Come to Nashville, TN
For the 2006 NCSLI Annual Workshop and Symposium
August 6-10, 2006
EDITOR'S MESSAGE

NCSLI Measure Journal has rolled out

By the time you read this issue of the Newsletter in late April 2006, you should have received your copies of the NCSLI Measure Journal, edited by Dick Pettit. This is an excellent addition to the benefits that NCSLI member organizations receive, reinforcing the technical nature of our companies.

Since Dick will be emphasizing the technical side of our activities, I will continue with most of my previous chapters. Naturally I won’t be publishing the technical papers that I have in the past. For the NIST news releases, I will be publishing the business and organizational aspects of their news, and let Measure Journal handle the NIST technical announcements.

You have also noticed that in the January 06 issue, I dropped the 9 pages of NCSLI volunteer roster displays. You can easily find the pertinent and current contact information on all those 140+ members by logging on to the NCSLI website and clicking NCSLI Volunteers.

Looking for New Content from you Readers

By freeing up a few pages with the above changes, I would like to personalize the Newsletter a little more, by publishing more Member Laboratory Tours, and Personal Profiles than I have done recently. I call them Touring our Member Labs and Someone You Should Know.

***Articles and other material appearing in the NCSLI Newsletter express the views of the authors and contributors, and are not necessarily those of the Editor or the NCSLI International.

Visit our website:
<www.ncsli.org>

On the cover: Photos courtesy of Nashville Convention Bureau and BIPM.

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PRESIDENT’S MESSAGE

2006 - Off to a Fast Start

I would imagine that every NCSL International President feels this way, but to me, 2006 is already flying by and it absolutely amazes me how much our organization has accomplished. As you read this message, many of you have already analyzed your company's accomplishments for the first quarter. I would like to share information regarding the accomplishments of our organization.

January Board of Directors Meeting

The January Board of Directors Meeting was held at the Marriott San Antonio River Center on January 16th through 18th. Usually we like to couple our Board of Directors Meeting with the Measurement Science Conference to allow our Board Members to save on travel costs. However, since the Measurement Science Conference date moved to the beginning of March, we elected to visit a potential future conference site.

At the January Board Meeting, I assumed the position of President, and Jack Ferris of Consumers Energy was elected to the position of Executive Vice President, thereby succeeding me as President next year. Harry Moody moves to Past President, and we appointed Dave Agy from the Fluke Corporation to the position of Treasurer (formerly held by Jack Ferris). Also elected to the board for this year is Roger Burton from Honeywell, Kansas City. I am very pleased to be working with such a great group of people.

Measure Journal

By the time you read this article, you should also have in hand NCSL International's latest project, MEASURE JOURNAL. This journal will be published quarterly, and will include peer-reviewed technical articles, technical tips, and advertising to cover the cost of publication. This is an additional member benefit that is being delivered to you at no additional cost. This means that you will now be receiving NCSLI publications eight of the twelve months, and we are working hard on providing new materials for the remaining four.

Publications

By now each member who has paid their annual dues will have received the NCSLI Publications CD. You will notice that NCSLI has decided to adopt document management practices that are similar to those of ANSI, ASTM and ISO. I know that it will take a bit of getting used to dealing with a new document system, but I ask for your patience while we roll this program out. It is our hope that this initiative will improve our publications sales and allow our membership dues to remain stable. If you do find yourself having difficulties with the new CD's please contact NCSLI headquarters and we will be happy to assist you.

The NCSLI committees worked very hard last year, and the following new/revised publications are available on the CD or for purchase at the NCSLI website:

- RP 9 - "Calibration Laboratory Capability Documentation Guideline"
- RP 14 - "Recommended Practice for Selecting Laboratory Environments"
- RP 15 - "Recommended Practice for Interlaboratory Comparisons"

For our non-member associates, publications are also for sale at the NCSLI website. In addition to NCSLI publications, we also have many other useful documents such as the Fluke Calibration - Philosophy in Practice book as well as the ASQ Metrology Handbook at the NCSLI online store.

The NCSLI Marketing team has also developed a great 2006 calendar that shows major metrology events for the year and looks great in your laboratory. We also have an SI Units Poster available for purchase that would also make a fine addition to any laboratory.

ANSI Z540 Update

The 174 Committee reports that ANSI Z540.3 has been approved by a significant majority vote. A committee has been formed to develop a handbook for the interpretation of ANSI Z540.3. I would anticipate that one of the general sessions at the annual conference will be dedicated to sharing the latest information about the document and how it fits into our world of documentary standards.

International News

This year, we expect the publication of the latest version of the International Vocabulary of Metrology (VIM) as well as some new supplements to the ISO Guide to the Expression of Uncertainty in Measurement (GUM). The supplements will not replace the GUM, but are intended to augment the document. These documents will be made available for free at the BIPM website. If you would like to purchase a printed copy, there will be a fee.

The BIPM is also publishing a new brochure on the SI units that will be made available for free on the BIPM website. The expected publication date is May.

World Metrology Day (See page 14)

World Metrology Day is May 20th. Don't forget to mark your calendars, and check the NCSLI and BIPM websites for further information on the event. Perhaps you can use this date as a way to spread the awareness of metrology within your company and with your customers!

(Continued on page 22)
A NASCAR race can be won or lost due to minor variations in tire pressure or to fractions of an inch in vehicle height. A Nashville musician depends on the quality of sound in his electric guitar that is built from parts with exacting specifications. Industrial metrology laboratories calibrate equipment used to determine whether a product is shipped to a customer or it must be returned for re-work. Legal Metrology programs ensure that the measurements associated with commerce are accurate and reliable. All of these examples require a sound and cohesive metrology and quality system to be in place. Metrology practiced anywhere in the traceability chain, from the National Metrology Institute to a customer's location, affects critical decisions and improves the quality of life for everyone.

The conference will cover the following topics:

**Theoretical**
- New or Improved Standards and Capabilities
- Measurement Uncertainties (GUM; Bayesian)
- Intrinsic Standards
- Advances in Measurement Disciplines
- Traceability Issues
- Standards & Calibrations at National Metrology Institutes

**Applied**
- Laboratory Automation
- Calibration Processes or Procedures
- Improvements or New Trends in Instrumentation
- Interlaboratory Comparisons
- Metrology applications in industry, government, Telecommunications, automotive, chemistry, space, and other specialized disciplines

**Management / Quality**
- ISO & ANSI Standards (ISO 900x, ISO/IEC 17025, ISO 17011, Z540-1, Z540-2, etc.)
- Metrology Management Information Systems
- Equipment Management
- Laboratory Accreditation and Quality Processes
- Metrology Education and Training
- National & Regional Measurement Systems

**Keynote Address**

Jim Sylvester, Verizon Systems Integration and Testing VP, is responsible for an ISO 9001 registered laboratory that both tests new products and services prior to placement in Verizon’s commercial network and assures the safety and reliability compliance of supplier equipment. Prior assignments with Bell Atlantic, ATT, and Bell Telephone Laboratories include: Managing the development of technical requirements for new products and services; Testing of voice, data, and video systems; Representing Bell Atlantic in Czechoslovakia on regulatory reform; Ten years in External Affairs managing technical regulatory and privacy issues before the FCC and U.S. Congress; Representing the telephone industry on Senator Leahy’s 1991 Privacy and Technology Task Force, and Writing Verizon’s Consumer Privacy Policy.

Register Now!
www.ncsli.org/conference/
Register by May 3 and save up to $150.
NCSL International
2006 Workshop and Symposium Registration
August 6-10, 2006  Nashville, TN
Conference language: English
Conference currency: USD

REGISTRATION OPTIONS
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Fax: 303.440.3384  –  Phone: 303.440.3339
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NCSL International
2995 Wilderness Place, Suite 107
Boulder, CO  80301-5404

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Logo Items
- Shirt (Size?____) $35
- Mug                $12

Organizational Membership $400

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CANCELLATION POLICY
NCSLI Conference, Tutorials and Related Events: Cancellations received IN WRITING before 5:00 p.m. (Eastern) on July 11, 2006, will be subject to a service charge of $50 per registration. No refunds will be issued for cancellations received after 5:00 p.m. (Eastern) on July 11, 2006. Registrations may be transferred from one party to another BY WRITTEN REQUEST RECEIVED through August 1, 2006.

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NL-06
NCSL International 2006 Workshop and Symposium
Tutorial Registration
August 6-10, 2006 - Nashville, TN
Conference language: English  Conference currency: USD

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TUTORIAL OPTIONS

T16 Practical Pipette Calibration
Sat. Aug. 6 8:00 a.m. - 12:00 p.m. $110/140 $130/160

T15 Chemical Measurement Traceability
Sat. Aug. 6 8:00 a.m. - 12:00 p.m. $110/140 $130/160

T14 Humidity Calibration Tutorial
Sat. Aug. 6 8:00 a.m. - 12:00 p.m. $110/140 $130/160

T13 Laboratory Compliance with ISO/IEC 17025: The How-To Guide
Sun. Aug. 6 8:00 a.m. - 12:00 p.m. $110/140 $130/160

T12 Advanced Topics in Uncertainty Analysis
Fri. Aug 11 8:00 a.m. - 12:00 p.m. $110/140 $130/160

T11 Very Low Pressure Calibration
Sun. Aug. 6 8:00 a.m. - 12:00 p.m. $110/140 $130/160

T10 Introduction to Bayesian Uncertainty Analysis Using WinBUGS
Sat. Aug. 5 8:00 a.m. - 12:00 p.m. $110/140 $130/160

T9 Dimensional Calibration II: Major Instruments and Site Calibration
Sat. Aug. 5 1:00 p.m. - 5:00 p.m. $110/140 $130/160

T8 Balance and Scale, and Weighing Process Uncertainties
Sat. Aug. 5 1:00 p.m. - 5:00 p.m. $110/140 $130/160

T7 Test Equipment Management: A Guide to Key Features & Processes
Sat. Aug. 5 1:00 p.m. - 5:00 p.m. $110/140 $130/160

T6 Temperature Calibration Uncertainties Analysis
Sat. Aug. 5 1:00 p.m. - 5:00 p.m. $110/140 $130/160

T5 Measurement Uncertainty Made Easy
Sat. Aug. 5 1:00 p.m. - 5:00 p.m. $110/140 $130/160

T4 Dimensional Calibration I: Gages and Small Tools
Sat. Aug. 5 8:00 a.m. - 12:00 p.m. $110/140 $130/160

T3 Balance and Scale Calibration and Use
Sat. Aug. 5 1:00 p.m. - 5:00 p.m. $110/140 $130/160

T2 Running an Effective Laboratory - Measuring Performance
Sat. Aug. 5 8:00 a.m. - 12:00 p.m. $110/140 $130/160

T1 Fundamentals of Temperature Calibration
Sat. Aug. 5 8:00 a.m. - 12:00 p.m. $110/140 $130/160

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Job Title: ________________________________

Organization: ________________________________
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Fax No.: ________________________________

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Signature: ________________________________ Date: __/____

Conference currency: USD
**TUTORIAL ABSTRACTS**

**Saturday, August 5, 8:00 AM - 12:00 PM**

**Fundamentals of Temperature Calibration**
Thomas Wiandt & Ron Ainsworth Bio

This presentation is a review of the fundamentals of temperature calibration. Topics include calibration equipment, calibration techniques, curve fitting issues, and the mathematics important to thermometry. Types of thermometers covered include platinum resistance thermometers, thermistors, thermocouples, and combined thermometer/readout systems. This segment is intended for those who are new to temperature calibration, those who need to validate what they already know, or those who just have some nagging questions that need to be answered.

**Running an Effective Laboratory – Measuring Performance**
Malcolm Smith

This tutorial will be of interest to owners, managers, and supervisors of calibration laboratories, both in-house and commercial. The tutorial will cover four areas where performance measurement is important in the running of a laboratory: productivity, finance, marketing and customer satisfaction. The range of measurement systems that can be used to monitor performance in each of these areas will be discussed. Suggestions on how these measures might be used in practice and in concert will be reviewed. Examples of measurements, with discussion of their effectiveness and appropriateness for process improvement, will be given.

**Balance and Scale Calibration & Use**
Val Miller & Mark Ruefenacht

Weighing processes are a significant part of many manufacturing and analytical processes. This tutorial will present an overview of the calibration and use of weighing devices in the analytical environment. It will focus on the use of weighing techniques, correct procedures, eliminating and minimizing sources of errors, and compliance with the weighing requirements of the USP, FDA and ASTM. Classification schemes and calibration procedures for balances and scales will be covered. The approach will discuss the selection and use of standards, artifacts, procedures, facilities, equipment, measurement assurance, and software to determine how each contributes to the quality of mass measurements, the impact on the overall laboratory capability, and the effect on the production environment.

**Dimensional Metrology Calibration I: Gages and Small Tools**
Jim Salsbury & Amosh Kumar

This tutorial will examine the calibration of common gages and small tools found in the dimensional metrology field. Items to be covered include gage blocks, micrometers, calipers, rings gages, indicators, length standards, height gages, squares, straightedges, and many more. Procedures will be presented and measurement uncertainty will be discussed. For those also interested in the calibration of major dimensional instruments, this tutorial continues with the NCSLI tutorial “Dimensional Metrology Calibration II: Major Instruments and Site Calibration”.

**Measurement Uncertainty Made Easy**
Mike Ouellette

Why is it important to express the uncertainty in measurement? Quite simply, there is no traceability in measurements that lack statements of uncertainty at every link of the traceability chain. For this and other reasons, ISO/IEC 17025 requires calibration laboratories, in particular, to provide estimates of uncertainty of their measurements using accepted practices. The instructor will discuss the basics for preparing uncertainty estimates for typical uncomplicated measurement processes. This approach is consistent with the GUM but it dispenses, wherever possible, with the algebraic notations, statistical jargon, arithmetic modeling, and differential calculus operations found in the GUM that perhaps encumber a person who requires no more than a simple, conservative estimate of the uncertainty in the result of a simple measurement process. For these situations, it will be shown that the mathematics is quite straightforward and that the actual challenge, if any, to estimating uncertainty in measurement is in defining the factors that affect the measurement; namely, in understanding the metrology. Participants will receive an example Excel spreadsheet for making simplified uncertainty calculations. The tutorial will include a group exercise. Participants should bring stationery and pocket calculators.

**Saturday, August 5, 1:00 - 5:00 PM**

**Test Equipment Management: A Guide to Key Features & Processes for Successful Implementation**
James Smith

This tutorial will present and examine key features that comprise a holistic internal approach to Test Equipment Management as it relates to the an inventory comprised of General Purpose Test Equipment, a subset of M&TE (Measurement, Inspection & Test Equipment). The scope of features entailed in creating a program are covered with emphasis on potential savings and efficiencies which are examined with real life examples along with identifying roadblocks and success strategies when applied in support of a dynamic & fast changing testing environment.

Flexibility in applications is stressed to assist in molding specific solutions based on customer requirements and the business environment. Emphasis is also placed upon team make-up, skill sets, “Lean” process techniques, easy customer and administrator access, rapid deployment, & LCM (Life Cycle Management). Overviews will be provided for creating a “right sized inventory” along with planning the pool criteria for discipline, model & mfg. acceptance based on business & historic performance factors.

Key Areas: While many attributes contribute to a TEM function this tutorial will cover; Inventory Process, Standardization, Rapid Access, Effective use of “Delay Dating”, Cost Effective Customer Service, Cost Controls, Metrics, Instrumentation Engineering Functions, Metrology relations/throughput, Supplier management as it relates to TEM Business.

Who Should Attend? Equipment Managers & related Staff, Instrument engineers, Companies & Programs looking into creating a TEM function. Current TEM program representatives interested in enhancing their programs and Metrology Managers/ Staff who are looking to augment their processes with TEM processes.

**Balance and Scale, and Weighing Process Uncertainties**
Val Miller

One requirement of traceability of measurement results is calculating the associated measurement uncertainty. This tutorial will present concepts and methods for calculating and evaluating the uncertainty of balance and scale calibrations. Weighing processes in the industrial and analytical environments will also be discussed. Attention will be focused on the sources of errors in weighing operations, methodologies for estimating the magnitude of errors, and computation and reporting of the measurement uncertainty associated with reported weighing measurement results. This approach is based on the content of NIST IR6919, Recommended Guide for Determining and Reporting Uncertainties for Balances and Scales.

**Dimensional Metrology Calibration II: Major Instruments and Site Calibration**
Jim Salsbury & Amosh Kumar

This tutorial will examine the calibration of major dimensional metrology instruments that normally require on-site calibrations, such as coordinate measuring machines, vision instruments, roundness measuring machines, and contour and surface texture measuring instruments. Procedures will be presented and measurement uncertainty will be
discussed. Attendance in the NCSLI tutorial, “Dimensional Metrology Calibration I: Gages and Small Tools”, is not required to get the full benefits of this tutorial.

**Introduction to Bayesian Uncertainty Analysis Using WinBUGS**

William Guthrie & Blaza Toman

The ISO Guide to the Expression of Uncertainty in Measurement provides uncertainties that can be viewed as approximations to a fully Bayesian analysis. However, the approximations used the ISO Guide only allow a restricted set of assumptions about the measurement process and only provide symmetric uncertainty intervals as their output. A fully Bayesian analysis, on the other hand, allows more flexible and realistic modeling of the measurement process and provides a complete probability distribution for the measurand, from which an appropriate uncertainty interval can easily be obtained. With the recent development of high-level software for Markov chain Monte Carlo (MCMC) simulation, Bayesian analysis can now be implemented relatively easily as well, eliminating one of its earlier drawbacks. This course will introduce Bayesian uncertainty analysis using the MCMC software WinBUGS. The course will give insight into the theory underlying Bayesian analysis and MCMC simulation, but will primarily focus on case studies in uncertainty analysis demonstrated using WinBUGS. Participants who bring laptop computers will be able to follow along with demonstrations and so all participants can easily re-work the examples after the course. A limited number of laptops are available from the presenters for participants who do not have a laptop but would like to use one during the course. Please contact one of the presenters in advance to arrange for use of a computer.

**Temperature Calibration Uncertainties Analysis**

Ron Ainsworth & Tom Wiandt

This presentation is a step by step review of the tools necessary to evaluate the uncertainties present in temperature calibrations. Topics include curve fitting errors, error propagation, error budgeting, TURs, and statistical process control. Also discussed will be pertinent fundamentals of uncertainty analysis as outlined in the Guide to The Expression of Uncertainty in Measurement (GUM). This segment is intended for those who are new to uncertainty analysis as well as those who are well versed but require further guidance or clarification.

**Sunday, August 6, 8:00 AM - 12:00 PM**

**Very Low Pressure Calibration**

Karl Kurzt, Michael Bair, John McGonigle

This course focuses on the special challenges of very low gauge and differential pressure calibration. Topics range from the fundamental concepts of pressure measurements to the unique practical issues encountered in hardware setups, data acquisition and the measurement process. The calibration influences that become dominant at very low pressure are analyzed. Hands on application of the material presented in this tutorial can be experienced in the afternoon tutorial --“Very Low Pressure Measurement Applications”.

**Practical Modelling of Measurements for the Uncertainty Evaluation Measurement of Temperature, Pressure and Electrical Quantities**

Dr. Klaus-Dieter Sommer

In accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM), the modeling of the measurement is a key element of the evaluation of measurement uncertainty. It is the aim of the modeling procedure to mathematically establish the relationship between the measurand and all input quantities, which may contribute to the uncertainty associated with the measurement result. This relationship serves as a basis for the uncertainty propagation as well as for computer-aided uncertainty determination. Since neither the GUM nor other relevant uncertainty documents provide any guidance on the systematic modeling of measurements, it appears to be the most difficult problem of modern uncertainty evaluation.

With a view to overcome this problem, a straightforward and highly versatile modeling procedure has been developed which is based on the idea on the classical measuring chain. It is structured into five elementary steps, and only three types of generic modeling components are employed. It is demonstrated that almost all measurements and calibrations can be reduced to only a few generic model structures, which, on their part, can easily be tailored to the particular measurement procedure.

The tutorial will give an introduction to the above modeling concept with numerous examples from measurement and calibration in the steady state. The main focus will be laid on the measurement of temperature, pressure and electrical quantities. On the basis of both, comprehensible and –if desired- advanced exercises and practical examples, the participants will be qualified to systematically analyze and perform the modeling of their measurement and calibration procedures with a view to mathematically establishing the so-called model equations.

Due to the limited number of participants, to a certain extent, the possibility will be given to individually discuss particular modeling problems.

**Laboratory Compliance with ISO/IEC 17025: The How-To Guide for Implementation in your Laboratory**

Dana Leaman

The revision of the standard for accreditation of laboratories, ISO/IEC 17025, was published in May 2005, replacing the 1999 version. Internationally recognized accreditation bodies agreed to a transition period of two years for full compliance with the 2005 revision of this standard from all their laboratories. In meeting this two-year goal, accreditation bodies have worked to interpret the revisions so that application of the requirements is economical for the laboratories as well as technically sound. This presentation will review all the requirements of ISO/IEC 17025:2005 regarding simple, economical ways for implementation with particular focus on the revisions from the 1999 version.

**Humidity Calibration**

Jeff Bennewitz

This tutorial will provide an overview of basic information regarding humidity definitions, dew point, frost point, and relative humidity. Participants will practice humidity calculations and conversions using the HumiCalc humidity conversion software. Instructions will be given for the humidity calibration technique using the 2 pressure humidity calibration standard. The instructor will demonstrate a typical calibration setup of a hygrometer and dew point instruments. Discussion will be held regarding response time and calibration procedure using the 2 pressure humidity standard. Calibration and maintenance of the 2 pressure humidity calibration standard will be discussed in detail.

**Chemical Measurement Traceability**

Marlene Moore

Traceability of chemical measurements is handled in a variety of ways by testing laboratories and calibration laboratories. For many laboratories, the ways of ensuring traceability do not meet the requirements of ISO/IEC 17025. The measurements are presumed to be traceable to a national standard, but the proof of the traceability is not always complete. Outdated industry applications of traceability are often found in laboratories since chemical measurements have not been the focus, until now. The recent need for traceability of chemicals has resulted in new discussions and presentations to improve the industry standards for chemical measurement traceability.

In many industry sectors chemical measurements are presumed to be traceable since the container or certificate from a supplier indicates it is traceable to a national metrology institute (e.g.; NIST). However these certificates do not always include uncertainty values. The certificates if analyzed closely do not ensure full traceability to the purity of the material used, but often only define the traceability to the weight of the material.
In the United States, calibration standards are often traced to the National Institute of Technology (NIST). NIST provides standard reference materials (SRM) and certified reference materials (CRM) for a variety of measurement activities. These standard reference materials provide a stated uncertainty and the laboratory uses this material as a national or reference standard for calibrating test equipment. The materials include a review of the latest definitions for the various types of chemical standards offered by NIST.

Whenever NIST reference materials are not available the laboratory often explores the use of standard reference materials from other internationally recognized bodies that are comparable to NIST. When these are not available, the laboratory ensures traceability to refer-

ence standard providers. These providers do not accredited and the certificates do no always provide information on the uncertainty as defined by the “Guidelines for Estimating the Uncertainty of Measurement” (GUM). An ISO/IEC 17025 laboratory must have a program for ensuring the quality of purchased standard (ISO/IEC 17025 4.6). This will be explored during the tutorial to define the best practices for ensuring traceability of chemical measurements.

Practical examples are presented to show how to evaluate the trace-

ability of chemical measurements. Traceability is the “property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international stan-
dards, through an unbroken chain of comparisons, all having stated uncertainties.” Examples include pH, selecting reference material suppliers, and other recent changes that help ensure traceability of chemical measurements to national standards.

**Practical Pipette Calibration**

George Rodrigues, Ph.D. & Larry Newman

This tutorial session will focus on hands-on experience for calibration supervisors and technicians. Participants will learn:

- How to calibrate and service common pipette models
- Diagnosis and troubleshooting
- Proper technique for using pipettes to achieve best accuracy and precision
- Health and safety risks, including ergonomics and hazardous contamination

The session will be hands-on, practical and interactive. Participants will calibrate, adjust, disassemble and repair pipettes. Reporting of results, including calculation of uncertainty will be covered depending on group interest level.

**Sunday, August 6, 1:00 - 5:00 PM**

### Very Low Pressure Applications

Karl Kurtz, Michael Bair, John McGonigle

This course is intended to follow the NCSLI tutorial “Very Low Pressure Calibration”. Specific low pressure calibration applications are set up for discussion and hands on calibration training. Data taken during the hands on sections is analyzed and the uncertainties associated with the influences present in the calibration process are discussed in detail. Specific problems experienced by students either in their own labs or during the hands on section are discussed as time permits.

### Force Calibration: Methods and Uncertainties

Michael Tovey

Force calibration is a special discipline with many considerations not common to other areas of metrology. Often measurement uncertain-
ties are underestimated due to the omission of significant error sources. Metrologists must consider both mechanical and electrical boundary conditions to achieve calibrations with low measurement uncertainties. Factors such as second order material responses, and interaction of undesired parasitic loading due to fixture characteristics, misalignment of load frame components, stiffness, etc. can have sig-

nificant influence on the measurement result. This tutorial will cover the characteristics of force transducers, force calibration methods, force calibration standards (E74 and ISO 376) and measurement uncertainty models for primary standards, secondary standards and field transfer standards. The tutorial begins at a basic level and leads to discussion of more complex issues.

### Advanced Methods for Metrology – using Excel

Alan Steele & Rob Douglas

The first Supplement to the ISO Guide to the Expression of Uncertainty in Measurement, even in its 2004 draft, defines a standard procedure for evaluating uncertainties in difficult circumstances and for validating uncertainty methods. It proposes “Monte Carlo simulation” as a standard method. In this NCSLI tutorial you will learn to use and to modify Excel macros that perform the Monte Carlo simulations proposed in the ISO Guide’s draft Supplement One. It is a hands-on tutorial: you must bring your own Windows notebook computer, pre-loaded with Excel (97 or later).

The tutorial will cover the basics of Monte Carlo simulation by pro-
gramming in Visual Basic for Applications (VBA). Excel’s program-
manship language for macros. You will need to be comfortable program-
ning in some variety of BASIC, since you will be modifying the inner loop (of tens to hundreds of lines of code) of our Monte Carlo routines to simulate the system or systems chosen from your workplace.

Although VBA suffices for many simulations, some others require access to special programs written in C or FORTRAN, which are impractical to rewrite and re-validate in VBA. Some applications require the faster execution offered by a fully compiled language (more than 10x faster than VBA). Knowing how to harness C or FORTRAN will give you the confidence to tackle more complex problems – although you may be delighted to find how powerful VBA can be even without invoking C or FORTRAN routines.

The tutorial will address how to interface routines both from FOR-
TRAN and from C, but for hands-on work it will use examples from C together with the freely-available Borland C compiler. If you want to participate in C-language hands-on examples, you should also pre-
load your computer with this compiler (details are at http://www.
ibm.com/anx/cntc/calg.czept.html#paragrap102).

We will finish by discussing how Monte Carlo simulation can be used for purposes other than uncertainty analysis. More general probabilis-
tic analysis of decision trees can be done where decisions depend on specific procedures using measurements with characterized ran-
doness. The tutorial’s last focus will be on how to make toolkits and document them so that they are suitable for use by others, and on documenting a procedure’s validation for your quality system.

### Analysis of Quality Control Data for Laboratory Technicians and Managers

Dilip A. Shah

The revised ISO 17025:2005 standard states:

“5.9.1 The laboratory shall have quality control procedures for moni-
toring the validity of tests and calibrations undertaken. The resulting data shall be recorded in such a way that trends are detectable and, where practicable, statistical techniques shall be applied to the reviewing of the results. This monitoring shall be planned and reviewed and may include, but not be limited to, the following:….”

“5.9.2 Quality control data shall be analyzed and, where they are found to be outside pre-defined criteria, planned action shall be taken to correct the problem and to prevent incorrect results from being reported.”

This 4-hour tutorial demonstrates how to collect and analyze quality control data in a laboratory in a systematic manner and assist in satis-
ifying the additional requirements of the ISO 17025:2005 standard. The workshop is targeted for laboratory managers and technicians who are involved in maintenance of standards, test and calibration activities. Practical examples are demonstrated using a spreadsheet. Participants are provided a copy of the spreadsheet template.
Evaluating Measurement Uncertainty in Chemical Laboratories
Dr. Wolfgang Richter & Dr. Klaus-Dieter Sommer

Results of chemical analyses are often used as a basis for important decisions and agreements, particularly in such fields as health care, food chemistry, environmental protection, or international trade, and must therefore be reliable and trustworthy. Knowledge of measurement uncertainty, based on metrological traceability, is an important prerequisite for creating confidence in the quality of measurement and analytical results.

The ISO/BIPM Guide to the Expression of Uncertainty in Measurement (GUM) together with the EURACHEM/CITAC Guide to Quantifying Uncertainty in Analytical Measurement are accepted worldwide as master documents for evaluating measurement uncertainty in a uniform and consistent way.

The tutorial will give an introduction to the concepts of these documents and will provide both, the necessary knowledge and practical "recipes", for the evaluation of the uncertainty of analytical results. Emphasis will be laid on practical examples. These will cover typical applications of chemical analysis often occurring in practice such as, for example, the determination of lead in water using atomic absorption spectrometry and the determination of pesticide residues in a food sample using extraction techniques and gas chromatography.

Optionally, other examples or problems proposed by the participants may be discussed. The tutorial will also address the proper use of data from inter-laboratory studies, method validation and proficiency tests, which are available in most laboratories. The participants will be enabled to evaluate the measurement uncertainty for analytical tasks that typically can be found in every day's laboratory practice.

Measurement of Customer Satisfaction: An application of "soft" metrology
Jean Claude Krynicki

What is customer satisfaction and how to measure it? Available methods to gather satisfaction data. How to build a pertinent customer satisfaction study questionnaire? Measurement process; Measurement uncertainties; Results interpretation and conversion into actionable items; More advanced methods; Inventory of resources. Upon completion of this module the student will be able:
- to design a customer satisfaction measurement tool,
- to perform a reliable interpretation of the result,
- to design presentations for Management reviews,
- to build a customer satisfaction dashboard.

Measurements from 10 μΩ to 1 TΩ with Traceability to the QuantΩ
Barry Wood & Duane Brown

Many metrologists believe that of all of the electrical units, resistance is the most difficult to establish and maintain. Some of the major reasons for this belief are the complexity of the intrinsic resistance standard, the Quantum Hall Resistance, the enormous dynamic range of resistance metrology (> 10^22) and the different measurement techniques and instruments needed to support typical industrial measurement requirements across this range.

Over the past decade there have been significant improvements in all of these areas. Commercial equipment is now available to reproduce the intrinsic standard and to scale resistance measurements over 17 orders of magnitude using only three instruments. The authors will outline the principles and validation and use of the MIL QUANTΩ intrinsic resistance standard. The direct current comparator, the MIL 6010Q, will be reviewed as an instrument for scaling from the quantum Hall resistance onto the resistance range of 1 Ω to 10 kΩ. Then the MIL current comparator extender will be discussed for extension from 1 Ω to 10 μΩ. Finally the operation of the MIL 6008B will be discussed in regards to extension from 10 kΩ to 1 TΩ. For each of these bridges and for specific ranges the performance expectations, typical uncertainty budgets and auxiliary validation tests will be discussed.

Friday, August 11, 8:00 AM - 12:00 PM

Advanced Topics in Uncertainty Analysis
Dr. Howard Casstrup

This tutorial examines methods and techniques of uncertainty analysis taken from the GUM, other published work and current research. Widely used statistical uncertainty analysis tools will be derived from scratch, allowing a discussion of their utility and applicability. In addition, methodologies, such as Monte Carlo, Bayesian, ANOVA, and SPC will be discussed and an error analysis model will be developed that provides a rigorous framework for uncertainty analysis. Concepts will be illustrated using shareware and commercially available software.

Splitting the Second: Stopwatch and Timer Calibrations
Robert M. Graham

Due to the changing regulatory requirements in this country (and around the world), many devices now require calibration that have never before been calibrated. Two of these items are stopwatches and timers. This tutorial will cover the basics of calibrating stopwatches and timers using NIST Special Publication 960-12, Stopwatch and Timer Calibrations, as a reference (copies of which will be provided to the students). Topics to be covered include: Introduction to stopwatch and timer calibrations; deciding if a particular device needs to be calibrated; descriptions of the timing devices that need calibration and why; interpreting manufacturer’s specifications; various calibration methods, the standards required, and how to select the most appropriate method; hands-on practice sessions in the different methods; and finally determining uncertainty budgets and the calculations needed for each method.

Business Practices and Improvements – A Look at the Future
Ernest Garner

Metrology, the science of measurements, is frequently perceived, valued and characterized as an end unto itself. This traditional and narrow view can become a barrier to the business side of metrology, impacting the productivity, profitability and competitiveness of users and clients of metrology organizations as well as the metrology provider. While good metrology is the key to many doors throughout all levels of the economy, all aspects of the metrology organization must be managed to achieve success, to be competitive, and to produce a positive business result. This tutorial will explore the impact of rapidly changing technology on today’s metrology organization and identify tools and approaches that will keep it competitive in the future. Starting with current business practices, we will examine ways the metrology organization may have to change in order to assure its future, and we will discuss new ways of strategic thinking to meet tomorrow’s challenges.
### Guest Registration

#### NCSL International 2006 Workshop and Symposium

**August 6-10, 2006 - Nashville, TN**

- **Conference language:** English
- **Conference currency:** USD

#### Registration Options

- Register on-line at www.ncsli.org
- Fax or Phone Credit Card Registrations to:
  - Fax: 303.440.3384  –  Phone: 303.440.3339
- Mail Check or Credit Card Registrations to:
  - NCSL International, 2995 Wilderness Place, Suite 107, Boulder, CO 80301-5404

#### Guest Program Dates & Fees

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Date</th>
<th>Time</th>
<th>Type</th>
<th>Price Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evening Reception</td>
<td>Sun Aug. 6</td>
<td>7:00 p.m. - 9:00 p.m.</td>
<td>N/C</td>
<td></td>
</tr>
<tr>
<td>Orientation and Continental Breakfast</td>
<td>Mon Aug. 7</td>
<td>7:30 a.m. - 8:30 a.m.</td>
<td>N/C</td>
<td>$45</td>
</tr>
<tr>
<td>Tour &quot;Historic Franklin&quot; (no lunch)</td>
<td>Mon Aug. 7</td>
<td>10:30 a.m. - 4:30 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tour &quot;World Famous Jack Daniels Distillery&quot;</td>
<td>Tue Aug. 8</td>
<td>9:00 a.m. - 4:00 p.m.</td>
<td>$60</td>
<td></td>
</tr>
<tr>
<td>Conference Reception &amp; Banquet - Entertainment</td>
<td>Tue Aug. 8</td>
<td>6:00 p.m. - 9:30 p.m.</td>
<td>$85</td>
<td></td>
</tr>
<tr>
<td>Tour &quot;Historic Homes&quot; (no lunch)</td>
<td>Wed Aug. 9</td>
<td>9:30 a.m. - 2:30 p.m.</td>
<td>$65</td>
<td></td>
</tr>
<tr>
<td>International Event - Wildhorse Saloon</td>
<td>Wed Aug. 9</td>
<td>6:00 p.m. - 10:30 p.m.</td>
<td>$75</td>
<td></td>
</tr>
<tr>
<td>Tour &quot;World Famous Jack Daniels Distillery&quot;</td>
<td>Fri Aug. 11</td>
<td>9:00 a.m. - 4:00 p.m.</td>
<td>$60</td>
<td></td>
</tr>
<tr>
<td>Lunch &quot;How Nashville Became Music City&quot;</td>
<td>Mon Aug. 7</td>
<td>12:15 p.m. - 1:45 p.m.</td>
<td>$35</td>
<td></td>
</tr>
<tr>
<td>Lunch Member Delegates' Meeting</td>
<td>Tue Aug. 8</td>
<td>12:15 p.m. - 1:45 p.m.</td>
<td>$35</td>
<td></td>
</tr>
<tr>
<td>Lunch &quot;Songwriter Showcase&quot;</td>
<td>Wed Aug. 9</td>
<td>12:15 p.m. - 1:45 p.m.</td>
<td>$35</td>
<td></td>
</tr>
<tr>
<td>Lunch &quot;Grand Ladies of Country Music&quot;</td>
<td>Thur Aug. 10</td>
<td>12:15 p.m. - 1:45 p.m.</td>
<td>$35</td>
<td></td>
</tr>
</tbody>
</table>

#### Registrant Information

(Please print or type)

- **First Name:** __________________________
- **Last Name:** ___________________________
- **Telephone Number:** _____________________
- **Organization:** _________________________
- **City/State/Zip/Country:** __________________
- **Telephone Number:** _____________________
- **Address:** ____________________________
- **Phone Number:** ________________________
- **E-mail:** _____________________________
- **City/State/Zip/Country:** __________________

**Special Accommodations**

- Please check here if you require special ADA, wheelchair, or dietary needs, and attach a written description so we may serve you.

**Credit Card Information**

- **VISA** □ Mastercard □ American Express □ Discover Card #: ___________________________ Exp. Date: ____ / ___
- **Signature:** ___________________________ Date: ____ / ___

### Cancellation Policy

- **NCSLI Related Events:** Cancellations received IN WRITING before 5:00 p.m. (Eastern) on July 11, 2006, will be subject to a service charge of $30 per registration. No refunds will be issued for cancellations received after 5:00 p.m. (Eastern) on July 11, 2006. Registrations may be transferred from one party to another BY WRITTEN REQUEST RECEIVED through August 1, 2006. NCSLI reserves the right to cancel any of the Guest Program events if the number of registrations is below the contracted minimum with the tour company. In that event, a full refund will be issued.

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**For NCSLI Use Only**

- Registration Received: ____ / ____
- CK # / CC App #: __________________________
- CK / CC App Date: ____ / ____
- Payment Received: ____ / ____
- PO / Inv. #: __________________________
- Amount: $___________
- Entered: ____ / ____
The 15-block original downtown area of Franklin dates from 1799, and the history shows! Franklin is a Tennessee Main Street Community under the
National Trust for Historic Preservation and its public square provides quarters for retailers, bankers, attorneys and residents. The charming downtown
area with its restored and renovated 19th century homes and shops is listed in the National Register of Historic Places. Franklin's Main Street is lined
with specialty shops, antique stores, and restaurants and its close proximity to Nashville further enhances its recreation and entertainment fare. One of the
reasons Franklin is called the prettiest town in Tennessee is its historic public square, with a Confederate soldier at its center and a sweep of lovely
Victorian and modern buildings along Main Street, which boasts some of the loveliest architecture to be found anywhere. A recently completed
streetscape project compliments the architecture with appropriate lighting, plantings and public improvements. In 1995 the National Trust for Historic
Preservation awarded Franklin one of five Great American Main Street Awards for its outstanding downtown revitalization. Franklin earned the honor in a
nationwide competition with other towns and cities.

Monday Tour: Historic Franklin Tour (no lunch). $45
Driving tour of Franklin, TN

The 15-block original downtown area of Franklin dates from 1799, and the history shows! Franklin is a Tennessee Main Street Community under the
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Preservation awarded Franklin one of five Great American Main Street Awards for its outstanding downtown revitalization. Franklin earned the honor in a
nationwide competition with other towns and cities.

The Factory at Franklin

After touring the Carter House, it is off the The Factory at Franklin. The Factory is a vibrant shopping, dining, and entertainment complex located in Franklin, Tennessee. A member of the National Register of Historic Places, the FACTORY occupies the 1929 factory that once served as the Dortch Stove Works, Magic Chef, and later the Jamison Bedding Company. This unique facility will meet all of your shopping, meeting, dining, entertainment and special events needs. The Factory is located six blocks from historic downtown Franklin, and just minutes from the Cool Springs Shopping Mall. Many "Stars" have performed at the Factory and many have been photographed here. CMT/TNN uses areas for live broadcasts of live music shows. Your group will have time to browse the many shops and enjoy lunch at Th Stoveworks Restaurant.

Tuesday & Friday - World Famous Jack Daniel's Distillery Tour. $60

Jack Daniel Distillery

Journey back in time to the oldest registered distillery in the United States, the Jack Daniel Distillery. Located in Lynchburg, Tennessee, see how the famous “sippin’ whiskey” is made. You will experience a first hand account of every step in the process of making the world famous Jack Daniel’s whiskey, from the beautiful cave spring that produces pure limestone water, to the burning of Moore County hard sugar maplewood which is used in the charcoal mellowing process. In addition, you will enjoy visiting the 1886 renovated bottlery, which is now the Jack Daniel Amber Lager Brewery.

Miss Bobo’s

Just off the town square, beneath the outstretched branches of an old maple, rests Miss Mary Bobo’s Boarding House. Since 1908, this simple white Federal-style house has served as home to fine traditional Tennessee cooking and a gracious taste of Southern hospitality. Miss Mary Bobo’s Boarding house began back in 1908 when a young Miss Mary assumed ownership of the historic Salmon Hotel. The original structure was raised in 1867 as a traveler’s hotel and is built over a natural spring. Miss Mary ran the boarding house until her death at 101 in 1983. Today, Miss Lynne Tolley presides over the boarding house where her famous great-grand uncle, Mr. Jack Daniel, once took his daily noon-time meal. To honor Mr. Jack’s spirit, a recipe prepared with just a taste of the “hometown product” regularly graces the table. True to Southern boarding house tradition, guests sit together at large family tables alongside a gracious Lynchburg hostess who encourages conversation, shares a bit of local lore and ensures dishes are passed to the left. Miss Mary’s menu varies daily but always includes generous helpings of two home-style meats, six vegetables and side dishes, hot cornbread, biscuits or rolls, freshly brewed ice tea, homemade dessert; and a piping hot cup of coffee.

Wednesday - Historic Homes Tour (no lunch). $65

Belle Meade Plantation

Belle Meade Plantation represents a full 100-year span of Tennessee history and architecture. Today, 30 acres remain of the once 5,400-acre plantation, making this one of the South's most outstanding show places. On the National Register of Historic Places, Belle Meade Mansion had been beautifully restored to reflect the sumptuous elegance of the 19th century. Elaborately furnished with antiques and art of the period, Belle Meade brings to life true antebellum Tennessee. Visit the mansion's colossal carriage house, which is filled with restored antique carriages, and see the stables, which once housed some of horse racing's finest lineage. The garden, smoke house, and dairy give a glimpse of the practical and pastoral side of life at one of the South's most interesting and visually rewarding showplaces. Come and meet the "Old South" at the queen of Tennessee plantations!

Next, it is off to Cheekwood. Once the private estate of the Leslie Cheek family, of the Maxwell House Coffee fortune, Cheekwood today includes the Botanical Garden, the Museum of Art, landscaped lawns and forested hills. The neo-Georgian mansion built in 1929, features architectural treasures from some of the great houses of Europe. The mansion, that now houses the Museum of Art, is surrounded by the Botanical Garden. Breathtaking designs feature perennials, an Herb Study Garden, Japanese Garden, grand vistas, and bubbling streams. New sites opened in 1998 include the new Frist Learning Center, Color Garden, renovated Water Garden, the Woodland Sculpture Trail and the Seasons Garden.
New Metrology Publication

NCSL International is pleased to announce it is launching a new metrology scientific/technical trade journal titled "measure." The journal’s primary audience is centered on calibration laboratory personnel - from laboratory managers, to project engineers, to calibration technicians. NCSL is looking forward to partnering with its Member-ship in the development of this new, quarterly scientific trade publication.

Practical Information

This journal will provide up-to-date information on:

- Calibration techniques
- Uncertainty analysis
- Measurement standards
- Laboratory accreditation
- Quality processes
- Metrology review articles

Magazine Features

- Calibration laboratory excellence
- Industry-wide best metrology practices
- New trends/opportunities in training
- Emerging technologies
- New and existing standards
- Innovative standards & calibration equipment
- Support software
- New products and services

YES: The valuable NCSLI Newsletter will continue to be published with its distinct content of committee updates, liaison news, BOD reports, etc.

NCSLI invites both its Members and measurement science leaders to be a part of this new metrology focused journal!

To contribute a technical article, tech tips, or letter to the Editor, please contact:

Dr. Richard Pettit, Managing Editor
NCSL International measure
Phone: (505) 292-0789
Email: <measure@ncsli.org>

Technical Submissions

All technical articles in measure will be refereed by the NCSLI Technical Review Board, currently managed by Dr. Richard Pettit, Managing Editor. Technical articles are solicited on topics relevant to calibration laboratories, such as:

- Calibration procedures or techniques
- Uncertainty of measurement
- Laboratory accreditation and quality systems
- New or updated metrology standards
- Background/review articles in above areas

For more information, please see "Author Manuscript Instructions" at <www.ncsli.org/measure/tc.cfm>.

Advertising Opportunities

All advertising is reserved exclusively for NCSLI Member Organizations. If you are interested, please see www.ncsli.org/measure/ads.cfm for pricing, specifications, publication calendar, and deadlines.

New Products or Services

NCSLI Member Organizations may announce in NCSLI measure the introduction of their new product(s) or service(s) that are of interest to the NCSLI membership. For more information, see www.ncsli.org/measure/psa.cfm.

For advertising, please contact:

Craig Gulka
Business Manager, NCSL International
Phone: (303) 440-3339
Email: <cgulka@ncsli.org>
WORLD METROLOGY DAY, 2006

Andrew Wallard, Director, BIPM

WMD 2006 preparations are moving ahead. The day (20 May) is the anniversary of the signing of the Metre Convention in 1875 in the French Foreign Ministry (France is the holder of the Convention - see photo below of the room in which the signing took place). For a few years several folk have encouraged me to draft a message which they can use to promote metrology at a national level. The 2006 “message” will be available on the BIPM’s website on 20 May.

A photograph of the Metre Convention document which was signed in 1875.

Quite a considerable number of such Metrology Days were organised around the globe in 2005, hence a second WMD in 2006. As with all such slogans and messages, we hope to draw attention to a number of aspects of measurement and this year, I’d like to highlight the use made of better measurement practice in the relatively new application area of laboratory medicine (as an example of how metrology is extending its influence), in reduction of technical barriers to trade (highlighting a statement by us, OIML and ILAC on the relevance of various MRAs to the reduction of TBTs) and the launch of the 8th SI brochure.

In this elegant room of the French Foreign Ministry, in 1875, the global convention of the Metre was signed. The room is called the “Salon de l’Horloge” (the clock room) and is the main diplomatic reception room in the Foreign Affairs Ministry - the “Quai d’Orsay.” The building, in the Second Empire style, was completed in about 1855 at the instigation of Napoleon III. The main feature is the clock and the splendid fireplace. It has been the location for many famous events - including the signing of the Metre Convention on 20 May 1875 - amongst which were the 1919 Peace Conference and the launch of the “European Coal and Steel Community” in 1950 - the forerunner of the European Community.

The declaration with OIML and ILAC, below, is fully in the public domain and is on the BIPM web site.

Statement: The Relevance of Various International Agreements on Metrology to Trade, Legislation And Standardization

On behalf of the International Bureau of Weights and Measures (BIPM), the International Organization for Legal Metrology (OIML) and the International Laboratory Accreditation Cooperation (ILAC), we draw your attention to the joint declaration produced by these three bodies.

The initial motivation for this declaration comes from the 22nd General Conference on Weights and Measures (CGPM) at which national delegations unanimously endorsed a resolution which dealt with the importance of mutual recognition of measurement standards, calibrations and tests. Resolution 6 asked the International Committee for Weights and Measures (CIPM) to draw up a declaration on the importance and application of its Mutual Recognition Arrangement (the CIPM MRA) for trade, commerce, and regulatory affairs. The Resolution also invited Member States of the Metre Convention to promote the CIPM MRA as a framework for the acceptance of calibration and measurement certificates from national metrology institutes (NMIs) as well as from accredited laboratories which could demonstrate traceability of their measurements to the International System of Units, the SI.

In preparing the declaration, the CIPM recognized that its MRA was complemented by similar Arrangements drawn up by OIML and ILAC. Indeed, all three are interlinked and all support the equivalence and acceptability of SI-traceable measurements world-wide. The aim of this international measurement system is to provide users with measurement results which can be accepted everywhere without the need for further measurements. An important feature of this system is that its use can help reduce the effects of technical barriers to trade and can provide a secure base for scientific and other measurements throughout society.

We invite you to endorse the declaration and the relevance of its contents to the work of your organization.

We would of course be pleased to receive any comments or remarks you may have on how you may wish to take advantage of these MRAs.

Signed:

Director of the BIPM
Prof. Andrew Wallard

Director of the OIML
Mr. Jean-Francois Magana

Chair of ILAC
Mr. Daniel Pierre
"Global Confidence Through SI Traceability" From Metrology Day, 2005

Editor's Note: For World Metrology Day in 2005, I published Andrew Wallard's BIPM organization recognition of the event. Some of that content is still applicable, so for 2006, I have excerpted parts of his treatise. It can be seen in its entirety in the April 2005 Newsletter.

On 20 May 1875, 17 States became the founding Members of the Metre Convention. The Convention is the second oldest intergovernmental treaty arrangement and set the scene for what is now 130 years of achievement and success in the establishment of a global infrastructure for precise, accurate and traceable measurement. Today there are 51 Members of the Convention and 17 Associate States and Economies of the General Conference on Weights and Measures. The first members of the Convention and the staff of the Bureau International des Poids et Mesures (BIPM) started with the metre and the kilogram as reference standards. However the work of the Convention now extends to a much greater number of international measurement standards and is making its presence felt in fields as diverse as biological standards and nanotechnologies.

We celebrate the 20th May as a day on which metrologists globally can be proud of their quiet, largely unseen, but influential achievements. They can look back on a successful past, and look forward to another 130 or more years of service to the scientific, technical, commercial, and social applications of precise, traceable measurements within the International System of units (SI).

This message from the BIPM, which is at the heart of world metrology, is a challenge to, as well as recognition of, the immense contributions of many thousands of metrologists throughout the world. It also aims at drawing the attention of Governments from our Member States and others, as well as international bodies, to the benefits of good metrology and the very large economic benefits which come from their investments. Many studies have shown a clear and very large techno-economic benefit from public investments in metrology. One recent UK study put the return from their £40 million national investment at over £5000 million! Similar figures apply to economies of all sizes and stages of economic development. The benefits of metrology touch us all, wherever we live and whatever we do.

The economic success of nations depends upon our ability to manufacture and trade precisely measured and tested products and services. Metrology is central to the manufacturers, suppliers and customers of goods and services. All groups must have confidence in the accuracy and reliability of the measurements made at every level of precision.

The maintenance of human health depends critically on the ability to make accurate diagnosis, and deliver precise treatment in which reliable measurement is essential. This also supports an industry worth hundreds of billions of dollars worldwide. For many years we have focussed on radiation dosimetry and radionuclide activity measurements and we continue to improve the uncertainties in the dissemination of the international reference standards for radiotherapy measurements in particular.

Metrologists working in different areas specialize in different types of measurements. At the highest scientific level, metrologists ensure the consistency of the International System of Units, which built on the early units of the Metric System and which was formally created in 1960. Their work usually involves research into the definitions of the units and ways of realizing them with sufficient accuracy to meet the needs of society and the world of scientific research. Legal metrologists are involved in aspects of metrology in the regulated sector, which directly concern consumers. Both metrologies are essential in ensuring consistent national measurement systems, traceable to international standards; thereby establishing that measurements and tests made in different countries can be regarded as equivalent.

The maintenance of the world's system of units takes many forms, from direct dissemination of units (as in the case of mass and time) to coordination through international comparisons of national measurement standards (as in length, electricity and ionizing radiation). Such comparisons are coordinated by the International Committee for Weights and Measures, the CIPM.

The creation in 1999 of the CIPM Mutual Recognition Arrangement (MRA) marked a major advance in the internationalization of metrology. A means of increasing confidence in the technical abilities of participants from laboratories around the world to make equivalent measurements and enable the provision of calibration certificates that are validated, verified and accepted by all signatories represents a significant contribution to the reduction to technical barriers to trade.

Some people claim that the CIPM MRA is as influential as the Metre Convention itself. Time will tell, but it is clear that metrologists are actively involved in practical research to produce results which bring potentially huge benefits to society at large. One recent estimate is that the impact of the CIPM MRA in reducing technical barriers to trade is worth over $4 billion.

To achieve all this, a continuous upgrading of technology and expertise is needed. Typically the accuracy required of national measurement standards doubles every ten years. This demand for increasing precision and uniformity applies not only to national standards but also to the implementation of quality systems based on international standards. For example, the ISO/IEC 17025 quality standards require that all measuring instruments used for production or service are calibrated; where calibration means the comparison of the instrument's measurements with standards or reference materials of known value.

The international work of the BIPM demonstrates that the Metre Convention is still a living instrument, responsive to the current needs of globalization. This is a testament to the sagacity of those who met in Paris in May 1875. The adventure of metrology is an enterprise which has been propelling the evolution of the modern world and which continues to excite the imagination and to assist society.

<http://www.bipm.org>
NCSLI MEETINGS
August 6-10, 2006
NCSLI Workshop & Symposium
Nashville Convention Center, Nashville, TN
CONTACT: NCSL Business Office, (303) 440-3339
Fax: (303) 440-3384
e-mail: <info@ncsli.org>
website: <www.ncsli.org/conference>

INDUSTRY MEETINGS
April 24-28, 2006
Manufacturing & Measurement Conference
Doubletree Hotel, Nashville, TN
CONTACT: Ed Pritchard, (865) 938-0365
Fax: (865) 938-0365
e-mail: <epritcha@tds.net>
Webpage: <www.qualitymag.com/mmcw/>

May 9-11, 2006
5th International Symposium on Humidity and Moisture
INMETRO, Rio de Janeiro, Brazil
CONTACT: Julio D. Brionizio, 55-21-2679-9066
e-mail: <ishm2006@inmetro.gov.br>

May 2-5, 2006
5th International Symposium on Humidity and Moisture
INMETRO, Rio de Janeiro, Brazil
CONTACT: Ed Pritchard, (865) 938-0365
Fax: (865) 938-0365
e-mail: <epritcha@tds.net>
Webpage: <www.qualitymag.com/mmcw/>

May 16-17, 2006
CIE Symposium and Division 1 Meeting
NRC, Ottawa, ON, Canada
CONTACT: website: <www.iscc.org/jubilee2006>

June 25-28, 2006
5th Oxford Conference on Spectrometry
National Physical Laboratory, Teddington, Mx, UK
CONTACT: UK - Fiona Jones <fiona.jones@npl.co.uk>
US - Art Springsteen <arts@aviantechnologies.com>
Maria Nadal <maria.nadal@nist.gov>
David Wyble <wyble@cis.rit.edu>

September 17-22, 2006
16th IMEKO World Congress
Rio de Janeiro, Brazil
CONTACT: Chester Franklin, (951) 313-3866
Fax: (951) 736-7390
e-mail: <cfranklin@cscnorco.com>

October 25-27, 2006
Symposium of Metrology
CENAM, Santiago de Queretaro, Qro., Mexico
CONTACT: website: <www.cenam.mx>

November 14-16, 2006
16th Intl. Conference of the Israel Society for Quality
David Inter-Continental Hotel, Tel Aviv, Israel
CONTACT: ISAS International Seminars, 972-2-6520574
Fax: 972-2-6520558
e-mail: <register@isas.co.il>

NY/PA/NJ REGION
New York Section Meeting
April 26, 2006
Dayton T. Brown, Inc., Bohemia, NY
CONTACT: Don Bansen, (631) 589-6300 x723
Fax: (631) 244-6234
e-mail: <dbansen@dtb.com>

NORTH CENTRAL US REGION
April 19, 2006
Uncertainty Road Show
Abbott Laboratories, Chicago, IL
CONTACT: Andrew Duchaine, (847) 991-0290
e-mail: <andy@jhmetrology.com>

SOUTHWESTERN US REGION
Phoenix/Tucson Section Meeting
April 18-19, 2006
Measurement Technology Symposium
Arizona State University, Phoenix, AZ
CONTACT: Rob Parchinski, (480) 323-6072
rob.parchinski@boeing.com

CANADA REGION
April 20-21, 2006
Hotel Mortange, Quebec
CONTACT: Jim Mullins, (613) 226-7920 x230
e-mail: <jmullins@pylonelectronics.com>

CHECK WEBSITE FOR UPDATES
<www.ncsli.org/events/>

You can submit information on your upcoming Region/Section meeting, Committee meeting, or other Metrology-related event on the web! Just click on “Calendar” then “Submit an upcoming event”. Get listed and increase awareness and attendance!
EUROPEAN COOPERATION IN METROLOGY (EUROMET)
Seton Bennett, EUROMET Representative to the Board

Two new National Metrology Institutes in Europe!

The last year has seen the creation of two new major European NMIs. In January last year, the French government created the Laboratoire national de métrologie et d’essais (LNE) <http://www.lne.fr/index_en.html>, with overall responsibility for French Metrology. LNE will represent France in the work carried out by the Bureau International des Poids et Mesures (BIPM) and in EUROMET. LNE works closely with three other national metrology laboratories:

LNE-INM (Institut National de Métrologie), part of the Conservatoire National des Arts et Métiers (CNAM), which works in the fields of length and dimensional metrology, mass and related quantities, radiometry-photometry, temperature and thermal quantities;

LNE-LNHB (Laboratoire National Henri Becquerel), part of the Commissariat à l’Energie Atomique, which is responsible for developing reference standards in the field of ionising radiation;

LNE-SYRTE (Systèmes de Référence Temps-Espace), part of the Observatoire de Paris, which is responsible for developing reference standards in the time & frequency field.

It also relies on six associate laboratories for work in highly specific fields:

CETIAT (Centre Technique des Industries Aérauliques et Thermiques) for hygrometry, liquid flow measurement and anemometry;

ENSAM-Paris (Ecole Nationale Supérieure d’Arts et Métiers de Paris) for dynamic pressure;

FEMTO-ST (Franche-Comté Electronique, Mécanique, Thermique et Optique - Sciences et Technologies) for time & frequency;

IRSN (Institut de Radioprotection et de Sûreté Nucléaire) for neutron dosimetry;

LADG (Laboratoire Associé de Débitmétrie Gazeuse) for gas flow measurement;

Observatoire de Besançon for time & frequency.

The new Laboratory has set up a Metrology Committee to oversee decisions and long-term strategy. Comprising 14 leading scientists and metrologists and representatives of the French Ministries of Industry and Research, the Metrology Committee will steer research work in priority fields, align investment with research programmes and create mixed units of researchers where possible. Jean-Luc Laurent was appointed Managing Director of the LNE at the beginning of 2006, taking over from Marc Mortureux, who has become Senior Vice-President for Administration and Finance at the Pasteur Institute.

On 1 January this year, a new National Metrology Institute was created in Italy with the merger of the Istituto Elettrotecnico Nazionale "Galileo Ferraris" (IEN) and the Istituto di Metrologia "Gustavo Colonnetti" (IMGC) to establish the Istituto Nazionale di Ricerca Metrologica (INRIM). INRIM is a new public body with the task of carrying out and promoting research in the field of metrology. It will assume responsibility for all the activities of the two former institutes, including representation in all the EUROMET TCs, except for TC-IR where ENEA-INMRI at the Casaccia Research Centre <http://www.enea.it/com/ingl/default.htm> will maintain its previous role.

As the primary metrological institute for Italy, INRIM will generate and disseminate knowledge in metrology and materials research in order to promote the development of the economy, technology and society in Italy. It will also continue to provide consultancy and other services on request.

The president of the new institute is Professor Elio Bava, formerly president of IEN.

A new website <www.inrim.it> is under construction.

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ILAC/NACLA REPORT
Anthony Anderson

International Laboratory Accreditation Cooperation (ILAC) Laboratory Committee (LC)

There has not been a meeting of the ILAC Laboratory Committee (LC) or the ILAC Executive since the General Assembly in Auckland New Zealand last September.

As I reported in my October Board report after the successful decision to allow a statement about meeting the principles of ISO 9001:2000 in conjunction with laboratory accreditation, calibration and test certificates, implementation is now in progress. The ILAC Secretariat has issued to all AB’s guidance on how the documents are to be used and although translations are permitted, the original signed communiqué in English must accompany all certificates. It should be noted that until a laboratory has been assessed to the 2005 version of ISO/IEC 17025, use of the statement and communiqué is not allowed. Even though some AB’s have indicated that they will not be instructing their accredited laboratories to use the documents, the LC continues to urge all laboratories to persuade their respective AB’s to reconsider and explain the benefits of providing more market clarity on the issue of accreditation versus certification.
Reports from the Board

Following the decision in Auckland to allow wider use of the ILAC MRA Mark, the Accreditation Committee (ARC) will prepare modifications to the license agreements used between ILAC and the AB's and the sub-license agreements used between the AB's and their accredited laboratories.

The issue of PT frequency continues to be monitored by the LC. The idea that one size fits all is inadequate for testing laboratories. Although the recently published P9 has attempted to address some of the problems, it may have made a bad situation worse.

For calibration laboratories the four-year cycle appears to be acceptable to most and is unlikely to be changed. The LC will be soliciting information from testing laboratories to share with the ILAC committees involved with the frequency issue.

ILAC has been trying to get more visibility for accreditation and for ISO/IEC 17025 within ISO itself. ILAC believes that whenever a measurement forms the basis for any decision, ISO/IEC 17025 chapter 5 should be the normative reference included in any other ISO standard or document. This will provide confidence in decisions made because they will be based on reliable and accurate measurement results that are fit for their intended use. ILAC is proposing to CASCO that they approach the ISO Council to request that ISO Directives and Procedures be amended to include ISO/IEC 17025 Chapter 5 as the preferred reference in all ISO documents, which are relevant to testing, measurement and calibration.

The ILAC Executive and associated committee meetings were in Tel Aviv, Israel, February 19 through 24, 2006 and the next Laboratory Committee meeting will be in Madrid, Spain May 8 & 9, 2006.

National Cooperation for Laboratory Accreditation (NACLA)

The last NACLA Board meeting of 2005 was held in Indian Rocks, Florida, at the beginning of November. High on the agenda was a report by the new Quality Manager, Thom Adams, of the status of the NACLA quality and documentation system. Although NACLA has a complete quality system, it appears to be much too complex and unrealistic for an organization of NACLA's size. Consolidation and simplification are needed, so that staff and volunteers can readily and consistently comply with the system's requirements.

A secure area of the NACLA web site is being prepared to provide access to more NACLA documents than is presently possible. Much of what exists will be consolidated at the Secretariat in Florida. The Board has approved that the temporary housing of the Secretariat since it left NIST two years ago become permanent at the first of the year at the Florida location. Dedicated space at the GCS facility has been set aside for the NACLA office and separate communications and data systems will shortly be installed. The NACLA web site is also being moved to a dedicated hosting service with the Secretariat taking over webmaster duties.

At the November Board meeting, the Board reaffirmed NACLA's position that the organization is MRA driven and will continue to conduct its business as a cooperation in line with all the other accreditation cooperations around the world. All seven signatories to the NACLA MRA have now signed the revised version approved at the August Board meeting.

EUROLAB REPORT
Horst Czichos

New EUROLAB President and Vice-President

Bent Larsen, Denmark, and Guy Jacques, Belgium, will take over as new acting EUROLAB President and Vice-President, since Marc Mortureux, France, was appointed new director of the famous French Pasteur Institute and thus had to resign as EUROLAB president.

Transfer of the EUROLAB Technical Secretariat

The EUROLAB Technical Secretariat will be transferred now after 7 years at BAM, Germany, to LNE in France from the beginning of 2006. However, for a transition period until June 2006, the BAM secretariat will still remain active in parallel.

The new contact data are EUROLAB, 1, rue Gaston Boissier, 75724 Paris Cedex 15 - France, <eurolab@lne.fr>. Tel: +33.1.40.43.39.23. The new secretary will be <Jean-Marc.Aublant@lne.fr>.

Measurement Uncertainty: EUROLAB's aid for laboratories

EUROLAB-Germany has set up uncertainty circles as self-help groups to discuss real examples and problems from daily practice in laboratories. A first uncertainty circle was set up in the field of microbiology, which had its first meeting in November 2005. Also in the field of analytical food chemistry, an uncertainty circle is being set up, as well as a circle for beginners in general.

EUROLAB Technical Report on Measurement Uncertainty

The draft EUROLAB Technical Report on Measurement Uncertainty is currently under discussion within EUROLAB and may be published soon.

Acoustics Laboratories Network "ACOUSTILAB"

EUROLAB Spain has created a network of laboratories specialized in acoustics called "ACOUSTILAB" to initiate collaboration with other laboratories in the same field.

Computer Guideline to be published in 2006

The first draft of the "Guideline for the use of computers and software in laboratories with reference to ISO 17025" is now available and discussed internally in EUROLAB's working groups. Greg Gogates from the U.S. has also been involved in the drafting group. Publication of the guide is to be expected in 2006.

Revision of the European legislation for products

The concept of Europe's legislation for products is called the "New Approach" involving European directives for the different product groups and the CE marking of products in conformity with these requirements. Currently the concept of the "New Approach" is under revision by the European Commission. A main focus is the use of accreditation as a proof of the conformity assessment bodies' competence as well as the structure of EA (European Cooperation for Accreditation) to prove the accreditation bodies' harmonized performance. Also market surveillance will be improved. A first consolidated paper was discussed in December and a final proposal from the Commission is expected in the first half of 2006.
Changes To The SI Units

During the past few months there have been several developments on possible re-definitions of the SI, particularly the kilogram. For many years, a number of NMIs have been researching new approaches to the replacement of the international kilogram as the SI unit of mass. Progress has been steady and there is now every prospect that the two major approaches - the watt balance and the International Avogadro consortium - will result in convergent results which could provide the basis for a redefinition within the next few years.

We now need to study the best approach and the best timing of any redefinition. An immediate redefinition based on a fixed value of the Planck or Avogadro constant may, as some have recommended, bring benefits to the fundamental constant community. However, the relevant Consultative Committees and the International Committee for Weights and Measures (CIPM) have taken the view that more work is needed before the General Conference on Weights and Measures (CGPM) could be asked to make a redefinition. In addition, the Consultative Committee for Mass (CCM) drew attention to the major implications for the mass community of a redefinition which assigned a conventional value to the international kilogram, and which may have to be changed in the light of subsequent experimental results.

Bearing in mind the progress made in measurements of the fundamental constants in the electrical area, the Consultative Committee for Electricity and Magnetism (CCEM) also considered the implications of possible changes in the definition of the ampere, which could be based on a fixed value of the charge of the electron. Like the CCM, it urged National Metrology Institutes (NMIs) and others to consult with user communities so that plans could be put in place to raise awareness of, and to plan for, any changes.

The Consultative Committee for Temperature (CCT) also pointed out that better measurements of the Boltzmann Constant which are in progress worldwide may present an opportunity to redefine the kelvin. As a result (qv) the CIPM drew these responses together and recommended a number of actions to prepare for any recommendations on the SI definitions which the CGPM might make at its meeting in 2011.

In December 2005, we finalized two important documents which have been drawn up in collaboration with other intergovernmental and international bodies. The first, drawn up with the International Laboratory Accreditation Cooperation, ILAC, concerns the relationships between NMIs and the accredited sector. It sets out best practice and comments on the importance of a dialogue between these two elements of the world metrology system.

The second document is the result of a Resolution from the 23rd CGPM and deals with the importance of Mutual Recognition Arrangements, especially in relation to technical barriers to trade. This document has been developed in partnership with the OIML (International Organisation for Legal Metrology) and the ILAC. Both documents have been sent to a wide range of organisations and can be found on the BIPM web site.

The CIPM MRA continues to occupy the time of many staff members of the BIPM as well as that of many more colleagues in NMIs and Designated Institutes worldwide. With the launch of the joint statement with ILAC and OIML, we hope to raise the profile of the CIPM MRA with Governments, regulators, and others and thereby find ways of engaging their interest in, and commitment to, its use in a larger number of international agreements. The best way of keeping up to date with developments in the CIPM MRA and the key comparison data base (KCDB) is to subscribe to the free KCDB newsletter which is freely available from the BIPM web site. This can be done online through the BIPM web site <www.bipm.org>.

One measure of success of the CIPM MRA is the number of new signatories and the number of new Associate States and Economies of the CGPM. Whilst the number of Member States remains the same at 51, there are now 20 Associates. Fortyfive Member States and all 20 Associates have become signatories, in addition to two international organisations. Croatia, Kazakhstan and CARICOM have all become Associates in the last year. The CARICOM is a formal economic grouping of 11 of its Member States.

The Joint Committee of the Regional Metrology Organizations and the BIPM (JCRB)

The JCRB met in September 2005. The main issues concerned a number of steps to improve, still more, the speed and efficiency of the intra- and inter-Regional Metrology Organisation (RMO) reviews of calibration and Measurement Capabilities (CMCs) and the latest state of approved Quality Systems. The JCRB also revisited the current definition of the term CMC, which had been reviewed and discussed during the May 2005 meeting in Minsk. The JCRB retained the formal definition of the term as agreed at the 8th JCRB in paper JCRB 8/18 (see the open part of the JCRB webpages on the BIPM web site). It also welcomed further work to be carried out on the version discussed at Minsk as a "shorthand" explanation which could be used to convey the essence of the term to non-NMI users.

Meeting of NMI Directors

Over 70 Directors from NMIs in Member States of the Metro Convention and in Associate States or Economies of the CGPM met at the BIPM in September. The first day of the meeting focused on the processes that NMIs use to set priorities among their programmes and representatives of four laboratories, of different sizes and from various regions of the world, gave presentations. This was followed by a presentation on the European project iMERA (implementing Metrology in the European Research Area), and which illustrates a model for inter-laboratory cooperation within a region.

Meeting of the CIPM

The 94th meeting of the CIPM was held in October 2005. The Committee reviewed and approved a number of documents concerned with subcontracting of NMI activities and the role played by Certified Reference Materials (CRMs). These policy papers are now on a new open CIPM website together with the with CIPM Recommendations. The CIPM considered a number of strategic issues, most notably the role of Consultative Committees and their future workplans.
specific expert advice to the CIPM on the BIPM work programmes. The Presidents of the Consultative Committees (CCs) made their regular reports to the Committee. The major points of significance being:

- The CC for Temperature reported a number of recommendations related to clarification of the conditions used to advise fixed points with ITS90 [see <http://www.bipm.org/en/publications/its-90.html>] and the work needed to address any future redefinition of the kelvin based on improved measurements of the Boltzmann constant;
- The CC for length (CCL) reported on new agreed values to be assigned to the radiations for several trapped ions and atoms and recommended that several of them also be considered by the CC for Time and Frequency (CCTF) as secondary representations of the second. The CCL also recommended that its Working Group on the Mise en pratique of the Metre be merged with the Joint CCL/CCTF Group on secondary representation of the second;
- The CC for Units (CCU), taking into account discussions at other Consultative Committees on a potential redefinition of a number of base units of the SI, encouraged other CCs to work with user communities to explore and raise awareness of, the implications of simultaneous re-definitions of the kilogram, ampere, kelvin and mole. This could possibly take place at the 24th CGPM in 2011. The CCU recommended that the CIPM issue a Recommendation on the work to be done in relation to any re-definitions and this can be found on the CIPM web site.

The CIPM received a report from Dr. Seton Bennett on possible activities concerned with traceable measurements in materials metrology. This was the result of an initiative launched at the 2004 CIPM, and which considered approaches from the materials community which argued that measurement uncertainties could be reduced, and SI traceability be improved, by a more formal approach with the framework of the Metre Convention. As a result of Dr Bennett's report, the CIPM decided to set up an ad-hoc working group which would consider the matter further and which would identify a number of comparisons related to materials metrology. The Working Group will report to the 2006 CIPM.

The future work programme of the BIPM, and preparations for the 2007 CGPM were major discussion topics. The BIPM had prepared ten-year 'visions' for its activities in current areas of scientific work, as well as an analysis of the criteria to be used to set priorities for technical work and for co-ordination activities. These helped the CIPM to see how the usual 4-year work programmes and budgets fitted into a longer term planning framework while identifying future directions. BIPM's preliminary review of the BIPM's outline proposals for the 2009-2012 working plan were debated and the Director was encouraged to provide more detailed justifications of core activities and future project programmes for consideration by the CIPM in 2006.

There has been one resignation from the CIPM in 2005 - Dr Janusz Lusztyk from the Institute of Measurement Standards in the National Research Council, Canada. Dr Lusztyk has been a distinguished member of the Committee for several years and, we wish him well in his future career.

The SI Brochure.

The 8th edition of the SI brochure was approved by the CIPM and work is now in hand to produce the printed version in time for a proposed launch on World Metrology Day 2006. The Brochure will be complemented by "mini and micro brochures" which would provide short summaries for widespread distribution. A major change from the 7th edition is that the section concerned with current definitions of the SI will be maintained on the BIPM web pages in electronic form. This makes it easier to keep this section up-to-date and it can reflect any changes in definitions and supporting material in advance of a future 9th edition.

Joint Committee for Guides in Metrology (JCGM)

In November, the JCGM met for the first time in many years. It reviewed progress on the forthcoming revision of the International Vocabulary of Metrology (VIM) and various supplements to the Guide to Uncertainty in Measurement (GUM). The joint committee also considered future work programmes for its Working Groups and encouraged them to submit proposals for future activities so that they could be considered by the JCGM next November. The Committee endorsed the spirit of the "JCGM Charter" and asked for a number of modifications to be made which reflected the evolution of the Committee's work and the addition of a new member, the ILAC.

Joint Committee for Traceability in Laboratory Medicine (JCTLM).

The JCTLM has met on several occasions and continues to make rapid progress. Its Executive met in November and considered reports from its two working groups. Working Group 1 has now recommended over 120 reference materials and over 100 reference procedures as complying with the criteria set out for higher order reference materials required by the invitro device industry and Working Group 2 has established the necessary procedures and criteria for reference laboratories. Both groups will continue to issue "calls" for the nomination of suitable materials and laboratories and will continue this during 2006.
URGENCY SEEN IN FALLING INTEREST
IN SCIENCE
Christopher L. Grachanen

In this issue of the Educator's Corner I would like to share two hard-hitting articles addressing the disparity in recruiting U.S. scientific/engineering talent and two programs helping to alleviate this problem. The first article written by Shirley Ann Jackson, Ph.D., a theoretical physicist and president of Rensselaer Polytechnic Institute, cuts right to the heart of the matter. Dr. Jackson's article, "The Quiet Crisis: America's Economic and National Security at Risk - Falling Short in Producing American Scientific and Technical Talent," can be found at <http://www.rpi.edu/homepage/quietcrisis/>. Dr. Jackson echoes the fears of many when she writes about the shortfall (gap) in our national scientific and technical capabilities due to the U.S. inability to graduate sufficient numbers of scientific and technical professionals. The following quote from Dr. Jackson's article infers a major consequence of ignoring this problem:

"The need to make the nation safer from emerging terrorist threats that endanger the nation's people, infrastructure, economy, health, and environment, makes this gap all the more critical and the need for action all the more urgent. We ignore this gap at our peril."

The second article, which some of you may have already read, can be found at <http://www.time.com/time/archive/0,10987,1156600,00.html>. I was encouraged to learn that Time Magazine thought enough of the issue of declining U.S. technical talent to make it the centerpiece of its 13 February 2006 issue as well as asking the question on its front cover, "Is America Flunking Science?"

The featured article, "Looking for a Lab-Coat Idol!" was written by Rebecca Winters Keegan who eloquently reaffirmed the theme of, "a shrinking pipeline of talented U.S. students pursuing the science." Ms. Keegan cites President George W. Bush's recent State of the Union speech in which he related that it is imperative U.S. students receive a "firm grounding in math and science" and that his proposed $380 million in science-education initiatives for the 2007 budget is a sign that policymakers are starting to take the U.S. technical talent shortfall seriously.

In his speech, President Bush called for an additional 70,000 high school teachers to lead advanced-placement courses in math and science. Ms. Keegan keenly points out that beginning in the 2007-08 school year the No Child Left Behind program will require states to start testing in science in three grades as well as relating another Bush plan to bring 30,000 math and science professionals to teach in classrooms through an Adjunct Teacher Corps program.

These Bush proposals are aimed at nurturing tomorrow's technical talent at a time in students' lives when they are developing aspirations for future employment. Additional articles in this issue include "Are We Losing Our Edge?" by Michael D. Lemonick and "The Political Science Test" by Mark Thompson and Karen Tumulty. These articles add more credence to the reality of a U.S. quiet crisis.

One program attempting to reverse the technical talent shortfall is the Texas Engineering and Technical Consortium known as TETC. The TETC is a consortium of industry and academic members working together to help enable young folks to enter into science and engineering career fields. The majority of academic members are from either computer science departments or accredited electrical engineering departments. Industry members reads like a who's who of high tech companies and includes Advanced Micro Devices, Inc., Hewlett-Packard, Intel Corporation, Lockheed Martin Corporation, National Instruments Corporation, Applied Materials, Inc., Motorola, Inc., SBC Foundation - AT&T, Inc. and Texas Instruments. TETC mission is to:

- Meet the market demands for CS & EE engineering in Texas
- Improve the diversity of graduating engineers
- Increase collaboration between industry and higher Education in Texas

Texas Governor Rick Perry states the need for TETC as, "Technology is a critical engine powering jobs and economic growth in our state. However, many of the technology jobs being created in Texas are left unfilled for want of qualified graduates. While our colleges and universities have made significant strides in bolstering education programs, we must work with them so they can do more."

Recognizing the impact of technology on the economy, Governor Rick Perry and legislative leaders joined with the Technology Education Coalition to pass Senate Bill 353, creating the Texas Engineering and Technical Consortium Grant Program. This grant program commits up to $5 million annually to match education contributions raised from the technology industry and other private sector sources for approved engineering and computer science education programs in Texas colleges and universities. More information on TETC may be found at <http://tetc.egr.smu.edu/>.

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NCSL INTERNATIONAL STRATEGIC ROADMAP
FOR METROLOGY EDUCATION AND TRAINING

Georgia Harris, V.P.

In response to the alarming decease in young people entering the Metrology field, NCSL International has developed a strategic roadmap for planning, organizing and developing resources and activities in the U.S. to help reverse this trend. This effort is spearheaded by Georgia L. Harris, NCSLI Vice President for Education & Training who is rallying all stakeholders in the world of measurement to get involve and express their opinions and suggestions regarding the roadmap (many organizations throughout the U.S. have helped in its development).

Please take the time to read the roadmap and fill out the roadmap survey (note: there is no kiosk and no more door prizes as mentioned in the survey which was promoted at the 2005 NCSL International Conference).
Educator’s Corner

NCSLI Strategic Roadmap Update Jan 2006 (PPT, 471KB)
NCSLI Strategic Roadmap (PDF, 122 KB)
NCSLI Roadmap Survey (PDF, 20 KB)

These education strategy and roadmap documents are posted on the NCSLI website, and available for downloading. The slide sets would be useful for presentations at region/section meetings.

Use this URL: <http://www.ncsli.org/training/index.cfm>

For NCSLI Strategic Roadmap Update Jan 2006: <http://www.ncsli.org/training/160%20ET%20Update%20Jan06%20Sections.ppt> (PPT, 471KB)

Educational Institutions Offering Metrology Programs

Training Information Directory

To benefit our Membership, the Training Resources Committee has developed and procured some excellent training materials.

Training Videos

These video tapes may be obtained via loan from the NCSL International Training Resources Library based on availability. Some of the available videos include:

- Why Calibrate?
- Measurement the Vital Link (NBS)
- Thermometer Calibration (single video tape)
- Metrology for Industry (4-video tape set)
- MIT's Video Series on Measurement (8-video tape set)

1. Introduction to Measurement
2. Calibration, Accuracy, and Error
3. Measuring Dynamic Variables
4. Contact Temperature Measurement
5. Infrared Temperature Measurement
6. Distance, Velocity, and Acceleration
7. Mass, Force, Strain, Torque and Pressure Measurement
8. Fluid Quantity and Flow

Training Software

The computer software package is a 2-disk (3.5”) tutorial entitled: "Modern Oscilloscope Capabilities (TA-160)"

To order NCSL International Training Videos and Software, use the Training Aids Video and Software Order Form on the NCSLI website.

NIST News

Dr. Belinda Collins, our NIST Representative to the Board and longtime NCSLI supporter, has been named the Director of Technology Services at NIST. Additionally, another well-known face at NCSLI, Carol Hockert, has been named Chief of the Office of Weights and Measures. This lets her leave the State of Minnesota Weights and Measures for the warmer (but humid) climate of Gaithersburg, MD. We are extremely proud and pleased that both of these NCSLI contributors are being recognized for their contributions and hard work. (See page 40)

Have you ever wanted to know where to find all the standards the United States Government uses? Try looking at <www.standards.gov>. It is a very useful website.

Dr John L. (Jan) Hall from NIST Boulder is one of the three recipients of the 2005 Nobel Prize in Physics for his development work in laser-based precision spectroscopy.

Measurement Science Conference

The Measurement Science Conference was held on March 2nd and 3rd this year at the Disneyland hotel. It was one of the better turnouts in attendees and the MSC was kind enough to sponsor space for many NCSLI committees. The majority of NCSLI committees met at the MSC to keep activities of their committee moving forward. I was not able to attend all the committee meetings, but I was able to sit in on the Ad Hoc committee for developing a committee chair handbook, the 174 committee, 160 VP committee, and MCP committee meetings. The committees are where many of the NCSLI publications are produced and I greatly appreciate the efforts of all of our committee chairs and members.

2006 Annual Conference

Don't miss our Annual Workshop and Symposium, August 6-10 at the Nashville Tennessee Convention Center. The theme of the conference is "Metrology's Impact on Society." The Nashville Convention Center allows us to have the largest exhibit space at a conference to date, but only 27 spaces remain available. If you plan to exhibit at the conference, please contact the NCSLI International Headquarters soon! In addition to the conference itself, we also have very strong Tutorial programs which are immediately before and after the conference. At last count, we have over 25 tutorials scheduled, so be sure to plan your travel so that you can take advantage of some of the most cost-effective technical training available anywhere!

There are so many activities occurring in NCSLI that there is something that should be of interest to everybody involved in measurements. We are a volunteer organization and we depend on the cooperation of all members, so we welcome you to get involved in our significant NCSLI activities!

Jeff Gust
President, NCSLI
NCSLI HAS A NEW EDUCATION AWARD!

Georgia Harris, V.P.

Nominations Needed

The new Education & Training Award will be presented for the first time at the 2006 Annual Workshop and Symposium in Nashville. The Education & Training Award is one of the highest awards of the NCSLI (second to the William A. Wildhack Award) and will be given to an individual or group of individuals for an outstanding contribution(s) to the field of Metrology Education & Training. The contribution(s) may be in any appropriate form including oral presentation, Conference paper, tutorials, training resources, educational programs, technical or administrative innovation or accomplishment, and outstanding leadership to NCSLI in the area of Education and Training.

The purpose of the award is to provide incentive for and recognition of outstanding contributions to the field of Metrology Education & Training and, in particular, contributions that are in consonance with the goals and purposes of the National Conference of Standards Laboratories.

I used the slides in Houston recently and we already have our first nomination for the Education & Training award. If you have nomination suggestions, please send a letter detailing the person's contributions to metrology/calibration education and training. Be sure to detail information in the nomination letter -- and not just send a name. A nomination form is available on the NCSLI website and should be sent to Mark Lapinskes at mark.lapinskes@sypris.com.

*******

MEASUREMENT UNCERTAINTY TRAINING COURSE

Hilton Hotel Diagonal Mar
Barcelona, Spain
4 May to 5 May 2006
(before the ASME-IGTI Turbo Expo)

This course is designed to provide value to students from the turbo-machinery industries. Students will find the material applicable to both calibration and manufacturing processes. The material is based on CEESI's 40 years of experience in the operation of gas and liquid flow calibration facilities. This experience includes the measurement of pressure, temperature, gas composition, and mass as well as the operation of data acquisition systems. The material is example based, the fundamental concepts are taught by exploring a variety of real world applications. The necessary statistical concepts are reinforced based on numerical simulation.

Instructor: Tom Kegel, Senior Staff Engineer, CEESI - Colorado Engineering Experiment Station, Inc.

More Information and Registration Online at:
<http://www.ceesi.com/spain>
Tel: 970-897-2711
Email: <training@ceesi.com>

CRYOGENIC ENGINEERING COURSE

May 22-25, 2006
Boulder, CO

25th Year. Four full days. Basic principles, Properties of cryogenic fluids, properties of solids at low temperatures, refrigeration and liquefaction, cryogenic instrumentation, cryogenic equipment, cryogenic systems, safety.

Based on the book, Cryogenic Engineering, 2nd ed.
Register and Contact:
Cryoco, Inc
<www.cryoco.com>
Dr. Thomas M. Flynn
(303) 665-8302
<thomasflynn@comcast.net>

*******

MEASUREMENT UNCERTAINTY MADE EASY

Inst. de recherche d’Hydro-Quebec
Elizabeth Lambe, (613) 993-5976
elizabeth.lambe@nrc.ca
<www.hydroquebec.com>

April 19, 2006

$500 per student. The instructor will discuss the basics for preparing uncertainty estimates for typical uncomplicated measurement processes. The instructor’s approach is consistent with the GUM but it dispenses, wherever possible, with the algebraic notations, statistical jargon, arithmetic modeling, and differential calculus operations found in the GUM. Participants will receive an example Excel spreadsheet for making uncertainty calculations. The course will include group exercises. It will be in English. However, the instructor, Mike Ouellette, will respond to any questions in French and the documentation for the course will be available in English and French.

*******

MEASUREMENT UNCERTAINTY CLASS

Quametec Corp.
Karen Moor, (810) 225-8588
info@quametec.com
www.quametec.com

2006:
April 24-26 Detroit, MI
May 17-19 Boulder, CO
June 21-23 Detroit, MI
July 17-19 Mississauga, ON
August 23-25 Seattle, WA
September 13-15 Harrisburg, PA
October 23-25 Detroit, MI
November 28-29 Detroit, MI
$1595 per student. Attendees will receive 3 days of hands-on Measurement Uncertainty training based on the GUM Method, plus a copy of our book, “Measurement Uncertainty Analysis Fundamentals” and a licensed copy of our software, “Uncertainty Toolbox for Microsoft Excel” developed by Quametec. See our website at www.quametec.com for additional information, course outline and our unique class guarantee.

AUDITING TO ISO 17025
Quametec Corp.  
Karen Moor, (810) 225-8588  
info@quametec.com  
wwwquametec.com  
April 27-28, 2006 Detroit, MI  
August 21-22, 2006 Seattle, WA  
$895 per student. Become qualified to be an internal Auditor for ISO 17025 compliance by taking the same course that we teach to Laboratory Accreditation Assessors. This 2-day course covers the full standard as well as provides tools and guidance on how to perform and document your Internal Audits. Get it right the first time with professional training on your side. Includes a CD loaded with tools and forms to simplify the required documentation of your internal audit.

PRINCIPLES OF METROLOGY
Fluke Corporation  
(425) 446-6330 FAX(425) 446-5992  
caltraining@fluke.com  
May 1-5, 2006 Boulder, CO  
September 18-22, 2006 Boulder, CO  
$2495 per student. This is a 5-day workshop covering electrical/electronic measurements and calibration. Participants will receive extensive hands-on training with a wide range of measurement instructions. This course covers all aspects of dc/low frequency calibration.

INTRODUCTION TO UNCERTAINTY ANALYSIS
Integrated Sciences Group  
1-800-400-7866  
training@isgmax.com.  
Registration: www.isgmax.com  
June 14-15, 2006 Boulder, CO  
$895 per person. This 2-day course provides an introduction to the principles of uncertainty analysis as found in the ISO Guide to the Expression of Uncertainty in Measurement (the GUM), published papers and current research. Type A and Type B methods of estimating measurement process uncertainties are discussed and multivariate analysis is outlined. Instruction involves minimal statistics with hands-on use of ISG’s Uncertainty Sidekick freeware to illustrate concepts for a variety of direct measurement scenarios. The role that uncertainty estimates play in developing specifications and making decisions is also discussed.

UNCERTAINTY/SPC ANALYSIS
Integrated Sciences Group  
1-800-400-7866  
training@isgmax.com.  
Registration: www.isgmax.com  
June 19-22, 2006 Boulder, CO  
September 11-14, 2006 Portsmouth, NH  
$1895 per person. This 4-day course provides straightforward and easy-to-understand principles of measurement uncertainty analysis for direct and multivariate measurements and measurement systems. Concepts and methods are consistent with those found in the “U.S. Guide to the Expression of Uncertainty in Measurement.” Advanced measurement uncertainty analysis topics that extend these methods and concepts are also presented. Hands-on analyses using ISG’s Uncertainty Analyzer software provide practical application of important concepts to the development of uncertainty estimates for direct measurements, multivariate measurements and measurement systems. Applying uncertainty estimates to control measurement processes, establish calibration intervals, and minimize decision risk is also discussed.

ADDITIONAL COURSES OFFERED AT NCSLI TRAINING CENTER
Developing Your Laboratory Accreditation Plan  
<http://www.ncsli.org/training/tc/cf.cfm>  
May 9 - 11, 2006
Why let the process of becoming an accredited laboratory cost more than necessary? This course will guide you through the process of preparing for laboratory accreditation. The accreditation preparation process can be like driving through a foreign land, in the fog, where you only understand some of the language, and don’t know the “Rules of the Road.” Wrong turns are costly and waste valuable time (T = S). A plan is essential! Have a plan, but stay flexible and ready with work-arounds for those unexpected events.

Gage Calibration Methods & Hands-On Workshop  
<http://www.ncsli.org/training/tc/qcis.cfm>  
August 16-17, 2006
This course provides the latest information on how to meet the compliance requirements for measurement systems. Calibration concepts and theory are combined with hands-on training including an overview of terminology, audits, hands-on calibration and calibration requirements with emphasis on ISO 10012, ANSI Z540-1, ISO 17025, ISO 9001:2000 and ISO/TS 16949. Workers will learn how to develop and document a calibration and measurement assurance program and assess capabilities.

Certified Calibration Technician (CCT) Review  
<http://www.ncsli.org/training/tc/qcis.cfm>  
November 1-3, 2006
Twice per year, American Society for Quality (ASQ) administers tests to applicants who desire to become certified in inspection methods and theory. This 3-day review course is designed to help prepare CCT applicants for the ASQ exam. These exams are normally given in the spring and fall.
NCSLI 2005 FINANCIAL SUMMARY

Balance Sheet

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INCOME
$1,273,017

INCOME
Sales $95,527
Interest $10,182
Other $85,218
Dues $353,462
Conference $728,828

EXPENSES
$1,288,264

EXPENSES
Dues $353,462
Conference $728,828
Rent $64,892.00
Credit Card Charges $23,983.00
Scholarships/Awards $22,183.00
Bank Charges $22,183.00
Office Operations $281,670.00
Travel $14,166.00
Board of Directors $31,310.00
Misc $19,153.00
Newsletters $17,764.00
Publications $401.00
Conference $728,828

The 1220 Central Florida Section of the NCSLI held its fall meeting on September 29, 2005 at Sypris Test & Measurements in Orlando, Florida. Our host, Paul Bessette, Southern Region Operations Director/Staff Metrologist welcomed the speakers and attendees to Sypris. Paul provided a brief summary of the Sypris business operations and product lines. To kick the meeting off, Sypris provided a large assortment of pastries and coffee to the members along with pens and other giveaways. Our fall meeting hosted 51 attendees from 20 different companies.

This time around, Region 1222 had the honor of hosting the NCSLI Road Show, presenting "Uncertainty Analysis Workshops." Our guest speakers included NCSLI Division V.P., Ed Pritchard, Dr. Jim Salsbury, Mitutoyo, Karl Kurtz, DH Instruments, Tom Wiandt, Hart Scientific, and Mark Parker, NIST. Mark had to cancel at the last moment due to an unexpected business requirement. We would like to thank all of our presenters, their respected companies, and NCSLI for providing a great meeting.

NCSLI Divisional V.P., Ed Pritchard, started us off by reviewing the latest NCSLI Board meeting minutes. Ed provided a short presentation of the board meetings held in Washington DC on August 7 - 13, 2005. He discussed the 2005 NCSLI Workshop and Symposium held in Washington DC on August 7-11 as a great success. There were 1142 Attendees, 121 Exhibitors and the 154 Booths were a sell-out. 142 Technical Papers and 6 Tracks were presented. The NIST Boulder Training Facility is offering education and training. Ed briefly talked about the drafted Z540.X document. The next BOD meeting will be at the Marriott River Center in San Antonio, TX on January 14-18, 2006. The 2006 Conference & Symposium "Metrology's Impact on Society" will be held on August 6-10, 2006 at the Nashville Convention Center.

Jim Salsbury, PhD, Mitutoyo, was our next speaker with "Introduction to Measurement Uncertainty." The presentation covered general guidelines relating to uncertainty analysis, uncertainty terminology, and how to process the data without complicating the process. Dr. Salsbury provided a brief exercise with the members called "What time is it?" This portion of the presentation was well received by the members, requiring their participation to demonstrate the objectives from the presentation. After lunch, Dr. Salsbury gave a second presentation entitled "Dimensional Uncertainty." Dr. Salsbury expanded on his earlier measurement uncertainty presentation as it applies to the disciplines of dimensional metrology. This was Dr. Salsbury's second visit to Central Florida in support of NCSLI meetings and the members really enjoyed the presentations and the discussions that followed.

Our next speaker was Karl Kurtz, DH Instruments. Karl's presentation was "Measurement Uncertainty in Pressure Metrology." Karl explained that reducing measurement uncertainty exists at all levels; NMI's, trade groups, manufacturers, users, in turn we are all responsible. Karl's presentation included Efforts to Reduce Measurement Uncertainty, Influences in the Pressure Calibration Process, Setup Influences, Operation Influences, Reference Specific Influences, Causes of Error, How to Identify and Prevent Errors, Example of Uncertainty Analysis for a Pressure Gage. Karl stated that the greatest potential source of large unpredictable errors comes from the human element.

Sypris Test, & Measurements provided a tasty lunch for all of the members. Due to the number of attendees, we had to move the group photo outside.

Our next speaker was Tom Wiandt from Hart Scientific. Tom's presentation was titled "Uncertainty Guide to Temperature Calibration." Tom discussed the different methods for calculating temperature uncertainties and the problems inherent to each. Tom's presentation discussed the Type A and B evaluations and why one is not any better than the other. Tom also discussed bath immersion effects, standard and expanded uncertainty, and uncertainty budgets. After discussing the complexities involved, Tom provided a simpler approach to calculate the uncertainty of temperature measurements.

Paul Bessette and his staff provided a tour of the Sypris Test & Measurements Facility. The members were very impressed with the size and capabilities of the lab. We would like to give special recognition and thanks to Paul Bessette and his staff at Sypris Test & Measurements for sponsoring this conference.

Ray's meeting turnout was so great that they had to move the group outside into the Florida sun for the attendance photograph. Nice work, Ray.

Attendees:
Larry Yates ACLASS
John Couturier CorMed Lighthouse Corporation
Karl Kurtz DH Instruments
Steve Dixon Dico Instruments
Jerry Gaffney GEC Instruments
Tom Stark Guideline Instruments Limited
Bob Gangawer Gulf Coast Calibration
Mike Fiser Gulf Coast Calibration
William Bullock Gulf Coast Calibration
Bruce Macley ICL Calibration Labs, Inc.
Deborah Weber ICL Calibration Labs, Inc.
Jeff Kelly ICS Calibration Labs, Inc.
Jim Streeter Lockheed Martin McFC
Bill Clarke Lockheed Martin STS
Joe Henriquez          Lockheed Martin STS
Joe Patchett           Lockheed Martin STS
Ray Minchew           Lockheed Martin STS
Mark Kramer            Marine Corps Logistics Base
Michael Hokenhagen     Marine Corps Logistics Base
Matt Hippy             NIST
Ed Prichard           NCSSL Divisional VP
Bob Clement            Northrop Grumman Laser Systems
Gary Bokich            Northrop Grumman Laser Systems
Kyle Peppiuce         Northrop Grumman Laser Systems
Paul Arbitt         Northrop Grumman Laser Systems
Brian James            Sypris Test & Measurement
Deide Spight           Sypris Test & Measurement
Ed Kirk                Sypris Test & Measurement
George McElhaney        Sypris Test & Measurement
Greg Cannon             Sypris Test & Measurement
Jim Marrett            Sypris Test & Measurement
Josh Baker              Sypris Test & Measurement
Jasen Barratti         Sypris Test & Measurement
Kevin Pickering        Sypris Test & Measurement
Mark Guthrie            Sypris Test & Measurement
Mark Nelson              Sypris Test & Measurement
Paul Bussett            Sypris Test & Measurement
Terry Perkins           Sypris Test & Measurement
Tony Jackson            Sypris Test & Measurement
Tony Rodgers            Sypris Test & Measurement
Mark Lappinse           Sypris Test & Measurement
Gary Daigle             United Space Alliance
Jeffrey Tubbs           United Space Alliance
Phil Albright           United Space Alliance
Deb Crawford           Wyle Laboratories
James Wachter          Wyle Laboratories
Lori Thompson          Wyle Laboratories
Merle Eiff                Wyle Laboratories
Otto Fischer            Wyle Laboratories
Paul Rezau              Wyle Laboratories
Perry King               Wyle Laboratories
Sarah Gunzburg         Wyle Laboratories
Ed Prichard           NCSSL Divisional VP
Dr. Jim Salibey         Minatoyo
Tom Waddie              Hart Scientific

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January 19, 2006
Holiday Inn
Houston, TX
D. Keith Scoggins
South Texas Section Coordinator

The NCSSL International South Texas Section winter meeting was held on January 19, 2006 at the Holiday Inn in Houston, Texas. Doug Lynde, On Time Support, hosted the meeting which was conducted by Keith Scoggins, the South Texas Section coordinator and metrology laboratory supervisor at the South Texas Project Nuclear Operating Company.

Keith opened with welcoming comments and also requested feedback from the attendees on what subjects they would like to see presented at future section meetings.

Terry Conder, NCSSL VP Central US, and metrology manager at 3M Center Corporate Metrology Services - St. Paul, presented an overview of the NCSSL International Board of Directors meeting which was held on January 15-17 in San Antonio, Texas.

Our host, Doug Lynde, from On-Time Support, gave an overview of METDaemon, a new application server software package that is designed to execute on the server hosting the metrology database. It accepts connections from a variety of (configurable) sources and provides data from the metrology database to those sources. Doug also provided a solution for printing calibration labels on a network printer with laminated labels.

James Henke, from GE-Ruska Corporation, provided an excellent presentation on the calibration of differential pressure transducers at elevated operating line pressures. Jim described the problems that they had to overcome to meet the accuracy requirements for measuring differential pressures. Anyone that has a need to measure high line differential pressures should most definitely contact Jim.

Since our meeting coincided with the national NCSSL Board meeting in San Antonio, three members of the Board came over to Houston for our section meeting; Jeff Gust, current NCSSL President, Georgia Harris, NCSSL VP Education & Training, and Terry Conder, NCSSL VP Central. This question and answer session proved to be very informational for both the attendees and the BoD members.

A wonderful Texas-style barbeque lunch was provided by our host, On Time Support.

After lunch, Chris Grachanen, South Central U. S. Region coordinator, from Hewlett-Packard, provided information regarding the U.S. Department of Labor Bureau of Labor Statistics Metrology Job Descriptions Initiative. Chris explained how the Standard Occupational Classification (SOC) System is used by Federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data and how educators use the SOC to provide students with career guidance information.

Next Georgia Harris, from NIST and NCSSL VP Education & Training, described what the NCSSL was doing as an organization to promote education and training in Metrology. Georgia explained the programs that are under consideration by the NCSSL BoD and how NCSSL members could get involved in promoting Metrology. Georgia also reminded everyone that May 20 in Metrology day and we need to get the word out to non-metrologists.

The last speaker of the day was Jeff Gust, from Quamtec Corporation and current NCSSL President, who discussed the results of an accredited resistance proficiency test. Jeff described the process that was used to ensure the artifact integrity. There was a good deal of discussion concerning the benefits of proficiency testing and why laboratories should participate.

In addition to the above speakers, we opened an exhibit area where several local vendors showed their products and services. During the breaks and lunch, the vendors were available to discuss and demonstrate their products with the attendees. Comments from the attendees and vendors after the meeting were very positive and they would like to see additional vendor participation at future meetings.

A special thanks to Doug Lynde, On Time Support, for his support in providing for the meeting location, refreshments, and lunch. An enthusiastic "thanks" is extended to the vendors that supported the mini-show to make this meeting such an immense success.
Georgia Harris, Education and Training VP, came over after the Board meeting in San Antonio to meet with our local section and talk about Education initiatives of NCSLI.

Keith turned out a very impressive crowd for this meeting. Attentive, too.

Informal exhibitor tables seem to find a useful function at local NCSLI meetings. The talk is casual but informative, and good information passes back and forth.

Attendees:

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
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<tbody>
<tr>
<td>Georgia Harris</td>
<td>NIST</td>
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<tr>
<td>Jeff Gut</td>
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<td>Tony Conder</td>
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<td>Doug Lynde</td>
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<td>Jason DeGroot</td>
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<td>Marc Wallace</td>
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<td>Terry Melcher</td>
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<td>Burt Felton</td>
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<td>Ron Kayberman</td>
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<td>Wayne Cummings</td>
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<td>Howard Burdwell</td>
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<td>Doug Sexton</td>
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<td>Ted Beckham</td>
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<td>Dave Sanders</td>
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<td>James Riley</td>
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<td>Larry Mock</td>
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<td>Kelly Oppliger</td>
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<td>David Carter</td>
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<td>Warren Gilchrist</td>
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<td>E. O. Gileston</td>
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<td>Scott Predkop</td>
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<td>Yancy Cain</td>
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<td>Bill Simmons</td>
<td>WA Simmons &amp; Assoc.</td>
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<td>Wallace Berry</td>
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<td>Donna Hudfeld</td>
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<td>Robert Banyan</td>
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<tr>
<td>Francisco Torrino</td>
<td>M &amp; M Instruments</td>
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Kazumi Hayakawa, Japan Region Coordinator

Japan Region Report — NCSLI-Japan Forum

The 14th Annual NCSLI-Japan Forum was held at the Tokyo Metropolitan Ohta-ku Industrial Plaza on November 25, 2005, with approximately 450 attendees. The forum was organized as The Japan Measurement Standards Forum Third Symposium, and operated by NCSLI Japan and NMIJ in collaboration, under the auspices of the Ministry of Economy, Trade, and Industry.

Other participating organizations were NITE, JAMP, JEMIC, JQA, JMIF, FAA, CERI, JAB, JSA, JEMIMA, JEMA, JEITA, JAPIA, JTM, JMCT, JEMCA, MMRN. There were six major sessions: (1) Accreditation (2) Calibration, Measurement and Management (NCSLI-I) (3) National Measurement Standards (NMIJ) (4) Traceability and Users (5) Legal Metrology (6) International

Mr. Masahiko Yoshida of METI, opened the forum with a greeting message. This was followed by a special guest speech entitled "Measurement in the automotive industry" by Mr. Keiichi Murata, VP of Nissan Motors. The Accreditation Session, the Calibration, Measurement and Management Session, and the Legal Metrology Session were held in parallel in the morning. In the afternoon, The
National Metrology Institute session, the NCSLI-J session, the Traceability and Users Session, and International Session were held.

There were 19 organizations in the exhibitors' hall showing their products and services.

**Accreditation Session:**
- Realization for "Open Door" JCSS
  Hiromi Murata of IAJapan/NITE
- The Revision of New ISO/IEC 17025 and Perspective to Remote-Calibration
  Yoshinobu Uematsu of IAJapan/NITE
- Accreditation of ASNITE-Calibration for thermal conductivity reference plate
  Tetsuo Fujimoto of Japan Testing Center for Construction Materials

**Calibration, Measurement and Management Session:**
- Introduction to Assets and Calibration Management Solution Service
  Atsushi Fujima of ORIX Rentec Co.
- The Certification of the Traceability of Anritsu Customer Services Co., Ltd.
  Masao Nakamura of Anritsu Customer Services Co., Ltd.
- Design of the Pressure Calibration Manual with an Animation Technology
  Toru Yamaguchi of Yamatake Corporation
- Introduction of Frequency JCSS Calibration System
  Atsushi Yoshizawa of Yokogawa Electric Corporation
- The Wattmeter Calibration System with the instrument Transformer
  Hiitoshi Ooizumi of Yokogawa Rental & Lease Corporation
- Building the Metrology Standard Across the Pacific Ocean Case of 4TP Capacitance Standard (1960 to 2010)
  Katsumi Yokoi of Agilent Technology International Co.

**International Session:**
- Activities of Conformity Assessment-related ISO standards and their relationship with calibration business
  Mamoru Sumimoto of IA Japan/NITE
- Current status of CIPM-MRA
  Ichiro Fujima of NMIJ/AIST
- The present situation on the measurement standard field in China
  Kiyokazu Miyazaki of Panasonic Mobile Communications Engineering Co., Ltd.

**Exhibitors of products and services:**
- Agilent Technologies
- Alpha Electronics Corporation
- Fluke Corporation
- IQUANTUM Corporation
- Japan Association for Metrology Promotion
- Japan Electric Meters Inspection Corporation
- Japan Electronics and Information Technology Industries Association
- Japan Measurement Instruments Federation
- Japan Quality Assurance Organization
- Key Techno Co., Ltd
- National Institute of Technology and Evaluation
- Nippon Netsudenki Seisakusho Co., Ltd.
- Ohite Giken, Inc.
- ORIX Rentec Corporation
- Rohde&Schwarz
- Shin Ei
- Traceability Research Association
- Yamari Industrial Ltd.
- Yokogawa Electric Corporation

The forum was organized by the following dedicated volunteers with many other helpers:
Reports from the Regions

Masanori Sakairi JMIF
Mitsuo Ishii Metcal Co., Ltd.
Naomi Ito JMIF
Norio Ishizaki NITE
Shigeaki Hatakeyama MEMIC
Takashi Sugiyama KQA
Takahiro Topo ORIX Rentec
Takaharu Nishi Yokogawa Rental & Lease Co.
Yoshishige Ina NMII
Tetsutaro Tsuchiya
Yoshii Horioka JEMIC
Yoshimoto Kato Yokogawa Electric Corporation
Yoshinori Kato Caltech Co.
Yukihiro Onzo JQA
And many others

Mr. Masahiko Yoshida of METI gave the welcoming address.

Our Keynote Speaker was Mr. Keiichi Murata of Nisson Motor Company. He related some of the special measurement considerations of his industry.

Mr. Toru Yamaguchi of Yamatake introduced a unique documentation using video movie for accreditation.

Paper presenters and committee volunteers all gather for a group photo. A conference which attracts 450+ attendees requires a LOT of organizing, and paper presenters and a large number of volunteers. We thank them all.

Some sessions were so popular that audiences overflowed into the hallway.

Social events at our conferences are valuable times to create networking with other metrologists who have very similar work activities as our own.
INTERNATIONAL REPORT
Malcolm Smith, V.P.

I continued dialogue with Steve Sidney, National Laboratory Association, South Africa, about possible NCSLI representation at SA conference September 2006. I expect to hear back from Steve in early February.

I confirmed that Steve Stahley is able to and will continue as our SIM representative and that he has Cummins’ support to do so. For different reasons he and I have missed the last two SIM General Assemblies and I have given a personal commitment to Dianne Lalla-Rodrigues that NCSL International will be properly represented at the next one.

I have had several communications with Paul Hanson regarding China-based activities of potential interest to us.

I have also communicated with Klaus Jaeger about his possible activities for the International Division in 2006.

Editor’s Message (Continued from page 2)

It’s very easy to get your own laboratory featured in the lab tours. If you already have an internal brochure or promotional publication describing your lab capabilities, and maybe 6-8 photos, I can work with you to get some genuine printed space. Need I say that your boss might be quite pleased to see your company’s capabilities right out there? I especially like to publish Lab Tours which have calibration workloads that are unusual, or where you have been able to figure out clever and innovative procedures or equipment which might be of interest to other readers. If you have an interest in promoting your lab, and would like to see an example, let me know and I can refer you to a past issue or FAX a copy of several typical articles.

Likewise with the Personal Profile chapters. This requires a simple biography of your Life and Times in the Calibration or Metrology business. I KNOW that there are many interesting personalities out there, because when I occasionally talk with readers, I find that their route to metrology was often unusual or “checkered.” More than just coming up through the military’s PMEL School at Lowry AFB in Denver. It takes only a one page biography of perhaps 1000 words.

I will be pleased to work with any of you with clever ideas of use to our other readers.

John L. Minck
Editor
SCENES FROM THE SAN ANTONIO
BOARD MEETING

The Annual Rite of Passage for incoming NCSLI
President Jeff Gust is for him to receive the honorary
gavel, presented by outgoing President Harry Moody.

Secretary Dave Abell holds high an "Elecraft KX1," a
portable low-power Morse code transceiver. The Board
presented a kit version to Harry Moody for his Service
Award. It was invented for backpackers or frequent
travelers. Dave reports that he has "worked" Japan
from California with it.

Georgia Harris makes her presentation to the Board.
Her Education and Training Committees have been
VERY busy working on initiatives for encouraging
more young people to enter the field of metrology.

Jack Ferris (r) and Charles Fallon, a member delegate
from SMUD (Sacramento Municipal Utility District)
catch up on some activity during a break in the action.
Charles came from California to join in the Board meeting.

With their trusty laptop "brains" at the ready, Tony
Anderson, Terry Condor, and Doug Sugg participate
in the global action from their outpost in Texas.

San Antonio wel-
comes the top man-
age of NCSLI,
who also participated
in a local section
meeting at Houston
during their stay
there.
COMMITTEE NEWS

COMMITTEE CHAIR GUIDEBOOK

Ad Hoc Committee

Terry Conder

The mission of this ad hoc committee is to organize, document and implement a Guidebook for Committee Chairs with the vision that NCSLI Committee Chairs are effective leaders, and NCSLI committees are effective and efficient in successfully accomplishing the objectives of NCSLI.

A survey of experienced committee chairs and vice presidents was conducted in early 2005. Survey questions included:

1. My greatest sources of frustration in chairing/leading a NCSLI committee are?
2. My greatest sources of satisfaction in chairing/leading a NCSLI committee are?
3. What improvements should be made to the NCSLI committee process?
4. What are the behaviors of a successful NCSLI committee chair?
5. What Best Practices are used in your committee?

The outline and contents of the future Guidebook are based upon the responses to this survey.

The Committee provided an update as part of the Section Coordinator and Committee Chair Leadership Workshop at the August 2005 NCSLI Symposium and Workshop in Washington, DC. Topics of this workshop included informing Committee Chairs, Coordinators and Board Of Directors on the process and progress of the ad hoc committee, confirming the lessons learned from the survey, participating in the development of the Guidebook, and providing at least one take-away for the next committee meeting.

The final draft of the Guidebook is nearing completion, with the next step being a review by a focus group of active committee chairs and vice-presidents. The Guidebook is scheduled to be approved by the Board of Directors at the April, 2006 BoD meeting in Boulder, and to be introduced at the Symposium and Workshop in Nashville in August.

The ad hoc Committee would like to thank all of the NCSLI members who provided valuable inputs into the development of this Guidebook.

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STANDARDS POLICY

Doug Sugg, V.P.

U.S. MEASUREMENT REQUIREMENTS

Jeff Walden

During the first quarter of 2006, the USMRC worked at planning for the March meeting at MSC. At that meeting there were two items on the agenda:

First was a discussion regarding the USMRC survey and how our committee can improve on it, as well as other methods to encourage participation in identifying measurement needs.

The second topic included a presentation by Dennis Swyt. Dennis is the NIST manager for the USMS, and presented a brief on the U.S. Measurement System (USMS) initiative. This was followed by a discussion on ways in which our committee can work with NIST on this initiative. Dennis provided a CD on which many of the already-captured measurement needs and concerns have been recorded. The role to be played by NCSLI, and others, is to review and verify that these needs are accurately stated.

The committee is always looking for input and participation; anyone who is interested can e-mail our committee chair Jeff Walden at <Jeffrey.Walden@navy.mil>, or Chet Franklin at <cfranklin@csc-norco.com>. For more information regarding the US Measurement Requirements Committee, go to <www.ncsli.org>, click on Committees, and go to 131.

USMRC Survey:

1. The redesigned survey has yet to be implemented, which is intended to replace the one currently on the NCSLI website.
2. The value of an e-mail version of the survey, which can be sent to the NCSLI membership and other organizations, was discussed at the meeting at the MSC.

CANADIAN MEASUREMENT REQUIREMENTS

Dave Stevens

No report.

GLOSSARY COMMITTEE

Emil Hazarian

We continued to locate, obtain, evaluate, compile, and catalog listings of terms and their various definitions that are related to Measurements, Test, and Calibration. We've continually revised and updated the existing NCSLI Glossary of Metrology-Related Terms. We will be updating the NCSLI Glossary of Metrology-Related Terms and Acronym List on the Web site. The Committee will create a validation of the process to analyze, select and validate new proposed terms for submission. A list of desired references was also drafted.

NCSLI LEGAL METROLOGY COMMITTEE REPORT

Val Miller

Plans for the upcoming meeting of Committee 134 at the 2006 NCSLI Workshop and Symposium in Nashville continue to be developed. As of this writing, a commitment to participate in the committee meeting and the Legal Metrology General Session hosted by the committee chair has been received from all three of the potential participants.
Committee News

The papers will be presentations on the overall make-up and value of the Weights and Measures Programs of the three NAFTA signatories. Weights and Measures and the part it plays in the economies of the signatories are grossly under appreciated. This paper session and the discussion time during the Legal Metrology Committee meeting will hopefully be useful in making the general metrology community more aware of the value of the legal aspects of metrology.

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MEASUREMENT SCIENCE & TECHNOLOGY
Richard B. Pettit, V.P.

General

- Finalized figures and format for RP-15, "Recommended Practice for Interlaboratory Comparisons" that was approved by the NCSLI Board at the October meeting.

Managing Editor Activities: MEASURE

I currently have the following articles in process for publication:

1. Total of 21 papers in process.
2. Total of 8 ready for publication.
3. Total of 7 reviewed and being updated by author.
4. Total of 6 under review.
5. Total of 7 requests for publication (need to be updated).

Together with T. Wunsch, we developed a summary of NMI metrology news releases for publication in the March issue. Items are included from PTB, South Africa, Metrology Institute of Japan, ILAC, INMETRO, New Zealand, and NIST. The total number of news items is 12.

Summary of VP-140 Publications

141: Automatic Test & Calibration Systems
   "Validation of Software for Automatic Test & Calibration Systems" - NEW, 2008 (David Seaver)

142: Measurement Comparison Programs
   "Recommended Practice for Interlaboratory Comparisons" RP-15 - Update Completed, 2005

143: Intrinsic & Derived Standards
   "Two-Pressure, Two-Temperature Humidity Generator" RISP-5 - Update, 2006 (Bob Hardy)
   "Deadweight Pressure Gauges" RISP-4 - Update, 2008 (Ruben Salazar)
   "Triple Point of Argon" - NEW, 2006 (Stan Pond)
   "Catalogue of Intrinsic and Derived Standards" - Update, 2006 (Dave Deaver)
   "Triple Point of Water Cell" RISP-2 - CANCELLED, 2005 (Use ASTM E1750-02)

148: Dimensional Metrology
   "Calibration of Coordinate Measurement Machines" - NEW, 2007 (Jim Salbsby)

Committee Reports:

AUTOMATIC TEST & CALIBRATION SYSTEMS COMMITTEE
David Seaver

The committee has a meeting schedule for the 2006 MSC Conference. It is in process of producing a NCSLI recommended practice (RP) dealing with the validation of software for automatic test and calibration systems (AT&CS). The time frame for the production of the document will be decided at the next meeting.

The team will be working with the NCSLI Business Office to secure resources to store reference material produced by the group and set up a communication process for the RP development and future virtual meetings.

MEASUREMENT COMPARISON PROGRAMS
Jim Wheeler & Al Teruel

- The updated RP-15 "Recommended Practice for Interlaboratory Comparisons" was approved by the NCSLI Board at the October, 2006 meeting. Document was finalized for the NCSLI Publications CD.
- Jay Klevens, Process Instruments Inc., is developing a charter for the 1 G-Ohm Interlaboratory Comparison (ILC). When drafted, Jim Wheeler will review the charter. NIST, Gaithersburg, has agreed to provide opening and closing calibration data at a reasonable cost.
- Tom Larason, NIST, attended the 142 Committee meeting at the 2006 MSC Conference to discuss the proposed UV Round Robin ILC. Tom is also scheduling a meeting at the 2006 NCSLI Conference in Nashville.

INTRINSIC & DERIVED STANDARDS
David Deaver

- Several documents are in process, including: "Revision to the Catalogue of Intrinsic/Derived Standards" (D. Deaver); "Argon Triple Point Cell" RISP (S. Pond); "Revision to the Dead Weight Pressure" RISP (R. Salazar). Bob Harding, RH Systems, has finished developing an additional humidity uncertainty example and will send it to the committee members for their review. The document should be ready for NCSLI Board review in late 2006. He was supported in this activity by Thunder Scientific.
- Yi-hua Tang, NIST, reports that the 2005 NCSLI Josephson Volt System ILC is complete. All the sub-pivot labs finished with an improvement of about an order of magnitude in uncertainty for the comparison. We also learned several good lessons about how to maintain JVS system in satisfactory condition. Yi-hua is in the process of developing a "Certificate of Completion" that will be sent to each participant summarizing its results. The group will be meeting at the 2006 MSC Conference.
- Ruben Salazar and David Allen, Boeing, are chairing a working group that is in the process of revising the Dead Weight Pressure, RISP-4. The committee is developing an uncertainty analysis for performing a cross-float calibration and updating the uncertainty analysis associated with the mass standards by considering the proper way to handle correlated uncertainties. The group will meet at the 2006 MSC Conference.
CHEMICAL METROLOGY
Burt Sutherland

No update at this time.

DIMENSIONAL METROLOGY
Jim Salsbury

The NCSLI Dimensional Metrology Committee has organized a panel session for the upcoming NCSLI annual conference in Nashville. The topic of the panel will be The Calibration of Coordinate Measuring Machines (CMM).

The CMM is a dimensional measuring workhorse in many factories and laboratories in almost all industries, but the calibration of CMMs still remains a mystery to many people. The three-dimensional capability of the CMM, combined with software that allows almost any dimensional feature to be measured, creates unique problems that must be addressed. The panel session will begin with short presentations regarding various CMM calibration issues followed by an open discussion period.

The panel members include Dr. Ed Morse, University of North Carolina at Charlotte, Shawn Mason, St. Jude Medical, and Dr. Jim Salsbury, Mitutoyo America Corporation. The panel moderator is Dr. Hy Tran, Sandia National Laboratories.

The NCSLI Dimensional Metrology Committee is also working on a recommended practice (RP) in the calibration of CMMs, and this panel will support the discussion of key issues that the RP is intended to address.

The NCSLI Conference in Nashville, TN, USA will also feature two new dimensional metrology tutorials. Amosh Kumar and Jim Salsbury, both with Mitutoyo America, will present tutorials on the calibration of dimensional tools, gages, and instruments. The first tutorial will address smaller tools and the second will address larger instruments.

New standards now available:
ASME B89.4.22, "Performance Evaluation of Articulating Arm CMMs"

Important draft standards being voted upon:
ISO 10360-2, "Performance Evaluation of CMMs"
ASME B89.3.1, "Measurement of Out-of-Roundness"

Upcoming standards meetings:
ASME B89: May 3-5, in Atlanta, GA, USA
ISO TC213: September 6-14, in Torino, Italy
ASME B89: October 4-6, in San Diego, CA, USA

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INDUSTRIAL PROGRAMS
Roxanne Robinson, V.P.

I reported on NCSL International activities at the APLAC Technical Committee meeting in Chang Mai, Thailand, 15 November 2005.

Committee Reports:

UTILITIES COMMITTEE
Peter Buzzard

The NCSLI 153 Utilities Committee held a meeting in conjunction with the Measurement Science Conference.

The NRC has approved the use of NVLAP and A2LA audited vendors for commercial grade nuclear calibration procurements. Until now, nuclear plants were limited to using NUPIC audits or special plant level audits.

The NIST document NISTIR-6989 outlines the differences between NUPIC and 17025, of which there are three. The biggest one is our old friend, the 4:1 ratio. One of the big challenges for this committee right now is "How do we procure calibrations from 17025 vendors without conflicting with our plant commitments?"

We clearly can't let go of the requirement to indicate the relationship of the uncertainty of the measurement to the rated tolerance of the UUT, but 17025 only requires that the measurement uncertainty is stated. The 4:1 ratio has become the golden ratio for the nuclear world since we all committed to it years ago and things change slowly when it comes to the NRC. It is up to this committee to help the industry change together towards a more 17025-ish world.

The NRC has recommended that nuclear plants establish standard terminology for our purchase documents, so we have established an initial plan to do this as a group.

Our next meeting will be held in August in conjunction with the NCSLI conference.

AUTOMOTIVE METROLOGY
Patrick Butler

I am compiling a list of names of potential members of our Automotive Committee. Anyone interested in these activities should contact me via email or phone.

(248) 848-2331 <Pat.Butler@us.bosch.com>

SMALL BUSINESS INITIATIVE
TBA

We are actively looking for a new chair.

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EDUCATION AND TRAINING
Georgia Harris, V.P.

PERSONNEL TRAINING AND QUALIFICATIONS
Gloria Neely

The committee met at the Measurement Science Conference.

Attendees:
Neely, Gloria
Cameron, Graham
Connor, Richard
Harris, Georgia
Lapinskas, Mark
Warren, Kathy
Williams, Robert

NSWC Corona
Standards Council of Canada
Unified Industries, Inc.
NIST, NCSLI VP E&T
Sypro Test & Measurement
V-12 Oak Ridge Metrology Center
NSWC Corona
Committee News

The committee discussed a paper written by Rich Cozier on "Documenting Metrology Education, Training, and OJT."

Committee reviewed Draft outline for Recommended Practice on OJT. Committee members volunteering to write various sections were:

Rich Cozier - Section III - BASIC REQUIREMENTS FOR TRAINING
Kathy Warren - Section VI - RECORD KEEPING
Gloria Neely - Section VIII - APPENDICIES

We would like to have the DRAFT RP prepared by the August meeting at NCSLI in Nashville. We are asking for volunteers to accept the task of writing:

Section IV - ORGANIZATION TRAINING NEEDS
Section V - ASSESSMENT
Section VII - TRAINING RESOURCES

If you can participate in this project please contact Gloria Neely at: <gloria.neely@navy.mil> or Mark Lapinskes at <mark.lapinskes@sypris.com>.

A Proposed NCSLI Recommended Practice:

"Documenting Metrology Training"

Richard Cozier, Lab Manager, Navy Standards Lab, Springfield, VA

The documenting of training can provide many benefits to both the employer and employee. For the employer, it provides a record of training a current or prospective employee has received. It also allows for evaluating different sources of training. When the training records of the entire staff are combined, it could provide an effective tool for identifying training deficiencies and projecting future training requirements. For the employee, it provides a permanent record of the training received and the areas he or she are qualified to work in. It may be useful in the event the employee changes employers.

If the documentation of training follows established consensus guidelines, one of the greatest benefits would be portability, which will benefit both the employer and employee. A review of training records between a prospective employee and prospective employer will increase the mutual confidence that the employee is a correct fit for the position the employer is trying to fill. Unfortunately these consensus guidelines do not exist at the present time.

The Personnel Training and Qualifications Committee of the National Conference of Standards Laboratories International (NCSLI) is considering the development of consensus guidelines for documenting various forms of metrology training. Depending upon feedback received from NCSLI members, the proposed "Documenting Metrology Training" may become an NCSLI Recommended Practice. The proposed Recommended Practice will provide a method by which metrology education, formal training, and on-the-job training can be documented in support of a metrology laboratory. The methods will be designed to ensure that various aspects of training are compliant with the requirements of ISO/IEC 17025:2005 and to facilitate acceptance of metrology education, formal training, and on-the-job training records by employees.

Documenting formal metrology education and training is relatively easy. It can be as simple as placing a certificate of completion or diploma in the employee's records. A copy of the course(s) synopsis and/or transcript could be included if additional details are necessary. Therefore, the majority of the proposed Recommended Practice will deal with documenting on-the-job training. This is an area where laboratory procedures and processes differ significantly in how they document this important and common method of training.

The various levels of knowledge, skills and qualifications achieved through on-the-job training will need to be clearly defined. These definitions will be critical in allowing portability of the employee's training records. Selection, assignment and responsibilities of both the Trainer(s) and Trainee(s) will be another topic discussed in the Recommended Practice. The plan is to also include various example methods that can be used for the purpose of documenting on-the-job training. The actual methods and techniques of on-the-job training will not be addressed in detail, as these are too numerous and depend upon a wide variety of situations that occur in the individual laboratories. A comprehensive list of references for effective on-the-job training programs may be included as an appendix.

The proposed "Documenting Metrology Training" NCSLI Recommended Practice may also include a section on using the training documentation to identify training needs and evaluate the effectiveness of training actions to meet these additional requirements of ISO/IEC 17025:2005.

Your help is needed in order to determine if a significant need exists...
for this proposed "Documenting Metrology Training" NCSLI Recommended Practice and for examples of how your laboratory currently documents the various types of metrology training their staff receives.

You are cordially invited to attend the next Personnel Training and Qualifications Committee meeting during the 2006 NCSLI Workshop and Symposium in Nashville, Tennessee. You may also send your ideas, comments, and/or examples to the committee chairperson, Gloria Neely, via email: <gloria.neely@navy.mil>.

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DOCUMENTARY STANDARDS APPLICATIONS
Larry E. Nielsen, V.P.

CALIBRATION SYSTEMS RESOURCES
Chet Franklin

Earlier this year Larry Nielsen, VP - DOCUMENTARY STANDARDS APPLICATION, presented a plan to the NCSLI Board of Directors for a redesign of the Laboratory Evaluation Resources Committee. This included a title change and modification to the Charter and LRP. These are available on the website.

The first two 2006 Goals and Objectives for the new committee were: 1) Develop and publish a handbook providing guidance on the implementation of and application of the new standard, Z540.3; and 2) Evaluate requirements for the development and publication of a handbook for ANSI/ISO/IEC 17025:2005.

At MSC in March, the committee began work immediately on Goal 1. Steve Doty of NSWC Corona has been selected as the Working Group leader to pursue that goal. The working group will be soliciting guidance from members of the Writing Committee, Working Group (174, WG 1) who authored the standard, and inputs regarding application and implementation from users, specifiers and other stakeholders.

I have optimistically set as our target a draft of the handbook to be ready for circulation to the general membership for comment by the MSC 2007 conference. However, it will be a large undertaking, with a lot of data gathering, analyzing and editing to be done. There was considerable enthusiasm shown at the meeting, and all those there were anxious to be a part of this process, as well as several others who weren't able to attend but indicated their interest. I think that the participants will channel that energy and enthusiasm and we will have a good product. For more details on the intent and content of the handbook, and regular updates on progress, stop by the 171 Committee page on the NCSLI website, at <www.ncsli.org>.

We are looking for input and participation; anyone who is interested please e-mail me, Chet Franklin at <cfranklin@cscnorco.com>, or Steve Doty at <Stephen.Doty@navy.mil>.

LABORATORY FACILITIES
Dr. David Braudaway

Finalized the revision to RP-14, Recommended Practice for Selecting Standards Laboratory Environments. This document was approved for publication by a special meeting of the board on December 8. Work continues on a new RP on verification of labora-

tory environments (planned completion 2006).

METROLOGY PRACTICES
Dr. Howard Castrup

Calibration Intervals

Publication: RP-1, "Establishment and Adjustment of Calibration Intervals."
Subcommittee Chair: Don Wyatt, Diversified Data Systems.
Activity: Document update.
Percent Completed: 20%. Changes and new material, called out in the April 2005 workshop, are currently in progress. A revised Chapter 1 will be submitted within the next 30 days to the subcommittee for review.
Estimated Completion Date: August 2006.

Measurement Decision Risk Analysis

Publication: TBD, "Measurement Decision Risk Analysis and Management."
Subcommittee Chair: Greg Cenker, SCE.
Activity: Document development.
Percent Completed: 10%. There is no activity to report for this quarter.
Estimated Completion Date: February 2007.

SPC Methods

Publication: TBD, SPC Methods for Metrology.
Subcommittee Chair: Howard Castrup, Integrated Sciences Group.
Activity: Document development.
Percent Completed: 5%. Work is still in-progress on extending current ANOVA methods to cover part variation, equipment variation, reproducibility, repeatability and uncertainty growth.
There is no activity to report for this quarter.
Estimated Completion Date: May 2007.

Decision Support

Publication: TBD, Decision Support Analysis for Metrology.
Subcommittee Chair: Pat Snyder, Boeing.
Activity: Document development.
Percent Completed: 5%. This document will serve to integrate material from other Metrology Practices documents to assist in managing metrology programs. There is no activity to report for this quarter.
Estimated Completion Date: February 2008.

A draft RP titled "Metrology Practices Decision Support Topics, submitted by Derek Porter of the Boeing Commercial Airplane Group, is currently under review.

Uncertainty Analysis

Publication: RP-12, "Measurement Uncertainty Analysis."
Subcommittee Chair: Suzanne Castrup, Integrated Sciences Group.
Activity: Document update.
Percent Completed: 35%. A comprehensive document has been developed incorporating and extending GUM methodology. Numerous examples have been developed involving multivariate and systems analysis methods and that explore sources of error that are either not addressed in the current RP-12 or are given only peripheral mention. In addition, methods for acquiring, interpreting and using equipment specifications have been developed and are in the
Committee News

process of being documented.
Estimated Completion Date: February 2007.

The Committee is scheduled to meet during the Measurement Science Conference in March of 2006. We will also attempt to hold working sessions for the subcommittees to take place following the next scheduled meeting.

WRITING COMMITTEE
Jesse Morse


Report:

A letter ballot to the 174 consensus body was emailed on November 29, 2005 to approve/disapprove a new standard for managing M&T. It has been circulated once again to the committee consensus body for comment. At this writing five (5) members have cast ballots. All have been affirmative.

The ballot closed on January 12, 2006 prior to the BOD meeting in January. I will present the final results to the BOD at the meeting in San Antonio.

There was a panel session planned for MSC and at the NCSLI Conference in 2006 to present the new standard to the general public (this assumes the issue is approved). The next 174 committee meeting will be at the Measurement Science Conference in March.

ACCREDITATION RESOURCES
James Jenkins

Finalized the revision to RP-9, Calibration Laboratory Capability Documentation Guideline. This document and the "Comparison of ANSI/ISO/IEC 17025:2000 to ANSI/ISO/IEC 17025:2005 were approved for publication at the October board meeting. A new paper on resources for accreditation and activities related to accreditation is under consideration (planned completion 2006).

CALIBRATION PROCEDURES
Dale Varner

Work continues on the draft revision to RP-3, "Calibration Procedures." (planned completion 2006). The Calibration/Certification Procedures Committee meets on the first and third Wednesdays of each month. Currently the committee is finishing the revision of RP-3, Calibration Procedures, which is based upon the calibration procedure requirements of ISO 17025 and ANSI/NCSL Z540-1. The RP-3 should be presented for final review and release by late summer 2006.

The committee welcomes Daniel Martinez from NSWC Corona as a replacement for Julie Cunavelis.

One of the committee's 2006 goals is to recruit more representatives from the equipment manufacturing community to join the team.

In addition to our bimonthly teleconference meetings, this commit-
CONFERENCE MANAGEMENT
Carol Hockert, V.P.

2006 Conference Roster
Director - Ed Pritchard
Meeting Planner Report - Tom Huttemann
Registration/Exhibits/Sponsors - Craig Gulka
Technical Program - Karen Semer
Tutorials - Klaus Jaeger
Publicity - Jesse Morse
Finance - Jack Ferris
Best Paper - Doug Sugg
Conference Evaluation - Terry Conder
Entertainment - Barbara Belzer
Door Prizes - Steve Doty
Site Selection Chair - Tony Anderson
Conference Site Selection

The committee visited Nashville in early December 2005 for a pre-conference site visit. The room allocations have been finalized and an updated operating plan has been issued by Tom Huttemann. During the time in Nashville, possible sites for the International event were visited. A site has been chosen and contract negotiations are in progress. A contract has been signed with the Hilton Hotel in Nashville for the overflow hotel in 2006.

The committee is pleased to announce that working with Conferon and at the recommendation of the Site Selection Committee, NCSLI has signed a contract with the Swan & Dolphin Resort in Orlando for the 2008 Conference.

While at the January Board meeting the committee will be conducting a site visit in San Antonio and immediately following the Board meeting the committee will be visiting San Antonio, San Jose and Sacramento.

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EDUCATION SYSTEMS LIAISON
Mark Lapinskes

Our committee met at the Measurement Science Conference

Attendees:
Neely, Gloria
Cameron, Graham
Cozier, Richard
Harris, Georgia
Lapinskes, Mark
Shawn Mason
Williams, Robert
NSWC Corona
Unified Industries, Inc.
NIST, NCSLI VP E&T
Sypro Test & Measurement
St. Jude Medical
NSWC Corona

Old Business

Changes to the website:

1. Applications for scholarships and usage reports for schools are now available online in a template format.
2. Changes to the guidelines complete and approved

New Business:

1. The status of 2006 Educators Forum. The forum is complete. Three speakers will be presenting training perspectives from three different countries. Dr. Shoichiro SHIN the Director of Metrology Training Center of NMIJ, AIST in Japan, Mr Steve Sidney of the National Laboratory Association of South Africa and Mr Tony Able of Central Georgia Technical College
2. The Status of the scholarship program for 2006 Presentations. Twelve Schools have been contacted and most have responded as of this writing. Recommended presentation of scholarship funds will presented to the BOD at the April BOD meeting after the education committees review.
3. Committee also discussed the results of a solicitation for nominations, from the various institutions contacted, for the JD Simmons Memorial Scholarship. The response has been poor.

New Projects and Action Items:

The Committee discussed the need to bring the level of awareness concerning Metrology training to the High School level. This will be an ongoing "Brainstorm" to find ways to accomplish this task. This will be a direct tie in to Georgia Harris's "Outreach" initiatives. Graham Cameron forwarded Mark a similar discussion going on in Canada focusing on the same concern.

The committee has been wanting to do an analysis of several curriculums to compare the similarities and differences, and then do a study to determine if industry needs are being met by what is offered. Shawn Mason volunteered to head this task and Mark Lapinskes will be working with him to push this study ahead.

2007 sessions for the conference were discussed. Mark Lapinskes will host a collective session based on USA offered curriculums from different institutions. Shawn Mason volunteered to host a session on Training Effectiveness based on ISO 17025 and ISO 13485.

The committee will solicit training plans from industry and review plans submitted previously to the 163 committee to support #3 above.
NIST APPOINTS NEW WEIGHTS AND MEASURES CHIEF

Ms. Carol Hockert, currently Director of the Minnesota Weights and Measures Division, has been selected as the new Chief of the NIST Weights and Measures Division, replacing Mr. Henry Oppermann, who retired July 1, 2005. Ms. Hockert has extensive knowledge of weights and measures, legal metrology, and laboratory metrology. She also has strong academic credentials and in-depth experience in weights and measures oversight for the state of Minnesota.

She has demonstrated leadership in weights and measures, legal metrology, and laboratory standards activities through her work with the State of Minnesota, as a technical expert for the National Voluntary Laboratory Accreditation Program, and as a Vice President with NCSL, International (formerly National Conference of Standards Laboratories). Carol Hockert has the knowledge, experience and skills needed to be an effective leader in metrology for NIST and for our nation. She will report to NIST in late February, 2006.

NEW DIRECTOR FOR NIST TECHNOLOGY SERVICES

"I am pleased to announce that I have asked Belinda Collins to become the new Director of Technology Services (TS) at NIST (pending DOC formal approval). I delayed making this decision while I reviewed key activities at NIST involving the services group. Most notably, I wanted to be certain that we strengthened our emphasis, strategy, and abilities in standards-related activities -- and that we were properly organized to do that. I considered a variety of possibilities, including some restructuring."

"Belinda will be empowered to help Technology Services to become an even stronger and more effective unit. Relying on the existing talent within TS as well as the many standards-related capabilities elsewhere at NIST, her first and foremost responsibility will be to lead the efforts to achieve one of NIST's top four priorities: foster more efficient transactions in the domestic and global marketplace by more effective development and use of standards."

"Please join me in congratulating Belinda and in helping her to help TS and NIST to succeed." --William Jeffery, Director NIST

Editor's Note: As part of the launch of the new NCSLI MEASURE Journal, in March, Editor Dick Pettitt and I have agreed that his publication will take over publication of technical materials from NIST and other global NMIs that are members and affiliates of our organization. Therefore, I will discontinue the long chapters of NIST technical stories that I have handled for a long time.

On the other hand, I believe that there are plenty of business- and standards- and organizationally-oriented stories of interest to you readers of this newsletter. It may take a few issues to work out the wrinkles on the content between our publications, and any comments from you readers would be valuable.

Editor's Note: We at NCSLI are all VERY proud of Carol and Belinda. Carol was one of our member delegates from Minnesota, and a long-time Board contributor for more than a decade. By earning this significant promotion to this highly visible and important national office at NIST, Carol is a real success story. See her personal profile in our April, 2004 issue.

Belinda is a more recent addition to our NCSLI Board, but has shown great enthusiasm for the crucial connection between NCSLI and NIST. She is the latest in a long line of NIST representatives who have carried our message and needs into the highest levels of NIST.

******

NIST FY 2007 BUDGET FUNDING PUBLISHED

The U.S. National Institute of Standards and Technology (NIST) is slated for $535 million for its laboratory research and facility upgrades under President George W. Bush's American Competitiveness Initiative, according to the FY 2007 budget request submitted to the Congress. That budget proposal includes an additional $104 million-more than 24 percent-increase for the NIST laboratory programs and facilities. This would be the largest dollar increase ever for NIST's laboratory research.

The NIST budget is divided into three appropriations:

- $467 million for Scientific and Technical Research and Services (STRS), including $459.4 million for NIST's laboratory research and $7.6 million for the Baldrige National Quality Program. This category includes a major research initiative with 12 main components.
- $68 million for Construction of Research Facilities (CRF) including resources for safety, maintenance, repair, and facilities upgrades. The CRF request would fund:
  - Construction and renovations at the NIST Center for Neutron Research, tied in with the parallel R&D initiative in STRS ($12M).
  - Increases for the NIST safety, capacity, maintenance and major repairs (SCMMR) budget to repair aging facilities ($10M), and
  - Building renovations at the agency's Boulder, Colo., site ($10.1M).

NIST Core (subtotal): $535 million

- $46.3 million for Industrial Technology Services (ITS) to fund the Hollings Manufacturing Extension Partnership program. This reduction of $58.3 million from the FY 2006 level would be made in order to address the nation's most pressing needs in an austere fiscal environment. NIST will focus the FY 2007 funding to maintain an effective network of centers with an emphasis on activities that promote innovation and competitiveness in small manufacturers. The FY 2006 appropriations and estimated recoveries will be sufficient to meet all existing obligations of the Advanced Technology Program and to phase it out; no FY 2007 funds are requested.

NIST Total: $581 million
TWO UNIVERSITIES GET GRANTS FOR PRECISION MEASUREMENTS

NIST has awarded two new Precision Measurement Grants to promote fundamental research in measurement science in U.S. colleges and universities. One grant was made to Edmund G. Myers of Florida State University (Tallahassee, FL) to carry out a sensitive measurement of the difference between the mass of tritium and helium-3, at the level of one part in 1011. This information will provide a constraint on the interpretation of tritium beta-decay experiments, which, in turn, will provide an improved upper limit on the mass of the electron anti-neutrino. This has important consequences for both fundamental physics and astrophysics.

The other grant was awarded to David Weiss of Pennsylvania State University to carry out an ultrasensitive search for an electric dipole moment of the electron at the level of $3 \times 10^{-32} \text{ e m}$, a 500-fold improvement over the current limit. The experiment is expected to help put limits on possible extensions of the Standard Model, currently the most fundamental theory of matter, which plays a key role in understanding of nature.

The grants are awarded for three years, with an initial year funding of $50,000. The funding may be renewed at $50,000 per year for up to two additional years, for a total of $150,000, at the discretion of NIST. Over the 35-year history of the program, four PMG awardees have gone on to win Nobel Prizes. For more information, see <http://physics.nist.gov/pmg> or contact Peter Mohr, (301) 975-3217, <mohr@nist.gov>.

**********

FIRST LAB ACCREDITED BY NVLAP TO ISO/IEC 17025:2005

Tovey Engineering, Inc., located in Phoenix, Ariz., is the first laboratory accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) to the new ISO/IEC 17025:2005 standard. The ISO/IEC 17025:2005 standard was released on May 15, 2005, and Tovey Engineering achieved accreditation to the new version of the standard on November 7, 2005. Tovey Engineering offers NVLAP-accredited calibrations meeting the requirements of NIST Handbook 150, ISO/IEC 17025, and ANSI Z540 for force calibration services from 1 gf to 1,000,000 lbf. in compression and 1 gf to 800,000 lbf. in tension with direct traceability to NIST. The company’s calibration facilities include both deadweight and servo-controlled hydraulic transfer standard calibration rigs.


**********

2006 IS A SECOND LONGER!

This year, 2006, is an extra second longer, say physicists at the NIST. Along with the rest of the world's atomic timekeepers, NIST's time and frequency experts will insert a second (known as a leap second) into their time scale on Dec. 31 for the first time in seven years.

From 1972 (when the world went to the current system of atomic timekeeping) until Dec. 31, 1998, 22 seconds were added to Coordinated Universal Time (the official world time known as UTC) to keep it in sync with the Earth's rotation (which can speed up or slow down due to many factors). Since 1999 until recently, that rotation and UTC had stayed closely enough in harmony to not require the adjustment of adding a leap second.

This year's leap second was implemented by adding an extra second to atomic clocks at NIST in Boulder, Colo., and other sites around the world. Normally, the last second of the year would be 23:59:59 UTC on Dec. 31, 2005, while the first second of the new year would be 00:00:00 UTC on Jan. 1, 2006. The leap second will be added at 23:59:59 UTC (06:59:59 p.m. Eastern Standard Time) on Dec. 31, so that atomic clocks will read 23:59:60 UTC before changing to all zeros.

A recent proposal to eliminate leap seconds altogether in the future is still under consideration by the international bodies in charge of coordinating world time.

For more information on leap seconds, go to <http://tf.nist.gov/timefreq/general/leaps.htm>.

Editor's Note: We hope that this leap second announcement doesn't come as a surprise to any of our member delegate professionals. Just kidding!

**********

NIST ISSUES FINAL FEDERAL BIOMETRIC SPECS

The NIST yesterday issued the final publication describing how biometrics should be stored on Personal Identity Verification (PIV) cards. These cards will be required for all federal employees and contractors beginning in October 2006.

NIST Special Publication 800-76, "Biometric Data Specification for Personal Identity Verification," contains specifications for acquiring, formatting, and storing fingerprint images and templates; for collecting and formatting facial images; and specifications for biometric devices used to collect and read fingerprint images. The publication specifies that two fingerprints be stored on the card as "minutia templates," mathematical representations of fingerprint images.

In August 2004, the President issued Homeland Security Presidential Directive 12 calling for a mandatory, government-wide personal identification card that all federal government departments and agencies will issue to their employees and contractors requiring access to federal facilities and systems.

Federal Information Processing Standard 201, Personal Identity Verification for Federal Employees and Contractors, approved by Commerce Secretary Carlos Gutierrez on Feb. 25, 2005, specifies the technical and operational requirements for the PIV system and cards. NIST Special Publication 800-76 is a companion document to FIPS 201 describing how the standard will be implemented.

For a copy of SP 800-76 and more information on PIV, see <http://csrc.nist.gov/piv-program/index.html>.
**WHY 'FILLING-IT-UP' TAKES MORE THAN 'TANK CAPACITY'**

You fill up your "empty" fuel tank at the gas station and the pump charges you for more gallons than the tank's rated capacity. Are you being deliberately overcharged?

Unauthorized tampering with pumps does happen, even though state and local weights and measures officials regularly check gasoline pumps to ensure their accuracy. But there are also legitimate reasons for a discrepancy between the amount of fuel metered by a gas pump and an automobile's rated fuel tank capacity, according to a recent paper from the NIST.

For example, some manufacturers estimate that actual fuel tank capacity can vary as much as 3 percent from the tank capacity rating because of design characteristics, the manufacturing process, and even the physics associated with the components.

NIST notes that it is important to consider which parts of a vehicle's fuel tank are used to determine its capacity rating and what happens to these components when operating and fueling a vehicle. A small area at the bottom of a full tank is considered unusable because the fuel pump cannot reach that level to draw fuel. In addition, the tank's rated capacity does not include the "vapor head space," the uppermost portion of the tank compartment, nor does it include the volume of the filler pipe where fuel enters the vehicle.

Drivers, however, sometimes fill the tank beyond the pump's automatic shut-off point, resulting in fuel being drawn into the vehicle's vapor recovery system or filler pipe. Similarly, if the lanes that surround the service station pumps are not level, fuel can shift into the vapor space allowing more fuel to be delivered into the tank.

NIST cautions against using the "half full" reading on the fuel gauge to determine the exact number of gallons it will take to fill the tank. The fuel gauge is intended as an approximate indication of the fuel level. Manufacturers may set the "full" indicator at a level just below the tank's actual capacity.

Reserve fuel also can be present if the manufacturer designs the fuel gauge to indicate empty at a level above the actual point where the tank runs out of gas.


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**GRANT ADVANCES WEB PORTAL FOR U.S./CHINA STANDARDS**

NIST has awarded a $250,000 matching grant to support the development of an American National Standards Institute (ANSI)-sponsored U.S./China Standards Portal. The Web site will provide online educational materials on the Chinese and U.S. standards systems, as well as translated titles and scopes of up to 1,000 selected standards used in each of the two nations.

Standards-related issues are a significant concern among U.S. businesses competing in the Chinese market. In a recent survey of members of the U.S.-China Business Council, standards ranked sixth among the top 10 concerns of U.S. companies, up from eighth a year earlier.

Developed in consultation with ANSI members and constituents, the U.S./China Standards Portal will feature translations of key bibliographic information pertaining to 1,000 of China's mandatory national standards and Chinese translations for a comparable number of U.S. standards. The free site will include information on the structure and operation of the standards systems in both nations.

ANSI anticipates the site will be operational by the third quarter of 2006. NIST intends to provide additional funding for enhancements to the portal. The additional funds also would help to support an "Options for Action" Summit meeting, tentatively scheduled for the summer of 2006.

Organized by ANSI and NIST, this high-level meeting for standards developers and industry and government representatives will focus on the development of timetables and actions that can be taken to make the U.S. more competitive internationally in the standards arena. Participants will devise methods to coordinate and leverage the resources of individual organizations to respond more effectively to external standards-related challenges to innovation and competitiveness.

Embodied in safety and other regulations or specified by customers, standards influence an estimated 80 percent of global merchandise trade. Occasionally, some of these technical requirements, which range in scope from specific types of products to organizational management and quality systems, may pose market-entry barriers to merchandise and services exported by other nations.

Contact: Mark Bello, <mark.bello@nist.gov>, (301) 975-3776

*********

**EINSTEIN WAS RIGHT (AGAIN): NIST/MIT CONFIRM E=MC²**

Albert Einstein was correct in his prediction that E=mc², according to scientists at the Massachusetts Institute of Technology (MIT), the Commerce Department's NIST, and the Institute Laue Langevin, Genoble, France (ILL) who conducted the most precise direct test ever of what is perhaps the most famous formula in science.

In experiments described in the Dec. 22, 2005, issue of Nature,* the researchers added to a catalog of confirmations that matter and energy are related in a precise way. Specifically, energy (E) equals mass (m) times the square of the speed of light (c²), a prediction of Einstein's theory of special relativity. By comparing NIST/ILL measurements of energy emitted by silicon and sulfur atoms and MIT measurements of the mass of the same atoms, the scientists found that E differs from mc² by at most 0.0000004, or four-tenths of 1 part in 1 million. This result is "consistent with equality" and is 55 times more accurate than the previous best direct test of Einstein's formula, according to the paper.

(Continued on opposite page)
ISHM 2006, BRAZIL

(5th International Symposium On Humidity And Moisture)
2-5 May 2006
Rio de Janeiro, Brazil

The National Institute of Metrology, Standardisation and Industrial Quality (INMETRO) is very proud and honoured to host such an important and prestigious international symposium. INMETRO looks forward to having you join us to enrich our symposium and also enjoy the beauty that Rio de Janeiro has to offer.

Topics:
- Humidity and Moisture Standards
- Intercomparison and Transfer Standards
- Calibration Methods
- Standard Reference Materials for Humidity and Moisture
- Humidity Measurements in Gases
- Moisture Methods in Solids and Liquids
- Hygrometers and Moisture Sensors
- Accreditation and Legal Metrology

An exhibition of the latest developments in instrumentation and services will be highlighted.

Contact:
Julio D. Brionizio
INMETRO
Tel. +55 21 2679 9066
<ishm2006@inmetro.gov.br>

SYMPOSIUM OF METROLOGY 2006

Oct 25, 26, 27, 2006
Santiago de Queretaro, Qro., Mexico

The National Metrology Institute of México (CENAM) invites you to the Symposium of Metrology 2006. Our Symposium has continuously drawn a large attendance from the Mexican metrology community, as well as members from several National Metrology Institutes.

During the event there will be an industrial products exhibition related to metrology, which will give us an opportunity to increase awareness of nowadays most relevant measuring instruments and related products in the market. For the aforementioned, we will count with the main trademarks of instruments and industrial measuring laboratories, as well as instruments for chemical analysis, firms of specialized software and others.

Your presence at the Symposium is a great opportunity for the enrichment of this event with the contributions of the NCSL members and to share your knowledge and your experience with the metrology community of Mexico and to promote your products during the Symposium. During the Symposium we will have simultaneous translation.

General Subjects
- The metrology in Mexico, challenges and perspectives
- Measuring instruments, design, use and calibration
- Methods of measurement, application, improvement and validation
- The metrology in the industry
- Development of measuring standards and systems of measurement
- Chemical Metrology and its applications
- Accreditation of calibration and testing laboratories (including chemical analyses)
- Comparisons and proficiency testing
- Estimation of the uncertainty in measurements, chemical tests and analyses
- Statistical tools applied to the metrology
- Traceability of the measurements
- The measurements in the quality systems
- Legal Metrology and Standardization
- The Metrology in the scientific research
- Education in Metrology

For more information, please visit our Web page that is in English and in Spanish: <http://www.cenam.mx/simposio2006>.

A NCSL Board of Directors Meeting will take place at the hosting hotel just before the Symposium.

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NMI News (Continued from previous page)

Such tests are important because special relativity is a central principle of modern physics and the basis for many scientific experiments as well as common instruments like the global positioning system. Other researchers have performed more complicated tests of special relativity that imply closer agreement between $E$ and $mc^2$ than the MIT/NIST/ILL work, but additional assumptions are required to interpret their results, making these previous tests arguably less direct.

The Nature paper describes two very different precision measurements, one done at MIT by a group led by David Pritchard and another done at the ILL by a NIST/ILL collaboration led by the late physicist Richard Deslattes (NIST) and Hans Börner (ILL).

Deslattes and his collaborators developed methods for using optical and X-ray interferometry—the study of interference patterns created by electromagnetic waves—to precisely determine the spacing of atoms in a silicon crystal, and for using such calibrated crystals to measure and establish more accurate standards for the very short wavelengths characteristic of highly energetic X-ray and gamma ray radiation. Börner and his collaborators were responsible for a highly successful gamma-ray measurement program at the ILL. For further information, see <www.nist.gov/public_affairs/releases/einstein.htm>.
**LIAISON NEWS**

**AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)**
Craig Gulka

**United States Standards Strategy offers Framework for U.S. Business and International Trade**

The Board of Directors of the American National Standards Institute (ANSI) became the first entity to approve the newly published United States Standards Strategy (USSS) at their meeting on December 8, 2005. The Strategy establishes a framework that will be used by U.S. stakeholders to improve trade issues in the global marketplace, enhance consumer health and safety, meet the needs of diverse industries, and advance U.S. viewpoints in the regional and international standardization arenas.

The U.S. standardization system functions under the belief that standards should meet societal and market needs and should not be developed to act as technical barriers to trade. The U.S. Standards Strategy promotes standards that are technically suitable, applied globally, and developed in accordance with the principles of openness, transparency, consensus and due process within the World Trade Organization's Technical Barriers to Trade Agreement.

The U.S. Standards Strategy is the result of a collaborative process that began in 2004 when ANSI convened a committee to review and revise the previously published National Standards Strategy for the United States (2000). The updated and renamed U.S. Standards Strategy reflects the input of hundreds of representatives of industry; small, medium and large enterprise; standards developers and consortia; consumer groups; and federal and state governments that contributed to the revision process.

"The U.S. standardization system is an intricate and vital infrastructure that promotes the public good, enhances the competitiveness of U.S. industry, and contributes to a liberalized global trading system," said Mr. S. Joe Bhatia, chair of the United States Standards Strategy Committee. "Providing a strategic standards framework for a nation as complex as the United States is an essential element that helps to maintain and improve the system. The United States Standards Strategy was developed to serve as this framework."

The document is built upon twelve initiatives that address the role of government; health, safety and environmental responsibilities; consumer interests; prevention of standards as trade barriers; responsiveness to cross-cutting technologies; efficiency in standards development; the priority of standards education; and other crucial considerations. Key updates to the Strategy relate to intellectual property rights, funding models for the standards system, national priorities, and global trade issues.

ANSI served as facilitator during the review and revision of the USSS and plans to play a lead role in its implementation, beginning with a public awareness campaign and distribution of the Strategy to the Institute's members and constituents. ANSI is also sponsoring web space to make the document freely available for download and distribution.

"I encourage every member of the U.S. standardization community to endorse the U.S. Standards Strategy and incorporate its core tactics into their own organization's business and strategic practices," said ANSI's president and CEO Dr. Mark W. Hurwitz. "The Strategy is the result of our ANSI Liaison 4th Quarter 2005 Report, San Antonio, TX, Page 4, and the community's willingness to contribute a new strategic vision to the future of our nation's prosperity."

The Strategy and an accompanying Frequently Asked Questions document can be found online at


**The Role of Standards in Daily Life**

In an effort to communicate the vital role that standards play in daily life, ANSI Online will publish, on an ongoing basis, a series of snapshots of the diverse standards initiatives undertaken in the global and national standards arena, many of which are performed by ANSI members and ANSI-accredited standards developers. Two of the latest selections follow:

**Household Electric Room Air Cleaners**

Dust, pollen, pet dander, and other airborne particles in the home are an assault on someone suffering from certain allergies. Household room air cleaners provide one line of defense, and their performance is guided by a standard from ANSI member the Association of Home Appliance Manufacturers (AHAM).

**Laser Safety Measurements**

The optical dexterity and utility of lasers allows for their wide application across industries and technologies. ANSI member the Laser Institute of America (LIA) is the professional society dedicated to fostering lasers, laser applications and laser safety worldwide. LIA recently published ANSI Z136.4 (2005), Recommended Practice for Laser Safety Measurements for Hazard Evaluation.

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**ACCREDITATION BODIES**

Dana S. Leaman, Liaison Delegate

I am now reporting on several accreditation organizations when their reports are available; Doug Leonard (LAB), Hershel Brewer (IAS). Keith Greenaway (AClass) had nothing to report.

**For A2LA, we would like to report the following:**

Revocation of Bi-Lateral Memorandums of Understanding (MOUs)

Recent events have led A2LA to the decision to terminate all bi-lateral Memorandums of Understanding (MOUs). A2LA will rely solely on the international mutual recognition arrangement (MRA) process for the purpose of recognizing the test or calibration results.
from the laboratories of other accreditation bodies. So results from laboratories accredited by accreditation bodies recognized by the Asia Pacific Laboratory Accreditation Cooperation (NVLAP, IAS, Canada, Mexico and many others) or the European cooperation for Accreditation (UKAS and many others) or Inter-American Accreditation Cooperation (Brazil and Argentina) or ILAC (Israel, South Africa) are accepted. A2LA is signatory to each of these Cooperations.

A2LA Launches its Product Certification Body Program

As of January 6, 2006, A2LA has developed and is currently accepting applications for product certification body accreditation to ISO/IEC Guide 65:1996, General Requirements for Bodies Operating Product Certification Systems. A2LA welcomes applications for the accreditation of all types of certifications. The addition of the product certification bodies program at A2LA will provide many laboratories with a single accreditation service provider to meet all their needs. For further information, please contact Brad Moore, Senior Laboratory Services Officer, at 301 644 3226 or <bmoore@a2la.org>.

2006 A2LA Assessor Conclave and Annual Meeting

The 2006 A2LA Assessor Conclave and Annual Meeting will be held March 7 -13, 2006, at the Sheraton Columbia in Columbia, MD. Invitations were sent out in early January of 2006. Meetings on March 11 and 12 are open to interested parties and A2LA encourages laboratory representatives to attend. If you would like to attend the Conclave and/or participate in one of the advisory committees, or if you should have received an invitation but have not, please contact A2LA (301 644 3248).

A2LA Attends APLAC General Meeting

The annual general meeting of the Asia Pacific Laboratory Accreditation Cooperation (APLAC) took place in Chang Mai, Thailand, 14-18 November 2005. A2LA was represented by Peter Unger, Roxanne Robinson, Trace McInturf, and Dan Tholen. Three more signatories were added to the APLAC MRA: Canadian Association For Environmental Analytical Laboratories (CAEAL), Canada, for testing; Bureau of Product Standards Laboratory Accreditation Scheme (BPSLAS), Philippines, for testing and calibration; and Mexican Accreditation Entity (EMA), Mexico, for testing, calibration and inspection.

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ISA INTERNATIONAL
Mike Suraci, Liaison Delegate

Walt Bajek, Past ISA President, has continued to inquire status re/IMEKO. I forwarded his request to Dave Agy for attention.

I have forwarded ISA announcements to interested NCSLI Board members.

Over the years, ISA has published NCSL INTERNATIONAL WORKSHOP & SYMPOSIUM notices in their "In Tech" magazine.

COUNCIL FOR OPTICAL RADIATION MEASUREMENTS (CORM)
Sally Bruce, Liaison Delegate

CORM 2006 Annual Conference
May 9 to 11, 2006
Green Auditorium

National Institute of Standards and Technology
Gaithersburg, MD

The CORM 2006 Annual Conference will be structured to provide interaction between the optical radiation industry and National Metrology Institutes (NMIs) such as the National Institute of Standards and Technology (NIST), National Research Council (NRC) of Canada, and National Center for Metrology (CENAM) of Mexico.

CORM 2006 technical sessions are as follows:

Technical Session

Imaging Photometry and Colorimetry
Spectral and Photometric Flux and Intensity of LEDs, Lamps and Luminaires
Ultraviolet Lamps
Detector Responsivity
Electronic Displays
Chairperson
Mr. Tim Moggridge <timm@instrumentsystems.com>
Mr. Angelo Arecchi <angelo@SphereOptics.com>
Dr. Howard Yoon <howard.yoon@nist.gov>
Dr. George Eppeldauer <george.eppeldauer@nist.gov>
Mr. Paul Boynton <boynton@eeel.nist.gov>

An NMI representative will present available solutions, if any, or technology status, development, and ideas for improvement. A question and answer period involving industry, NMI, and audience participation will be allotted to stimulate technological solutions and innovation.

Session chairs can still use inputs from industry regarding problems and issues, for inclusion in the forum and technical sessions.

Contact either of the conference organizers, Mr. Jason Chonko of Keithley Instruments and Mr. Tim Moggridge of Instrument Systems, Ltd., or the appropriate session chair listed above.

CORM 2006 Conference Organizing Committee:

Jason Chonko
Keithley Instruments
Ph: 440-542-8042
Email: <jchonko@keithley.com>
Tim Moggridge
Instrument Systems, LTD
Ph: 613-729-0614 x27
E-mail: <timm@instrumentsystems.com>?

For registration and additional information visit the CORM website at <http://www.corm.org>
INTERNATIONAL MEASUREMENT CONFEDERATION (IMEKO)
Chester Franklin, Liaison Delegate

"METROLOGY FOR A SUSTAINABLE DEVELOPMENT", the 16th IMEKO World Congress, will be in Rio de Janeiro, Brazil on Sept 17-22, 2006, in connection with the Brazilian Congress of Metrology, and organized by the Brazilian Society of Metrology. The technical program structure of the Congress will be based on the subject-themes of the various IMEKO Technical Committees.

Schedule:
Exhibitors Application: April 21, 2006
Discounted and Rate Registration: May 31, 2006
Congress Websites: <www.metrologia2006.org.br or www.imeko.org>

The 19th IMEKO WORLD CONGRESS will be in Paris in 2009.

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ASQ MQD LIAISON NEWS
Chris Grachanen

Certified Calibration Technician (CCT) Program

The results are in for Dec 05 CCT exam candidates. Congratulations go out to all new CCT alumni.

<table>
<thead>
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<th>Date of Exam</th>
<th>Sat for Exam</th>
<th>Passed Exam</th>
<th>% Passed</th>
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CCT Alumni: 552

Metrology Job Description (MJD) Initiative

The results from the (MJD) Initiative have been compiled and summarized. Work is nearing completion on formal job descriptions for Calibration Technician, Calibration Engineer and Metrologist and should be ready for submitting to the Department of Labor's Standard Occupation Classification (SOC) system with the next couple of weeks. The following report from ASQ gives the overall status of the job descriptions.

JOB DESCRIPTIONS FOR CALIBRATION PROFESSIONALS
ASQ
February 2006

I. Education and Experience Requirements1
Calibration Technician

Education: Technical school or military (PMEL) Training
Experience: 0 to 2 years

Required skills and abilities:
- Determine the kind of measurement tools and equipment needed to do a job.
- Perform routine maintenance and calibration on equipment and determine when and what kind of calibration and maintenance is needed.
- Use mathematics to solve measurement-related problems.
- Conduct tests and inspections of products, services, or processes to evaluate quality or performance.
- Determine causes of measurement errors and decide what to do about it.
- Choose the right mathematical methods or formulas to solve a problem.
- Apply measurement science principles to specific problems to produce answers that make sense.
- Recognize when a measurement is wrong or is likely to go wrong.

Calibration Engineer

Education: Associate's or Bachelor's Degree
Experience: 3 or more years

Metrologist

Education: Bachelor's degree or military (PMEL) training
Experience: 5 or more years

(1) For all positions, years of experience can be substituted for education.

II. Essential Knowledge and Desired Knowledge(2)
Calibration Technician

Essential Knowledge
Algebra
Basic computer skills
Electronics - basic
Measurement sciences
Statistics - basic
Technical writing
Quality Management Sys (ISO 9000 Series)

Desirable Knowledge
Trigonometry
Electronics - advanced (circuit analysis)
Measurement sciences

Calibration Engineer

Essential Knowledge
Algebra
Basic computer skills
Electronics - basic
Measurement sciences
Statistics - basic
Technical writing
Quality Management Sys (ISO 9000 Series)

Desirable Knowledge
Trigonometry
Calculus
Computer programming
Physics
Electronics - advanced (circuit analysis)
Engineering - electrical
Engineering - mechanical
Statistics - advanced (ANOVA, DOE, gage R & R)
Metrologist

**Essential Knowledge**
- Algebra
- Basic computer skills
- Electronics - basic
- Measurement sciences
- Statistics - basic
- Technical writing
- Quality Management Sys (ISO 9000 Series)

**Desirable Knowledge**
- Analytic Geometry
- Electronics - advanced (circuit analysis)
- Geometric dimensioning and tolerancing

(2) Essential knowledge was selected by >65% of survey respondents, desirable knowledge was selected by 51 - 65% of survey respondents

### III. Essential Responsibilities for Calibration Technicians, Calibration Engineers, and Metrologists

<table>
<thead>
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<th>Calib Tech</th>
<th>Calib Engr</th>
<th>Metrologist</th>
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<tbody>
<tr>
<td>1. Calibrate inspection, measurement, and test equipment (IM&amp;TE) in one of the following disciplines - electrical, dimensional, optical, physical/mechanical, chemical - in order to ensure compliance with published specifications.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2. Maintain primary and/or intrinsic calibration standards.</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>3. Maintain secondary and/or working calibration standards.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4. Develop calibration procedures and methods, according to detailed specifications, blueprints, drawings, and other technical requirements.</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>5. Collect, compile, measure, summarize, and record data gathered during calibration.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6. Analyze measurement data for identifying abnormalities, trends and/or predicting future values.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7. Identify IM&amp;TE out-of-tolerance conditions and perform corrective action via adjustments, component replacement, correction factors, etc.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>8. Identify and correct measurement errors, as applicable.</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>9. Prepare calibration reports and certificates.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10. Inspect and evaluate new calibration standards for proper operation before releasing to calibration laboratory.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>11. Recommend IM&amp;TE for use in measurement applications.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>12. Recommend standards for use in calibration applications.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>13. Adapt existing calibration equipment, standards, and techniques to accomplish unique measurements tasks for which they are not principally used.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>14. Apply engineering knowledge to the design and development of calibration methods, fixtures, and IM&amp;TE not commercially available.</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>15. Develop, document, and maintain calibration systems and procedures, based on principles of measurement science, technical analysis of measurement problems and accuracy and precision requirements.</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>16. Perform uncertainty evaluation and analysis for measurement standards and associated measurement processes.</td>
<td>X</td>
<td>X</td>
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<tr>
<td>17. Design and document measurement reference material for laboratory use.</td>
<td>X</td>
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</tr>
<tr>
<td>18. Conduct technical audits of the calibration laboratory to verify traceability of standards and compliance with published standards and guidelines.</td>
<td>X</td>
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<tr>
<td>19. Develop software for calibrating IM&amp;TE.</td>
<td>X</td>
<td>X</td>
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<tr>
<td>20. Develop software for the maintenance of calibration standards.</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>21. Develop, implement, and maintain the calibration laboratory's quality systems per published standards and guidelines.</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>22. Train subordinates in calibration concepts and procedures.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>23. Perform technical assessments for personnel performance reviews.</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>24. Perform laboratory housekeeping.</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>25. Maintain laboratory recognition/ accreditation.</td>
<td>X</td>
<td>X</td>
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<tr>
<td>26. Provide technical advice to other departments of the organization.</td>
<td>X</td>
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</table>

(3) May be performed, but not in all positions.

### IV. Extent to Which Knowledge is Required for Entry-Level Calibration Technicians, Calibration Engineers, and Metrologists

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Calib Tech</th>
<th>Calib Engr</th>
<th>Metrologist</th>
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<tbody>
<tr>
<td>Algebra</td>
<td>c</td>
<td>c</td>
<td>c</td>
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<tr>
<td>Trigonometry</td>
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<td>b</td>
<td>c</td>
</tr>
<tr>
<td>Analytic geometry</td>
<td>a</td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>Calculus</td>
<td>b</td>
<td>a</td>
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<tr>
<td>Basic computer skills (word processing, spreadsheets)</td>
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<td>c</td>
<td>c</td>
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<tr>
<td>Computer programming</td>
<td>b</td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td>a</td>
<td>b</td>
<td>b</td>
</tr>
<tr>
<td>Electronics - basic</td>
<td>c</td>
<td>c</td>
<td>c</td>
</tr>
<tr>
<td>Electronics - advanced</td>
<td>c</td>
<td>c</td>
<td>c</td>
</tr>
</tbody>
</table>
(circuit analysis) b b b
Engineering - electrical b
Engineering - mechanical b a
Engineering - systems
Measurement sciences b c c
Geometric dimensioning and tolerancing a a b
Statistics - basic a c c
Statistics - advanced (ANOVA, DOE, gage R & R) b a
Technical writing a c c
Quality Management Systems (ISO 9000 Series) a c c

(4) (a) indicates 35% to 55%, (b) 51% to 65%, and (c) greater than 65% of respondents indicating that the knowledge is essential at entry level.

*********

MEASUREMENT SCIENCE CONFERENCE
Miguel Cerezo, Liaison Delegate

This year's Measurement Science Conference was held at the Disneyland Hotel and Conference Center in Anaheim, CA during the week of February 27th - March 3rd, 2006. The conference was extremely successful and well-attended with over 1000 attendees and 100+ exhibitors.

The first two days (Feb. 27 and 28) were devoted to NIST seminars and topics included:

- Double Substitution: Workhorse of Mass Metrology
- Experiment Design, Calibrations and Interlaboratory Studies
- Estimating and Reporting Measurement Uncertainty
- NIST Flow Seminar
- Time and Frequency: Measurement and Applications
- Regression Analysis using NIST/SEMATECH e-handbook of Statistical Methods
- Selection, Use and Calibration of Contact Thermometers
- NIST Pressure and Vacuum Measurements

The Seminars were followed up with a series of Tutorial Workshops on March 1st. On the final two days of the Measurement Science Conference (March 2nd and 3rd), attendees were treated to six distinct tracks in which papers and presentations related to a plethora of measurement science related topics were presented.

The Measurement Science Conference has an established fund to award $1000 scholarships to students in an Engineering, Science or Quality Assurance degree program. The scholarship program places emphasis on papers or projects that discuss the advancement of measurement science technology. This year's recipients of MSC scholarship awards were:

- Christopher A. Herwerth, California State University, Los Angeles
- David B. Hughes, California State Polytechnic University, Pomona
- Scott A. Norby-Cedillo, University of Michigan, Ann Arbor
- James C. Pan, California State University, Long Beach
- Jesse Pompa, University of California, Irvine
- Penelope Spence, California State University, Chico

Also awarded at the conference was the Muriel Mantes Scholarship Award, which is administered by California State University, Dominguez Hills. This scholarship, a $1000 award given in honor of the Mantes family, recognizes measurement science students who have completed at least one year of study. The recipient of this award for 2006 was James Patch, a student in the Bachelor of Science Quality Assurance, Measurement Science program at California State University, Dominguez Hills.

2007 promises to be another exciting year and preparations have already commenced. The conference theme will be "Apply Metrology: Rule the World" and, once again, the conference will take place in Southern California. Anyone wishing to help craft next year's technical program can find information on the conference website at <www.msc-conf.com>.

One significant change from recent trends is the conference location. Next year, the conference will be held in Long Beach, CA at the convention center. Also, the conference dates will be switched back to the more traditional late January timeframe (Jan. 22 - 26, 2007). So please mark these dates on your calendar and we'll look forward to seeing you again next year.
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ppm Metrologie
Bromont, QC J2L 2K4 Canada
Member Delegate:
Xavier Guillaud
(450) 534-2614
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<th>Name</th>
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<th>Fax</th>
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<td>(651) 639-4014</td>
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<td>(865) 574-2802</td>
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<tr>
<td>Minutes</td>
<td>Lynn Matthews</td>
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<td>(425) 446-5992</td>
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<td>Meeting Planner</td>
<td>Tom Huttemann</td>
<td>(252) 255-1690</td>
<td>(252) 255-1927</td>
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<td>Exhibits</td>
<td>Craig Gulka</td>
<td>(303) 440-3339</td>
<td>(303) 440-3384</td>
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<tr>
<td>Registration</td>
<td>Joan Wilshire</td>
<td>(303) 440-3339</td>
<td>(303) 440-3384</td>
</tr>
<tr>
<td>Technical Program</td>
<td>Karen Semer</td>
<td>(740) 788-5180</td>
<td>(740) 788-5021</td>
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<tr>
<td>Tutorials Program</td>
<td>Klaus Jaeger</td>
<td>(408) 867-1743</td>
<td>(408) 867-3705</td>
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<tr>
<td>Guest Program</td>
<td>Tom Huttemann</td>
<td>(252) 763-1600</td>
<td>(252) 255-1927</td>
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<tr>
<td>Publicity/Marketing</td>
<td>Jesse Morse</td>
<td>(425) 446-5468</td>
<td>(425) 446-5992</td>
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<tr>
<td>Finance</td>
<td>Jack Ferris</td>
<td>(231) 334-4891</td>
<td>(231) 334-3788</td>
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<td>Doug Sugg</td>
<td>(909) 273-5380</td>
<td>(909) 273-5500</td>
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<tr>
<td>Conference Evaluation</td>
<td>Terry Conder</td>
<td>(651) 736-4331</td>
<td>(651) 736-7325</td>
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<td>Entertainment</td>
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<td>Door Prizes</td>
<td>Steve Doty</td>
<td>(951) 273-5221</td>
<td>(951) 273-5175</td>
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<tr>
<td>Site Selection</td>
<td>Tony Anderson</td>
<td>(407) 333-3327</td>
<td>(407) 333-3309</td>
</tr>
<tr>
<td>VP Operations</td>
<td>Tom Wunsch</td>
<td>(505) 844-4359</td>
<td>(505) 844-7699</td>
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<tr>
<td>VP Education &amp; Training</td>
<td>Georgia Harris</td>
<td>(301) 975-4014</td>
<td>(301) 926-0647</td>
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### ANSI and ISO Standards:

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<th>Standard</th>
<th>Members</th>
<th>Non-Members</th>
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<tr>
<td>ANSI/NCSL Z540-1-1994 (R2002) (Calibration &amp; Measurement &amp; Test Equip. General Requirements)</td>
<td>50.00</td>
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<td>ANSI/NCSL Z540-2-1997 (R2002) (U.S. Guide to the Expression of Uncertainty in Measurement)</td>
<td>85.00</td>
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<td>ANSI/ISO/IEC 17025: 2005 (General Requirements for the Competence of Testing and Cal Labs)</td>
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<tr>
<td>ISO 10012:2003 (Measurement Management Systems - Requirements for Measurement Processes and Measuring Equipment)</td>
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### NCSLI Recommended Practices:

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<tr>
<td>RP-1 &quot;Establishment &amp; Adjustment of Calibration Intervals&quot;</td>
<td>25.00</td>
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<tr>
<td>RP-3 &quot;Preparation of Calibration Procedures&quot;</td>
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<tr>
<td>RP-6 &quot;Calibration Control Systems for the Biomedical and Pharmaceutical Industry&quot;</td>
<td>25.00</td>
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<td>RP-7 &quot;Laboratory Design&quot;</td>
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<td>RP-8 &quot;An Individual Equipment Evaluation Guide&quot;</td>
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<td>RP-9 &quot;Calibration Laboratory Capabilities Documentation Guidelines&quot;</td>
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<td>RP-10 &quot;Establishment &amp; Operation of Electrical Utility Metrology Laboratory&quot;</td>
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<td>RP-12 &quot;Determining &amp; Reporting Measurement Uncertainties&quot;</td>
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<td>RP-13 &quot;Computer Systems in Metrology&quot;</td>
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<td>RP-14 &quot;Guide to Selecting Standards-Laboratory Environments&quot;</td>
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<td>RP-15 &quot;Guide for Interlaboratory Comparisons&quot;</td>
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### NCSLI Recommended Intrinsic/Derived Standards Practices:

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<tr>
<td>RISP-1 &quot;Array Josephson Junction&quot;</td>
<td>25.00</td>
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<tr>
<td>RISP-2 &quot;Triple Point of Water Cell&quot;</td>
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<td>RISP-3 &quot;Quantized Hall Resistance&quot;</td>
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<td>RISP-4 &quot;Deadweight Pressure Gauges&quot;</td>
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<td>RISP-5 &quot;Two-Pressure, Two Temperature Humidity Generator&quot;</td>
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<tr>
<td>Catalog of Intrinsic and Derived Standards</td>
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### Laboratory Management Publications:

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<tr>
<td>LM-1 Acronym and Abbreviations List</td>
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<tr>
<td>LM-2 NCSLI Glossary of Metrology-Related Terms</td>
<td>25.00</td>
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<tr>
<td>LM-3 Guide to Achieving Laboratory Accreditation</td>
<td>25.00</td>
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<tr>
<td>LM-4 Calibration Laboratory Manager's Guidebook</td>
<td>25.00</td>
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<tr>
<td>LM-5 Companion Volume to Guide to Achieving Lab. Accred.</td>
<td>75.00</td>
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<tr>
<td>LM-6 Guide to Measurement Uncertainty for Calibration Laboratories - DRAFT</td>
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<td>LM-9 ANSI/NCSL Z540-1-1994 Handbook</td>
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<tr>
<td>LM-10 1999, 2001, 2003, or 2005 Benchmarking Survey</td>
<td>25.00</td>
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### Metrology Reference and Textbooks

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<th>Title</th>
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<tr>
<td>Calibration: Philosophy in Practice (2nd Ed.)</td>
<td>60.00</td>
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<tr>
<td>The Metrology Handbook</td>
<td>85.00</td>
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<tr>
<td>Managing the Metrology System (3rd Ed.)</td>
<td>32.00</td>
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<tr>
<td>The Uncertainty of Measurements: Physical and Chemical Metrology Impact and Analysis</td>
<td>59.00</td>
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2005 (CD-ROM only)  
250.00  400.00

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<tr>
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<td>100.00</td>
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<td>Royal Egyptian Cubit</td>
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---

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<tr>
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<th>Appointing Officer* information:</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<th>Delegate’s Business Mailing Address</th>
<th>Mailing Address (if different from Member Delegate)</th>
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<th>Postal Code</th>
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<th>Fax Number</th>
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<th>Company’s URL Address</th>
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Appointing Officer* information:

<table>
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*The Appointing Officer is the individual from the above company who is appointing the Member Delegate, and is usually the Member Delegate’s supervisor.

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- New Corporate Member Fee (Jan-Dec 2006) .........................$400
- New Educational Institution Member Fee (Jan-Dec 2006) ......$400
- New Membership above plus annual dues renewal (Advance payment is guaranteed at $325 per year. No refund for advance payment.)
  - New Member $400 + 2007 dues $325 = $725
  - New Member $400 + 2007/2008 dues $650 = $1,050
  - New Member $400 + 2007/2008/2009 dues $975 = $1,375
  - New Member $400 + 2007/2008/2009/2010 dues $1,300 = $1,700

No Purchase Orders...Please

Please remit with Application the amount shown above (in U.S. funds). Make checks payable to: NCSL International.

Or charge your:  
- Visa   
- MasterCard   
- American Express   
- Discover

**Full name as it appears on card**

<table>
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<tr>
<th>Card Number</th>
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NEWSLETTER EDITORIAL SCHEDULE FOR 2006-07

<table>
<thead>
<tr>
<th>Issue Date</th>
<th>In Mail</th>
<th>To Printer</th>
<th>Last Editorial to Editor</th>
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<td>Jul. 06</td>
<td>10 Jul. 06</td>
<td>15 Jun. 06</td>
<td>1 Jun. 06</td>
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<tr>
<td>Oct. 06</td>
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<td>15 Sep. 06</td>
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<td>Jan 07</td>
<td>10 Jan. 07</td>
<td>15 Dec. 06</td>
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<td>Apr 07</td>
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<td>15 Mar. 07</td>
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EDITOR'S NOTE:
This schedule is for guidance for anyone who needs to submit material for publication in the Newsletter.

FUTURE CONFERENCES

2006 NCSL International Workshop & Symposium
August 6-10, 2006
Nashville, TN

2007 NCSL International Workshop & Symposium
July 29-August 2, 2007
St. Paul, MN

2008 NCSL International Workshop & Symposium
August 3-7, 2008
Orlando, FL

Abstracts are required for Workshops, Panels, and Papers. For more information contact:
NCSL International Business Office
2995 Wilderness Place, Suite 107
Boulder, CO 80301-5404
Tel: (303) 440-3339
Fax: (303) 440-3384
E-mail: <info@ncsli.org>

BOARDS OF DIRECTORS' MEETING DATES

April 24-26, 2006
NCSLI Headquarters
Boulder, CO

August 6, 11-12, 2006
Renaissance Nashville
(in conjunction with the NCSLI International Workshop & Symposium, August 6-10, 2006)

October, 2006
CENAM
Queretaro, Mexico

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The NCSLI Vision
Promote competitiveness and success of NCSL International members by improving the quality of products and services through excellence in calibration, testing, and metrology education and training.

The NCSLI Mission
NCSL International (NCSLI) is a continuing, nonprofit corporation, oriented toward organizations involved in Metrology and related activities.

The mission of NCSL International is to advance technical and managerial excellence in the field of Metrology, Measurement Standards, Conformity Assessment, Instrument Calibration, as well as Test and Measurement, through voluntary activities aimed at improving product and service quality, productivity, and the competitiveness of member Organizations in the international marketplace.

World Metrology Day, May 20

The Convention of the Metre was signed in this French Foreign Ministry salon, May 20, 1875. See Page 14.