CITAC
Cooperation on International Traceability in Analytical Chemistry

N E W S

FEBRUARY 2009

Foreword by the Chairman:

Human errors and teaching metrology and quality in chemistry

It is my pleasure to welcome the specialists in metrology and quality in chemistry elected at the 23rd CITAC Members Meeting, Paris 2008, as new CITAC members: Prof. Ivo Leito, University of Tartu, Estonia; Mr. Prabhat K. Gupta, National Physical Laboratory, India; Dr. Jerry D. Messman, Stranaska Scientific LLC, USA and Dr. Olívio Pereira de Oliveira Junior, Instituto de Pesquisas Energéticas e Nucleares, Brazil. The State Research Institute for Rare Metals Industry of Russia, GIREDMET (represented by Prof. Yury Parkhomenko and Dr. Vasilissa Baranovskaya) is also welcome as the first collective member of CITAC. Unfortunately, at the same Meeting, CITAC had to accept the resignations of Dr. Al Pohland, AOACI, USA (AOACI has changed its business model), and Dr. Arun Agrawal, retired recently from NPLI, India. I thank both of them for their contributions to the CITAC activity. More details about the Meeting are available in the editorial by Dr. Philippe Charlet.

I am extremely happy to congratulate the CITAC Award Winners 2008, authors of the most interesting/important papers on metrology in chemistry: Dr. Ronald G. Manning, USP, USA, and his co-authors in *Pharmacopeial Forum* (2007) 33(6):2-14; Prof. Paul De Bievre, Independent Consultant in MiC, Belgium, the author of the paper in *Metrologia* (2008) 45:335–341; and Dr. Andrew S. Brown, NPL, UK, and his co-authors in *Analyst* (2008) 133/6: 946-953 (see the message of Dr. Wynand Louw, the Award Coordinator, and the contributions by the 2008 Winners in this issue of CITAC News).

In spite of the work of such talented and distinguished scientists, I realize that the majority of measurements in chemistry are executed by non-experts in metrology, quality and analytical chemistry. Modern measuring systems used in analytical laboratories have user-friendly interfaces and specific software for processing measurement signals, simplifying the measurement and the analysis as a whole. Unfortunately, laboratory managers sometimes do not understand that this does not relieve the analyst (user) from a critical attitude with respect to the instruments used, execution of the measurement, and interpretation of the final analytical result [1]. Depending on the application, more or less basic knowledge is required to perform measurements/analysis in an adequate manner. However, human activity is never free from errors [2, 3]. This is true especially in chemistry, where for example, unsuccesful analyte/measurand definition can lead to an erroneous choice of the measurement method; insufficient knowledge about a chromatographic column and the measurand properties can "compromise" the separation method; storage and use of a certified reference material in conditions other than required in the certificate increase uncertainty of the certified value; etc. I am not even considering the infinite human errors caused by a mobile telephone use during a sample preparation for analysis, measurements and/or calculations.

Reducing the error probability starts with corresponding education and training [1-4]. Teaching chemistry students metrology and quality should include an explanation not only of principles of measurement and mathematical statistics applied [5], but also of human errors.

Students who study metrology and quality will become thinking analysts able to detect a human error in a measurement process and to evaluate its results. With time some of them will have to decide if it is worthwhile to pursue a career as a laboratory manager and to deal more with human errors. For such a case I would like to cite a known hasidic story.

A downcast hasid came to his rebbe*: "Rebbe, whatever job I take, it seems my heart is not really in it". The rebbe looked hard at his disciple: "You are an outstanding student of the Torah. You work well with people. Why don't you become a rabbi?" The hasid grimaced: "Rebbe, I have yearned to be a rabbi. But rabbis interpret the Law for people. Their judgements might affect the destiny of a person's soul. I can't be a rabbi. I'm afraid I might make a mistake!" The rebbe met the hasid's eyes: "So? Who should become a rabbi? Someone who is ***not*** afraid of making a mistake?"

In summary I propose discussing as widely as possible the problem of human error and teaching metrology and quality in chemistry, and developing a new generation of managers of analytical laboratories competent in these fields.

* A hasid is a member of a Jewish community. Rebbe (rabbi) is a title of respect for a Jewish teacher.

References

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Message from the CITAC Secretary

The 23rd CITAC Members' Meeting in Paris, March 30, 2008

The 23rd CITAC Member's Meeting held in Paris on a beautiful sunny Spring afternoon prior to the meetings of CCQM (Consultative Committee of the Amount of Substance). Seventeen members or representatives gathered and several invited speakers and some observers also attended the meeting. Members came from all over the world, including Australia, Korea, Japan, India, Thailand, South Africa and Europe of course. We were very honored to have observers also coming from Germany, Mexico and Hong Kong. In total, 35 people interested in participating in CITAC activities attended the meeting.

Five proposals for nominations as new CITAC Members have been received before the meeting, four individual and, for the first time, one collective application. After the presentation of the candidates, there was full agreement for their appointment as new members. The election of these new members, as well as resignations are described in the foreword of this issue by the Chairman Dr. Ilya Kuselman.

The financial report, presented by our treasurer, Wolfhard Wegscheider, indicated a sound financial situation of CITAC with a positive balance; the main expense being the edition of CITAC News. Considering the situation, it is planned in the near future to use some financial resources to promote CITAC activities.

An important aspect of the meeting was the first CITAC awards that reward the best papers for their contribution to the development and dissemination of Metrology concepts. Diplomas were awarded to Bertil Magnusson, David Duewer and Venkatesh Iyengar. The message in this issue from CITAC Vice-President pays close attention to these contributions.

The liaison reports by Alan Squirrell (ILAC), Yoshito Mitani (SIM) and Philippe Charlet (EURAMET) were received electronically by the members. During the meeting a discussion on the draft document "Guidance for Liaison Persons" took place and modifications have been accepted.

The meeting was an opportunity to present important works for CITAC and the scientific community:

- The Nordtest guide on measurement uncertainty, by Bertil Magnusson,
- IUPAC / CITAC Project on PT for a limited number of participants, by Ilya Kuselman,
- ERANET-Plus Project on Bayesian statistics to improve reference values in metrology in chemistry, by Séverine Demeyer,
- IUPAC Project on Metrological traceability of measurement results in chemistry: concepts and implementation, by Paul De Bièvre.

A focus topic of the meeting was the discussion and clarification of some points of the CITAC strategy 2007-2010. As CITAC is not intending to become a legal entity, there is no necessity to have by-laws. An important point concerns the relationship between CITAC and the industry, which must be strengthened, so that the activities of CITAC are more relevant and effective. Therefore, CITAC's strategy must continually be improved.

In autumn 2008, during its 97th meeting, the International Committee of Weights and Measures (CIPM) has confirmed that CITAC has been accepted as an Observer of the CCQM.

This issue of CITAC News presents the full text of the awarded most interesting papers on metrology in chemistry in 2008, whose authors will be awarded at the CITAC Member's meeting next Spring in Paris.
The reports of international organizations and Metrology Regional Organizations summarize the activities in 2008 in metrology in chemistry, with special attention given to reference materials with the reports of REMCO and COMAR committees.

The year 2008 was rich in conferences and workshops related to metrology in chemistry, in particular The 17th International Conference on Quality in Israel, The 6th Workshop on PT in Analytical Chemistry, Microbiology and Laboratory Medicine in Italy, and The Workshop on Biofuels and Metrology in France, etc. Short reports on these events are presented in this issue. Upcoming meetings on Metrology in Chemistry are also included, and CITAC will take the opportunity of these events to present its activities worldwide.

We are pleased to publish messages of the new members of CITAC. The updated list of CITAC members is available at the end of this issue.

Dr. Philippe Charlet
CITAC Secretary
LNE, France

Message of the CITAC Vice-Chair and Award Coordinator

Analytical chemists are well aware of the concepts of metrology. For decades, they have used reference materials to calibrate their instruments and validate their results. More recently, certified reference materials improved the traceability of the measurement result. Around the world metrology in chemistry workshops, CIPM Consultative Committee and technical Working Group meetings and conferences and awareness seminars are stressing the importance of traceability and uncertainty of measurement. However, at recent sub-regional metrology organisation meetings in Northern, Southern and Eastern Africa, NMIs in developing countries, accredited laboratories and industry had many questions related to traceability, especially on what is fit for purpose for their respective needs and applications. It made me more aware of the gap that exists between the understanding of the concept of traceability (and uncertainty of measurement) amongst NMIs and other laboratories in the developed and developing countries.

It is here that CITAC plays an important role, but can play a much larger role in future. In NMIs and designated institutes, or institutes frequently in contact with the formal metrology world, the metrological concepts are part of everyday life and we sometimes forget that not everyone deals with it on a daily basis. As we move down the metrology pyramid to accredited calibration or analysis laboratories and finally to testing laboratories, we need to be able to explain all concepts in a clear and uncomplicated way. The previous CITAC publications had an impact on improving the understanding of these concepts, but we need to do more and provide a mechanism for better communication of metrological concepts to all levels of the pyramid, even to the "man/woman on the street".

CITAC had a presence at many conferences and the newsletter in itself is a publication that is widely distributed, but there remain many areas where an increased activity can have a substantial positive impact on the general level of understanding of traceability, uncertainty of measurement and in general Quality, and finally on the accuracy of measurement results.

The increased awareness is not only necessary in developing countries, but in developed countries as well. It is only the level (in the metrology pyramid) that the awareness campaign needs to be aimed at that differs from developing to developed countries. CITAC should play a role in both, but it is probably in the developing countries that the greatest gains could be realised with relatively little effort.

Most of you are aware that two years ago, the Intra Africa Metrology System (AFRIMETS) was started to take on the role of regional metrology organisation (RMO) for Africa. This culminated in AFRIMETS officially been acknowledged as the RMO for Africa in October 2008. Membership (currently 40 countries) spans Africa from North to South, East to West and already many exciting projects are underway to assist NMIs in Africa to climb the metrology pyramid. You can read more about AFRIMETS in the report from the region on page 15.

In collaboration with the other RMOs, CITAC can play an important role in the distribution of fit for purpose metrology publications to Africa and other developing countries, and to testing laboratories in the developed countries.

Let us therefore build on our successes achieved during 2008 and find innovative ways of increasing the importance of CITAC for everyone involved in Analytical Chemistry.

CITAC Best Paper Award for 2008

It was my privilege to again facilitate the process to select the CITAC Best Paper Award for 2008. A larger number of members voted this year, and I want to thank everyone that voted for their commitment to the process. There were five nominations, two clear winners, but the third paper was hotly contested and finally won by one vote! It highlighted again that each vote makes a difference.

Please join me in congratulating our deserving winners for 2008 (in no particular order):

Paul De Bièvre
"Essential for metrology in chemistry, but not yet achieved: truly internationally understood concepts and associated terms"
Metrologia (2008) 45:335–341

Andrew S. Brown, Richard J. C. Brown, Warren T. Corns and Peter B. Stockwell
"Establishing SI traceability for measurements of mercury vapour"
Analyst (2008) 133/6: 946-953

Ronald G. Manning, Steven Lane, Shawn Dressman, Walter W. Hauck, Roger L. Williams
"The application of uncertainty to USP's compendial reference standards program: certified reference materials"
Pharmacopeial Forum (2007) 33(6):2-14

Finally, on behalf of our NMISA and African colleagues, may I wish CITAC and all its members a fruitful and productive 2009.

Dr. Wynand Louw, CITAC Vice-Chair
NMI
South Africa

Reports of International Organizations

CCQM Developments in Metrology in Chemistry

14th meeting of the CCQM

The 14th meeting of the CCQM took place in April 2008 at the BIPM in Sèvres, France. Also the CCQM Working Groups on Organic Analysis (OAWG), chaired by Dr. W. May, NIST, on Inorganic Analysis (IAWG), chaired by Dr. M. Sargent, LGC, on Gas Analysis (GAWG), chaired by Dr. M. Milton, NPL, on Electrochemical Analysis (EAWG), chaired by Dr. M. Mariassy, SMU, on Bio Analysis (BAWG), chaired by Dr. H. Parkes, LGC, on Surface Analysis (SAWG), chaired by Dr. W. Unger, BAM and on Key Comparisons and CMC Quality (KCWG), chaired by Dr. L. Mackay, NMIA met in April 2008 at the BIPM. During the period October – November 2008, the IAWG and the EAWG met at the IAEA in Vienna, while the OAWG, GAWG and BAWG met in Bangkok, Thailand, hosted by the National Institute of Metrology in Thailand - NIMT. All CCQM Working Groups reported very good progress and results of Key Comparisons (KCs) and pilot study comparisons.

The interest of NMIs and other (potential) designated institutes to participate in the activities of the CCQM and its working groups has again continued to increase. Inasmuch as metrology in chemistry in support of the improvement of the quality of life and the economy, e.g., by taking away Technical Barriers to Trade, in many countries is given a very high priority, it is to be expected that the activities in the field of metrology in chemistry will continue to increase and to be broadened. Currently about 4500 Calibration and Measurement Capabilities (CMCs) claimed by the NMIs and other Designated Institutes (DIs), out of a total of some 20500 physical and chemical CMCs, have been reviewed, approved and recognized in the scope of the CIPM Mutual Recognition Arrangement (CIPM MRA). These CMCs have been published in the CIPM MRA database KCDB on the website of the BIPM. (www.bipm.org/kcdb) As the validity of the CMCs has to be demonstrated, for example by the results of Key Comparisons, the CCQM has decided to study the effectiveness and efficiency of the process of organizing and choosing KCs and other comparisons to be carried out. Therefore in 2007 two CCQM ad hoc Working Groups were established. One WG dealt with the harmonization of the Key Comparison Reference Value (KCRV) and measurement uncertainty calculations, chaired by Prof. M. Cox, NPL and the other WG dealt with the way and organization of testing the claimed NMI and DI capabilities and competences, chaired by Dr. G. Turk, NIST. Both WGs reported on the progress made. As part of this topic Dr. W. Bremser (BAM) gave a presentation on considerations with regard to the calculation of the KCRV, while Dr. S. Ellison (LGC) reported on approaches for the selection of statistical methods and Dr. D. Duewer (NIST) made suggestions with respect to the presentation and decision making process on the basis of KC results. It is planned that by the end of 2009 CCQM Guidelines for organizing KCs and pilot study comparisons will be published.

During the CCQM week in Sèvres attention was also given to "15 years of CCQM; the achievements and challenges". Presentations were given by Drs. Alain Marshal (formerly LNE) and Hun-Young So (KRISS) on whether we are doing the right job. Dr. Milton talked about the achievements and challenges in monitoring climate change, while Dr. Sargent talked about achievements and challenges in food testing. Dr. Craig Jackson (consultant, USA) gave a presentation on metrological achievements and challenges in laboratory medicine; Dr. Mike Amos (NIST) presented an interesting paper on metrological challenges in "omics" (human protein and cell measurements) and Dr. Unger talked about metrological challenges in surface analysis.

CCQM plenary

As usual the CCQM plenary meeting was attended by more than 45 organizations, not only representing NMIs and other DIs, but also representing the intergovernmental organizations and international bodies IAEA, IUPAC, IFCC, ILAC, JCTLM, WHO/NIBSC, WMO, Codex Alimentarius Commission/ FAO, ENFSI (European Network of Forensic Science Institutes), ISO REMCO and CITAC. Dr. C. Bertler, chairperson of the Quality and Competence Standing Committee of the ENFSI gave an overview of the ENFSI aims, structure and activities. Near future activities of the ENFSI include comparability, traceability, databases, sampling techniques, reference materials, proficiency testing and uncertainty of both quantitative and qualitative measurements. The presentation generated significant interests and discussions. A number of issues are of the same kind as faced in the JCTLM and in the WADA. Dr. S. Doyran of the Codex Alimentarius Commission/FAO outlined the background of the Codex Alimentarius Commission and reported on the progress in the work of the Codex Committee on Methods of Analysis and Sampling. The BIPM is now an effective contributor to the work under the Codex Alimentarius Commission.

Dr. E. Gray presented a report on the activities of the National Institute of Biological Standards and Control (NIBSC), which is the major WHO laboratory. More than 95% of the WHO biological measurement standards are produced and held by the NIBSC. The cooperation with the CCQM and in the JCTLM is very stimulating, leading to increased efforts to make the WHO reference standards traceable to the SI or at least define the values based on the application of metrological principles.

Dr. M. Milton (NPL) reported on the increased cooperation between the WMO Global Atmospheric Watch committee and the CCQM WG on Gas analysis. Currently negotiations are taking place with the aim of establishing collaboration between a number of NMIs leading in the field of gas analysis and gaseous CRMs, the CCQM GAWG and the WMO GAW concerning the realization of SI traceable Volatile Organic Compounds (VOCs) at the parts-per-billion level. VOCs play a role in the generation of ozone in the troposphere. Dr. A. van der Veen (NMi VSL and ISO REMCO chair) presented an update on the work by ISO REMCO. He mentioned the development of a new ISO REMCO Guide 80 on quality control reference materials and "in-house" RMs. ISO Guides 30 and 33 are under review. The review of the ISO Guide 34 is in its final phase. ISO

Guide 79 will become a introductory guide to RMs and CRMs.

Dr. A. Fajgelj (IAEA and IUPAC) reported on activities by IUPAC. It was mentioned that the IUPAC document "Metrological Traceability of Measurement Results in Chemistry", being composed by Prof. de Bièvre and Dr. Dybkaer, is nearing completion. Mr. A. Squirrell provided information on behalf of the ILAC. He noted that some 30 000 laboratories have now been accredited under the ILAC Arrangement (mostly to ISO 17025). Approximately 10,000 of these laboratories are involved in chemical measurements. ILAC is currently developing a multi-lateral agreement for CRM producers, based on ISO 17025 plus ISO Guide 34. Mr. Squirrell also gave an overview of the results of the fruitful cooperation between ILAC and the BIPM and between the Regional Metrology Organizations (RMOs) and the Regional Cooperations of Accreditation Bodies. Dr. I. Kuselman, Chair of CITAC presented a short overview of the CITAC activities and achievements. In particular he mentioned the (upcoming) publication of the IUPAC/CITAC Guide on "Selection and use of proficiency testing schemes for a limited number of participants".

Redefinition of the mole

In 2007 the CCQM established a working group on the redefinition of the mole chaired by Dr. M. Milton. Other members are Drs. L. Besley, M. Salit, R. Wielgosz, R. Kaarls and Prof. de Bièvre. Dr. Milton presented a progress report and a clear presentation on the essence and consequences of the proposed changes. It was made very clear that by redefining the mole based on fixing the value of the Avogadro constant we are deliberately breaking the link with mass, decoupling it from the kilogram. This is very helpful because there has always been confusion between amount of substance and mass when units were defined on the basis of the fixed mass of carbon. Dr. Milton and Dr. Mills will publish another paper on this issue. The WG is in touch with its stakeholder community, in particular the IUPAC, by publishing relevant papers, while a "mise-en-pratique" for the "realization" of the mole will be prepared.

Metrology for bio-fuels

Prof. Jornada, President of INMETRO, Brazil, was invited to present an overview on the needs, phase of development and activities with respect to the realization of global comparability and traceability of measurement results on quantities of importance for the characterisation of bio-fuels. He gave a good overview of the parameters of importance that are nowadays under discussion. One of the questions to be solved by the bio-fuel producing industry and the users of bio-fuels (transport and energy industry) is to define which parameters are of critical importance, and to define maximum and/or minimum levels of these quantities (ranges and target uncertainties). This is also an issue for the ISO. He expressed his opinion and wish that the CCQM becomes active in this area and gives priority to this field of measurement. Prof. Jornada also made reference to the collaboration in this field between INMETRO (bio-ethanol), NIST (bio-diesel) and the EU (including a number of European NMIs). Drs. Sommer (PTB) and Charlet (LNE) mentioned the organization of a workshop on bio-fuels and metrology "Bio-fuels Met 2008" on 6-7 November 2008 in Strasbourg, France. Dr. May mentioned the international conference on "Accelerating Innovation in 21st Century Bio-sciences", organized by NIST and the University of Maryland on 20-22 October 2008 at NIST in Gaithersburg, MD, USA. Dr. Kaarls chaired a NMI Directors panel during the plenary session on the first day.

CCQM WG programmes of work

High priority areas are Food analysis (safety and nutritional value), Analysis in healthcare (diagnostic, therapeutic, pharmaceuticals), Environmental measurements and Purity analysis. In addition to this programme of work a need for global comparability and traceability was expressed in areas like metals, metal alloys, (advanced) materials (including polymers and plastics), fuels and nanostructures, while also a growing interest was expressed by the forensic sciences community.

CCQM Working Group on Organic Analysis (OAWG)

Dr. May reported results of key comparisons on PAHs in soil; Nutrients in infant/adult formula (folic acid, niacin, vitamin A); Non-peptide hormones in serum (cortisol and progesterone) and VOCs in solution. Also, results of a number of pilot studies have been reported: Organic purity assessment series (digoxin); Determination of acrylamide in cooked high-carbohydrate food; Antifungals in food, like malachite green in fish (salmon), and Chloramphenicol (CAP) in milk. Future work will include study comparisons on: purity assessment of high purity organic materials,like beta-estradiol; anabolic steroid in urine, like testosterone glucuronide and epitestosterone glucuronide in freeze dried human urine; pesticides in foods, like pyrethroids in apple juice, and flame retardants in plastics, like selected PBDEs and PPBs.

CCQM Working Group on Inorganic Analysis (IAWG)

Dr. Sargent reported results of key comparisons on As, Hg, Se and methyl-mercury content in marine fish; Trace elements in whole fat soybean powder; Chemical composition of clay and Determination of nitrogen and trace elements in silicon nitride powder. Also results of a number of pilot studies have been reported: As and arsenobetaine content in marine fish; Cd and Pb in herb; Hg in pure water and Purity analysis of zinc. Other comparisons in progress are: Assay of potassium hydrogen phthalate; Analysis of copper alloy (key comparison); Assay of HCl; Salinity of seawater composition and Assay of EDTA. New comparisons are planned for: mercury in natural water (related to the EURAMET project for water reference laboratories); arsenobetaine; trace elements in biofuels and trace elements in frozen urine and coal or fly ash.

CCQM Working Group on Gas Analysis (GAWG)

Dr. Milton reported progress in and results of key comparisons on ammonia in nitrogen; carbon dioxide in synthetic air; oxygen in nitrogen and CO in nitrogen at 5 μmol/mol. Proposed comparisons include: purity of methane; nitrious oxide (including participation of the WMO GAW/WCC and NOAA); multi-component stack emission gases (NO, SO_2, CO, CO_2, propane in nitrogen) and NO_2 in synthetic air. Further collaboration with the WMO Global Atmospheric Watch

programme (WMO GAW) has been reported. The organization of a BIPM – WMO symposium, among others addressing ozone and green house gases and ocean salinity issues, is now planned for 2010 at the premises of the WMO in Geneva.

CCQM Working Group on Electrochemical Analysis (EAWG)

Dr. Mariassy reported results on electrolytic conductivity; pH of carbonate buffer; pH of oxalate buffer; assay of potassium chloride and nitrate and nitrite in calibration solutions and natural water. Proposed comparisons include the further coverage of the pH and conductivity scales.

CCQM Working Group on Bio Analysis (BAWG)

Dr. Parkes reported results of comparisons on quantitative polymerase chain reaction (PCR) (key comparison); peptide and protein quantification; quantitative analysis of DNA methylation and protein glycosylation. She then proceeded to briefly summarize progress in several on-going studies: comparability of fluorescence in ELISA; protein structural measurements by circular dichroism; quantification of cells with specific phenotypic characteristics; measurement of a multiplexed panel of RNA transcripts and relative quantification of genomic DNA fragments. New study proposals include: measurement of a-amylase activity; measurement of acetylcholine in a microdialysate and atomic force microscopy measurement of DNA.

CCQM Working Group on Surface Analysis (SAWG)

Dr. Unger reported on progress and results in silicon dioxide on silicon (key comparison); amount of low z elements in diamond-like carbon (DLC) films and amount of Fe and Ni in 200 nm Fe-Ni alloy films on silicon. The SAWG also reflected on its future activities. These will include calibration issues for EPMA, using the Bessy facilities for the calibration of absolute spectrometer efficiency; organic functional group surface density; amount of OH-groups at hydrophilic surfaces; amount of NH_2-groups at animated surfaces and amount of DNA and drugs on a surface.

BIPM programme of work

Dr. Wielgosz presented the progress and results of the work by the Chemistry Section of the BIPM. The following comparisons have been prepared, are being prepared and or coordinated by the BIPM: purity of theophylline; digoxin; 17 beta-estradiol; ozone and NO_2 in nitrogen.

In the area of organic purity analysis a study is being carried out investigating the optimum number of purity analysis comparisons and CRMs needed to judge the capabilities and competences of the NMIs. (molecular weight – polarity mapping).

Further, the Chemistry Section acts as the secretariat of the JCTLM and liaises with several other international organizations and bodies, including the Codex Alimentarius Commission, CCMAS, USP, ENFSI, WMO and ISO REMCO.

Joint Committee for Traceability in Laboratory Medicine - JCTLM

Dr. R. Wielgosz also presented an up-date on the work of the JCTLM in general and, on behalf of the chair of JCTLM Working Group 1, Dr. W. May, on the progress by the JCTLM WG 1 on Reference Materials and Reference Methods/Procedures of Higher Order. Prof. L. Siekmann, chair of the JCTLM Working Group 2, on Reference Measurement Laboratory Services and Inter-laboratory Comparisons reported on the progress in establishing and publishing a list of available, reliable reference measurement laboratory services and the results of PT schemes carried out among the participating laboratories. Lists of reliable Reference Materials and Reference Methods/ Procedures of Higher Order are published on the JCTLM websites of the IFCC and the BIPM (www.bipm.org/jctlm).

In the mean time also lists of available Reference Measurement Laboratory Services have been published in the JCTLM database. In order to become listed the participating laboratories have to be accredited on the basis of ISO/IEC 17025 and ISO 15195 and must have satisfactory results in the obligatory PT schemes. The results of the laboratories listed with their services in the JCTLM database are clearly of good quality. Results of the inter-comparisons are available at the web-site of the DGKL. (www.dgkl-rfb.de:81/index.shtml) The discussion with the relevant EU DG is continuing with respect to the formal recognition of the JCTLM database by the EU.
On 12 December 2008 a successful JCTLM Members' and Stakeholders' meeting was held at the BIPM. Presentations were given by representatives of CCQM, IFCC, EU DG Enterprise (responsible for the EU IVD Directive), clinical quality assurance organizations, ILAC, WHO/NIBSC and clinical laboratories. Also an overview of developments in Europe, USA, Japan and Australia was given. Representatives of the IVD and pharmaceutical industry presented their views and developments in these industries.

CCQM and the Pharmacopoeia

On 4-5 December 2008 the CCQM and the US Pharmacopoeia (USP) held a workshop dedicated to comparability and traceability in pharmaceutical measurements: "CCQM Pharmacopoeia Workshop – Measurement Traceability for Pharma and Bio-pharma Measurements" at the BIPM. Presentations were given by representatives from the CCQM and BIPM, the pharmacopoeia in Europe, Japan and the USA, regulators, the pharmaceutical industry, the metrology institutes NIST, NMIJ, LGC, WHO/NIBSC, IRMM and ISO REMCO. Topics addressed included regulations, industry needs on comparability and traceability, standards, reference materials and reference measurement systems, SI and WHO International Units, single and multiple method value assignment and multi-component/variant value assignment.

It is planned that this interesting and successful workshop will be followed up by another workshop in two years time.

Dr. Robert Kaarls
President CCQM
The Netherlands

Reports of International Organizations

ILAC Update

CITAC

CITAC is a stakeholder member of ILAC and actively contributes to ILAC's work program, particularly with respect to issues involving metrology and chemistry. CITAC also has official liaison status with ILAC and ILAC representatives attend appropriate meetings which are hosted by CITAC, or its sister organisation, EURACHEM. Examples of these in 2008 include the CITAC Members Meeting (March, Paris), the Eurachem (CITAC) Proficiency Testing Workshop and CITAC/ Eurachem Working Group or Traceability and Measurement Uncertainty (October, Rome). ILAC and CITAC were also represented at the CCQM Plenary (April, Paris) and the recent news about the granting of official observership to CITAC in the CCQM is most welcome.

In maintaining this close cooperation with CITAC, ILAC have been able to jointly continue our efforts to strengthen the links between accreditation and metrology (particularly in chemistry) – an essential link to assist accreditation bodies and accredited laboratories in delivering traceable and reliable measurement results which are fit for their intended use. Issues of common interest include metrological traceability, proficiency testing, reference materials and further applications of measurement uncertainty (including qualitative analysis) and CITAC's input on these issues, through their membership of ILAC's Laboratory Committee (which is currently chaired by Dr. Maire Walsh, a CITAC member) is much appreciated.

A general update on ILAC activities since February 2008 follows.

ILAC Meetings

The first ILAC Executive Committee and Arrangement Committee (ARC) meetings for 2008 were kindly hosted by RvA in Amsterdam, the Netherlands, during the first week of March.

This meeting included an additional half day session to begin the process of reviewing the ILAC Strategic and Business Plan. An Executive Task Force, led by ILAC's Vice-Chair Peter Unger, was formed to manage the revision process. After a final discussion and review session, during the Paris Executive meeting in July, the draft was circulated to the ILAC members for a 60 day comment period. It is hoped that the document will be approved by the membership and then published on the ILAC website prior to the end of 2008.

The mid year meetings of the ILAC Executive and the ILAC Arrangement Management Committee (AMC) were hosted by Cofrac in Paris, in July. Meetings of the IAF Executive and the IAF MLA Management Committee (MC), were also held during the same week as were meetings of the Joint Committee for Closer Cooperation (JCCC) and the joint session of the ILAC AMC and the IAF MLA MC (JMC). The IAF/ILAC/ISO Joint Working Group also met in July, with representatives from ISO traveling to Paris to participate. Further progress was made on many of the major work items.

The ILAC committees all held mid-term meetings in 2008, as well as their end of year meetings in Stockholm. The minutes of the committee meetings are published in the members area of the ILAC website on the respective committee pages.

Special thanks go to our colleagues from SWEDAC, the hosts of the 2008 annual meetings, for the excellent logistical arrangements and support provided throughout the series of meetings which were held in Stockholm from 10 - 22 October 2008. These meetings saw many work items come to a successful conclusion together with commencement of a number of new activities.

The joint ILAC/IAF annual meetings for 2009 will be held in Vancouver, Canada, from 10-21 October.

The ILAC Arrangement

As at 19 November 2008, there were 61 Signatories (Full Members) to the ILAC Arrangement, representing 47 economies.
ILAC continues to focus on enhancing a more widespread understanding of the socio-economic benefits of the Arrangement amongst the international community, particularly governments and regulators.

ILAC Membership

ILAC membership as at 19 November 2008 is as follows:

- 61 Full Members (Signatories to the ILAC Arrangement) representing 47 economies;
- 21 Associates representing 20 economies;
- 19 Affiliates representing 17 economies;
- 4 Regional Cooperation Bodies;
- 1 National Coordination Body;
- 26 Stakeholders.

The ILAC membership (total 132 bodies) now covers a total of 80 different economies worldwide and approximately 30,000 laboratories and 5,000 inspection bodies are accredited by the 61 ILAC Full Member.

Joint ILAC/IAF Activities

The joint activities between ILAC and IAF continue to be managed through the Joint Committee for Closer Cooperation (JCCC).

Various joint activities are currently being progressed by various joint groups and annual updates were presented to the membership during the Joint General Assembly meeting in Stockholm.

Discussions regarding the future of ILAC and IAF were also held during the first half day of the Joint General Assembly (JGA). It was agreed during the JGA that a Task Force would be established under the auspices of JCCC, to consider the issues highlighted by the members as requiring further investigation. The Task Force is comprised of the Chairs and Vice-Chairs of ILAC and IAF, the Chair or nominated representative from each region, stakeholder representatives from three areas namely the ILAC laboratory Committee, the IAF industry representative and the IAF conformity assessment bodies representative and a representative of unaffiliated bodies. The Task Force is now working on their terms of reference and they are planning to hold a meeting in mid January 2009.

The first International Accreditation Day was held on 9 June 2008, with many members reporting on the successful activities undertaken by their organisations to highlight the benefits of accreditation. Feedback received from the survey, circulated to both the ILAC and IAF memberships to obtain feedback from the members on the inaugural International Accreditation Day, was reviewed by the ILAC MCC during their meeting in Paraguay.

Reports of International Organizations

ILAC Liaisons

The review of liaison activities continues to be a major focus of the ILAC Executive Committee, who seeks to ensure that ILAC interests are represented in areas which have an impact on the activities of ILAC and its members. The Liaison Database, located in the members area of the ILAC website, continues to serve as the main repository for the ever increasing number of reports and documents that are produced as part of ILAC's rapidly expanding liaison activity. It can be accessed via the members area of the ILAC website.

The regular annual series of meetings between ILAC and BIPM, including representatives from the Regional Membership Organisations of both ILAC and BIPM, were held in Paris in March 2008, and included a workshop on the progress in adopting and implementing the joint statement on calibration and measurement capability (CMC) as well as an update on progress in our endeavours to strengthen the links between accreditation (ILAC Arrangement) and Metrology (CIPM MRA) and disseminate traceability of measurements from NMIs to field laboratories. This was reinforced at the April 08 meeting of CCQM with respect to chemical measurements and will be discussed again at the June 08 REMCO meeting.

A meeting of the Joint Committee on Coordination of Technical Assistance to Developing Countries in Metrology, Accreditation and Standardisation (JCDCMAS) was also held in Paris on 7 March 2008 and ILAC delegates represented both ILAC and IAF at this meeting. This committee aims to provide a holistic approach to issues relating to metrology, accreditation and standardisation in developing economies. Representatives of the Joint Development Support Committee (JDSC) and the ILAC Secretariat, met with UNIDO officials in Vienna in July 08. The discussions focused on identifying areas of mutual interest where the three organisations could work together in 2008 – 2009. Further consideration was also given to the practical mechanisms by which the three organisations can work together, in the most effective and efficient manner, to achieve shared goals.

As mentioned earlier, ILAC's continuing close cooperation with EURACHEM and CITAC supports the important metrological initiatives in chemical and biological measurement also being undertaken in conjunction with BIPM. Liaison activity with EURACHEM and CITAC also includes work on method validation, measurement uncertainty and compliance with limits, the use of "good quality" reference materials and proficiency testing.

The Memorandum of Understanding (MoU) signed between ILAC and OIML in November 2006 was extended to include IAF in October 2007 in Sydney, Australia. Progress is also continuing on the ILAC and OIML Joint Work Programme, with related items scheduled for consideration and progression during the ILAC/OIML meetings in March 2009. ILAC and IAF were also represented at the 13th International Legal Metrology Conference, held in October in Sydney, Australia.

ILAC continues it's very active role in many ISO Technical Committees and CASCO Working Groups. In 2007/2008 ILAC liaison officers (sometimes more than one) participated in meetings of the CASCO CPC (Chairman's Policy Committee), WG 27 (Drafting requirements for use in conformity assessment applications), WG 29 (Revision of ISO Guide 65 - Product Certification), CASCO WG28 (Revision of ISO Guide 43 – Proficiency Testing), CASCO Plenary, ISO TC212 (Technical Committee - Clinical laboratory testing and in vitro diagnostic test systems), ISO TC 69 (Technical Committee - Applications of statistical methods), ISO TC 176 (Technical Committee - Quality Management and Quality Assurance) and the IAF, ILAC and ISO Joint Working Group.

ILAC also played an active role in the Seminar on Accreditation of Proficiency Testing Providers and Reference Material Producers, conducted by INMETRO in Rio de Janeiro, on 5 and 6 June 08, with the ILAC representative participating as one of the presenters. This seminar was held immediately prior to the annual ISO REMCO (reference materials) meetings where ILAC was also actively involved.

ILAC and the World Anti Doping Agency (WADA) have continued the cooperation begun in 2003 and it is pleasing to note the good progress this collaboration continues to make and in particular that it has matured to the point that a Memorandum of Understanding between the two organisations was signed in Madrid in November 2007. Meetings of the ILAC(AIC)/WADA WG were held in May 08 in Cape Town and also during the recent Stockholm meetings.

ILAC is also commencing discussions with the World Health Organisation (WHO) to determine how we might best cooperate to achieve some progress in areas of mutual interest and involvement.

ILAC Secretariat

The Secretariat is very pleased to welcome Rose Bevins to the role of ILAC Administrator (part-time), which she shares with our other part-time ILAC Administrator, Alison Hay. Rose joined the Secretariat in May 08 and is working 3 days a week.

The Secretariat is continuing to develop the ILAC website with significant updates completed for the ILAC and joint ILAC/IAF committee pages in the members only area. We have also completed a full audit of the ILAC website, resulting in some updates and refinements being made.

A complete list of all documents that have been (or are being) circulated to members for either comments or voting can be obtained from the ILAC website in the Members Section under Ballots.

The ILAC-MRA Mark registration process continues and, as at 19 November 2008, 44 ILAC Full Members had signed Licensing Agreements with ILAC, for the use of the Combined MRA Mark (the Combined MRA Mark is the ILAC-MRA Mark used in combination with the accreditation body's own mark).

Two editions of ILAC News were published in 2008, in April and October. Members have been sent a request for articles for the April 2009 edition.

Further information on ILAC can be obtained from the ILAC website at www.ilac.org, or by emailing the Secretariat on ilac@nata.asn.au.

Mr. Alan Squirrell
ILAC Executive Liaison Officer
Australia

Reports of International Organizations

Information from the Division of Analytical Chemistry (DAC), European Association for Chemical and Molecular Sciences (EuCheMS)

The annual DAC meeting took place just before the 2nd Chemistry Congress of EuCheMS in Torino, Italy, on 16 September 2008. The DAC chairman Bo Karlberg welcomed delegates and guests from 13 member societies and other international organizations. The Chemistry Congress in Torino was attended by more than 2000 scientists and analytical chemistry was represented by two half-day sessions under the topic "Chemical measurement quality: Societal impact". The next European Chemistry Conferences will take place in Nürnberg, Germany, in 2010 and in Prague, Czech Republic, in 2012. At present about 170000 European chemists are EuCheMS members.

The DAC chair informed the delegates that the 36th issue of the European Analytical Column had been produced and was published in several international journals and newsletters. Within DAC a new steering committee has been appointed comprised of Bo Karlberg (Sweden, chairman), Jens Andersen (Denmark, secretary), Wolfgang Buchberger (Austria), Paul Worsfold (UK) and George Horvai (Hungary).

DAC is the main force behind the conference series Euroanalysis and its 15th event will take place in Innsbruck, Austria, on 6-11 September 2009 under the chairmanship of Wolfgang Buchberger and Wolfgang Lindner. The motto of the conference is "Impact of Analytical Chemistry on the Quality of Life". Further information can be obtained on the webpage www.euroanalysis2009.at. Euroanalysis XVI will be organized by the Serbian Chemical Society and will be chaired by Slavica Ražić.

There are various Study Groups of DAC which are carrying out the following activities in their respective areas: initiate cooperation, orgainze meetings, draft reviews or prepare guiding documents. For instance, the Study Group "Education in Analytical Chemistry" provided several lectures and a publication on the status of the Bologna Declaration implementation (*Anal. Bioanal. Chem.* 391 (2008): 875-880). The other study groups are "Quality Assurance", "History", "Bioanalytics", and "European Analytical Chemistry on the web".

The DAC Annual Meeting 2009 will be held on the starting day of Euroanalysis XV.

Prof. Hendrik Emons
Liaison person DAC-CITAC
EC-JRC-IRMM, Belgium

Contribution of IMEKO TC-23 to Food and Nutritional Metrology

This was the first contribution of TC-23 at the international level to the Conference on Metrology of Environment, Food and Nutritional Measurements (MEFNM) that took place during 9-12 September 2008, in Budapest, Hungary. Although there were only fifteen submissions to the program from ten countries, the quality of several presentations was very high since eight of them were invited lectures, specifically chosen to reflect the depth and breadth of emerging metrological applications in the food and nutritional (F&N) areas.

The presentations touched on the following topics: metrological and impending capacity development needs in several F&N areas (G,V, Iyengar, FSNSP, Tufts University USA); reference materials for F&N metrology (W. Wolf, USDA, USA); NIST contributions to strengthen F&N measurements (S. Wise et al, NIST, USA); measuring nutrients in foods and international standards (B. Burlingame, FAO, Rome, Italy); implementing metrological principles in food composition (I. Castanheira, NIH, Lisbon, Portugal, and P. Finglas, IFR, Norwich, UK); contribution of CRMs for strengthening F&N analysis (R. Koeber, H. Schimmel and H.Emons, IRMM, Geel, Belgium); analytical QA approaches for food analysis (H. Kawamura, JMSF, Mutsu, Japan); national facilities for food matrix RMs (I. Castanheira et al. NIH, Lisbon, Portugal and IFR, Norwich, UK), among others.

The general discussion session highlighted the importance of traceability and uncertainty in chemical, physiological and clinical measurements in several F&N areas, and the need for providing the foundation for comparability (a vital requirement when results from different laboratories are evaluated).

The discussion also emphasized three key points:

(i) integration of metrology into F&N measurements is essential for improving the measurement infrastructure of an institution,
(ii) educating the future F&N investigators with knowledge of metrology is pivotal for strengthening the very base of nutrition education, an agenda that has not received much attention by the academic community in charge of training the future F&N investigators, and
(iii) the national measurement laboratories (NML) have an indispensable role in disseminating the QA message. In the national context, the NMLs are the torch bearing leaders expected to proactively interact with various groups such as the F&N community, for servicing the measurement needs.

Prof. Venkatesh Iyengar
Tufts University
USA

Activities of the EURAMET Technical Committee for Metrology in Chemistry

Transition from EUROMET to EURAMET

EUROMET has undergone a major reorganisation in 2007 and re-established itself as EURAMET e.V. The process was driven by the prospect of a European Metrology Research Programme (EMRP) co-funded by the European Commission under article 169 of the EC treaty. This required that the European metrology organisation register as a legal entity.

Analysis of appropriate solutions led to the foundation of EURAMET as an Association of Public Utility under German Law (e.V.). In accordance with the recommendation of the 20th EUROMET General Assembly (May 2006) a single comprehensive body was established to coordinate metrology in Europe for both, the operation of an EMRP and the other purposes of EUROMET. At the 21st EUROMET General Assembly in May 2007 the decision was taken on the termination of the EUROMET-Memorandum of Understanding (MoU) in effect from June 30, 2007. All responsibilities were transferred to EURAMET. EURAMET has now 37 members and associates.

All EUROMET-bodies continued to work under EURAMET including METCHEM, also called Technical Committee for Metrology in Chemistry (TC-MC) in line with the nomenclature of the other TCs. Also, the internal organization of METCHEM continues to exist under TC-MC. It has four sub-committees, for Inorganic (convenor: Christophe Quetel, IRMM) Organic (Franz Ulberth, IRMM) Electrochemistry (Petra Spitzer, PTB) and Gas (Rob Wessel, NMi).

The European Metrology Research Programme

The European Metrology Organization concluded its preparation for the European Metrology Research Programme with the transfer of responsibilities from EUROMET to EURAMET. At the same time, 21 European countries committed to the EMRP Article 169 activities and agreed in principle to collectively commit up to 250 M€ over a 7 year period to EMRP. In March, the related EMRP2007 work programme comprising 15 targeted programmes (TPs) was published. A first phase was lanched in Spring 2007 with a new European Comission supported project called iMERA-Plus. The level of the financial support was 21 million Euros. Since the condition was co-financing research projects on a 1:2 basis, an additional 42 million Euros had to be raised by the partner countries as payment in kind. This made it necessary to adapt a selective approach, because not all targeted programmes could be funded simultaneously. Four out of 15 Targeted Programmes (TPs) were selected as "test cases" under the "iMERAplus" scheme. These were "SI & fundamental constants", "Health" (one of the so called "grand challenges") and two so called "single discipline" programmes, "Length" and "Electricity and Magnetism".

Project proposals from consortia of different NMIs were requested and funding was granted in a competitive selection process within and across the selected targeted programmes. Obviously, none of these programmes were explicitly devoted to chemistry, so that activities coming from TC-MC had to be arranged and proposed under suitable targeted programmes and in competition and/or cooperation with other physics-oriented activities.

In a preparation step, "Expressions of Interest" from participating NMIs were collected and consortia for joint research projects (JRPs) were formed on the basis of common research interests. These consortia had to prepare project proposals to be submitted to the EMRP secretariat. Some 20 groups from NMIs and designated institutes active in TC-MC expressed interests in the targeted programmes mainly in the area of clinical chemistry within the Targeted Programme "Health". Three project proposals related to this programme were submitted. A fourth contribution from chemistry was incorporated in an interdisciplinary proposal related to the redefinition of the kilogram under the programme "SI & fundamental constants".
The submitted project proposals were presented in a "Review Conference" in Paris in October 2007 to a board of external referees from outside the EURAMET metrological community. The referees produced a ranking list of the proposals based on an agreed upon criteria list comprising aspects like scientific challenge but also the expected impact of project results. 26 out of 40 proposals were selected for funding including all proposals co-ordinated by TC-MC members and dedicated to chemistry.

The opinion of the referees was formally confirmed by the EU in January 2008 and starting dates of successful projects proposals were set for May/June 2008 after completion of contract negotiations.

The four successful projects with participation of TC-MC members were:

Avogadro and molar Planck constants for the redefinition of the kilogram
INRIM (ITA), IRMM (EU), PTB (GER)
Coordination: INRIM;

Breath analysis as a diagnostic tool for early disease detection
NMi (NL), DFM (DAN), IPQ (PT), LNE (FRA), PTB (GER)
Coordination: NMi;

Traceable measurements for biospecies and ion activity in clinical chemistry
PTB (GER), DFM (DAN), INRIM (ITA), LGC (UK), LNE (FRA), METAS (SUI), Metrosert (EST), SMU (SK), SP (SWE), UME (TUR)
Coordination: PTB;

Traceability of complex biomolecules and biomarkers in diagnostics - effecting measurement comparability in clinical medicine
LGC (UK), IRMM (EU), NPL (UK), PTB (GER)
Coordination: LGC.

Further Activities in METCHEM/TC-MC

The first meeting of EURAMET TC-MC was conducted in Istanbul on 11–15 February 2008. All sub-committees had separate meetings on the first two days of the conference and a plenary meeting was held on 14-15 February. There was a strong attendance with some 63 representatives from 34 institutions and 24 countries. At that time, the results of the EMRP selection process were already known and had a significant influence on the meeting.

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A EURAMET Workshop entitled "Recent developments of the iMERA-Plus programme" was held on February 14th with contributions from the successful projects in the field of clinical chemistry but also with some general presentations about the Targeted Programme "Health" by Prof. Hans Koch, coordinator of the programme, and also by Dr. Hans Bachmair, former chairman of the Technical Committee for Electricity and Magnetism (TC-EM) and strongly involved in setting up the single discipline "Targeted Programme - Electricity and Magnetism". There were also some reports about IMERA stakeholders workshops preparing future EMRP calls. Dr. Bertil Magnusson gave a brief report on the workshop for "Metrology Needs and Measurement Priorities in the Environmental Sector" held in Borås, Sweden, October 18, 2007. Dr. Hans Bachmair reported on the workshop for Metrology Needs and Measurement Priorities in the Energy Sector held in Amsterdam (NL), in June 2007.

Also, a broad range of ongoing activities and projects in TC-MC outside the current scope of iMERA-Plus programme were discussed. New methods and their possible application to metrology in chemistry are investigated in a PTB-NPL research cooperation on Surface-Enhanced Raman Scattering. Project 924 was initiated to support the EU Water Framework Directive (WFD). The aim is to propose and demonstrate the feasibility of a possible system for traceable measurements for short-listed analytes within the WFD. The project concentrates on inorganic analytes. In a first step, the measurement capabilities of NMIs and reference institutes in the field of water analysis were compared. These latter institutes could act as calibration laboratories in a framework providing results traceable to the SI. These measurements were recently completed. The results give evidence of the good quality of measurements conducted by both, NMIs and potential calibration laboratories. The large number of participants (32 institutions from 18 countries) reflects the enormous interest in these activities in environmental measurements. In a forthcoming step, regional comparison measurements organised by the reference institutes shall be made in order to link these laboratories with the local monitoring laboratories. The reference values are provided by the potential calibration laboratories. NMIs also participate in these comparisons in order to control the success of the validation. The project comprises a supplementary comparison (EUROMET.QM-S2) extending previous CCQM key comparisons and also initiated the global CCQM P100 series of comparisons on Hg in water.

Environmental issues are also tackled in Project 833 (Intercomparison of PCB congener in solution, sewage sludge extract and sewage sludge). This long-term project was carried out in three steps since 2004. The results from the final step showed significant improvements compared to previous steps. Relative uncertainties of comparison reference values are 7-14 %.

A study on the traceability of salinity measurements in seawater was conducted by the Sub-committee for Electrochemistry. Salinity is one of the most important input quantities of oceanographic and climate models. The distribution of density inside the ocean is directly related to the distribution of ocean currents. Temperature, salinity, and pressure are used to calculate density. The Practical Salinity Scale PSS-78, endorsed by UNESCO/IAPSO, forms the basis of an internationally accepted method for calculating salinity from conductivity measurements. The objective of the study was to assess the degree of equivalence in conductivity results of practical salinity measurements. The results indicate that a degree of equivalence in the order 10-4 can be reached. But in order to come to more reliable results, more attention has to be paid to the treatment of the uncertainty. The project was supported by the WG 127 on Thermodynamics and Equation of State of Seawater of the Scientific Committee on Oceanic Research (SCOR) and the International Association for the Physical Science of the Oceans (IAPSO).

The sub-committee for gas conducted three workshops. Project 888 "Comparability of measurements of NO, CO, and SO2 at low ambient level" met in March 2007 in Ispra, Italy. Another workshop was held in conjunction with project 893 on a "Metrology infrastructure for airborne nanoparticles" in October 2007 in Berlin, Germany. The project intends to establish the requirements for coordination of activity within EURAMET for the development of a metrology infrastructure for nanoparticles. A third workshop was held in January 2008 in Turin, Italy in conjunction with Project 934 on "Traceable IR laser-spectrometric amount fraction measurements (TILSAM)" which aims at gas metrology by calibration-free infrared laser-spectrometry as a potential primary method. In addition, a range of gas-related comparison projects were discussed, mainly related to environmental issues.

Dr. Bernd Güttler
Chair EURAMET TC-MC
PTB
Germany

APMP Liaison Report

The 23rd Asia-Pacific Metrology Programme (APMP) General Assembly and related meetings were held in Sydney, Australia from 28 October to 2 November 2007. Metrologists from member NMIs, and guests from CIPM, BIPM, RMOs (COOMET and SADCMET), metrology society (NCSLI) and specialist regional bodies (APLAC, APLMF) attended the meetings.

Three new members (NISIT) Papua New Guinea, (KazlnMetr) Kazakhstan and (JEMIC) Japan joined the APMP family. APMP is getting more involved with the other specialist regional bodies and they have agreed to coordinate efforts to better promote their activities to the APEC Standards and Conformance Subcommittee. This is a good start for APMP

with promoting a higher profile of metrology to governments. Reports on the 17th COOMET meeting, 21st EUROMET GA, 13th SIM GA, 19th JCRB meetings, NCSLI 2007 and BIPM and CIPM activities along with liaison reports from APLAC, APLMF and OIML were presented at the meeting.

DEC, TC and EC Joined Meetings in Xi'an, China

APMP's regular meetings of EC/TC Chairs/DEC for the year of 2007 were concluded in China's historical city of Xi'an on June 14. Starting from June 10, this 5-day event covered meetings of APMP EC, DEC and TC Chairs. A DEC Technical Assistant (TA) Workshop, an informative and fruitful discussion platform aimed to find proper and effective mechanisms and approaches to facilitate technical assistance to developing member economies of APMP to underpin their effective participation in global trade, became an important component of this event. A local lab tour at the Metrology Institute of Shanxi province was also arranged. In the first section of the meeting, EC discussed feedback from all members on the strategic planning report (2006 draft), with a view to achieve a consensus on objectives and priorities that will help determine APMP's next-step projects. In the EC/TCCs meeting, members discussed the TC issues related to JCRB, RMO and APEC.

The workshop progressed following scientific and systematic procedures of case study, sub-group discussion, all-inclusive discussion and conclusions made effective efforts in identifying ways to enhance technical assistance delivery. The workshop conducted case studies by listening to presentations from the recipient economy, the funding/delivering agency, as well as the metrology experts, then identified lessons to be learned and key issues and concerns, and finally worked out plans to better carry out the technical assistance to APMP members from developing economies. Dr. Robert Kaarls, CIPM secretary and CCQM president, as well as two representatives from UNIDO and PTB attended the Workshop as invited reporters.

APMP Technical Committee on Amount of Substance Meeting (TCQM)

7th annual meeting of APMP TCQM was held in Sydney, Australia on 29 – 30 October 2007. A total of 37 delegates from 15 member economies and two representatives from PTB technical cooperation attended the meeting. Activity reports from CCQM organic analysis, inorganic analysis, bio-analysis and key comparison working groups were presented. Representatives from eight countries/economics: NIMT, Thailand, NPLI, India, LIPI, Indonesia, SIRIM, Malaysia, ITI, Sri Lanka, GLHK, Hong Kong, China, Chinese Taipei and NIM, China gave reports on the activities and strategic plans of their respective laboratories. Chairman Prof. Yu Yadong updated newly proposed comparison programmes, workshops and seminars to the members.

Highlights of APMP TCQM Activities

There was a discussion on ISO Guide 34 during the meeting. Dr. Lindsey Mackay of NMIA informed that the 30th REMCO meeting held in Tsukuba, Japan on 5-8 June 2007 had reported the progress of the revision of ISO Guide 34:2000. The new version had been distributed in October 2007 and it will be sent to the secretariat for approval in 2008. Regarding the content of the new version, Dr. Mackay remarked that NMIs might have concerns about the revised requirements on traceability, homogeneity and stability testing. As reported in the REMCO meeting, the final revised text of ISO/WD Guide 80 "Guide on Quality Control Materials (QCMs)" had been submitted to the ISO/REMCO secretariat in July 2007.

5th Workshop of APMP/TCQM Gas Analysis Working Group was held on 22-25 May 2007 in Xian, China. 40 delegates from 8 different countries/economies attended the event. Prime objective of the workshop was to share information, knowledge and improve skills and know-how in gas metrology. The workshop divided into three sessions to cover topics on traceability in gas analysis, analytical techniques and skills for industry and environment, and quality assurance/control.

APMP/TCQM Symposium on Metrology in Chemistry was held on 13 June in China. Over 90 delegates from 15 countries/economies attended the symposium. Dr. Robert Kaarls of BIPM and experts from NIST, LGC, BAM, NMIA, NMIJ and NIM gave talks in the symposium. The main theme of the symposium was about building and improving national infrastructure for chemical measurements, issues including traceability and comparability, development of reference materials, CIPM MRA and inter-laboratory comparisons.

2nd APMP TCQM/ DEC workshop was held on 14-15 June in Xian, China. The objective of the workshop was to discuss the application of the "Guide to Creating or Improving a National Infrastructure for Chemical Measurement". The guide was drafted based on concepts and findings gathered in previous workshops and meetings held in 2006. The Guide had been approved by the APMP GA in December 2006 and published on the website. Six countries/economics including China, India, Indonesia, Malaysia, Thailand and Vietnam were invited to the workshop to present their national situation with respect to Metrology in Chemistry. Group discussions on how to identify national needs and develop each individual economy plan for the way forward were also held during the workshop. In the workshop evaluation, Dr. Besley, Australia reported that, generally, the Guide as well as the workshop was found to be very useful for economies starting on this process

Mr. Ma from China reported about the National Conference on Metrology in Chemistry which was held on 14-15 June. Over 60 attendees from China participated in the conference which provided a platform for technical exchanges on key techniques and quality assurance for food, environmental and herbal analysis.

Dr. Kim of KRISS reported on the 6th ACRM meeting held on 28 – 29 March 2007 in Busan, Korea. 32 delegates from the 3 relevant NMIs (KRISS, NIM, NMIJ) and government agencies attended the meeting. The progress reports of the three working groups which cover food & environment, gas and ROHS respectively were also presented. NMIJ will host the 7th meeting in Nagoya, Japan.

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Discussion of the procedure for CMCs claim/review

Dr. Lindsey Mackay of NMIA presented the procedure for NMIs to submit CMCs claim. She also briefed the meeting about the relevant requirements and the intra-regional review progress to be involved.

Progress Reports on TCQM Pilot Studies

- **APMP.QM-P10: Cadmium and Lead in Herb**
  Dr. Siu-kay Wong of GLHK reported that the study was running in parallel with CCQM-97 in which 12 NMIs and international organizations participated. For the APMP study, there were 11 participating NMIs and reference laboratories including KRISS, NIM, NPSL, NIMT, LIPI, TISTR, NPLI and NBSM.

- **APMP.QM-P11: Organo-arsenic in Swordfish**
  Dr. Kenji Kato of NMIJ reported that the study was co-ordinated by NIM and NMIJ, and was running in parallel with CCQM-96 "Total arsenic and arsenobetaine in swordfish". 3 NMIs (BAM, NIST and UME) participated in the CCQM study while the APMP study had 3 participants including KRISS, NPLI and DMSc (Thailand).

- **Proposed pilot study (CCQM-P109): Acrylamide in Potato Chips**
  Dr. Jin Seog Kim of KRISS introduced this new study which ran in parallel with the CCQM-P109. Samples have been prepared and their homogeneity was tested satisfactory. The stability test for the samples was scheduled for November 2007. Dr. Kim briefly discussed the GC-MS and LC-MS methods used for the analysis. NMI/DMI of Thailand, Sri Lanka, Indonesia, India and Singapore had indicated interest in participation:

- **Proposed pilot study (CCQM-P106): Metals in Polypropylene**
  Mr. Liandi Ma of NIM China presented the proposed study concerning the determination of cadmium, mercury, chromium and lead in polypropylene, which was conducted in parallel with a CCQM pilot study. Mr. Ma informed that this would be the first comparison for polymers and plastics in response to the implementation of the RoHS's directive around the world. Samples have been prepared and their homogeneity was tested satisfactorily.

Progress Reports on the following TCQM Key and Supplementary Comparisons

- APMP.QM-S1: "Comparison of primary standards of nitrogen in helium" by Dr. Kim of KRISS
- APMP.QM-S2: "Purity analysis of methane" by Dr. Kato of NMIJ
- APMP.QM-K4.1: "Ethanol in nitrogen" by Dr. Kato of NMIJ
- APMP.QM-K1.c: "Nitrogen oxide in nitrogen" by Dr. Kim of KRISS
- APMP.QM-K1.d: "Sulphur dioxide in nitrogen" by Dr. Kato of NMIJ

New TCQM Key Comparisons and Bilateral Comparisons

- Key comparison: Cadmium in Rice
  Dr. Jin Seog Kim of KRISS informed that the sample preparation for this new study completed in October 2007 and the protocol and samples will be delivered to the participating laboratories. As requested by some delegates to the TCQM meeting, KRISS agreed to run a parallel pilot study with this key comparison. NIM China and NIMT had indicated interest to participate in the key comparison, while NMI/DMI from Thailand (TISTR and DSS), Indonesia and Sri Lanka were interested to participate in the pilot study.

- Bilateral comparison between NMIJ and NIMT: Oxygen in nitrogen
  NIMT will provide calibration service for oxygen in nitrogen gas mixtures and O_2 analyzer at concentrations near atmospheric concentration in the coming few years. As a part of the collaboration between NIMT and NMIJ in the area of gas metrology, NMIJ proposed to organize bilateral comparisons between NMIJ and NIMT to establish the comparability between them for the determination of oxygen in nitrogen gas mixture. The nominal amount-of-substance fraction is set to be 0.20 mol/mol. The preparation of mixtures and preliminary verification measurement were completed by NMIJ in March 2008. The bilateral comparison started in April 2008.

- Preload standard absorption tube
  Dr. Zeyi Zhou of NIM China presented the study on the preparation of preload standard absorption tube for VOCs analysis. The standard tubes produced will be proposed as a national measurement standard for VOC analysis according to National Standard of Indoor Air Quality and National Regulation of civil building air quality in China. Dr. Zhou stated that the study on efficiency rate, repeatability, stability, homogeneity, and measurement uncertainty for the absorption tube standards had been completed and the results were all very promising. Dr. Zhou proposed conducting a co-certification exercise for the absorption tube standards. Japan and Korea mainly use gas cylinder standards for VOCs analysis.

Report on the 6th ACRM Meeting

Dr. Kim of KRISS reported that the meeting was held on 28 – 29 March 2007 in Busan, Korea. 32 delegates from 3 relevant NMIs (KRISS, NIM, NMIJ) and government agencies attended the meeting. Dr. Kim reported on the progress of the work of three working groups which cover food & environment, gas, and ROHS respectively.

PT Case Study

Mr. Liandi Ma of NIM China shared with the meeting the NIM's experience on improving the performance of local field laboratories through the proficiency testing (PT) scheme organized by them. The PT scheme was conducted in two phases. For those laboratories whose results were not satisfactory in the first round PT programme, NIM arranged a technical exchange meeting and provided CRM for further validation of their methods. Afterwards, a second round PT programme was organized

for these laboratories. The results indicated that most of the laboratories had improved their performance significantly. Dr. Besley of NMIA suggested that NMIs should consider organizing similar PT scheme with a view to improve the performance of the local field laboratories.

Future comparison programmes

- Pesticide residues in tea
- Food additives (sorbic acid, sodium benzoate) in curry paste
- Inorganic contaminants in food
- Comparison of gas standard

For pesticide residues in tea, ITI will review the list of regulated pesticide in Sri Lanka. For sorbic acid and sodium benzoate in curry paste, TISTR, Thailand informed that a candidate testing material is available and the stability test studies are in progress. To reduce the burden of the pilot NMI, the meeting suggested using tea as the matrix for inorganic contaminants. Dr. Lindsey Mackay remarked that NMIA will organize a proficiency testing on metals in prawn next year.

New Appointments

The General Assembly elected Yoshio Hino from NMIJ, YU Yadong from NIM and Chua Sze Wey from SPRING as new EC members replacing Akira Ono, G. Tong and HSU Chang and Siew Leng Tan, SPRING (TCL), Kenji Kato, NMIJ (TCQM), Mark Ballico, NMIA (TCT one year extension) as the new APMP TC chairs.

Future Meeting and Activities

- LIPI will be hosting next APMP GA and TCQM meeting in Jakarta, Indonesia from 3-7 November 2008.
- 8th ACRM Meeting, 23rd – 24th September 2008 in Lijiang China.
- 7th workshop of APMP/TCQM Gas Analysis Working Group in May 2008 in Nogaya, Japan
- General Assembly elected Malaysia as the venue for 25th GA in 2009.

Dr. Laly Samuel
MSL, New Zealand

AFRIMETS Amount of Substance Annual Report

General Report on Activities

An exciting development in the region was the expansion of the Regional Metrology Organisation (RMO) representing Africa from SADCMET to AFRIMETS. SADCMET was the RMO for Africa from 1999 to 2008. In July 2007, five sub regions, representing 36 countries in Africa (SADCMET, EAMET, MAGMET, SOAMET and CEMACMET) and Nigeria (not part of a sub-region), signed the Memorandum of Understanding to officially form the Intra-Africa Metrology System. Since then Egypt, Ethiopia and Ghana have also become members and AFRIMETS now represents 40 countries spread over the width and breadth of the continent.

The structures required for AFRIMETS to become a fully fledged RMO were established and in October 2008, the International Committee for Weights and Measures (CIPM), on the recommendation of the JCRB (Joint Committee of Regional Metrology Organisations and the International Bureau of Weights and Measures –BIPM), gave the final approval for AFRIMETS to take over the role of the RMO in Africa.

AFRIMETS promises exciting developments for metrology on the continent and a large number of activities have already taken place, with more planned for 2009. The most exciting development this year was the registration of the first four AFRIMETS comparisons in the fields of temperature, voltage, dimension and organic chemistry. At least 5 more comparisons are in the planning stages.

The enlarged capabilities of the new RMO will also allow the region to perform its own intra-regional Calibration and Measurement Capability (CMC) reviews. Until now, the SADCMET CMCs were submitted through APMP. The assistance of APMP will still be sought for those parameters where not enough expertise exists within AFRIMETS to perform the review, but it will be phased out over a period of a few years. AFRIMETS will therefore maintain strong links with APMP and build on its relationships with the other RMOs.

As the only NMI in the region participating in the CIPM MRA, the National Metrology Institute of South Africa (NMISA) still provides the link for the region to the international metrology community. Egypt and Kenya are now preparing CMC submissions and are also participating in international meetings and technical activities. Egypt is being assisted by EURAMET who organises comparisons to support NIS CMC claims. SADCMET, and specifically the NMISA, assists Kenya. A number of bi-lateral comparisons are currently being organised to support KEBS CMC claims in a number of parameters. Some comparisons have already commenced.

An AFRIMETS Metrology in Chemistry (MIC) working group was initiated by the first Chairperson of AFRIMETS MiC WG, Ms. Sara Prins from the NMISA.

Other highlights of the year include:

SADC SQAM Meetings

The SADC Standardization, Quality assurance, Accreditation and Metrology (SQAM) structures meetings were held in Cape Town from 5 to 10 May 2008 hosted by the South African Department of Trade and Industry (the dti). The meetings were attended by over 70 delegates from SADC member states as well as invited international SQAM experts and observers from all over the world. The purpose of the meetings is to review activities carried out by each structure during the past year and to plan for items to be addressed in the coming year.

SADCMET held its meeting on 6 May and it was attended by all its members and associate members. The meeting received reports from the Chairs of the Technical Committees who each gave highlights of the activities for the past year.

World Metrology Day 2008 poster

World Metrology Day posters, together with the circular issued by the BIPM on copyrights

of the poster, were distributed to all SADCMET members who used the posters during World metrology day commemorations.

Second General Assembly (GA) meeting of AFRIMETS

The second GA meeting of AFRIMETS was held in Tunisia from 1-4 July 2008. The meeting was superseded by an Executive Committee meeting and a MAGMET workshop in Metrology. The GA was attended by over 50 delegates representing most of the member states of AFRIMETS, representatives from the PTB (Germany), EURAMET, LNE (France), the BIPM, the African Committee for Metrology (CAFMET) and the Arabic Forum for Metrology. The PTB and LNE became the first Associate members of AFRIMETS and EURAMET, CAFMET and the Arabic Forum became the first Observer members.

Kenya – CCQM Chemical Workshop

The Kenya Bureau of Standards (KEBS) hosted the 1st International Seminar on Metrology in Chemistry in Kenya during August 2008. The seminar was led by Dr Bob Kaarls, the secretary of the CIPM and president of the Consultative Committee of Amount of Substance (CCQM), and Dr Willie May, Director of the Chemical Science and Technology Division at NIST (USA). Dr Wynand Louw (the Acting CEO of the NMISA and AFRIMETS Chair) and Sara Prins were also invited to participate as facilitators and presenters at the seminar. The 2-day seminar was attended by ~60 local and ~10 other-African delegates, with introductions to metrology in chemistry by Drs Kaarls and May. Dr Louw introduced AFRIMETS, while Ms Prins discussed the efforts of the NMISA to establish a Metrology in Chemistry group. The active participation by both facilitators and attendees caused a successful seminar including the identification of specific focus areas for the development of Metrology in Chemistry in Africa.

Wynand Louw and Sara Prins then visited the chemistry facilities at the Kenyan Bureau of Standards (KEBS). KEBS is in the process of establishing a MIC facility and discussions were held on best practises and possible future collaboration between the MIC programme at KEBS and the MIC programme at NMISA. A first bi-lateral activity was identified to assign a value for a wheat flour sample that is being used for a proficiency testing exercise in East Africa.

SADCMET EU Project

In 2005 the Southern African Development Community (SADC) signed a financing agreement with the European Community (EC) to fund the SADC Standards, Quality, Accreditation and Metrology (SQAM) programme with an amount of €14.2 million. The SQAM Support Programme is a concrete outcome of the joint EC-SADC efforts to closely link trade and development. It is also an important contribution that is purposed to assist SADC economies to make full use of the opportunities of the Economic Partnership Agreement (EPA), currently under negotiation with the EU both in terms of facilitating inter regional trade as well as trade with the European Union.

The overall objective of the SADC SQAM Programme is to support trade and investment, enhance the protection of consumers and improve the competitiveness of suppliers of products and services in SADC Member States. The purpose of this programme is to contribute to the development and implementation of a regional policy on technical regulations and the establishment of a more effective, efficient and functioning trade related SQAM support infrastructure. This will strengthen existing SQAM capacities within Member States and at SADC level. The programme is designed to provide technical assistance and training as well as equipment to SADC SQAM infrastructures. In addition, SADC SQAM institutions will be linked with their European counterparts for specific awareness, training and cooperation activities.

For SADCMET, the project will focus on four metrology parameters judged to be the most basic for trade and testing purposes. These include mass, volume, dimensional and temperature, and an amount of €2.3 million has been allocated for this thrust to cover selective upgrading and acquisition of equipment, technical training and training in quality management systems. Although not directly applicable to MIC in the region, the training in mass, volume and temperature will indirectly impact the accuracy of mass, volume and temperature measurements in chemical laboratories in the region.

SADCMET Water Testing Laboratories Proficiency Scheme

SADCMET has been running a water-testing proficiency scheme for the past four years focusing on the chemical analysis of water. From this year the PT system has been extended to microbiology analyses and in this respect, the Uganda National Bureau of Standards was appointed to be the pilot lab for the microbiology water analysis. The result evaluation workshop took place in Kampala, Uganda during the second week of December 2008. The reports of the previous Water PT are available on the SADCMET website on www.sadcmet.org

Specific MIC activities at the NMISA

The metrology in chemistry laboratories at the NMISA are currently the only laboratories in Africa operating at the CCQM level. The laboratory therefore plays a leading role in providing advice to other countries in Africa that are establishing MIC facilities.

A few of the activities at the NMISA the past year include:

Metrology in Organic Chemistry

Often the methods prescribed in EU regulations are not readily available or accessible in SA, due to the high cost of the equipment, cost and availability of reference materials for the methods, or the high level of specialisation required to operate the equipment and validate the methods. The Organic Group at NMISA develops and validates equivalent methods on instruments widely available in laboratories in South Africa. Supporting food safety, the laboratory validates two independent methods for the value assignment of Ochratoxin-A in wine. An automated method has been developed to improve the reproducibility of the extraction.

A similar approach is being followed in the analysis of Persistent Organic Pollutants (POPs), to assist South Africa in fulfilling the requirements of the Stockholm Convention. The laboratory has developed and optimized

novel methods for the analysis of chlorinated pesticides, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), dioxins, furans and brominated flame retardants (BFRs), using specific column technology and isotope dilution mass spectrometry. This has lead to a collaborative project with the University of Liege, Belgium and the South African Police Forensic Science laboratory in the analysis of contaminated soil samples, collected in SA, extracted in Belgium and sent back to SA for comparative analysis at the forensic laboratories. This has enabled NMISA to compare results obtained with a high level instrument in Belgium. These developments are now playing a major role in the national effort with the University of Limpopo (situated jn northern SA), the University of Pretoria and UIS Analytical Services to determine the cause of a crocodile-dying pandemic in the National Kruger Park.

The Biofuel Initiative is progressing well, and a technique developed has proven very successful for the estimation of the concentrations of Fatty Acid Methyl Esters (FAMEs) in different biodiesel sources. FAMEs are one of the possible ways to fingerprint biodiesel, an important capability in ensuring that the proposed tax incentives for biodiesel can be implemented successfully.

Chemical Certified Reference Materials (CRMs): The NMISA continued to support the South African industry with the sale of CRMs and primary reference mixtures. There was a significant increase in the orders for both the organic solutions (aqueous ethanol and sodium fluoride) that are used in blood alcohol analysis, and special gases.

Measurement standards for the Food industry

Efforts to establish a chemical speciation facility at the NMISA was boosted by the Metrology in Chemistry group's first participation in a speciation international comparison - CCQM-P86.1: selenomethionine in wheat flour and yeast. Selenium is an essential element, and its bio-availability is higher in the speciated than elemental form. Speciation capability will assist in studies on bio-availability of elements as well as toxic determination (eg Hg and Cr are toxic in certain forms).

The Inorganic laboratory's scope was also expanded significantly and discussions were initiated to explore alternative ways (technique accreditation) for accreditation of the chemical laboratories to better serve the South African food industry.

Following on the 'Food Safety 2010' seminar in Cape Town South Africa, the MIC group had met with the Consumer Goods Council's Food Safety Initiative to explore ways to provide traceability for critical measurements in the South African food industry. A number of areas where the NMISA can contribute have been identified, one of the most critical being the requirement for matrix certified reference materials. The MIC group has already established its analytical capability in this field by participating in several food related international comparisons over the last number of years, for example Sn, Pb and Cd in tomato paste; Fe, Zn, Cd, Pb and Cr in bovine liver; and Chloramphenicol in milk.

Gas Standards for Industry

The laboratory expanded their offerings under the Guide 34 (Preparation of Reference Materials) to 7 primary reference mixtures that can now be supplied to gas manufacturers in South Africa.

Participation in International Comparisons

SADCMET (NMISA) participated in 10 comparisons in metrology in chemistry during 2008. A list of the comparisons is supplied below. In addition, three AFRIMETS comparison are being planned in the fields of organic and inorganic chemistry.

Futeure Meetings

Various MIC activities are planned in Africa during 2009. MIC workshops will be held in South Africa in conjunction with the 3rd General Assembly meeting of AFRIMETS from 13-16 July 2009. Participation of experts in MIC from other regions will be most welcome. All interested parties can contact Sara Prins at SPrins@nmisa.org.

The venue for the GA is the Mabalingwe Private Game Reserve just north of Pretoria, see: www.mabalingwe.co.za.

Dr. Wynand Louw
Mrs. Jayne de Vos
NMI, South Africa

List of International Comparisons that NMISA participated in or started

No	International Number	Laboratory	Description
1	CCQM-P73	Gas	Gravimetry: 30 to 70 ppm NO in nitrogen
2	CCQM-K52	Gas	360 ppm CO_2 in air
3	CCQM-K53	Gas	Gravimetry: 100 ppm O_2 in N_2
4	EUROMET 900a	Gas	5 ppm CO in nitrogen
5	CCQM-K51	Gas	5 ppm CO in nitrogen
6	BIPM.QM-K1	Gas	Ambient level ozone
7	CCQM-P90	Organic	CAP in Milk
8	CCQM-K56	Inorganic	Ca, Fe, Zn and Cu in Whole Fat Soybean Powder
9	AFRA IV-12	Inorganic	Research Reactor Programme for Socio-economic Development, Trace elements in nutrition additives, medicinal plants and food materials
10	CCQM K-67	SAM	The quantification of Fe-Ni alloy films

Reports of International Organizations

SIM Liaison report

SIM Chemical Metrology Working Group Meeting was held in San Pedro Sula, Honduras, on 1-2, October 2008, in conjunction with SIM General Assembly Meeting. Participants were from Argentine, Brazil, Uruguay, Chile, Canada, Mexico, USA, Trinidad & Tobago, St. Kitts and Nevis, Jamaica, Ecuador, Colombia, Costa Rica, Dominican Republic, El Salvador and Honduras. Also present were Dr. Robert Kaarls, President of CCQM and Mr. Ulf Hillner of the Office Technical Cooperation of PTB.

Several regional issues were discussed, including CMWG Strategic Planning, which consisted of brief presentations on current state of Chemical Metrology Programs within each SIM economy, grouped into three needs-based CMWG Subgroups, and discussions on how to better address the varying needs of SIM countries with Chemical Metrology Programs that are at different stages of development.

Based on the discussions from each of the Subgroups as to action items, recommendations, agreements and plans, the conclusion was drawn to organize some comparisons, which could be defined as SIM CMWG Key Comparison (with potential parallel Pilot Study). As a part of Sub group-I work program there are:

- Ethanol in Aqueous Matrix, coordinated by INMETRO beginning on November 2008
- Trace elements in potable water coordinated by NRC, its protocol to be presented on May 2009
- Report on homogeneity and stability study on meat by INTI by May 2009

Additional activities for training will be organized by LATU, Uruguay on measurement uncertainty for SURAMET and ANDIMET, specially designed for the participation of Subgroups II and III.

Ulf Hillner informed on the up-coming IAAC course on Organization of Proficiency Testing, which was scheduled to hold in Mexico on 19-21 November. Ideas about the possible Joint APMP/SIM 2-week School on Chemical Metrology were announced.

It was decided, in conjunction with the next SIM Chemical Metrology Working Meeting in May 2009, to have a half-day awareness seminar, as well as a workshop on how to identify and prioritized needs, requested by Subgroup III, for which a guide document elaborated by APMP will be circulated. A workshop on the comparison results on Ethanol in Aqueous Matrix is scheduled for the participants. The date and venue will be defined later.

It is also scheduled to hold a CMWG meeting in October, where workshops on uncertainty estimation in chemical measurements and how to get governmental financial support will take place.

Dr. Yoshito Mitani
CENAM, Mexico

Update on ISO/REMCO

The 31st Meeting of ISO/REMCO was held in Rio De Janeiro, Brazil, from 10–13 June 2008 and was hosted by the National Institute of Metrology, Standardization and Industrial Quality (INMETRO). ISO/REMCO now has 69 members of the International Organization for Standardization (ISO) and liaison with 20 international organizations and 6 other ISO committees. The liaisons are very important for the implementation of ISO/REMCO's work program. Most of the documents of ISO/REMCO directly affect work in other (international) organizations. It is important that work is not duplicated, and where possible resources are shared to obtain the best results. For this reason, ISO/REMCO has given a stronger mandate to its Steering Group SG1 'International Coordination & Communication' convener (Ales Fajgelj) to ensure good communication.

The assignments of both representatives and deputies to these liaison committees were also reviewed.

ISO/REMCO has an established work program. Main activities for 2008 and beyond include:

- complete revision of the vocabulary (ISO Guide 30, 1992), by extensive consultation with other liaison organizations;
- a complete revision (following on from a systematic review), of the guide on certificates, labels, and reports (ISO Guide 31, 2000);
- complete revision of the guide on the use of certified reference materials (ISO Guide 33, 2000);
- submission of the revised guide on quality systems of reference material producers for voting (ISO Guide 34);
- development of a new guide for the production and use of reference materials for metrological quality control (ISO Guide 80);
- development of an introductory document 'Guide to the Guides';

- development of a guidance document for the production of CRMs for qualitative analysis;
- further study into the matter of 'metrological traceability', in particular how the concept is expressed on CRM certificates and related communications.

The Technical Report on RM classification (ISO/TR 10989) has been approved and published.

During the REMCO meeting a draft "Guide to the ISO/REMCO Guides" was reviewed and discussed. The present ISO/REMCO Guides 30–35 provide an in-depth treatment of specific aspects. A general guidance document is deemed advantageous for users and potential producers of RMs, who may be unfamiliar with the role of RMs and CRMs in measurements, or who understand the roles of these materials, but are unfamiliar with the classification and use of the ISO/REMCO guides. The key requirement for this document is that it must be freely available to allow users to make informed and considered decisions, and therefore a new draft will be produced with this mandate.

REMCO has also noted that CRMs for qualitative analysis are growing in number and importance. For the authentication of food or microorganisms, the fight against doping in sports, the control of pesticides and residues in foodstuff, and many other analytical tasks are these CRMs very important. But so far, guidance on the production and use of RMs has been mainly focused on RMs/CRMs for quantitative measurements. A gap analysis review by a REMCO Ad-hoc Group established in 2007 has confirmed the need for RM guidance in this field, and this group has now been formally established as a REMCO Working Group.

Regarding REMCO's committee structure, several of the current Working Groups (WG) have been reassigned between SG1 and SG2 ('Technical Guidance'). WG6 has been renamed 'Information Services' with the remit to provide marketing communication support to the convenor of SG1. An ad hoc group to investigate the feasibility of preparing a Technical Specification on the establishment of metrological traceability and its statement on CRM certificates and related communications has been formed. Moreover, ISO/REMCO agreed to appoint Hendrik Emons (EC-JRC-IRMM) to be the next REMCO chair for the period 2009-2011 and the ISO TMB has meanwhile confirmed his appointment. Angelique Botha (South Africa) will serve as new REMCO Vice Chair.

The next ISO/REMCO meeting will be held in Teddington, UK (3-7 July 2009) in conjunction with BERM-12.

Dr. John P. Hammond
Starna Scientific Ltd., UK

Prof. Hendrik Emons
EC-JRC-IRMM, Belgium

Improvement of COMAR database

COMAR, the international database for certified reference materials (CRM) has been improved by BAM for the benefit of CRM users and producers worldwide.

The usefulness of reference materials (RM) is beyond question. RM provide "measurement benchmarks" for materials testing and chemical analysis and ensure reliability and worldwide comparability of measurements in these fields. The use of RM is a basic requirement for quality assurance. In addition CRM are very important for establishing traceability, especially in chemical analysis.

Even in the age of web based technologies and services finding a proper reference material is a demanding task especially for newcomers or for new kinds of materials. The best choice is to use reference material databases that collect data from several RM producers and provide information in a uniform way. COMAR has been established to help laboratories to find the proper CRM needed. The database gives information on the worldwide availability of certified reference materials.

BAM has recently improved COMAR in order to make searching in COMAR more simple and target-orientated and to make the process of updating data more efficient.

New COMAR features for improving the search are:

- The search for a particular molecule name now results in all CRM hits referring to the same CAS (Chemical Abstracts Service) number, whatever molecule name was used for data input by the producer for the CRM descriptions. This is accomplished by using CAS numbers rather than specific molecule names in the internal search process. This helps to find a complete list of CRM hits for a specific compound in spite of the diversity of names as is usually found in chemistry.
- The "CRM description field" has been extended to 1000 characters to allow more CRM information to be entered. The description field allows a simple string search and is therefore an important and easy-to-handle tool.
- A new search tool "matrix search" has been added, both as a separate tool or in combination with the search tool "chemical composition". This is a

significant improvement to aid finding a proper matrix CRM. Matrix CRM are key to major fields of analytical applications (e.g., environmental chemical analyses). Currently the new search tool has not yet been released. Prior to its release, a substantial part of the existing COMAR CRM entries have to be assigned to the new catalogue of matrix keywords supporting the search. The assignment process will take some time. COMAR will announce the release of the new search tool on the COMAR website.

For the matrix categorisation COMAR uses a list of matrix keywords recently developed by ISO REMCO (ISO's Committee on Reference Materials) as part of the ISO Technical Report 10989 "Categorization of reference materials – Guidance on, and keywords used for RM categorization".

- The new combination of the search tool "chemical composition" with the search in the "CRM description field" makes handling much easier and allows for more carefully targeted queries.

The database is maintained in a cooperation of 20 national or international institutes. COMAR contains information on about 11 500 CRM from about 220 reference material producers in 25 countries. Keeping the data up-to-date requires a huge effort by the cooperating institutes.

Closer involvement of RM producers in the update

The new COMAR version (released in March 2008) allows closer involvement of the various CRM producers in the update process. A new level of COMAR update rights has been created that can be assigned to individual CRM producers. In the past COMAR was operated using update rights of only country wide validity assigned to the cooperating national or international institutes. The new level of update rights allows the COMAR partners to share the burden of data updating with the affiliated CRM producers. That helps to make COMAR updating more efficient and aims

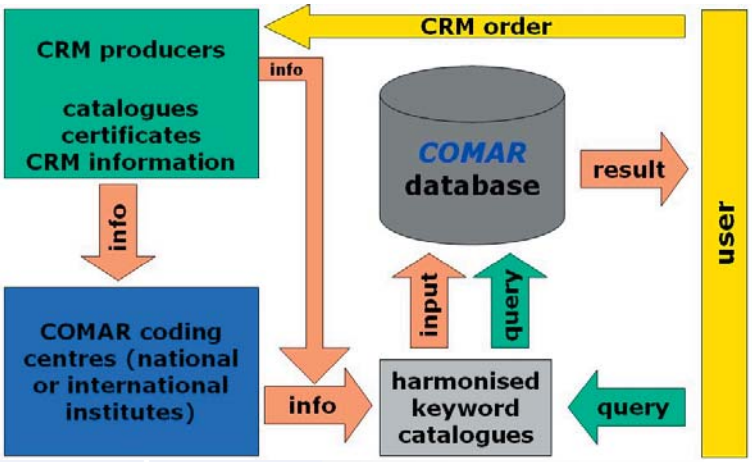

Fig. 1. The COMAR management now allows for direct RM producer data input

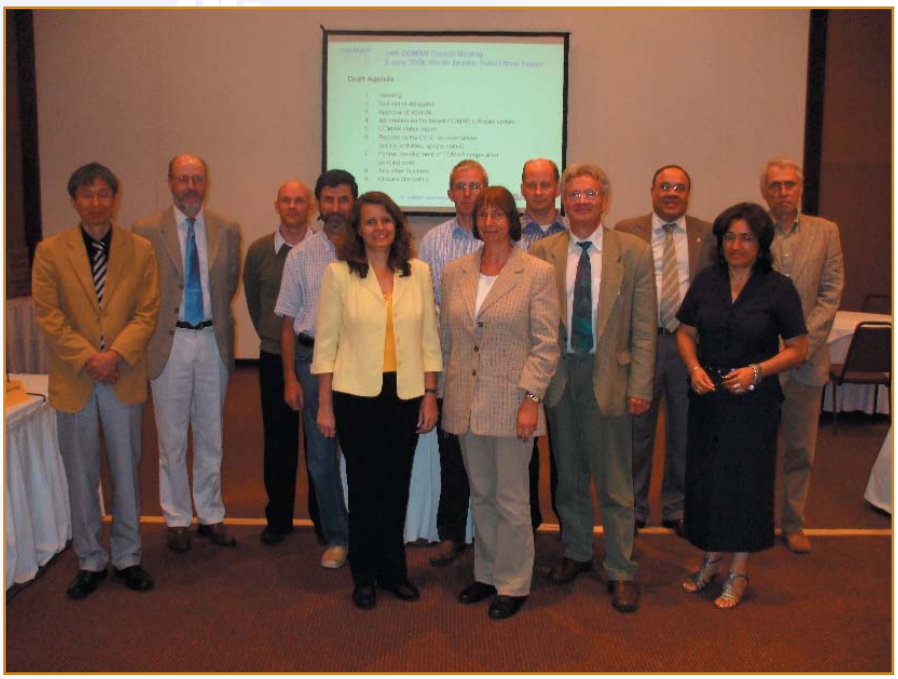

Fig. 2. Participants of the 14th COMAR council meeting, Rio de Janeiro, 9 June 2008

providing of current CRM information. The COMAR data management is shown in Fig. 1.

COMAR council meeting

At the last COMAR council meeting that was held in connection with the ISO REMCO meetings in Rio de Janeiro in June 2008 (see Fig. 2), there was agreed an amendment to the Memorandum of Understanding (MoU) that reflects the revised update right handling. With reference to the efforts necessary to keep their CRM entries up-to-date, NIST resigned from the COMAR cooperation in April 2008. For information about their reference materials NIST refers to the own RM website.

Considering the importance of current information on available RM the COMAR council agreed on actions for cancellation of not updated database entries.

Demand and Access

The demand for information about available CRMs is still growing in parallel to the ever

increasing number of chemical and biochemical measurements. Among other producer overarching databases [1 - 3], COMAR has been a key source of information on the worldwide availability of CRMs, covering a broad scope of application fields. The use of COMAR is free of charge and the number of COMAR users, logins and search results displayed has been growing for years (see Fig.3).

The recent improvements of COMAR are intended to meet this challenge now and into the future. CRM producers interested in entering their CRMs into COMAR are invited to contact the national COMAR partner or the COMAR central secretariat at BAM (for contact points see the COMAR website at: www.comar.bam.de). Interested CRM producers should comply with the quality requirements of the relevant ISO guides (ISO Guides 31, 34, and 35).

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1. Virtual Institute for Reference Materials (VIRM), http://www.virm.net/.

2. European Reference Materials (ERM®) http://www.erm-crm.org/.

3. Reference materials total information service of Japan (RMinfo) http://www.rminfo.nite.go.jp/english/index.html.

Dr. Thomas Steiger and Ms. Rita Pradel
COMAR Central Secretariat
BAM
Germany

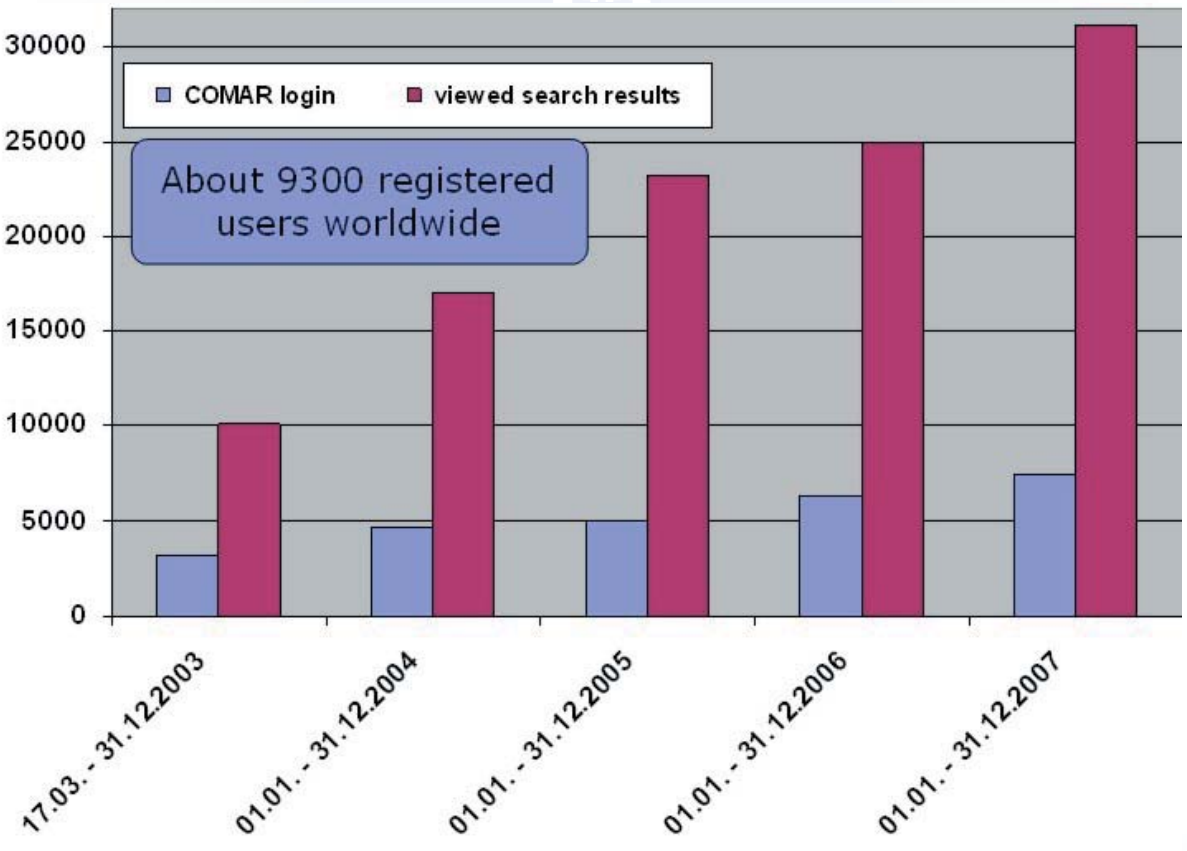

Fig. 3. Access to COMAR: There are currently about 650 user logins and 2 600 displayed search results monthly

Important Papers on MiC in 2008

The Application of Uncertainty to USP's Compendial Reference Standards Program: Certified Reference Materials


Shawn Dressman


William F. Koch


Ronald G. Manning


Steven Lane


Walter W. Hauck


Roger L. Williams

USP provides comprehensive, practical, relevant, and timely documentary standards and reference materials (RMs) to help ensure the strength, quality, and purity of medicines (drugs, biologics, and excipients) and foods (dietary supplements and food additives). As part of its public health mission to establish useful pharmaceutical standards based on the best possible science, USP intends to develop RMs as Certified Reference Materials (CRMs).

An overview of metrology concepts as they relate to USP's standards; a history of and description of USP's RM collection; value assignment decisions of USP's Reference Standard Expert Committee (RSEC); and scientific issues and opportunities are discussed in reference [1]. The development of USP CRMs results from increasing national and international acceptance of modern metrological principles and approaches. The United States Food and Drug Administration (FDA) and manufacturers of medicines and foods are increasingly adopting ISO approaches to establish and maintain laboratory quality systems that meet the requirements of ISO 17025 [2]. FDA's new guidance on GMPs reflects ISO 9001 approaches, and FDA's Office of Regulatory Affairs (ORA) laboratories are adopting ISO 17025 standards for the Competence of Testing and Calibration Laboratories [3]. USP's Rockville, MD, headquarters and India laboratories are both ISO 9001 certified and accredited to ISO 17025 (see authors' notes). ISO 17025 includes sections on traceability, uncertainty (uncertainty should be properly estimated), quality control (each result should be demonstrably valid within its stated uncertainty), requirements for periodic proficiency testing (ISO Guide 43, Parts 1 and 2) and the need for and use of CRMs [2].

According to ISO, an RM is a material that is sufficiently homogeneous and stable with respect to one or more specified properties and has been established to be fit for its intended use in a measurement process for value assignment (ISO Guides 30 and 31). RM properties can be quantitative or qualitative and can be used only for specific purpose(s) in a given measurement. Uses may include the calibration of a measurement system, assessment of a measurement procedure, assigning values to other materials, proficiency testing, and quality control. A CRM is an RM that is characterized by a metrologically valid procedure for one or more specified properties and is accompanied by a certificate that provides the value of the specified property and its associated uncertainty. A CRM is a means for establishing trueness and traceability to the measurement system, thereby enabling consistency and comparability of measurements and results over periods of time and among laboratories. Traceability is the property of a measurement whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty [4]. The general framework for certifying reference materials is discussed in ISO Guides 30–35 [5]. ISO Guide 34 provides an elaboration of various ways in which this traceability can be achieved, including the inter-laboratory approach described in this paper. Metrologically valid procedures for the production and certification of reference materials are given in, among others, ISO Guides 34 and 35. ISO Guide 31 gives guidance regarding the contents of certificates. Guide 34, amended in 2003, specifically addresses requirements for the competence of reference material producers.

PILOT STUDY

USP executed a pilot study on five candidate RMs. Following blending of bulk candidate RM, candidate RMs were subdivided and packaged into standard vials. Samples were pulled from early, middle, and late portions of the packaging run for testing by three collaborative USP-qualified laboratories that followed a common test protocol. Results were analyzed for content, homogeneity, and uncertainty. Measurement uncertainty was determined according to ISO Guide 98 [6]. The mass balance approach was used to assign property values, i.e. mg of analyte/mg of material = (100.0% – Total Chromatographic Impurities% ÷ 100) · (100.0% – ROI% ÷100) Where ROI% = percent residue on ignition. Impurities were determined by compendial high-performance liquid chromatographic (HPLC) procedures expressed as a percentage of the total detectable area and techniques such as Loss on Drying (LOD) <731>, Water <921>, Residual Solvents <467>, and Residue on Ignition <281> for the candidates, according to the USP–NF.

UNCERTAINTY CONSIDERATIONS

Uncertainty in the assigned value of a USP RM becomes part of the total uncertainty

of a laboratory's assignment of value to a measurand in a given sample or product (e.g., quality control). The uncertainty contribution of the CRM must be small with respect to the total uncertainty so that it is not the dominating factor. The test accuracy ratio (TAR) or test uncertainty ratio refers to the maximum allowed error and is expressed as the ratio of the ± limits of the acceptance interval to the expanded uncertainty. For example, if an active pharmaceutical ingredient (API) monograph acceptance criteria are 98.0%–102.0%, the acceptance interval is ± 2%. A 4:1 ratio means the expanded uncertainty of the RM needs to be less than one-fourth of 2%. Thus, the maximum allowed error is 0.5% for 100.0% ± 2%. A TAR of 4:1 is most commonly used and is USP's choice.

Figure 1 shows the probability of a failing result with acceptance criteria of 98.0%–102.0%, a worst-case error in the CRM, and a laboratory coefficient of variation, CV = 0.5%. The ideal case would be the bottom curve where there is no error in the assigned value for the USP CRM. As the TAR ratio increases, the closer the ideal (no USP error) is approached. This is illustrated in Figure 1 by TAR 8:1 and TAR 4:1.

RESULTS AND DISCUSSION

The pilot study results are summarized in Table 1. (p.24) The expanded uncertainties were extremely low, which is not unexpected since these USP's RMs are highly purified chemicals drawn from pharmaceutical production. The TAR of 4:1 is clearly met, and one could argue that the contribution of the CRM to the total

measurement uncertainty is negligible or insignificant. The USP CRM Certificate of Analysis includes the certified values for the material, demonstration of the traceability of the values to an SI unit of measure, expression of the uncertainty of the certified value, and an explanation of how the certified values and uncertainties were measured. USP is aware, however, that some of its RMs exhibit comparatively greater uncertainty: e.g., some potency standards are defined by a unit of activity, as is the case for enzymes and antibiotics. This observation, however, does not yield a conclusion about what uncertainty is small enough. It may be that—as with many acceptance criteria—an a priori decision will be useful in determining what is small enough, e.g., a 4:1 TAR approach. This would yield a quality boundary for USP's RM collection. If the a priori limit were to be exceeded, USP would do additional studies to assure the public that an RM uncertainty would not be greater than the specified amount. When the uncertainty is likely to be very low, USP could design smaller multi-laboratory studies than would be needed for candidate RMs with higher expected uncertainty.

At times, quality control laboratories may qualify secondary standards to primary national or international standards. When this occurs, the uncertainty of the secondary standards includes the uncertainty of the primary standard.

Thus, the uncertainty of the secondary standard is larger than that of the primary standard. Because the uncertainty is based on a confidence interval, this uncertainty may be overcome with increased testing.

SUMMARY

USP's strategic plan emphasizes accelerating introduction of new RMs in pace with monograph development and maintaining the quality of RMs that are currently available. The quality of a USP RM is evaluated and expressed by the provision of information discussed in this article. The scientific aspects of this information are the responsibility of the RSEC of the Council of Experts—and of the entire USP Council of Experts—working with USP scientific staff. A consensus has developed in the RSEC that these approaches are sound. This article reflects that consensus and articulates a scientific way forward for USP to offer CRMs in accordance with ISO Guide 34. Although further experience will be beneficial, the pilot study has concluded, and the five articles studied have been placed in commerce without publication of uncertainty values. USP will continue to apply the new approach with selected additional candidate materials, thus allowing the pilot approach to become increasingly routine. Beyond this publication, staff will advance further needed communications and training: e.g., the Prescription/Nonprescription Stakeholder Forum may wish to consider a Project Team devoted to the topic. USP has not concluded an approach that will make available a certificate required for a CRM. This has important implementation aspects that require careful staff consideration. Pending implementation of a certificate, the public will not know which RMs offered by USP have the requisite testing that would support a CRM. For this reason, USP intends rapidly to advance consideration of a certificate. Overall, USP's advances in ensuring the quality of its RM collection are intended to align with regulatory and manufacturing approaches to ensure that patients and practitioners have available official articles (ingredients and products) of the most optimal and relevant quality.

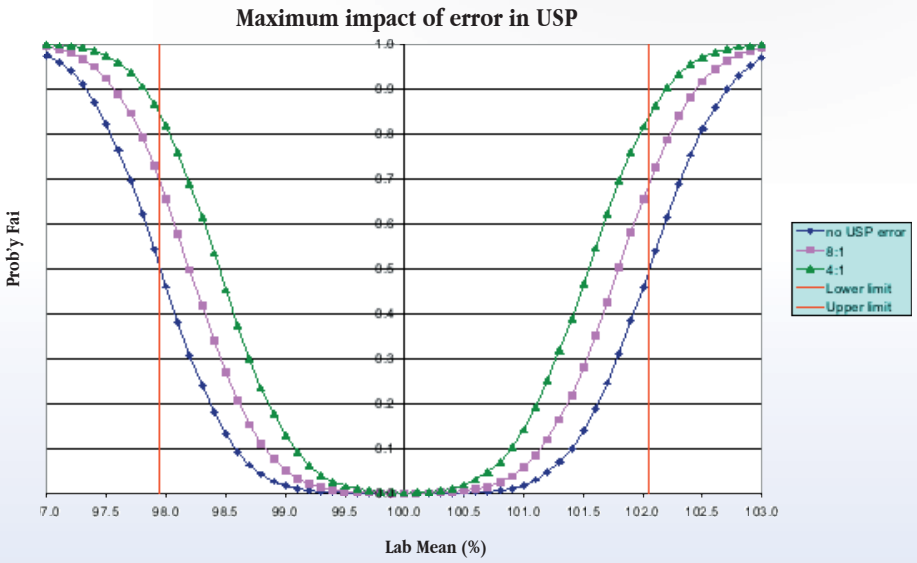

*Figure1: **Probability of a failing result with a worst-case error in the CRM (CV = 0.5%)***

Table 1. **Total Expanded Uncertainties in Comparison to the Associated Monograph Acceptance Criteria**

	Certified Value (mg/mg)	Methods in Certified Value Calculation	Total Expanded Uncertainty (mg/mg)	Monograph Acceptance Criteria	Uncertainty as Percentage of Monograph Assay Range
CRM 1	0.997	HPLC impurities, LOD	0.0006	98.0%–102.0%	3%
CRM 2	1.000	HPLC impurities, ROI	0.0005	98.0%–102.0%	3%
CRM 3	0.999	HPLC impurities, ROI, LOD	0.002	98.0%–102.0%	10%
CRM 4	0.997	HPLC impurities, ROI, LOD	0.002	90.0%–110.0%	2%
CRM 5	0.939	HPLC impurities, ROI, Residual Solvents, Water	0.004	945 μg/mg–1030 μg/mg	13%[a]

[a]Using symmetrical acceptance criteria of 970 μg/mg –1030 μg/mg to calculate percentage.

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AUTHORS' NOTES

This article is a summary and update of the CITAC Award winning paper published by the authors in *Pharmacopeal Forum* (2007) 33:2-14, that is available at http://www.usp.org/pdf/EN/USPNF/Vol33No6Stimuli.pdf accessed 16 December 2008.

Membership for the Reference Standards Expert Committee can be found in the original article. USP's Rockville, MD, headquarters is ISO 9001 certified, and accredited to both ISO 17025 and ISO Guide 34 as a Reference Material Producer of Chemical CRMs. USP's India and China laboratories are also both ISO 9001 certified, and accredited to ISO 17025. USP's first CRM, Dextromethorphan Hydrobromide, was released on 23 September 2008. The certificate of analysis is available at http://www.usp.org/pdf/EN/referenceStandards/certificates/1181007-K0F118.pdf, accessed 16 December 2008. USP's responses to comments the Pharmacopeial Forum article can be found in Reference 4.

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Essential for Metrology in Chemistry, but as yet unachieved: intercontinentally understood concepts and associated intercontinentally agreed terms

Introduction

Metrology is the "field of knowledge concerned with measurement"[1] , and "... includes all theoretical and practical aspects of measurement, whatever the measurement uncertainty and field of application" [1] whereby measurement is understood as a "process of experimentally obtaining one or more quantity values that can reasonably be attributed to a quantity" [1]. These definitions set the scene to think about concepts and terms used in all measurement, hence also in any chemical measurement. All measurements have fundamentally identical conceptual foundations, but the use of the results may be situated in many and very different applications.

It is useful to think about the ultimate reasons to perform measurements:

a) to go from qualitative knowledge (something is larger, taller, bigger, ... than something else), to quantitative knowledge (something is so many times larger, taller, bigger, ... than something else) which carries much more information, and
b) to communicate about the magnitude of the quantities[1] we use in
   - describing our observations of nature,
   - carrying out our scientific experiments using measurements.

In communication between parties, a language is needed as vehicle for the ideas we want to exchange. When measurement results are involved in such language, concepts about measurement are needed which are understood in the same way by all parties concerned. Commonly - which nowadays means intercontinentally - agreed terms in one language are then necessary, 'labeling' these concepts. They are the tools in the writings we use in relations with border-crossing nature. Such a set of intercontinentally agreed terms is the only conceivable base for translation into necessarily different terms in other languages, 3-4 or more. In addition, we also need to talk clearly to ourselves in the first place, in order to precisely formulate our thoughts. There too, clarity is of the utmost importance. Lack of clarity in conceptual thinking about measurement and all its features, does not only generate unclarity of the text we write. Lack of clarity in our writings also influences unwillingly the clarity of our thinking.

We have several languages available to communicate about measurements and their results: mathematical equations, pictures and sentences. All three need adequate tools to carry out that task: symbols, pictogrammes and terms. These tools must mean the same to all on the intercontinental scene. Pictures are readily understood, usually better than texts. Symbols are also understood rather well, especially in mathematics, physics and chemistry. Indeed, some of the oldest and most needed commissions of the International Union of Pure and Applied Chemistry (IUPAC) and the International Union of Pure and Applied Physics (IUPAP) aim at a common understanding of symbols (as well as of nomenclature, units and some terminology):

- SUNAMCO (Symbols, Units, Nomenclature, Atomic Mass Committee) in IUPAP;
- ICTNS (Interdivisional Committee for Terminology, Nomenclature and Symbols) in IUPAC.

Basic and general terms for measurement have been systematically addressed in the "International Vocabulary of Basic and General Terms in Metrology", in its first edition VIM1[2] [2], in its second edition VIM2 [3] and in its thoroughly revised edition VIM3 [1], henceforth called "International Vocabulary of Metrology – Basic and General Concepts and Associated Terms, VIM edition 3".

On the global scene of the 21st century, agreement across borders is needed on the definitions of the common concepts (with their associated terms) we use in border-crossing relations.

"Objects, concepts, designations, and definitions are fundamental to terminology ..." [4] and "concepts are not to be confused with abstract or imagined objects (i.e., we observe concrete, abstract or imagined objects in a given context, conceptualise them in our minds and then attribute a designation to the concept rather than to the objects themselves" [4]. The best way to achieve this is to define a concept for use in our thinking, in an international vocabulary and assign a specific term to each concept. Such a VIM has been available in the first and second editions for 23 and 13 years, respectively. It was used very little in the chemical measurement community at large with the exception of the clinical measurement field which is probably 10-15 years ahead of any other domain in chemistry [3], and in more refined physico-chemical and purely 'metrological' measurement laboratories. They were thought to be applicable only in 'high metrology' where more significant digits were being pursued in a measurement result for academic reasons, rather than being pushed by daily practice. That is certainly true in that one field of measurement which is chemistry: many new measurement methods were developed in chemistry during the last few decades, and some of them have a profound societal impact such as advanced biochemical, clinical, and DNA measurements. A common vocabulary for all of them, is essential for world-wide communication.

At the end of the 20th century, several reasons became apparent for a fundamental revision of VIM2:

a) our thinking about measurement had evolved because of deeper insight in the process of measurement, especially in

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chemical measurement; that required the definitions of basic and general concepts to be widened to accommodate these deeper insights; the meaning of the terms representing these revised concepts, had to be reviewed accordingly;

b) the need for a VIM to fully encompass chemical measurement; VIM1 and VIM2 were mostly written for physics and engineering by mostly physicists and engineers;
c) the explosive development in the last 20 years of biochemical measurements and their various applications such as measurement of 'biological activity' and DNA measurements, had to be covered by the definitions of basic concepts in measurement;
d) ISO Guides and Standards were –and still are- not written using a consistent common vocabulary; that requires an up-to-date edition in which chemical measurement is fully covered;
e) VIM2 [3] "was neither fully coherent nor terminologically quite satisfactory" [4];
f) the publication, after 15 years of work, in 1993/1995 of the ISO Guide for the Expression of Uncertainty in Measurement (GUM), and initiated by the CIPM; it constituted a fundamental change in the thinking about a measurement result and its measurement uncertainty; that had to be reflected in the definition of the concepts involved; it is remarkable that the GUM is still not fully understood and applied in the chemical measurement community 15 years later[3];
g) clarity in important documents for global use had become of paramount importance in settlement of disputes in global trade, in the drafting and implementation of EC Directives, and mutual acceptability of measurement results across borders in areas such as clinical chemistry, greenhouse gas measurements, and the CIPM Mutual Recognition Arrangements at BIPM.

Thus preparation of a 3rd edition ("VIM3") was initiated in 1997. It was achieved and published in 2008 [1], patronized by BIPM, IEC, IFCC, ILAC, ISO, IUPAC, IUPAP, OIML. "Ideally, every term in a vocabulary should designate only one concept, in order to minimize confusion", but, "constructing a single vocabulary of metrology that is able to unambiguously encompass and harmonize all of the approaches is difficult" [5]. An ideal vocabulary proved to be elusive, the main reason being that much laboratory jargon has gained so much 'civil right' by frequent usage, that the measurement community wants to find it back in a vocabulary to support their position in case they are involved in discussions and settlement of disputes, even on the scientific scene. In VIM3, consistency between concepts was preferred to be of overriding importance, not the "consecration of jargon" into the VIM as frequently requested. Unfortunately, a few exceptions had to be made under the pressure of hundreds of reactions during the formal consultation period (6 months in 2004) and during the formal voting period at the end of the revision (3 months in 2006).

The clarification to be brought by VIM3 by delivering a more consistent set of concepts, will now be illustrated by way of a few examples of revised concept definitions with their associated terms (the 'labels' of concepts). One of them is a central concept in measurement.

Measurand

The definition of 'measurand' in VIM2 being a "particular quantity subject to Measurement" [VIM2, 2.6] [3], probably has contributed to a paradoxal situation. Chemists can argue, if pressed, that they comply with the definition of 'measurand' when they deliver as measurement uncertainty of a result of a chemical measurement, some form of uncertainty of the electric current measurement of their instrument consisting of a repeatability or reproducibility statement (or the performance specification by the manufacturer of the instrument), whereas chemical measurements usually have chemical steps involved such as a chemical preparation of the sample. In many cases, these chemical operations have much larger variabilities than the instrumental measurement. Thus, on formal grounds (i.e. the VIM2 definition of the measurand) the major contribution to the final uncertainty of the measurement result, i.e. the variability of the chemical operations prior to the electric current measurement, could be ignored. Thus the definition of measurand might be at the origin of a very frequent observation that a pair of measurement results obtained for the same measurand in the same material, appear to show differences which are significant, not because they are real, but because the measurement uncertainties of each of the results are underestimated (i.e. the so-called "error bars" indicated are too small). The revised VIM3 definition as the "quantity intended to be measured", makes any chemical treatment of the sample to be measured, an intrinsic part of the process of measurement, and the 'uncertainty' (variability) unavoidably associated with each chemical operation in the process of measurement, an integral part of the final measurement uncertainty of the measurement result.

A further point about measurand. It is quite current to use the identification of the analyte (component, chemical compound, such as atoms of Cd, molecules of a dioxin) as 'measurand' whereas in chemical measurement -as in any other measurement- quantities are measurand. E.g. in spectrometric measurements, the quantity measured is 'concentration' (amount-of-substance per volume, unit: mol/litre) or 'mass fraction' (mass per mass, unit: kg/kg) or content (amount-of-substance per mass, unit: mol/kg), or amount fraction (amount-of-substance per amount-of-substance, unit: mol/mol). The new definition clarifies this by defining measurand as a "quantity intended to be measured" (VIM3, 2.6) [1].

The new definition also settles the old -and ongoing- discussion about the uncertainty of sampling being part of the measurement uncertainty: if the measurand is defined before the measurement to be the concentration in the sample submitted, then the sampling is not part of the measurement and therefore cannot contribute to the measurement uncertainty of the measurement result. On the other hand, if the analyst has accepted that a particular measurand is a concentration of a specified chemical compound in a large geological layer, or sediment, a sampling plan will have to be developed by a suitable sampling method. Such a method is basically different from a measurement method and the resulting sampling uncertainty will have to be added to the uncertainty of the final measurement

result, consistent with the definition of the measurand in order to deliver a measurement result consistent with the definition of the measurand.

There has always been a problem with incompletely defined measurands. An example is the measurement of the amount of e.g. leachable Cd in the measurement of a ceramic plate rather than the amount of total Cd. In such a definition, the measurement procedure ("detailed description of a measurement ..." - VIM3, 2.6) [1] describes an empirical procedure suitable to obtain the intended measurement result. It is of great practical importance for the intended use of the measurement result and has, therefore, to be included in the definition of the measurand. Thus, it is useful to have a concept of measurand which accommodates an 'operationally defined measurand' i.e. a measurand defined by a measurement procedure.

The translation problem

Correct translation is known to be very difficult. It is even doubted whether it can be done exactly. In each language, each term has a semantic field around it, resulting from its history and the context in which it is used. But that is also the case for the terms of the language into which a term is being translated. It follows that a common concept in the minds, must be intercontinentally understood and a common definition intercontinentally accepted before any translation into a non-English language of terms can be meaningfully attempted. For VIM3, the possibility of such a translation has now become a reality as VIM3 is published on the website of BIPM:
www.bipm.org/en/publications/guides/vim.html

The use of VIM3 should go further. There is a big need to implement a commonly agreed metrological language in ISO Guides and Standards, ILAC Multilateral Agreements within ILAC, Mutual Recognition Arrangements under CIPM, EC Directives, WTO documents and probably many others. That could ensure consistency and compliance world-wide with common intercontinentally understood concepts and intercontinentally agreed associated terms in one language, presumably English. Only then can consistent and compliant translations be made in 30-40 languages. The VIM3 makes this now possible.

Conclusions

1. On the global scene, clear border-crossing agreements are needed. Such agreements can only last if they are based on common understanding. Good understanding can only be built on clarity in the communication tools used.

2. Proper communication presupposes commonly understood concepts with associated terms.

3. Common intercontinentally understood concepts and associated terms are the necessary tools in languages where measurements are involved.

4. Unambiguous terms describing concepts, are needed in at least one language in order to achieve unambiguity in the translation needed into 30-40 other languages.

Closing remarks

For international trade in food and feed to be fair, for border-crossing implementation of environmental regulations to be identical for all parties concerned, for interchangeability of results of clinical measurements to become a reality, in fact, for any border-crossing interpretation of measurement results in chemistry to become possible, clarified, well understood and commonly agreed concepts and terms are essential to materialize mutual acceptibility of measurement results. Similarly, their translations from one language -english- to 30-40 other languages, must be realized and fixed unequivocally. Countries having English as native language have not yet realized that they are at a considerable advantage over countries where such translated terms describing concepts may not yet be available, let alone understood or accessible. Countries not having English as native language, may not have realized to the full extent that they are at a considerable disadvantage until intercontinentally understood concepts with intercontinentally agreed terms are available.

Let us quote P Giacomo, the then Director of BIPM, in the Foreword of the 1st Edition of the VIM [2]: 'All branches of science and technology need to choose their vocabulary with care. Each term must have the same meaning for all of its users; it must therefore at the same time express a well-defined concept ...'. The present revision of VIM2 to VIM3 is of primordial importance for clarity and understanding within and between the measurement communities world-wide, an essential requirement for making mutually understood, hence useful, agreements.

Footnotes

[1] The concept with associated term 'quantity' is used here in its metrological meaning, not in the meaning 'amount'. An unfortunate language evolution has taken place: the original French term 'quantité' meaning 'amount', was borrowed by the English language to also mean 'amount'. However, the term which is used in French to mean the things we measure, 'grandeur' (concentration, volume, time, mass, temperature) had no corresponding term in the English language. Then 'quantity' was started to be used as the translation for 'grandeur'. A recipe for confusion. Thus, quantity is a term covering two entirely different concepts in English. That is a problem when translations must be made into other languages. In measurement, it would be indicated to reserve 'quantity' exclusively for the things we measure and not use it to mean 'amount'.

[2] VIM is the acronym for 'Vocabulaire de Métrologie', the 'International Vocabulary of Basic and General Concepts in Metrology'. Both the English and French languages are official languages in this matter.

[3] In the period 1998-2005, I made a systematic sounding in my audiences for lectures and seminars on 'Metrology in Chemistry' on the five continents. Less than 5% of the more than 20 audiences knew about the existence of a VIM or GUM let alone used them, with one exception (10%). I must assume that the persons composing those audiences were rather preselected as the announced topic was almost invariably 'Metrology in Chemistry'.

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Establishing SI traceability for measurements of mercury vapour

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Introduction

Mercury is a highly toxic and persistent pollutant found in ambient, indoor and workplace air. Coal-burning power plants are the largest anthropogenic source of mercury emissions to the air, whilst the chlor-alkali industry, crematoria, breaking mercury products, and the burning and improper disposal of products or wastes containing mercury, can also release mercury into the environment. Human exposure to mercury can also be via dental amalgam and the ingestion of crops, animal products or water contaminated by mercury following deposition processes.

Accurate measurement of the concentration of mercury vapour in ambient air is essential in order to meet European legislation [1] established to protect the health of the public. In the UK, NPL operates the UK heavy metals monitoring network [2] on behalf of the Government's Department for Environment, Food and Rural Affairs. This network requires the measurement of the mercury vapour concentration at 15 monitoring sites across the UK. The concentrations of twelve particulate-bounded metals in the same sites were also determined by ICP-MS analysis.

The vast majority of mercury vapour measurements currently undertaken around the world are ultimately traceable to the vapour pressure of mercury. This is given in the scientific literature by several different empirical equations [3], but the agreement between these is not good, with data from different equations sometimes differing by up to 10 % (see Figure 1). There is no current international agreement on which is the best equation to use, meaning that results obtained from methods using different equations may not be able to be compared directly.

The mercury vapour equation is used to calculate the mass of mercury withdrawn from a 'bell-jar' calibration device (see Figure 2) containing a small amount of elemental mercury. A saturated vapour of mercury develops within the bell-jar, and a known volume of this vapour is sampled with a gas-tight syringe via a septum. The temperature of the vapour is recorded, thus allowing the mass of mercury removed to be calculated.

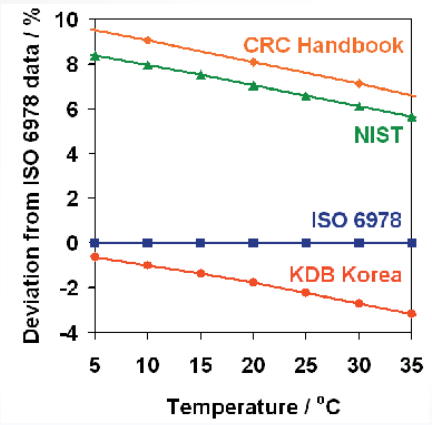

Figure 1. Graph showing the relative difference between the four most commonly used empirical equations for the vapour pressure of mercury. The data is plotted relative to the vapour pressure calculated by the most commonly used equation, that in ISO 6978-2 [4].

Figure 2. The 'bell-jar' calibration apparatus used to provide a known volume of mercury-saturated air for calibration of the mercury vapour analyser.

For automatic measurements, calibration may also take place by means of a dynamic mercury vapour generator, which produces mercury-saturated air by flowing a constant stream of clean air through a chamber containing a heated mercury reservoir. This dynamic mercury vapour generator is therefore in turn ultimately traceable to the vapour pressure of mercury and the bell-jar. The full traceability chain for these measurements is shown is Figure 3a.

This article provides an overview of recent work at undertaken at NPL [5], which has for the first time linked directly mercury vapour measurements to standards of mass, thus establishing traceability for these measurements to the SI system of units. The work was carried out in collaboration with PS Analytical (www.psanalytical.com), a UK company specialising in instrumentation for trace elemental analysis.

SI traceability has been achieved by collecting the output from a dynamic mercury generator over a period of time long enough such that the amount of mercury accumulated on an adsorption tube could be determined gravimetrically. The mass output rate of mercury calculated from this procedure was then used to dose other adsorption tubes with much smaller masses of mercury, similar to the masses removed from the bell-jar during calibration. Using this approach, the saturated mercury vapour concentration in the bell-jar could be linked to the SI by the novel traceability chain shown in Figure 3b. Note that the order of the traceability hierarchy in Figure 3b is different to that shown in Figure 3a as the bell-jar is now positioned below the mercury vapour generator – this difference arises as the dynamic mercury vapour generator is now directly traceable to standards of mass.

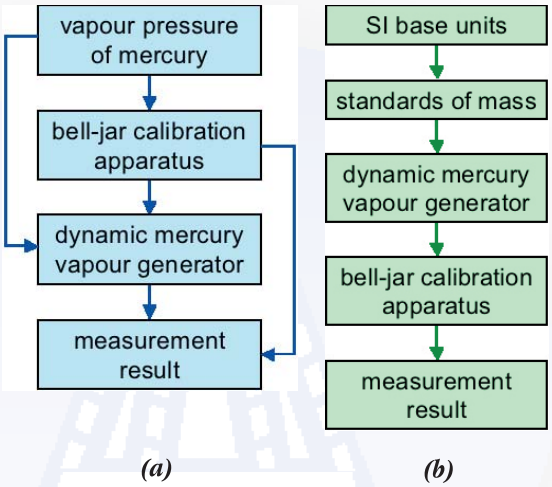

Figure 3. Traceability chains for mercury vapour measurements: traditional (Figure 3a), and novel (as demonstrated in this work) (Figure 3b). The arrows represent the direction in which the traceability hierarchy descends.

Experimental challenges

A number of experimental challenges were overcome during the course of the work. Firstly, In order to weigh the small amount of mercury collected on the tube (a mass of only approximately 140 μg on a tube weighing 8 g, i.e. less than 2 parts in 10^5), a high accuracy (1 μg resolution) balance with a custom-built pan was used, with precautions taken to eliminate the effects of static charges. A buoyancy correction was also applied to all measurements – this is crucial for a weighing of such accuracy, as a change in air pressure of only 20 mbar between the weighings before and after sampling (a realistic scenario in the United Kingdom) would change the true mass of the tube by over 70 μg – equivalent to half the mass of mercury collected.

Also, as adsorption tubes were dosed for approximately 24 hours to enable a sufficient mass of mercury to be collected, the output of the dynamic mercury generator had to be demonstrated to be stable over long periods of time. This was achieved by calculating the Allan deviation from the response of the mercury generator over this extended time period, which was shown to generate no significant drift.

Finally, the accuracy of the atomic fluorescence analysis of the adsorption tubes dosed with smaller masses of mercury was improved by using a drift correction procedure, where the response of the instrument to a known mass of mercury was measured regularly during the course of the analysis. A polynomial function was fitted to these data, and subsequently applied to the instrument responses obtained from all calibration injections and analyses of the dosed tubes.

Results

The results from the study are summarised in Figure 4, which shows the relationship between the drift-corrected instrumental response and the mass of mercury for three sets of data:

(1) 'Bell-jar': Mass of mercury determined from the volume of saturated mercury vapour injected from a syringe and the saturated mercury vapour equation.
(2) 'Sampled tubes – gravimetric': Mass of mercury determined from the mass output rate determined by gravimetry, multiplied by the sampling time.
(3) 'Sampled tubes – generator': Mass of mercury determined from the mass output rate determined from the instrument settings, multiplied by the sampling time.

In order to enable each set of data to be seen clearly, x-axis offsets of 100 ng and 250 ng have been applied to the second and third data sets respectively.

Important Papers on MiC in 2008

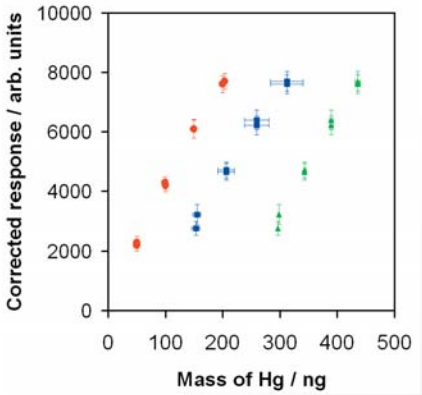

Figure 4. ***Plot of corrected instrumental response against mass of mercury for three sets of data: (1) 'bell-jar' [•]; (2) 'sampled tubes – gravimetric' [■, x-axis offset by 100 ng], (3) 'sampled tubes – generator' [▲, x-axis offset by 250 ng].***

To investigate the agreement of the three data sets, generalised least-squares (GLS) fits were performed to the data (thus taking into account the uncertainties inherent in both the x-axis and y-axis data). The GLS output quantity compared is the gradient of the calibration curve, which is effectively the drift corrected sensitivity of the instrument. Variations in the masses of mercury determined for the three sets of data mean that individual points from different data sets cannot be compared directly, but they can be compared as part of a set of points (the calibration relationship) that define the sensitivity of the instrumental response.

Dataset	Gradient
(1) Bell-jar	35.9 ± 1.6
(2) Sampled tubes-gravimetric	30.9 ± 3.7
(3) Sampled tubes-generator	34.4 ± 2.2

Table 1: ***Gradient and expanded uncertainty of the linear best fit obtained by GLS analysis of the three data sets in Figure 4.***

The calculated gradients of each line are shown in Table 1 where it can be seen that all three values agree with each other within their expanded uncertainties. The agreement between the first two sets of data ('bell-jar' and 'sampled tubes – gravimetric') shows that when using the most common equation for the vapour pressure of mercury [6]:

$$Y_{Hg} = \delta . \frac{D}{T} . 10^{-\left(A + \left[\frac{B}{T}\right]\right)}$$

the predicted mercury masses are compatible with those determined using a method traceable to the SI system of units through the unbroken chain of traceability shown in Figure 3b.

In the above equation, y_{Hg} is the saturated mass concentration of mercury vapour in air; T is the temperature of saturated vapour inside the bell-jar; A, B and D are empirically-determined constants equal to -8.1344, 3,240.9 K and 3,216,522 K·ng·ml^{-1} respectively; and δ is the deviation of the theoretical saturated vapour mass concentration of mercury in the bell-jar from reality, which was assigned a value of unity for this study.

Conclusions

The agreement between the data in Table 1 shows that this work has confirmed that a direct traceability link may be made between measurements of mercury vapour in ambient air and the SI. Thus in theory, SI traceable measurements can either be made directly, using the mass output of the mercury vapour generator, or indirectly, using this mass output to provide a calibration of the expected mass concentration of mercury saturated air within the bell jar apparatus. Importantly, this method does not need any knowledge of the predicted output of the mercury vapour generator, or even how it operates; it only requires that its mass output rate, and the rate at which the output is sampled, has a variability or drift over time which is minor in comparison to the ability to perform an analysis of the mercury collected on an adsorption tube.

Related studies

Other related research carried out at NPL includes the publication of a practical uncertainty budget for the measurement of mercury vapour in ambient air [7], assessment of, and a proposal for, the most accurate method for the calibration of mercury vapour measurements [8] and an investigation into the calibration of a mercury vapour indicator for occupational exposure measurements [9].

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This article is a summary and update of the CITAC Award winning paper published by the authors in *Analyst* (2008) 133:946-953.

Dr. Andrew S. Brown
Dr. Richard J.C. Brown
NPL, UK

Dr. Warren T. Corns
Prof. Peter B. Stockwell
PS Analytical Ltd, UK

The Metrology Track at the 17th International Conference of the Israel Society for Quality

November 18-20, 2008, Jerusalem, Israel

The conference was organized by the Israel Society for Quality in cooperation with the American Society for Quality, Co-operation on International Traceability in Analytical Chemistry (CITAC), the Israeli Metrological Society, Israel Laboratory Accreditation Authority and some other institutions.

Due to the current world economic upheaval, participation decreased from the usual 2000 participants to 1400, but nevertheless it was a diversified meeting.

The long standing tradition of the biannual International Conferences on Quality in Israel is to discuss quality problems with metrologists. The 17th Conference in Jerusalem brought together specialists in quality and a group of experts with outstanding knowledge of metrology and its application to real problems, in particular those related to quality of life and trade.

Dr. Zigmund Bluvband

The metrology track was organized on the second day of the conference, November 19, 2008. It started with plenary greetings by Mr. Oren Nakar, Conference Chair, Quality Manager of Motorola Israel; Dr. Zigmund Bluvband, President of ALD Ltd and former President of the Israel Society for Quality; and Mr. Gregory Watson, Chairman and Managing Partner of Business Excellence Solutions - a Finland based company - and President-elect of the International Academy for Quality. I also greeted the participants on behalf of CITAC, using some minutes and slides to promote the CITAC structure and mission. Then Prof. Franz Ulberth, Institute for Reference Materials and Measurements, Joint Research Center, European Commission, delivered a brilliant plenary lecture "Reference Materials and Measurement in the Quality Infrastructure in Europe and Beyond". The lecture was sponsored by System Advanced Laboratories Ltd., Israel.

Prof. Franz Ulberth

After the plenary session, participants had time for visiting the exhibition and posters. At the ALD booth, one could buy books of Dr. Zigmund Bluvband. His book, "Quality's Greatest Hits. Classic Wisdom from the Leaders of Quality", ASQ Quality Press, USA, 2002, attracted my attention for its depth and splendid sense of humor.

Three consecutive sessions on metrology took place in continuation of the Metrology Track.

The first, "Terminology, Statistics and Software in Measurements" included a lecture by Prof. Yury Adler, Moscow Institute of Steel and Alloys, Russia, titled "Statistical Thinking and Metrology: Enemies or Friends?!". When summarizing the heated discussion, I quoted Dr. Zigmund Bluvband's comment from his book: "Statistics are like a bikini - what shows is real, but what's hidden is vital".

The second session was "Measurement of Nano-particles and Interpretation of Interlaboratory Comparison and Sampling Results". One of the most attractive lectures at this session was delivered by Dr. Inna Popov, the Nano-Science Center of the Hebrew University of Jerusalem. She discussed results of the international project for study of nano-crystalline silicone spheres prepared by plasma-chemical technique, in which the CITAC members Prof. Yury Karpov and Dr. Vasilissa Baranovskaya (representing GIREDMET, Russia) and I (representing INPL, Israel) were involved. Another interesting lecture was presented by Prof. Vladimir Okrepilov, Test-St.Petersburg, Russia: "Quality in Nanoscale Sector: Role of Metrology and Standardization". I reported at this session on the development of the IUPAC/CITAC Guide for selection and use of PT schemes for a limited number of participants, now under review process in IUPAC. Dr. Orna Dreazen, Consultant, Israel, delivered a lecture "How does the Uncertainty of Sampling Affect Interpretation of Measurement Results?".

The third session was dedicated to the history of metrology and its noticeable developments. In particular, uncertainty of vitamin B1 measurement in baby food was discussed by Dr. Itzhak Skalski, Bactochem, Israel. This topic is very "hot" in Israel, where some babies even died from the vitamin deficiency in the food produced by "Remedia", a company recently indicted and now on trial.

It was long, nice and fruitful conference day for all of us, completed with a night tour of Jerusalem. The participants were thankful to the PCO - ISAS International Seminars - who organized the technical part of the conference very professionally.

Dr. Ilya Kuselman
CITAC Chairman
INPL
Israel

The 6th Eurachem Workshop on PT/EQAS in Rome, Italy Focus on standardization and new developments

The 6th Workshop on Proficiency Testing/ External Quality Assessment in Analytical Chemistry, Microbiology and Laboratory Medicine, organised by EURACHEM, jointly with CITAC and EQALM, was held in Rome, Italy, on the 6-7 October 2008. Several Italian organizations, including public research institutes devoted to public health, metrology, environmental protection and innovative technologies, as well as the accreditation bodies and the standardisation body for chemical industry, worked together to make this event possible and to promote the knowledge and practice of PT/EQA in Italy. As at previous workshops, the scientific programme included both key-note lectures, associated working groups and poster sessions. Special attention was given to the draft ISO/ IEC standard for PT/EQA, with Daniel Tholen, the convenor of the CASCO Group, reporting on the latest development[1]. Key aspects of the developments of PT/EQA within the European Union area were illustrated by Philip Taylor (EC JRC IRMM) in the light of the recent decisions of the European Parliament and the Council on strategies for the marketing of products and the consequent requirements for accreditation and market surveillance[2,3]. The prospective over the wider world was given by Abdulghani Shakashiro (IAEA) who reported on the activities of the Agency to support the quality of measurements and comparability of analytical results in developing countries. New developments in important and emerging fields of PT were addressed by Annette Thomas (WEQAS, UK) who discussed the issues associated with frequency of PT/ EQA; Tommy Šlapokas (Swedish National Food Administration), who reported about the key issues of the organization of PT/EQA for microbiology in drinking water and Ludwig Niewöhner (Bundeskriminalamt, Germany) who described the PT scheme for gunshot residues. The end-user perspective on PT/EQA was presented by Magnus Holmgren, Quality Manager of SP Technical Research Institute of Sweden. Maria Belli of the Metrology Service of the Environmental Institute of Italy summarised the current practice and guidance regarding the quality of test materials used in PT/EQA as well as perspectives and future developments. Two hundred and forty-four participants from 47 countries [see box] attended the Workshop sessions and provided an important input to the discussion in the Working Groups as well as to the poster sessions with 74 accepted poster contributions.

Participants in the 6th Eurachem Workshop on PT/EQA

The two half-day training courses planned to precede the Workshop were subscribed by 140 and 130 trainees. Such eager demand could only be satisfied thanks to the trainers who agreed to run two sessions of each course. Michael Koch (Universität Stuttgart, Germany) and Piotr Robouch (EC JRC IRMM) illustrated the mysteries of "Statistics for PT/ EQA Schemes" to an attentive audience and Ilya Kuselman (INPL, Israel) presented the new guidelines from IUPAC and CITAC for the organization and data treatment in PT/EQA with a limited number of participants (the draft guideline will be available on the IUPAC website, www.iupac.org and the CITAC website www.citac.cc). Ian Mann (SAS, Switzerland) and Antonio Menditto (ISS, Italy) lead the training sessions on the "Selection, use and interpretation of PT/ EQA Schemes", based on the draft revision of a joint EA-EURACHEM-EUROLAB document, expected to be released in 2009. Both courses were complemented by practical exercises.

A book of abstracts was distributed to the participants and is available on-line at the Workshop Website www.iss.it/eurachem. Full proceedings of the event, covering keynote lectures, working group discussions and poster contributions, subjected to peer-review, will be published as a special issue of Accreditation and Quality Assurance (Springer Verlag), expected during 2009. Copies of the speakers' presentations and the Working Groups summaries are available at the Workshop Website www.iss.it/eurachem and the EURACHEM Website at www.eurachem.org.

Based on the participant evaluation of the Workshop and Training Courses indicating overall satisfaction with the scientific content and the structure of the event, although some wished for more time for poster presentation, the event seems to have met its expectation and provided input for a next workshop, now scheduled for the autumn of 2011.

Support to the 6th Workshop from EPTIS, EuCheMS, International Laboratory Accreditation Cooperation, European Commission's Joint Research Centre Institute for Reference Materials and Measurements and LGC Standards is gratefully acknowledged.

In addition, the International Atomic Energy

Agency, Physikalisch-Technische Bundesanstalt (Germany) and the United Nations Industrial Development Organization provided support to delegates from developing countries.

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3. Regulation (EC) N. 765/2008 of The European Parliament and of the Council of 9 July 2008, Official Journal of the European Union L218/30, 13.8.2008

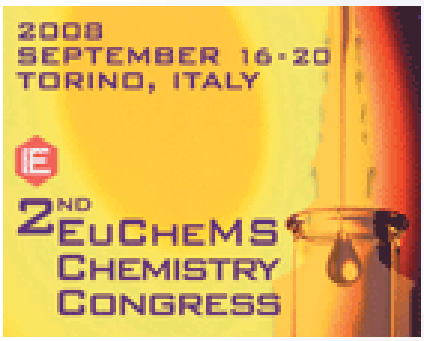
Countries represented at the 6th EURACHEM Workshop on PT/EQA:
Argentina, Australia, Austria, Belgium, Botswana, Brazil, Bulgaria, Burundi, Canada, Chile, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, India, Israel, Italy, Kenya, Latvia, Lithuania, Macedonia, Namibia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Rwanda, Slovenia, South Africa, Spain, Sweden, Switzerland, Syria, Tanzania, Thailand, Turkey, Uganda, UK, USA

Mr. Brian Brookman
Chair, Scientific Committee
LGC Standards Proficiency Testing
UK

Dr. Antonio Menditto
Dr. Marina Patriarca
Chairs, Organising Committee
Istituto Superiore di Sanitá
Italy

Eurachem symposium on Chemical Measurement Quality at the 2nd EuCheMS Chemistry Congress - Turin, Italy

16-20 September, 2008



EuCheMS (European Association for Chemical and Molecular Sciences) is an organization founded in 1970 to promote co-operation in Europe in the field of chemistry and molecular sciences. Members are mainly the chemical societies in Europe (see www.euchems.org).

During the 2nd EuCheMS Chemistry Congress, held in Turin (Italy) from 2008 September 16th to 20th a symposium on Chemical Measurement Quality: Societal Impacts was organized by the EuCheMS Division of Analytical Chemistry (DAC) in cooperation with Eurachem. Main topics were the challenges, perspectives and impacts of measurement quality in analytical chemistry on various societal activities. Oral contributions and posters covered areas such as environment, health, industry, trade, and forensics.

After welcome and introductory remarks by Elio Bava, INRIM, and Bo Karlberg, Department of Analytical Chemistry at Stockholm University, New perspectives on metrology in chemistry to support EU directives were presented by Philip Taylor, IRMM, pointing out the general need for quality of measurement and how to improve the situation for chemists both in labs and in education today. The Environmental Challenge for Analytical Sciences was presented by Manfred Grasserbauer, Vienna Technology University, focusing on the major elements of the EU Policy on environmental protection and sustainable development and the resulting challenges for analytical sciences. A speech on Reliable Quantification in Genomics and Proteomics-Scientific Challenges and Societal Impacts was given by Hendrik Emons, IRMM. Within the biochemical sector there is a strong need for reference materials matching as close as possible the complex nature of real biological samples to get comparable results. Emons presented examples from current research and development programmes at IRMM on GMOs, genetic testing, human biomarkers and microbiological analysis. In the clinical sector, accredited reference (calibration) laboratories have been established, which provide reference measurement services for setting target values in proficiency testing but also to diagnostic kit manufacturers. Several achievements were presented by Lothar Siekmann, University of Bonn, under the title Improvement of Laboratory Diagnostics by Introducing the Concept of Measurement Traceability in External Quality Assessment.

Other presentations dealt with traceable values in EQAS for trace elements in human serum (Marina Patriarca, ISS, Italy), the role of the Italian NMI (Michela Sega, INRIM), development of flow system to determine styrene metabolites (Karine Marques, Porto University), determination of mercury by anodic stripping voltammetry (Agnese Giacomino, Turin University), terpene fingerprint of dairy products (Simona Belviso, Turin University), and EURACHEM (Bertil Magnusson, and Marina Patriarca).

The symposium offered a comprehensive view of the critical issues facing the establishment of sound paths in chemical analysis. Thirty posters completed the survey, analyzing issues that range from new trends and method developments, to specific analytical, procedural and monitoring problems in environment, health and food control.

Dr. Bertil Magnusson
SP Technical Research Institute of Sweden

Dr. Enzo Ferrara
INRIM, Italy

Test & Measurement Conference

25 – 26 August, 2008, Johannesburg, South Africa

The National Laboratory Association (NLA) held its annual T&M Conference at the Misty Hills Conference Centre – just north of Johannesburg, South Africa, where nearly 300 delegates were exposed to the latest developments and 'goings on' in the laboratory world.

Delegates not only had the opportunity to rub shoulders and listen to experts in the field from many different scientific disciplines, but were also able to network with their peers over the three days that the Conference ran.

This year's event was significant from many points of view, with the following being the highlights:

- The Department of Water Affairs and Forestry took the opportunity to partner with the Conference in order to announce its strategy of upgrading the capability of water testing laboratories in South Africa. In addition, they used the Gala Dinner as an ideal occasion to make various awards to the winners of the Department's annual water saving project. The scholars were given the opportunity of presenting their projects and the winners were handed certificates.
- Various overseas speakers made technical contributions and the Conference was fortunate to host Professor Maurice Cox of the National Physical Laboratory (NPL) in England who provided a useful and interesting background to the Guide to the Estimation of Uncertainty (GUM), and its future development. This document is extremely important to all labs, and delegates were given a rare opportunity to listen to one of the world's experts in this area explain what is likely to happen in forthcoming years.
- A combination of nearly 50 papers, tutorials and posters were presented over the duration of the Conference, with the usual high standard being maintained.

A feature of this year's event was the number of tutorials and learning experiences that delegates were afforded. The most popular of these were the Temperature, SPC and Uncertainty in Chemical Measurements, with delegates expressing the opinion that more of the same should be organized for future conferences. This aspect alone makes the T&M Conference one of the best 'value for money' events in the world and at around a R100 per paper/tutorial it is no wonder that is has grown in popularity over the years.

The NLA has organized and run this event for more than 25 years and has established a superb track record in this regard, with many delegates coming back year after year to share in the experience.

The NLA Board at its Board Meeting in September, after this event, voted in favour of running the event again in 2009 and the NLA is pleased to confirm that the T&M 2009 Conference will take place 14 – 16 September 2009, and given the success of this year's event it will also be held at Misty Hills. Those planning to attend should ensure that the dates are in their diaries and that suitable arrangements are made with regard to budgets.

CITAC members who wish to make a contribution are invited to download the 2009 Call for Papers from the NLA web site http://www.nla.org.za , in order to see what the theme is and how to make a submission. The NLA looks forward to welcoming everyone to its 2009 event.

Mr. Steve Sidney
National Laboratory Association (NLA)
South Africa

Accelerating Innovation in 21st Century Biosciences: Identifying the Measurement, Standards and Technological Challenges

19-22 October, 2008, NIST, USA

On October 19-22, 2008, a major international symposium and workshop was conducted entitled "Accelerating Innovation in 21st Century Biosciences: Identifying the Measurement Standards and Technological Challenges". The meeting was organized by an 18-member international steering committee and co-sponsored by NIST and the University of Maryland Biotechnology Institute. The purpose of the conference and workshop was to identify and prioritize measurement, standards, and technology gaps that result in barriers to innovation and impediments to achieving maximal societal and economic benefits of new discoveries in the biosciences.

The meeting kicked off with a plenary day that featured roundtable discussions on international bioscience policy by international governmental bioscience leaders and on operational/budgeting strategies by NMI Directors. These leaders indicated that major funding is helping to drive better measurements in areas such as health, agriculture, food, nanotechnology, particularly on genomic, proteomic and metabolomics technologies. The EU, in particular, is planning a several billion Euro program on metrology for health and environmental issues. In the U.S., the America Competes Act calls for a doubling of the NIST budget, some of which will likely be for bioscience-related programs.

Visionary plenary speakers in medicine, energy, agriculture, biomanufacturing and environment shared their vision of the future and discussed issues surrounding measurement challenges in those areas.

Medicine - Leroy Hood, President, Institute for Systems Biology, described his vision for P4 medicine - that is personalized, predictive, preventative and participatory. Dr. Hood highlighted the need for better measurement tools, integrated multidisciplinary approaches and advanced computational tools in order to make P4 medicine a reality.

Energy - Anna Palmisano, U.S. Department of Energy Associate Director of the Office of Science for the Office of Biological and Environmental Research, who discussed the need for technologies to enable the use of biosystems for energy production. DOE is working on extracting more energy from ethanol, diesel, hydrogen and co-products from fermentation.

Environment - Steve Weisberg, President, Southern California Coastal Water Research Project Authority who highlighted the need for ways to monitor whole ecosystems, develop more effective bioremediation methods, grow the aquaculture industry and develop algae for biofuels production

Manufacturing - Jim Thomas, V.P Product Development, Amgen Inc., described the need for new technologies to facilitate more robust biomanufacturing processes and to understand the entire production organism's physiology and move towards more flexible manufacturing to get a greater amount of product produced per cell.

Agriculture - Pamela Ronald, Professor of Plant Pathology and Chair of the Plant Genomics Program at the University of California, Davis, and Raoul Adamchak, co-authors of "Tomorrow's Table: Organic farming, genetic and the future of food" described the blend of environmentally friendly farming with the growing utilization of genetic engineering to improve crop yields and quality. Measurement technologies could help increase yields and farm incomes while reducing pesticide use, fertilizer run off, soil erosion and enable better monitoring of species diversity and energy use.

All of the plenary speakers highlighted the need for better measurement technologies and standards for accelerating innovation. High-throughput genomics, proteomics and metabolomics are needed along with validation services for new measurement technologies as they become available.

The workshop that followed involved technical panels of experts who produced a set of prioritized measurement barriers in the areas of agriculture, energy, environment, manufacturing and medicine. In addition, a separate "Hot Topics" was conducted to facilitate discussion and obtain recommendations on some of the more controversial areas including: stem cells, transgenics, synthetic biology, personalized medicine, bioremediation, emerging infectious diseases/anti-microbial resistance, gene therapy and marine versus terrestrial biofuels production.

A detailed report on the outputs from the meeting is being prepared and will be rolled out as a series of documents focused on various sets of readers (legislators, stakeholders and NIST scientists and planners). However, in general, the consensus from the workshop indicated some clear high-level measurement science and technology gaps needing attention by the metrology community. There were:

- Better methodologies and practices for sample handling;
- More robust protein measurements;
- High throughput multiplexed measurements;
- Improved tools and standards for bioinformatics
- Data collection, analysis, modeling, archiving, etc.;
- Improved tools and methods to ensure confidence in data and enable comparability across multiple platforms
- Whether medical imaging, clinical assays, environmental sensors, etc.

The output from the workshop and other stakeholder discussions supports the NIST plan to expand programs in the biosciences by leveraging its multidisciplinary expertise in the quantitative physical, chemical and informational sciences to provide the measurement infrastructure to:

- Provide confidence in the results from measurements of complex biological systems; and thereby;
- Enable increased innovation.

It is clear that, now and into the foreseeable future, bioscience-related innovations will have an increasing impact in the fields of energy, national security, the environment, manufacturing, nanotechnology, food and nutrition and healthcare for certain—and perhaps even in additional fields. The full impact of these innovations cannot be fully realized unless cutting edge measurement science and the ability to generate relevant standards keep pace with the field.

Dr. Mike Amos, NIST, USA

First European meeting on Metrology of Biofuels

6-7 November 2008 in Strasbourg, France

This first workshop was organised by LNE and PTB in cooperation with the Collège Français de Métrologie. It aimed at exchanging ideas and experiences with scientists involved in this complex area to foresee better understanding of the metrological needs with respect to technical and socio-economic issues, to support production and use of energy from biomaterials and to identify challenges to be solved in the near future.

Biofuels are considered as an alternative source of energy complementary to fossil fuels used today. Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 promote the use of biofuels and

other renewable fuels for transport. Within the Directive, the European Union makes recommendations for partially replacing fossil fuels by biofuels.

The workshop dealed with metrology on all biomaterials used for energy production: biogas, liquid biofuel and solid materials. These must also be considered together with fossil fuels since both often used in parallel or in combination. 70 people attended the meeting from around the world, with particularly a strong representation from Brazil. Most National Metrology Institutes were represented at this workshop. The workshop was organized in different sessions with oral presentations and posters: Traceability, Environmental sustainability, Legal Metrology and Standardization, Energy and thermophysical properties, Health and Safety and Engineering. The meeting ended with a panel discussion on the definition of metrology needs prospects on the biofuels issue.

Dr. Philippe Charlet
LNE, France

Quality Assurance in Food Safety and Human Nutrition: Metrological Perspectives

This training course was conducted from 5-7 November 2008, at the Central Food Technological Research Institute (CFTRI) in Mysore, India. The institutional support was extended by Dr. V. Prakash, Director, CFTRI. Dr. V. Prakash and Dr. M.C. Varadaraj (Head, Human resource development, CFTRI) also assisted in designing the course. The participants were 13 food and nutrition teaching faculty members of colleges and universities from the state of Karnataka. The training course faculty included: Dr. G.V. Iyengar (FSNSP, Tufts University, Course Director), Dr. Anura Kurpad (St. Johns Medical Academy, Bangalore), Dr. Jamuna Prakash (University of Mysore, Mysore) and Drs. M.C. Varadaraj, K.N. Gurudatt, V.D. Sattigeri and K.M. Appaiah (senior staff members from the CFTRI).

Key topics addressed were:
Metrological concepts relevant to food safety concerns; prescriptive vs independently validated analytical techniques for food quality measurements; metrological perspectives governing nutritional, physiological and clinical measurements; reference materials for F&N investigations; quality assurance in nutritional assessment and surveillance; microbial food safety; instrumentation and laboratory needs for F&N safety and role of CODEX; food safety standards, proficiency testing and laboratory accreditation requirements; and capacity and leadership development issues in F&N areas.

Conceptual frame for the training course:
Food safety is a persistent problem faced by every country. Prevention is the best remedy to achieve a sustainable state of food safety aided with HACCP measures. Prevention programs also require monitoring (testing the final outcome) to ascertain the efficacy and effectiveness of the preventive steps. However, this may lead to facing a dilemma, reflected by 3 situations: (i) ever increasing demand on assured food safety, (ii) in a country responding slowly to food safety priorities, consumers not being able to quickly influence corrective steps, and (iii) the inability of food importers/countries to directly and quickly influence corrective measures where the food is produced. A host of timely and well-coordinated actions are necessary and are being introduced to set a functional food safety system in motion: these are: sustained awareness for food- borne diseases, an effective surveillance strategy backed by a good measurement system and trained personnel in the field. Many tools are available for implementing food safety programs. These include: robust sampling methods, validated analytical methods, certified natural matrix food and nutrition reference materials, methods for assessment of measurement uncertainty and links for establishing traceability, among others. The overall beneficial outcomes are: a sound and functional food safety management system at the national (policy) level; scientific and technical expertise to meet the food safety requirements; an institutional measurement infrastructure with a strong metrology base; a recognized chain of command for quality assurance i.e. traceability chain in the metrological domain, a pool of educators to propagate the message of good measurements, among others.

Prof. Venkatesh Iyengar
Tufts University
USA

12th International Symposium on Biological and Environmental Reference Materials

7 - 10 July, 2009, Oxford, UK

LGC and the organising committee invite you to attend the 12th International Symposium on Biological and Environmental Reference Materials (BERM12). This forum has been specifically established to encourage discussion of the issues related to the development of biological and environmental reference materials and their role in the quality assurance of analytical measurements.

Who should attend?

This important event should be of direct concern to a wide range of analytical scientists and managers in the food, environment, healthcare, pharmaceutical, chemical and life sciences sectors, as well as national measurement institutes, academic groups and instrument suppliers. The meeting will also enable reference material suppliers, accreditation bodies, legislators and other stakeholders to obtain a broad overview of the current position and new advances in the field.

Scope of the symposium

The symposium will focus on developments in the production and use of reference materials for a wide range of applications, including biological, clinical, forensic, waters, soil and food. The symposium will also explore the relationship between reference materials and international metrology and accreditation bodies, and will look at what the future holds for reference materials. Symposium topics scheduled include:

- The environment and energy, including soil, water, air, biofuels, green energy, climate change, marine pollution, hazardous waste, and vegetation
- Health, medicine, and forensic topics, including laboratory medicine, DNA and genomics, proteomics, microbiology, vaccines and biological standards, health and dietary supplements, and pharmaceuticals
- Food topics, including production, safety and quality, adulteration and authenticity, agriculture, and animal feeds
- International developments, including international metrology activities, ISO standards, protocols and guides, and regional cooperation

- Quality assurance/quality control, including accreditation, proficiency testing, and use of reference materials in method validation and quality control
- Reference materials challenges and trends, including advances in analytical methods, nanotechnology, new reference material areas, homogeneity and stability testing, processing and packaging, and transport and regulations.

Symposium programme

The scientific programme starts on Wednesday 8 July with welcome addresses. The symposium will then follow the format of plenary sessions followed by two parallel sessions covering the various topics, as follows:

8 July: International metrology and cooperation, and QA/QC, Proficiency testing and the use of reference materials.

9 July: Environment and energy, and Health, medicine and forensic.

10 July: Food, and Reference materials: challenges and trends

Invited plenary speakers include

Hendrik Emons, IRMM, Robert Kaarls, CCQM, Maire Walsh, ILAC, Ales Fajgelj, IAEA, Adrian Bristow, NIBSC, John Butler, NIST, Damià Barceló, IIQAB-CSIC, Steve Wise, NIST, Roger Wood, UK Food Standards Agency, Andrée Lamberty, IRMM, and Ulrich Panne, BAM

There will also be two dedicated poster sessions, on the afternoons of 8 and 9 July, and posters will be on display throughout the symposium. There will be a welcome reception and a symposium dinner for delegates and accompanying persons.

Presentations and exhibition

Both oral presentations and posters are welcome (deadline for submission of abstracts is 13 February 2009). Submissions should be sent to the organisers at berm12@lgc.co.uk. Prizes will be awarded for the best posters. Exhibition stands are also available to any organisation wishing to display their products or other information. Requests should be sent to the organisers at berm12@lgc.co.uk. Proceedings: All accepted abstracts will be included in a printed booklet for distribution to delegates at the symposium. In addition, delegates will be invited to submit scientific papers based on their contributions to the journals ABC and ACQUAL.

Venue

Oxford was established as a town in the 9th century and is home to the oldest university in the English-speaking world, with nine centuries of continuous existence. Oxford is to many more places of interest and some beautiful English countryside. It is some 60 miles (90 km) North West of London, with good road and rail links to Heathrow, Gatwick and Birmingham airports.

Nowadays, the city is a bustling cosmopolitan town. It still has its ancient university, but is also home to a growing hi-tech community. The symposium will be held at Keble College, which was established in 1870 and is located in the heart of Oxford close to museums, parks and shops. It is within walking distance of Oxford train and bus stations. Accommodation for delegates has also been arranged at Keble College, which will give all delegates an opportunity to sample the full 'college experience'.

Social and accompanying persons programmes

There will be full social and accompanying persons' programmes, which include a trip to Blenheim Palace, the birthplace of Sir Winston Churchill.

Registration

Delegates are invited to register for BERM12 online at: www.berm12.com.

Mr. Nick Boley, LGC
UK

14th International Congress of Metrology

Measurement as a Strategic Tool for Improved Production, Faster Cycles and Lower Costs

June 22-25, 2009, Paris, France

In today's environment, metrology is no longer regarded as a costly requirement, but rather as a strategic asset. It is an essential step of any quality and performance effort and a major decision making factor in an increasing number of industrial and service organizations.

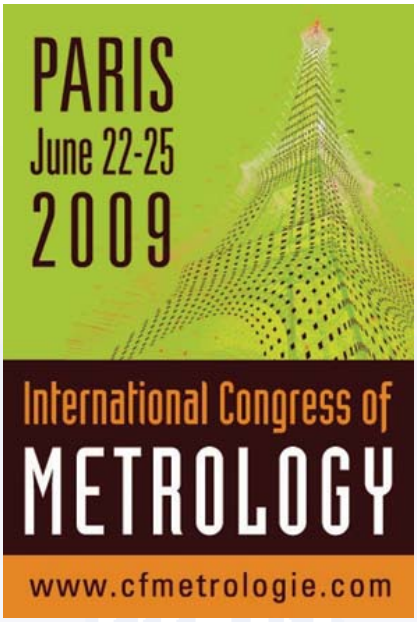
The International Congress of Metrology is the largest European event in this field, and its 14th edition will focus on Measurement Process Improvement as a requirement for product & process quality insurance in industry and laboratories. Nearly 1000 professionals from about fifty countries will meet to discuss these issues June 22 - 25, 2009 in 180 conferences and 6 round tables, and in a major exhibition of 90 top suppliers in the field and 4 field visits of companies.

Increasingly wider application of measurement processes

As new and more accurate measuring instruments were being designed based on technical and scientific developments, metrology was applied to an increasing number of new fields over the years. In the past, measurement had been traditionally limited to such characteristics as dimensions, electrical quantities, time or mass, but it is now commonly applied to such new fields as environmental control, health, biology, chemistry, nanotechnologies, or sensory and immaterial metrology.

Both open and concealed measurement processes are now at work in our everyday life. As a universal and vital decision-making tool in health, safety or environmental fields, measurement can have dramatic impact in major issues.

However, if such impact may be obvious in fields like health (strength of drugs, of radiation in radiotherapy, medical biology analyses ...) or



environmental management (measurement of pollutants in the air, water, etc.), its application is a little bit harder to manage in areas such as human safety (e.g. ABS systems in cars, tire pressure monitoring, speed control...). But when it comes to measurement of company savings, its implementation gets more tricky!

Potential leverage of measurement for improvement in manufacturing

Measurement gives manufacturers the assurance that their final product will meet stated requirements. Reliable and easily comparable measures help to make a good product on the first time. Used by Engineering departments at the product design stage, they contribute to monitor production quality control and management.

Manufacturers shall build measurement into the production process, and not limit its use to final quality product inspection. Metrology shall be custom designed to meet each company's needs. It shall be implemented in a friendly and practical manner, and planned well ahead of production to carry out effective leverage of company performance. Then it shall contribute to effectively limiting rejects, improving productivity by reducing setup times and lowering costs. As a suitable measurement system can greatly reduce rejects, over-quality costs and waste can be kept under control, contributing to effective sustainable development implementation.

Major international forum of metrology

Metrology is a field in constant change, with new developments and constraints to deal with: systems miniaturization, increased accuracy... Measurement processes improvement in industry and laboratories contributes to a large extent to such organizations performance optimization.

The next International Congress of Metrology will be one of the largest world forum of ideas and practices dedicated to such measurement processes improvement, bringing together hundreds of manufacturers and scientists from all over the world. Manufacturers will get new practical solutions meeting their needs and easy to implement within their organization.

After the previous events held in Lyon in 2005 and Lille in 2007, the 14th International Congress of Metrology will take place in Paris June 22 - 25, 2009.

Nearly 1000 participants from about fifty countries in all parts of the world, professionals in companies, laboratories and bodies, health organizations and measuring instruments manufacturers, metrology users, quality officers, managers and decision makers, teachers and researchers will meet in industry round tables to discuss such issues as:

- What's at stake for Metrology in the health field,

- Metrology and reduction of greenhouse gas emissions,
- Metrology and industrial performance,
- Industrial temperatures and new materials,
- Accreditation, economic and strategic issues,
- Wireless measurements in the industrial environment.

Unique trade exhibition of latest technical advances with about 90 exhibitors will be organized.

The French College of Metrology is in charge of managing this unique event in Europe, jointly with the following international organizations: EA, Euramet, BIPM, OIML and NPL, and along with the following user companies and technical centres: Eurocopter-Group EADS, Renault, Acac, BEA Métrologie, Cetiat, CETIM, IMQ, INSA of Lyon, and LNE.

Two leading companies on this field sponsor the 2009 Congress: Stork Intermes, provider of calibration and materials testing services, and Hexagon Metrology, world leader of high performance products and instruments.

For more information visit: www.metrologie2009.com

Dr. Philippe Charlet
LNE
France

"Measurement Science in Chemistry" consortium - a leading force in analytical chemistry higher education in Europe

In response to the huge need for people educated in chemical measurements (analytical chemistry) nine European universities have recently joined forces and have formed a consortium, which offers a jointly delivered Master's degree program ***Measurement Science in Chemistry*** (MSC).

The intention of this consortium is to offer master-level education in analytical chemistry adapted to today's job market requirements for analytical chemists, especially focusing on the quality assurance of analytical measurement results. The key concepts of analytical quality - traceability, validation, measurement uncertainty, etc. - are not new, but are rarely taught routinely at universities. The consortium sets as its aim to contribute to radical improvement and harmonization of analytical chemistry higher education Europe-wide.

In recognition of the academic quality of the program, ECTNA (the European Chemistry Thematic Network Association) awarded the MSC consortium the ***Chemistry Euromaster*** ® quality label in spring 2008.

The jointly delivered study program is a fully Bologna-compliant master's level program with the volume of 120 ECTS points. The program is open to students worldwide with bachelor's degrees in chemistry (or related). To guarantee admission of the best possible students the admission follows a two-level procedure: student first enrols at any of the consortium member universities to the local master's program and then additionally applies for a place in the MSC program. The core of the program is taken at the home university and additionally the MSC students are offered an international intensive course, student exchange and teaching by European experts.

The generic outline of the program is presented in Table 1. This corresponds to the average of the different Universities of the Consortium. The basic modules are given in bold and may be organized slightly differently (i.e. containing different courses/subunits) at each member university in order to accommodate local conditions. It is possible that at some universities some parts of the modules of Year 1 are taught during Year 2.

The Intensive course is carried out in the form of a summer or winter school. This course covers the most advanced topics of MiC and is one of the main added value components of the JDP: no single member university of the consortium is able to cover the topics taught at the intensive course. In 2008 the summer school took place in Celje (Slovenia) and in 2009 it will be in Blagoevgrad (Bulgaria).

These universities were initially brought together via the EC JRC-IRMM AcadeMiC initiative, thus deploying its mission to promote a common and reliable European measurement system in support of EU policies. IRMM now acts as the mentoring organization of the consortium with the main task to ensure that the program addresses the present and emerging needs originating from the European regulatory context and to foster the accessibility of European students to this program.

Detailed information on the consortium and on the study program is available from the consortium website www.msc-euromaster.eu and from the consortium coordinator Ivo Leito (ivo.leito@ut.ee).

Modules	ECTS	C[1]
Year 1 (60 ECTS)		
Fundamentals of Measurement Science (incl Measurement Science in Chemistry)	10	C
Data evaluation and management	10	C
Instrumental Methods	10	C
Sampling, sample preparation and separation methods	10	C
Applications of analysis	20	C
Year 2 (60 ECTS)		
Pan-consortium international intensive course (summer-school/ winter-school)	30	C
Practical examples (case studies) on method validation, different methods for assessment of uncertainty and their respective contents of information and demonstration of traceability	8	C,S,E
Quality management systems (ISO 17025 and GLP), Economic and legal aspects (with relevance to EU legislation) of measurements	6	C,S,E
Advanced topics in analytical chemistry (advanced sample preparation methods, bio- and medical analysis, etc)	10	C,S,E
Advanced statistical methods for data evaluation	6	C,S,E
Master thesis	30	C

[1]C-compulsory, S-semi-elective, E-elective.

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University of Warsaw
Claude Bernard University of Lyon
University of Maribor
University of Lisbon
University of Bucharest
Adam Mickiewicz University of Poznan
Maria Curie-Skłodowska University of Lublin
South-West University of Blagoevgrad

Prof. Ivo Leito
University of Tartu
Estonia

Messages from New Members

Message from Prabhat K. Gupta

It is an honor to have been elected as a member of CITAC. I look forward to contributing in CITAC activities in the coming years. By heading the chemical metrology program at NPLI, a national network programme on Metrology in Chemistry (MiC) and Certified reference materials (CRM) activities, the issue of providing metrological traceability in various chemical areas is a priority of many of my current scientific activities. MiC program has recently started in India and spreading awareness about MiC & its benefits, capacity building of human & other resources at national level of NPL & its partners in various sectors of the economy, helping in accreditation process for chemical areas & related PT programmes for dissemination of traceability & improving quality, providing apex level services by NPL & designated labs, and production of CRMs are some of the important plan tasks of NPLI and its designated partners.

I have been engaged over the years on the emission/ sinks and mitigation of various greenhouse gases (GHGs) like N_2O, CH_4 and CO_2 from agricultural ecosystems/ wetlands/ forests ecosystems etc., including national methane campaign in 1991. We had coordinated the 'ADB-Methane Asia Campaign 1998-99 sponsored by Asian Development Bank (ADB), under the Asia Least-cost GHG Abatement Strategy (ALGAS) project. Other scientific work included the studies of emissions of trace gases from different sources like bio-mass burning (shifting cultivation, agriculture residues, fuel woods etc.) and transport sector; aerosols & precursor gases (viz. O_3, CO, NOx, SO_2 etc.), GHGs inventorization and their budget estimates. Participation in scientific expedition to Antarctica in 1988-89 and the Indian Ocean Experiment program from 1996 to 1999 for the measurements of GHGs, aerosols, precipitation, and trace gases, apart from the activities related to the preparation of India's initial national communication (NATCOM) to the UN framework convention on climate change (UNFCCC), in GHG

Messages from New Members

inventories for Indian Agriculture sector (Rice cultivation, Livestock, Agricultural soils and agricultural residue burning) have been useful. It has also led to two NATCOM-SNC (second national communication) activities for providing measurement traceability in GHGs to all Indian NATCOM teams in all sectors. I am the chair of BIS (Bureau of Indian Standard) CHD 6 industrial gas committee, member of other BIS CHD committees, life member of several scientific societies and EC member of the metrology society of India. My current duties in NPLI provide excellent opportunities to apply many of above experiences for MiC/ CRM awareness and education in the country, measurement traceability in the region by extending the network cooperation with scientific colleagues globally and CITAC cooperation.

Mr. Prabhat K. Gupta, NPLI, India

Message from Jerry D. Messman

I am honored to have been elected as a new member of CITAC. I welcome this opportunity to participate in CITAC activities and to contribute as needed in the process of strengthening or reinforcing the infrastructural merits of metrological traceability in analytical laboratories.

I share the perspective with those who believe that the comparability and transparency of analytical measurements is a necessary and beneficial goal, and when realized, is an impeding process to the gradual erosion of the standard bar for trueness, reliability, and scientific defensibility of analytical data. The advocacy and promotion of metrological traceability as part of a new quality culture in the analytical laboratory is fundamentally important, and the integration of its principles and concepts into educational curricula worldwide is essential.

I've been involved in various analytical and spectrometric aspects of metrology in chemistry and related applied sciences throughout my entire professional career beginning more than 30 years ago with the U.S. National Bureau of Standards (NBS), now known as the National Institute of Standards and Technology (NIST). My memorable years at NIST helped build a strong foundation of historical knowledge and metrological experience upon which my small fledgling company, now known as Stranaska Scientific LLC, was founded.

Underpinned by its proud heritage and cultural linkage to NIST, the company is recognized for the scientific rigor of its PhD-credentialed measurement programs and educational outreach. For the past 15 years, Stranaska Scientific has continually strived to advance the state-of-the-art of ultraviolet and visible spectrophotometric metrology and its analytical applications within the healthcare community and other regulated industries.

Commercial metrology companies such as Stranaska Scientific play an important intermediary role within the traceability hierarchy, and I expect their recognition and involvement to increase over the coming years. By helping bridge the wide traceability gap between the NMI and the plethora of laboratory users of analytical instruments and systems, a competent commercial metrology company can significantly reduce the routine analytical measurement burden of the NMI. This allows the NMI to utilize its resources and scientific skills more effectively such as in international key comparison studies and primary artifact development programs.

I look forward to meaningful interactions with CITAC members, and providing a voice from the analytical perspective of a commercial metrology company.

Dr. Jerry Messman
Stranaska Scientific LLC, USA

Message from Yury Parkhomenko

I am very glad that the Russian Institute for Rare Metals Industry "Giredmet" became the first collective member of CITAC.

As the Director of this Institute and a specialist in diagnostics of semiconductors and nano-materials, I can say that the new materials fabrication is dramatically increased, while metrology & analytical methods in this field are developed insufficiently. I hope that together with the colleagues from CITAC, representing different countries and international organizations, we will be able to contribute more to the method development.

Dr. Vasilissa Baranovskaya, a specialist in spectral and mass-spectral analyses, will represent Giredmet at CITAC. Also Prof. Yury Karpov, Head of the Analytical Department of Giredmet and a CITAC member of many years, will continue his activity at CITAC as the representative of the Russian Association of Analytical Laboratories "Analytica".

I wish advances to CITAC and success to all of its members.

Prof. Yury Parkhomenko
Giredmet
Russia

Messages from New Members

Message from Olívio Pereira de Oliveira Junior

I was probably seven years old when I witnessed a very interesting scene in a street of my small Brazilian countryside village: an old lady was arguing with the fish-seller about the weight of the fish she wanted to buy. It was quite common at that time to buy fresh fish, fruits and lettuce in the streets. As she firmly questioned the kilogram artifact he was using as the reference in his balance, he allowed her to pick up the kilogram of the bike repair shop next door. At this moment many housewives of our street were following the scene and we boys had already stopped playing football. The result of the dispute, for the satisfaction of the people gathered around, was that the fish-seller eventually conceded and the old lady got one more fish in her bag. From that day on the owner of the bike repair shop ceased to have peace of mind because everyone wanted to use his kilogram in daily acquisitions.

It took me about three decades to understand that the reason of that quarrel was about traceability and metrology. Moreover, that experience made me understand why a trusted and agreed reference is so important in ordinary life.

This remembrance came to me on the occasion of my election as a new member of CITAC. My feelings can be summarized in two words: joy and responsibility. Joy because this technical society will allow me to interact with professionals tackling the hottest problems and challenges in the chemical measurement world; and responsibility because I will have the duty to represent well the views of the Brazilian analytical community.

I got my academic degree (1982), Masters of Science (2000) and PhD (2006) at the Universidade de São Paulo. I worked as a fellow at the IAEA laboratories (Seibersdorf, Austria) and as a detached national expert at the IRMM (Geel, Belgium). I developed my entire career at the Instituto de Pesquisas Energéticas e Nucleares, a governmental research institute, dealing with vacuum technology, mass spectrometry and metrology in chemistry, activities that launched me to the international scene, presently in the areas of certification of isotope reference materials and interlaboratory comparison of measurement results. I am looking forward to seeing CITAC fellows at the next CITAC Member Meeting, to share our views on metrology and to start working together for the benefit of all old ladies in this world.

Dr. Olívio Pereira de Oliveira Junior
Instituto de Pesquisas Energéticas e Nucleares
Brazil

Message from Ivo Leito

We are living in a time of unprecedented scientific and technological progress bringing changes to all aspects of functioning in society. Metrology is not an exception. Given the enormous increase of international collaboration and trade, there is now, more than ever before, a need for a solid chemical metrology infrastructure for the whole world. With its mission of advancing metrology in chemistry, and with a good reputation and worldwide connections CITAC has good possibilities to be an important contributor to the huge task of setting up such infrastructure.

In my opinion, one of the key aspects for success here is education. Rapid changes have taken place in the measurement and analysis community and up until now education systems in most countries have not been able to respond adequately to the changing situation. In response to this, the Master's program "Applied Measurement Science" has been launched at the University of Tartu and subsequently the international consortium "Measurement Science in Chemistry" has been established. Both of these are expected to contribute to improvement of the education level of analysts at laboratories. Over the years CITAC has actively contributed to education of analytical chemists by compiling (or participating in compilation of) numerous guidance materials. I think that CITAC has great potential to further advance the education of analytical chemists worldwide.

It is a great honor for me to be elected as a new member of CITAC and I am looking forward to contribute to the work of CITAC, especially in education.

Prof. Ivo Leito
University of Tartu
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