Hello, my name’s Laurie Besley, I’m the Chief Executive and Chief Metrologist at NMI.

I would like to take this opportunity to welcome you to the first edition of As A Matter Of Fact, our inaugural NMI Newsletter.

All of us here at NMI are very excited and hope our newsletter will give you, our valued clients and key stakeholders, a greater insight into our organisation.

This newsletter is more than just a resource, it’s a forum where we can share with you advancements in the areas of government, industry, research and international measurement.

NMI is Australia’s peak measurement body responsible for biological, chemical, legal, physical and trade measurement. We support Australian industries by offering a broad range of scientific and technical capabilities that is not only world class but addresses all sectors of measurement at the highest levels of precision and integrity.

Recently we were successful in securing a major funding boost to support activities in developing standards for the nanotechnology and biotechnology areas, which we hope will deliver major advantages to Australian industries. We plan to share news of this nature plus more in our coming editions.

In the meantime, I hope you enjoy reading our first edition. I welcome your feedback and if you would like to make a contribution to future editions, please email us at communications@measurement.gov.au

Dr Laurie Besley
Chief Executive and Chief Metrologist
National Measurement Institute
Department of Innovation, Industry, Science and Research

> measurement.gov.au
Australians love sport and NMI’s sports drug testing laboratory is invaluable in ensuring fair play and clean competition across Australian and international sporting events. All the sports drug testing in Australia, including sports such as NRL, AFL and cricket, as well as testing for the Olympics, is conducted at our laboratory.

Dr Catrin Goebel is the Director of the sports drug testing laboratory at NMI. The laboratory is among only 34 others around the world accredited by the World Anti-Doping Agency (WADA) for the testing of athletes’ urine and blood samples.

The reputation of Australian sport is ensured through accurate testing methods which are continually being improved as a result of an intensive research program lead by Catrin. The research program for new anti-doping tests conducted at NMI is funded through competitive grants from WADA, the US Partnership for Clean Competition and the Anti-Doping Research Program administered by the Department of the Prime Minister and Cabinet in Australia.

The next challenge on the home ground for the laboratory will be the Rugby World Cup which is being held in New Zealand starting at the beginning of September. Catrin and several members of her team will also be spending time at the London anti-doping laboratory for the Olympic Games next year.

Catrin was one of the scientists featured in the tour as part of National Science Week in August 2011.

www.scienceweek.gov.au
NMI is taking part in an international effort to revise the definition of the kilogram from one that is based on a physical artefact to one based on a fundamental constant of nature. The project, which is coordinated by the Avogadro coordination group, involves the manufacture of two near-perfect spheres made from a mono-isotopic silicon crystal. The spheres will be used to relate macroscopic density to the number of atoms in the crystal unit cell.

The spheres were manufactured by CSIRO’s Australian Centre for Precision Optics. The complex international measurement programme will involve several quantities including: molar mass, lattice parameter, mass, volume and degree of perfection of the spherical surface form and the crystal lattice. NMI’s objective is to measure the true volume of each sphere with an accuracy of 1 part in 10⁸. This is being done using a dual-channel laser interferometer with numerical processing of the interferograms.

The volume measurements will be combined with measurements of the spacing of the silicon atoms in the crystal structure to count the number of atoms making up the spheres. The intention is that the measurements may lead to a new and more useful definition for the kilogram based on a fixed number of atoms, replacing the platinum-iridium artefact currently stored at the International Bureau of Weights and Measures in Paris.

Sub-nanometre accuracy very close

The most recent results from NMI are strongly suggestive that its measurements of spherical diameter – and those made by its collaborators in Germany and Japan – are very close to the required sub-nanometre accuracy. This is indeed a very exciting time for the project.

Next steps – delivering higher accuracy standards

While the project itself is a very important one, NMI regards its involvement as particularly valuable because of the advances made in a variety of different measurement disciplines. These advances will be used to deliver higher accuracy standards to stakeholders in a range of other areas such as mass, density and pressure.

For further information, email us at info@measurement.gov.au
If you have ever asked yourself, ‘Did I really get 35 litres of petrol in my Lexus SUV RX series tank?’ or ‘Is that really 50 grams of Kopi Luwak coffee or have I been short changed?’ If you have ever questioned whether you received the amount you paid for, then you have asked a trade measurement question. Trade measurement is integral to the economic infrastructure of Australia and it is estimated that $400 billion a year of economic transactions rely on this legislative and regulatory framework. Few have heard of the term ‘trade measurement’, but as individual consumers and as businesses, we depend on it every day.

More than one hundred and ten years ago, when the newly written Constitution of Australia was formulated, weights and measures, as trade measurement was known, were Commonwealth responsibilities. However, for reasons of efficacy, trade measurement at that time remained an administrative and legislative responsibility of the state and territory governments.

In 2007 the Council of Australian Governments (COAG) decided that it was desirable to create a single system for measurements in domestic trade across Australia. Having a single national system that regulates this trade removes the costs and complexities of traders having to operate under eight different systems.

As a result, significant regulatory burdens on businesses have been lifted. On 1 July 2010, NMI took on the responsibility of trade measurement across Australia. In doing so, NMI has become responsible for the full spectrum of measurement in Australia – from the maintenance of primary standards through to the inspection of the petrol pump you use to fill your car.

Trade Measurement now
The new responsibility of trade measurement has meant major changes to the way NMI operates. For the first time NMI has a major regulatory function. Staff numbers have increased to include new administrative, laboratory and ‘in-the-field’ staff. NMI now has a truly national footprint with offices in all the capital cities as well many regional centres. Assumption of this new responsibility has allowed NMI to focus our resources and expertise and achieve our goals as one cohesive unit.

Trade Measurement of the future
This year has been an exciting one. A national recruitment initiative has been launched to attract a whole new demographic to the career opportunities within NMI and we look forward to future challenges.

For further information, email us at infotm@measurement.gov.au

**Dates to remember**

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<td>2 October 2011</td>
<td>Daylight Saving Time commences for the warmer months</td>
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<tr>
<td>19-21 October 2011</td>
<td>The Metrology Society of Australia (MSA) Conference 2011</td>
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<td>20 May each year</td>
<td>World Metrology Day is celebrated in various ways around the world</td>
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Imagine your customers’ reactions if the natural gas they purchase has inaccurately measured composition and energy content. The result is a potentially damaging experience for your reputation, customer relationships and corporate integrity.

There are many areas where the measurement of gas composition is essential – the determination of energy content of natural gas and other fuel gases, the measurement of stack emissions, and the monitoring of air toxins. In each area, quality gas calibration standards are the foundation for making correct measurements.

Gas calibration standards are used with gas analysis equipment to determine the composition of a gas sample. NMI can develop specific gas calibration standards to address particular needs of business and industry including standards for the testing of natural gas, liquified natural gas, and coal seam methane.

Damian Smeulders of NMI said “The best way to make reliable and correct measurements of gas composition is to use quality gas standards from a reputable source and confirm the accuracy of your measurements through participation in proficiency testing.”

Proficiency testing (PT) operates by having gas samples of known composition sent to testing laboratories for analysis. The laboratory analyses the sample and determines the gas composition. The company is then shown the difference between their measured composition and the true values.

PT participation ensures companies continue to work and report from a position of strength, based upon fact, skills and knowledge. For companies that do not achieve the correct result, they can rectify an otherwise unknown fault thereby possibly leading to improvements in their operations.

As the only provider of gas proficiency testing services in Australia, NMI is dedicated to partnering with Australian businesses to develop PT programs focussed on local needs and emerging industries.

“It is always good to deal with a local PT provider as cost and the time for transportation will be reduced,” said Paul Wong, Laboratory Manager SOC, BOC Gases Ltd.

NMI has developed PT programs of gas composition to support various industries, including safety measurements in underground coal mines; working with BHP Billiton on the measurement of coal seam gas; and working with Santos in developing studies on raw natural gases. Woodside and Santos, as well as pipeline operators such as the APA Group say their participation and achievement of excellent results in past PT programs on natural gas gave them independent endorsement and confidence that they
are making quality measurements and reporting factual results.

Participation in proficiency testing is a quality system requirement that some may see as an unnecessary burden. However, most laboratories gain real and lasting benefits as the studies are independent, unbiased assessments on the quality of work they deliver.

“We use our results for marketing purposes and our sales team can sell our products with confidence,” said Paul.

Laboratories that participate are given comparative information on the processes, measurements and gas composition estimates used by their peers. In addition, confidentiality is maintained throughout each study, enabling participants to choose whether to inform clients about their performance.

Several participants in the recent PT study on coal seam gas had problems with the measurement of the nitrogen in the gas sample. With assistance from NMI, the participants were able to rectify these problems and prevent the reporting of incorrect results.

“Participation in the studies helps us when we are audited by NATA. NATA would like us to participate in as many PT studies as possible,” said Fiona Ellis, Laboratory Manager at Woodside Energy Ltd.

The next PT study will examine an unprocessed natural gas with high CO₂ content. In the future, NMI will offer PT programs on liquefied petroleum gas to help companies meet regulations for composition and quality of that fuel.

To learn more about gas calibration standards, propose future PT programs or discuss the needs of your business please contact info@measurement.gov.au or call (02) 8467 3534.
Natural disasters that occur around the world are devastating to all concerned. More recently and closer to home, was the Christchurch earthquake where it was not just buildings and infrastructure that were destroyed, but also microbial cultures. Greentide Ltd is a company that specialises in the development of natural insecticides from microbes. The company has laboratories just outside Christchurch and when the earthquake struck, staff had to abandon the cultures for more than two weeks. As a result, the cultures were destroyed and NMI’s Microbiology and Allergens team have been working in conjunction with Greentide to rebuild the collections.

The microbes that Greentide had been working with are indigenous to New Zealand and some of the fungi are not known to be found anywhere else in the world. Fortunately, well before the earthquake struck, Greentide had deposited samples of the cultures that were damaged with NMI. NMI is an international depository authority for the Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure. As a result, NMI was able to retrieve viable cultures from long-term storage and send them back to New Zealand.

As one of a few depositories in the Asia Pacific region under the treaty, NMI receives and stores microorganisms for up to 30 years. In a recent media release on this topic, Innovation Minister Senator Kim Carr congratulated the company for its foresight in lodging those samples. It is a decision that will hopefully help New Zealand farmers produce healthier crops for consumers quickly and efficiently.

“We hope that research into New Zealand’s indigenous fungi – and the insecticides – can continue with these ‘rebuilt’ collections,” said Senator Carr.

For further information, please contact info@measurement.gov.au.
HOW do users of high-powered microscopes know that their measurements are correct? That’s where Nanometrology comes in. Nanometrology is the science of measurement at the nanoscale which is the size range between approximately 1 and 100 nanometers (1 nanometre is equivalent to 1 billionth of a metre).

NMI has commenced a nanometrology program to support nanotechnology in Australia and a key objective of the program is to establish infrastructure for traceable dimensional measurements at the nanoscale. To achieve this goal, NMI’s nanometrology team is building a metrological scanning probe microscope (mSPM).

This instrument uses precision laser interferometry and a highly sensitive quartz tuning fork probe to measure the dimensions of nanoscale objects accurately.

Recently, the nanometrology team has obtained the first images with the mSPM, including the image of the two-dimensional grid structure shown in the figure. After characterisation and calibration in NMI’s mSPM, such samples will serve as transfer artefacts to calibrate other microscopes used by researchers in industry, universities and research organisations.

Having successfully demonstrated high-resolution imaging, the team is now concentrating on the interferometric measurement of the displacements between the sample and the fixed probe.

For further information, please contact nano@measurement.gov.au

> measurement.gov.au
NMI TRAINING

NMI delivers a wide range of training and assessment programs to support skill formation and enhance competence in Australian industry, government and academia, including:

> verification of legal measuring instruments in use for trade;
> estimation of measurement uncertainty for staff working in laboratories that hold accreditation to ISO/IEC17025;
> validation of analytical methods for chemists in testing laboratories;
> physical measurement techniques for measurement technicians and specialists working in areas such as mass, electrical quantities, pressure, radiometry, dimensional, temperature and time and frequency.

These training opportunities are valuable for all workplaces concerned with accurate and effective measurement. NMI’s expertise is also contracted by overseas governments and international development agencies to assist with skill formation across all three branches of metrology.

TRAINING COURSES

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For more information and for a complete list of courses on offer, visit www.measurement.gov.au/services/training or email training@measurement.gov.au
TELL US YOUR THOUGHTS?

We would love to hear your thoughts on our first edition and what you might like to see in future editions. All feedback is welcome at communications@measurement.gov.au

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