What do our customers need?

If you read my message from the January issue you will see that I focused on how important it is to identify your customers. Once you have done this, then the next question you must ask is how you can best service their needs through the products and services you provide. In today's market, servicing your customers' needs goes well beyond just offering products or services. It is crucial that you express how those products and services help your customer to be successful. Ongoing customer service, listening to your customers' needs and continuously improving your products are all involved in a successful approach.

The information that you need to best understand your customers' needs can come in many forms. It might be a proactive approach such as surveys or one-on-one meetings soliciting customer feedback. It might be a reactive approach, looking for changes in warranty data or customer demographics. In either case you attempt to better understand what your customer needs and try to change your operations to accommodate those needs.

continued on page 18
EDITOR’S MESSAGE--

The attack of the wild hyphens

I owe an apology to Authors Reichmuth and Richard for overwhelming their article (January, 2003) with dozens of surplus hyphens. It was sloppy proofreading on my part.

In the publishing business, printing companies have standardized on accepting materials either in Quark or Pagemaker software formats. Both of those software packages have some black holes. In this case, when translating from the source text in MSWord, the Quark software responded to hidden commands from MSWord, and plugged in all the surplus hyphens.

My error was to assume the translation was mostly automatic, and not checking carefully. Further, I didn’t pass it by my ace proofreader, Chris Frank, either. Worse, one of my other careful reviewers actually did bring up the question of spurious hyphens, and I dismissed it. Inexplicably, I guess I was distracted, and thought it was maybe just a non-US extra use of hyphens practice, but I never actually looked to confirm my judgement.

Well, life goes on, and I guess the Board is not ready to fire me yet.

I promise to try to be more careful.

Continued on page 18
As Metrologists, Scientists, and Engineers, we can lose sight of where metrology often takes place. When many of us hear the word metrology, we think of the lab-coat-adorned scientist working in a state-of-the-art laboratory, performing what we sometimes call "black art" and attempting to measure what has never been measured. While this is metrology, we must remember that "the science of measurement" takes place at many levels and in many forms. For example, a technician calibrating a scale in a warehouse, a specially designed in-process gage used to control a machining line, or the analysis of wastewater to ensure that we are not impacting the environment—all of these involve the science of measurement. The spectrum of metrology is very broad and encompasses a range of sciences, techniques, tools and levels of accuracy. One does not need to measure microinches or at the parts-per-million level to perform metrology. In many instances, metrology that touches our everyday lives is the metrology that makes the final decision as to whether the product meets our requirements. At the end of the day, metrology covers a continuum of measurements performed from the highest-level laboratories to the gasoline pump, and each level presents unique challenges and rewards.

Papers, Panels & Workshops:
The Workshop & Symposium offers papers, panels, and workshops that explore this year's Conference theme, and are organized into the following five categories:

- Theoretical
- Applied
- Management
- International
- Quality

Exhibits:
Meet with key executives and leading technical experts from over 150 of the top Measurement Science industry innovators and suppliers from around the world. To keep pace with rapidly changing technology, this Conference is a must.

Networking:
The Workshop & Symposium affords unparalleled opportunities to meet with key individuals in the field of Metrology to collaborate and gain new information and insights that can help solve ongoing challenges with fresh perspectives, new skills and new partnerships. Examples of areas of involvement include automotive, analytical chemical, pharmaceutical, and forensics.

Tutorials:
As in past years, the 2003 Conference will include a series of tutorials presented before and after the conference. See the Tutorial Registration form and Tutorial Abstracts on the following pages for topics of study.

Please join us in Tampa, Florida prepared to learn, to teach, and to develop new professional relationships with your fellow Metrologists.

For more information, go to www.ncsl.org/conference/2003/
NCSL International 2003 Workshop and Symposium
Registration
August 17-21, 2003 Tampa, FL
(Conference language: English; Conference currency: USD)

Registration Options

<table>
<thead>
<tr>
<th>Registration Fees &amp; Deadlines</th>
<th>Members</th>
<th>Non-Members</th>
<th>Save!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Bird: May 16, 2003</td>
<td>$550</td>
<td>$700</td>
<td>$150</td>
</tr>
<tr>
<td>Regular: May 17 to June 27, 2003</td>
<td>$600</td>
<td>$750</td>
<td>$150</td>
</tr>
<tr>
<td>Late: After June 27, 2003</td>
<td>$650</td>
<td>$800</td>
<td>$150</td>
</tr>
<tr>
<td>International Evening: Aug 20, 2003</td>
<td>$50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tampa Bay Dinner Cruise aboard Starlite Majesty

Exhibitor Booth Inquiries:
Call: Tom Huttemann at (585) 554-6295

Registration Information (Please Print or Type)

First Name: ___________ Last Name: ___________
Job Title: ___________ Organization: ___________
Telephone No.: ___________ Mail Stop: ___________
Fax No.: ___________ Address: ___________
E-mail: ___________ Dept. / Div. / Lab: ___________

Special Accommodations

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

Please note the only alternate meal option offered at this time is a vegetarian plate.

Credit Card Information (Please Print or Type)

Card #: ___________ Exp. Date: ___________
Signature: ___________ Date: ___________

Job Codes

<table>
<thead>
<tr>
<th>(A) Administration</th>
<th>(C) Consultant</th>
<th>(E) Education</th>
<th>(G) Engineer</th>
<th>(M) Manager</th>
<th>(O) Owner</th>
<th>(P) Professor</th>
<th>(Q) Quality</th>
<th>(S) Senior Management</th>
<th>(D) Student</th>
<th>(T) Technician</th>
</tr>
</thead>
</table>

Industry Codes

| (G1) DOC | (G2) DOD | (G3) DOT | (G4) NASA |

Industry Codes

Government |

Education

| (C) Community College | (PC) Private College | (T) Technical College | (U) University |

Cancellation Policy

Full Registration Fees will be refunded IF WRITTEN NOTICE IS RECEIVED (by fax or mail) BY JULY 11, 2003. Registrants who fail to attend and do not cancel prior to July 11, 2003 will be liable for a 50% cancellation fee.

You may transfer your paid Registration to another individual from your organization to attend in your place without penalty.

WRITTEN AUTHORIZATION FOR THIS SUBSTITUTION IS REQUIRED. Please mail or fax written notice of substitution to the NCSLI Business Office to arrive by July 25, 2003.

For NCSLI Use Only

Registration Rec'd.: ___________ CK # / CC App #: ___________ CK / CC App Date: ___________
Payment Rec'd.: ___________ PO / Inv. #: ___________ Amount: $__________ Entered: ___________

Job Codes

Industry Codes

Cancellation Policy

For NCSLI Use Only
Whether it's the routine calibration of a conventional surveyor's tape via laser interferometry, or the hyper-precise characterization of an electronic oscillator frequency using reference signals derived from global positioning system satellites, the measurement services that enable the nation's vast technological infrastructure are a sustaining, critical national enterprise that must be continually assessed and evaluated in order to ensure that all important metrology needs are met at an appropriate level and in a timely fashion.

At the National Institute of Standards and Technology (NIST), as with other organizations that provide measurement service to industry, scientists, engineers, technicians, and support personnel are vigorously engaged in the business of developing and providing a vast array of measurement services. These measurement services address needs ranging from present industrial and scientific measurement requirements, including mature services dealing, for example, with the measurement of mechanical and thermodynamic parameters, to the development of state-of-the-art, cutting-edge instrumentation addressing the measurement of fundamental physical characteristics from which will be born the next generation of "conventional" measurement services.

Regardless of its specific nature and application, however, measurement science is the driving force that enables the advancement of science and technology. Indeed, technological progress can proceed only as fast as measurement science permits, whether it be the development of a novel certified reference material that supports a new capability within an otherwise established industrial process, or the development of a new calibration process that permits certification of instruments operating on the outer fringe of what is (presently) technically possible. As described in this talk, NIST, as the Nation's metrology institute, is firmly committed to meeting emerging measurement service needs of government, industry, and academia.
An Introduction to Measurement Uncertainty
Saturday, August 16, 2003 1:00 pm - 5:00 pm
Mr. Mike Ouellette
National Research Council Canada
Ottawa, ON Canada

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. His 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 encourage 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 stationary and pocket calculators.

Accreditation: View by a Lead Assessor
Sunday, August 17, 2003 8:00 am - 12:00 pm
Mr. John A. Wehrmeyer
Quality Consultants of New York
Maryville, TN

This tutorial will review the process of accreditation of a calibration laboratory. Brief comparisons to the process of accreditation of a testing laboratory will also be presented. The focus will be on those areas where most laboratories struggle, such as measurement uncertainty, validation of non-standard methods, proficiency testing, and document control, although time will not allow for an in-depth discussion of each of these topics. The goal of the tutorial is to help a laboratory preparing for accreditation to be aware of the assessor's expectations and thereby be more prepared for the accreditation experience.

The Fundamentals of Pressure Metrology
Sunday, August 17, 2003 8:00 am - 12:00 pm
Mr. Kurt Solis
Ruska Instrument Corporation
Houston, TX

This tutorial will cover fundamental aspects of the measurement of the pressure parameter. The discussion will include definition of pressure (as derived from base SI units), terminology, and sensing/transduction technologies and associated principles. Also presented will be basic principles associate with 'primary' standards (liquid manometers and piston gauges). The transfer of pressure knowledge (including traceability issues) will be discussed which includes application/process considerations required for the competent 'transfer' of pressure to other devices, i.e. the calibration process. To facilitate the presentation some active demonstration hardware will be made available as well.

Good, Bad, or Indeterminate: Using Guard bands to Help Make the Call
Sunday, August 17, 2003 8:00 am - 12:00 pm
Mr. David Beaver
Fluke Corporation
Everett, WA

When calibration data is provided on a certificate, ISO 17025 requires a statement of the measurement uncertainty. In addition, if a statement of compliance with specifications is made, the uncertainty of measurement must be taken into account. This tutorial will describe some practical ways to consider uncertainties when making in-tolerance or out-of-tolerance declarations.

Temperature Calibration: Systems & Turnkey Solutions
Sunday, August 17, 2003 8:00 am - 12:00 pm
Mr. John Tavenner
Isothermal Technology Limited
Pine Grove, Southport, England

The focus of this tutorial will be on complete calibration systems. The two main methods of calibration will be described, comparison calibration and fixed point or absolute calibration. The tutorial will then focus on combinations or systems which permit the calibration to be done automatically or semi-automatically and if time permits turnkey options in which the complete calibration project including laboratory size, supplies, air conditioning requirements and health and safety consideration are all provided.

Weighing in on Mass
Sunday, August 17, 2003 8:00 am - 12:00 pm
Mr. Randall Schoonover
Independent Consultant
Centredge, CO
Mr. Frank E. Jones
Independent Consultant
Surfside Beach, SC

This tutorial deals in detail with the key elements in the determination of mass. Subjects treated include definition of mass; mass standards, "apparent mass" (conventional value of the result of weighing in air); mass measurement (direct measurement of mass and mass comparison; air density equations and practical use, and the buoyancy effect; cleaning of weights; balance observations and use; balance and weighing errors; necessity of thermal equilibrium between a mass artifact and air in the balance chamber; weighing equation, parameters that can cause error in mass determinations, uncertainty estimates and statistical tools (standard deviation, F test, t test); between-time component of error or uncertainty; and the importance of density determination to mass determination.
Laboratory Compliance with ISO/IEC 17025 -
Keeping it Simple!
Sunday, August 17, 2003 1:00 - 5:00 pm
Ms. Roxanne M. Robinson
A2LA
Frederick, MD

The new standard for accreditation of laboratories, ISO/IEC 17025:1999, was published in December 1999, replacing ISO/IEC Guide 25:1990. Internationally recognized accreditation bodies agreed to have full compliance with this standard from all of their accredited laboratories by December 31, 2002. Meeting this goal has been a two-year adventure for both the laboratories and the accreditation bodies, including A2LA. Along the way, we have found all of the strengths and weaknesses of ISO/IEC 17025, and have worked to interpret the requirements in ways that are economical for the laboratories and technically sound. This presentation will review the requirements of ISO/IEC 17025 and offer guidance on implementing the standard in simple, economical ways while maintaining the necessary technical rigor of the laboratory.

Gas Flow Measurements
Sunday, August 17, 2003 1:00 - 5:00 pm
Mr. Thomas Kegel
Colorado Engineering Experiment Station, Inc.
Nunn, CO

This tutorial focuses on measurement uncertainty aspects of gas flow measurement; it is organized into two parts. The first part is an overview of the metering hardware with emphasis on the uncertainty issues associated with the different technologies. The second part describes the process of correctly interpreting calibration results for particular application conditions. This process includes issues associated with fluid properties, installation effects and performance correlations.

Estimating the Uncertainty in Deadweight Piston Gauge Pressure Measurements
Sunday, August 17, 2003 1:00 - 5:00 pm
Mr. Ken Kolb
Ruksa Instrument Corporation
Houston, TX

This tutorial will include advanced discussions and demonstration of the key application considerations using the deadweight piston gauge as a pressure reference. The primary focus of the presentation will be an exercise to estimate the uncertainty of measured pressure for an actual calibration system. The exercise will emphasize the methods and procedures applied in the statistical determination of the “expanded uncertainty” in accordance with NCSL RISP-4 and the ISO Guide to the Expression of Uncertainty in Measurement. Attendees with some experience in the application and metrology of deadweight piston gauge pressure measurements will benefit the most from this tutorial, but all experience levels are welcome.

Introduction to Sound Measurement and Microphones
Sunday, August 17, 2003 1:00 - 5:00 pm
Mr. Niels V Boegholm
Bruel & Kjaer
Denmark

This tutorial will explain what sound is and how (and why) it is measured. Different sound fields like the pressure-field, free-field and random-field is explained. Sound parameters like Sound Pressure Level and Sound Power as well as different frequency weighting functions is explained. Different types of microphones are introduced, with major focus on the condenser measurement microphone. Which microphone parameters are important for different applications? Introduction to different microphone calibration methods (using primary (reciprocity) calibration, comparison, actuator and pistonphone/calibrator) is provided. The major uncertainty contribution elements in sound measurement are defined and examined in some detail. Finally the latest trends in microphone technology, like MEMS and microphones with integrated data sheets (TEDS) are briefly explained.

Force Calibration: Methods and Uncertainties
Sunday, August 17, 2003 1:00 - 5:00 pm
Mr. Michael Tovey
Tovey Engineering, Inc.
Phoenix, AZ

Force calibration is a special discipline with many considerations not common to other areas of metrology. Often measurement uncertainties 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 significant influence on the measurement result. This tutorial will cover the structure and characteristics of force transducers, force calibration methods, force calibration standards (E74 and ISO 376) and measurement uncertainty models. The tutorial begins at a basic level and leads to discussion of more complex issues.

Humidity Measurement
Sunday, August 17, 2003 1:00 - 5:00 pm
Mr. Bob Pragnell
Consultant
Dartford, Kent, UK

After a brief introduction this tutorial will pursue four themes which between them cover all the most common aspects of humidity measurement. Questions and discussion will be encouraged throughout, and a short time will be allowed at the end of the tutorial for further discussion.

Theme 1 Hygrometric definitions and relationships.

The most commonly used measurement units will be defined with the emphasis on understanding the principles which govern the behaviour of water vapour in a gas and the reasons why there are so many ways of expressing humidity.
Theme 2  Humidity measurement principles and commercially available hygrometers.

The operating principle, accuracy, range, advantages, disadvantages and suitable applications, will be discussed for the more commonly available types of hygrometer.

Theme 3  Calibration Standards and calibration methods for hygrometers.

Calibration methods used by standards laboratories and industrial calibration laboratories will be covered. The discussion will be developed to cover methods available for in-house calibrations, and checks which can be performed by typical instrument users.

Theme 4  Humidity measurement uncertainty in rooms and enclosures.

Measurement uncertainty is a difficult topic in any field of metrology. For relative humidity the significance of temperature is often poorly understood. The main common sources of uncertainty will be identified and ways in which they can be estimated will be discussed. A typical analysis will be presented.

Running an Effective Laboratory - Measuring Performance
(Sponsored by the NCSL International Small Business Initiative Committee)
Friday, August 22, 2003 8:00 am - 12:00 pm
Mr. Greg Powell
The Signal Group
Vancouver, BC Canada
Dr. Malcolm Smith
NCS Laboratories
Seattle, WA

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 measures 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.

Interlaboratory Comparisons: Their Use for Proficiency Testing, Uncertainty Statements, Traceability and More!
Friday, August 22, 2003 8:00 am - 12:00 pm
Dr. Carroll Brickenkamp, Ms. Sharrill Dittmann, Mr. Ernest Garner
The Pi Group, Inc.
Gaithersburg, MD

Competitive issues, the possibility of "bad press," and the impact on a laboratory's workload can seem to be insurmountable obstacles to participating in interlaboratory comparisons. This INTERACTIVE workshop will describe some of the critical values to be derived from participation, ways to circumvent the obstacles, and economical ways to design and operate intercomparisons. Experts leading the discussions will include Henrik Nielsen of HN Proficiency Testing, Jeff Gust of Quantec, and Carroll Brickenkamp of the Pi Group, Inc.

Subjects to be discussed will include:
- WHY: Objectives for intercomparisons
- Looking for "agreement" in measurement values
- How is uncertainty to be handled?
- What facets of a laboratory's proficiency does an intercomparison seek to determine?
- Determining and improving procedures, standard test methods, etc.
- HOW: Organization of intercomparison
- Coordinator and technical advisor roles
- Invitations and instructions
- Timetable and sequence of participation
- Ways to preserve anonymity; protect confidentiality
- Ways to get routine measurements rather than the best measurement
- Steps of the process from initial design objectives, through troubleshooting, to streamlined operations
- Analysis of data
- WHAT: Artifacts and/or samples to be measured
- Stability and homogeneity
- Packaging and transportation issues
- Obtaining a reference value for the measurement
- Can calibrating artifacts provide traceability?
- Youden or split level design providing two separate test items
- CASE STUDIES: A number of case studies will be discussed

CASE STUDIES

Basics of Vibration, Shock, Accelerometers and their Calibration
Friday, August 22, 2003 8:00 am - 12:00 pm
Mr. Robert D. Sill
Endevco

This tutorial will introduce the fundamentals of vibration and shock, the various types of accelerometers used in its measurement, and accelerometer calibration. The physics of motion and the design of accelerometers will be summarized to support the discussion of calibration, with an emphasis on the parameters that are sources of uncertainties. A description will be given of comparison and absolute calibration techniques, with examples of the typical uncertainties to be expected. A brief list of calibration "Do's" and "Don'ts" is discussed.

to support the discussion of calibration, with an emphasis on the parameters that are sources of uncertainties. A description will be given of comparison and absolute calibration techniques, with examples of the typical uncertainties to be expected. A brief list of calibration "Do's" and "Don'ts" is discussed.
NCSLI International 2003 Workshop and Symposium
Tutorial Registration
August 16-17, 22, 2003, Tampa, FL
(Conference language: English; Conference currency: USD)

Registration Options

Register On-Line at:
www.ncsli.org

Fax Credit Card Registrations to:
Fax: (303) 440-3384
Tel: (303) 440-3399

Or Mail Check or Credit Card Registrations to:
NCSLI
1800 30th St., Ste. 305B
Boulder, CO 80301-1026

(Please provide both Codes)
Job Code:
Industry Code:

Tutorial Dates & Fees

Member/Non-Member After 6/27/03

- An Introduction to Measurement Uncertainty
  Sat Aug 16 1:00 pm - 5:00 pm $100/130 $120/150
- Accreditation: View by a Lead Assessor
  Sun Aug 17 8:00 am - 12:00 pm $100/130 $120/150
- The Fundamentals of Pressure Metrology
  Sun Aug 17 8:00 am - 12:00 pm $100/130 $120/150
- Good, Bad, or Indeterminate: Using Guardbands
  to Help Make the Call
  Sun Aug 17 8:00 am - 12:00 pm $100/130 $120/150
- Temperature Calibration: Systems & Turnkey Solutions
  Sun Aug 17 8:00 am - 12:00 pm $100/130 $120/150
- Weighing In on Mass
  Sun Aug 17 8:00 am - 12:00 pm $100/130 $120/150
- Laboratory Compliance with ISO/IEC 17025-Keeper It Simple!
  Sun Aug 17 8:00 am - 12:00 pm $100/130 $120/150
- Gas Flow Measurements
  Sun Aug 17 8:00 am - 12:00 pm $100/130 $120/150
- Estimating the Uncertainties in Deadweight Piston Gauge Pressure Measurements
  Sun Aug 17 8:00 am - 12:00 pm $100/130 $120/150
- Introduction to Sound Measurements and Microphones
  Sun Aug 17 8:00 am - 12:00 pm $100/130 $120/150
- Force Calibration: Methods and Uncertainties
  Sun Aug 17 8:00 am - 12:00 pm $100/130 $120/150
- Humidity Measurements
  Sun Aug 17 8:00 am - 12:00 pm $100/130 $120/150
- Running an Effective Laboratory - Measuring Performance
  Fri Aug 22 8:00 am - 12:00 pm $100/130 $120/150
- Interlaboratory Comparisons: Their Use for Proficiency Testing, Uncertainty Statements, Traceability and More!
  Fri Aug 22 8:00 am - 12:00 pm $100/130 $120/150
- Basics of Vibration, Shock, Accelerometers and their Calibration
  Fri Aug 22 8:00 am - 12:00 pm $100/130 $120/150

Registrant Information (Please Print or Type)

First Name: ___________________________ Organization: ___________________________
Last Name: ___________________________ Mail Stop: ___________________________
Job Title: ___________________________ Dept. / Div. / Lab: ___________________________
Telephone No.: ___________________________ Address: ___________________________
Fax No.: ___________________________ City: ___________________________
E-mail: ___________________________ State / Province: ___________________________
Member ☐ Please contact me with membership info Non-Member ☐
Please do not add my name to your mailing list. ☐
Member ☐ Please check here if you require special accommodations and attach a written description so we may serve you.

Credit Card Information (Please Print or Type)

☐ VISA ☐ MasterCard ☐ American Express Card #: ___________________________ Exp. Date: ___________________________
Full Name as it appears on Card: ___________________________ Signature: ___________________________

Job Codes

(A) Administration ☐ (C) Consultant ☐ (E) Education ☐ (G) Engineer ☐ (M) Manager ☐ (O) Owner ☐ (P) Professor ☐ (Q) Quality ☐ (S) Senior Management ☐ (D) Student ☐ (T) Technician

Industry Codes

(AE) Aerospace ☐ (G1) DOC ☐ (G2) DOD ☐ (G3) DOT ☐ (G4) NASA ☐ (G5) Other:

Industry Codes

(A) Administration ☐ (C) Consultant ☐ (E) Education ☐ (G) Engineer ☐ (M) Manager ☐ (O) Owner ☐ (P) Professor ☐ (Q) Quality ☐ (S) Senior Management ☐ (D) Student ☐ (T) Technician

Industry Codes

(AE) Aerospace ☐ (G1) DOC ☐ (G2) DOD ☐ (G3) DOT ☐ (G4) NASA ☐ (G5) Other:

Industry Codes

(A) Administration ☐ (C) Consultant ☐ (E) Education ☐ (G) Engineer ☐ (M) Manager ☐ (O) Owner ☐ (P) Professor ☐ (Q) Quality ☐ (S) Senior Management ☐ (D) Student ☐ (T) Technician

Industry Codes

(AE) Aerospace ☐ (G1) DOC ☐ (G2) DOD ☐ (G3) DOT ☐ (G4) NASA ☐ (G5) Other:

Registration Policy

Full Tutorial Fees will be refunded IF WRITTEN NOTICE IS RECEIVED (by fax or mail) BY JULY 11, 2003. Registrants who fail to attend and do not cancel prior to JULY 11, 2003 will be liable for a 50% cancellation fee.

You may transfer your paid Registration to another individual from your organization to attend in your place without penalty. WRITTEN AUTHORIZATION FOR THIS SUBSTITUTION IS REQUIRED. Please mail or fax written notice of substitution to the NCSLI Business Office to arrive in advance of the Conference.

For NCSLI Use Only

Registration Rec'd: _______________ CK # / CC App #: _______________ CK / CC App Date: _______________
Payment Rec'd: _______________ PO / Inv #: _______________ Amount: $ _______________ Entered: _______________

(See Legend below for Codes)

Acknowledgment

Registrant Information (Please Print or Type)

First Name: __________________________________________ Organization: ___________________________
Last Name: __________________________________________ Mail Stop: ___________________________
Job Title: __________________________________________ Dept. / Div. / Lab: ___________________________
Telephone No.: ______________________________________ Address: ___________________________
Fax No.: __________________________________________ City: ___________________________
E-mail: __________________________________________ State / Province: ___________________________
Member ☐ Please contact me with membership info Non-Member ☐
Please do not add my name to your mailing list. ☐
Member ☐ Please check here if you require special accommodations and attach a written description so we may serve you.

Credit Card Information (Please Print or Type)

☐ VISA ☐ MasterCard ☐ American Express Card #: ___________________________ Exp. Date: ___________________________
Full Name as it appears on Card: ___________________________ Signature: ___________________________

Job Codes

(A) Administration ☐ (C) Consultant ☐ (E) Education ☐ (G) Engineer ☐ (M) Manager ☐ (O) Owner ☐ (P) Professor ☐ (Q) Quality ☐ (S) Senior Management ☐ (D) Student ☐ (T) Technician

Industry Codes

(AE) Aerospace ☐ (G1) DOC ☐ (G2) DOD ☐ (G3) DOT ☐ (G4) NASA ☐ (G5) Other:

Industry Codes

(A) Administration ☐ (C) Consultant ☐ (E) Education ☐ (G) Engineer ☐ (M) Manager ☐ (O) Owner ☐ (P) Professor ☐ (Q) Quality ☐ (S) Senior Management ☐ (D) Student ☐ (T) Technician

Industry Codes

(AE) Aerospace ☐ (G1) DOC ☐ (G2) DOD ☐ (G3) DOT ☐ (G4) NASA ☐ (G5) Other:

Industry Codes

(A) Administration ☐ (C) Consultant ☐ (E) Education ☐ (G) Engineer ☐ (M) Manager ☐ (O) Owner ☐ (P) Professor ☐ (Q) Quality ☐ (S) Senior Management ☐ (D) Student ☐ (T) Technician

Industry Codes

(AE) Aerospace ☐ (G1) DOC ☐ (G2) DOD ☐ (G3) DOT ☐ (G4) NASA ☐ (G5) Other:

Registration Policy

Full Tutorial Fees will be refunded IF WRITTEN NOTICE IS RECEIVED (by fax or mail) BY JULY 11, 2003. Registrants who fail to attend and do not cancel prior to JULY 11, 2003 will be liable for a 50% cancellation fee.

You may transfer your paid Registration to another individual from your organization to attend in your place without penalty. WRITTEN AUTHORIZATION FOR THIS SUBSTITUTION IS REQUIRED. Please mail or fax written notice of substitution to the NCSLI Business Office to arrive in advance of the Conference.

For NCSLI Use Only

Registration Rec'd: _______________ CK # / CC App #: _______________ CK / CC App Date: _______________
Payment Rec'd: _______________ PO / Inv #: _______________ Amount: $ _______________ Entered: _______________

(See Legend below for Codes)
NOTE: Group Program events may be cancelled if there are limited sign-ups.

**Monday Tour: Salvador Dali Museum / Dish Restaurant / St Pete Pier $ 60**

The Dali Museum is home of the world's most comprehensive collection of his works. Dali created images that will captivate the mind and imagination of the world forever. A Docent will be available to take the group through the life of Dali and the various artistic stages of his work. This insightful look into the meaning of his paintings is truly fascinating as Dali had a habit of painting hidden images within his master works.

Our next stop is the new BayWalk Complex. It's Uptown, Downtown! Here you will enjoy lunch at the Dish Restaurant and shopping at the specialty shops. At Baywalk is lunch at the Dish Restaurant. Turn yourself loose on a stunning array of the finest meats, seafood, vegetables, and exquisitely crafted sauces, all awaiting your creative collaboration in the fresh market. Then bring your dish to the grill where it will be theatrically prepared right before your eyes. Dish is a picky eater's paradise. You can dish up exactly what you want, and grill as you wish. Lunch to include unlimited trips to the Salad Bar, Meats Market and One Beverage to include coffee, iced tea or soda with refills. No menu. No limits. No end to the fun. So go a little crazy, be innovative, be creative? Dish it up!!!

The last stop will be the St. Pete Pier, which has been a landmark of downtown St. Petersburg since 1899. This five-story complex contains sixteen specialty stores, specialty carts, a food court and restaurants. The Pier Aquarium is located on the second level and is a non-profit public Aquarium and Marine Education Center. The Great Explorations Hands-On Children's Museum is located on the third level. The famous Columbia Restaurant is on the fourth level and Cha Cha Conch Bar and Grill, as well as the Observation Deck are on level five.

**Tuesday Tour: Tarpon Springs Tour $ 35**

Tarpon Springs, the oldest city in Pinellas County, was incorporated in 1887 when it was best known as a health center and winter resort for wealthy northerners. At that time, it was called "The Venice of the South." Following the discovery of sponges in the Gulf of Mexico, the Greek sponge divers started arriving and the Greek immigrants became the dominant social group.

Sponges were so plentiful that Tarpon Springs became known as the "Sponge Capitol of the World." Today you can still see the boats, laden with sponges, pull in to the docks. Our tour will begin at the Tarpon Springs Cultural Center where you will watch a short film entitled "The Sponge Divers". This National Geographic film is about the Greek heritage of Tarpon Springs.

Then board your bus for a short trip to St. Nicholas Orthodox Cathedral. The Cathedral will open its doors for an informal viewing of its beautiful icons and stained glass windows. The Cathedral is designed in the Byzantine style and is a replica of St. Sophia Church in Constantinople. It was built entirely from donations, mostly from the Greek sponge fishermen who donated a percentage of their gross sales from each sponge catch.

Following the Cathedral visit the group will step outside into the heart of Tarpon Springs' activities. Tarpon Springs is perfect for an afternoon of sightseeing and shopping. Watch the sponge boats bring in live sponges or fishermen with their catch of the day.
**NCSL International 2003 Workshop and Symposium**

**Guest Registration**

**August 17-21, 2003 San Diego, CA**

*Conference language: English; Conference currency: USD*

### Registration Options

- **Register On-Line at**
  - [www.ncsli.org](http://www.ncsli.org)
- **Fax Credit Card**
  - Registrations to:
    - Fax (303) 440-3384
    - Tel (303) 440-3339
- **Or Mail Check or Credit Card**
  - Registrations to: NCSLI
    - 1800 30th St., Ste. 305B
    - Boulder, CO 80301-1026

### Guest Program Dates & Fees

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Date</th>
<th>Time</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evening Reception</td>
<td>Sun Aug 17</td>
<td>7:00 pm</td>
<td>N/C</td>
</tr>
<tr>
<td>Orientation and Continental Breakfast</td>
<td>Mon Aug 18</td>
<td>7:30 am</td>
<td>N/C</td>
</tr>
<tr>
<td>Salvador Dali Museum/Dish Restaurant/St. Pete Pier</td>
<td>Mon Aug 18</td>
<td>8:45 am</td>
<td>$60</td>
</tr>
<tr>
<td>Tarpon Springs Tour</td>
<td>Tue Aug 19</td>
<td>8:45 am</td>
<td>$35</td>
</tr>
<tr>
<td>Conference Reception &amp; Banquet &quot;The British Invasion&quot;</td>
<td>Tue Aug 19</td>
<td>6:00 pm</td>
<td>$75</td>
</tr>
<tr>
<td>International Event - Tampa Bay Dinner Cruise aboard Starlite Majesty</td>
<td>Wed Aug 20</td>
<td>5:30 pm</td>
<td>$50</td>
</tr>
</tbody>
</table>

### Registrant Information (Please Print or Type)

- **First Name:**
- **Last Name:**
- **Job Title:**
- **Telephone No.:**
- **Fax No.:**
- **E-mail:**
- **Mail Stop:**
- **Address:**
- **City:**
- **State / Province:**
- **Zip+4 / Postal Code:**
- **Organization:**
- **Dept. / Div. / Lab:**
- **Signature:**
- **Exp. Date:**
- **Full Name as it appears on Card:**
- **Phone No.:**
- **Account #:**
- **Exp. Date:**
- **Card #:**
- **Card Type:**
- **Amount:**
- **PO / Inv. #:**
- ** Entered:**

### Special Accommodations

- Please check here if you require special ADA, wheelchair, or dietary needs, and attach a written description so we may serve you.
- Please note the only alternate meal option offered at this time is a vegetarian plate.

### Cancellation Policy

Full Guest Program Fees will be refunded IF WRITTEN NOTICE IS RECEIVED (by fax or mail) BY JULY 11, 2003. Registrants who fail to attend and do not cancel prior to July 11, 2003 will be liable for a 50% cancellation fee. You may transfer your paid Guest Program Registration to another individual to attend in your place without penalty. WRITTEN AUTHORIZATION FOR THIS SUBSTITUTION IS REQUIRED. Please mail or fax written notice of substitution to the NCSLI Business Office to arrive by July 25, 2003. NCSLI reserves the right to cancel any of the Guest Program events if the number of registrations are below the contracted minimum with the tour company.
HOTEL:
Tampa Marriott
(Headquarters Hotel/Conference Site)

Casting its dramatic reflection onto the Bay, the Tampa Marriott Waterside stands as the newest, largest and most striking hotel in the area. Its downtown location in the emerging Channel district and direct connection to the Tampa Convention Center makes it an ideal spot for business or pleasure.

- 15 minutes from Tampa International Airport
- Located in the heart of downtown Tampa
- Across the street from Tampa's Streetcar Station
- 5 minutes from Tampa's newest "channelside" entertainment complex

700 South Florida Ave, Tampa, FL, 33602
Phone: 813-221-4900 Fax: 813-204-6373

When booking a room, please cite NCSS (National Conference of Standards Laboratories) for the Conference Rate.

Single/Double  US $ 125.00
Triple  US $ 145.00
Quads US $ 145.00
Conference Rate (per night):

Wyndham Harbour Island
Surrounded by lush tropical landscaping, the Wyndham Harbour Island rests on its own tranquil island - yet we're just minutes from downtown Tampa, the Convention Center and Tampa International Airport.

Enjoy a quaint harbor view from a guest room full of special touches, such as oversized windows and high-speed data ports. Dine at the refreshing Luna Di Mare or relax in our heated swimming pool. Guests also have access to the exclusive Harbour Island Athletic Club.

725 South Harbour Island Boulevard
Tampa, Florida 33602
Phone: 813-229-5000

When booking a room, please cite NCSS (National Conference of Standards Laboratories) for the Conference Rate.

Single/Double  US $ 125.00
Triple  US $ 145.00
Quads US $ 145.00
Conference Rate (per night):

Cain Travel
(800) 346-4747
http://www.caintravel.com

Ask for either Sandra or Tammy and identify yourself as an NCSS attendee or send them an email at: sandra@caintravel.com
tammy@caintravel.com

Delta Airlines
(800) 241-6760
http://www.delta.com
Group ID Number: DMN194196A

There will be a free Delta Airlines ticket awarded to the lucky person who is drawn from the pool of travelers on the Delta. Delta

Express or Delta Connection Carriers, and (excludes travel on the Delta Shuttle) Airlines manifest by ticketing through the group phone number: (800) 241-6760. They must have the group ID DMN194196A on their ticket.

There will be a minimum savings of 5% off any Delta, Delta Express or Delta Connection Carriers, and excludes travel on the Delta Shuttle.

Delta Airlines is offering special meeting fares for all attendees of NCSSL who use the Special Meeting Desk to book their reservations. Book early and take advantage of the promotional fares that give you the greatest savings! Earn a 5% discount off the lowest applicable fare, including First Class. Delta is also offering an additional 5% off tickets purchased at least 60 days in advance. Simply call (or have your travel agent call) (800) 241-6760 and refer to Meeting ID Number DMN194196A. Reservations and schedule information may be obtained by calling the Delta Meetings Desk at (800) 241-6760 and referencing the Meeting ID DMN194196A. The Meeting Desk hours are Monday thru Sunday, 8:00 AM to 11:00 PM (Eastern).

US Airways
(877) 874-7687
http://www.usairways.com
Group ID Number: GF27122657

US Airways Airlines is offering special meeting fares for all attendees of NCSSL who use the Special Meeting Desk to book their reservations. Book early and take advantage of the promotional fares that give you the greatest savings! Simply call (or have your travel agent call) (877) 874-7687 and refer to Meeting ID Number GF27122657.

Avis
(800) 331-1600
Group ID Number: J099304

When making your car rental reservations, please refer to ID Number J099304 to receive special conference rates. Reservations may be made by calling the Avis Reservations and Information Desk at (800) 331-1600 or using the Avis' website especially for NCSSL conference attendees: https://www.avis.com/

National 800-CAR-RENT
https://www.nationalcar.com/
Group ID Number: 6801174

Discover a whole new way to "Go your own way" (sm). National offers attendees to the NCSSL ANNUAL CONFERENCE special car rental rates. These rates are available one week before and after the meeting dates and include unlimited mileage. For reservations, contact your travel agent or call National at 1-800-CAR-RENT or at nationalcar.com. Request Contract ID # 6801174 at time of reservation.
International Evening
Tampa Bay Dinner Cruise aboard the Starlite Majesty $50
Wednesday, August 20, 2003 - 6:30 pm - 10:00 pm

No trip to the Tampa Bay area is complete without a Starlite Cruise. Sit back and enjoy the scenery of the beautiful inland waterways. Listen to the captain’s tales of the area’s history and present ecology. Combine that with sparkling emerald waters, fresh salt air and soft gulf stream breezes, and you’ve got a truly relaxing voyage.

We will board the yacht directly from the dock at the Convention Center at 6:00 pm — no busses required!

Elegant decor, fine dining, first-rate musicians, and an ever-changing water view on smooth inland waters, all combine to make a truly memorable night. Each party is seated at their own individual table and all meals are always prepared fresh to order on board.

Your sit-down dinner with choice of entree is prepared fresh to order on board by our award-winning chef. Before or after dinner feel free to move about the vessel’s decks. Dance to your favorite songs performed by our talented musicians.....or take a romantic stroll on the outer decks.

Of course, your favorite cocktails are available from our two service bars.

Conference Banquet

Tuesday, August 19, 2003
Featuring British Invasion

Join us for the Conference Banquet at the Marriott Waterside on Tuesday, August 19th

6:00 p.m. Reception (no host)
7:00 p.m. Dinner
8:00 p.m. Dance to the Sounds of The British Invasion

Additional tickets are available at the registration desk for $75

The British Invasion, the best-known Beatle tribute act in the country, has played over 5000 shows to over a million people at Walt Disney World’s Epcot Center. Their production spans the Beatles’ entire career in three acts. Songs include great hits from the early Beatle era, right up to their last days of the sixties. The British Invasion captures the original sounds of the Beatles and use multimedia, authentic costumes and musical gear to recreate the thrill of a live Beatles concert. They will also perform songs from all the fabulous British Invasion groups including the Searchers, the Dave Clark Five, Gerry and the Pacemakers, Herman’s Hermits and more, but their first love is the Beatles and nobody does it better.
CORPORATE CONFERENCE SPONSORSHIP

NCSL International is pleased to introduce a new sponsorship program in conjunction with the 2003 Workshop and Symposium in Tampa, Florida. This program allows interested parties to support NCSL International at the event and to receive recognition for their contribution to the program.

Sponsors may select from a variety of sponsorship opportunities, fitting any size budget, from "Diamond" sponsors to "Partners." As an alternative, a sponsor may select a specific venue, such as the sponsorship of the Cyber Café.

A number of benefits are included at each sponsorship level. For example: your company logo displayed on NCSL International website, conference pocket guide, and conference bag; plus literature in the Conference bag; recognition at opening and closing sessions; signage displayed during the sponsored event; product demonstrations, and more. The following details outline the extended benefits that are included at each level.

**DIAMOND**

Here are the benefits provided for Diamond Sponsors:

- Company Logo on conference sponsor website, with banner ad, in conference last minute guide sponsor page, on Conference Bag
- Recognition at opening keynote and closing sessions
- Sponsorship Signage at the Event
- Product Demonstration (4 hour in a meeting room on Sat or Sun)
- Up to a five-page or a CD insert in the Conference Bag
- Listed in the Program CD and in NCSLI Newsletters

You will receive additional recognition in these areas:

- Sunday Night Exhibit Reception
- All Luncheons (Mon, Tue, Wed, Thurs)
- All breaks (Your logo prominently displayed on table tents at refreshment areas)

**PLATINUM**

Here are the benefits provided for Platinum Sponsors:

- Company Logo on conference sponsor website, with banner ad, in conference last minute guide sponsor page, on Conference Bag
- Recognition at opening keynote and closing sessions
- Sponsorship Signage at the Event
- Product Demonstration (4 hour in a meeting room on Sat or Sun)
- Single-page literature or a CD insert in the Conference Bag
- Listed in the Program CD

You will receive additional recognition in these areas:

- Sunday Night Exhibit Reception
- Single Luncheon
- Single breaks (Your logo prominently displayed on table tents at refreshment areas)

**GOLD**

Here are the benefits provided for Gold Sponsors:

- Company Logo on conference sponsor website, with banner ad, in conference last minute guide sponsor page, on Conference Bag
- Recognition at opening keynote and closing sessions
- Sponsorship Signage at the Event
- Single-page literature or a CD insert in the Conference Bag
- Listed in the Program CD and in NCSLI Newsletters

**SILVER**

Here are the benefits provided for Silver Sponsors:

- Company Logo on conference sponsor website, with banner ad, in conference last minute guide sponsor page
- Recognition at opening keynote and closing sessions
- Sponsorship Signage at the Event

**PARTNER**

Here are the benefits provided for Partner Sponsors:

- Company Logo on conference sponsor website, with banner ad, in conference last minute guide sponsor page
- Recognition at opening keynote and closing sessions
- Sponsorship Signage at the Event

**CYBER CAFÉ**

Here are the benefits provided for Cyber Café Sponsors:

- Company Logo on conference sponsor website, in conference last minute guide sponsor page
- Recognition at opening keynote and closing sessions
- Signage at the Cyber Café

**A/V SERVICES**

Here are the benefits provided for Audio/Visual Services Sponsors:

- Company Logo on conference sponsor website, in conference last minute guide sponsor page
- Recognition at opening keynote and closing sessions
- Signage for A/V Equipment

**SPONSORSHIP FEES**

<table>
<thead>
<tr>
<th>Sponsorship Level</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diamond</td>
<td>$7,000</td>
</tr>
<tr>
<td>Platinum</td>
<td>$4,500</td>
</tr>
<tr>
<td>Gold</td>
<td>$2,500</td>
</tr>
<tr>
<td>Silver</td>
<td>$1,500</td>
</tr>
<tr>
<td>Partner</td>
<td>$750</td>
</tr>
<tr>
<td>Cyber Café</td>
<td>$750</td>
</tr>
<tr>
<td>A/V Services</td>
<td>$750</td>
</tr>
</tbody>
</table>
Taiwan has been recognized as an important base for product development with flexible manufacture and dynamic design in a global product value chain. Characteristics of Taiwan industry are analyzed, and special attention is paid to electronics and IC industries having a short life cycle of products. The national measurement system is introduced briefly, including CMS-NML and CNLA. Besides primary calibrations, CMS-NML is strongly requested by the government and Taiwan industry to apply the standards-based technologies to promote the competitiveness of Taiwan companies.

Challenges of NMS in implementation of measurement interoperability: 
(i) meeting the dynamic demands from fast-growing industries 
(ii) facing the impact by the westbound movement of Taiwan companies to mainland China.

1 Metrology Infrastructure in Support of World Manufacture Base

1.1 Characteristics of Taiwan industry

As the National Metrology Laboratory in Taiwan, Center for Measurement Standards (CMS-NML) has been established to support by metrology techniques the safety, health, environment and trade (S.H.E.T.) aspects of Taiwan industry and society. In other words, CMS-NML aims to bring forward the living quality of Taiwan society and to enhance the competitiveness of Taiwan industry via metrology standards and related developed technologies.

Taiwan's economy is characterized by its flexible and dynamic features, with a cluster of small to medium companies having an average market capital of $500 million. In contrast, a threshold for a company to be considered in the A-list of Forbes is at least $5 billion in sales or market capitalization. From the point of view of global value chain of products, Taiwan plays an important and indispensable role in manufacture, especially in production of electronics and integrated circuits.

In a review of Taiwan industry, it is found that the manufacturing industry sector has a contribution of more than 25% to Taiwan's gross domestic product (GDP). In addition, its electronics industry has a dominant 46.5% contribution in terms of revenues of all Taiwan industries in 2001. The indispensability of Taiwan manufacturing to the global economy can be explained in the following paragraphs.

Taiwan companies are key suppliers to the global economy by producing a wide variety of hardware and software for information and communication. For instance, primary information hardware electronics made in Taiwan range from notebook and desktop personal computers and motherboards to CRT and LCD displays.

Every one of two notebook PCs in the global market of 2001 was manufactured in Taiwan, although they may be branded Dell, Toshiba, Compaq or IBM. In addition, each computer has a motherboard inside, which is the main body containing a CPU, memories, and peripherals. More than 85% of all motherboards from the world's top 10 PC companies were contracted to be made in Taiwan in 2001.

Integrated circuits (IC) are core elements of electronics, such as rice to food processing. IC manufacture is the core of the IC industry. IC foundry plays an important role in Taiwan IC manufacturing. IC foundry companies (contract-chip producers) are dedicated to provide IC fabrication services to integrated device manufacturers (IDMs), such as Intel and Motorola, and IC design companies. However, IC foundry companies themselves do not produce any brands of electronic commodities.

The top two IC foundry companies are all located in Taiwan; these are the Taiwan Semiconductor Manufacturing Co. (TSMC) and Union Micronelectronics Co. (UMC). TSMC is ranked as the most profitable computer hardware company of 2001 by Forbes magazine. The market values of TSMC and UMC are estimated to be over 20% of the Taiwan stock market.

1.2 National Measurement System in Taiwan

The National Measurement System (NMS) in Taiwan consists of a national metrology institute, CMS-NML, and an accreditation body, Chinese National Laboratory Accreditation (CNLA). The former maintains the primary measurement standards at Taiwan and the comparability with those of other NMs; the latter manages the routine conformity of accredited labs to ISO 17025, including proficiency testing between the accredited labs and their fulfillment of traceability to CMS-NML or SI units.

CMS-NML was founded in 1987, and is a contract agent in operation of national metrology institute by project in Taiwan in 15 measuring fields, including most of the primary standards for the realization of SI units, except time and frequency standards [1]. To date, 103 measurement systems have been established and provide about 4000 primary calibrations annually to Taiwan industry. To achieve the requests from MRA of NMs [2], CMS-NML has applied for
third-party accreditation via CNLA. The accreditation consists of assessment of the quality system at CMS-NML, and the technical assessment of measurement capability with the help of assessors from other NMIs. In principle, at least one assessor is from the country members of APMP, and at least one from the countries outside APMP. The assessment of 15 fields of measurement standards should be completed by the end of 2002.

CNLA is the member of International Laboratory Accreditation Cooperation and Asia-Pacific Laboratory Accreditation Cooperation. CNLA performs laboratory accreditation in the domain of 15 testing fields and 10 items in the field of calibration. 663 laboratories are accredited by CNLA with ISO/IEC 17025 (revision of Guide 25).

2. Application of Standards-based Technologies to Raise the Competitiveness of Taiwan Industry

2.1 Technical support to electronics industry

The fabrication process of semiconductors is extremely sensitive to the vibration of environments. In the south of Taiwan, a planned high-speed railway will pass through a science-based industrial park, where a cluster of IC and optoelectronics companies are located. Several advanced 305-mm (12-inch) wafer production lines are scheduled to operate in the science park. The influence of vibration caused by high-speed trains to the production lines becomes a noteworthy topic, which leads to disputes in the aspects of technology, economy and even politics.

A giant IC-maker asked CMS-NML to evaluate the influence of vibration at the same scale that a high-speed train may cause to the production equipment. In other words, the testing results will provide the maker with valuable information to the decision of specifications of IC equipment. The IC maker is a primary customer of CMS-NML in shop-floor vibration testing service, which is an essential test before precision manufacturing or measuring equipment is installed in the production line.

A newly-designed amplitude generator was used to emulate the vibration conditions at a frequency range less than 12.5 Hz that are expected to occur when high-speed trains pass by. The generator was installed and operated near by a production line and the vibration impact to the process equipment, such as scanners and SEMs, along the production line was tested. The testing layout is shown in Figure 1.

![Figure 1. Test of vibration influence to IC manufacturing process.](image)

The CMS-NML evaluation report on the vibration influence due to high-speed train movement has a significant contribution to the restart investment of semiconductor fabs by IC makers. The investment includes 6 production lines of 305-mm (12-inch) wafers, amounting to $20 billion.

2.2 Establishment of satellite calibration laboratories

To enhance the effectiveness of NMIs and to relieve the burden of CMS-NML due to budget and space limitations, CMS-NML helps some key companies, including instrument makers, wholesalers and distributors to set up calibration laboratories and urges them to apply for the accreditation of CNLA.

Chinese Petroleum Corporation (CPC) is the top company among 1000 Taiwan manufacturing companies in terms of sales capitalization. With help from CMS-NML, CPC has launched a project to establish a standards lab for calibration of flow meters in liquid petroleum gas (LPG). CMS-NML is responsible for the overall design and layout of the LPG calibration lab, with a budget of a half million. The lab is designed to calibrate the flow meters having a diameter of 50 to 300 mm with a flow rate from 20 to 4000 m³/h. The CPC case is a CMS-NML contribution in implementation of satellite calibration laboratories. The strategy for establishment of key satellite labs is especially necessary to apply to those fields requiring large facilities and heavy equipment.

2.3 Measurement traceability for emerging industries

CMS-NML is also strongly requested by the government to provide measurement traceability for emerging industries, such as nanotechnology, communication and biotechnology, which are normally the core investments of government to create new industries or to promote the competitiveness of traditional industries by new technologies.

Nanotechnology is related to research and technology development at the atomic, molecular or macromolecular levels, in the length scale of approximately 1 - 100 nanometer range, to provide a fundamental understanding of phenomena and materials at the nanoscale and to create and use structures, devices and systems that have novel properties and functions because of their small and/or intermediate size. Nanotechnology research and development includes manipulation under control of the nanoscale structures and their integration into larger material components, systems and architectures [3]. Characteristics of objects ranging from 1 to 100 nm (extent between isolated atoms and bulk materials) are substantially different from those by either atoms or bulk materials.

Calibration and quality assurance analysis for nanosystems are important subjects in nanotechnology research. Scanning probe microscopes are important investigative tools in nanotechnology. The SPMs measure local properties with nanometer-scale spatial resolution by bringing a sharp tip in proximity to a solid surface. Thus calibration of scanning probe microscopes (SPMs) is essential to achieve measurement traceability of SPMs, and accordingly within the research scopes of NMIs. The traceability of SPMs is achieved via reference materials, as shown in Figure 2.
In addition, a metrological SPM can be made by addition of measuring scales, either laser interferometers or capacitance sensors along three axes. Figure 3 is a metrological SPM home made by CMS-NML.

CMS-NML has drafted a new proposal of "Metrology Standards for Nanotechnology Project" in line with the National Nanotechnology Program (NNP), which is launched this year by the Taiwan government to promote new technology-based industries. The government investment of about $500 million in five years in the NNP will be carried out jointly by key research laboratories from academia and industry.

3 Challenges of the National Measurement System

3.1 Beyond Moore's law: challenges from the electronics industry

As described in the analysis of characteristics of Taiwan industry, most of them have a very short life cycle of products. For instance, performance of computer electronics will be doubled in less than 18 months (Moore's law). The fast-growing advance of manufacturing capability leads to great pressure on electronics companies in terms of investment of equipment, capital and human resources. This also brings tremendous pressure on the timely offer of supportive instruments of inspection and related traceable metrology infrastructure.

The investment of a 305-mm (12-inch) wafer fab may be as high as $3 billion, with accompanying sales up to $7.2 billion. Thus, it is estimated that less than 10 companies in the world can afford to invest in a 305-mm (12-inch) wafer fab. In terms of speed, it is reported that TSMC will carry out 90-nm IC process technology into mass production by the end of 2002, even faster than the prediction by Moore's law. In establishment of metrology infrastructure, CMS-NML has just completed in three years a series of standards systems for line-width, line-spacing and thickness of IC thin films for a nominal process of 300 nm. This obviously reveals the awkward situation of CMS-NML in catching up with demands from the microelectronics industry.

Instead of developing measurement standards alone, especially in consideration of expensive facilities like clean rooms, CMS-NML is seeking the cooperation of IC makers in fabricating semiconductor reference standards of the new generation.

3.2 Westbound movement of Taiwan companies

With the fast growth of the new economy of mainland China, many Taiwan companies, either traditional or high-tech, have moved westbound across the Taiwan Strait into the south-east provinces of the Continent. It is reported that at least 600,000 Taiwanese stay in Shanghai city. The "cluster-effect" is reproduced in the mainland. This means the lower and upper stream companies of an industry are gathered together in science parks. During my personal visit to Shanghai and neighboring cities, the author was much impressed by the "cluster-effect". It was found that nearly all Taiwan companies with brands have a corresponding branch company in the mainland. The impact of the westbound movement to Taiwan economy is rather difficult to estimate.

Taiwanese companies on the mainland have reported their demands of measurement traceability and the difficulty in obtaining local support. In general, the technical level of local accredited labs is competent; however, the calibration capability and timely service need to be enhanced. Many companies still transport their instruments back to Taiwan for recalibration. Fortunately, both accreditation bodies across the Strait are the members of APLAC, and accordingly mutual recognition of calibration reports is in principle available in the near future.

4 Conclusion

The National Measurement System in Taiwan has been established since 1987. The establishment of 103 primary systems in 15 measurement fields by CMS-NML has satisfied 95% of demands (unweighted) from Taiwan industry. However, with the fast advance of heavy-weight electronics and IC technologies, the national metrology infrastructure has faced severe challenges from industry in terms of technical specification and timely offering. Advanced technology forecast and working closely with industry may alleviate the difficulty of CMS-NML in enhancement of the metrology infrastructure. In addition, the implementation of mutual recognition may also improve the satisfaction of metrology demands from Taiwanese companies around the world, especially in mainland China.

References

President’s Message (Continued from front cover)

In my last message I described the process that NCSLI uses to set the future direction of our organization. I explained how the Long Range Plan (LRP) is developed. We have begun the plan for the coming year. Now that the 2003 year has begun it is time for us to begin following the plan we have developed. Here are some highlights from the recent board meeting describing how NCSLI is attempting to meet its membership’s needs.

Operational Objective for 2003

Communications

While NCSLI provides many ways to facilitate communication within the Metrology community, the most effective is our annual conference. This year’s conference is being held in Tampa, Florida, August 17th through the 21st with the theme: “From the State-of-the-Art to the Everyday.” The NCSLI conference provides an excellent opportunity to network with other metrology professionals and to attend sessions and tutorials presented by international experts. This venue also provides the opportunity to attend the exhibits with vendors specializing in metrology and quality solutions. In addition, we sponsor many committee meetings at the conference, for discussion of specific issues related to their industry or metrology discipline. Important global topics involved in developing Recommended Practices and National Standards are also addressed.

Education and Training

The NCSLI Board is currently investigating moving the NCSLI Business office out of the present Boulder location, but staying within the Boulder area, to take advantage of lower operating costs and to add additional space for a training facility.

Leadership Succession Planning

Leadership in the NCSLI organization has been one important key to its success. I am pleased to announce that Tom Wunsch from Sandia National Labs will be joining the NCSLI Board of Directors as V.P. of the Central Division. Tom has the full support of his management and is well respected by those in the Central Division. I am confident Tom will provide a strong contribution to the board.

Breakthrough Objective for 2003

Value to the Membership

Value to our members is always key to the NCSLI operations. In many instances it may not make business sense for companies or organizations to join NCSLI, yet individuals within these companies would like to become more active in the Metrology community through organizations such as NCSLI. After years of expressed interest and discussions, NCSLI will begin to offer a Professional Membership class to individuals, beginning this year.

The Professional Membership will provide some of the full Organizational Membership benefits, such as the quarterly newsletter, access to the member’s area of the NCSLI web site, ability to post resumes to the website, and purchase of NCSLI materials and conference registration at the member rate.

In addition to the Professional Membership, NCSLI is adding a Student Membership. This will be available only to full time students, which will provide many of the same benefits as the Professional Membership, but at a reduced student rate. Both of these new classes of membership are described in this issue.

As you may have noted, I have reported the board high lights based on some of the 2003 LRP Operational and Breakthrough Objectives. This will be my theme for the year, attempting to show how the NCSLI organization and its board of directors will work through the year, using the LRP as a guide to success. I hope all of the membership will benefit from the plan we have developed.

Steven Stahley
NCSLI President

Editor’s Message (Continued from page 2)

New membership categories

After decades of discussion, the NCSLI Board has voted to add several new membership classes to the usual trade association membership of corporations and organizations.

Larry Yates was instrumental in this significant change of direction, which will permit individual and student memberships in addition to the traditional memberships, which will continue. This is a good change, in my opinion, and should enable NCSLI to make connections into the colleges and technical schools to interest the next generation of metrologists. It is incumbent for all of you readers to publicize this change with potential new applicants. Ed Pritchard carried out the details.

The program is explained on page 38 and the new application form is printed on page 69.

John Minick
Editor

BARRY BELL, NIST, PASSES

At press time, we learned that Barry Bell, of the NIST Electricity Division, passed away March 13, 2003, at Montgomery General Hospital, after suffering a brain aneurysm. Barry came to NBS in 1976 as the Section Leader of the Electrical Instruments Section of the Electricity Division. He served in that capacity (through many reorganizations and name changes) until he was appointed the Deputy Division Chief of the Electricity Division in 2001.

Barry became an IEEE Fellow in 1997 for his technical leadership in the development of analog electronic standards based on digital technology. He won the DoC Silver Medal in 1981. Prior to working at NBS/NIST, Barry worked at Leeds and Northrup, the U.S. Naval Nuclear Power School, and Hewlett Packard Company. He held a Masters degree in Electrical Engineering from Yale University, and a BSEE from Stanford University. Barry is survived by his wife, Jane, twin daughters, Cathryn B. Kibby and Carolyn B. Duska; a son, Jonathan; two step-sons, Matthew and Andrew Chalfant; and six grandchildren.

Editor’s Note: I knew Barry from his time at HP in the 1970s. His work at NIST was always guided by a passion for finding out what industry needed for better measurements and standards.
METROLOGY CALENDAR

NCSLI MEETINGS
August 17-21, 2003
NCSLI Workshop & Symposium
Tampa Convention Center, Tampa, FL
CONTACT: NCSLI Business Office, (303) 440-3339
FAX: (303) 440-3384
e-mail: <info@ncsli.org>
website: <www.ncsli.org/conference>

INDUSTRY/GOVERNMENT MEETINGS
International Dimensional Workshop
May 12-16, 2003
Nashville Marriott, Nashville, TN
CONTACT: Ed Pritchard, (865) 574-4261
Fax: (865) 574-2802
e-mail: <pritchardew@y12.doe.gov>
website: <www.sme.org/IDW>

2nd International Conference on Metrology
November 4-6, 2003
Paradise Red Sea Conference Hotel, Eilat, Israel
CONTACT: Conference Secretariat
ISAS International Seminars
P.O. Box 34001
Jerusalem 91340, Israel
972-2-652-0574
Fax: 972-2-652-0558
e-mail: <confer@isas.co.il>

NACLA Laboratory Accreditation Forum
March 17-18, 2003
Sheraton Hotel, Columbia, MD
CONTACT: Joe O'Neil, <joneil@nist.gov>

REGION/SECTION MEETINGS
MID-WESTERN US REGION
Southern Ohio/Kentucky Section, May 1, 2003
USAF Primary Standards Lab, Heath, OH
CONTACT: Charlie Mays, (740) 788-5399
FAX: (740) 788-5404
e-mail: <cmays@afpsl.bionetics.com>

CANADA REGION
Spring Meeting, May 1, 2003
Sheridan Park Conference Center, Mississauga, ON
CONTACT: Wayne Sampson, (902) 468-3344
FAX: (902) 468-1203
e-mail: <wsampson@pylonelectronics.com>

Northwest US; Western Canada, May 16, 2003
Fluke Corp., Everett, WA
CONTACT: Keith Cable (206) 762-2515
FAX: (206) 762-5880
e-mail: <kcable@nwcal.com>

REGIONAL STANDARDIZATION & METROLOGY WORKSHOP & SYMPOSIUM
The Jamaica Conference Center
May 5-9, 2003
Theme: Standards and Metrology: For Our Health, Safety and Economic Prosperity
Presented by:
The Pan American Standards Commission (COPANT)
The Inter-American Metrology System (SIM) &
The Bureau of Standards, Jamaica (BSJ)
Jamaica Bureau of Standards Training and Development Centre,
19 Hope Road, Kingston 10, Jamaica

Exhibitors Welcome
Booths $900-$1,000
See page 52 for Jamaica Symposium session details

CONTACT: <hedmondson@bs.org.jm>
<mwright@bs.org.jm>
<nhall@bs.org.jm>

Please send Metrology Calendar additions and corrections to the NCSLI International Business Office,
(303) 440-3339 FAX: (303) 440-3384, or E-mail to <info@ncsli.org>
The Accreditation Process at INMS

As mentioned in previous reports, INMS has determined that it would seek third-party accreditation to ISO/IEC 17025 for its calibration and measurement capabilities that are listed in the CIPM MRA Appendix C. This is a key element in meeting its responsibilities under the requirements of signing the CIPM MRA. NRC takes this very seriously since acceptance of INMS calibration services and recognition of their competence helps ensure the acceptance of those services by our national and international client base. It also helps Canadian manufacturers sell their products by providing a competent and acceptable source of measurement traceability for their manufacturing processes.

It can be reported that the first NRC laboratory has been accredited by the Standards Council of Canada to the standard ISO/IEC 17025. This accreditation was granted on 24 October 2002 to the GDMS Test Unit of the INMS’s Chemical Metrology Group for the glow discharge mass spectrometric analysis of high purity metals and semiconductor materials. The push to become accredited was driven almost totally by the Group’s clients. Likewise, in addition to the requirements of the CIPM MRA, the clients buying INMS calibration services are increasingly asking when the Institute will become accredited to 17025. It seems clear that it will soon be the marketplace that drives the accreditation bandwagon and not a group of conformity assessment zealots.

The INMS Groups, Programs and projects continue their progress on the quality system trail. An increasing number have been working on their documentation as the first on-site assessment draws ever closer. As frequently happens with these kinds of activities, progress is never as fast as predicted or as hoped for. The internal auditor course was held last fall and it was so well received that a second internal auditor course was held in early January 2003, with a third course likely later in the year.

The first internal audits of the Acoustics and Vibration program and the Photometry and Radiometry Group are scheduled for late January and mid-February 2003. It is likely that the first on-site assessment of these two groups will take place in the April/May 2003 time frame, with the anticipation that the accreditation of the Institute CMCs will be completed by the end of 2005.

Implementation of INMS Strategic Plan

As noted in our report of August 2002, NRC’s governing Council endorsed the INMS Strategic Plan and encouraged the NRC President to seek the $80M needed for the ten-year program. The strategy adopted is to seek some $50-60M in the first five-year time frame. The task of obtaining this level of support from the federal budget in a time of some economic uncertainty is proving to be a substantial one. An additional challenge is that recent government investments in federal laboratories have been almost exclusively outside of Ottawa, its national capital. Despite these challenges, NRC senior management is pursuing several possible opportunities and we remain optimistic that the funding for the first five years of the new plan will be forthcoming within the next twelve to eighteen months.

INMS Acquires A New High-Performance CMM

Coordinate Measuring Machines (CMMs) have computer-controlled translation stages to move a sensing probe to selected ‘touch’ points on a work piece, and thereby measure the 3-D shape and size of features on the object. Industry increasingly relies on CMMs to check the dimensions of complex parts, and in Canada, several thousand machines check billions of dollars worth of manufactured goods each year.

The INMS Dimensional Metrology Program has brokered a deal with Mitutoyo (Japan) to be the first foreign NMI to test and use their new high-performance Legex CMM. The new machine has a large working volume (700 x 700 x 450) mm3 with a resolution of 10 nm on each axis. INMS will conduct rigorous tests to verify the claimed accuracy specification of U = (480 nm + 10-6L), which is considerably better than any other CMM available.

The partnership is very good for INMS, bringing significant value to the lab for a reasonable cost. The age-old problem of staying current with expensive technology on a tiny budget has been overcome, as the deal with Mitutoyo includes the regular update of hardware and software for the life of the machine (at least 10 years). The machine arrived with all three types of contact probes and a machine-vision non-contact probe, and the company will soon send two new ultra-high performance probes still under development in Japan.

The rigorous INMS tests and experiences with this technology will be relayed to the company to further improve their metrology hardware and software, and will bounce back to INMS in the form of improved updated products for the new machine, for a win-win outcome.

Switching to Mitutoyo also aligned INMS to Canadian users of over 1000 CMMs using the same software, so that we can better relate and create solutions for this client sector (our previous make of CMM was one of only two units in Canada). It is the dawn of a new era of CMM metrology for INMS.

ORMS-2

A new Certified Reference Material called ORMS-2, a river water spiked with inorganic mercury, has been released by the INMS Chemical Metrology Group. In Canada, NSERC (National Science and Engineering Research Council) recently contributed $12.6M to create a Collaborative Mercury Research Network (COMER). The aim of this group of investigators, composed largely of University and Government agencies, is to provide an integrated research effort to improve our general understanding of how mercury is transmitted
and accumulates in the ecosystem. Likewise, the USEPA has released a draft version of its Mercury Research Strategy.

The purpose of this document is to guide the EPA mercury research program by identifying key scientific questions and the research programs that can be expected to provide the answers. Both of these programs require the measurement of Hg at ambient levels in environmental samples and it is hoped ORMS-2 will assist in assuring the quality of these measurements.

To assure a reasonable shelf life of ORMS-2, various packaging strategies were evaluated and stability studies were carried out over a period of three years before the CRM was released. Bromine monochloride (0.5%) was found to be adequate to preserve the Hg in solution and packaging the liquid in flame sealed glass ampoules provided the necessary conditions for long term stability.

It is also significant that this is the first chemical metrology CRM that included uncertainty components in compliance with the GUM. Uncertainty factors associated with homogeneity and stability as well as the uncertainty related to the characterization of the analyte were included in the final expanded uncertainty.

ORMS-2 is intended for the calibration of instruments and evaluation of methods for the determination of mercury. It is especially applicable to the new EPA performance-based method that supports water quality monitoring programs authorized under the US Clean Water Act. These measurement criteria are required to conform to the Water Quality Guidelines for the Great Lakes System of 1.3 ng/L Hg.

ORMS-2 complements the suite of NRC sediment CRMs certified for total inorganic Hg. and marine biological tissues certified for inorganic and methylmercury content.

Hydrogen Maser Upgrade for Improved Time Dissemination Services

The Time Dissemination Program of the INMS Frequency and Time Group has embarked on a project to upgrade its ability to perform high precision timing and frequency calibration and to make these new capabilities available in any high-level Canadian laboratory. To this end, a new hydrogen maser and its auxiliary offset generator have been acquired.

This equipment will maximize the benefits of a collaborative project with Natural Resources Canada CACS (Canadian Active Control System) Program to provide Canadian users nearly direct access to international time scales and the SI definition of the second. This is the basic building block for all telecommunication and also for all dimensional measurements, given that the definition of the unit of length is directly derived from the SI second. Additionally, the project will permit easy access to the NRC's time and frequency calibration services from anywhere in Canada.

These benefits will strengthen Canada's abilities in communication and manufacturing that depends on accurate dimensional metrology, which together account for about 50% of modern manufacturing processes. This program fulfills a key role in commerce and trade at the national and international levels.

CLAS Activities

The Calibration Laboratory Assessment Service keeps moving steadily along. A couple of labs have dropped out of the program as reported on our website directory but several more have been added to the growing list. The labs that dropped out did so for organizational reasons, including the downturn in the high technology industry.

There are currently 26 accredited calibration laboratories with about 20 more at some stage in the process. We have recently hired a new CLAS Technical Advisor - Mechanical. The CLAS TAs are the assessment team leaders, each having a specific metrological background and expertise enabling them to also serve as Measurement Experts for lower level applicant labs. For higher level (i.e. smaller claimed uncertainties) an INMS scientist is always the Measurement Expert.

The latest CLAS TA is Georgette Macdonald who came to INMS with several years' experience as a metrologist in a local mass laboratory. CLAS is active in supporting the Standards Council of Canada to meet its international commitments under the APLAC and ILAC Mutual Recognition Arrangements. Two of the CLAS TAs have qualified as APLAC evaluators, having taken the requisite training, and each has participated in at least one evaluation of an Accreditation Body. In addition, they have been involved as NACLAs evaluators in the evaluation of AAs seeking to become signatories to the NACL MRA or in the re-evaluation of NACLAs signatory AAs.

One of the key elements of the CLAS program is the requirement for CLAS certified/SCC accredited labs to participate in proficiency testing activities, prior to accreditation and on a regular basis after accreditation is granted. CLAS labs are encouraged to participate in national and international ILCs whenever they can since this will minimize or eliminate some of the bilateral ILCs they would otherwise be required to do with NRC. Thus CLA labs participate in NACC, APLAC and EA ILCs as and when appropriate. CLAS also participates as the coordinating body for NACC and APLAC ILCs on a regular basis. The following is a list of some of the ILC activities that CLAS and CLAS labs have been involved in.

1. CLAS labs took part in EA EI-27 (High-end DMM). We are waiting for the draft of the report; we still don't have draft results on the loop including Canada.

2. CLAS/SCC is coordinating and NRC is providing reference values for a High-Resistance ILC (10 and 10 MO) for APLAC, the activity being designated as APLAC APM014. So far, 46 laboratories from different countries from North America and the Asia-Pacific area have indicated that they would take part in the comparison. The North American (NACC) measurements are completed and the devices are being shipped to the Asia-Pacific area starting with Australia and New Zealand.

Preliminary results for Mexico are ready and will be sent to EMA once we have confirmed some interim reference values. The preliminary results for the US will be available as soon as the measurement reports for the accredited labs from A2LA and NVLAP are received. Participation in this ILC was offered to NACLAsignatory AAs as well as those AAs which have applied to become signatory to the NACL MRA. The only response was from A2LA and NVLAP.
Report from the Board

Andrew Wallard

Since my last report, there have been several major events and decisions that will affect the future of the BIPM and its work. These have been debated at the meeting of the International Committee for Weights and Measure (CIPM) last October and are directed towards the quadrennial General Conference next October that sets BIPM’s budget and general strategy for the next four years.

The CIPM discussed the fact that the work of the BIPM has expanded enormously since the last budget setting during the General Conference in 1999. This has been driven largely by the Mutual Recognition Arrangement (MRA) between National Metrology Institutes (NMIs) as well as by a far more demanding set of activities in the vital area of chemical metrology - in which we include work in bioanalysis, environmental measurement, and laboratory medicine. The current BIPM budget could not sustain this expansion whilst at the same time maintaining all our current activity in physical and engineering metrology.

We also were aware that some of our Member States would not support the very significant budget increase that would be required to continue to do everything. CIPM therefore decided that the most appropriate strategy would be to prioritise our work, to identify additional cost savings and to work with Governments on our proposal for a more modest budget increase. As a result, BIPM's work on photometry and radiometry will close later this year and staff will transfer to the electricity section where we expect some retirements in the next few years.

We also plan to start two internationally collaborative projects; the construction of a calculable capacitor and of a "Watt Balance" to monitor and eventually stimulate a redefinition of the kilogram. The laser section will also reduce substantially. Internal transfers will be used to resource the expanding high priority and essential work in the chemical area. This is a major reorganisation for BIPM and we believe that it has the overall support of our Member States.

2. International acceptance of calibration certificates

2.1 The MRA continues to take up a huge resource. Results from completed comparisons are arriving regularly and we now have over 14000 "calibration and measurement capabilities" (CMCs) on the BIPM's Key Comparison Data Base. The results lead to heated debate and, as a result, we are helping build more and more confidence in the integrity of the international metrology system. Similar lively activity is concerned with the statistical analysis of comparisons.

2.2 Several projects - largely driven by the European Community - are working towards closer liaison with Regulators and Accreditors. With Regulators, there is a proposal for a "template" that would help them identify the measurement issues that they should resolve before legislation is set in place. It would also encourage thinking about the sort of international framework for the mutual recognition of calibration certificates that would be acceptable to them. We, of course, expect this to be within the MRA framework complemented by traceability through an ISO/IEC 17025 accredited laboratory network. We also wished to find a way of identifying those NMI certificates that are produced within the MRA framework and which are therefore accepted by signatory NMIs. The Regional Metrology Organisations have therefore agreed to an official set of words that NMIs can use on their certificates and which should give users more confidence in the world-wide acceptability of compliant certificates.

This should do much to help reduce technical barriers to trade that stem from lack of acceptance by Regulators of measurement results in different countries. More details of this process will be presented by the "REGMET" project that is expected at the NCSLI Conference in Tampa later this year.

2.2 As to Accreditors, a joint ILAC/BIPM group is looking at how the organisations can work more closely on a variety of matters. These include:

- making sure that accredited laboratories that claim traceability to their NMI have uncertainty claims that match the CMCs from the NMI. There are some cases in which this clearly is not the case. Similarly, some NMIs offer "special" high accuracy calibrations from time to time. These are not within the MRA framework. If
3. Chemical Metrology.

The importance of work in this area continues to grow. BIPM and the World Health Organisation are close to finalising a Memorandum of Understanding and the WHO is also a partner in the "Joint Committee for Traceability in Laboratory Medicine". The aim of the Joint Committee is to support world-wide comparability, reliability and equivalence of measurement results in laboratory medicine, for the purpose of improving health care, by:

- promoting the concept of traceability of measurement results to the Système International des Unités (SI) or, where necessary, to other internationally agreed references;
- promoting close links between Reference Laboratories in Laboratory Medicine and National Metrology Institutes;
- coordinating and giving guidance in the establishment of Reference Measurement Systems with respect to medical needs;
- identifying and prioritising the measurands that require international traceability and comparability and thereby encouraging appropriate organizations to accept responsibility for the development of suitable reference methods and measurement procedures and certified reference materials;
- encouraging the in-vitro diagnostic (IVD) industry to apply the agreed reference measurement systems;
- providing support for Reference Laboratories preparing for accreditation;
- publicising widely relevant information to interested parties; and
- providing scientific and organizational expertise to the parties involved.

Particular early priorities include the identification of reference materials and reference procedures that meet the requirements of the EC Directive on in-vitro diagnostic medical devices, the formation of networks of Reference Measurement Laboratories in certain areas and the co-ordination of specialist networks in areas like cholesterol and enzyme measurements.

BIPM is currently discussing its own proposed technical programme in organic chemistry with the NMIs that are major players in the field.

4. Developing Countries.

With 51 members of the Metre Convention and 10 Associate members, the BIPM is frequently asked to assist in the development of metrology infrastructures in developing countries. We rarely have the resources to do this ourselves and it is increasingly a challenge that is being addressed by the Regional Metrology Organisations and various aid agencies. However it is clear that some co-ordination of these efforts would help to ensure that money is spent as effectively as possible.

We should also aim to help developing countries gain a full appreciation of the range of activities in metrology, quality, accreditation and standardisation that are needed to equip them for today's world. With this in mind, joint activity between BIPM, ILAC, ISO, IEC-TCU, OIML, IAF and UNIDO will endeavour to link activities. We shall work to help developing countries evolve metrology structures that enable them to participate in the work of international and intergovernmental organisations. This is planned to happen in close collaboration with NMIs and with other national policies and initiatives, many of which now share similar objectives.

E U R O P E A N CO O PERAT I O N IN M E R O LOG Y (E U R O M E T ) R E P O RT
Seton Bennett
In the last report I mentioned the large number of active EUROMET projects. Most of these involve technical collaboration in joint research or intercomparisons of standards. There are two projects, however, which are addressing the impact of metrology on regulation, trade and commerce. Recognising that the operation of the economy on a global scale and the quality of life for the individual citizen depend on reliable measurements which are trusted and accepted internationally, the European Commission is supporting these two projects (RegMet and MetroTrade) within its Fifth Framework Programme.

RegMet specifically aims to promote a greater understanding of metrological issues amongst regulators, promote a best-practice approach to regulation, and identify the metrological needs of regulatory bodies in Europe. Commencing in November 2000, it will run until autumn 2003 with the participation of nine NMIs and two other organisations.

The project has established a two-way dialogue between the metrology and regulatory communities, commencing with a consultation exercise involving over 100 regulators across Europe, from sectors including avionics, the environment, food, health and safety, medical devices and transport. It is apparent that much of the regulatory structure is highly fragmented, often for historical or technical reasons, with the responsibility for legislation and enforcement shared between organisations in many sectors. Some European countries have a relatively centralised regulatory structure, whilst for others it is much more distributed.

The project has highlighted the wide range of metrological challenges facing the regulatory community in the development and enforcement of regulatory legislation. To address these, a template is being developed, focusing on the need for an appropriate approach to measurement when formulating regulations and undertaking market surveillance. The combined expertise of 'best practice' regulators and the metrology community will be captured and incorporated within the template. In addition, a common approach will offer a degree of transparency and help avoid trade barriers and unfair competition. The template will be made widely available for embodiment in policy, legislation and practice.

The second project (MetroTrade) aims to identify and facilitate the removal of metrological impediments to international trade, by addressing issues such as the lack of knowledge of the equivalence of national measurement capabilities as a basis for the mutual acceptance of calibration certificates and the identification of
metrology-related trade difficulties. This is also a three-year project, running until the end of 2003. The project partners include six European NMIs as well as Canada's INMS.

Specific studies within MetroTrade have identified areas where a lack of awareness of metrological issues or technical problems associated with measurements has led to technical barriers to trade. Examples include the classification of thermal insulation materials in the construction industry, differences between US ASTM and ISO requirements for impact testing, optical measurement in the paper industry, the supply of natural gas, and the limited acceptance of EU calibrations within the US aviation sector. In some cases the appropriate application of metrology has successfully prevented or overcome these problems.

A specific issue highlighted by both the RegMet and MetroTrade projects is the historical practice of specifying technical limits of 'below detectable levels', 'no detectable levels' or 'zero.' As technology advances, detectable limits have reduced and levels of contaminants or hazardous materials, which were previously undetectable, may be detected for the first time. This can result in goods that would previously have been widely accepted, being rejected by some countries but accepted by those countries with the modern detection technology, despite the fact that neither the quality of the goods on the market nor the legislation have changed.

Through these two EUROMET projects, groups of NMIs are identifying and addressing metrological issues affecting industry, trade and the quality of life. Lessons are being learnt from examples of existing good practice, and optimising the relationship between the communities affected has the potential to bring benefits not just to industry but also to the public at large through improved regulation and easier trade on the basis of robust, reliable measurements.

Further details of these projects can be found at: <www.metro-trade.dk>.

ILAC/NACLA REPORT
Anthony Anderson

There has been no meeting of the ILAC-LC since the last report. However, there has been much discussion regarding the issue of an ILAC/IAF common Mark. To recap, at the Kyoto ILAC General Assembly in the fall of 2001, the decision was made to have an ILAC Mark which could be used on qualification certificates and test reports of laboratories whose Accrediting Body (AB) is a signatory to the ILAC Arrangement. As I reported in October, the issue of a common Mark has been confused by the continuing discussions about the possible merger of ILAC and the International Accreditation forum (IAF). Those in favor of merger want a common Mark for the two organizations.

The Laboratory Committee is against a common Mark because it will add even more confusion in the market place between certification/registration and accreditation and would likely water down the technical competency of laboratory accreditation. In addition, if ILAC/IAF do vote for a common Mark, then merger of the two organizations would become even more inevitable. The LC has consistently stated that the laboratory community is against a merger and a common Mark. Following discussion at the NCSLI Nashville Board meeting, this position continued to be supported by NCSLI.

As Chairman of the ILAC/LC, I have strongly conveyed to the ILAC Executive the position of the Laboratory community. The issue is currently out for vote and the ballot closed February 6, 2003. Unfortunately only full ILAC members are allowed to vote, not Stakeholder members such as NCSLI. We can only hope that presentations on the floor of the Berlin GA by Stakeholders and some accreditors, and numerous communications since then, have been sufficient to persuade and produce a majority view against a common Mark.

In Berlin, the LC discussed a draft document from one of its members on the status of the implementation of ISO/IEC 17025. From this draft, a document has been prepared as a proposal from the LC to the Executive of ILAC, that ILAC conduct a study to determine the state of progress in implementing the requirements of ISO/IEC 17025. If approved by the Executive, the implementation of the study will be discussed at the March LC meeting.

The ILAC/LC meeting was on March 5&6, 2003, in Orlando and I will also attend the ILAC Executive meeting in Paris February 24-26, 2003.

NATIONAL COOPERATION FOR LABORATORY ACCREDITATION (NACLA)

I attended the NACLA Board of Directors and committee meetings in November, in Vancouver, Canada. The ILAC Mark issue was discussed by the International Affairs Committee and concluded that the NACLA position should be against the common Mark. Although NACLA is also only a Stakeholder member of ILAC and cannot vote, the three US accrediting bodies, which are signatories to the ILAC MRA and NACLA recognized, will represent the official US position. Their vote on this issue is to oppose the common Mark. In addition, the NACLA position has been relayed to the ILAC Executive.

The revision of the NACLA QA manual is virtually complete and subject to some appendices and new guidelines, which have still to be produced. The Board has adopted the QA manual in its current form.

The Standards Council of Canada hosted a joint meeting of the NACLA Executive Committee and the APLAC Executive on the afternoon of November 9th. This afforded NACLA the opportunity to further the levels of cooperation and confidence building between NACLA and APLAC, with the ultimate goal of international recognition of NACLA as a cooperation for the recognition of laboratory accreditation bodies.

As part of the NIST-NACLA MOU, each party is obliged to report annually on its progress in fulfilling its MOU commitments. The President, Roxanne Robinson, and Executive Vice President, Lou Dixon, met with NIST on December 19th to discuss the MOU commitments and related issues that NACLA would like to see in their report.

At the end of 2002, the sponsorship of NACLA by NIST ended, although the use of the Gaithersburg office and services will continue for one more year. NACLA has achieved some of its financial goals and will be able to sustain operations throughout 2002 without difficulty. However, with this independence, the necessity to obtain more financial support will be a high priority in the coming months. The March forum and Annual General Meeting (AGM) will provide some funding, but individual corporate and patron sponsorships are still needed. The NCSLI 2003 budget, which was passed in Nashville, included a continuing patron sponsorship for NACLA. The Board of NACLA very much appreciates NCSLI's continuing support as one of its founding members.
TRAINING INFORMATION

UNCERTAINTY/SPC ANALYSIS WORKSHOP
April 29-May 2, 2003

We are pleased to announce that Integrated Sciences Group will be offering an Uncertainty/SPC Analysis class April 29-May 2, 2003 at the Holiday Inn Select in Bakersfield, California.

This four-day workshop covers methods and techniques documented in the ISO Guide to the Expression of Uncertainty in Measurement (the GUM), the primary source for ISO 17025 accreditation with regard to uncertainty analysis and reporting. This course emphasizes the practical application of these principles through hands-on training in the use of ISG's UncertaintyAnalyzer software, which is included as part of the course tuition.

Information about the course outline, tuition, location and registration can be found at

<www.isgmax.com/training_selectsite.htm>. Please contact us at 1-800-400-7866 or email <training@isgmax.com> if you require additional information.

********

CRYOGENIC ENGINEERING SHORT COURSE
Boulder, CO
June 23-26, 2003

The course includes four days, 30 contact hours, on Basic Principles, Properties of Cryogenic Fluids, Properties at Low Temperatures, Cryogenic Refrigeration and liquefaction, Cryogenic Instrumentation, Cryogenic Equipment, Cryogenic Systems and Cryogenic Safety.

Based on the book, Cryogenic Engineering, by Thomas M. Flynn.

Contact Dr. Flynn
CRYOCO Inc.
511 North Adams Ave.
Louisville, CO 80027
(303) 665 8302
<tflynn3113@aol.com>
<www.cryoco.com>

CERTIFIED CALIBRATION TECHNICIAN (CCT)
TEST PREP

Computer-Based Training Module…content, terminology, concepts, graphics, formulas, real world examples, and practice questions from subject matter experts throughout the calibration industry all designed to better prepare a technician for the CCT exam. All in one source!

For details on the Application Process, Education and Experience Requirements, Test Dates, and the complete Body of Knowledge, see <www.asq.org>

Contents...

I. GENERAL METROLOGY
II. MEASUREMENT SYSTEMS
III. CALIBRATION SYSTEMS
IV. APPLIED MATHEMATICS AND STATISTICS
V. QUALITY SYSTEMS AND STANDARDS
VI. UNCERTAINTY

Practice test questions based on the Six Levels of Cognition based on Bloom's Taxonomy, Online or CD-ROM.

Workplace Training
3195 Casco Circle
Wayzata, MN 55391
1-800-472-2564
<www.wptraining.com>

25
INCOME
Total Income = $1,178,772.38
Values shown in the chart are in %

EXPENSES
Total expenses = $1,098,362.76
Values shown are in %

Other expenses include Postage, Credit card expense, Publications, Supplies, Telephone, etc. and all of the other expenses are less than 2.20%.

Income-- $1,178,772.38
Expenses-- $1,098,362.76
NET-- $80,409.62

If you would like further details, please contact Harry J. Moody at harrymoody@cs.com.
October 25, 2002
Troemner LLC
Thorofare, NJ
Joe Reinsein
Philadelphia Section Coordinator

On October 25, 2002, the Philadelphia Section of the NCSLI held their Section Meeting at the Headquarters and Manufacturing facility of Troemner LLC, located in Thorofare, NJ.

Guest speakers for the meeting included: Steven Armstrong, Instrument Engineer for Troemner LLC, whose presentation was on "The Development of a Primary Laboratory for the Calibration of Standard Platinum Resistance Thermometers."

Sharry Masarek, Metrologist for Transcat's New Jersey Calibration Laboratory gave her presentation on "Creating a New ASQ Certification/ Certified Calibration Technician Program Proposal."

Ken Bonnell, President, Alpha Omega Calibrations, gave a presentation on "The Components of a Quality Pipette Calibration."

The speakers' presentations were very professional and the material was presented in a manner so that it could easily be understood by the audience.

Troemner provided a free luncheon and tour of their manufacturing and calibration facilities. I would also like to thank John Rowley, VP Operations at Troemner, for hosting the meeting and for appointing Joe Moran, Troemner's Lab Manager, to accept the new Philadelphia Section Coordinator role, effective at the conclusion of the meeting.

Editor's Note: Welcome to Industrial Volunteering, Joe, and thanks to your Mr. Rowley too.

The following personnel (18) were in attendance at the meeting: Joe Moran, John Rowley, Ken Bonnell, Sharry Masarek, Steven Armstrong, Chris Di Carlo, Clayton Souders, Costas Patsalosavvis, David Law, Frank Camello, Gerald Blosey, Joe Reinsein, Rob Freiwald, John Strouth, Katherine Ellison, Ken Koe, Michael Kerner and Mike Sodl.

I would also like to thank the employers of all those in attendance for allowing them the time to attend these meetings.

Southern Ohio/Kentucky Section Meeting (1132)
May 1, 2003

You are invited to our Thursday, May 1, 2003 Section meeting.

Our line-up of speakers include none other than Dr. Klaus Jaeger, Steve Kaplan, and Dilip Shah. We are very fortunate to have this group of speakers. The icing on the cake will be a tour of the AFPSL. For those that will take the USAF Primary Standards (AFPSL) tour, US citizenship and advance registration is required.

Contact
Charles E. Mays
The Bionetics Corporation
740-788-5399, FAX 740-788-5404
<cmays@afpsl.bionetics.com>

January 23, 2003
Hewlett-Packard Compaq
Houston, TX
D. Keith Scoggins
South Texas Section Coordinator

The NCSL International South Texas Section winter meeting was held on January 23, 2003 at the Hewlett-Packard Computer Center in Houston, Texas. The meeting was hosted by Bob Cummings from Hewlett-Packard Corporation and was conducted by Keith Scoggins, the South Texas Section coordinator and metrology laboratory supervisor at the South Texas Project Nuclear Operating Company.

Opening comments were made by Keith Scoggins to welcome everyone to the meeting and to also request feedback on the types of presentations attendees would like to see in future section meetings.

Chris Grachanen, from Hewlett-Packard, was the first presenter of the morning. Chris provided valuable information on the American Society for Quality and the publication of its Certified Calibration Technician program Body of Knowledge. Chris explained how the Certified Calibration Technician provides a method for certifying personnel's technical knowledge.

The second speaker was Rob Crowe, from Beamex Corporation, who presented information on how industrial process plants should consider ISO 17025 to satisfy their calibration program requirements.

Next Mike Lawyer, from Hart Scientific, delivered enlightening and highly fascinating information regarding fixed points for secondary level temperature laboratories.
A wonderful lunch was provided by our host, Hewlett-Packard. After lunch, Ken Kolb, from Rucka Corporation, talked about improvements in estimating the uncertainty in deadweight piston gauge pressure measurements. Ken dazzled everyone with his expert knowledge of this subject.

The next speaker of the day was Guillermo Vigna, from National Instruments. Guillermo gave a presentation on "Computer-Based Measurement and Automation in Calibration." During his presentation, he provided a demonstration of Virtual Instrumentation Programming and described the advantages of this type of programming.

The next speaker of the day was Matthew Sell, from On-Time Support. Matthew gave an overview of software testing and virtual computing. Again Matt provided the attendees with a great deal of practical and useful information.

The last speaker of the day was Jit Lim, from Tektronix. Jit provided a summarizing history of high frequency scope probing techniques and demonstrated how different probing techniques can affect waveform measurements.

In addition to the above speakers, there was an exhibit area where several local vendors showed their products. 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.

I would like to give a special thanks to Bob Cummings and Chris Grachen, from Hewlett-Packard, for their support in providing for the meeting location, refreshments, and lunch. Also, to the vendors that supported the mini-show to make it such a big success.

Matt Sells, OnTime Support Programmer, showing off his computer talents with a Linux operating system.

Jit Lim, Tektronix, describing the effects of improper probing on high frequency signals.

During breaks, attendees were eager to get to the vendors exhibit area to learn what new technologies they had to offer.
Our host will be Atomic Energy of Canada (AECL), Sheridan Park Conference Centre, 2275 Speakman Drive, Mississauga, Ontario. Agenda will be sent to all members when finalized. This meeting is a one-day event. Registration forms can be obtained from Wayne Sampson.

Uncertainty roadshow

NRC will be hosting the NCSLI roadshow uncertainty course at NRC in Ottawa on Oct 15, 2003 in conjunction with the NCSLI Canadian Regional Fall conference on Oct 16-17, 2003 at NRC. The NCSLI has not yet put together a slate of speakers for the course, but Pressure and Temperature are two of the key topic areas under consideration, along with Electrical.

The course will be geared to the introduction to intermediate level and will focus on practical rather than theoretical issues. Details will be published on our website at <www.inns-icmp.nrc-cnc.gc.ca/courses_e.html> as they become available. When all details are available, we'll also announce it on the NCSLI website at <www.ncsli.org/current_events/calendar>. We expect that the cost will be minimal because the speakers' time and expenses are usually covered by their employers for the NCSLI courses.

Contact: Wayne Sampson
Secretariat
<wsampson@pylonelectronics.com>

********

December 6, 2002
Tokyo Metropolitan Ohta-ku PlazaTokyo, Japan
Kazumi Hayakawa
Japan Region Coordinator

NCSL International Japan Region Report

The 11th Annual Technical Forum of NCSLI-Japan was held at the Tokyo Metropolitan Ohta-ku Industrial Plaza on December 6, 2002, with 144 attendees from all over Japan. There were more attendees from the government sectors this year than the last due to rising interests in promoting Metrology activities, and fewer from the private sectors due to severe economic condition lingering Japan.

The following eleven presentations were made:

• Monitoring of super-conducting magnet using ultrasonic wave
  By Dr. Takeshi Ishigoka, Seikei University.
• Calibration and its uncertainty
  By Dr. Masayoshi Koike, National Metrology Institute of Japan, AIST
• Adapting the ISO GUM for a practical approach to uncertainty calculation of complex numbers
  By Mr. Makoto Kasugai, Agilent Technologies, Japan Ltd.
• Calibration of liquid in glass thermometers using a platinum resistance thermometer as a reference standard
  By Mr. Yoichi Mizuma, Yamari Industries, Ltd.
• Fixed point for secondary and industrial calibration
  By Dr. Xunmo Li, Hart Scientific
• The standard of flow rate and their calibration services of Japan
  By Dr. Shinteki Nakao, National Metrology Institute of Japan, AIST
• Development of a dead weight piston gauge (1 to 20kPa abs) for the calibration of vacuum gauge
  By Mr. Tomoyuki Ishinabe, Futaba Sokki Co., Ltd.
• A consideration on a shape of distribution of DMM output
  By Mr. Yoshito Ichinomiya, K.K. Fluke
• Calibration of dividing ratio DC voltage divider
  By Mr. Tomoyuki Ishinabe, National Metrology Institute of Japan, AIST
• Worldwide trend of and NMI approach to the national measurement standards
  By Dr. Akira Ono, National Metrology Institute of Japan, AIST

Between presentations there were enough tea-breaks made so as to provide attendees a chance to visit exhibitors' booths of the following companies and organizations:

Asia Pacific Metrology Programme (APMP)
Alpha Electronics Corporation
Agilent Technologies
Fluke Corporation
Key Techno Co., Ltd./Sunjem
Nippon Netsudenki Seisakusho Co.
Tosya Corporation
Traceability Research Association
Yanari Industrial Ltd.
Yokogawa Electric Corporation

Attendees:
Katsuzo Yoko
Akira Yonezaki
Makoto Kasugai
Hiroyuki Shibata
Takdu Yamasaki
Koichi Nakao
Shinsuke Kato
Yoshito Ichinomiya
Noriaki Kato
Kazumi Hayakawa
Yasuhiro Ichinomiya
Toshihiro Kunitake
Sugio Watanabe
Toyohi Takeda
Katsunori Kodaka
Shinsuke Yamamoto
Toyotaka Ishikawa
Makoto Ohto
Hiroyuki Sato
Hitoshi Nakano
Mitsuji Yamamura
Masahiro Ogata
Ken-ichi Tsukamoto
Monochrome Ohki
Kenjiro Kano
Shinsuke Shimizu
Satoshi Kato
Takashi Tabata
Kazumi Hayakawa
Hiroshi Inoue
Makoto Ohto
Hiroyuki Sato
Satoshi Kato
Kazumi Hayakawa
Hitoshi Nakano
Mitsuji Yamamura
Masahiro Ogata
Ken-ichi Tsukamoto
Monochrome Ohki
Kenjiro Kano
Shinsuke Shimizu
Satoshi Kato
Satoshi Kato

Reports from the Regions
Reports from the Regions

Mitsubishi Electric Corporation

Dr. Osamu of NMII/AST presents his paper to a receptive audience.

Many paper presenters join Forum Committee volunteers for a round of applause for a job well done.
Mr. Ode (l). Vice Chairman of Japan NCSLI, gives out tokens of appreciation to a group of paper presenters.

The large room provided lots of room for equipment exhibitors and tables for informal discussions.

There was plenty of time at coffee breaks and intermissions for attendees to informally see some of the latest offerings of metrology products.

Remembering Claude Miks

Claude Miks
2017 – 2002

Claude E. Miks, Jr.
died at his home on December 20, 2002 at the age of 85. Claude was employed with Ruska Instrument Corporation, Houston Texas, for over 45 years. In 1942, Claude was hired by Walter Ruska, the founder of the company, as an instrumentation technician and retired as Vice President of Technical Services in 1988. Claude was directly involved in the design/development and construction of much of Ruska's early instrumentation.

With the introduction of the Ruska hydraulic piston gauges in the late 1940's and pneumatic piston gauges in the early 1960's, Claude dedicated his professional career to the advancement of pressure metrology. He was active in hardware development as well as dissemination of metrological skills through his teachings. Claude recognized that confidence and competence in the operation of pressure standards meant being familiar with the equipment and understanding how and why it worked. The pressure schools he organized and taught for some 30+ years enabled and propagated that understanding resulting in significant improvements in pressure measurement and calibration. The first Ruska pressure school was conducted in 1960 at Wright Patterson Air Base.

Claude's unassuming and quiet style masked the significant impact and contribution he made to the pressure measurement community, not only in the USA but also in many regions of the world. For those who did not know him personally, one word comes to mind - Values. Claude's resolute commitment to excellence was evident to all that dealt with him. During any visit to Ruska, Claude was always an exemplary host.

His nieces, Beverly Camden and Angel Johnson and nephew Lloyd Hawkins as well as numerous grandnieces, nephews, cousins and friends survive Claude.
SCENES FROM THE INDIAN WELLS BOARD MEETING

The Boulder staff honored Charlie with an Outgoing President's plaque thanking him for his many years of working with the Boulder office.

Carol Hockert and Larry Yates obviously discussing organizational matters at an informal fruit juice bar.

NIST's Belinda Collins, Dave and Winnie Agy and Bill Wightman meet after the Board meeting for "getting to know you" discussions so typical of the personal relationships that develop among the NCSLI Board members.

Steve and Melanie Stahley are both committed to a LOT of work this year. The spouses of anyone who has accepted top management jobs at NCSLI knows that they have agreed to a share of the workload.

Eat your hearts out Midwest and Eastern Member Delegates. If you would volunteer for some NCSLI organizational jobs, you get to attend Board meetings like this in sunny Palm Springs, California. To be honest, many hours are spent indoors taking care of the agenda.
STANDARDS POLICY
Jack Ferris, V.P.

U.S. MEASUREMENTS REQUIREMENTS COMMITTEE
Jeff Walden

A meeting was held in conjunction with the Measurement Science Conference.

CANADIAN MEASUREMENT REQUIREMENTS
Les Peer & Lorraine Williams

No report.

GLOSSARY
Bob Hardy

No report.

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

AUTOMATIC TEST & CALIBRATION SYSTEMS
Scott Sowerby

Committee met at the MSC 2003 Conference. The agenda was the following:

MCP Activities Table

<table>
<thead>
<tr>
<th>Measurement Discipline</th>
<th>Range</th>
<th>Point of Contact</th>
<th>Phone No.</th>
<th>E-mail Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>1 Kg</td>
<td>Jim Ross (Quality Control Services)</td>
<td>(503) 236-2712</td>
<td><a href="mailto:Lab@qc-services.com">Lab@qc-services.com</a></td>
</tr>
<tr>
<td>Dimensional (Steel and Chromium Carbide)</td>
<td>0.25, 0.5, 0.75, 1.0, 2.0 and 4.0 inches</td>
<td>Brian Foltz (Rockford Calibration Service)</td>
<td>(615) 877-0680</td>
<td><a href="mailto:Brian@theclerigationsolution.com">Brian@theclerigationsolution.com</a></td>
</tr>
<tr>
<td>Helium Leak</td>
<td></td>
<td>Pat Abbott (NIST)</td>
<td>(301) 975-4838</td>
<td><a href="mailto:patrick.abbott@nist.gov">patrick.abbott@nist.gov</a></td>
</tr>
<tr>
<td>Vector Automatic Network Analyzers (VANA)</td>
<td>Supports 2.4 mm, 2.92 mm, 3.5 mm, GPC-7, 7-18, Type N Connector Types</td>
<td>John Cable - Coordinator (Honeywell FM&amp;T)</td>
<td>(818) 997-4361</td>
<td><a href="mailto:jcable@kcp.com">jcable@kcp.com</a></td>
</tr>
<tr>
<td>NIST National Internet ILC Database</td>
<td>Various</td>
<td>Bob Walters (NIST)</td>
<td>(301) 975-4122</td>
<td><a href="mailto:bob.walters@nist.gov">bob.walters@nist.gov</a></td>
</tr>
<tr>
<td>(Josephson Junction) DC Voltage</td>
<td>10 VDC</td>
<td>Dave Deaver (Fluke)</td>
<td>(425) 350-5094</td>
<td><a href="mailto:deaver@tc.fluke.com">deaver@tc.fluke.com</a></td>
</tr>
<tr>
<td>(Started in 2002)</td>
<td></td>
<td>Tom Larson (NIST)</td>
<td>(301) 975-2334</td>
<td><a href="mailto:thomas.larason@nist.gov">thomas.larason@nist.gov</a></td>
</tr>
<tr>
<td>Resistance</td>
<td>POC</td>
<td>Jeff Gust (Verizon)</td>
<td>(219) 428-6504</td>
<td><a href="mailto:jeff.gust@supply.gte.com">jeff.gust@supply.gte.com</a></td>
</tr>
<tr>
<td>Resistance</td>
<td>1 ohm ILC Coordinator</td>
<td>Tom Pown (Broadview Inst.)</td>
<td>(206) 544-0251</td>
<td><a href="mailto:tp@earlink.net">tp@earlink.net</a></td>
</tr>
<tr>
<td>Electrolytic Conductivity (Resistance)</td>
<td>0.056 uS/cm to 147 uS/cm</td>
<td>Jason Tang (Brixmon)</td>
<td>(847) 938-5109</td>
<td><a href="mailto:jason.tang@brixmon.com">jason.tang@brixmon.com</a></td>
</tr>
<tr>
<td>Electrolytic Conductivity (Proposed)</td>
<td></td>
<td>Joe Peterson, (Abbott Laboratories)</td>
<td>(505) 844-5944</td>
<td><a href="mailto:Dckrinski@sandia.gov">Dckrinski@sandia.gov</a></td>
</tr>
<tr>
<td>Resistance</td>
<td></td>
<td>David Kruker, (Sandia Labs)</td>
<td>(478-785)</td>
<td><a href="mailto:David.Kruker@sandia.gov">David.Kruker@sandia.gov</a></td>
</tr>
<tr>
<td>Humidity (Proposed)</td>
<td></td>
<td>Bart Schriver, (Agilent Technologies)</td>
<td>(707-577-2495)</td>
<td><a href="mailto:Bart_schriver@agilent.com">Bart_schriver@agilent.com</a></td>
</tr>
</tbody>
</table>

- Review of meeting activity in San Diego
- RP-13 WG
- Electronic Records/Signatures (Paul Marciniak)
- Open Data Specification
- Validation and Verification
- Metrology software survey - (Larry Newberry)
- Automation and Healthcare/FDA requirements
- Meeting ISO/IEC 17025 specific requirements

MEASUREMENT COMPARISON PROGRAMS
Jim Wheeler and Al Teruel

The "Guide for Interlaboratory Comparisons," RP-15, is being updated and will include information on the new ILC certificate, National ILC database, SRM topics, data from ILAC 13 and ISO Guide 43, information on the NIST Dataplot program and an updated Bibliography. The RP will also be called a "Recommended Practice for Interlaboratory Comparisons" vs. a "Guide for Interlaboratory Comparisons." We hope to have all the material included in the RP by our meeting time at NCSLI Tampa. Material for the update was provided by Georgia Harris, Larry Tarr, Tom Quinet, Clark Hamilton, Jeff Gust and Dick Pettit.

We continue to look for people to lead ILCs. Contact us for more information. NCSLI is also looking for ILC papers at the conference in Tampa. The paper could be an update of an ILC or an ILC final report.

The MCP Committee met at MSC. The minutes are on the NCSLI MCP Committee Webpage at <www.nclis.org>. The main discussion was the new RF Power ILC, ILC Charter and RP update.
Committee News

If you know of corrections to the above table, please let me know.

Jason Tang, Boeing, reports 19 active participants in the 10-Mohm ILC. The ILC round robin is about 55% completed. Due to the delay of this ILC program, its estimated completion date will be in September of 2003.

NCSLI is in the planning stages of an RF Power ILC. The artifacts are Agilent 8478A and 4788-H75 Thermistor Mounts. Sixteen labs are on the list to participate. POC is Bart Schrijver (Agilent Techniques Group (ARF TG) round robin in support of Automatic Control Services) email: < Lab@qc-servic es.co m >. NIST software Technologies) See above list for more information, Bart has completed a draft of instructions for participants.

The Mass ILC final report was disseminated by Jim Ross (Quality Control Services) email: < Lab@qc-services.com >. NIST software was used to generate the final report. Two 1-kg artifacts were used in the ILC. Quality Control Resources did the analysis. Jim reports that Quality Control Services is the pivot lab for the WRAP 100-g to 1-ng round robin. Jim is interested in starting another ILC in January 2003. Contact him if you are interested.

John Cable, Honeywell FM&T, < jcab le@kcp .com >, coordinates the IEEE Microwave Theory and Techniques - Automatic RF Techniques Group (ARFTG) round robins in support of automatic network analyzers. The following connector types are supported in the round robin effort. Thanks to John Cable for providing this information. Note the new 7-16 connector.

ARFTG MCP ILC Points of Contact

2.4 mm connector, Bart Schrijver, Agilent Technologies. Phone (707) 577-2495, FAX (707) 577-5484, e-mail < bart_schrijver@agilent.com >

2.92 mm/K connector, Gilbert Perez, Anritsu. Phone (408) 778-2000 ext., 4950, FAX (408) 778-4010, e-mail < gperez@namg.us.anritsu.com >

3.5 mm connector, Phil Yates, JPL. Phone (818) 393-3705. FAX (818) 354-8153, e-mail < pyates@jpl.nasa.gov >

GPC-7 connector, Yeou-Song (Brian) Lee, Anritsu. Phone (408) 778-2000 ext. 4976, FAX (408) 778-4010, e-mail < brian-ys.lee@anritsu.com >

7-16 connector, Greg Burns, Northrop Grumman, Phone (410) 765-7331, FAX (410) 765-7370, e-mail < burns.john@postal.esd.northgrum.com >

Type 'N' connector, John Cable, Honeywell FM&T, Phone (816) 997-4361, FAX (816) 997-3803, e-mail < jcab le@kcp .com > [ARFTG MCP Com.Ch.]

John Cable also reports that ARFTG is looking into the possibility of getting together 1.85 mm & 1 mm MCP kits.

ARFTG is working to re-write and update the instructions for the kits with an effort to do a better job of explaining the measurement convention (connector on port).

ARFTG is also going to try and automate the submission of the data files through a web-based script system. They currently e-mail data files to NIST and (with the proper formatting) can expect to see the results returned in one to two days. Our biggest problem has been getting everyone to format the data properly.

Proposed New ILCs

Tom Larson, NIST, < thomas.larson@nist.gov > announced the need for a new UV ILC. Tom coordinated a UV ILC in the early 1990s.

Joe Petersen, Metrology Engineer at Abbott Laboratories informed me that he would like to start an Electrolytic Conductivity (Resistivity) ILC. The range is 0.056 uS/cm to 147 uS/cm. The artifact is a conductivity meter(s) with flow through and dip cells. Joe would like to have approximately 6 to 10 participants. Joe's phone number is (847) 938-9109 and FAX is (847) 937-4634 < joe.petersen@abbott.com >

David Krukar, Sandia National Laboratory, is interested in coordinating a Chilled Mirror Hydrometer ILC for Humidity. Dave can be contacted at (505) 844-5944 or email:

< dckrukar@sandia.gov >. David is also interested in participating in ILCs in shock and acceleration/vibration.

Interested Participants

Fred S. King < fking@kelhabs.com >, QA Manager at Kimball Electronic Laboratory Inc., is interested in participating in future ILCs in measuring Gage Blocks, and DC resistance.

TestEquity Inc. is interested in participating in AC/DC Current and Voltage and Resistance ILCs. Contact Tim Holder, Quality Assurance Coordinator, TestEquity Inc. Phone Tim at 805-498-9933 x134, FAX 805-498-3733 or email < timh@testequity.com >.

For more information about the NCSLI MCP Committee contact Jim Wheeler at (619) 545-6928 or AI Teler at (619) 545-2857.

********

INTRINSIC & DERIVED STANDARDS

John Ball

The Intrinsic and Derived Standards Committee continues to be very active and the committee held a meeting at MSC in January 2003. A summary of committee activities include:

1. The Catalogue of Intrinsic and Derived Standards is being updated.
2. A few editorial changes to the humidity RISP will be updated by Bob Hardy.
3. Stan Pond volunteered to re-start the TP Argon WG.
4. Ruben Salazar and the Pressure WG are updating the Pressure RISP. They will also develop an uncertainty analysis for pressure cross-floating calibrations.
5. There was a discussion of "derived standard" meaning a primary standard that was not intrinsic. This definition needs to be updated for the Catalogue revision.
6. Chuck Ehrlich reported that the definition of an Intrinsic Standard by the committee remains in the VJM, but the committee has issues with the notes.
7. Josephson Junction Interlaboratory Comparison results for 2002 will be presented at the 2003 NCSLI Conference.
CHEMICAL METROLOGY COMMITTEE

Tom Oatinum

The Chemical Metrology Committee (CMC) will not hold a meeting at the 2003 PITTCON meeting because of travel cutbacks of the committee members. However, they will prepare a flyer to be handed out from the NCSLI booth. This has been coordinated with Ed Pritchard and Larry Yates.

The updated Committee Charter will read as follows:

"Serve as a forum for information exchange among calibration and testing laboratory managers and staff on chemical metrology issues at both the national and international level. Provide communication and information for member organizations with regard to chemical measurement traceability, uncertainty analysis, standards availability, documentary standards development and distribution, accreditation needs and requirements, benchmarking criteria and schedule, and interlaboratory comparisons."

The Chemical Metrology Committee will hold its next scheduled meeting in conjunction with the NCSLI Workshop & Symposium the week of August 17-21 in Tampa, Florida. Please refer to the NCSLI website for conference details;

<http://www.ncsli.org/conference/2003/>. It is expected that there will be two chemical metrology sessions held during the workshop.

********

INDUSTRIAL PROGRAMS

Woody Tramel, V.P.

HEALTHCARE METROLOGY

Todd McCullough

No report

UTILITIES

Kent Crow

The most recent meeting of the Utilities committee was held on Tuesday, January 14, 2003 in conjunction with the 2003 Measurement Science Conference in Anaheim, CA. The meeting was hosted by Edison ESI, and was held in their Westminster, CA facility. Larry Nielsen of Edison ESI chaired the meeting on behalf of committee chair, Kent C. Crow, who was unable to attend.

Following introductions, an update on the status of ANS 3.2, NIST gap analysis of ISO/IEC 17025 and 10 CFR 50 Appendix B, and use of accredited laboratories by nuclear facilities was provided by Clint Eldridge of PG&E, chairman of the ANS 3.2 committee.

The next revision of ANS 3.2 will adopt a risk-informed approach to quality management as defined by 10 CFR 50.69. While retaining stringent quality requirements for procurement of safety-related plant equipment and materials, certain non-critical items would be identified and subject to less stringent controls. Plant M&TE would be unlikely to be affected by this change.

During a January 8 meeting between NIST and the NRC, it was agreed that accreditation to ISO/IEC 17025 by a NACL A recognized accrediting body would be sufficient to qualify a supplier of calibration services to the nuclear power industry provided additional nuclear-specific program requirements (identified by NUPIC) are addressed. 10 CFR 21 reporting requirements would be retained by the utility. Although some details remain to be worked out between NRC and the accrediting bodies, approval is expected within the next few months.

A briefing on the STARs (Strategic Teamming and Resource Sharing) programs was presented by Bruce Wallace. Cost effective procedures employed by utilities in sharing tools and equipment were described in detail as were similarities to the USA (Utilities Service Alliance) program.

A discussion on progress of the revision of RP-10 was moderated by Larry Nielsen. The following points were discussed.

a. Not all attendees had received updated copies of the draft since the San Diego meetings so some time was spent reconciling the various versions. It was agreed that Bruce Wallace would coordinate distribution of future versions of the draft.

b. The pending approval for use of ISO/IEC 17025 accredited suppliers by the NRC made the purpose of RP-10 more clear. It may serve as a quality bench mark for internal laboratories of nuclear facilities unlikely to adopt or to be required to comply with 17025 by their parent organizations.

c. Since M&TE management (ie, M&TE control) is typically an important issue to utility quality systems, and if we're going to include verbiage from clause 4.0 and 5.0 of ISO/IEC 17025 in RP-10, then it would be logical to include verbiage from Part II from ANSI/NCSL Z540-1 as well.

d. There has been a recommendation that no verbiage from either standard be included in RP-10, that it be re-titled as "Supplement to ISO/IEC 17025 and ANSI/NCSL Z540-1-1994 (R2002) for the Utilities Industry," and that it become part of a larger document containing similar requirements from other regulated industries, such as pharmaceutical and aviation.

Chairman comments:

I believe that verbiage from applicable standards SHOULD be included in RP-10 because many nuclear utility calibration labs operate solely for the purpose of supporting their plants. These labs have no business need or obligation to gain accreditation. RP-10 should serve as standalone guidance for these facilities.

e. The material in draft Appendix B on Estimation of Measurement Uncertainty should be revised to reflect industry standard practice on setting uncertainty-based guard bands and conformance test decision rules per the material presented by Larry Nielsen on ASME B89.7.3.1.2001, a new documentary standard on conformance testing.

f. It was agreed that the writing group (Bizzard, Eldridge, Hinton, Nielsen, Nystrom, and Scoggins) would have their respective assignments updated and submitted to the committee chair not later than 1 July, and that a revised draft would be circulated by coordinator Bruce Wallace in time for review prior to the Tampa conference (August 17-21).
Attendees enjoyed box lunches served at 12:00 pm consisting of ham and turkey deli-style sandwiches, potato salad and sodas. After lunch, a briefing on updates to calibration process management software developed by Edison ESI - Metrology Engineering Services was presented by Curt Castro.

It was agreed that two Utilities committee meetings would be held in conjunction with the Tampa conference. Times for the meetings are to be coordinated with Tom Hutton, NCSLI meeting planner, and announced by the committee chair.

The meeting was followed by a brief tour of the Edison ESI Metrology Laboratory conducted by Larry Nielsen. Many thanks to Jack Burdick, Larry Nielsen, Southern California Edison, and all committee members who attended the meeting for your continuing support.

EQUIPMENT MANAGEMENT FORUM
Rob Parchinski

The committee held a meeting January 16th in conjunction with MSC.

AIRLINE METROLOGY
Victor Cleland

The committee scheduled a meeting January 14th at MSC.

AUTOMOTIVE METROLOGY
Tom Kypta

The committee held a meeting at Auburn Hills, Michigan, on Dec 13th, with 16 attendees. The report was in the January issue of the newsletter.

TESTING LABORATORIES

This committee is still looking for a chairperson. Hopefully Nancy Fenn soll can be appointed soon.

********

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

LABORATORY EVALUATION RESOURCES
James Crane

No Q4 report submitted but per the most recent 174 committee meeting, the working group established to draft the replacement standard for Z540.1;1994 (R2002) will use research materials to develop a handbook to the new standard under this committee. Estimated completion circa 2005.

LABORATORY FACILITIES
Dr. David Braudaway

Q4 report indicated no progress to report but per abstract submitted for Tampa conference, committee continues to fulfill its long range plans to publish papers on laboratory environmental controls. Paper title - "I Know Temperature is Important, But Why Be Concerned With All These Other Environmental Factors."

METROLOGY PRACTICES
Dr. Howard Casarp

The committee continues to work toward revision and development of RPs for calibration interval analysis, measurement risk analysis, SPC and Bayesian methods, and metrology decision support analysis.

1. Calibration Intervals

Research on and documentation of instrument level and parameter level calibration intervals is ongoing. Further discussion has taken place on designing experiments to link instrument parameter in-tolerance probability to variables other than time. The subcommittee chair, Don Wyatt of Diversified Data Systems, is working on data management models that will optimize the collection of data and the management of recall cycles. The identification and documentation of requirements for variables data interval analysis are in progress.

2. Measurement Decision Risk Analysis

Subcommittee chair Karl Haynes and I are continuing development of material for presentation in a draft RP. Including real-time risk management algorithms will be discussed at the January committee meeting.

3. SPC Methods

Subcommittee chair Ricardo Nicholas of Boeing Defense & Space Group is continuing to manage development of a Metrology SPC RP. The new Gage R&R model is still under development. The SPC-based (average and range) methods seem fairly well established, but work is needed on extending current ANOVA methods to cover part variation, equipment variation, reproducibility, repeatability and uncertainty growth.

4. Decision Support

The subcommittee chair, Derek Porter of Boeing Commercial Airplane Group, has been continuing his efforts to identify decision support guidance in existing NCSLI RPs. Derek and I met offline in August to discuss ways to expand the scope of current efforts.

WRITING COMMITTEE
Jesse Morse

During Q4, I attended the section meeting in Vancover, British Columbia where I did the "174" committee presentation.
Doug Sugg and his team finalized the draft of the "17025 to Z540-1 Comparison Matrix." This draft was presented at the MSC Meeting for approval to publish through the business office.

The MSC meeting kicked off the work necessary to achieve our goal of a single standard (Z540-1) prior to the expiration of the current standard in 2007.

ACCREDITATION RESOURCES
James Jenkins

1. Laboratories Capabilities

The committee has completed a second draft of RP-9, "Laboratory Capability Documentation Guidelines" but due to the diversity of acceptable methods the committee wants to go back and add "strengths and weaknesses" of each, and to include more examples. A new draft is planned for completion in time for the Tampa conference.

2. Web Site Development

The committee is seeking guidance and/or permission from the Operations VP or board of directors to post accreditation related papers from past NCSLI conference proceedings as a starting point for an accreditation resources web page.

CALIBRATION/CERTIFICATION PROCEDURES
Dale Varner

As an action item from the last meeting, committee members came prepared to discuss the pros and cons of keeping RP-3 "Calibration Procedures" a recommended practice or raising it to the level of a standard. After much discussion, it was the consensus of the committee that RP-3 should be kept as a recommended practice (RP). Now the real work of reviewing, revising, and republishing RP-3 can begin. It was made an action item by the committee chair that all committee members review and prepare recommended changes to the first four sections of RP-3 for discussion at the next teleconference.

There was some discussion among committee members regarding the definitions of the terms "calibration," "certification," and "verification" as they are used within committee member organizations. There is a noted disparity across organizations and no definitive consensus was reached. The committee will work to discover commonality and develop inclusive definitions to meet the needs of the recommended practice.

In addition to our periodic teleconference meetings, this committee will meet in Tampa at the annual NCSLI conference. Any measurement professional interested in participating in the re-write of RP-3 should contact Dale Varner at 303-977-55234 or email at <dale.varner@lmco.com>. You do not have to be an NCSLI member or member delegate to participate.

CONFERENCE MANAGEMENT
Mike Suraci, V.P. (now Carol Hockert)

CONFERENCE ACTIVITIES
Tom Huttemann

Tom has provided his report and reported status at the Board meeting. Tom has been a very busy Meeting Planner again this quarter.

2003 TAMPA, FLORIDA
Conference Director - Bill Wightman

Bill attended the Board meeting and presented his report. Bill has initiated Conference calls for the Tampa Conference.

SITE SELECTION COMMITTEE REPORT
Bill Simmons

Bill attended the Board meeting and presented his report.

2004 SALT LAKE CITY, UTAH
Conference Director - Bernard Morris

Bernard has participated in the 2003 Conference calls getting ready for 2004.

2005 CONFERENCE SITE
Mike Suraci

The contract with the DC Hilton was signed.
NEW NCSL INTERNATIONAL MEMBERSHIPS

Larry Yates & Ed Pritchard

NCSL International, in a historic move, has established for the first time 3 new memberships. The first one is for Educational Institutions and is designed for Colleges and Universities that teach courses related to the field of Metrology. The dues are the same as a corporate membership and the benefits are the same. But the dues are frozen indefinitely and can only be increased by a special vote of the NCSLI Board. The Board encourages these institutions to establish student sections once they become members of the organization.

The second new membership is for Students. This is a limited membership in that they would not receive the documentation and all of the benefits of full membership. They would receive the Newsletter, have limited access to the web site and would be able to post their résumés on the web and search for jobs. They can also purchase materials and training at the reduced member rates and attend the Conference and Tutorials at the reduced member rates. The dues have been changed and set at $35 per year. To be eligible to join as a Student member they must be classified as a full time student at their respective school which will be verified with that school.

The third and final membership is a Individual Professional Membership. This limited membership is intended to provide Calibration Technicians, Metrologists, Engineers and Metrology Managers an opportunity to join NCSL International and have access to many of the benefits available previously only to their company. For $85 a year, Individuals will receive the Newsletter, access the web site, can purchase materials and training at the discounted member price and attend the conference and tutorials at the reduced member rates. They would not receive all the documents of a full corporate membership.

See new membership application forms on page 69.

EDUCATION AND TRAINING

Dave Nebel, VP

EDUCATION SYSTEM LIAISON

Terrelle Wilson

NCSLI Educational Scholarships

Educational Scholarships are available to "students" of all NCSLI member organizations.

In order to be eligible, the training must meet the criteria set forth in the NCSLI Recommended Guidelines for Scholarship Awards. In a nutshell, the scholarship must be applied for by the NCSLI member organization on behalf of the student, the training must be measurement-related (or be part of a measurement-related course of study) and the member organization must administer the scholarship and report back to NCSLI.

Please see the Guidelines for additional information and clarification, which are included at the end of this report. An application for scholarship is also printed in this newsletter. Questions can be directed to Terrelle Wilson (committee chair) at <terrelle.wilson@lmco.com>

If you are interested in an NCSLI Scholarship for your students, use the application on page 42. You can complete the application and submit it to the NCSLI business office, or reference each question by number and submit your responses by email to <terrelle.wilson@lmco.com>.

The Education Systems Liaison Committee met at the NCSLI Conference in San Diego in August of 2002. At that meeting, several items of interest were discussed. A follow-up meeting was held at the Measurement Science Conference in Anaheim California in January of 2003. This report documents Committee Activity from both meetings.

Education Liaisons - It was noted that several member organizations that had requested and administered NCSLI Scholarships in the past were no longer offering measurements training, but that some new organizations were showing an interest. It was also noted that as an International organization (NCSLI) we should be concerning ourselves with measurements training around the world. To address these concerns, the committee agreed to establish regional or country education liaisons within the committee to assist the committee chair in staying abreast of the changing face of measurements training and to encourage organizations that are considering offering measurements training to consider membership in NCSLI. Liaisons for the USA, Canada, and Europe have been identified. If you would like to represent a region or country by keeping tabs on institutions and organizations offering metrology training, please contact Terrelle Wilson at 303-977-8195 or email at <terrelle.wilson@lmco.com>

Recommended Guidelines - The committee agreed to review and recommend revisions to the NCSLI scholarship guidelines. The revised guidelines were submitted for committee approval in January 2002 and Terrelle Wilson presented the revised guidelines to the NCSLI Board of Directors (BOD) at the winter board meeting. The revised guidelines follow this report.

NCSLI Vision Statement - It was noted that NCSLI Vision did not address the strong commitment that NCSLI has to education and training. Terrelle was assigned the task of drafting a revised Vision statement. The committee approved the revised Vision statement in January and Terrelle Wilson presented it to the NCSLI BOD. The NCSLI BOD agreed to the revised Vision statement in principle (the principle that Education and Training should be part of the NCSLI Vision) and created a committee to prepare revisions to the vision and mission statements for board review in April.

Education Benchmark Survey - The committee expressed a concern with the rapidly changing needs and training opportunities in measurements and metrology education. It was suggested that NCSLI
conduct an Education Benchmark Survey of its membership.

Terrelle Wilson discussed this issue with the NCASI business office and other Education committee chairs. It was suggested that we should expand the survey to all affected industries. It was agreed to go forward with the development and conduct of the survey. Terrelle reported this intent to the BOD at the winter meeting. It is hoped that survey results will be available for presentation in Tampa Bay this summer.

Education Division Activity - Terrelle Wilson participated in and represented the Education Liaison Committee at a meeting held in Boulder last December (2002). Three of four education committees and the business office were represented at the meeting. Items of interest that were discussed include:

A web based learning presence for NCASI available for use by our members.

The need for an Education Benchmark Survey, Possible industry, government and educational institution partnering for the furtherance of metrology education.

NCASI Scholarship guideline changes

Ways to increase the effectiveness and value of offered CEUs to the NCASI membership.

The proposed changes to the NCASI vision statement, etc.

Membership in the Education Liaison Committee

Membership in the Education Liaison Committee is free and not restricted to NCASI members (those who work for member organizations). If you are interested in being a member, visit our website and make a difference. If you are interested in joining, you would like to represent the educational institutions in your region or country, or if you know of a school or company near you that is offering measurements training, please contact Terrelle Wilson at 303-977-8195 <terrelle.wilson@lmc.com>.

NCASI SCHOLARSHIP GUIDELINES

These guidelines take effect and will be applied to all new applications for NCASI scholarships beginning January 1, 2003.

1. Submission and Award Deadlines

Scholarship requests will be solicited during the winter and spring of each year, to be submitted for review and recommendation to the board. The committee chair will designate two committee members to assist in review. Scholarship recommendations will be submitted to the VP of Education for approval and presentation to the NCASI BOD. Annual scholarships will be awarded for use throughout the upcoming year starting in the autumn semester (August) of the scholarship year. Scholarship applications that are received in time for consideration for autumn will be considered for spring semester (January) of the scholarship year.

2. Application for NCASI Scholarship

The application for NCASI scholarships is the responsibility of the Education System Liaison Committee. Changes may be made to clarify and correct with committee chair approval, but the same application form must be used throughout each scholarship year. At no time will the application conflict with the requirements of this guideline. Requesting organizations are expected to provide all requested information (complete the application in full.) Failure to provide requested information may jeopardize the ability of the requesting organization to receive scholarship funds. Failure to submit the application in a timely manner will jeopardize the ability of the requesting organization to receive scholarship funds.

3. Eligibility for Scholarship Funds

a) Scholarship funds will not be awarded or used for awards and incentives, nor may scholarship funds be used for tuition in programs or courses that are not specifically measurement-related or have as their contractual goal the completion of an approved measurement-related course of study. (The Education Liaison committee chair will be the arbiter, with the VP of Education the last court of appeal)

b) Scholarship funds may be awarded for all formal measurement-related courses of study regardless of accreditation, including correspondence, online, and formal classroom programs provided not only by institutes of higher learning but also by consultants, companies, and conferences (tutorials). Priority will be given to accredited multi-course programs, but other applicants may apply until the designated funding is exhausted. Identified training purchased by these funds must apply to an identifiable individual/student.

c) The list of applicant organizations eligible to apply and administer scholarship funds will include (in addition to accredited institutions of higher learning) any organization that can show the ability to successfully identify and combine students and training.

d) The definition of the "student" eligible for scholarship assistance becomes all-inclusive based on the above criteria.

4. Accountability

Each successful applicant will be required to report to the chair of the Education Liaison committee the following:

a) Distribution of scholarship funds to date.

b) Justification for scholarship fund distribution.

c) Plans for yet-to-be-distributed scholarship funds.

The first report will be due by October 1, the second April 1, and the final report is due July 1. The final report will be accompanied by a check for any unused scholarship funds.

d) Scholarship monies returned as unused will be used to increase the amount available to award for scholarships in the following year.

NCASI Education Liaison Committee Chair
Terrelle Wilson

Effective January 1, 2003
Committee News

Scholarship Applicant: Copy this form for scholarship application, or use email and reference question numbers.

NCSLI MEASUREMENTS EDUCATION AWARD
Request for Scholarship Consideration

Date Submitted __________________________

Person Submitting (name & title) __________________________________________

1. Name, Address and contact information for your School and program (phone, fax, email, website, etc.):

2. Staff (Please attach titles and biographical information on those who manage, develop, and present coursework):

3. Does your school offer degrees or certificates? (Please list the specific degree type, title, and Program):

4. Do you have any articulation agreements in force (include H.S. to college, two year to four year, etc.):

5. Is your school accredited? By what accrediting body?

6. Students (Please indicate number of individual students who attended one or more measurement-related course in the last year. Please indicate the total number of measurement-related semester hours taught by your institution in the last year):

7. Laboratory or equipment training. Please indicate what percentage of the courses you offer include a laboratory component. Please indicate the ratio of lecture to laboratory in those courses:

8. Is your school a member of NCSLI?

9. Do you have an advisory committee?

   How often did they meet in the last year?

10. Describe measurement-related courses and disciplines taught at your school. (Please attach or send under separate cover course descriptions, certification or degree requirements for graduation, and course syllabi): 

11. Describe how your curriculum, facilities, and equipment meet Industry Standards.

12. Describe your plan to upgrade your curriculum, facilities, and equipment.

13. Describe the scope of your teaching methods (lecture, lab, multimedia, online, etc.) and any plans for expansion or development:

14. Describe how your school contributes to the metrology community, locally and nationally.

15. How do you propose to utilize this scholarship/award/grant if awarded?

16. Describe your program to place graduates in the workplace.

17. Please list any additional supporting information.
COME AND JOIN OUR COMMITTEE ACTIVITIES

Committee Meetings at the Marriott Waterside

<table>
<thead>
<tr>
<th>DATE/TIME</th>
<th>COMMITTEE</th>
<th>ROOM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sunday, August 17</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:00 - 5:00pm</td>
<td>153 - Utilities</td>
<td>1</td>
</tr>
<tr>
<td><strong>Monday, August 18</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:15 - 6:00pm</td>
<td>143 - Intrinsic &amp; Derived Standards</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>147 - Chemical Metrology</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>156 - Airline Metrology</td>
<td>Salon I</td>
</tr>
<tr>
<td></td>
<td>153 - Utilities</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>174 - Writing Committee</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>151 - Healthcare Metrology</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>157 - Automotive Metrology</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>183 - Membership Committee</td>
<td>Salon II</td>
</tr>
<tr>
<td><strong>Tuesday, August 19</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:15 - 6:00pm</td>
<td>155 - Equipment Management Forum</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Consensus Standards</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>172 - Laboratory Facilities</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>164 - Education System Liaison</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>175 - Accreditation Resources</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>142 - Measurement Comparison</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>151 - Healthcare Metrology</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>171 - Laboratory Evaluation</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>133 - Glossary</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Small Business Initiative</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Industrial Committee</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>176 - Calibration/Certification Procedures</td>
<td>13</td>
</tr>
<tr>
<td><strong>Wednesday, August 20</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:15 - 6:00pm</td>
<td>141 - Auto. Test and Calibration</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>173 - Metrology Practices</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>131 - US Measurement Requirements</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>163 - Personnel Training Requirements</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Dimensional Metrology</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>UV Round Robin</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Dead Weight Pressure</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Voltage Round Robin</td>
<td>11</td>
</tr>
<tr>
<td><strong>Thursday, August 21</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:00 - 8:00pm</td>
<td>Resistance LLC</td>
<td>6</td>
</tr>
</tbody>
</table>

---

**2003 NCSL INTERNATIONAL WORKSHOP & SYMPOSIUM**

<table>
<thead>
<tr>
<th>Category</th>
<th>Name</th>
<th>Phone 1</th>
<th>FAX 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>VP/Conference Management</td>
<td>Carol Hockett</td>
<td>(651) 628-6851</td>
<td>FAX (651) 639-4014</td>
</tr>
<tr>
<td>Director</td>
<td>Bill Wightman</td>
<td>(407) 333-9288</td>
<td>FAX (407) 333-4473</td>
</tr>
<tr>
<td>Meeting Planner</td>
<td>Tom Huttemann</td>
<td>(716) 554-6295</td>
<td>FAX (716) 554-4434</td>
</tr>
<tr>
<td>Registration</td>
<td>Joan Wilshire</td>
<td>(303) 440-3339</td>
<td>FAX (303) 440-3384</td>
</tr>
<tr>
<td>Technical Program</td>
<td>Richard Petitt</td>
<td>(505) 844-6242</td>
<td>FAX (505) 844-4372</td>
</tr>
<tr>
<td>Tutorial's Program</td>
<td>Richard Petitt</td>
<td>(408) 867-1743</td>
<td>FAX (408) 867-3705</td>
</tr>
<tr>
<td>Guest Program</td>
<td>Tom Huttemann</td>
<td>(716) 554-6295</td>
<td>FAX (716) 554-4434</td>
</tr>
<tr>
<td>Publicity/Marketing</td>
<td>Craig Gulka</td>
<td>(303) 440-3339</td>
<td>FAX (303) 440-3384</td>
</tr>
<tr>
<td>Finance</td>
<td>Harry Moody</td>
<td>(208) 522-9774</td>
<td>FAX (208) 522-9774</td>
</tr>
<tr>
<td>Best Paper Selection</td>
<td>Jeff Gust</td>
<td>(260) 244-7450</td>
<td>FAX (260) 244-7905</td>
</tr>
<tr>
<td>Conference Evaluation</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entertainment</td>
<td>Ed Priehard</td>
<td>(865) 574-4261</td>
<td>FAX (865) 574-2802</td>
</tr>
<tr>
<td>Door Prizes</td>
<td>Mike Saraci</td>
<td>(206) 842-7321</td>
<td>FAX (206) 780-8157</td>
</tr>
<tr>
<td>NCSLI Exhibit Booth</td>
<td>Craig Gulka</td>
<td>(303) 440-3339</td>
<td>FAX (303) 440-3384</td>
</tr>
<tr>
<td>Site Selection</td>
<td>Tony Anderson</td>
<td>(407) 333-3327</td>
<td>FAX (407) 333-3309</td>
</tr>
<tr>
<td>Visitor Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VP/Conference Management</td>
<td>Carol Hockett</td>
<td>(651) 628-6851</td>
<td>FAX (651) 639-4014</td>
</tr>
<tr>
<td>Director</td>
<td>Bill Wightman</td>
<td>(407) 333-9288</td>
<td>FAX (407) 333-4473</td>
</tr>
<tr>
<td>Meeting Planner</td>
<td>Tom Huttemann</td>
<td>(716) 554-6295</td>
<td>FAX (716) 554-4434</td>
</tr>
<tr>
<td>Registration</td>
<td>Joan Wilshire</td>
<td>(303) 440-3339</td>
<td>FAX (303) 440-3384</td>
</tr>
<tr>
<td>Technical Program</td>
<td>Richard Petitt</td>
<td>(505) 844-6242</td>
<td>FAX (505) 844-4372</td>
</tr>
<tr>
<td>Tutorial's Program</td>
<td>Richard Petitt</td>
<td>(408) 867-1743</td>
<td>FAX (408) 867-3705</td>
</tr>
<tr>
<td>Guest Program</td>
<td>Tom Huttemann</td>
<td>(716) 554-6295</td>
<td>FAX (716) 554-4434</td>
</tr>
<tr>
<td>Publicity/Marketing</td>
<td>Craig Gulka</td>
<td>(303) 440-3339</td>
<td>FAX (303) 440-3384</td>
</tr>
<tr>
<td>Finance</td>
<td>Harry Moody</td>
<td>(208) 522-9774</td>
<td>FAX (208) 522-9774</td>
</tr>
<tr>
<td>Best Paper Selection</td>
<td>Jeff Gust</td>
<td>(260) 244-7450</td>
<td>FAX (260) 244-7905</td>
</tr>
<tr>
<td>Conference Evaluation</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entertainment</td>
<td>Ed Priehard</td>
<td>(865) 574-4261</td>
<td>FAX (865) 574-2802</td>
</tr>
<tr>
<td>Door Prizes</td>
<td>Mike Saraci</td>
<td>(206) 842-7321</td>
<td>FAX (206) 780-8157</td>
</tr>
<tr>
<td>NCSLI Exhibit Booth</td>
<td>Craig Gulka</td>
<td>(303) 440-3339</td>
<td>FAX (303) 440-3384</td>
</tr>
<tr>
<td>Site Selection</td>
<td>Tony Anderson</td>
<td>(407) 333-3327</td>
<td>FAX (407) 333-3309</td>
</tr>
<tr>
<td>Visitor Information</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NPL Partnering to Support Measurement in UK Education
Nigel Milton, UK Region Coordinator

Nigel and future metrologists at work.

Editor's Note: I thought this was an exceptional and unexpected example of Metrology Training, and I thank Nigel for bringing it to our attention. Contact him for further information for your own possible use.

National Physical Laboratory (NPL) sponsorship has contributed to an exciting new initiative to support mathematics and measurement skills in the UK's national schools curriculum. The project was the brainchild of Garth Lee of SETPOINT [1] and the GTMA (the British Gauge and Toolmaker's Association) were involved with NPL in its implementation.

Entitled "Understanding Measurement with the Metrology Toolkit," the resource is aimed at students in the 11-14 year age range, thus grabbing young people's interest in metrology at an early age. The Toolkit has been designed to create an awareness of industrial applications of mathematics using basic engineering measuring instruments such as micrometers, vernier calipers, GO-NOGO gauges and steel rules.

Trials using the pilot Toolkit were carried out in Leicestershire schools where it proved to be extremely popular. Comments from students, such as "it was fun to use, different from what we usually do, interesting and useful for the future", showed that the practical application of measurement science can successfully take its place within the mathematics curriculum.

Lord Sainsbury, Minister of State for Science and Innovation, launched the Toolkit on the NPL stand at the British Association Festival of Science, saying "This new maths' resource will help bring real industrial relevance and interest in maths for young people".

Since the launch, schools have been able to borrow the Toolkit from their local SETPOINT, where they are managed and maintained. NPL sponsorship enabled the initial run of 25 Toolkits in the first year and has continued the commitment for a further 27 kits to be delivered in 2003. This will then provide full UK coverage.

The Toolkits have been well received by teachers. Mr Giles Ward, science teacher, Dorothy Stringer School, Brighton, Sussex, UK commented, "The metrology kit is proving to be an invaluable resource in the teaching of our vocational General Certificate of Secondary Education science course. The teacher's notes and pupil work sheets have enabled us to fully explore the significance of the different forms of measurement".

Ultimately the aim of this programme is to enthuse young people about metrology, emphasise its importance and relevance to our society and encourage them to develop the vital skills needed in industry.

[1] SETPOINTS operate as a focus for teachers, business and industry to obtain information about resources, schemes and initiatives concerned with science, engineering, technology and mathematics. They were established by SETNET (Science, Engineering, Technology and Mathematics Network), with support from the Department of Trade and Industry and the Department for Education and Skills initiative.

For more information contact Nigel Milton of NPL
+44 20 8943 6689
PRESIDENT APPROVES FY 2003 FUNDS FOR NIST

On Feb. 20, 2003, President Bush signed into law the fiscal year 2003 omnibus appropriation, which includes $707.5 million for the National Institute of Standards and Technology (NIST) after the 0.65 percent rescission mandated by the legislation. The FY 2003 NIST appropriation represents a 3.4 percent increase over the FY 2002 amount of $684.5 million, and provides funding to all of the agency’s four major programs.

Included in the FY 2003 budget are three separate NIST appropriations:

- $357.1 million for Scientific and Technical Research and Services (including $331.9 million for the NIST Laboratories and $5.2 million for the Baldrige National Quality Program);
- $284.7 million for Industrial Technology Services (including $178.8 million for the Advanced Technology Program, or ATP);
- $105.9 million for the Manufacturing Extension Partnership, or MEP;
- $65.7 million for Construction of Research Facilities (including $22 million to address the highest priority safety, capacity, maintenance and major repair projects required to operate NIST’s research facilities in Gaithersburg, Md., and Boulder, Colo.; $11 million for construction and renovation projects at the Colorado laboratories; and $4 million for fitup of the near-completion NIST Advanced Measurement Laboratory in Gaithersburg, Md.).

Contact: Michael Newman, (301) 975-3025

**********

NIST SAYS: ‘HUG A WEIGHTS AND MEASURES OFFICIAL IN MARCH!’

Imagine if every time consumers ran to the grocery store, stopped for gasoline or bought new carpeting, they had to bring along their own measuring devices to make certain that they got their fair share for each purchase based on weight, volume or some other quantity. That would affect about half of all consumer transactions enough to grind the $10 trillion US economy to a halt.

Thanks to some 3,000 state and local weights and measures officials, consumers and businesses are spared this major hassle. By checking the accuracy of commercial weighing and measuring devices, these professionals protect both sides in marketplace transactions. They also help ensure that products and services sold by weight or measure comply with federal, state and local laws.

To acknowledge these contributions, March 1-7, 2003, has been designated National Weights and Measures Week. The tribute marks the 204th anniversary of the signing of the nation’s first weights and measures law.

This year’s theme is “Weights and Measures - Working for Integrity in the Marketplace.”

“The work of the nation’s approximately 700 state and local weights and measures jurisdictions underpin consumer confidence and marketplace efficiency,” says National Institute of Standards and Technology (NIST) Director Arden Bement Jr. NIST provides technical assurance to these offices, and it helps to promote state-to-state uniformity.

Even tiny measurement inaccuracies can be tremendously costly. The National Conference of Weights and Measures (NCWM), a professional organization, estimates that an error of slightly more than 1 tablespoon per 5 gallons at the gas pump equals a charge of $125 million annually that, depending on the direction of the error, is borne either by consumers or retailers.

Tips for consumers and information on NIST’s weights and measures activities may be found at www.nist.gov/ownm.

**********

NEW NIST COLOR REFERENCE MORE THAN A SHADE IMPROVED

A new reference instrument for measuring the surface color of materials with high accuracy has been developed by the NIST Optical Technology Division, which plans to offer a calibration service for 0 degrees/45 degrees industrial color standards starting in January 2003. Because color often plays a major role in the acceptability of a product, this service is designed to meet a demand for improved measurements and standards to enhance the color matching of products.

The new reference colorimeter measures with the best possible accuracy non-fluorescent sample’s spectral reflectance properties, from which color quantities are calculated. The instrument design can perform measurements at all possible combinations of illumination and viewing angles, which is important for accurate image rendering. In addition, the standard 0 degrees/45 degrees geometry (illumination at 0 degrees and viewing at 45 degrees) is highly automated through the use of a sample wheel with a capacity of 20 samples.

The new calibration service will be NIST’s first for color measurement in many years, a response to needs articulated in recent reports of the Council for Optical Radiation Measurements. This new service complements ongoing services in reflectance, transmittance, and specular gloss. Industrial customers are expected to send samples (typically colored tiles) to NIST for measurement, and they use these samples as standards to calibrate their own instruments. Users then typically convert a spectral reflectance measurement into the color coordinate system used by that particular industry.

For more information, contact Maria Nadal, (301) 975-4632, < maria.nadal@nist.gov >.
NIST METHOD HELPS FIND WATER IN INDUSTRIAL PHOSPHINE GAS

As manufacturers of semiconductor devices, especially lasers used in the telecommunications industry and light-emitting diodes for displays and lighting, seek to improve their products through the use of higher-purity gases, more sensitive methods for measuring extremely small amounts of water are needed. Undetected low levels of water often contribute to a device failing or not working as originally designed.

Using cavity ring-down spectroscopy (CRDS), a high-sensitivity method based on optical absorption, researchers from the NIST Optoelectronics Division recently demonstrated the ability to measure extremely small concentrations of water as an impurity in phosphine gas. This is the first time that CRDS has been used for this purpose in a highly toxic gas.

The CRDS technique uses a laser tuned to a specified wavelength and measures the time it takes the light to be absorbed by a container of phosphine gas. In part because the laser light makes more than 100,000 passes through the container for a single measurement, the water-detection sensitivity of the NIST technique is comparable to the best research results from other methods and has the potential to be much higher.

The developers of the CRDS water-detection method believe it will be attractive to industrial users because it requires only limited instrument preparation and no calibration. Moreover, the NIST technique tests phosphine gas as it flows during an industrial process, the production of semiconductor crystals (such as those used in lasers). This combination allows NIST researchers to measure how much water contamination can be tolerated by the process.

The development of the CRDS water-detection method is being done in collaboration with NIST’s Process Measurements Division.

For more information, contact Kris Bertness, (303) 497-5069, <bertness@boulder.nist.gov>.

********

NIST OFFERS A NON-TRADITIONAL UWB ANTENNA MEASUREMENT FACILITY

Traditional ultra-wideband (UWB) antenna characterization and measurement facilities, such as anechoic chambers, are expensive to build and operate. To overcome this obstacle, researchers in the NIST Radio Frequency Technology Division have designed and implemented an approach for acquiring such measurements without an anechoic chamber.

The new NIST antenna measurement facility is a 7.3-meter by 7.3-meter (24-foot by 24-foot) ground-plane with a plus or minus 0.1 mm flatness specification. A 4-meter (13-foot) tall cone is used to generate a precisely characterized field. The cone and ground plane are located in a high-bay room with a 5-meter (17-foot) ceiling and concrete walls. The facility is capable of generating standard fields down to approximately 20 megahertz. To enhance performance of the facility, broadband pulsed and swept-frequency sources, along with time-gating techniques, have enabled mathematical removal of room reflections and other unwanted effects.

Tests conducted by NIST researchers produced measurements that are comparable to those obtained from computer models. Encouraged by these results, the researchers will perform additional tests including far-field extrapolation measurements and compare them with computer models.

For a copy of paper 32-02 detailing the new facility, contact Sara Beth Harris, MS104, NIST, Boulder, Colo. 80305-3328; (303) 497-3237; <sara.beth@boulder.nist.gov>.

********

ATP PARTNER THINKS BIG BY GOING SMALL WITH NANOTECH MATERIALS

Nanotechnology is delivering on its promise of improved performance in products ranging from dental adhesives to flame-retardant components for military ships. This is possible through the use of novel nanotechnology materials that can be manufactured affordably, thanks to support from the NIST Advanced Technology Program (ATP).

Polyhedral Oligomeric Silsesquioxanes (POSS®), made by Hybrid Plastics Inc. (Fountain Valley, Calif.), enable the design of additives that make plastics that are unusually lightweight, durable, heat tolerant and environmentally friendly. POSS® combines organic and inorganic materials in molecules with an average diameter of 1.5 nanometers (about 60 billionths of an inch). They can be used as either additives in or replacements for traditional plastics.

First developed by the U.S. Air Force for aerospace applications, POSS® originally cost as much as $5,000 per pound and took up to three years to produce. In Hybrid Plastics’ three-year ATP project (active from 1998-2001), the company simplified and redesigned the process chemistry. This reduced production costs 100-fold to about $50 per pound. The small start-up company began making the materials commercially in 1998, and now has more than 250 customers.

Current applications of POSS® include dental adhesives, in which a strengthened resin provides a strong interface between teeth and restorative material, and resins with reduced flammability for use in composite structures on naval ships. In addition, tests have shown that POSS® materials are much more resistant to radiation damage and erosion than conventional polymers used in space vehicles and platforms.

To learn more about the ATP, go to <www.atp.nist.gov>. For more information on Hybrid Plastics™ and POSS®, go to <www.hybridplastics.com>.

********

SATELLITE MEASURES SUN’S TRUE POWER WITH NIST HELP

Scientists expect to gain important information about the sun’s effect on the Earth’s atmosphere and climate from sophisticated instruments, all calibrated by NIST or relying on components measured by NIST, successfully launched on a satellite Jan. 25, 2003.

The Solar Radiation and Climate Experiment (SORCE) has a five-year assignment to provide precise and accurate daily measurements...
of the sun's radiant power (or light intensity). The satellite will collect data on both total light output and amount of optical radiation at particular wavelengths in the ultraviolet (UV) to near-infrared parts of the electromagnetic spectrum.

Two NIST-calibrated instruments will take spectral readings of the UV intensity. NIST also calibrated an assortment of small photodiodes for another instrument that will measure extreme ultraviolet radiation (EUV) and low-energy X-rays. For additional instruments, NIST performed accurate measurements of the areas of optical apertures, which are used to define the conditions for various solar irradiance measurements.

The calibrations were performed at NIST's Synchrontron Ultraviolet Radiation Facility (SURF III), which offers specialized beamlines with unique calibration equipment and a highly accurate radiometric standard.

More information about the mission can be found at: http://lasp.colorado.edu/oroc/index.html.

*********

TINY CELL-BASED CHEMICAL DETECTORS HAVE PROTECTION POTENTIAL

A highly sensitive, inexpensive "lab-on-a-chip" that provides warning within seconds of even trace amounts of toxic chemicals in water was designed and demonstrated recently by NIST scientists and collaborators.

The prototype sensor system monitors the natural response of bacterial cells bound within the microscopic channels of a plastic microfluidics device-a miniaturized chemical and biochemical analysis system. In the presence of certain chemicals, the cells eject large amounts of potassium, which is detected with an optical sensor that changes color. The prototype was demonstrated as part of an early warning system for industrial pollutants that interfere with sewage treatment, but it also has potential homeland security applications.

Cell-based sensors are of great interest today because they can respond to a wide range of chemical toxins rapidly. NIST's primary contributions to this project involve expertise in microfluidics technology, particularly aspects such as plastics processing. The new device has a novel configuration in which, through the use of lasers, tiny posts are constructed within the channels to act as a sieve and promote adhesion of the cells.

Although this type of chemical test could be performed in other formats, a microfluidics device is more sensitive because of the high surface to volume ratio, and also faster because of the close juxtaposition of chemicals and cells. In addition, it consumes less reagent and sample material and could be used in a distributed sensor network for real-time field testing. The device was designed in collaboration with scientists at Virginia Polytechnic Institute and State University (Blacksburg, Va.) and Veridian Pacific-Sierra Research (Charlottesville, Va.).

For more information, contact Laurie Locascio, (301) 975-3130, <laurie.locascio@nist.gov>.

BALDRIGE CRITERIA CHALLENGE CEOs TO BE 'CHIEF ETHICAL OFFICERS'

Responsibility for corporate stewardship and ethical business practices starts at the top with an organization's chief executive and governing body, says the 2003 Baldrige Award performance excellence criteria recently issued by the NIST. The Baldrige performance excellence criteria can help any organization form the foundation for sound management and ethical business practices.

"For America to have a strong economy, we need sound businesses with ethical, responsible leaders," said Commerce Secretary Don Evans. "Great authority is vested in the men and women who run our public corporations, and with such power comes responsibility. Corporate leaders aren't simply stewards of their individual companies. They are stewards of American capitalism itself."

The criteria long have stressed that senior leaders should be ethical role models and that organizations have a responsibility to practice good citizenship. This emphasis is woven throughout all of the Baldrige criteria's seven categories. However, it is most visible in the leadership category, which asks how the organization's governance system ensures management and fiscal accountability and independence in audits and protects stockholder and stakeholder interests. Also, the results category in the 2003 criteria asks organizations to provide evidence of fiscal accountability, ethical behavior, legal compliance and organizational citizenship.

In addition to being the basis for a Malcolm Baldrige National Quality Award application, the Baldrige Award performance excellence criteria are used by thousands of organizations to assess and improve their performance on a wide range of key indicators.

The Baldrige criteria are available in editions for business, education and health care at <www.baldrige.nist.gov> or by calling (301) 975-2036.

*********

FIBEROPTIC LINK TRANSFERS CLOCK SIGNALS WITH GREAT STABILITY

In May 2000, a high-speed fiberoptic network was set up between research laboratories in Boulder, Colo., including the NIST. It was predicted that time and frequency signals eventually could be transmitted over the network with a stability significantly better than that obtainable through Global Positioning System (GPS) or two-way time transfer. That goal now has been achieved.

In a recent paper, scientists from JILA (a joint institute operated by NIST and the University of Colorado at Boulder) and NIST report that they have connected both optical and radio frequency standards between the two institutions, which are about 3.5 kilometers (2.2 miles) apart. Ultimately, they hope to relay stable optical frequency standards and, subsequently, derived optical atomic clock signals over much greater distances.

"With the recent demonstration of optical atomic clocks, interest in the development of highly stable and accurate optical fiber transmission networks has become stronger, for obvious reasons: the unprecedented stability promised by optical frequency standards will need direct optical links for distribution and intercomparison," the researchers state.
The NIST work-representing the first phase-coherent transfer of an optical frequency standard over a commercial fiber link of greater than a kilometer in length-shows that high-stability signals can be transmitted from laboratories to remote sites via optical fiber networks. One example of the need for such a capability is NASA's Deep Space Network, which requires distribution of ultra-stable reference frequencies from its signal processing center in Pasadena, Calif., to multiple antenna sites for gravity wave searches, occultation science and other radio science experiments.

Also shown for the first time is the advantage of direct optical signal transfer over traditional microwave modulation approaches. The resulting noise (instability) of the transfer process is extremely low, 3 x 10^-15 at one second of averaging.

For a copy of paper no. 35-02, contact Sarabeth Harris, NIST, MC104, Boulder, Colo. 80303-3328; (303) 497-3237; <sarabeth@boulder.nist.gov >.

*********

NIST INNOVATIONS TO IMPROVE INDUSTRIAL TEMPERATURE MEASUREMENT

How hot (or cold) is your industrial processing environment? Thermodynamic temperatures are difficult to measure, and new techniques are continually being developed to make the mathematical formulas in the International Temperature Scale of 1990 (ITS-90) more closely represent the laws of nature. Recent innovations by the NIST Physics and Chemical Science and Technology (CSTL) laboratories are among the advances working toward new and improved reference thermometers for industry and research.

One of the new CSTL techniques uses acoustic thermometry, which involves measuring the speed of sound waves in a basketball-sized acoustic resonator filled with gas, and then using this value and fundamental physical properties to calculate temperature. The result will be a two-fold reduction in uncertainty in future temperature scales-over the range 273 to 800 Kelvin (roughly from 0 degrees Celsius to 530 degrees Celsius)-improving NIST's calibrations of the standard platinum resistance thermometers widely used in industry.

In an effort to reduce uncertainties at much higher temperatures, NIST's Physics Laboratory is developing sensors and methods to improve radiation (or non-contact) thermometry. The sensors under development, called absolute pyrometers, are calibrated in a process that determines optical power by comparison to electrical power. Planned improvements in radiation thermometry will be achieved by accurately measuring the temperature of a "blackbody" (a test source that absorbs almost all radiant energy with no reflection) operating at the freezing point of a particular metal.

These techniques were among the many topics discussed at the recent 8th International Temperature Symposium, which was co-sponsored by NIST and the Instrumentation, Systems, and Automation Society. The symposium has been held about every 10 years since 1919. Participants from 32 countries made more than 210 presentations on real-world measurement problems, new techniques and improved understanding of established techniques. Proceedings from the meeting will be published in the near future.

For more information, contact Dean Ripple, (301) 975-4801, <dean.ripple@nist.gov >.

*********

NIST RESEARCH PAPERS: THE FUTURE IS FULL OF (LASER) LIGHT

It is not always easy to look into the future. But in the case of physics, the future is definitely full of light, as in lasers and optics. Recent developments in the measurement of optical frequencies at the infrared and visible levels have opened up new avenues for research. One practical result may be the development of super-accurate atomic clocks based on optical frequency measurements rather than the microwave frequency measurements that are the basis of today's state-of-the-art timekeeping devices (such as the NIST-F1 cesium fountain clock that is accurate to one second in 30 million years).

Two recent research papers from the NIST outline this bright future. They state that a "remarkable synergy" has been formed between precise optical frequency measurements and ultrafast (femtosecond or one-quadrillionth of a second) laser science. The result has been the control of the frequency spectrum produced by mode-locked lasers which consists of a "comb" of sharp lines. If the comb is broad enough, it is relatively straightforward to determine the absolute frequency of all of the comb lines.

The authors state this development has "revolutionized" optical frequency measurements and led to demonstrations of optical atomic clocks based on optical frequency transitions.

Additionally, the researchers state, "the comb technology is having a strong impact on time-domain applications, including control of the carrier-envelope phase, precision timing synchronization, and synthesis of a single pulse from independent lasers."

"Precision absolute optical frequency metrology and synthesis is becoming a common laboratory tool." they conclude.

For a copy of these papers (36-02), contact Sarabeth Harris, NIST, MC104, Boulder, Colo. 80303-3328; (303) 497-3237; <sarabeth@boulder.nist.gov >.

*********

NEW NIST TOOL HELPS SMALL BUSINESSES PROTECT IT SYSTEMS

Protecting electronic information and data is vital to the success of any company. But, small businesses are especially vulnerable because they often do not have the staff or resources to constantly monitor their information technology systems.

The NIST e-Scan Security Assessment is an online diagnostic tool that can assist small businesses in determining how well their company's information technology systems are protected against failure or intrusion. The e-Scan tool also will provide recommendations to correct security problems. The tool is available free-of-charge at <http://escau.nist.gov/sai/index.nist >.

The easy-to-use tool asks a series of questions in 11 critical security areas, including computer virus protection, computer system physical environment, potential computer system mechanical failures,
back-up policies and procedures, and IT contingency planning. Once the assessment is completed, the tool provides a report that specifies how well a business scores in all 11 of the areas and provides suggested improvements.

For more information on the e-Scan tool, contact Rick Korchak, (301) 975-8323, <richard.korchak@nist.gov>.

**NIST HELPS HEALTH CARE INDUSTRY DEVELOP IT SECURITY STANDARDS**

NIST computer security experts are teaming up with a health care standards organization to identify the best practices for information security in health care.

The Security Health Care Certification and Accreditation Workgroup is reviewing draft security guidelines recently published by NIST and the new security rules being phased in under the Health Insurance Portability and Accountability Act (HIPPA) of 1996. NIST is teaming on this effort with Washington, D.C.-based URAC (also known as the American Accreditation Health Care Commission), which accredits managed care organizations.

Initially, the group is reviewing and discussing all relevant standards for computer security in health care information technology systems. Included will be reviews of two draft NIST Special Publications: 800-37 (Guidelines for the Security Certification and Accreditation of Federal Information Technology Systems; see <http://csrc.nist.gov/publications/drafts.html> for the text) and 800-53 (Minimum Security Controls for Federal Information Systems, due on the previously listed Web site in the spring of 2003) for possible use in the health care sector. Ultimately, the workgroup hopes to develop a common set of health care security standards that will cover security policies, procedures, controls and auditing practices.

URAC-accredited organizations provide health care services to more than 120 million Americans. More information is available at <www.urac.org>.

**NIST REACHES QUARTER-VOLT OUTPUT FOR JOSEPHSON VOLTAGE STANDARD**

NIST researchers have developed the first intrinsic quantum standard for alternating current (AC) voltage, making possible far more precise measurements and comparisons with existing power-detection-based AC voltage standards.

The researchers demonstrated a direct current (DC) and AC Josephson voltage standard system that produces output voltages of up to one-quarter volt. Attaining one-quarter volt permits the system to be used in making precise calibrations for the first time.

Commercial and defense standards laboratories, as well as electronic instrumentation facilities, will be able to use the new standard for precision measurements requiring accurate and stable AC voltages. The development, for example, enables meaningful measurements with thermal transfer standards. Until now, such measurements have used power ratio comparisons, although measurement uncertainties increase as frequencies change.

This latest NIST achievement of the quarter-volt output is 40 times higher than the lab’s starting point of six millivolts when work began six years ago. The team, however, is striving to attain output voltages of a half volt to one volt in the next year or two. That would reduce uncertainties in AC voltage measurements by three to four orders of magnitude, similar to today’s DC volt standards that are based on quantum effects.

The research is funded by NIST, the Department of Defense (DoD) Office of Naval Research (ONR) and ONR’s Calibration Coordination Group. For more information, contact Sam Benz, (303) 497-5258, <benz@boulder.nist.gov>.
MEASUREMENT SCIENCE CONFERENCE (MSC)
Chet Crane, Reporter

Woodington Presentation for 2003
Chet Crane

The purpose of the award is a memorial to the late Andrew (Andy) J. Woodington. The award represents professionalism, dedication and contributions to the metrology science community. I worked closely with Andy over the years and I can attest that Andy personified the expression "metrology professional". The Woodington Award was conceived following his untimely death just days before the 1978 Measurement Science Conference.

Regarding the award itself, nominees are to have warranted recognition and acceptance as a metrology professional that performs with dedication, competence and commitment to the field of metrology and calibration processes. The recipient of the Andrew J. Woodington Award must represent the highest level of professionalism and dedication to the metrology community.

This year's recipient is clearly worthy of that title. He was born in Washington D.C. in 1943. His Dad worked as a physicist at NBS, Washington. However, his family moved shortly thereafter and he grew up in the then little town of Boulder Colorado. He was there long enough to get a BS degree in 1964 and an MS degree in 1967 from the University of Colorado in electronic engineering. Before and after graduation he worked for NBS Boulder from 1962 until 1970 on rf and microwave metrology projects.

After about four years there, he came come to work for the Navy's Metrology Engineering Center. While there he was instrumental in the development and fielding of a highly accurate microwave power and attenuator calibrator for support of the Phoenix missile test system. He also developed intercomparison standards and methods for the early automated network analyzers and he coordinated all rf and microwave R&D projects with counterparts in the other military services and with NBS technical personnel.

In 1977 he went to work for the John Fluke Manufacturing Company. He has been there ever since and has made many contributions to the metrology community, its people and its equipment. Here are a few of his accomplishments while at Fluke. In the early years he was instrumental in defining and expediting the development and fielding of such equipment as the 5100A and B meter calibrators used in the MECCA systems, multifunction calibrators of the 5400 and 5500 series, the 5220 transconductance amplifier, and the 5700A high accuracy meter calibrator. In addition, he was a principal contributor to the 732 and 734 Zener dc volt reference standards.

Basically, he served as the interpreter and facilitator between customer needs, marketing and engineering design. He co-authored a 1994 book entitled "Calibration Philosophy in Practice" and handled many of the software products connected with calibration processes. More recently he serves as the principal troubleshooter and problem solver providing tech support to internal managers and engineers as well as to customers. As such he serves all of us with his body of valuable knowledge about calibration processes from the bench level onward.

In addition to all of that, this man has been friend and facilitator to any number of metrologists throughout his career, developing and championing innovations in precision measurement systems.

Over the years, he has kept in the background, content to serve and help others to look good and to be successful. It is only recently that he has become more visible, serving as Secretary of NCSL and is to move up to Executive Vice President and much more visible NCSL leadership roles in the near future. This individual has participated in numerous MSC and NCSL conferences as a speaker, session developer and exhibitor representative. He is a well-known and well-liked representative of the Fluke Corporation. On behalf of the Measurement Science Conference, heartfelt congratulations to David Agy as the 2003 Andrew J. Woodington Award winner.

Editor's Note: Kudos to Dave for keeping all those MSC and NCSL balls in the air all the time.

********

AMERICAN PHYSICAL SOCIETY
Klaus Jaeger, Liaison Delegate

The annual APS March meeting was held March 3-7, 2003 in Austin, TX. The complementary April meeting was held April 5-8, 2003 in Philadelphia, PA.

Two recent sets of publications in Physics Journals have led to investigations of apparent impropriety of the principal authors. In an article in Physics Today, November 2002, Barbara Gross Levi, an editor for the journal, describes the research done at Bell Labs, Lucent Technologies, regarding organic materials that show superconductivity behavior. She goes on to say that the publications regarding this work, published in reputable Physics Journals, over the last 2-3 years could not be reproduced by other researchers and that in fact some data appeared to have been copied from one experiment to the next.

An investigative committee reported its finding last September and concluded that the principal author committed scientific misconduct in 16 of 24 allegations involving 25 publications. This is, of course, very serious for all of research and points out the need for better oversight. In particular it points out the need for all co-authors to be more involved in the projects and to question all aspects of the publication. (Please see pages 15 through 17 of the mentioned Journal for the full article.)

Bertram Schwarzscihld, an editor for the journal Physics Today, describes in the Sept. 2002 issue, another case of misconduct. In this case, researchers from Lawrence Berkeley National Laboratory (LBNL) had claimed the discovery of the heavy element 118. The "discovery" was claimed in a publication in 1999. It was then retracted by LBNL in 2001, after additional experiments at this and laboratories in Japan, Germany and France could not duplicate the results.
A committee was convened to check into the allegations and concluded by saying: "We find clear and convincing evidence that the data in 1999, upon which the reported discoveries was based, were fabricated." Once again, the community at large has to contend with false claims and has to address the responsibilities of co-authors. (Please see pages 15 through 17 of the mentioned Journal for the full article.) JR Minkel, who works part time for the APS, further describes this case. His article appeared in Scientific American, Nov, 2002, pages 20-22. He essentially repeats the arguments presented by Bertram Schwartzschild in Physics Today.

On a lighter note, I would like to point to an article by Martin Bridge reprinted with permission in the APS News of Oct, 2002, Page 3. He starts out with the fraudulent claim of discovery of element 118. He then, humorously, questions discoveries and listing of several other elements. Especially in regard to rare earth elements he states: "Even some well-known elements are threatened with extinction. Potentially the most serious is silicon, only recently thought to be most abundant of all the elements on earth." He then goes on: "Imagine what this will do to the semiconductor industry when they found out that they named their valley after a fictional element. Silicon comes from silly con, which just means ridiculous fraud."

Even though I end this report with the humorous article by Martin Bridge, I am nevertheless disappointed in the research results published with fraudulent claims. It is a worrisome development but not really a surprise. After all, most of basic research in the USA is conducted under the motto "Publish or Perish."

*********

INSTITUTE OF ENVIRONMENTAL SCIENCES AND TECHNOLOGY (IEST)

Robert Mielke, Liaison Delegate

ESTECH 2003: IEST Golden Jubilee - 50 Years of Technical Excellence!

ESTECH 2003, the 49th annual technical meeting and exposition of IEST, will be held May 18-21, 2003, at the Hyatt Regency Phoenix in Phoenix, Arizona.

ESTECH 2003 will feature technical sessions, tutorials, and IEST Working Group meetings of interest to experienced and beginning professionals in the fields of contamination control; design, test, and evaluation; and product reliability. Networking and social events will include a welcome reception, the IEST awards ceremony, and a farewell banquet celebrating IEST's 50th anniversary. The exposition will feature state-of-the-art displays from leaders in all areas of contamination control; design, test, and evaluation; and product reliability fields. Contact: < www.iest.org >.

*********

AMERICAN SOCIETY FOR QUALITY (ASQ)/MEASUREMENT QUALITY DIVISION

Chris Grachen, Liaison Delegate

The next activity required before the Certified Calibration Technician (CCT) exam can "go to press" later this year is completion of the Exam Review workshop. The Exam Review workshop is scheduled for April 4th & 5th at the American Society for Quality (ASQ) headquarters in Milwaukee, WI.

As the name implies, the Exam Review workshop focuses on reviewing the CCT draft exam. Four weeks in advance of the workshop, a draft version of the CCT exam is sent to the twelve subject matter experts (SMEs) participating in the workshop. The draft CCT exam is in the same format as will be used by CCT exam candidates. This allows workshop participants to evaluate each exam item in the same context as candidates. Workshop participants will be asked to do the following pre-meeting tasks:

- "Take" the CCT draft exam as if they were a candidate.
- Record their answers and their comments about each exam item in an electronic "Comments Form" document.
- E-mail the comments form to ASQ headquarters no later than the Monday before the meeting.
- Bring their marked-up copy of the CCT exam to the workshop for reference and to ensure confidential disposal afterwards.

Note: Workshop participants are required to sign a confidentiality contract with ASQ, which stays in affect for two years.

Workshop participants will have their draft CCT exams graded. At the workshop, participants are trained in a variety of assessment techniques and then asked to focus on exam items identified as 'problematic'. Workshop participants will disposition flagged exam items in one of the following ways:

- Quick Fix - Revise and approve the item within the 3-minute time frame.
- Parking Lot (Temporary Hold Status), to Revise - The item can probably be kept in the test but needs further work or confirmation of the reference, which should be handled by a team.
- Parking Lot to Replace Only - Item is fine, but cueing or overlap with other items in the test requires a team to find a replacement from the residual pool.
- Parking Lot to Replace & Hold - Item is worth saving but should be reworked at another meeting to ensure that major revisions get all the reviews and approvals necessary.
- Parking Lot to Replace, Delete & Kill - This disposition is reserved for items that the workshop participants never want to see again.

After all the issues in the draft exam are resolved, the exam can then "go to press."

A cut-score study will be conducted to establish the minimum passing score for the CCT exam. After the cut-score study, Exam Review workshop participants will be notified whether they are certified. ASQ does not 'grandfather' Exam Review participants; they must meet the minimum standard of performance, just like other candidates who sit for the CCT exam. The 'no grandfather' policy of ASQ is a well-taken position to ensure certification is granted only when one has satisfactorily proven competence regarding the CCT body of knowledge. Information about the CCT program, its body of knowledge and reference publication listing, exam prerequisites, exam dates and the latest news updates may be found at:

< http://www.asq.org/cert/types/cct/index.html >
< http://www.measurementquality.org/cct/fs_cct.html >
**COUNCIL FOR OPTICAL RADIATION MEASUREMENTS (CORM)**
Sally Bruce, Liaison Delegate

CORM Annual Conference and Business Meeting
18 - 20, June 2003
SLAC Auditorium, Stanford Linear Accelerator, Stanford University


CORM 2003 “Optics in the 21st Century
Latest Developments in Optical Measurements, Light Sources and Standards for the Lighting and Telecommunications Industries

The CORM Conference and Business Meeting will be held at SLAC on 18 - 20 June.

CORM Technical Committee meetings will be held at Riekey's Hyatt House in Palo Alto on 17 June.

This is a great opportunity for scientists and engineers in Silicon Valley to bring their optical measurement and standardization concerns to the attention of scientists at NIST and other metrology experts.

The Conference will feature advances in optical measurements and standards for a variety of industries, applications and emerging technologies, including:

- LEDs
- Displays
- Sensors/Detectors
- Microtechnology
- Optical measurements and standards in Biophysics and Medical Science
- Human Interface: Photometry, Colorimetry, Color Science

Local contact:
Ms. Carolyn Jones
CJ Enterprises
2170 Monterey Avenue
Menlo Park, CA 94025
650-854-5588
<munyk@aol.com>

---

**AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (A2LA)**
Ramona J. Saar, Liaison Delegate

A2LA Signs IAAC Recognition Arrangement

On October 24, 2002, A2LA joined INMETRO of Brazil and SCC of Canada in signing the newly established Inter-American Accreditation Cooperation (IAAC) Multilateral Recognition Arrangement (MLA).

The Inter-American Accreditation Cooperation is a relatively new regional cooperation of accreditation, certification and inspection bodies, as well as representatives from testing and calibration laboratories and other interested parties from countries in North and South America. Similar to APLAC and EA, IAAC’s main objective is to facilitate commercial exchange among the member nations or blocs of nations in the economies it serves through a system of recognition arrangements of various types of conformity assessment bodies.

By signing the arrangement, A2LA, SCC and INMETRO agree to formally recognize and promote the equivalency of each other’s laboratory accreditations. Since these three bodies already recognize each other under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA), this first signing is largely symbolic but forms the foundation for expanding recognition in the Americas. Additional IAAC member accreditation bodies in the Americas are preparing for formal IAAC on-site evaluations and expect to be invited to sign the MLA once all requirements are met. Once this happens, A2LA accreditations will become more widely recognized.

A2LA Board of Directors Meeting Highlights

The A2LA Board of Directors (BOD) met October 17-18, 2002 at A2LA Headquarters in Frederick, MD. Meeting highlights included the following items:

- A report on the most common deficiencies cited by assessors during A2LA assessments was presented. The report is posted on A2LA’s web site at the following URL:
  - <http://www.a2la2.net/guidance/Common_17025_Defts.pdf>
- Board members discussed the difficulty testing laboratories are having with the ISO/IEC 17025 requirements for measurement uncertainty and discussed efforts being made by ILAC to develop more discipline-specific guidance.
- Board members approved the addition of another Accreditation Council member, Mr. James Ingram, a calibration expert.
- The A2LA policy on handling relocations of accreditation laboratories was revised.
- The A2LA 2003 budget was approved.

---

**ASIA/PACIFIC LABORATORY ACCREDITATION (APLAC)**
Peter Unger, Liaison Delegate

APLAC Multilateral Mutual Recognition Arrangement

Since the last meeting of the APEC SCSC, Department of Standards Malaysia, Malaysia and Department of Medical Sciences, Thailand became signatories to the APLAC MRA, each for testing only. Following the recent merger of CNACL and CCICBLAC to form CNAL (People's Republic of China) the number of signatories to the MRA is now 19 out of 28 Full Members of APLAC.

APLAC General Assembly

The last meeting of the APLAC General Assembly and associated meetings were held in Vancouver during the week of 10-15.
November 2002. During the meeting, elections were held for all APLAC office bearers: Chair, Board of Management, MRA Council Chair, and Committee Chairs (see details of the outcome of the elections below).

Several documents or revisions to documents were finalized and approved for issue. These included a revision to the Rules of Procedure, and the first issue of the APLAC Code of Ethics and APLAC Procedure for Appeals and Alternate Dispute Resolution Process.

JCLA (Japan) and NQA-LS (USA) were accepted as new Full Members of APLAC. NARL (Australia) and ACLASS (USA) were accepted as new Associate Members.

APLAC MRA Council

The APLAC MRA Council met in Vancouver on 13 and 14 November 2002. Two additional signatories were accepted into the APLAC MRA.

Five signatories to the APLAC MRA have applied to be inaugural signatories to the MRA for inspection body accreditation and APLAC expects to have done the initial evaluations before the end of 2003.

The MRA Council also finalized revisions to APLAC MR 001: Procedures for Establishing and Maintaining Mutual Recognition Agreements between Laboratory Accreditation Bodies. Major changes were to take account of the extension of the MRA to include inspection body accreditation, and to simplify and standardize the evaluation report format.

Contact the APLAC secretariat:
Dr Helen Liddy
PLAC Secretary
71-73 Flemington Road
North Melbourne  VIC 3051
AUSTRALIA
Telephone: +61 3 9329 1633
<aplac@nata.asn.au>

*********

EUROPEAN CO-OPERATION FOR ACCREDITATION (EA)
Graham Cameron, Liaison Delegate

General Assembly

During the EA 10th General Assembly, held in Vedbaek, Denmark 2002-11-27/28, many topics were discussed.

Laboratory Committee

The Laboratory Committee discussed the results of the 1st management group meeting and confirmed that harmonisation of assessment procedures should be the priority task of the committee. As a consequence, technical work should be handed over to Laboratory organisations through close co-operation. Members also recognised that Proficiency Testing and Interlaboratory Comparisons are important but that Accreditation Bodies should not work as Proficiency Testing providers. In the field of calibration, organisation of Interlaboratory Comparisons will be discussed with Eurometer.

New Documents

- Publication EA-04/15 - Accreditation for Non-Destructive Testing [28 pages] was approved; the issue of measurement uncertainty will be included at a future stage.
- Publication EA-04/14 - The Selection and Use of Reference Materials [16 pages] was approved.

These recently approved documents can be found on the website.

EA Database

The Working Group has been requested to start discussion on the common scope for testing. It was reported that the database proved able to operate with data coming from various systems in Germany, Denmark and France. The database for calibration could now be extended to EA members.

EA Newsletter

The EA published the first issue of the "EA Newsletter" which will normally be available electronically from the EA website <www.european-accreditation.org>.

In the Chairman’s editorial he indicates: "The Executive committee of EA wants the newsletter to be the link between the EA members. This is the reason why you will find information about the works and achievements in the EA committees, the EA Advisory Board but also about developments in EA members’ countries. The newsletter must also reflect the links we want to maintain with our colleagues in Europe and in the world."

EA Update

The EA site has an "Update" feature, which summarizes significant items.

I suggest that you take the opportunity to review the "Update" feature and the EA Newsletter.

Next General Assembly

My next report will likely follow the next EA General Assembly, which takes place in Dublin on 2003-06-11/12.

*********

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
Roxanne M. Robinson, Liaison Delegate

Several years back, ASTM E36 broadened its scope of work to include the development and maintenance of standards in all areas of conformity assessment, not just those associated with laboratory accreditation. It has become apparent, however, that most standards addressing conformity assessment are also being developed at the international (ISO) level and these are the standards that are recognized and used by conformity assessment bodies. As an example, how prevalent is the use of ASTM E994 in comparison to ISO Guide 58 for directing the operations of laboratory accreditation bodies?
As E36’s conformity assessment standards have largely been over-taken by ISO standards, the committee has been concerned for the past year with finding a new direction for itself. Two surveys went out to the E36 membership, first to determine if there was still interest in the continuation of E36 activities (clearly a strong interest in its continuation), and then to ask for ideas where areas for ASTM conformity assessment standards or guidance may still be needed.

After considerable debate and analysis, the committee has decided to pare down its subcommittee structure and focus again in the laboratory and inspection conformity assessment areas. The four newly-defined subcommittees will address issues relating to accreditation activities, construction building testing/inspection, international conformity assessment and long range planning. Homeland security and industry-specific inspection are areas where additional E36 work may be needed.

Many of the ASTM Standards (E548, E994, E1884, E1904, E1905, E1224, E1738, E1905) are being considered for withdrawal or will be allowed to expire because they are exact adoptions of ISO standards or the subject matter has been addressed at the international level in standards that are better-recognized.

E36 has made considerable progress towards classifying its membership in accordance with ASTM directives. Classification is necessary to allow standards developed by E36 to be recognized as American National Standards.
NEW NCSLI MEMBERS

NY/NJ/PA US REGION

BAE Systems TW & DS
Yonkers, NY 10710
Member Delegate:
Edward Haney
(914) 964-2824

Brinkmann Instruments
Westbury, NY 11590
Member Delegate:
Jim Floyd
(516) 334-7500

Questech Instrumentation Services
Westampton, NJ 08060
Member Delegate:
Joseph Schneeloch
(609) 267-8717

MID-WESTERN US REGION

General Motors Instrm. Knowledge Ctr.
Milford, MI 48380
Member Delegate:
Daniel T. DeLisle
(248) 674-7524

SOUTHERN US REGION

Progress Energy
Crystal River, FL 34428
Member Delegate:
Jerome T. Lowe
(352) 563-4339

NORTH CENTRAL US REGION

Precision Calibration, Inc.
Schuyler, NE 68661
Member Delegate:
George A. Whitaker
(402) 352-5484

SOUTH CENTRAL US REGION

DynaCAL
Mission, TX 78572
Member Delegate:
Felipe Narcio
(512) 831-5959

Glenn Tool, Inc.
Oklahoma City, OK 73127
Member Delegate:
Cyrus Newman
(405) 789-2190

Lockheed Martin Integrated Metro. Ctr.
Stennis Space Center, MS 39470
Member Delegate:
Ken Garcia
(228) 813-2075

Sears, Roebuck and Co.
Garland, TX 75041
Member Delegate:
J. Scott McCrory
(214) 340-2859

Sensarray
Austi, TX 78723
Member Delegate:
Allan Watson
(512) 450-1445

BOSTON SCIENTIFIC/TARGET
Fremont, CA 94538
Member Delegate:
Richard Trinies
(510) 440-7621

NANO Measurements, Inc.
Sunnyvale, CA 94085
Member Delegate:
Fred Espenshade
(408) 732-5400 x303

Sensarray
Fremont, CA 94538
Member Delegate:
David Dalor
(510) 360-5600

SOUTHWESTERN US REGION

Baxter BioScience
Duarte, CA 91010
Member Delegate:
Michael Lee Ellis
(626) 305-6096

CDI Torque Products
City of Industry, CA 91748
Member Delegate:
Donna E. Brunot
(626) 810-2759

Cell Genesys
San Diego, CA 92121
Member Delegate:
Randy D. Farmer
(858) 824-7427

USCalibration
Irvine, CA 92614
Member Delegate:
Jim Simmons
(949) 724-5117

NORTWEST US REGION

Erickson Air-Crane, Inc.
Central Point, OR 97502
Member Delegate:
T.C. Myers
(541) 564-9582

INTERNATIONAL REGION

Acqiris Data Conversion Instruments
Geneva, Switzerland 1223
Member Delegate:
Allan Rothenberg
41-22-884-3390

UZSTANDARD
Tashkent City, Uzbekistan 700069
Member Delegate:
Abduqahhor A. Abduvaliev
7-3711-99871-1446601

CANADA REGION

Spectraflux Indusies, Inc.
St-Laurent, QC H4S 1M2
Member Delegate:
Chrisnel Blot
(514) 332-0082
NCSL INTERNATIONAL BOARD OF DIRECTORS 2003

10 PRESIDENT *
Steve Stahley
SRS Technical Services
24037 Hilltop Rd.
Oldenburg, IN 47035
(253) 933-1636 FAX(253) 390-3086
e-mail: <stahley@srstech.com>

20 EXECUTIVE VICE PRESIDENT *
Dave Agy
Fluke Corporation
MS: 275G
P.O. Box 9090
Everett, WA 98206-9090
(425) 446-5471 FAX(425) 446-5992
e-mail: <Dave.Agy@fluke.com>

30 PAST PRESIDENT *
Charles Motzko
C.A. Motzko & Associates
546 Kealake Circle
Redwood City, CA 94065-1212
(650) 595-8878 FAX(650) 595-1285
e-mail: <charles@motzko.com>

40 SECRETARY *
Dave Abell
Agilent Technologies
SSU Div. MS: 61UAC
5301 Stevens Creek Blvd.
Santa Clara, CA 95052
(408) 553-4425 FAX(707) 825-0444
e-mail: <dave_abell@agilent.com>

50 TREASURER *
Harry Moody
Harry J. Moody Enterprises
155 Harrisburg Ln.
Idaho Falls, ID 83404
(208) 522-9774 FAX(208) 522-9774
e-mail: <harrymoody@idaho.net>

61 NIST REPRESENTATIVE TO THE BOARD
Dr. Richard F. Kayser
NIST
NIST North (820), Room 304
100 Bureau Dr., Stop 2000
Gaithersburg, MD 20899-2000
(301) 975-4000 FAX(301) 975-2183
e-mail: <richard.kayser@nist.gov>

62 INMS REPRESENTATIVE TO THE BOARD
Gary L. Hyser
Nat. Res. Council of Canada
Montreal Rd., Bldg. M36
Ottawa, ON K1A 0R6 Canada
(613) 998-5648 FAX(613) 952-1394
e-mail: <gary.hyser@nrc.ca>

63 CENAM REPRESENTATIVE TO THE BOARD
Dr. Salvador Cueverna-Vinaqornez
Dr. Salvador Cueverna-Vinaqornez
Fluke Corporation
CENAM
P.O. Box 9090
Santa Clara, CA 95052
(408) 553-4425 FAX(707) 825-0444
e-mail: <sueverna@cenam.mx>

70 BIPM REPRESENTATIVE TO THE BOARD
Harry Moody
Antony Anderson
Harry J. Moody Enterprises
Countryside Instruments, Inc.
103 Commerce St., Suite 190
Lake Mary, FL 32746
(407) 933-3327 FAX(407) 933-3309
e-mail: <harrymoody@idaho.net>

71 SIM REPRESENTATIVE TO THE BOARD
Dave Abell
Dave Abell
Agilent Technologies
INMETRO
SSU Div. MS: 51UIAG
DIMCI
5301 Stevens Creek Blvd.
Santa Clara, CA 95052
(408) 553-4425 FAX(707) 825-0444
e-mail: <dave_abell@agilent.com>

73 EUROMET REPRESENTATIVE TO THE BOARD
Seton Barnett
National Physical Laboratory
Queens Road
Twickenham, Middlesex, TW11 0LY United Kingdom
44-20-8943-6920 FAX:44-20-8943-6082
e-mail: <seton.barnett@npl.co.uk>

OPERATIONS VICE PRESIDENTS

120 VP - OPERATIONS
Georgia Harris
NIST
Office of Weights & Measures
100 Bureau Dr., Stop 2600
Gaithersburg, MD 20899-2000
(301) 975-4014 FAX(301) 975-0647
e-mail: <gharris@nist.gov>

130 VP - STANDARDS POLICY
Jack Ferris
Sleeping Bear Metrology
P.O. Box 591
Clen Arbor, MI 49626-0591
(231) 334-4891 FAX(231) 334-3788
e-mail: <sleeping_bear@hotmail.com>

140 VP - MEASUREMENT SCIENCE & TECHNOLOGY
Dr. Richard Petit
Sandia National Laboratories
Dept. 25-2, MS: 0665
P.O. Box 5800
Albuquerque, NM 87185-0665
(505) 844-6242 FAX(505) 844-4572
e-mail: <pettit@sandia.gov>

150 VP - INDUSTRIAL PROGRAMS
P.W. "Woody" Tramel
Wyle Labs
Mail Stop: Wyle-500
Kennedy Space Center, FL 32899
(321) 867-7215 FAX(321) 867-1340
e-mail: <woodrow.tramel-1@nsc.nasa.gov>

160 VP - EDUCATION & TRAINING
David Nebel
DEN Technical Services
1456 Yankee Park Pl., Suite A
Centerville, OH 45458-1854
(513) 436-1888 FAX(513) 436-2131
e-mail: <DENebel@acol.com>

170 VP - DOCUMENTARY STDS APPLICATIONS
Larry E. Nelson
Southern California Edison
Metrology
7300 Ferndick Ln.
Westminster, CA 92683
(714) 985-0489 FAX(714) 985-0686
e-mail: <larry.nelson@sce.com>

180 VP - MARKETING
Edward Pitchard
BWXT Y-12, LLC
Oak Ridge Metrology Center
P.O. Box 2009
Oak Ridge, TN 37831-8091
(865) 574-4261 FAX(865) 574-2802
e-mail: <pitchard@y12.doe.gov>

190 VP - CONFERENCE MANAGEMENT
Carol Hockert
MN Dept. of Commerce
Weights & Measures Div.
2277 Highway 56
Roseville, MN 55113
(651) 268-0314 FAX(651) 639-0141
e-mail: <carol.hockert@state.mn.us>
ONAL BOARD OF DIR
DIVISION VICE PRESIDENTS

1100 VP - NORTHEASTERN US
Jeff Gust
Guamelec Corporation
Proficiency Testing Services
501 W. Van Buren, Unit C
Columbia, IN 46725
(260) 244-7450 FAX(260) 244-7905
e-mail: <jgust@guamelec-pl.com>

1200 VP - SOUTHEASTERN US
Mike Suraci
7940 NE Koura Rd.,
Bainbridge Island, WA 98110-1555
(206) 842-7321 FAX (206) 780-8157
e-mail: <mikesuraci@ansi.org>

1300 VP - CENTRAL US
Tom Wansch
Sandia National Laboratories
Primary Standards Lab
P.O. Box 6000
Albuquerque, NM 87185-0665
(505) 844-4365 FAX (505) 844-7989
e-mail: <tfwu nsc@sa ndia.gov>

1400 VP - WESTERN US
Derek Porter
Boeing Commercial Airplane Group
MS: 19-MC
P.O. Box 3707
Seattle, WA 98124
(206) 665-6288 FAX(206) 655-5173
e-mail: <derek.j.porter@boeing.com>

10000 VP - INTERNATIONAL
Ed Nemeroff
Pragma - USAID
3744 D SW Quail Meadow Trail
Palm City, FL 34990
(772) 287-3547 FAX(772) 287-3547
e-mail: <EdN emero ff@es.com>

NCSL INTERNATIONAL COMMITTEE CHAIRS 2003

21 US GOVERNMENT AFFAIRS
Doug Sugg
Naval Surface Warfare Center
MS: 00A
P.O. Box 5000
Corona, CA 91719-5000
(909) 273-5300 FAX(909) 273-5500
e-mail: <suggd@navy.mil>

22 LIAISON DELEGATES
Dave Agy
Fluke Corporation
MS: 275G
P.O. Box 3090
Everett, WA 98206-0090
(425) 446-5471 FAX(425) 446-5992
e-mail: <Dave.Agy@fluke.com>

31 ARCHIVAL
Lewis Fong
Lockheed Martin Technical Operations
Ctg. 43-91, Bldg. 153A
P.O. Box 61687
Sunnyvale, CA 94088
(408) 756-3534 FAX(408) 742-4435
e-mail: <lewis_fong@lmco.com>

32 ADMINISTRATIVE GUIDELINES
Klaus Jaeger
Jaeger Enterprises
13865 Calle Tacuba
Santa Barbara, CA 93108-4918
(805) 667-1743 FAX(805) 667-3705
e-mail: <kjaeger@altbi.com>

41 BY-LAWS
Dave Abell
Agilent Technologies
SSU Div. MS: 51UAG
5301 Stevens Creek Blvd.
Santa Clara, CA 95052
(408) 563-4426 FAX(707) 825-0444
e-mail: <Dave.abell@agilent.com>

120 VP - OPERATIONS
Georgia Harris

121 NCSL INTERNATIONAL BUSINESS MANAGER
Craig Guika
NCSL International
1800 30th St., Suite 305B
Boulder, CO 80301-1026
(303) 440-3339 FAX(303) 440-3364
e-mail: <cguik@ncsl.org>

126 ANSI SECRETARIAT
Craig Guika
NCSL International
1800 30th St., Suite 305B
Boulder, CO 80301-1026
(303) 440-3339 FAX(303) 440-3364
e-mail: <cguik@ncsl.org>

127 NEWSLETTER
John Minck
642 Towe Pl.
Palo Alto, CA 94306-2335
(650) 493-3955 FAX(650) 493-3955
e-mail: <john_minck@non.agilent.com>

128 PUBLICATIONS OVERSIGHT
Dr. Stuart Kupferman
Sandia National Laboratories
Div. 1542, MS-0665
E-mail: <slkupfer@sandia.gov>
NCSL INTERNATIONAL COMMITTEE CHAIRS (Cont’d)

130 VP - STANDARDS POLICY
Jack Ferris

131 U.S. MEASUREMENT REQUIREMENTS
Jeff Wallace
Naval Warfare Assessment Station
Measurement Science Directorate
P.O. Box 5000
Corona, CA 92878-5000
(909) 273-4481 FAX(909) 273-5448
e-mail: <waldenwj@corona.navy.mil>

132 CANADIAN MEASUREMENT REQUIREMENTS
Les Pepper (Chair)
Environment Canada
NWRI, RSB
P.O. Box 5050
Burlington, ON L7R 4A6 Canada
(905) 336-4893 FAX(905) 336-6230
e-mail: <les.pepper@cwv.ca>

Lorraine Yeomans (Chair)
Pulse Engineering, Ltd.
1137 Keewatin St.
Winnipeg, MB R2X 2Z3 Canada
(204) 633-4321 FAX(204) 697-2264
e-mail: <sales@pulse-engineering.com>

133 GLOSSARY
Bob Hardy
RH Systems
2655-F Pan American Fwy. NE
Albuquerque, NM 87107
(505) 344-6400 FAX(505) 344-6409
e-mail: <bob@rhysystems.net>

134 VP - MEAS. SCIENCE & TECHNOLOGY
Richard Pettit

135 CHEMICAL METROLOGY
Thomas Ouimet
Eastman Kodak Co.
565 State St.
Rochester, NY 14650-2139
(585) 722-1666 FAX(585) 722-2608
e-mail: <thomas.ouimet@kodak.com>

136 VP - INDUSTRIAL PROGRAMS
P.W. “Woody” Tramel

137 HEALTHCARE METROLOGY
Todd McCullough
Pharmaceutical Calibrations, Inc.
P.O. Box 40545
Raleigh, NC 27629-0545
(619) 231-7121 FAX(619) 231-9185
e-mail: <tmcculloch@pci-lic.com>

138 UTILITIES
Kent Crow
Ameren UE
Callaway Plant. MS: CA-460
P.O. Box 620
Fulton, MO 65251
(673) 676-8090
e-mail: <kccrow@cal.ameren.com>

139 EQUIPMENT MANAGEMENT FORUM
Rob Parcinski
The Boeing Company (TEMC)
11501 Boeing Field Way
Huntington Beach, CA 92647-2099
(714) 896-2391 FAX(714) 896-5534
e-mail: <rob.parchinski@boeing.com>

140 AUTOMOTIVE METROLOGY
Timothy W. Kypta
Borg Warner
Emission/Thermal Systems
3800 Automation Ave.
Auburn Hills, MI 48326
(248) 754-0628 FAX(248) 754-9030
e-mail: <tkypta@bfwauto.com>

141 AUTOMATIC TEST & CALIBRATION SYSTEMS
Scott Sowerby
Verizon Logistics
3301 Wayne Trace
Fort Wayne, IN 46806
(260) 428-6900 FAX(260) 428-6124
e-mail: <scott.sowerby@verizon.com>

142 MEASUREMENT COMPARISON PROGRAMS
James C. Wheeler (Chair)
Navy Primary Standards Lab
Code 4144, Bldg. 469
NADEP North Island
San Diego, CA 92135-7056
(619) 545-9668 FAX(619) 545-9661
e-mail: <jwheeler@navair.navy.mil>

Al Teruel (Chair)
Navy Primary Standards Lab
Naval Aviation Depot, Code 41430, Bldg. 469 South
NAS North Island
San Diego, CA 92115
(619) 545-2857 FAX(619) 545-2865
e-mail: <alteruel@navair.navy.mil>

143 INTRINSIC & DERIVED STANDARDS
John Ball
U.S. Army Primary Sids Lab
Attn: ANSAM-TMD-S
Redstone Arsenal, AL 35809-5500
(256) 575-2866 FAX(256) 542-8767
e-mail: <john.ball@redstone.army.mil>

144 TESTING LABORATORIES
TBD
NCSLI INTERNATIONAL COMMITTEE CHAIRS (Cont’d)

160 VP - EDUCATION & TRAINING
David Nebel

161 TRAINING RESOURCES
Burton W. Sutherland
NS Software Services
5320 Casa Loma St.
Lake Park, GA 31636
(850) 516-6016 FAX(229) 636-5057
e-mail: <sutherlandbw@mail.com.usmc.mil>

162 TRAINING INFORMATION DIRECTORY
Paul Hanssen
Workplace Training
3195 Casco Cir.
Wayzata, MN 55391
(952) 471-8554
e-mail: <phanssen@wptraining.com>

163 PERSONNEL TRAINING REQUIREMENTS
Gloria Neely, Co-chair
Naval Surface Warfare Center
MS: 44
P.O. Box 5000
Corona, CA 92878-5000
(909) 273-5469 FAX(909) 273-4903
e-mail: <neelygj@corona.navy.mil>

164 EDUCATION SYSTEM LIAISON
Terrelle J. Wilson
Lockheed Martin Technical Operations
MS: P9682
P.O. Box 179
Denver, CO 80201-0179
(303) 977-5523 FAX(303) 971-5635
e-mail: <terrelle.wilson@lmco.com>

165 LABORATORY EVALUATION RESOURCES
James A. Crane
Keithley Instruments, Inc.
28775 Aurora Rd.
Cleveland, OH 44139-1891
(440) 498-2904 FAX(440) 248-6188
e-mail: <jcrane@keithley.com>

166 LABORATORY FACILITIES
Dr. David Broadaway (Co-Chair)
103 Ranch Rd.
P.O. Box 9
Sandia Park, NM 87047-0000
(505) 281-3691 FAX: same (call first)
e-mail: <dbroadway@worldnet.att.net>

Doug Cooper (Co-Chair)
TAC Americas
1770 Mason Morrow Rd.
Lebanon, OH 45036
(513) 398-9000 x229 FAX(513) 398-9048
e-mail: <doug_cooper@tac-americas.com>

167 METROLOGY PRACTICES
Howard Castrup
Integrated Sciences Group
14088 Cisneros Canyon Rd.
Bakersfield, CA 93316
(661) 872-1683 FAX(661) 872-3669
e-mail: <castrup@isgmax.com>

168 WRITING COMMITTEE
Jesse Morse
Fluke Corporation
MS: 275-G
P.O. Box 9890
Everett, WA 98208
(425) 446-5488 FAX(425) 445-5992
e-mail: <jesse.morse@fluke.com>

169 ACCREDITATION RESOURCE
James Jenkins
Quametec Corp.
17600 Collinson Ave.
Eastpointe, MI 48021
(586) 775-5495 FAX(586) 775-5123
e-mail: <jenkins@quametec.com>

170 VP - DOCUMENTARY STDS. APPLICATIONS
Larry Nielsen

171 LABORATORY EVALUATION RESOURCES
James A. Crane
Keithley Instruments, Inc.
28775 Aurora Rd.
Cleveland, OH 44139-1891
(440) 498-2904 FAX(440) 248-6188
e-mail: <jcrane@keithley.com>

172 LABORATORY FACILITIES
Dr. David Broadaway (Co-Chair)
103 Ranch Rd.
P.O. Box 9
Sandia Park, NM 87047-0000
(505) 281-3691 FAX: same (call first)
e-mail: <dbroadway@worldnet.att.net>

Doug Cooper (Co-Chair)
TAC Americas
1770 Mason Morrow Rd.
Lebanon, OH 45036
(513) 398-9000 x229 FAX(513) 398-9048
e-mail: <doug_cooper@tac-americas.com>

173 METROLOGY PRACTICES
Howard Castrup
Integrated Sciences Group
14088 Cisneros Canyon Rd.
Bakersfield, CA 93316
(661) 872-1683 FAX(661) 872-3669
e-mail: <castrup@isgmax.com>

174 WRITING COMMITTEE
Jesse Morse
Fluke Corporation
MS: 275-G
P.O. Box 9890
Everett, WA 98208
(425) 446-5488 FAX(425) 445-5992
e-mail: <jesse.morse@fluke.com>

175 ACCREDITATION RESOURCE
James Jenkins
Quametec Corp.
17600 Collinson Ave.
Eastpointe, MI 48021
(586) 775-5495 FAX(586) 775-5123
e-mail: <jenkins@quametec.com>

176 CALIBRATION/CERTIFICATION PROCEDURES
Dave Varnes
Lockheed Martin Technical Operations
MS: P9682
P.O. Box 179
Denver, CO 80201
(303) 977-5523 FAX(303) 971-5635
e-mail: <dave.varnes@lmco.com>

177 VP - MARKETING
Edward Pritchard

178 HONORS & AWARDS
John Wade Keith III
Boeing
MS: H014-C42
5301 Bolsa Ave.
Huntington Beach, CA 92647
(714) 896-2070 FAX(714) 372-2714
e-mail: <swade.keith@boeing.com>

179 BENCHMARKING PROGRAMS
Larry Yates
Acumen Strategies
16605 Quabado Ave., #SS103
P.O. Box 1399
Fort Charlotte, FL 33948
(941) 629-0554 FAX(941) 629-0554
e-mail: <larryy2002@aol.com>

180 VP - MARKETING
Edward Pritchard

181 HONORS & AWARDS
James Tavarnier
RCM Technologies, Inc.
JPL MS: 125-B18
4800 Oak Grove Dr.
Pasadena, CA 91109
(818) 393-5700 FAX(818) 393-5015
e-mail: <jmtav@yahoo.com>

182 BENCHMARKING PROGRAMS
John Wade Keith III
Boeing
MS: H014-C42
5301 Bolsa Ave.
Huntington Beach, CA 92647
(714) 896-2070 FAX(714) 372-2714
e-mail: <swade.keith@boeing.com>

183 MEMBERSHIP
Larry Yates
Acumen Strategies
16605 Quabado Ave., #SS103
P.O. Box 1399
Fort Charlotte, FL 33948
(941) 629-0554 FAX(941) 629-0554
e-mail: <larryy2002@aol.com>

184 PUBLICITY
James E. Smith
The Boeing Company (TEMC)
MS: H021-714 Attn: Jim
5301 Bolsa Ave.
Huntington Beach, CA 92647-2099
(714) 896-1670 FAX(714) 896-5534
e-mail: <james.e.smith4@boeing.com>

185 VP - CONFERENCE MANAGEMENT
Carol Hocke rt

186 SITE SELECTION
Anthony Anderson
Guideline Instruments, Inc.
103 Commerce St., Suite 180
Lake Mary, FL 32746
(407) 333-3327 FAX(407) 333-3309
e-mail: <anderson@ncsl.org>
NCSL INTERNATIONAL COMMITTEE CHAIRS (Cont’d)

192 WORKSHOP & SYMPOSIUM STAFF

2003 DIRECTOR

Bill Wightman
Fluke Corporation
171 Archers Point
Longwood, FL 32779
(407) 333-9028 FAX(407) 333-4473
e-mail: <bill.wightman@fluke.com>

2004 DIRECTOR

Bernard Morris
Hart Scientific, Inc.
795 E. Utah Valley Dr.
American Fork, UT 84003-9775
(801) 763-1600 FAX(801) 763-1010
e-mail: <bernard.morris@hartsScientific.com>

NCSL INTERNATIONAL REGION COORDINATORS 2003

1100 VP - NORTHEASTERN US

Jeff Gust

1110 New England Region

Steve Griffin
Fluke Corporation
78 Miragey Lane
Westwood, MA 02090
(781) 762-9021 FAX(781) 225-9981
e-mail: <sgriffin@pc.fluke.com>

1111 New York/Pennsylvania/New Jersey Region

Joe Reinstein
Simco Electronics
2126 SW 28th St.
Allentown, PA 18103
(610) 793-0100 x28 FAX(610) 798-8231
e-mail: <jreinstein@simco.com>

1112 Upstate New York Section

Kyle LaVallette
CalSource
1045 W. Fayette St., Suite 4D
Syracuse, NY 13204
(315) 425-1151 FAX(315) 425-1175
e-mail: <kyle@calsource.com>

1113 Central Indiana Section

Jim McWilliams
Tangent Labs, LLC
5603 W. Raymond St., Suite 1
Indianapolis, IN 46268
(317) 477-2378 FAX(317) 477-2375
e-mail: <jimmcwilliams@ptscal.com>

1114 Northern Indiana Section

James Reilly
Michiana Calibration Service, Inc.
1996 E. McKinley Ave.
Mishawaka, IN 46545
(574) 255-6573 FAX(574) 259-8548
e-mail: <michanacal@aol.com>

1115 Michigan Section

Lonnie Spites
Dynamic Technology, Inc.
1200 N. Old US-23
P.O. Box 559
Hartland, MI 48353-0559
(810) 225-4601 x277 FAX(810) 225-4602
e-mail: <ispites@dynamictechnology.com>

1200 VP - SOUTHEASTERN US

Jeff Taylor

1210 Mid-Atlantic US Region

Kevin Abercrombie
Navy, Dept of
RDT&E Lab, Bldg. 1403, NAWCAD, Unit 7
2113 Forton Circle
Patuxent River, MD 20670-1118
(301) 342-1654 FAX(301) 342-0920
e-mail: <abercromblkr@navair.navy.mil>

1211 Maryland Section

Ramona Saar
American Association for
Laboratory Accreditation
5301 Buckeystown Pike, Suite 300
Frederick, MD 21704
(301) 644-3201 FAX(301) 652-2974
e-mail: <saar@a2la.org>
NCSL INTERNATIONAL REGION COORDINATORS (Cont’d)

1212 North Carolina Section
TBD

1213 Virginia Section
TBD

1220 Southern US Region
TBD

1221 Atlanta Section
Jay Romanek
Southern Marketing Associates
1950 Redd Rd.
Alpharetta, GA 30201
(770) 664-9797 FAX (770) 664-9795
e-mail: <smajay@bci.com>

1222 Central Florida Section
Ray Minch
Lockheed Martin Information Systems
MP 220
12500 Lake Underhill Rd.
Orlando, FL 32825-5002
(407) 305-2269 FAX (407) 305-2271
e-mail: <raymond.l.minchin@lmco.com>

1223 Huntsville Section
Greg St. Charles
Boeing Huntsville
MS: JY-66
P.O. Box 240002
Huntsville, AL 35824
(256) 772-2624
e-mail: <gregory.stcharles@hsv.boeing.com>

1224 Tennessee Section
Ada McConnell
Eastman Chemical Co
Tennessee Eastman Div. Bldg. 277A
P.O. Box 511
Kingsport, TN 37662
(423) 229-1941 FAX (423) 220-5516
e-mail: <ada@eastman.com>

1225 Puerto Rico Section
Angel Pabellon
Advanced Instruments
P.O. Box 29502
San Juan, PR 00936
(787) 752-1133 FAX (787) 762-1833
e-mail: <apabellon@advpr.com>

1300 VP - CENTRAL US
Carol Hockert

1310 North Central US Region
Terry Conder
3M Metrology Lab
3M Center Bldg. 205-1-01
St. Paul, MN 55144-1000
(651) 736-4331 FAX (651) 736-7325
e-mail: <tmconder@nmms.com>

1311 Twin Cities Section
Doug Evink
Palen Kinball Co.
550 Vandalia Dr.
St. Paul, MN 55114
(651) 647-4333 FAX (651) 542-2564
e-mail: <devink@palenkinball.com>

1312 Chicago Section
Tom Wallich
Baxter Healthcare Corp.
MS: WG2-25
Route 120 E. Wilson Rd.
Round Lake, IL 60073-0940
(847) 270-2500 FAX (847) 270-5559
e-mail: <thomas.wallich@baxter.com>

1313 St. Louis Section
Brent W. Griffith
Boeing Company
MC: ST2-2199
P.O. Box 516
St. Louis, MO 63186-0516
(314) 232-9247 FAX (314) 232-3445
e-mail: <brent.w.griffith@boeing.com>

1314 Kansas City Section
Roger Burton
Honeywell FM&T
E14 B23
P.O. Box 410159
Kansas City, MO 64141-6159
(816) 997-5431 FAX (816) 997-3856
e-mail: <rbuton@kcp.com>

1315 Central Illinois Section
TBD

1316 Rockford Illinois Section
Gordon Sklum
Rock Valley College
3301 N. Mullford Rd.
Rockford, IL 61114-5699
(815) 554-5537 FAX (815) 554-4459
e-mail: <adlsc3gp@rvc.cc.il.us>

1317 Madison Wisconsin Section
Jay Bucher
Promega Corp.
5445 E. Cheryl Pkwy.
Madison, WI 53711
(608) 277-2522 FAX (608) 277-2516
e-mail: <jbucher@promega.com>

1320 South Central US Region
Tom Wunsch
Sandia National Laboratories
Primary Standards Laboratory
P.O. Box 5600
Albuquerque, NM 87185-5055
(505) 844-4339 FAX (505) 844-7699
e-mail: <twunsch@sandia.gov>

1321 Central Texas Section
Allen Todd
Fluke Corporation
2104 Hutton Dr., Suite 112
Corpus Christi, TX 78306
(972) 406-1000 x713 FAX (972) 247-5542
e-mail: <allentodd@fluke.com>
<table>
<thead>
<tr>
<th>Region</th>
<th>Coordinator</th>
<th>Address</th>
<th>Phone Numbers</th>
<th>Email Addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Texas Section</td>
<td>Keith Scoggins</td>
<td>South Texas Project Nuclear Operating Co., MS: L-1001, Metrol. &amp; Radiation, P.O. Box 239, Wadsworth, TX 77414</td>
<td>(361) 972-7742 FAX(361) 972-8388</td>
<td><a href="mailto:keith.scoggins@htcmail.com">keith.scoggins@htcmail.com</a></td>
</tr>
<tr>
<td>Boulder/Denver Section</td>
<td>Dale Varner</td>
<td>Lockheed Martin Technical Operations, MS: P6962, P.O. Box 179, Denver, CO 80201</td>
<td>(303) 977-8323 FAX(303) 971-5635</td>
<td><a href="mailto:dkscoggins6@hotmail.com">dkscoggins6@hotmail.com</a></td>
</tr>
<tr>
<td>Albuquerque Section</td>
<td>Tom Wunsch</td>
<td>Sandia National Laboratories, Primary Standards Laboratory, P.O. Box 5800, Albuquerque, NM 87185-0665</td>
<td>(505) 844-4356 FAX(505) 844-7499</td>
<td><a href="mailto:twunsch@sandia.gov">twunsch@sandia.gov</a></td>
</tr>
<tr>
<td>Gulf Coast Section</td>
<td>Ken Garcia</td>
<td>Lockheed Martin Technical Operations, Bldg. 5100, Room M110, Stennis Space Center, MS 39529</td>
<td>(228) 813-2075 FAX(228) 813-2073</td>
<td><a href="mailto:lgarcia7@hotmail.com">lgarcia7@hotmail.com</a></td>
</tr>
<tr>
<td>1400 VP - Western US</td>
<td>Derek Porter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central California/Nevada Region</td>
<td>Guy Fleming</td>
<td>Lockheed Martin Technical Operations, Bldg. 156A, O/A 3-91, P.O. Box 61887, Sunnyvale, CA 94089-1697</td>
<td>(408) 742-7575 FAX(408) 742-4435</td>
<td><a href="mailto:g.fleming@lmco.com">g.fleming@lmco.com</a></td>
</tr>
<tr>
<td>Southwestern US Region</td>
<td>Wayne Banda</td>
<td>Raytheon Systems Company, Bldg. 911, P.O. Box 11337, Tucson, AZ 85734</td>
<td>(520) 791-4483 FAX(520) 794-5058</td>
<td><a href="mailto:w.banda@raytheon.com">w.banda@raytheon.com</a></td>
</tr>
<tr>
<td>Las Vegas Valley Section</td>
<td>Miguel Cerceo</td>
<td>Amgen, Inc., MS: 21-2-C 1 Amgen Center, Thousand Oaks, CA 91320-1789</td>
<td>(805) 447-1128 FAX(805) 499-9732</td>
<td><a href="mailto:mcercceo@amgen.com">mcercceo@amgen.com</a></td>
</tr>
<tr>
<td>LA/Orange Co. Section</td>
<td>James E. Smith</td>
<td>The Boeing Company (TEMC), MS: H021-F144 Alt: Jim, 5301 Bolsa Ave., Huntington Beach, CA 92647-2099</td>
<td>(714) 896-1870 FAX(714) 896-5534</td>
<td><a href="mailto:james.e.smith4@boeing.com">james.e.smith4@boeing.com</a></td>
</tr>
<tr>
<td>San Diego Section</td>
<td>TBD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phoenix-Tucson Section</td>
<td>TBD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utah Section</td>
<td>Bernard Morris</td>
<td>Hart Scientific, Inc., 799 E. Utah Valley Dr, American Fork, UT 84003-9775</td>
<td>(801) 763-1699 FAX(801) 763-1010</td>
<td><a href="mailto:bernard.morris@hartsientific.com">bernard.morris@hartsientific.com</a></td>
</tr>
<tr>
<td>Northwest US Region</td>
<td>Keith Cable</td>
<td>Northwest Calibration Systems, P.O. Box 81205, Seattle, WA 98106-1205</td>
<td>(206) 762-2515 FAX(206) 762-5880</td>
<td><a href="mailto:kcable@nwcal.com">kcable@nwcal.com</a></td>
</tr>
<tr>
<td>CANADA Region</td>
<td>Carlos Sanzalazos</td>
<td>Atomic Energy of Canada Ltd., CPCS Sherburn Park SF3, 2251 Speakeian Dr., Mississauga, ON L5K 1B2 Canada</td>
<td>(905) 823-9040 x2199 FAX(905) 823-8448</td>
<td><a href="mailto:sanzar@aecl.ca">sanzar@aecl.ca</a></td>
</tr>
<tr>
<td>Canada Region Secretariat</td>
<td>Wayne Sampson</td>
<td>Pylon Atlantic, Inc., 201 Wright Ave., Dartmouth, NS B3B 1V6 Canada</td>
<td>(902) 483-3444 x244 FAX(902) 483-1203</td>
<td><a href="mailto:wsampson@pylonelectronics.com">wsampson@pylonelectronics.com</a></td>
</tr>
<tr>
<td>Eastern Canada Section</td>
<td>Wayne Sampson</td>
<td>Pylon Atlantic, Inc., 201 Wright Ave., Dartmouth, NS B3B 1V6 Canada</td>
<td>(902) 483-3444 x244 FAX(902) 483-1203</td>
<td><a href="mailto:wsampson@pylonelectronics.com">wsampson@pylonelectronics.com</a></td>
</tr>
<tr>
<td>Eastern Ontario Section</td>
<td>Jim Mullins</td>
<td>Pylon Electronics, Inc., 147 Colonnade Rd., Nepean, ON K2E 7L9 Canada</td>
<td>(613) 226-1920 FAX(613) 226-8195</td>
<td><a href="mailto:jmullins@pylonelectronics.com">jmullins@pylonelectronics.com</a></td>
</tr>
<tr>
<td>Quebec Section</td>
<td>Adrien Michaud</td>
<td>QMC Electronics, Inc., MS: 60 600 Dr. Frederick Philips Blvd., St. Laurent, PO H1M 2A9 Canada</td>
<td>(514) 748-3000 x4074 FAX(514) 748-3149</td>
<td><a href="mailto:adrien.michaud@qmcelectronics.ca">adrien.michaud@qmcelectronics.ca</a></td>
</tr>
<tr>
<td>Western Ontario Section</td>
<td>Mark Reid</td>
<td>CalMatrix Technical Services, Inc., 1495 Bonhill Rd., Unit 1 &amp; 2 Mississauga, ON L5T 1M2 Canada</td>
<td>(905) 564-6235 FAX(905) 564-6399</td>
<td><a href="mailto:mreid@calmatrix.com">mreid@calmatrix.com</a></td>
</tr>
</tbody>
</table>
NCSL INTERNATIONAL REGIONAL COORDINATORS (Cont'd)

5420 Hyderabad Section
Dr. S.P. Venkatesh
Vimta Labs Limited
142, IDA Phase II
Cherlapally, RR Dist.
Hyderabad - 500 051, India
011 91 40 726 4400 FAX:011 91 40 726 3657
e-mail: <vimta@ntd.net.in>

5430 Bangalore Section
K.R. Walle
Bharat Heavy Electricals Limited
(Electronics Division)
P.B. No. 2606, Mysore Road
Bangalore, Karnataka - 560 028, India
011 91 80 6791895 FAX:011 91 80 6740137
e-mail: <k.r.walle@bhel.in>

5440 Delhi Section
S.K. Kothari
Electronics Regional Test Lab (North)
STOC Directorate
'S' Block, Okhla Industrial Area, Phase 9
New Delhi 110 020, India
011 91 11 638 4219 FAX:011 91 11 638 4524
e-mail: <skkothari@net.in>

LIAISON DELEGATES

22.02 GIDEOP METROLOGY COMMITTEE
Jim Carlton
GIDEOP Operations Center
P.O. Box 8000
Corona, CA 92878-8000
(909) 273-4958 FAX(909) 273-5200
e-mail: <carltonja@corona.navy.mil>

22.03 MEASUREMENT SCIENCE CONFERENCE (MSC)
James E. Smith
The Boeing Company (TEMC)
MS: H021-F144 Attn: Jim
5301 Bolsa Ave.
Huntington Beach, CA 92647-2099
(714) 896-1670 FAX(714) 896-5534
e-mail: <james.e.smith4@boeing.com>

22.04 ORGANISATION INTERNATIONALE DE METROLOGIE LEGALE (OIML)
Dr. Charles Ehrlich
NIST
Bldg 820, Rm 224
100 Bureau Dr., Stop 2150
Gaithersburg, MD 20899-2150
(301) 975-4834 FAX(301) 975-5414
e-mail: <charles.ehrlich@nist.gov>

22.06 AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
Craig Gulka
NCSL International
1800 30th St., Suite 305B
Boulder, CO 80301-1026
(303) 440-3339 FAX(303) 440-3384
e-mail: <cgulka@ncsll.org>

22.07 CONFERENCE ON PRECISION PRECISION ELECTROMAGNETIC MEASUREMENT (CPEM)
Norman W. Bielecki
4713 Mill Run Dr.
Derwood, MD 20855-1156
(301) 869-4520
e-mail: <n.bielecki@ieee.org>

22.09 ISA INTERNATIONAL
Mike Suraci
7940 NE Keara Rd.
Bainbridge Island, WA 98110-1555
(206) 842-7321 FAX(206) 780-8157
e-mail: <mikesuraci@aol.com>

22.10 EUROPEAN COOPERATION FOR ACCREDITATION (EA)
Graham Cameron
Standards Council of Canada
270 Albert St., Suite 200
Ottawa, Ontario K1P 6N7 Canada
(613) 238-3222 x496 FAX(613) 569-7808
e-mail: <gcameron@scc.ca>

22.11 INSTITUTE OF ELECTRICAL & ELECTRONICS ENGINEERS INSTRUMENTATION & MEASUREMENT (IEEE I&M)
Dr. David Braudaway
103 Ranch Rd.
P.O. Box 9
Sandia Park, NM 87047-0009
(505) 281-5911 FAX: same (call first)
e-mail: <dbraudaway@sandia.org>

22.12 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
Roxanne Robinson
American Assn. for Lab Accreditation
5301 Buckeyslown Pike, Suite 350
Frederick, MD 21704
(301) 644-3206 FAX(301) 662-3974
e-mail: <rrobinson@alaa.org>

22.13 COUNCIL FOR OPTICAL RADIATION MEASUREMENTS (CORM)
Sally Bruce
NIST
Optical Technology Div., MS: 8441
100 Bureau Dr.
Gaithersburg, MD 20899-8441
(301) 975-2323 FAX(301) 975-5700
e-mail: <sbruce@nist.gov>

22.14 JLC/CCG
Arman Hovakemian
Naval Surface Warfare Center
MS00
P.O. Box 5000
Corona, CA 92878-5000
(909) 273-5221 FAX(909) 273-4904
e-mail: <hovakemian@corona.navy.mil>
LIAISON DELEGATES (Cont’d)

22.15 INTERNATIONAL MESSTECHNISCHE KONFEDERATION (IMEKO)

Mike Suraci
7940 NE Koura Rd.
Bainbridge Island, WA 98110-1555
(206) 842-7321 FAX(206) 780-8157
e-mail: <mikesuraci@ao.com>

22.19 AMERICAN PHYSICAL SOCIETY

Dr. Klaus Jaeger
Jaeger Enterprises
13085 Calle Tacuba
Saratoga, CA 95070-4918
(408) 887-1743 FAX(408) 887-3765
e-mail: <jaegerenterprises@ntbl.com>

22.21 INTL LAB ACCREDITATION COOP. (ILAC)

Anthony Anderson
Guildline Instruments, Inc.
103 Commerce St., Suite 100
Lake Mary, FL 32746
(407) 333-3227 FAX(407) 333-3209
e-mail: <an Anderson@guildline.com>

22.25 NATL. CONF. OF WEIGHTS & MEASURES

Georgia Harris
NIST
Office of Weights & Measures
100 Bureau Dr., Stop 2600
Gaithersburg, MD 20899-2600
(301) 975-4014 FAX(301) 926-0647
e-mail: <g harris@nist.gov>

22.26 ASIA/PACIFIC METROLOGY PROGRAM

Dr. Katuo Seta
Research Center for Measurement Standards
1-1-4 Umezono, Tsukuba Science City
Ibaraki, Japan 305-8563
011-81-298-54-4362 FAX:011-81-298-54-4393
e-mail: <seta@rcms.go.jp>

22.27 ASSOCIACION MEXICANA DE METROLOGIA (AMMAC)

Roberto Benitez
Metra, S.A. de C.V.
Alfonso Reyes #2620
Francisco, Mexico
011-52-81-83-702600 FAX:011-52-81-8129-4646
e-mail: <r benitez@metra.co mx>

22.28 AMERICAN SOCIETY FOR QUALITY (ASQ)/MEASUREMENT QUALITY DIVISON

Christopher L. Goschman
Compac Computer Corp.
Corporate Metrology, MS: 070110
P.O. Box 692000
Houston, TX 77070-6900
(281) 518-8486 FAX(281) 518-7275
e-mail: <chris goschman@compaq.com>

22.29 NORTH AMERICAN CALIBRATION COOPERATION/ NORTHERN AMERICAN METROLOGY COOPERATION (NAC/NORAMET)

Doug Faison
NIST
Stop 2140
100 Bureau Dr.
Gaithersburg, MD 20899-2140
(301) 972-6304
e-mail: <faison@c ni.gov>

22.30 INSTITUTE OF ENVIRONMENTAL SCI. & TECH.

Robert L. Mielke
Abbott Laboratories
1400 Sheridan Rd.
N. Chicago, IL 60064
(847) 938-9111 FAX(847) 937-4834
e-mail: <robert.mielke@abbott.com>

22.33 ASIA PACIFIC LABORATORY ACCREDITATION COOPERATION (APLAC)

Peter S. Unger
American Assn. for Lab Accreditation
5301 Buckeys town Pike, Suite 350
Frederick, MD 21704-8373
(301) 644-3212 FAX(301) 662-2074
e-mail: <punger@a2la.org>

22.35 BRAZILIAN SOCIETY OF METROLOGY (SBM)

Mauricio Mogueira Frota
Sociedade Brasileira de Metrologia
Av. Beira Mar, 2625 Andar Castelo
Rio de Janeiro, RJ 20221-060 Brazil
011-5521-544-5751 FAX:011-5521-544-5527
e-mail: <mfrota@mac.puc-rio.br>

IF YOU HAVE NAME/ADDRESS/PHONE/FAX/E-MAIL CHANGES TO THE NEWSLETTER ORGANIZATIONAL ROSTER, OR CHANGES TO THE ORGANIZATION CHART, MAPS, OR METROLOGY CALENDAR. Please fax changes directly to the NCSL International Business Office (303) 440-3384, or E-mail at <info@ncsl.org>
**NCSL INTERNATIONAL GEOGRAPHIC ORGANIZATION**

**Regions in the U.S.A.**

<table>
<thead>
<tr>
<th>Region</th>
<th>President</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Central US</td>
<td>Terry Conder</td>
<td>(651) 736-4331</td>
</tr>
<tr>
<td>Twin Cities Section</td>
<td>Doug Eshen</td>
<td>(651) 647-1633</td>
</tr>
<tr>
<td>Chicago Section</td>
<td>Tom Weirlich</td>
<td>(847) 270-2600</td>
</tr>
<tr>
<td>St. Louis Section</td>
<td>Brent W. Griffin</td>
<td>(314) 232-0947</td>
</tr>
<tr>
<td>Kansas City Section</td>
<td>Roger Burton</td>
<td>(816) 997-5431</td>
</tr>
<tr>
<td>Madison WI Section</td>
<td>Jay Bucher</td>
<td>(608) 277-2522</td>
</tr>
<tr>
<td>Rockford Illinois Section</td>
<td>Gordon Skattum</td>
<td>(615) 854-6837</td>
</tr>
<tr>
<td>South Central US</td>
<td>Tom Wunsch</td>
<td>(505) 644-4359</td>
</tr>
<tr>
<td>Central Texas Section</td>
<td>Allen Todd</td>
<td>(972) 406-1000 x713</td>
</tr>
<tr>
<td>South Texas Section</td>
<td>Keith Scoggins</td>
<td>(361) 972-7472</td>
</tr>
<tr>
<td>Boulder/Denver Section</td>
<td>Dale Varner</td>
<td>(303) 977-0517</td>
</tr>
<tr>
<td>Albuquerque Section</td>
<td>Michelle Monsam</td>
<td>(505) 794-0545</td>
</tr>
<tr>
<td>Gulf Coast Section</td>
<td>Ken Garza</td>
<td>(229) 813-2075</td>
</tr>
<tr>
<td>Central CA/Nev</td>
<td>Guy Fleming</td>
<td>(408) 742-7857</td>
</tr>
<tr>
<td>Southwestern US</td>
<td>Wayne Benda</td>
<td>(520) 794-4483</td>
</tr>
<tr>
<td>LA/Valley Section</td>
<td>Miguel Ceresso</td>
<td>(805) 447-1128</td>
</tr>
<tr>
<td>Orange County Section</td>
<td>James E. Smith</td>
<td>(714) 895-1670</td>
</tr>
<tr>
<td>San Diego Section</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>Phoenix/Tucson Section</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>Utah Section</td>
<td>Bernard Morris</td>
<td>(801) 793-1600</td>
</tr>
<tr>
<td>Northwestern US</td>
<td>Keith Cable</td>
<td>(206) 762-2515</td>
</tr>
<tr>
<td>New England</td>
<td>Steve Griffin</td>
<td>(781) 762-8621</td>
</tr>
<tr>
<td>NY/PANJ</td>
<td>Joe Reinstein</td>
<td>(610) 798-0100 x29</td>
</tr>
<tr>
<td>New York City Section</td>
<td>Don Bansen</td>
<td>(813) 559-8300 x723</td>
</tr>
<tr>
<td>Upstate New York Section</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>Philadelphia Section</td>
<td>Joe Moran</td>
<td>(656) 664-4251</td>
</tr>
<tr>
<td>Pittsburgh Section</td>
<td>Karl Kevens</td>
<td>(412) 431-4600</td>
</tr>
<tr>
<td>Mid-Western US</td>
<td>Lloyd Baker</td>
<td>(734) 484-8758</td>
</tr>
<tr>
<td>Northern Ohio Section</td>
<td>Tom Powis</td>
<td>(216) 552-0050</td>
</tr>
<tr>
<td>Ola/Kentucky Section</td>
<td>Charlie Hays</td>
<td>(740) 788-5612</td>
</tr>
<tr>
<td>Central Indiana Section</td>
<td>Joe Kaukka</td>
<td>(317) 497-2378</td>
</tr>
<tr>
<td>Northern Indiana Section</td>
<td>James Reidy</td>
<td>(574) 256-6573</td>
</tr>
<tr>
<td>Michigan Section</td>
<td>Lennie Spinks</td>
<td>(586) 262-0011 x727</td>
</tr>
<tr>
<td>Mid-Atlantic US</td>
<td>Kevin Abarcrombie</td>
<td>(301) 342-1654</td>
</tr>
<tr>
<td>Maryland Section</td>
<td>Ramona Sear</td>
<td>(301) 644-0081</td>
</tr>
<tr>
<td>Virginia Section</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>Southern US</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>Atlanta Section</td>
<td>Dennis Fuller</td>
<td>(713) 813-8053</td>
</tr>
<tr>
<td>Central Florida Section</td>
<td>Ray Minchin</td>
<td>(407) 308-2089</td>
</tr>
<tr>
<td>Huntsville Section</td>
<td>Greg S. Charles</td>
<td>(256) 772-2024</td>
</tr>
<tr>
<td>Tennessee Section</td>
<td>Ade McConnell</td>
<td>(423) 229-1041</td>
</tr>
<tr>
<td>Puerto Rico Section</td>
<td>Angel Pacheco</td>
<td>(787) 752-1133</td>
</tr>
</tbody>
</table>
# Publications Price List

## Available Formats

<table>
<thead>
<tr>
<th>Format</th>
<th>Members</th>
<th>Non-Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## NCSLI Newsletter (single copy)
- **Members**: $5.00
- **Non-Members**: $10.00

## Laboratory Management Publications
- **Laboratory Management Publications CD**
- **Acronym List (7/89)**
- **NCSLI Glossary of Metrology-Related Terms**
- **Catalog of Intrinsic and Derived Standards (3/99)**
- **1999 or 2001 Benchmarking Survey (PDF Only)**
- **U.S. or Canadian National Measurement Requirements Comm. Report 2000**
- **"Guide to Achieving Laboratory Accreditation" (3/02)**
- **"Guide to Measurement Uncertainty for Calibration Laboratories" - DRAFT**

## Standards
- **ANSI/NCSL Z540-1-1994**
  - (Calibration & Measurement & Test Equip. General Requirements)
- **ANSI/NCSL Z540-2-1997**
  - (U.S. Guide to the Expression of Uncertainty in Measurement)
- **NCSLI Recommended Practices**:
  - **RP’s on CD-ROM**
  - **RP-1 "Establishment & Adjustment of Calibration Intervals" (1/96)**
  - **RP-3 "Preparation of Calibration Procedures" (1/90)**
  - **RP-4 "Calibration System Specifications" (7/71)**
    - superseded by ANSI/ISO/IEC 17025
  - **RP-6 "Calibration Control Systems for the Biomedical and Pharmaceutical Industry" (5/99)**
  - **RP-7 "Laboratory Design" (11/00)**
  - **RP-8 "An Individual Equipment Evaluation Guide" (10/88)**
  - **RP-9 "Calibration Laboratory Capabilities Documentation Guidelines" 7/89**
  - **RP-10 "Establishment & Operation of Electrical Utility Metrology Laboratory" (8/91)**
  - **RP-11 "Reports & Certificates of Calibration" (10/91)**
    - superseded by ANSI/ISO/IEC 17025
  - **RP-12 "Determining & Reporting Measurement Uncertainties" (4/95)**
  - **RP-13 "Computer Systems in Metrology" (2/98)**
  - **RP-14 "Guide to Selecting Standards-Laboratory Environments" (3/99)**

## NCSLI Workshop & Symposium Proceedings:
- **1990-1997 Composite (CD-ROM only)**
- **1998, 1999, 2000, 2001 or 2002 (CD-ROM only) per CD**

## NCSLI Recommended Intrinsic/Derived Standards Practices:
- **RISP’s on CD-ROM**
  - **RISP-1 "Array Josephson Junction" (1/02)**
  - **RISP-2 "Triple Point of Water Cell" (5/95)**
  - **RISP-3 "Quantized Hall Resistance" (8/97)**
  - **RISP-4 "Deadweight Pressure Gauges" (7/98)**
  - **RISP-5 "Two-Pressure, Two Temperature Humidity Generator" (3/02)**

## Miscellaneous:
- **Duplicate or Replacement Plaques (members only)**
- **NCSLI 3-Ring Binders (pricing by contacting the NCSLI Business Office)**
- **Video "What Is NCSL International?"**
- **Royal Egyptian Cubit Poster (supply limited)**

**Note:** Bound (HC) copies of all NCSLI publications are available only as supplies last. Otherwise, Print On-demand (OD) copies will be available at cost plus a $20.00 handling charge.

**Payment:** Please remit payment with order (in U.S. funds only). Make checks payable to NCSL International. Purchase Orders are accepted. Or charge to your Visa, MasterCard or American Express by phone.

**Shipping:** Member prices include shipment to U.S. locations via U.S. Mail or UPS Ground. Non-Member and Overseas shipments are sent via U.S. Mail, UPS Ground or by using an alternate courier. Contact the NCSLI Business Office for rates.
Publication Order Form

Date: __________________________

Ordered by: ___________________________________________ Telephone No.: ______________________________

Ship to: Company: ______________________________________
Attn: ________________________________________________
Address: _____________________________________________
City/State/Zip Code: __________________________________

Is shipping address Residence_____ or Business_____?

<table>
<thead>
<tr>
<th>Publication/Item</th>
<th>Quantity</th>
<th>Cost</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*S&H (if app.)
Total cost

UPS or Federal Express (if requested): 3-day____ 2-day____ Overnight____

Purchase Orders: Refer to the NCSLI Publications list for pricing information. Your purchase order may be mailed or faxed to the NCSLI Business Office. Please be sure to include complete shipping and billing information. Non-Member Purchase Orders will have shipping cost added to the purchase order unless we are contacted for charge. No phone orders.

Payment by check: Please remit payment with order (in US funds only). Make checks payable to NCSL International. Shipping: Member prices include shipping to US locations via US Mail or UPS Ground. Non-Member and Overseas orders are sent via US Mail, UPS Ground, or by using an alternate courier service. Contact the NCSLI Business Office for rates before placing order.

Credit Card Payment:

Charge: _____ Visa _____ MasterCard _____ American Express

Full name of Card Holder as it appears on card: ________________________________

Card Number: ___________________________ Expiration Date: ______________________

Date: ________________________ Signature: _______________________________

Credit Card Receipt:
Please check one: _____ Enclose with shipment _____ Fax to: __________________________

NCSL International Use Only:

Check No. & Date: ______________________ Credit Card Approval No. & Date: ____________

Date shipped: _______________ Via: __________________ Order filled by: __________________
2003 Application for Membership in NCSL International
(Individual Professional, or Student)

NCSL International is a nonprofit association of laboratories or organizations that maintain or have an interest related to measurement standards and calibration facilities.

Member Information:

Member Name

Mailing Address

City	 State	 Postal Code	 Country

Telephone Number	 Extension	 Fax Number

E-mail address

Signature

Date

Student Memberships Only:

Name and Location of School:

Contact Name: Contact Phone:

To be eligible to join as a Student member, applicant must be classified as a full-time student at his or her respective school, which will be verified with that school.

☐ New Individual Professional Member Fee (Annual) $85

☐ New Student Member Fee (Annual) $35

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

Full name of card holder as it appears on card

Card Number	 Expiration Date

Date: Signature:

Individual and student membership would consist of:

- Subscription to Newsletter
- Post resumes on Website
- Search for jobs on Website
- Purchase publications at reduced member rates
- Borrow training aids
- Attend Conference and Tutorials at reduced member rates
NCSL International is a nonprofit association of laboratories or organizations that maintain or have an interest related to measurement standards and calibration facilities. Each member organization appoints a "Member Delegate" who has the responsibility of representing the member company or organization in NCSL International.

Member Company or Organization (Enter name as it is to appear on membership certificate and wall plaque)

Member Delegate information:

Member Delegate's Name
Title
Department or Division
Delegate's Business Mailing Address
City State Postal Code Country
( ) Telephone Number Extension Fax Number
E-mail address
Company's URL Address

Appointing Officer* information:

Appointing Officer's Name
Title
Department or Division
Mailing Address (if different from Member Delegate)
City State Postal Code Country
( ) Telephone Number Extension Fax Number
E-mail address
Signature of Appointing Officer
Date

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

For NCSL International use only

Date Rec'd Check/CC App #
Date Approved Date Plaque List #
Manual Sent Computer Entry
Region
Account #
SIC Codes

☐ STUDENT MEMBERSHIP FEE: $50 per year
Student membership would consist of a subscription to the newsletter, and access to training and employment information on the NCSLI website. Student members would also be able to purchase any NCSLI publications at the reduced member prices.
### NCSL International Staff

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Craig Gulka</td>
<td>Business Manager</td>
<td><a href="mailto:cgulka@ncsli.org">cgulka@ncsli.org</a></td>
</tr>
<tr>
<td>Joan Wilshire</td>
<td>Office Manager</td>
<td><a href="mailto:jwilshire@ncsli.org">jwilshire@ncsli.org</a></td>
</tr>
<tr>
<td>Doris Schaffner</td>
<td>Admin. Support Asst.</td>
<td><a href="mailto:dschaffner@ncsli.org">dschaffner@ncsli.org</a></td>
</tr>
<tr>
<td>Larry Johnson</td>
<td>Computer Specialist</td>
<td><a href="mailto:lajohnson@ncsli.org">lajohnson@ncsli.org</a></td>
</tr>
</tbody>
</table>

NCSL International Business Office  (303) 440-3339  
1800 30th St., Suite 305B  or Toll Free (866) 519-NCSL  
Boulder, CO 80301-1026  Fax: (303) 440-3384  
<info@ncsli.org>  <www.ncsli.org>

### Newsletter Editorial Schedule for 2003-04

<table>
<thead>
<tr>
<th>Issue Date</th>
<th>In Mail</th>
<th>To Printer</th>
<th>Last Editorial to Editor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jul. 03</td>
<td>10 Jul. 03</td>
<td>20 Jun. 03</td>
<td>1 Jun. 03</td>
</tr>
<tr>
<td>Oct. 03</td>
<td>10 Oct. 03</td>
<td>20 Sep. 03</td>
<td>1 Oct. 03</td>
</tr>
<tr>
<td>Jan. 04</td>
<td>10 Jan. 04</td>
<td>20 Dec. 03</td>
<td>1 Dec. 03</td>
</tr>
<tr>
<td>Apr 04</td>
<td>10 Apr. 04</td>
<td>20 Mar. 04</td>
<td>1 Mar. 04</td>
</tr>
</tbody>
</table>

**Editor's Note:**

This schedule is for guidance for anyone who needs to submit material for publication in the Newsletter.

### Future Conferences

- **2003 NCSL International Workshop & Symposium**
  - August 17-21, 2003
  - Tampa, FL

- **2004 NCSL International Workshop & Symposium**
  - July 11-15, 2004
  - Salt Lake City, UT

Abstracts are required for Workshops, Panels, and Papers. For more information contact:

NCSL International Business Office  
1800 30th St., Suite 305B  
Boulder, CO 80301-1026  
Tel: (303) 440-3339  
Fax: (303) 440-3384  
E-mail: <info@ncsli.org>  
<www.ncsli.org>

### Board of Directors' Meeting Dates

- **April 28-30, 2003**
  - Boulder Marriott Hotel  
  - Boulder, CO

- **August 17, 22-23, 2003**
  - Tampa Convention Center  
  - Tampa, FL

(In conjunction with the NCSL International Workshop & Symposium, August 17-21, 2003)

### NCSL International Publications Club

If your company is already a member of NCSL International, then you may be eligible to subscribe to the NCSL International Publications Club and receive your own copy of the many publications available through NCSL International. Contact the Business Office for details -- (303) 440-3339. See inside for application, or go to the NCSL International web site at <www.ncsli.org>