month of calibration, the facility may elect to perform the monthly consistency checks only for the depths that are commonly used and, when a different depth is to be tested, an appropriate check is made immediately prior to testing.

Table 1 Uncertainty calculation (simplified) for AS 2891.7.1

	A	B	C	D	E	F
Measurement component	Estimated Component Uncertainty	Rectangular Distribution factor	Column A / B (Standard Uncertainty)	Weighting Factor	Column C x D	Column E squared
Pycnometer + Lid	0.5	1.73205	0.28868	-0.0072	-0.0021	4.3E-06
Pyc + Lid + Water	0.5	1.73205	0.28868	0.01153	0.00333	1.1E-05
Pyc + Lid + Asphalt	0.5	1.73205	0.28868	0.00721	0.00208	4.3E-06
Pyc + Lid + Asphalt + Water	0.5	1.73205	0.28868	-0.0115	-0.0033	1.1E-05
Air left in flask (1%)	0.01	1.73205	0.00577	-0.312	-0.0018	3.2E-06
Density determined from temperature measurement*	0.00003	1.73205	1.7E-05	-2.6667	-5E-05	2.1E-09*
Sum						3.4E-05
Square root						0.00583
Coverage factor (95% confidence level)						2
Expanded uncertainty						0.012

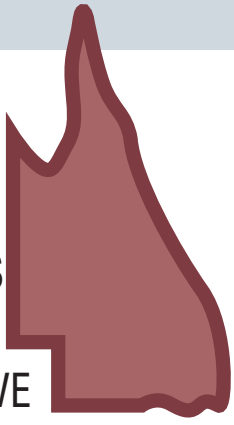
This table illustrates the concept of 'non critical' equipment

*Temperature measurement does not contribute significantly to the overall uncertainty result. A thermometer is therefore a 'noncritical' equipment item for this method.

EQUIPMENT SUBJECT TO WEAR

Facilities need to maintain appropriate assurance over equipment that is subject to wear, such as compaction hammers and moulds. The frequency of checking after compliance has been initially established will depend on whether the equipment is subject to wear or deterioration due to climatic conditions. A bulk density pot which is left out in the weather may rust, whereas the pots used for checking the pouring density of sand kept in a cupboard in the laboratory should not change in volume. Also, it is possible that only parts of the equipment may wear, e.g. the inside of a bowl and the cam for a Casagrande liquid limit device. Other equipment which may be subject to minor wear, e.g. an aggregate splitter, may not require additional measurements unless it is visibly obvious that they are worn.

MEET NANCY LA MONACA - QUEENSLAND'S NATA COUNCIL REPRESENTATIVE



The Queensland State Government representative on the NATA Council is Ms Nancy La Monaca, Principal Policy Officer, Biosecurity Queensland, Department of Agriculture, Fisheries and Forestry.

Nancy, who became a NATA Technical Assessor since 2002, holds a Bachelor of Science- Medical Laboratory Science (QUT), a Master of Applied Science (QUT) and a Postgraduate Certificate in Assessment and Evaluation (Uni of Melb).

Nancy started as a research scientist at the Queensland Department of Primary Industries in 1992. She transitioned to the department's microbiological services laboratory in 1995 where she first engaged with NATA as a signatory for biological testing.

During her time leading the Department's two consulting microbiological testing laboratories (Brisbane and Cairns), Nancy was also the Quality Manager for the Scientific Services Program (incorporating microbiology and chemistry laboratories) and the Department's representative on the Standards Australia Food Microbiology Committee.

Nancy's association with NATA also extended to her being a Technical Assessor for biological testing.

Since establishing the role of Coordinator (Laboratory Quality Management Systems) for the Agency, Nancy has undertaken a number of corporate roles including change implementation, program investment and service analysis.

She is currently the Principal Policy Officer for Queensland's Chief Biosecurity Officer with oversight of animal and plant biosecurity, invasive pests management, animal welfare and product integrity.

CONTRIBUTIONS WELCOME

This is a great place to share some of all that experience you've gained, whether it's from working in the laboratory or while conducting assessments.

Stories, technical articles, photos, jokes – all contributions from our Technical Assessors are welcome.

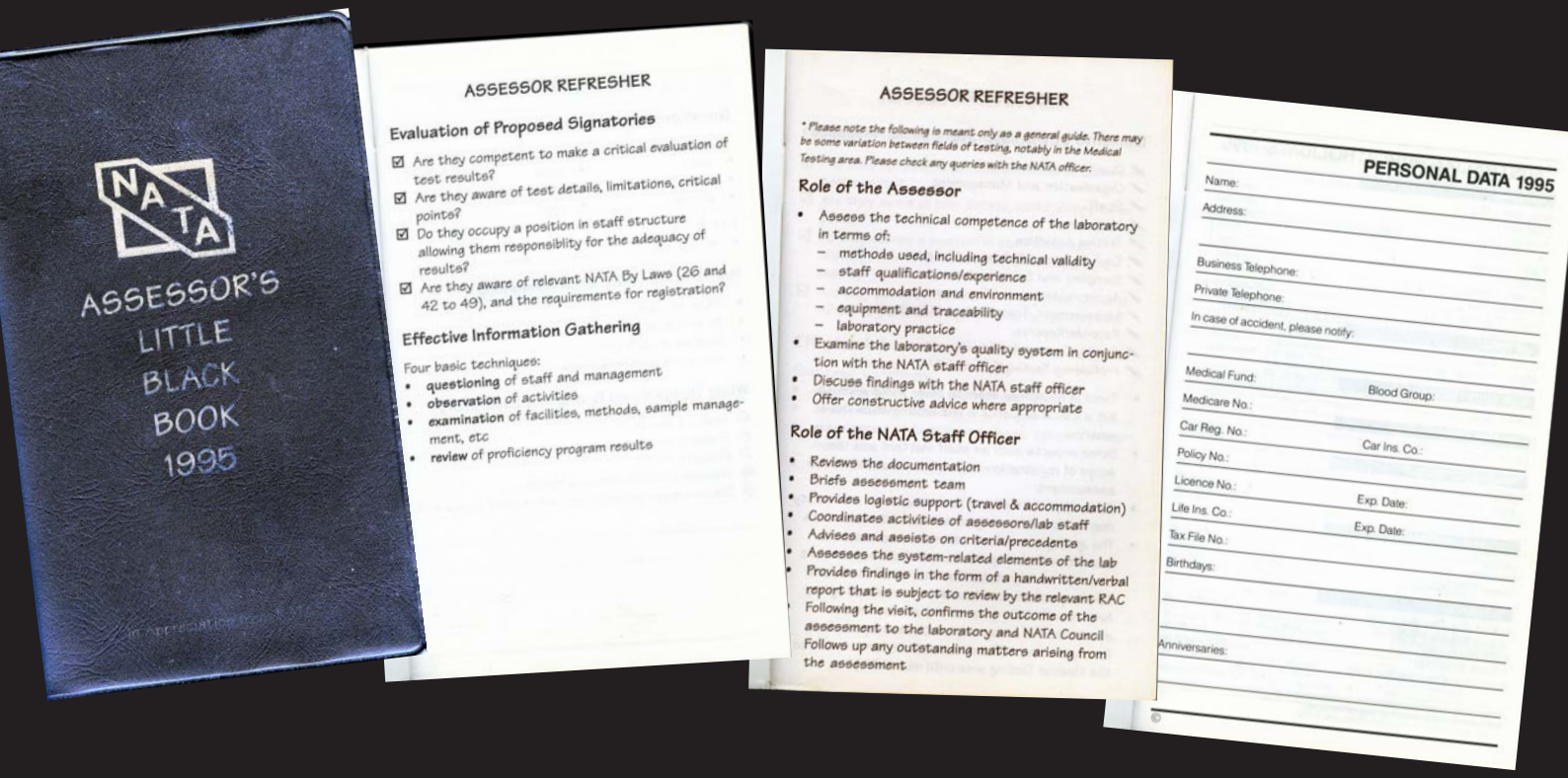
Send them via email to: corpcomm@nata.com.au or to: NATA Communications, PO Box 7507, Silverwater NSW 2128.

THE ASSESSORS' 'LITTLE BLACK BOOK'

Cliff Baker, AM has been involved with NATA since 1953 in an amazing variety of capacities, as Technical Assessor, signatory, authorised representative, AAC Chair, member of the NATA Council, Board Member and Board Chair.

In 1956, Cliff became a NATA Technical Assessor and continued in this role for the next forty years. In 1995 he was a recipient of a guide for Assessors that was officially titled "Assessor's Little Black Book".

Cliff has generously provided Technical Assessors' News with a copy of the Little Black Book which is reproduced here for your information. Yes, it was a simpler world nearly twenty years ago, but it's interesting to note that many principles of accreditation remain unchanged after all this time.



RECOGNITION FOR AN 'UNKNOWN' SCIENTIFIC ACHIEVER

The Sydney Morning Herald's science reporter, Nicky Phillips, recently wrote an article about the scientists who, though largely unknown by the general public, have had an important impact on all our lives.

Among the four 'Doctor Whos' profiled was Professor Peter Colman, a NATA Technical Assessor from 1992 to 2007 and Department Head of Structural Biology at the Walter + Eliza Hall Institute in Melbourne.

The article said that statistics suggest a few thousand people in NSW will fall victim to the flu each winter. Their doctors may prescribe a class of drug invented by Melbourne virologist Peter Colman.

Many Australians know it was Adelaide pathologist Howard Florey who discovered penicillin was a wonder drug against bacterial infections, but not as many know that Colman, a senior scientist at the Walter Eliza Hall Institute, was the man whose research on the constantly changing influenza virus resulted in the antiviral drug Relenza, and enabled others to develop Tamiflu.

While working at the CSIRO in the 1980s, Colman, with his Australian National University colleague Graeme Laver, wanted to understand how the influenza virus changed so rapidly, the key characteristic that enabled the virus to reinfect the population year after year.

They knew two proteins on the virus's surface – called haemagglutinin and neuraminidase – were the crucial parts of the virus that evolved. When the pair took detailed images of neuraminidase using X-ray crystallography, they pinpointed the sections of the protein that remained unchanged.

"It turns out [these regions] were important for the virus to cut itself free from an infected cell," Colman told Nicky Phillips.

The antiviral drugs Colman and colleagues developed stops the virus replicating itself from an infected cell, slowing its spread around the body.

Professor Peter Colman
(photo: Walter + Eliza Hall Institute)

WE'D LIKE YOUR THOUGHTS ON 'TECHNICAL ASSESSORS' NEWS'

Are the contents interesting? Do you feel it's relevant to your role as a Technical Assessor? How many issues would you like to receive each year? And anything else you'd like to tell us.

Please send your response to us via email at corpcomm@nata.com.au

LEGAL TRACEABILITY – THE FREQUENTLY ASKED QUESTIONS

By Dr Richard Brittain LLB, NATA Technical Assessor since 1999 and Senior Legal and Policy Officer at the National Measurement Institute

Introduction

Over many years the Legal Metrology Policy Section of the National Measurement Institute (and its predecessor[1]) has responded to numerous legitimate and pertinent questions from NATA stakeholders about *legal traceability*. These questions, from both assessors and accredited laboratories and their clients, have increased in number and scope over time as the number of measurements made for legal purposes, and/or brought within a metrological control system under the *National Measurement Act 1960* (Cth), has increased. The purpose of this article is to provide guidance to all NATA stakeholders on *legal traceability* by teasing out and providing answers to what have emerged as the FAQs on *legal traceability*.

What is legal traceability?

Legal traceability is the ability to demonstrate that a measurement has been made in terms of Australian legal units of measurement[2] which are the 'sole legal units of measurement' in Australia for the measurement of physical quantities. It connotes the ability to demonstrate the traceability of a measurement to the appropriate Australian legal unit of measurement by means that are recognised under Australian law. This imperative and the means or options for satisfying it are given in section 10 of the *National Measurement Act 1960* (Cth).

Legal traceability is in effect a special case of what the *International vocabulary of metrology – Basic and general concepts and associated terms (VIM)*[3] defines generally as '*metrological traceability*' i.e. the 'property of a measurement result whereby the result can be related to a reference through a documented and unbroken chain of calibrations, each contributing to the measurement uncertainty'. *Metrological traceability* is abbreviated to, and commonly known as, *traceability* by most of us most of the time even though this practice is deprecated by the VIM[4]. More specifically *metrological traceability* is a special case of what the VIM defines as '*metrological traceability to a unit*' i.e. '*metrological traceability* where the reference is the definition of a measurement unit through its practical realization'. As noted in the VIM[5] the *International Laboratory Accreditation Cooperation* (ILAC) considers *metrological traceability* 'to be an unbroken *metrological traceability* chain to an international measurement standard or a national measurement standard'. In the case of *traceability to the SI* this means '*metrological traceability* to a unit of the International System of Units'. For *legal traceability* in Australia it means '*metrological traceability* to an Australian legal unit of measurement'.

How is legal traceability achieved?

Section 10 of *the National Measurement Act 1960* (Cth) provides multiple traceability pathways for achieving *legal traceability*. These include 'by means of, by reference to, by comparison with or by derivation from':

1. A standard of measurement which can be an appropriate:
   a. Australian primary standard of measurement;
   b. Australian secondary standard of measurement;
   c. State primary standard of measurement;
   d. recognized-value standard of measurement; or
   e. reference standard of measurement.
2. An Australian certified reference material.
3. A certified measuring instrument.
4. Or combinations of one or more of the references given in paragraphs 1 to 3 above.

Having provided these options section 10 then also draws a clear line ruling out other options by stating that *legal traceability* may be achieved by any of the above means but 'not in any other manner'[6] .

All of the references in paragraphs 1 to 3 above have a specific meaning under Australian law and they are precisely defined in the *National Measurement Act 1960* (Cth)[7] and the regulations in power under it i.e. *National Measurement Regulations 1999 (Cth)*[8] .

When is legal traceability needed?

Many NATA stakeholders have enquired: when do my measurements need to have *legal traceability*? The good news is that whilst *metrological traceability* is required of all NATA laboratories in order to obtain and retain accreditation by compliance with AS ISO/IEC 17025, *legal traceability* is not required for measurements made for scientific or technical purposes. Therefore a vast majority of the measurements made by NATA laboratories do not need to have *legal traceability* – so don't panic, lawyers are not invading science!

Section 10 of the *National Measurement Act 1960* (Cth) specifies when *legal traceability* is required. It stipulates that four conditions need to be met before its *legal traceability* imperative, and the options that it provides for meeting it, apply. These are:

i. The measurement must be for a legal purpose (as opposed to a scientific or technical purpose);

ii. The measurement must be of a physical quantity;

iii. There must be Australian legal units of measurement for the physical quantity being measured; and

Dr Richard Brittain

iv. It must be necessary to show that the measurement has been made in terms of Australian legal units of measurement.

The first three conditions are largely self explanatory. The fourth condition is critical to understanding when *legal traceability* is required and its purpose and value. Exactly what enlivens the necessity condition is decided in terms of legal principle. In general it is anything that raises a doubt about, or brings into question, the veracity of a measurement as, when established, this doubt can trigger the obligation to demonstrate the veracity of the measurement. The veracity must then be proved by showing that it has been made in terms of Australian legal units of measurement. This necessitates the measurement having *legal traceability* i.e. the ability to show that it has been made in terms of Australian legal units of measurement by one of the *legal traceability* pathways provided in section 10. A good example of how the *legal traceability* imperative could be enlivened would be a situation where there were two measurements of a disputed quantity. In such a case the courts would initially apply legal principle and be guided towards accepting a measurement that had *legal traceability* over one that merely had *metrological traceability*.

However, as stated in the VIM [9], '*metrological traceability* of a measurement result does not ensure that the measurement uncertainty is adequate for a given purpose or that there is an absence of mistakes'. The same applies to *legal traceability* and in a situation where a court was asked to adjudicate between two measurements of a disputed physical quantity, both of which had *legal traceability*, other factors would also need to be considered by the court in making its decision.

What is the difference between metrological traceability and legal traceability?

In many ways *metrological traceability* and *legal traceability* are simulacrum. They both

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LEGAL TRACEABILITY – THE FREQUENTLY ASKED QUESTIONS (cont)

require that a '[measurement] result can be related to a reference through a documented and unbroken chain of calibrations, each contributing to the measurement uncertainty'. The key differences are: first, that for *legal traceability* the reference must be the relevant Australian legal unit of measurement[10] through its practical realization, whilst for *metrological traceability* the reference may be of a wider variety of references including both national measurement standards from countries other than Australia and international measurement standards; second, for *legal traceability* the means available for achieving the 'unbroken chain of calibrations, each contributing to the measurement uncertainty' are restricted to means recognized under Australian law i.e. the *legal traceability* pathways specified in section 10 of the *National Measurement Act 1960* (Cth), whilst for *metrological traceability* there are further options again based on the use of measurement standards from countries other than Australia, and international measurement standards to produce a documented and unbroken chain of calibrations to SI units rather than exclusively to Australian legal units of measurement.

What is the purpose of legal traceability?

Legal traceability is intended to provide means recognized by law by which the veracity of measurements made for legal purposes can be established at law when necessary – such as when there is a dispute about a matter determined by a measurement. At law all decisions are made according to legal principles honed by legal precedents. Therefore it is necessary to bring measurements within the scope of the relevant legal principles when they are to be used for legal purposes if they are to be able to withstand legal challenge. The facilities provided by the national measurement legislation for doing this consist of Australian legal units of measurement realized and promulgated by references recognized at law for that purpose. Put another way; in order to demonstrate that a measurement is correct under Australian law it is necessary to be able to show that it was made in terms of Australian legal units by means of the references recognised for that purpose under Australian law. *Legal traceability* is the ability to show that a measurement has been made in terms of Australian legal units by means of the references recognised for that purpose under Australian law. These means are further detailed elsewhere in this article.

Where can I find more information about legal traceability?

The national measurement legislation, and section 10 of the *National Measurement Act 1960* (Cth) in particular, provide details of the *legal traceability* imperative, when it applies, and the means by which it may be satisfied. The Legal Metrology Policy Section of the National Measurement Institute is also happy to provide assistance with, and further information about, *legal traceability*. Contact details are available from the National Measurement Institute's website at the following URL: http://www.measurement.gov.au/Pages/contact.aspx.

How does the CIPM Mutual Recognition Agreement affect legal traceability?

On 14 October 1999, the International Committee of Weights and Measures (CIPM), acting under the authority of the Metre Convention, opened for signature by directors of national metrology institutes of Member States of the Metre Convention, the Mutual Recognition Agreement (MRA). The CIPM MRA enabled the mutual recognition of national measurement standards and of calibration and measurement certificates issued by national metrology institutes who were signatories. The objective of the CIPM MRA was to establish the degree of equivalence of national standards of physical quantities maintained by national metrology institutes through a database of comparisons of those standards. This was to 'provide governments and other parties with a secure technical foundation for wider agreements related to international trade, commerce and regulatory affairs'[11].
It required participating national metrology institutes to have quality systems that met the requirements of AS ISO/IEC 17025 that attest to their competence in order to establish the necessary mutual confidence or to 'declare' their measurement capabilities.

The CIPM MRA effectively enabled NATA laboratories to achieve *metrological traceability* or '*metrological traceability* to a unit of the International System of Units' by many additional traceability pathways. However, it does not enable the *legal traceability* imperative, where it exists, to be met by pathways other than those specified in section 10 of the *National Measurement Act 1960* (Cth). This important point is explicitly made in the CIPM MRA[12] which states 'it is recognized and accepted by each signatory that this arrangement creates no rights, liabilities or obligations that will have binding effects in national and international law'. The CIPM MRA[13] further states that 'this arrangement covers, in each country, only the signatory institutes and other institutes represented by it. It does not extend to other metrological or regulatory bodies in that country'.

This means that, for laboratories that are seeking appointment as legal metrology authorities on the basis of capability or competence established by their NATA accreditation, it is necessary for them to be able to demonstrate that they can also achieve *legal traceability* in their proposed means of compliance with clause 5.6 of AS 17025. Further, it is also important for NATA assessors to be aware of this imperative when assessing such laboratories and, when necessary, to direct them to obtain further information on *legal traceability* and how it can be achieved from the Legal Metrology Policy Section of the National Measurement Institute.

How does legal traceability affect NATA accredited laboratories?

AS 17025[14], the standard of competence against which NATA accredits laboratories, requires that calibrations and measurements made by accredited laboratories are traceable[15] (i.e. have *metrological traceability*) to the SI units[16]. It further requires that calibration laboratories establish traceability (i.e. *metrological traceability*) of the measurement standards that they use for calibration purposes 'to the SI by means of an unbroken chain of calibrations or comparisons linking them to relevant primary standards of the SI units of measurement'[17]. Further,

> '[t]he link to the SI units may be achieved by reference to national measurement standards. National measurement standards may be primary standards, which are primary realizations of the SI units or agreed representations of SI units based on fundamental physical constants, or they may be secondary standards which are standards calibrated by another national metrology institute. When using external calibration services, traceability [i.e. *metrological traceability*] of measurement shall be assured by the use of calibration services from laboratories that can demonstrate competence, measurement capability and traceability' i.e. have *metrological traceability*.

AS 17025[18] further clarifies this by stating that 'when the terms "international standard" or "national standard" are used in connection with *traceability* (i.e. *metrological traceability*), it is assumed that these standards fulfil the properties of primary standards for the realization of SI units', and '[t]*raceability* (i.e. *metrological traceability*) to national measurement standards does not necessarily require the use of the national metrology institute of the country in which the laboratory is located'[19].

These *traceability* [i.e. *metrological traceability*] requirements are reflected in the NATA Field Application Documents. The NATA ISO/IEC Field Application Documents for Calibration[20] requires 'measurement traceability' (i.e. *metrological traceability*) such that 'all ... measurements ... that have a significant effect on the reported result ... be traceable ... to national or international standards'[21]. Further, 'facilities must therefore ensure that [the] equipment or instruments [that they] use are calibrated by one or more of the following:

a) A NATA accredited calibration facility ...;

b) A calibration facility accredited by [a] NATA mutual recognition arrangement ... partner ...;

c) [The] National Measurement Institute (NMI)[22] or a national metrology institute that is a signatory to the ... CIPM MRA'.

This is reinforced in the NATA Rules[23] which

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LEGAL TRACEABILITY – THE FREQUENTLY ASKED QUESTIONS (cont)

requires that the NATA endorsement used by accredited laboratories 'comprises an emblem of the Association ... accompanied by the relevant mandatory statement'[24]. The latter is 'Accredited for compliance with ISO/IEC 17025 and may include where appropriate 'The results of the ... measurements included in this document are traceable to Australian/national standards'.

From this it is clear that NATA accredited laboratories seeking to be appointed as legal metrology authorities under the *National Measurement Act 1960* (Cth) and its National Measurement Regulation 1999 (Cth) need something more than the usual *metrological traceability* required by AS 17025[25]. They, in fact, need *legal traceability* and the latter can only be achieved through the specific traceability pathways detailed in section 10 of the *National Measurement Act 1960* (Cth).

Conclusion

Legal traceability is not necessary for measurements made for scientific or technical purposes. For the vast majority of measurements made by NATA laboratories *metrological traceability* is sufficient. *Legal traceability* is necessary when measurements of physical quantities for which there are Australian legal units of measurement are made for legal purposes in order for them to be able to withstand a legal challenge of their veracity. When *legal traceability* is necessary section 10 of the *National Measurement Act 1960* (Cth) provides multiple pathways for achieving it. These involve the use of a range of Australian standards or certified reference materials or certified measuring instrument as specified in section 10 of the *National Measurement Act 1960* (Cth) or combinations of one or more of these. *Legal traceability* requires NATA accredited laboratories to underpin their work by references that are recognized under Australian law. These are fewer in number than those that would satisfy the requirements for *metrological traceability* in AS ISO/IEC 17025 as reflected in the NATA Field Application Documents. Further information about *legal traceability* is available to all NATA stakeholders from the Legal Metrology Policy Section of the National Measurement Institute.

1 The former National Standards Commission 1950 to 2004.

2 *National Measurement Act 1960* (Cth) section 7.

3 BIPM JCGM 200:2012 International vocabulary of metrology – Basic and general concepts and associated terms (VIM) 3rd edition.

4 BIPM JCGM 200:2012 International vocabulary of metrology – Basic and general concepts and associated terms (VIM) 3rd edition clause 2.41 note 8.

5 BIPM JCGM 200:2012 International vocabulary of metrology – Basic and general concepts and associated terms (VIM) 3rd edition clause 2.41.

6 *National Measurement Act 1960* (Cth) section 10.

7 *National Measurement Act 1960* (Cth) subsection 3(1).

8 National Measurement Regulations (Cth) 1999 regulation 3.

9 BIPM JCGM 200:2012 International vocabulary of metrology – Basic and general concepts and associated terms (VIM) 3rd edition clause 2.42, Note 5.

10 *National Measurement Act 1960* (Cth) section 7.

11 International Committee of Weights and Measures, Mutual Recognition of National Standards and of Calibration and Measurement Certificates Issued by National Metrology Institutes, Objectives.

12 International Committee of Weights and Measures, Mutual Recognition of National Standards and of Calibration and Measurement Certificates Issued by National Metrology Institutes, Mutual Recognition Agreement, clause 10.1.

13 International Committee of Weights and Measures, Mutual Recognition of National Standards and of Calibration and Measurement Certificates Issued by National Metrology Institutes, Mutual Recognition Agreement, clause 10.2.

14 AS ISO/IEC 17025 – 2005 General requirements for the competence of testing and calibration laboratories.

15 AS ISO/IEC 17025 – 2005 General requirements for the competence of testing and calibration laboratories, clause 5.6.3.1.

16 International System of Units (SI) (Système international d'unités).

17 AS ISO/IEC 17025 – 2005 General requirements for the competence of testing and calibration laboratories, clause 5.6.2.1.1.

18 AS ISO/IEC 17025 – 2005 General requirements for the competence of testing and calibration laboratories, clause 5.6.2.1.1. Note 5.

19 AS ISO/IEC 17025 – 2005 General requirements for the competence of testing and calibration laboratories, clause 5.6.2.1.1. Note 6.

20 NATA ISO/IEC Field Application Documents for Calibration, Supplementary Requirements for Accreditation May 2012.

21 NATA ISO/IEC Field Application Documents for Calibration, Supplementary Requirements for Accreditation May 2012, clause 5.6 page 21.

22 Note: Australian primary and secondary standards of activity, exposure and absorbed dose of ionizing radiation are maintained by the Australian Nuclear Science and Technology Organisation (ANSTO) and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) under an Authorisation issued by the NMI.

23 NATA Rules – June 2011.

24 NATA Rules – June 2011 Second schedule, clause 1.

25 AS ISO/IEC 17025 – 2005 General requirements for the competence of testing and calibration laboratories, clause 5.6.2.1.1. Note 5.

GORDON ARCHER
1926-2013

Gordon Archer AO

As the AIDS epidemic of the 1980s unfolded, Gordon Archer, who was a NATA Technical Assessor from 1990 to 1995, played a key role in protecting the supply of blood and blood products in Australia.

Gordon Thompson Archer was born in Melbourne on March 18, 1926. He went to Canberra High School, then Scotch College in Melbourne and was awarded a scholarship to RMIT in 1941.

He studied metallurgical engineering and graduated in 1944. He enlisted in the Royal Australian Army Engineers and was sent to the 12th Advanced Watercraft Workshop in Rabaul.

After the war, Gordon opted to study medicine at the University of Sydney. He graduated in 1952 and married Joy Germer in 1953.

He did a a resident year and two years as a pathology registrar at Royal Prince Alfred Hospital and developed a close interest in the life-saving aspects of blood transfusion, including once administering 500 bottles of blood over three days to a haemophiliac before the patient recovered.

Archer was offered the deputy directorship of the NSW blood transfusion service in 1957. Soon after he was awarded a post-doctoral research fellowship by the National Institutes of Health in the US.

He was elected president of the Australian Society of Medical Research in 1965 and was also involved in supporting international initiatives. He was appointed secretary-general of the XI Congress of the International Society of Blood Transfusions, held in Sydney in 1966.

Archer spearheaded initiatives in the Asia-Pacific region to help poorer nations in training and improving their blood banking operations. He was appointed director of the NSW blood transfusion service in 1967 and held the position for 25 years.

In 1983 on behalf of the NSW Blood Bank he made a public announcement that homosexuals should refrain from donating blood. At a time when the gay community was working to have its sexual activities decriminalised, the blood bank was picketed and Archer labelled a bigot.

It was proclaimed there was no evidence AIDS was caused by a virus. This started a media frenzy that initially targeted Archer. Only those closest to him knew the hurt he felt.

While waiting for the bureaucrats to agree on donor declaration forms and approve new testing practices, Archer introduced his own strategies for protecting the blood supply, including early adoption of testing kits to remove potentially contaminated blood.

In 1989, Archer became the first Australian president of the International Society of Blood Transfusions. In 1991, he was made an Officer of the Order of Australia.

After retiring in 1992, Archer joined his brother Harold's business, Water Treatment Australia, as technical director for chemical and biochemical analysis and treatment.

Gordon Archer is survived by Joy, children Sue, Martin, Tim and Megan, 12 grandchildren and brother Harold.

(Content from an obituary by Martin Archer in the Sydney Morning Herald)

ASSESSMENTS BUILD UP APPETITES

Justyn O'Sullivan, who is a CMT Client Coordinator in NATA's Brisbane office, says that nothing beats a good meal after a busy day. Here's what Justyn has to say about mixing business with pleasure - in other words, having a good feed at the end of a day spent conducting assessments.

Some of the days are long, arduous, challenging, and without the comfort of our own beds to climb into, we take solace in knowing a delicious hearty feast awaits us at the end of it all.

Decisions, decisions are to be made as we sit down and peruse the unfamiliar menus, do we go healthy? Or do we go large? Or do we supersize? Over the past few months I have witnessed, and been involved in, some serious supper supersizing! The size of some of these meals needed to be seen to be believed - lucky there has been a camera handy...

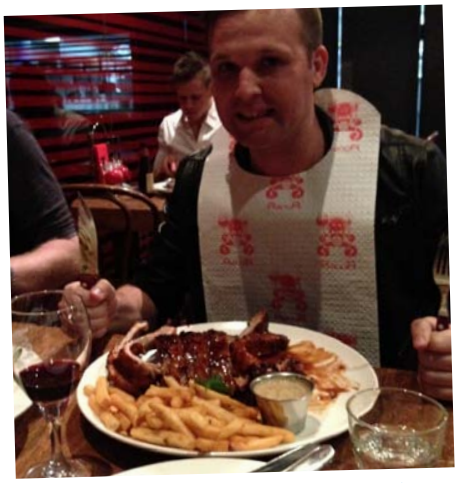
'Scratchleys On The Wharf' in Newcastle dishes up all types of fresh seafood on its menu. Cameron Nix was so overwhelmed by all the options he decided to do it all and conquer the mother of all seafood platters! It was an admirable effort, and as you can see from the before and after pics, nothing went to waste.

Everywhere we travel we encounter the proclamation of, "Best steaks in the country". The Gladstone Yacht Club menu uncovered the 'Big Boy', a 500g slice of quality cow, perfect to replenish deficient iron levels of a weary body. Robert Sindholt was up to the challenge, the 'Big Boy' was no match for a hungry Technical Assessor.

Spectating all of this culinary carnage has influenced my own dietary decision making processes as well. I too have succumbed to peer pressure, stepped up to the plate, and literally bitten off more than I can chew.

The ribs and rump combo at the appropriately named 'Ribs and Rumps' at North Ryde tested my intestinal fortitude. You can see the look of fear on my face as I shudder at the thought of consuming the vast quantity of mammal which lies in front of me. Indeed at the end of it all, I was ready for hibernation.

Our journeys around the country can take us to all sorts of places, some we would never think to visit, but remember when the going gets tough on assessment, evenings provide opportunities for new delicious, digestible, dietary discoveries to be made!



Justyn O'Sullivan, ready for ribs

Cameron Nix and the seafood platter (before)

Cameron Nix and the seafood platter (after)

Rob Sindholt devouring the "Big Boy"

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