

**Australasian Soil and Plant Analysis
Council Inc. (ASPAC) Submission to the
Standards and Accreditation Study by
the Productivity Commission into the
Australian Government's Relationship with
Standards Australia Limited and the
National Association of Testing
Authorities (NATA)**

prepared by G.E. Rayment

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EXECUTIVE SUMMARY

ASPAC (the Australasian Soil and Plant Analysis Council Incorporated) incorporated in Victoria in 1991. It has been proactive since then in the area of soil and plant chemical testing for rural productivity enhancement, for better nutrient management of cropping and pasture lands, and for environment and natural resource management. Most of this testing is for use within Australia but the testing covers all Australian states and Territories.

ASPAC was not consulted in any part of the 1993-95 Kean Inquiry Report or on subsequent decisions that resulted in the MoU between the Australian Government and NATA in 1998.

This ASPAC submission, inclusive of references, deals in a general way with relevant questions posed in the Productivity Commission Issues Paper of March 2006, with most focus on relationships with NATA.

Based on its track record across the past 15 years, ASPAC warrants a seat at the table when it comes to the certification and continuous quality improvement of soil and plant analysis laboratories in Australia. A regular quantum of funding support (in an accountable way) from the Australian Government would be well used and beneficial to the profession.

ASPAC would be prepared to enter into a MoU with government in much the same way as government has done with NATA if funding support was offered for its public good activities. Justification is provided in the submission.

While ASPAC makes good use of many international standards, there are better (and cheaper) ways of delivering procedural details for empirical soil chemical tests in Australia than through a Standards Australia approach. ASPAC would welcome a share of government funding for its public-good efforts in this area of activity.

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1. PREAMBLE

The Australasian Soil and Plant Analysis Council Incorporated (ASPAC) is a scientific, not-for-profit organisation with many achievements since its incorporation in Victoria in 1991. It was established to advance the science and practice of individuals, laboratories and organisations with a special interest in soil and plant analysis, initially within Australia and subsequently across Australasia. ASPAC maintains regular contact with the Soil and Plant Analysis Council of North America and like groups elsewhere.

An Executive Committee, elected from the membership every two years, administers ASPAC. Office-bearers consist of a Chairperson, Vice-Chairperson, Secretary, Treasurer, Newsletter Editor, and additional members so that all Australian States and Territories and New Zealand are represented.

Types of ASPAC membership are: individual (*for those not representing an organisation*); corporate (*for laboratories and organisations involved in or who make use of soil and plant analysis*); sustaining (*for firms and individuals wishing to underwrite ASPAC programs/objectives*); and student (*open to full-time students of academic institutions in Australasia*). Moderate joining and annual membership fees apply. For example, the annual cost of Individual Membership is A\$30.

ASPAC seeks to harness and utilise the skills of its members across all aspects of soil and plant analysis, particularly for soil fertility appraisal, nutrient management advice and environmental assessment. In so doing, it recognises that many of its members are competing actively in the marketplace. Members are encouraged to work together in an open and inclusive manner in ways that enhance the science and practice of soil and plant analysis for community benefit. The wide geographic separation of ASPAC members and clients of soil and plant testing services and the empirical nature of most soil test methods are among the challenges to be overcome. ASPAC's Strategic Plan 2005 – 2009 is on the ASPAC Web Site at www.aspac-australasia.com.

One of the main activities listed in ASPAC's original Membership Information and Objectives Brochure of 1991 was to: *Conduct regular National Quality Assurance Programmes to enhance standards of the analysis and assist standardisation of soil and plant analytical methods across laboratories*. Since then, ASPAC has offered separate interlaboratory soil and plant proficiency programs, each involving around 40 or more government and private laboratories initially from Australia and subsequently Australasia. The ASPAC Executive established in 1992/93 a Laboratory Proficiency Committee (ASPAC-LPC) to manage its soil and plant inter-laboratory proficiency programs and to certify on a method-by-method basis those laboratories deemed (through a robust statistical procedure applied to reported results) to be analytically proficient. Thirteen principles listed below were developed to guide the initiative. These were to:

- (i) promote excellence in soil and plant analysis through periodic, method-specific, performance-based certification, accepting that competence for the purpose of laboratory proficiency can be confirmed periodically from results achieved in formally-sanctioned QA programs involving an exchange of carefully prepared samples;
- (ii) encourage the adoption of preferred analytical methods;
- (iii) stimulate the development and credibility of soil and plant analysis in Australasia;
- (iv) not duplicate the laboratory accreditation work of NATA;

- (v) assess performance based on clearly defined numeric procedures for methods performed by a minimum of six laboratories;
- (vi) issue Certificates to successful participants, listing the methods for which satisfactory performance was achieved;
- (vii) treat all participating laboratories fairly and with high standards of confidentiality;
- (viii) offer technical support for laboratories having difficulties with their analytical performance;
- (ix) provide regular reports to members on specific proficiency programs using the ASPAC Newsletter and other fora;
- (x) share honorary membership of the LPC between the public and private sectors, and to review membership at least every two-years;
- (xi) have one point of contact for communications with participants;
- (xii) ensure that all QA programs recover most costs; and
- (xiii) encourage participating laboratories to concurrently obtain or maintain accreditation with NATA.

Nowadays, the ASPAC-LPC operates with four members, two from Australia and two from New Zealand. The ASPAC Chairperson also attends occasional ASPAC-LPC meetings in an *ex officio* capacity. The ASPAC-LPC reports periodically through the ASPAC Digest (a newsletter), at workshops, and to the ASPAC Executive via Notes of Meetings. These meetings are held as required but usually occur twice yearly, at least once in-person. So far, ASPAC has completed nine discrete inter-laboratory proficiency program reports for soils (1993, 1995, 1997, 1998, 1999, 2000, 2001-2, 2003, 2004-5), and eight discrete plant programs (1994, 1996, 1998, 1999, 2000, 2001, 2002, 2004-5). Until 2004-5, each of these programs contained six carefully prepared samples tested on one occasion. Now an annual program is comprised of 12 samples of soils and 12 of plants (four samples each across three rounds), with methods' based performance recorded on an annual certificate and also in the public area of the ASPAC Web site. Currently, ASPAC uses an internationally accredited (ISO/IEC Guide 43-1: 2nd Ed, 1997; and ISO/IEC Guide 43-2: 1st Ed, 1997) proficiency service provider for operational aspects of its interlaboratory proficiency programs. Two-thirds of the data from the 2005-6 soil and plant programs have already been assembled.

In addition to its interlaboratory proficiency programs, ASPAC secondary soil and plant reference materials are made available to the profession at low cost. ASPAC also makes many other contributions to improve the understanding, quality and usefulness of soil and plant chemical tests in areas such as environmental assessments, the monitoring of soil condition, and the measurement of cadmium in food crops marketed nationally and internationally. Indeed, it has worked with the National Cadmium Management Committee to quantify and improve cadmium measurement quality in Australian laboratories. In addition, ASPAC arranged / hosted a well attended international symposium on soil and plant analysis in 1999 and has organised several national conferences and workshops on soil and plant analysis and related topics since 1993. ASPAC has benchmarked the analytical performance of soil and plant testing laboratories internationally since 1998 and is using its interlaboratory proficiency program datasets to define "real-world" relationships between expected measurement uncertainty and concentrations for commonly used soil and plant chemical tests.

Separate interpretation manuals on plant (Reuter and Robinson 1997) and soil (Peverill *et al.* 1999) analysis represent major international contributions. The 1992 *Australian Laboratory*

Handbook of Soil and Water Chemical Methods (Rayment and Higginson 1992), encouraged by ASPAC, helped improve the standardisation and coding of soil test methods in national databases, while a new *Australian Handbook of Soil Chemical Methods* is in preparation. As a further contribution to soil test methodology, ASPAC endorsed an enhanced soil phosphorus buffer test for Australia and has encouraged efforts in at least three states to cross-correlate existing empirical soil tests with one or more universal tests (particularly Mehlich No. 3) as a means of lessening the cost of diagnostic soil testing to end users. Several prominent members of ASPAC are honorary assessors of chemical testing laboratories for NATA.

Given all of the above, ASPAC is keenly interested in the present Productivity Commission review, as it was in the 1993-95 Kean Inquiry Report into *Australia's Standards and Conformance Infrastructure – Linking Industry Globally* and the subsequent federal government response recorded in the publication titled '*Australia's Standards and Conformance Infrastructure*' (ISBN 0644462752). At that time, ASPAC was disappointed that it was not consulted prior to the release of the Kean Inquiry Report or again by advisers of Senator Chris Schacht, who announced the then federal government decision on 13 December 1995. Moreover, the views of ASPAC were not sought by the present Coalition Federal Government prior to its signing (by the Honourable Andrew Thomson, Minister of State for Sport and Tourism) of the 25 February 1998 *Memorandum of Understanding* with NATA that recognised NATA "as the key organisation in Australia's standards and conformance infrastructure....". This submission deals in a general way with relevant questions posed in the Productivity Commission Issues Paper of March 2006.

2. ASPAC and NATA

Table 1 provides summary details of present numbers of Australian laboratories known to engage in soil chemical analyses, at least to some degree. The annual average soil sample numbers (2001–2003) included come from a national survey in November 2003 (Rayment 2004a) that attracted a 64% response (34 laboratories). Laboratories with only minor roles in "traditional" soil testing were the main non-responders to the survey.

To be better informed on analytical performance, the November 2003 questionnaire (Rayment 2004a) sought information on whether or not the laboratories had one or more methods accredited by NATA in Australia and also whether one or more methods had ASPAC certification for proven analytical competence on a method-by-method basis. In the event, seven "traditional" soil testing laboratories had NATA accreditation, with one claiming their accreditation covered 65 tests. Two laboratories indicated that NATA accreditation was "in progress", while 12 laboratories (including the largest soil and plant testing laboratory in Australia on a samples analysed basis) clearly indicated they were not NATA accredited for soil chemical tests. For plant tests, six laboratories had NATA accreditation (up to 30 tests) while 16 were not accredited. In contrast, 65% of all soil testing laboratory respondents had ASPAC certification for one or more methods but only five (16%) reported certification for all methods submitted for assessment. For plants, 48% of laboratories that responded to the survey had ASPAC certification in 2002 but only seven of these (23%) reported a 100% success rate. A small number of laboratories reported that they issued NATA endorsed reports, while only one ASPAC certified laboratory claimed to include the ASPAC logo on test reports. Few "research" laboratories associated with universities and the like are NATA accredited, while laboratory accreditation to ISO/IEC 17025 has not guaranteed a higher and consistent measurement performance (relative to non-NATA accredited laboratories) across ASPAC interlaboratory proficiency programs. That said, there is support within ASPAC for the statement "*NATA accreditation is not a guarantee of high quality results*

but along with regular participation in proficiency testing programs, it substantially reduces the risk of erroneous or false results.”

Table 1. Summary details at November 2003 of the geographic distribution and ownership of soil-testing laboratories in Australia and the number of soil samples analysed by private and publicly funded laboratories for rural, natural resource management and related research purposes (annual average for years 2001, 2002 and 2003). The statistics are conservative and are known to have increased since then.

Location	No of soil testing laboratories (2003)		Annual average soil samples (‘000) 2001–2003	
	Private	Public	Private	Public
ACT	No data	2	No data	17
NSW	4	5	46	17
NT	No data	1	No data	1
Qld	4	4	73	33
SA	1	3	13	6
Tas	1	1	6	5
Vic	2	2	42	17
WA	2	2	89 ^A	9

^A Annual sample numbers received for analysis in WA (multiple states) in 2003–04 rose to ≈150,000 (G. Proudfoot, personal communication)

Since the mid-1990s, numeric assessments of the analytical quality of soil and plant tests included in ASPAC’s proficiency programs have been compiled and reported to members and others at national workshops, conferences and at international symposia (eg. Lester and Rayment 1997; Rayment *et al.* 1998; Rayment *et al.* 2000; Rayment and Peverill 2002; Rayment 2004 a,b; Rayment 2005). NATA does not provide this level of service / scrutiny to the soil and plant analysis profession in Australia. The professional contributions associated with these initiatives are honorary, with ASPAC meeting or contributing to the costs of associated travel. Commonwealth funding support for these initiatives would enable ASPAC to fund the participation of representatives from lesser-performing laboratories at these “events”.

Soil and plant testing laboratories with NATA accreditation are justifiably proud of their achievement. However, it is clear from the initiatives already mentioned that ASPAC has been far more proactive and involved than NATA in the quest for quality in the laboratory measurement of soil and plant samples since the signing in 1998 of the MoU between NATA and the Commonwealth. Moreover, almost all of the benefits that emerge from more accurate testing of soils and plant materials are applied in Australia, so mutual international recognition is rarely an issue. What is more, ASPAC takes a wider view of quality than is covered by ISO/IEC 17025: 2005. For example, ASPAC has alerted its member laboratories and others to biosecurity issues associated with the movement (or restrictions on movement) of soil and plant samples within and between Australian states and internationally (Rayment 2006). Moreover, NATA makes no contribution to data interpretations and recommendations that flow from results reported by soil and plant testing laboratories. There is a persuasive (unfunded) case to require these steps to be as rigorous and transparent as soil and plant sampling and laboratory measurements (Rayment 2004b). It is suggested that three mega-regional expert panels coordinated by ASPAC (one covering subtropical and tropical Australia, a second dealing with

Southern Central and South-Eastern Australia, and a third dealing with the bottom half of Western Australia) could be established to overcome this limitation.

NATA does list ASPAC as a provider of interlaboratory proficiency programs but has never sought formally to include a representative of ASPAC on any of its advisory panels, etc. Moreover, while proficiency testing is clearly a necessary part of a quality system for laboratories, there is a level of conflict between NATA as an owner of a Proficiency Testing Company and NATA's policy of charging other proficiency testing providers a fee to gain NATA approval as a provider of proficiency testing schemes. In March 1998, an application to NATA for accreditation attracted a fee of A\$1,070 plus an additional charge of A\$112 per hour for a NATA staff officer to review all documentation. At that time there was also a charge of A\$895 per assessor unit for the initial assessment visit. Travel, accommodation and associated expenses add to total costs that ASPAC resolved were too high for the benefit (if any). Likewise, many laboratories with a proven record of sustained good performance in ASPAC interlaboratory proficiency programs have mentioned high cost as one of the main reasons NATA accreditation lacks strong laboratory support within the profession. It is noteworthy that in North America, the North American Proficiency Testing Program operated by The American Society of Soil Science is used as the main indicator of soil testing competency by laboratories contributing to the nutrient management plans of Code 590 in the USA¹. To ASPAC's knowledge, there is no scheme for soil and plant testing laboratories in USA equivalent to NATA accreditation.

Finally, ASPAC provides advice on its public Web site on "How can I be sure that the lab is giving me the right results?" (see Appendix 1). This advice puts compliance to ISO/IEC 17025: 2005 in perspective.

Based on ASPAC's track record across the past 15 years, it clearly warrants a seat at the table when it comes to the certification and continuous quality improvement of soil and plant analysis laboratories in Australia. It could do so much more for laboratories closely connected to rural industry productivity, nutrient management and to environment and natural resource management if it had a regular quantum of funding support (in an accountable way) from the Australian Government. ASPAC would be prepared to enter into a MoU with government in much the same way as government has done with NATA. Facilitating international trade is rarely an issue for laboratories involved in soil and plant analysis in Australia.

3. *ASPAC and Standards Australia Limited (and NATA)*

Laboratories associated with ASPAC as well as the ASPAC-LPC typically make appropriate use of relevant international standards. These include ISO/IEC 17025: 2005; ISO/IEC Guide 43-1: 2nd Ed, 1997; ISO/IEC Guide 43-2: 1st Ed, 1997, the ISO 9000 and ISO 14,000 series of standards, and several others.

Its members (including those covered by Corporate ASPAC membership) have contributed and are contributing in an honorary, professional capacity to other standards, particularly in the

¹ Code 590 is a conservation practice standard for nutrient management, established by the US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). Code 590 sets out to manage the amount, source, placement, form and timing of the application of plant nutrients and soil amendments. The code is national but it relies on implementation at state level. States can and have developed their own standards, which are permitted under Code 590 to be more stringent.

methodology area. We are aware through the ISO-ILAC-IAF Communiqué of June 2005 that ISO/IEC 17025:2005 now used by NATA for laboratory accreditation covers technical competence requirements embraced by the superseded version of ISO17025, plus system management requirements applicable to ISO 9001:2000. It is recognised that quality system assessors “locked-out” of laboratory accreditation by the MoU with the Australian Government may see this as encroachment. ASPAC accepts that ISO/IEC 17025:2005 is a step forward. It is a policy decision of government to resolve whether a “sole accreditation supplier” for laboratories is in the national interest, given the accreditation process is well documented and heavily reliant on honorary contributions from a decreasing number of independent professionals with a range of skills, experience and time. Nationally and internationally, it will be more meaningful to be ISO/IEC 17025:2005 accredited than to be “NATA” accredited.

Currently, the *Australian Laboratory Handbook of Soil and Water Chemical Methods* (Rayment and Higginson 1992) describes adequately almost all of the empirical soil chemical methods used by soil testing laboratories in Australia. In the not distant future, this much cited handbook will be superseded by the *Australian Handbook of Soil Chemical Methods*, which is presently being prepared by G. Rayment, D. Lyons and B. Shelley. While such handbooks are tedious and rather slow to prepare, they offer a means of getting essential information on soil test methodology and know-how into routine and research laboratories at much lower cost and in shorter time-frames than do one off analytical procedures that occasionally attract the interest of Standards Australia Limited. The soil test profession in Australia is best placed to develop and describe chemical methodology suited to the unique nature of many Australian soils. That said, ASPAC is prepared to harmonise with sister organisations overseas when there is opportunity to share soil chemical procedures across national boundaries. In short, there are better (and cheaper) ways of delivering procedural details for empirical soil chemical tests in Australia than through a Standards Australia approach. Changes in technology often supersede methods that were “in vogue” even a decade or less ago. ASPAC would welcome a share of government funding for its public-good efforts in this area of activity.

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APPENDIX 1

ASPAC Advice on: "How can I be sure that the lab is giving me the right results?"

The Australasian Soil and Plant Analysis Council Inc (ASPAC) is an organisation that supports continuing improvement in laboratory performance, and also believes consumers need to be aware that laboratories do not all perform to the same, impeccable standard. When a farmer, extension officer or researcher sends soil and plant samples to a laboratory, how can they be sure the results are reliable? Analytical testing is like any other product – the quality can range from very good to the opposite extreme.

The following few simple questions can help ensure a wise and rewarding investment. These questions assume the client (e.g. farmer, extension officer, researcher) is certain of the method or methods to be used.

Are you an ISO accredited lab?

There is a special standard (ISO 17025) against which testing laboratories are audited. Independent assessors review the laboratory's Quality Assurance protocols and procedures, regularly inspect the laboratory, and ensure high standards are in place before awarding this accreditation. This does not guarantee nothing will ever go wrong (mistakes can always happen); it does provide proof the lab has good systems, appropriate staff and high standards.

Do you compare well against other labs?

Ask if they participate in Laboratory Proficiency programmes. These are also known as interlaboratory comparisons, or round robins. They involve a central coordinator preparing well-mixed samples, dividing these into homogenous subsamples and sending these periodically to participating laboratories for analysis. The proficiency program coordinator processes the reported values after a specified time to identify laboratories with acceptable and outlier results.

ASPAC runs such programmes for soils and plants. It also issues Certificates of Proficiency for each program on a method-by-method basis.

Ask the laboratory if they have an ASPAC Certificate of Proficiency for the test or tests of interest. Have confidence in the laboratory if the method is listed on the Certificate issued following the most recent ASPAC Program. Be cautious if the laboratory cannot or will not produce the ASPAC Certificate or if that Certificate does not list one or more of the tests of most interest to you.

What do you do to be sure your results are right?

This question is like doing a quick quality audit yourself, and obviously cannot be as comprehensive as a full ISO audit. But the lab's answers may either reassure you, or ring warning bells. They should be running check samples in every batch of analyses, and should be participating in some type of proficiency programme. If they are not doing these basics, be afraid; be very afraid.