



NCSLI Newsletter

NCSL International

Serving the World of Measurement Since 1961

President's Message



*Dave Agy
NCSLI President*

Annual Workshop & Symposium

Do you ever think about timing? This year's Annual Conference is about a month earlier than recent years' conferences. This means a lot of you will be reading this President's message in Salt Lake City at the Conference. And, due to editorial timing, this message is due about six weeks prior to the Conference, consequently I have only the earliest statistics to report.

Happily, at the end of the advanced registration period, registrations for both the Conference and Tutorials are up from previous years. Further, there are over 130 exhibitors and the Technical Program CD will have 95 papers, the most ever. Thank you all for your strong response and participation in this year's Conference. I'd also like to take this opportunity to recognize the Conference Committee for their hard work, which makes this an outstanding event!

Our speakers this year are excellent. The Keynote Speaker is Graeme Drake. Graeme is currently Head of Conformity Assessment with the International Organization for Standardization (ISO) based in Geneva.

continued on page 50

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On the cover: Courtesy of Lockheed-Martin

TABLE OF CONTENTS

THE SALT LAKE CITY CONFERENCE	3
BEST APPLIED METROLOGY PAPER, 2003, GEORGE RODRIQUES	7
BEST QUALITY & MANAGEMENT PAPER, 2003, ROXANNE ROBINSON ..	11
REPORTS FROM THE BOARD	15
METROLOGY CALENDAR	19
TRAINING INFORMATION	20
SOMEONE YOU SHOULD KNOW-JEFF GUST	21
SOMEONE YOU SHOULD KNOW-CHRIS GRACHANEN	22
REPORTS FROM THE REGIONS	23
SCENES FROM THE BOULDER BOARD MEETING	34
COMMITTEE NEWS	35
NEWS FROM THE NMIs (Previously NIST NEWS)	40
NCSLI NEWSNOTES	47
LIAISON NEWS	48
WELCOME TO OUR NEW NCSLI MEMBERS	52
NCSLI MANAGEMENT ROSTER	53

TOO MANY BLANK PICTURES IN ROSTER

If you are listed on the organizational roster on pages 53-62, do not have a photo, and will be in Salt Lake City, please be sure to find a member of the photography team to snap a photo of you for the Newsletter! Alternatively, you can send your own photo to Editor John Minck.

EDITOR'S MESSAGE —

The Changing Face of Calibration

I came into my career entering engineering school in 1948, the very year the transistor was invented at Bell Labs. Everything in instrumentation from the college labs to my early years doing blast-line testing for atomic bombs was vacuum tubes. To say that routine calibration of those measurement systems was crucial is a wild understatement. You could put as much negative feedback around vacuum tube amplifiers as you liked, to stabilize gain, but they still deteriorated with time. Components which determined the frequency of oscillators were just as subject to drift. Analog filters and most other analog components inherently weren't very stable. Oh, we thought we were running at the state of the art, which I guess we were, for that period.



*John Minck
NCSLI Editor*

When I joined Hewlett-Packard in 1958, they were just introducing their first transistor product, the HP 721A power supply (150 ma), trivial by today's standards. But the whole catalog was full of vacuum tube products and would remain so for some years. The measurement world was truly ready for NCSLI's debut in 1961. Measurement assurance finally went professional, driven strongly by the burgeoning military/aerospace needs for worldwide precision and traceability. (See our July 2001 anniversary newsletter supplement for a historical narrative.)

Continued on page 39

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NCSL International Workshop & Symposium



Salt Lake City, UT

July 11-15, 2004

The definition of metrology, from the simplest - *The science of measurement*, to the most complex - *The science of measurement for determination of conformance to technical requirements including the development of standards and systems for absolute and relative measurements*, may need to be reconsidered in light of increased responsibilities for calibration laboratories. Over the last decade, there has been a dramatic increase in the requirements applied to all levels of the international measurement system. Thanks, in large part, to national and international standards, standards and calibration laboratories in particular have had to consider becoming both registered [ISO 9000] and accredited [ISO 17025]. Even National Metrology Institutes must implement a full quality program. No longer is it enough to just concentrate on providing a good, traceable measurement, metrologists must also be concerned with training, documentation, metrics, customers, complaints, etc., as well as the political and legal aspects of metrology

It is important even with all of the new requirements that metrologists not lose sight of the primary responsibility of the laboratory - to provide good measurements to their customers. Join us in Salt Lake City for the 2004 NCSL International Workshop & Symposium to discuss this and many other issues facing the metrology community.

Papers, Panels & Workshops:

The Technical program offers papers, panels, and workshops that explore this year's Conference theme, and are organized into the following five categories:

- ▲ Theoretical
- ▲ Applied
- ▲ Management & Quality
- ▲ International
- ▲ Invited

Exhibits:

Meet with key executives and leading technical experts from over 120 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:

The 2004 Conference will include a series of tutorials presented before and after the conference. There will be more tutorials this year than in past years. Some of the subjects to be covered include Temperature, Accreditation, and Uncertainty, among others. Please visit the NCSLI Website, <www.ncsli.org>, for the titles and abstracts of all of the 2004 tutorials.

Please join us in Salt Lake City, Utah, prepared to learn, to teach, and to develop new professional relationships with your fellow Metrologists.

For more information, please visit our website at <www.ncsli.org/conference/2004/>



NCSL International 2004 Workshop and Symposium Registration



July 11-15, 2004 - Salt Lake City, Utah

Conference language: English
Conference currency: USD

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<input type="checkbox"/> Late	After June 14, 2004	\$800	\$1000	\$200
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Dinner/Square Dance at This is the Place - Heritage Park				
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(G2) DOD	(T) Technical College
(G3) DOT	(U) University

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NCSL International 2004 Workshop and Symposium

Tutorial Registration

July 10, 11 & 16, 2004 - Salt Lake City, Utah

Conference language: English

Conference currency: USD



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			Member/Non-member	After 6/14/04
<input type="checkbox"/> Fundamentals of Temperature Calibration	Sat. July 10	8:00 a.m. - 12:00 p.m.	\$110/140	\$130/160
<input type="checkbox"/> Temperature Calibration Uncertainty Analysis	Sat. July 10	1:00 p.m. - 5:00 p.m.	\$110/140	\$130/160
<input type="checkbox"/> Introduction to the Evaluation of Uncertainty	Sat. July 10	1:00 p.m. - 5:00 p.m.	\$110/140	\$130/160
<input type="checkbox"/> Microwave Measurement Principles, Techniques and Uncertainties	Sun. July 11	8:00 a.m. - 5:00 p.m.	\$190/230	\$210/250
<input type="checkbox"/> Laboratory Accreditation: The Process from A to Z	Sun. July 11	8:00 a.m. - 12:00 p.m.	\$110/140	\$130/160
<input type="checkbox"/> Running an Effective Laboratory - The Measurement Beyond Metrology	Sun. July 11	8:00 a.m. - 12:00 p.m.	\$110/140	\$130/160
<input type="checkbox"/> Good, Bad, or Indeterminate: Using Guardbands to Help Make the Call	Sun. July 11	8:00 a.m. - 12:00 p.m.	\$110/140	\$130/160
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<input type="checkbox"/> Who Accredits the Laboratory Accrator?	Sun. July 11	1:00 p.m. - 5:00 p.m.	\$110/140	\$130/160
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<input type="checkbox"/> Pipette Calibration and Use: Methods for REDucing Variability via Uncertainty Analysis and Bench-top Verification	Sun. July 11	1:00 p.m. - 5:00 p.m.	\$110/140	\$130/160
<input type="checkbox"/> Basics of Vibration, Shock, Accelerometers and Their Calibration	Sun. July 11	1:00 p.m. - 5:00 p.m.	\$110/140	\$130/160
<input type="checkbox"/> GasFlow Calibration and Uncertainties Using MolBloc/Molbox	Sun. July 11	1:00 p.m. - 5:00 p.m.	\$110/140	\$130/160
<input type="checkbox"/> Advanced Topics in Uncertainty Analysis	Fri. July 16	8:00 a.m. - 12:00 p.m.	\$110/140	\$130/160
<input type="checkbox"/> Laboratory Data Management: If the Data Don't Match, Then the Answers Won't Hatch	Fri. July 16	8:00 a.m. - 12:00 p.m.	\$110/140	\$130/160
<input type="checkbox"/> Methods, Traceability and Uncertainties for Hardness Testing	Fri. July 16	8:00 a.m. - 12:00 p.m.	\$110/140	\$130/160

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(CL) Commercial Lab	(G1) DOC	(PC) Private College
(CG) Consulting	(G2) DOD	(T) Technical College
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BEST APPLIED METROLOGY PAPER, 2003

BIAS, UNCERTAINTY AND TRANSFERABILITY IN STANDARD METHODS OF PIPETTE CALIBRATION

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Executive Summary

This paper compares the bias, uncertainty and transferability in two current standards of pipette calibration: ASTM E 1154; and ISO 8655-6:2002. Both these standards are based on the gravimetric principle, in which the weight of a liquid is measured using a balance and converted to volume using an accepted formula.

The paper compares and contrasts the two important current gravimetric standards, and presents experimental work that quantifies the error contribution of some of the most significant sources pertaining to pipette calibration using gravimetry.

To assess the uncertainty of the measurement method, the uncertainty introduced by the various means described in the respective standards for controlling, measuring, and compensating for the effect of evaporation are evaluated. Data are presented to quantify the uncertainty in estimates of the evaporation rate, and the bias incurred as a result of neglecting evaporation.

To assess the uncertainty attributed to the device under test, experimental work is presented to confirm the significant impact that changes in environmental relative humidity and operator technique exert on the mean volume delivered by air displacement pipettes.

COMPARISON OF GRAVIMETRIC STANDARDS

This section compares and contrasts the two most widely-used current standards for pipette calibration using the gravimetric method, ASTM E 1154 (1997) and the newer ISO 8655-6:2002. It also presents an overview of the gravimetric method, and a brief history of the evolution of today's standards.

Overview of the Gravimetric Method

Gravimetry refers to the measurement of the weight of water and its conversion to volume using an accepted formula (see Figure 1 below). Gravimetric methods involve these basic procedures:

1. A balance of adequate performance is used.
2. A receiving vessel, typically made of glass, is placed on the balance pan.
3. Apart from the balance is a source vessel, which contains the liquid to be dispensed. For calibration purposes under these gravimetric standards, the liquid is water.
4. An initial reading (tare weight) of the receiving vessel is taken.
5. A pipette to be tested is used to aspirate water from the source vessel.
6. This volume of water is then delivered to the receiving vessel.

7. The draft shield of the balance is closed to seal the weighing chamber.
8. A final weight of the sample liquid plus the receiving vessel is taken.

With any gravimetric method, there is some instability due to evaporation in the sample itself. This evaporation must be estimated and appropriate compensation made. Figure 1 shows the equation for converting the weight of a liquid to a volume and compensating for evaporation.

$$V_G = Z(T_w, T_A, P_A) \times (W_1 - W_0 + e)$$

Figure 1: Calculation of delivered volume.

The terms of the equation are as follows: V_G is the gravimetric volume measured; W_1 is the final weight after dispensing the sample volume; W_0 is the initial (tare) weight; e is a correction term for the amount of liquid that evaporates during the weighing cycle. Thus $(W_1 - W_0 + e)$ yields the differential weight; i.e., the weight of the dispensed liquid as shown on the balance. This weight is converted to volume using the "Z factor," which properly accounts for the air buoyancy and liquid density effects. The Z factor is a function of the temperature of the water (T_w), the temperature of the air (T_A), and the barometric pressure (P_A). Tables of the Z factor are available; these tables typically make the simplifying assumption that the air and water are at thermal equilibrium.

To summarize, the primary factors influencing this measurement equation are:

- The density of the water as function of its temperature
- Air buoyancy as a function of air temperature and barometric pressure
- Evaporation as a function of temperature and relative humidity

Secondary considerations in gravimetric measurements include:

- A balance of adequate resolution must be used. ISO 8865-6, for example, provides requirements for minimum balance resolution in relationship to the volume to be weighted.
- Any of the normal factors that could influence a weighing on a balance, such as air currents or electrostatic forces, need to be considered and controlled. In particular, air currents can influence not only the settling rate, but also the evaporation rate of the unstable liquid sample.
- Likewise, because the receiving vessel is typically made of glass, and pipette tips are typically made of polypropylene, electrostatic forces can also be significant.

An important advantage of the gravimetric method is that it entails a small materials expense, notwithstanding the acquisition of an appropriate balance. However, proper execution of gravimetric methods of pipette calibration, particular at small volumes, requires considerable time, attention to detail, and some expertise.

Historical Overview of Gravimetric Standards

This section summarizes the recent history of consensus standards for pipette calibration using gravimetry. The most influential modern standards are shown on the timeline in Figure 2.

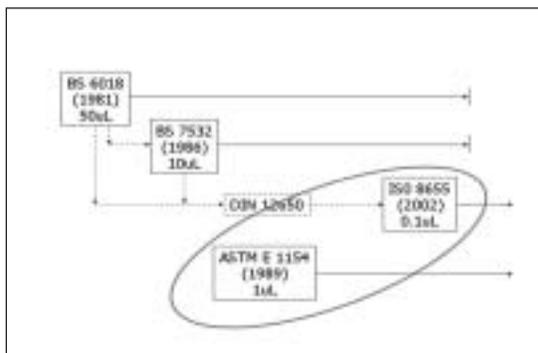


Figure 2: Consensus standards applicable to gravimetric pipette calibration.

The British Standard 6018, approved in 1981, applied to pipettes down to and including 50µL. This was adequate for the volume ranges of glass pipettes and the larger air displacement pipettes in use at that time. However, even in 1981, and more so in subsequent years, pipettes of volumes well below 50µL were produced. The overall market trend has clearly been towards smaller and smaller volume pipetting devices, and the corresponding standards have attempted to follow this trend.

In 1986, British Standard 7532 was released, extending the BS 6018 methods to smaller volumes down to and including 10µL. The major differences between BS 7532 and BS 6018 concerned the inclusion in the latter standard of a means of correcting for evaporation, which at volumes below 50µL was judged to be a significant source of error that required compensation.

These British Standards, as well as other work undertaken in Germany, were used as source material for the revision of the DIN 12650 standard. DIN 12650 was issued in parts during the period from 1978 to 1983, and work to revise this standard was still ongoing in 1998 when the work of the DIN committee was transferred to ISO Technical Committee 48.

In the United States, the ASTM E 41 committee produced the ASTM 1154 in 1989, which was a standard for gravimetric pipette calibration with a scope of applicability down to 1µL. ASTM 1154 was re-approved in 1997, with balloting for re-approval to begin again in the spring of 2003.

In the meantime, work on the DIN 12650 standard (now within ISO TC 48), resulted in the issuance in 2002 of the ISO 8655 family of standards. Part 6 of this standard specifies a gravimetric method of calibration with a lower range of applicability of 0.1µL.

Changes in gravimetric standards for pipette calibration over the last 20+ years have principally resulted in the incremental extension of the lower range of applicability from 50µL down to 0.1µL. It is interesting to note, however, that the methodology for controlling evaporation specified in ISO 8655 is very similar to that described in BS 7532. However, even though evaporative compensation methods have not much changed, the same lower limit of applicability of the method has been extended by two orders of magnitude. It is open to consideration whether the extension of these methods to

increasingly small volumes is rigorously valid. In any event, a significant minority of pipettes currently in use can dispense volumes less than 50µL. And a small but growing number of applications below 0.1µL have evolved for which there are no current standards for gravimetric calibration.

Comparison of ASTM 1154 and ISO 8655

The primary goal of Part 1 of this paper is to compare and contrast the ASTM 1154 and ISO 8655 methods. To facilitate this comparison, we start by examining some details of the language within these standards searching for differences that might introduce bias between them. Then we present an experimental method and data that examines these potential biases. This experimental data can then be used to estimate measurement uncertainty.

There are significant points of disagreement between these two standard methods, particularly as regards the estimation of evaporation. ASTM 1154 specifies a method of evaporation using a blank trial. It states in Section 13.6.2.11:

Perform a control blank for estimation of evaporation by repeating (prior sections) exactly as in a normal sample weighing but without actually delivering any liquid to the weighing vessel.

It is worthwhile to note from a compliance viewpoint the use of the word "exactly." It raises questions as to how exact a replication is required. In a strict sense this is probably not an assessable clause, as all methods are bound to be at some variance from this requirement for an exact estimation. However, the intent of this language is clear: the user is to mimic the normal weighing process as closely as possible, in order to obtain as representative an evaporative estimate as possible.

ISO 8655, in contrast, offers greater compromise with respect to estimating evaporation; it states in Section 7.2.8 that:

After the last weighing leave the weighing vessel on the balance pan for the time measured in (prior section) and record its mass...

Here the general approach to estimating the sample instability is to use a differential weighing over a timed interval. It requires the user to note how long it takes to perform a calibration, leave the balance undisturbed for an equivalent time period, and then use the evaporative weight loss during that period as an estimate to apply to calibration. For addition weighing cases, however, it seems intuitively likely that this method should produce an underestimation of the evaporative weight, because the draft shield remains closed throughout the interval. During normal weighing the shield would be open and closed a number of times, increasing air flow and hence evaporation. Data discussed below will address the significance of this source of potential variability.

ISO 8655 includes further statements regarding evaporative compensation. In Section 7.2.8 it states:

...if a weighing vessel with a lid is used, omit (step 7.2.8), as a correction for evaporation is unnecessary.

Introducing further flexibility, ISO 8655 seemingly clouds the above statement in Section 6.3, which in regard to the problem of evaporative control and correction states:

...an evaporation trap could be used ... evaporation can be determined...

When using a lid over the weighing vessel, the letter of the standard requires the user to omit evaporative compensation. The question then arises as to the significance of the evaporative loss that is ignored. Even though a tightly covered weighing vessel greatly improves sample stability, the procedure requires removal of the cover for subsequent additions, each instance of which permits evaporation to occur.

SUMMARY OF STANDARDS COMPARISON

To summarize the most relevant points from the above discussion:

- ASTM 1154 describes a single, detailed gravimetric method.
- ASTM 1154 requires that evaporation be estimated by "exact" blank trials.
- ISO 8655 describes a "family of methods" (i.e., options) in which evaporative correction is in some cases optional.
- Where it requires correction, ISO 8655 specifies that evaporation be estimated using a timed trial.

The uncertainty of standard gravimetric calibration methods was investigated experimentally at ARTEL, as described below. Following these discussions, subsequent sections present further experimental data concerning those factors that may influence the uncertainty associated with pipettes themselves.

EXPERIMENTAL METHODS

The general approach taken in these experiments is to use one or more wire artifacts of known (or determinable) weight as surrogates for a liquid volume of unknown weight. Since these wires are stable artifacts that can be uniquely identified, they can be used to load the balance as needed to assess the repeatability and bias of a variety of weighing process configurations. For each experimental method, three types of weighing processes were evaluated. These are:

- Simple weighing; i.e., weighing on a bare pan
- Dry process weighing, in which the wire artifacts are weighed in the presence of associated equipment such as a receiving vessel, evaporation trap, etc., but with no water in the receiving vessel
- Wet process weighing, which is similar to the dry process, except that water is added to the receiving vessel.

Experimental data was collected by systematically stepping through each of these three measurement processes for a given method. Four different methods were evaluated, as described below. The data collected from each method were analyzed under the minimum requirements of the two gravimetric procedures. By this analysis the uncertainty and bias of each method and standard combination could be estimated.

Method 1: Weighing a 10mg Artifact Using an Evaporation Trap

In this method, an evaporation trap was used to increase the relative humidity in the vicinity of the receiving vessel. A significant increase in local relative humidity, and hence a decrease in the evaporation rate, can be obtained in this way; however, there is still instability in the sample.

This method attempts to mimic a pipette calibration process using tare addition. But rather than delivering an unknown quantity of liquid to the receiving vessel, a wire artifact of known mass was instead delivered to the top of the receiving vessel. The mass of this artifact is stable and can be calibrated in a dry environment. The method tests the ability of the measurement process to return the known value corresponding to the mass of the artifact.

The procedure employed in this method is to:

1. Calibrate the weight of the wire artifact
2. Determine its weight using the standard wet measurement process
3. Check whether the weight returned by the calibration method matches that determined by convention "dry" calibration.

The data were gathered in ARTEL's calibration laboratory using a Mettler AX205 balance with the manufacturer's evaporation trap in place. Figure 3 shows a photograph of the experimental setup.



Figure 3: Setup used to weigh 10mg samples with an evaporation trap.

The mass of the wire artifact was determined using a Mettler MT5 balance in six-place mode (microgram resolution). The graph in Figure 4 shows the repeatability of the weighing of that artifact.

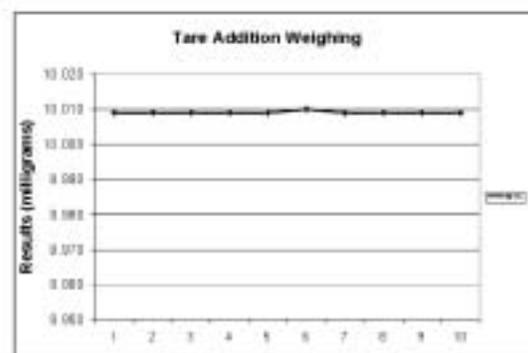


Figure 4: Weight of wire artifact on a six-place balance.

Figure 5 shows the repeatability of weighing of the wire artifact on the five-place AX205 balance. The reduced repeatability compared to Figure 4 is due to the lower balance resolution.

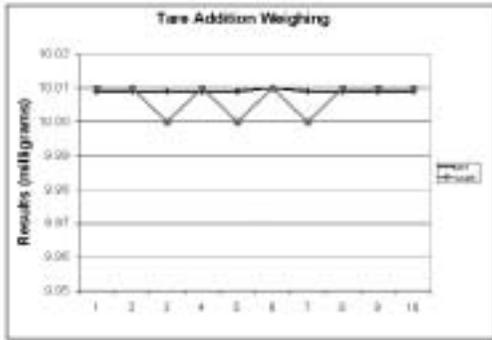


Figure 5: Weight of wire artifact on a five-place balance.

Next, the evaporation trap was assembled, a glass receiving vessel was placed on the AX205 balance pan, and water was added to the receiving vessel. Then we weighed the wire artifact once again. As Figure 6 shows, the results returned in this phase of the method are lower than the weight obtained in the "dry" case. This difference in the "wet" case is attributable to evaporation.



Figure 6: Weight of wire artifact in "wet" case using evaporation trap.

WEIGHT FOLLOWING CORRECTION VIA THE ASTM METHOD

Using the ASTM 1154 method of mimicking the weighing process described above as precisely as possible, an average correction factor for evaporation can be determined. The result of applying this correction factor to the uncorrected result illustrated in Figure 6 is shown in Figure 7.

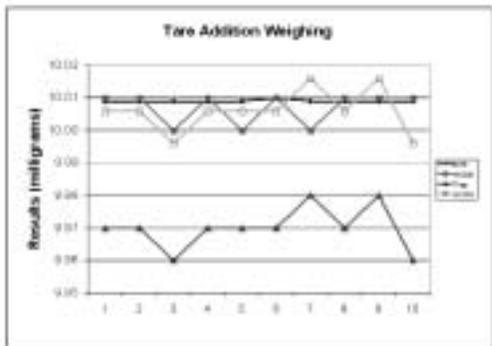


Figure 7: Weight of wire artifact following evaporative correction using ASTM method.

Here it is evident that the mean value for the weight of the artifact moves up much closer to the previously determined weight, but scatter increases somewhat. This is due to the variability in evaporation within each individual trial. Thus, the ASTM method seems to provide a good estimate of average evaporation, but with some variability across trials, as is typical in methods of this type.

Weight Following Correction via the ISO Method

When weighing the wire artifact with an evaporation trap using the ISO 8655 method, no correction is made to the values obtained, because the standard permits the omission of evaporative correction when appropriate controls (such as an evaporation trap) are used. Thus, a user operating in compliance with ISO 8655 could report a mean result of 9.97mg, whereas a user complying with ASTM 1154 would report a result some 0.40mg higher. Figure 8 plots the relative size of the random errors as standard uncertainties. The sign and magnitude of the bias (converted to nanoliters) is also shown.

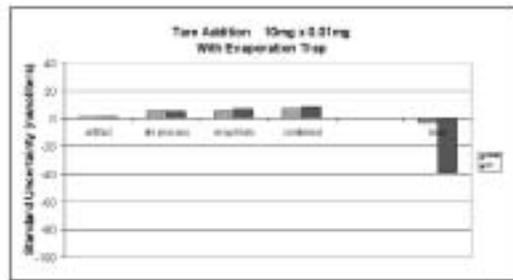


Figure 8: Comparison of bias at 10mg with evaporation trap.

The bias between the mean values in the "wet" and "dry" cases is small for the ASTM method. In the case of the ISO method applied without correction, the bias is statistically significant, in that it is larger than the uncertainty attributable to the random error. Under the ISO Guide to the Expression of Uncertainty in Measurement (GUM) this bias should preferably be quantified and corrected, as the GUM states that "It is assumed that the result of a measurement has been corrected for all recognized significant systematic effects and that every effort has been made to identify such effects." (Section 3.2.4)

Method 2: Weighing a 10mg Artifact in Controlled Humidity

This method, which was also a tare addition method, uses elevated relative humidity in the laboratory environment as a means to increase sample stability by reducing evaporation. Both the ASTM 1154 and ISO 8655 standards set minimum facility requirements for relative humidity. In this case, under the ISO method for example, the required relative humidity is greater than 50%.

Data were again gathered in ARTEL's calibration laboratory using a Mettler AX205 balance. For this method, an elevated relative humidity in the 50-55% range was used instead of an evaporation trap.

Editor's Note: This paper, like others before it, was too long for my limited space in the newsletter. If you want the complete paper, you can request the electronic file from the author or send an email to me at my editor's email.

BEST QUALITY & MANAGEMENT PAPER, 2003

ANATOMY OF AN INTERNATIONAL PEER EVALUATION

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Abstract:

The International Laboratory Accreditation Cooperation was established in 1978 and has since emerged as the foremost authority on laboratory accreditation issues. ILAC members include laboratory accreditation bodies throughout the world and other interested stakeholders from governments, private organizations, and laboratories. ILAC focuses on the development of harmonized procedures for laboratory accreditation activities and works to bring to the attention of the international community the importance of laboratory accreditation as a tool to facilitate trade, and in particular the acceptance of data from accredited laboratories to reduce or eliminate re-testing and re-calibration.

ILAC's greatest achievement in recent history was the October 2000 signing of the first international mutual recognition arrangement (MRA) in laboratory accreditation. Forty-four accreditation bodies throughout the world signed this arrangement and by doing so, agreed to formally recognize and promote the equivalency of the test and calibration reports issued by laboratories accredited by the other signatories. This created the first comprehensive global network of accredited laboratories. Prior to then, two regional networks existed through the European cooperation for Laboratory Accreditation (EA) MRA and the Asia Pacific Laboratory Accreditation Cooperation (APLAC) MRA.

The magnitude of the commitment signatories make is remarkable. By signing the MRA, each signatory is in effect agreeing that organizations that could be potential competitors in the laboratory accreditation market (other signatories) are doing their job at least as well as the signatory accreditation body is doing it.

How can these organizations have such confidence in the other signatory accreditation bodies? The answer lies in the peer evaluation process that accreditation bodies are subjected to in order to become eligible for signatory status. The process includes a rigorous week-long evaluation of the accreditation body's operations, its laboratories, and its assessors by a team of international accreditation experts and a critical review of the evaluation results by established committees before a decision can be rendered.

This paper will explore the peer evaluation process as recently experienced by the American Association for Laboratory Accreditation (A2LA) during its March 2002 multi-regional international peer re-evaluation for renewal as a signatory to the MRAs for ILAC, EA, APLAC, National Cooperation for Laboratory Accreditation

(NACLA) and a new regional cooperation, the Inter-American Accreditation Cooperation (IAAC).

1. Introduction

In general, it seems known and understood that quality system registrars are accredited by the Registrar Accreditation Board (RAB) that in turn is recognized by the International Accreditation Forum (IAF).

But the question has been raised more and more frequently, "Who accredits the Laboratory Accreditor?" There has been a proliferation of laboratory accreditation bodies in the United States within the last few years, due in large part to the requirements of QS 9000 (1998) for accredited calibration services. Calibration laboratories pursuing accreditation are often confused about which laboratory accreditation body to choose to meet their needs. If their only client is ultimately an American Automaker, then the laboratory should be content with the services that an accreditation body recognized by the Big 3 can give them.

However, if that calibration laboratory is interested in providing services to international clients or is interested in supporting testing laboratories that are providing services at an international level, then the calibration laboratory must be accredited by an internationally recognized laboratory accreditation body. The question is then asked, "What is so special or different about the international recognition process for laboratory accreditation bodies?" The simple answer is "Confidence." There must be confidence that the accreditation bodies are competently accrediting testing and calibration laboratories for their competence to perform the tests or calibrations on their scopes of accreditation. This level of confidence is fundamental to the obligations of the MRA that each signatory accreditation body has to promote the acceptance of data from accredited laboratories of each MRA partner.

Each laboratory accreditation cooperation (e.g. ILAC, APLAC, EA, NACLA, IAAC) is governed by peer accreditation body representatives in accordance with requirements and guidelines established by each cooperation. These include articles of incorporation, by-laws, business plans, and policies and procedures to operate as Cooperations. [3] There are also policies and procedures for recognizing the accreditation bodies that wish to become signatories to the cooperation's MRA. [1] [4] Apart from the requirement that each accreditation body must meet ISO/IEC Guide 58 and their laboratories must comply with ISO/IEC 17025, the Cooperations also have requirements relating to measurement traceability and proficiency testing. Strong guidance is also offered for controlling the use of the accrediting body's logo and defining the laboratory's scope of accreditation, for example. Further information concerning the documents issued by each cooperation can be gathered from the respective websites:

ILAC: < www.ilac.org >
APLAC: < www.aplac.org >
EA: < www.european-accreditation.org >
NACLA: < www.nacla.net >
IAAC: < www.iaac.org >

Accreditation bodies gain the confidence of their peers by first joining as a "member" (this does not confer signatory status), interacting at the international level, attending conferences and participating on the committees that develop the policies, procedures, guidelines and requirements for recognition. Confidence, respect and camaraderie grow as dedication and commitment to the conditions of the mutual recognition arrangements are demonstrated. This also affords the laboratory accreditation body the opportunity to increase its knowledge of the expectations and requirements for recognition.

When a Cooperation "member" can demonstrate that they operate an accreditation program for testing laboratories and/or calibration laboratories, and can provide evidence that they are operational and committed to comply with the requirements and obligations of the MRA and are recognized in their economy as offering a laboratory accreditation service, they are then eligible to be peer evaluated. [3]

Peer evaluators are usually senior staff members representing the signatories to the cooperation. Each evaluator has been trained and qualified by their Cooperation. The lead evaluator must be additionally qualified for that role. The team of evaluators is chosen based on its technical expertise to cover the depth and breadth of the programs offered by the applicant accreditation body. The team always has at least two members. An applicant accreditation body can request a pre-evaluation.

2. The Peer Evaluation Process

When A2LA was evaluated in March 2002, the team not only covered the breadth of the A2LA accreditation programs, but also pulled representatives from five different Cooperations to make up the team. This team composition offered the opportunity not only for each team member to confirm their confidence in the competence of A2LA to accredit laboratories, but also for each to confirm that their cooperation's requirements and process for recognition equated well with the others. As A2LA has held signatory status for some time and there had been no significant changes to their program, a pre-evaluation was not necessary.

2.1 Team Composition

Identification of the team leader and suitable team members was the first priority. As A2LA is signatory to Cooperations that circle the globe, the final team composition [5] was as follows:

Team Leader: HKAS (Hong Kong Accreditation Service) representing APLAC

Team Members:

SCC (Standards Council of Canada) representing IAAC and APLAC

CNLA (Chinese National Laboratory Accreditation) representing APLAC

UKAS (United Kingdom Accreditation Service) representing EA

AASHTO (American Association for State and Highway Transportation Officials) representing NACLA

Evaluation and continuation of recognition by APLAC and EA would also ensure the continued recognition of A2LA as a signatory to the greater ILAC MRA.

The testing and/or calibrations from A2LA accredited laboratories are recognized by a number of federal regulators that were interested in observing this evaluation to confirm their continued confidence in A2LA's competence to accredit the laboratories they recognize. Representatives from the Federal Communication Commission (FCC), from the US EPA National Lead (Pb) Laboratory Accreditation Program and from the NIST National Voluntary Conformity Assessment Service were observers to this evaluation, along with an observer from IAAC, and from the National Resource Council (NRC) of Canada representing the National Calibration Committee (NACC). [5] Observers are allowed to watch and listen but are not allowed to interfere in any way in the progress of the evaluation.

2.2 Document Review

Via email, A2LA provided each team member with a full set of quality system documentation so that a full document review against the requirements of ISO/IEC Guide 58 and the Cooperations' requirements could be performed by the team members. [5] These documents included:

- Quality Manual;
- Key Performance Indicators Report addressing A2LA's compliance with the major criteria associated with recognition;
- Standard Operating Procedures;
- General and specific requirements for accrediting the laboratories;
- Traceability Policy;
- Proficiency Testing Policy;
- Advertising Policy for Use of the Accreditation Logo;
- Measurement uncertainty guidance;
- Summaries of proficiency testing participation by the laboratories, including international and domestic programs and measurement audit programs; and
- ISO/IEC Guide 58 compliance checklist

The team was also given a number of web sites to access information concerning NIST capabilities. One of the critical components of a peer evaluation is ensuring that the accreditation body has access to appropriate measurement institutes that can provide suitable traceability to the SI. When a peer evaluation of an accreditation body takes place in an economy that has never before undergone a peer evaluation, a visit to the economy's national metrology institute is usually included as part of the peer pre-evaluation.

The team leader is primarily responsible for completing the document review. The team leader requested clarifications from A2LA on certain issues and once satisfied, worked with the team members and A2LA to set acceptable dates for the peer evaluation. The dates for the peer evaluation were established as March 17 through 22, 2002. You might note that March 17, 2002 was a Sunday. Because of the large size of the A2LA programs, the team thought it prudent to begin the evaluation on Sunday and a number of the A2LA staff was able to accommodate them. [5]

2.3 The Headquarters Evaluation [5]

The agenda was developed so that the team arrived from their various corners of the world on Friday March 15th or Saturday March 16th depending on the extent of expected jet lag. The team met in a closed meeting on Saturday evening to confirm responsibilities and decide on courses of action.

The full team and two observers arrived at A2LA headquarters at 10:00 am on Sunday morning. There was an opening meeting where welcomes and introductions were made and the team leader described the purpose and scope of the evaluation. A2LA staff clarified any issues and answered any questions that the team needed to have answered in order to move forward in the agenda. Then the team dispersed to begin evaluation of the office operations and to interview A2LA staff. Each team member had been assigned to cover specific portions of the requirements for recognition.

The team leader looked into the organizational structure, levels of experience and expertise of the staff, the composition of the technical advisory committees and the policies and procedures for accreditation of the laboratories. He also reviewed the A2LA requirements for proficiency testing and the effectiveness with which A2LA monitored the participation of the laboratories in proficiency testing and followed up on the laboratories' corrective action process for outlying results. He was also responsible for determining that A2LA was meeting the terms of the mutual recognition arrangement.

Another team member focused on the assessor program that A2LA has to support the accreditation of the laboratories. A2LA's process for recruiting, training, qualifying and monitoring the assessors was looked at very carefully and a significant sample of assessor records was perused to ensure that the documented assessor program was properly carried out. The team member was very careful to check that the assessors that were being assigned to assessments were suitably qualified (on paper anyway) to perform the assessments. This team member was also responsible for ensuring that A2LA's Traceability Policy was written and enforced in accordance with international requirements.

One team member looked specifically at the decision-making processes for granting, denying, suspending and revoking accreditation. The process for balloting the A2LA Accreditation Council was examined and the qualifications of each Accreditation Council member were also checked. This team member was also responsible for reviewing the implementation of A2LA's policy for traceability with respect to the reference materials that support the chemical and microbiological testing accreditation programs.

Another team member was responsible for examining implementation of the procedures used by A2LA to accredit a laboratory. This included procedures for accepting the applications, assigning the assessor(s), handling assessor reports, reviewing corrective actions from the laboratories and granting accreditation. The processes for performing surveillances and reassessments were also examined. Along with interviews with the staff, a sampling of laboratory assessment files was also reviewed. A2LA's database system for tracking the status of assessments and accreditation of the laboratories was inspected.

The fifth team member was responsible for verifying that A2LA had appropriate arrangements for ensuring that the accredited laboratories were aware of their accreditation responsibilities and that A2LA

properly enforced the laboratories' compliance with these conditions for accreditation. This team member also looked at A2LA's web site and the searchable scopes of accreditation that are there to ensure that the information presented there was valid and up-to-date.

2.4 Witnessing Assessments [5]

The team spent six hours on Sunday and six hours on Monday in the evaluation of the office operations. The team leader stayed an additional half-day on Tuesday. But confidence cannot be built completely just by a visit to the accreditation body's headquarters. Because the confidence that must be established includes confidence in the competence of the laboratories to provide valid test or calibration results, all of these peer evaluations also include witnessing of the assessors in the field.

Once A2LA received confirmation of the peer evaluation dates, the A2LA quality manager spent a frenzied few weeks finding appropriate testing and calibration laboratories that were willing to accept a peer evaluator, and sometimes an observer, into their laboratory for their assessment. A2LA received very short notice on confirmation of the evaluation dates that added to the burden of finding a suitable number of laboratories. The team leader, and the federal regulator representatives requested that laboratories in particular disciplines be witnessed. For example, the FCC understandably wanted to visit an electromagnetic compatibility (EMC) testing laboratory. There was also the need to mix up the types of assessments so that a sampling of new, renewal and surveillance assessments could be watched.

Laboratories that were coming up for their normally scheduled assessments were approached. Some laboratories are very wary of allowing the peer evaluator into their facility because they feel the assessor is going to be unusually hard on them because he is being watched. However, we received good cooperation from our laboratories and the appropriate laboratories and assessment types were secured for the witnessed assessments. It is A2LA policy that each witnessed assessment for the peer evaluation include an A2LA staff person who is there to answer any questions posed by the peer evaluator and clear up any confusions that may arise. The peer evaluator is not to interfere in any way in the assessment. Being a "fly on the wall" is *de rigueur*.

The peer evaluator has a number of responsibilities while witnessing the assessments. The laboratory is being watched to see if they are knowledgeable about the accreditation requirements, including A2LA policies and ISO/IEC 17025, and if they appear technically competent. The assessors are watched to see if they are technically qualified to perform the assessment, understand the requirements, have appropriate assessor skills and techniques and are implementing the requirements of the accreditation body in accordance with the guidance given to them by the accreditation body. The assessor's handling of traceability and measurement uncertainty in the laboratories is watched. The assessor's organizational skills and the reporting of non-compliances and report writing are also witnessed.

Following is the schedule of witnessed assessments for the peer evaluation of A2LA:

Tuesday, March 19, 2002 through Thursday, March 21, 2002

- The SCC representative witnessed the initial assessment of a food testing (Chemical/Biological) laboratory

- The CNLA representative and NACLA Representative witnessed the renewal assessment of a Construction Material and Geotechnical testing laboratory

Tuesday, March 19, 2002 through Wednesday, March 20, 2002

- The UKAS representative and the NACC observer witnessed the renewal assessment of an electrical calibration laboratory

Wednesday, March 20, 2002 through Thursday, March 21, 2002

- The team leader, FCC representative and NIST representative watched a renewal assessment of an EMC testing laboratory.

Thursday, March 21, 2002

- The UKAS representative witnessed the surveillance assessment of a scale/weight calibration laboratory

These laboratories were located as far away as Texas but A2LA was fortunate that a couple of them occurred in Maryland or an adjoining State.

The team reconvened for a private caucus on Friday morning, March 22, 2002 and spent the morning and greater part of the afternoon compiling the draft evaluation report and getting any last minute questions answered. Because each evaluator witnessed a different assessment, they needed to compare their notes and arrive at general conclusions about the effectiveness and technical expertise of the A2LA assessors in assessing the competence of the laboratories that are accredited. The effectiveness of the assessor program is the most critical element in ensuring the laboratories' competence. If the assessors are not technically qualified and properly trained, there is no possibility that the MRA signatories can have confidence in the competence of the laboratories being assessed.

2.5 The Results of the Evaluation [5]

The team held its closing meeting with A2LA late on Friday afternoon. All A2LA staff was invited to attend. The general conclusion of the evaluation team was that A2LA was operating in accordance with the requirements for recognition. Specifically:

- A2LA has the necessary financial stability, resources and organization structure for operating an impartial accreditation system;
- A2LA is a mature scheme, operating in a systematic manner;
- A2LA is recognized as an authoritative body by many public and private organizations;
- The top level national measurement system can provide measurement support to A2LA accredited laboratories;
- The A2LA assessors witnessed during the evaluation were technically competent to assess the tests or calibrations they were assigned to assess;
- A2LA demonstrates a strong commitment to APLAC, EA, IAAC, NACLA, and NACC activities, including their MRAs (note: NACC does not have an MRA)
- A2LA has participated in a number of APLAC and EA proficiency testing programs and has organized one program itself. The performance of their accredited laboratories was generally satisfactory and discrepancies identified were followed up; and
- A2LA monitors the performance of its accredited laboratories closely.

The team acknowledged the commitment of A2LA to improve the quality of their system and the extensiveness of its database system. The team noted that all of the laboratories, with the exception of one, were well equipped and staffed to carry out their scopes of accreditation. What was disconcerting to the evaluators (and to A2LA) was the fact that the laboratory that was not found to be well equipped or staffed was already holding A2LA accreditation. The team also noted that remedial actions taken by A2LA against the finding from its previous evaluations by APLAC, EA and NACLA were acceptable.

The team did not find any non-conformances but that does not mean they did not have some concerns that A2LA would have to address:

- "The construction materials laboratory visited during the evaluation (that's the one that was not found to be well equipped or staffed) had a system breakdown, but A2LA did not suspend the accreditation immediately and did not appear to have a mechanism to do so."

A2LA corrective action response: The A2LA General Requirements for Accreditation does give the President the authority to make an immediate decision to suspend a laboratory under certain conditions, including finding objective evidence that a laboratory has lost competence to perform the testing on a portion of, or all of the scope of accreditation. However the standard operating procedures (SOP) did not clearly state this policy. Two SOPs were revised to ensure that consideration for immediate suspension was taken where needed. A2LA staff was trained on these SOPs. The accreditation of this construction materials laboratory was suspended and a follow up assessment of the laboratory was mandated.

- "For the EMC and construction materials testing laboratories visited, the number of tests witnessed by the assessment team was only a very small percentage of the tests included in the proposed scopes of accreditation. For the EMC laboratory, whether the laboratory had the required standards were not inspected. A2LA should ensure that all tests included in the accredited or proposed scope of accreditation are adequately assessed and a representative sample witnessed."

A2LA corrective action response: A2LA did not agree that this concern was warranted. The peer evaluator was in attendance for this assessment for only the first day and a half of the three-day assessment. After the peer evaluator left, the assessors had to revise their schedule to extend the assessment time because of technical issues they uncovered. The assessment records (test method matrices) indicated that each test method or technologies was assessed to the appropriate depth and indeed a number of technologies were removed from the scope of accreditation because of the laboratory's lack of technical competence.

Editor's Note: This paper like others before it was too long for my limited space in the newsletter. If you want the complete paper, you can request the electronic file from the author or send an email to me at my editor's email.

REPORTS FROM THE BOARD

NCSLI RECOGNIZES TEN YEARS OF ACHIEVEMENTS OF CENAM



To celebrate the success of CENAM's first ten years, NCSL International presented the Director General of CENAM, Dr. Héctor Nava Jaimes with a plaque commemorating the achievement. The presentation took place during the semi-annual Council meeting of the Systema Interamericano de Metrologia (SIM), at CENAM, in early May.

The picture shows (L) Dr. Malcolm Smith, Deputy-Americas, International Division of NCSL International making the presentation to Dr. Nava. The ceremony was accompanied by senior CENAM staff. Salvador Echeverria Villagómez, CENAM's representative to the NCSL International Board, is hidden just behind Dr. Nava.

BIPM REPORT

Andrew Wallard

We were delighted to welcome Harry Moody and Klaus Jaeger to the BIPM last month. It was, I hope, a good chance for them and NCSLI to see the work of the BIPM and to understand more of our role.



International V.P. Klaus Jaeger and NCSLI President-in-Waiting Harry Moody, visit the home of BIPM, and are welcomed there at headquarters by Andrew Wallard.

Since last January we have been busy working on our links with international and intergovernmental bodies. With ILAC there are now a number of clearly identified areas of common interest which relate to the consistency of the world measurement system and a joint working group is drafting a common declaration of our aims and ambitions. It is also dealing with the harmonisation of things such as proposals to link the comparisons carried out within the CIPM MRA and those at accredited laboratory level (PT or ILCs), the use of the term Calibration and Measurement Capability (the Metre Convention) and Best Measurement Capability (the accreditation community).

With ISO we have recently become extremely active on behalf of the NMIs in the Metre Convention. In particular we are actively drawing their attention to clauses in the current drafts of ISO 17011 and ISO 17001 which are in conflict with Metre Convention policy or the positions which NMIs and Governments took at the last General Conference for Weights and Measures in October 2003. I have asked Rainer Kohler at the BIPM to act as liaison manager for our links with ISO and ILAC.

The VIM (International Vocabulary of Basic and General Terms in Metrology) and GUM working groups of the Joint Committee for Guides in Metrology met recently. Both have finished the current phases of their work and are consulting with the international community on the latest draft of the VIM and on supplements to the GUM which deal with uncertainty measurement. NCSLI may wish to consult NIST on how to make their inputs to this work.

Chemistry at the BIPM continues to grow. We have recruited two new staff members to deal with the coordination of NMI and other work in organic chemistry, with emphasis on pure materials. As I write, the Consultative Committee on Metrology in Chemistry is meeting and reviewing progress on its work, especially the results of a number of comparisons with applications to the biosciences, laboratory medicine and food.

The Joint Committee for Traceability in Laboratory Medicine met last month and agreed on the publication of a list of reference materials of "higher order" which will enable manufacturers of In-Vitro Diagnostic kits to demonstrate compliance with the requirements of the European IVD Directive. This is now on the BIPM web site.

OPPORTUNITY FOR NCSLI INPUTS FOR THE DRAFT 3RD EDITION OF THE VIM AND GUM SUPPLEMENT

Emil Hazarian

Urgent action requested

As mentioned in the report by Andrew Wallard above, the BIPM is soliciting survey inputs for the Draft 3rd Edition of the VIM (International Vocabulary of Basic and General Terms in Metrology). A Template has been developed by the BIPM for providing comments back to them. Each technical comment should be accompanied by a concrete proposal for change for the VIM Committee (JCGM-WG2) to consider.

NCSLI is soliciting and consolidating inputs for this document from its members through the Glossary Committee, chaired by Emil Hazarian. The DRAFT 3rd Edition of the VIM is posted on the NCSLI website < <http://www.ncsli.org/> > select Committee, Glossary, along with a comment form for submitting your response to Emil Hazarian:

< HazarianE@corona.navy.mil >.

We invite all interested individuals and organizations to take this unique opportunity to have a professional input in what it is the prime communication reference in our world of Metrology and beyond.

The deadline for receiving comments is the end of August.

Chuck Ehrlich (NIST, and member of VIM Committee) will be making a presentation on this Draft 3rd Edition at the closing NCSLI conference session in Salt Lake City (Thursday afternoon July 15) to discuss the key revisions and additions. Chuck will also help answer questions that might arise as NCSLI conducts this exercise.

GUM Review

There is another parallel JCGM review effort going on, this one in connection with the GUM. In particular, JCGM-WG1 (GUM Committee) has developed a Draft Gum Supplement titled Numerical Methods for the Propagation of Distributions that is being circulated for international review. Tyler Estler (NIST, and member of the GUM Committee) is requesting that any NCSLI

members who are interested contact him < tyler.estler@nist.gov > and he will e-mail them a copy of the Draft Supplement. Wolfgang Woger, a member of the GUM Committee from PTB, will be making a presentation about this Supplement and the other WG1 projects at the Thursday afternoon closing session.

ILAC/NACLA REPORT

Tony Anderson

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

In February I attended the ILAC Executive meeting in Mexico City as the Chair of the Laboratory Committee (LC). The main item on the agenda was to fine-tune the latest revision of the ILAC Business Plan and bring it to a final version as a top-level document. All the detail was moved into committee action plans and aligning the various committee's work programs with the goals of the plan. The committee work programs will be the mechanism by which the goals of the Business Plan will be executed. After final review by the Executive at the next meeting in June, the Business Plan and Work Programs will be presented for adoption to the General Assembly in Cape Town in October.

The Mark license documents submitted to ILAC's lawyers in The Netherlands have been approved and the worldwide registration process of the ILAC MLA Mark has begun in all the countries where there is a signatory body to the ILAC MLA. There are two parts to the license; the first which authorizes use by the Accrediting Bodies (ABs) signatories and a sub-license with their accredited laboratories. There are now other legal issues ILAC has to face as a corporation and thought is being given to the likelihood of litigation and the liability of its officers. Implementation of some form of hold-harmless agreement as a condition of ILAC membership is being considered by the Executive.

Current succession procedures in ILAC can cause the whole of the Executive to turn over every two years when all positions except the Laboratory Committee Chair are elected by the General Assembly. (The LC Chair is elected by the members of the Laboratory Committee and endorsed by the General Assembly) This situation causes management continuity problems and is to be addressed by an ad hoc group of the outgoing ILAC Chair and the LC Chair, who by their positions have no conflict of interest in the upcoming ILAC 2004 elections.

ILAC has been considering outreach to ABs who operate accreditation and inspection programs that do not use Guide 58 and ISO/IEC 17025 as the basis of their programs. A discussion paper has been prepared with a new member category, which for the moment has been called "collaborator", and is currently out for comment within the membership of ILAC.

Proficiency testing (PT) continues to be a well-debated topic within ILAC and with so many aspects to this vital part of accreditation, a PT Forum will now be part of the agenda of ILAC 2004 in Cape Town. An open discussion on PT testing was also part of the LC and TAIC agendas in Charleston.

ILAC has been concerned for some time about its relationship with ISO. ILAC finds itself too often in a reactionary position regarding

ISO matters. Following meetings last year and a presentation to the Executive in Bratislava, an MOU has been drawn up between ISO, ILAC and IAF encouraging better cooperation. This MOU was signed earlier this year in Geneva. The intent is to have a better high-level relationship, while continuing ILAC Liaison A status and involvement in CASCO working groups. One committee which ILAC seeks to have better representation on is TC 176. The current representation is insufficient for the many areas of activity of this ISO technical committee, and it was suggested that a member of the LC committee, who has wide CASCO working group experience, might fill this role and become the second representative. The LC has endorsed this idea and will provide the second liaison representative to TC 176.

In March I attended the ILAC, Public Affairs Committee (PAC), LC and Technical Accreditation Issues Committee (TAIC) meetings in Charleston, SC. The PAC continued work on its marketing (action) plan and aligned it with the ILAC Business Plan. Improvements to the ILAC website were discussed including having a place for committee chairs to post committee communications and documents.

A survey will be carried out to find out how ABs are promoting the MLA. A recent success story for ILAC is the acceptance by General Electric Aerospace of AB signatories to the MLA, see the A2LA website at <http://www.a2la.org/press_releases/Test_Lab_Newsletter1.pdf> for more information.

The LC meeting in Charleston covered many of the items already reported in the Executive part of this report. Other items not previously reported include the status of the LC survey on the implementation of ISO/IEC 17025, recently circulated. Over 1300 replies have been received to date, but some of the major economies, including the US, have yet to report. No specific trends have been compiled at this time, but a full report is expected in Cape Town. A copy of the survey is available (see below) and anyone interested may return the survey to ILAC, if they have not already received it via their AB.

As has been reported earlier, an open discussion on PTs was given significant agenda time at the LC meeting. If PT is used as a tool to widen surveillance intervals, the cost and overhead to laboratories for PT participation could escalate. The following points were noted from the discussion:

- that the differences between calibration ILCs and testing PT be given due attention;
- that judging the competence of PT providers remains an accreditation function;
- that ILAC strengthen its role as the enforcer of the equivalence of technical outcomes by taking the lead in determining the frequency of PT participation and the appropriateness of accreditation of PT providers.

In addition to the earlier comments regarding the release of the amended ISO/IEC 17025, the LC will be developing a resolution for the General Assembly in Cape Town to request that ILAC develop an implementation program for the amended standard that allows ABs to include reference to compliance with the principles of ISO 9000/2000 in the accreditation paperwork given to accredited laboratories. This will be developed after discussion at the Accreditation Policy Committee meeting in Bern.

I attended the ILAC TAIC meeting in Charleston and gave an LC report to the committee. The TAIC has a very large work program, which is being revised to align with the ILAC Business plan and trimmed to reflect realistic outcomes. Important items in the work program include, surveillance and reassessment, horseracing issues (doping), and sampling. The sampling issue is more one of harmonization for the TAIC as it is felt that accreditation of sampling itself is not a priority of the committee, but it should be the labs that develop processes that are valid. Uncertainty in sampling is a major issue for testing labs, particularly in the food industry. Although an issue for accreditors, the labs will have to establish to what they are to be assessed. The concern for the TAIC is the variances in sampling around the world and does this challenge the integrity of the ILAC MLA?

The exercise on non-conformances carried out by several ILAC ABs as a TAIC work item showed up considerable inconsistencies, mostly due to the feeling of lack of information. Not only do ABs not all perform consistently; many assessors within an AB are not consistent. The guide on interpretation of non-conformances being prepared by the committee still needs work. Other items discussed at the TAIC meeting have already been covered earlier in this report.

Editor's Note: Tony attached a copy of an ILAC Laboratory Survey. Contact Tony or Bryce McNair at <brycemcnaie@bigpond.com> for your copy.

National Cooperation for Laboratory Accreditation (NACLA)

I attended the NACLA 3rd Annual Forum, AGM and Board of Directors meeting in early April in Columbia, MD. The two-day Forum covered a variety of topics on accreditation including, measurement uncertainty, competence of assessors, and the value of laboratory accreditation.

The Forum was followed by a half-day AGM. This year there was a much more positive feeling about NACLA's progress and much of this can be attributed to significant improvements in getting the backlog of evaluations scheduled, helped by the decision to pay lead assessors, and a better transparency within the organization. NACLA has now added a fifth AB to its MRA signatories. PRINADCAP has been recognized for testing. Reports were given at the AGM on the state of NACLA, its financial position and from each of the working groups set up at the Scottsdale retreat. A report was presented on the status of the AB's in the recognition process, although their identities were kept confidential.

At the board meeting, the resources task group presented their ideas for making NACLA more financially secure in the future. The board approved a motion to charge a capitation fee to all NACLA AB's, recognized and applicants, of \$30 per accredited laboratory with a \$2000 minimum and a \$10,000 maximum, effective January 1, 2005. It is estimated that this will provide about 50% of NACLA's annual budget requirements.

The stakeholder working group is working on a survey whose purpose is to collect information to elevate the role of NACLA, and its value to stakeholders, as the unique national organization for evaluating the competence of U.S. calibration and test laboratory Accreditation Bodies (ABs).

The latest revision of the NACLA Recognition document was presented by the recognition task group and adopted as Revision E. Among the revisions were the requirements for ABs to sign a Code of Ethics and Hold Harmless document and the costs for lead assessors. A full revision of the document is being planned to incorporate the work of the recognition task group currently reviewing the complete recognition process.

A training program for individuals who wish to qualify for service on evaluation teams of NACLA will be held on September 21 to 23, 2004, in Frederick, MD.

Editor's Note: Tony included a copy of a NACLA press release describing their September training program. Contact him for a copy if you are interested.

EUROPEAN COOPERATION IN METROLOGY (EUROMET)

Seton Bennett, EUROMET Chairman

EUROMET's annual General Assembly fulfils three main purposes. As well as the procedural matters of membership and the appointment to key positions, the meeting hears reports from the Chairs of all the Technical Committees and also reviews and discusses EUROMET's policy and objectives.

This year's event was held in the beautiful surroundings of Bled, Slovenia, from 2nd to 4th June. Attendance at the opening session on the afternoon of the first day was restricted to delegates from the member NMIs, with the Chairs of the Technical Committees joining the second session. The open sessions on days two and three were also attended by observers and representatives of other regional and international organisations.

The accession of ten countries to the European Union on 1 May meant three new members for EUROMET (Estonia, Lithuania and Malta), and the Assembly also voted to accept Romania, following an evaluation of the National Institute of Metrology by the Executive Committee in accordance with EUROMET's 'Full Membership' criteria. This brings the total number of full members in EUROMET to 31.

Elections to the Executive resulted in two new members: Dr. Janko Drnovsek of Slovenia and Mrs. Ani Todorova from Bulgaria's National Centre of Metrology. In addition, Jovan Bojkovski (Slovenia) was confirmed as Chairman of the Thermal TC and PTB's Michael Kühne was appointed to a second term as Chairman of the Technical Committee for Interdisciplinary Metrology.

A significant number of EUROMET's Corresponding Organisations were represented, with Andrew Wallard reporting on developments at BIPM and Keith Jones from New Zealand bringing a report from APMP. Among the other European organisations taking part were WELMEC, EA, and Eurachem.

The Assembly approved the recommendation of the Executive that EUROMET should sign the Memorandum of Understanding with the other European collaborators in the fields of metrology, accreditation and conformity assessment. This MoU will pave the way for further discussions and closer cooperation in the future between the so-called 5 Es. In addition, EUROMET confirmed its intention to sign a separate bilateral MoU with EA, Europe's accreditation cooperation.

The principal general policy discussion centred on the proposal for an implementation project to take forward the recommendations of the MERA project, which addressed the question of how the European NMIs can enter new areas of metrology whilst continuing to provide all their existing services. In particular, this calls for greater critical mass in R&D and better use of resources to ensure continuing high-quality services to meet metrology needs, at the European and local levels.

Following preliminary drafting work and initial discussions with the European Commission, the EUROMET Executive recommended to the GA that EUROMET should proceed to implement the MERA recommendations (iMERA). The General Assembly endorsed this proposal, and agreed to go ahead with iMERA, with a view to putting a proposal to the European Commission for financial support in October this year. The MERA report is available on the EUROMET website.

Finally, the meeting expressed its thanks and appreciation to the outgoing Chairman (Paul Hetherington) and Secretary (Brian Sheridan). At such a busy time for EUROMET they have worked so hard and contributed so much, leaving the organisation in such an excellent state. I took over from Paul Hetherington at the end of the General Assembly and shall be chairing EUROMET for the next two years, ably assisted by the new Secretary, Gordon Clark.

METROLOGY CALENDAR

0304

NCSLI MEETINGS

July 11-15, 2004

NCSLI Workshop & Symposium
Salt Palace, Salt Lake City, UT

CONTACT: NCSL Business Office, (303) 440-3339
Fax: (303) 440-3384
e-mail: <info@ncsli.org>
website: <www.ncsli.org/conference>

October 3-6, 2004

NCSLI Board of Directors Meeting
Crowne Plaza Hotel, Ottawa, ON Canada

CONTACT: NCSL Business Office, (303) 440-3339
Fax: (303) 440-3384
e-mail: <info@ncsli.org>
website: <www.ncsli.org/conference>

January 17-21, 2005

Measurement Science Conference

1/17-28 NIST Tutorials

1/19 MSC Tutorials

1/20-21 MSC Conference

Disneyland Hotel, Anaheim, CA

CONTACT: Cindy Becker, (866) 672-6327
Fax: (909) 273-5500
e-mail: <registration@msc-committee.com>
Website: <www.msc-conf.com>

August 7-11, 2005

NCSLI Workshop & Symposium
Hilton Washinton, Washington, DC

CONTACT: NCSL Business Office, (303) 440-3339
Fax: (303) 440-3384
e-mail: <info@ncsli.org>
website: <www.ncsli.org/conference>

August 6-10, 2006

NCSLI Workshop & Symposium
Nashville Convention Center, Nashville, TN

CONTACT: NCSL Business Office, (303) 440-3339
Fax: (303) 440-3384
e-mail: <info@ncsli.org>
website: <www.ncsli.org/conference>

INDUSTRY/GOVERNMENT MEETINGS

September 1-3, 2004

6th IFAC Symposium on Nonlinear Control Systems (NOL-COS)

VDI Engineering Society, Stuttgart, Germany

CONTACT: <rosenzweig@vdi.de or www.vdi.de>

September 13-14, 2004

Symposium on Modern Education in Measurement & Metrology

IMEKO, Bratislava, Slovakia

CONTACT: Dr. M. Halaj, 421-2-572-94-562

Fax: 421-2-524-95-315

e-mail: <halaj@kam.vm.stuba.sk>

September 14-17, 2004

FLOMEKO - 12th Conference on Flow Measurement

IMEKO TC-9, Chinese Society for Measurement, Beijing, China

CONTACT: Mrs. Zhao Ruojiang, 86-10-8425-3162

Fax: 86-10-6421-8709

e-mail: <csma@a-1.net.cn>

September 29-October 1, 2004

13th Symposium on Measurements for Research and Industrial Applications / 9th Workshop on ADC Modeling and Testing

IMEKO TC-4, National Technical University, Athens, Greece

CONTACT: Prof. E. Kayafas, 30-210-772-2544

Fax: 30-210-772-2538

e-mail: <kayafas@cs.ntua.gr>

TRAINING INFORMATION

REGULATORY ASSET MANAGEMENT TRAINING

Laboratory Instrument Qualification, Calibration & Maintenance

The analytical instrument qualification and calibration records are among the most frequently requested items in regulatory inspections. An understanding of the requirements of an effective instrument qualification and performance verification program assists in fulfilling GMP and GLP regulations. Individuals who are responsible for or involved with any aspect of the procurement, qualification, calibration or maintenance of laboratory instrumentation will enhance their job performance by attending this class.

Date: November 17-18, 2004 Location: Chicago, IL

Calibration Fundamentals & Best Practices

A successful calibration program within a corporation does not operate alone but rather it must interact with management, users, quality assurance departments and regulatory affairs. The development of an effective calibration program relies upon cooperation among these groups. Whether you have experience in the calibration field or have recently acquired calibration responsibilities, this course will provide you with the knowledge and understanding of the fundamentals of an effective calibration program.

Date: November 9-10, 2004
Location: Chicago, IL

Each two-day course is \$995 per student. Group discounts are available and call us to discuss bringing the training to your facility. Contact < www.eCalibration.com > at 800-982-2388 x139.

INVITATION TO SHARE YOUR KNOWLEDGE OF METROLOGY TERMINOLOGY

Emil Hazarian

Dear Metrology Professional:

The NCSLI Glossary and Acronyms Committee would like to invite you to be part of this exciting team and share your expertise and knowledge. We want to develop a team as diverse as possible so the glossary will reflect such diversity and become a more useful NCSLI document, worldwide.

Your volunteer contribution will be very much appreciated. Being part of the committee implies active contribution and participation at the committee meetings either in person, which is desirable, or by e-mail.

Meetings are held generally twice a year in conjunction with the NCSLI annual Conference and Measurement Science Conference.

Please check one of the boxes below as appropriate and send it back to me.

- Yes, I would like to become member of this committee
- No, I don't want to be a committee member, but I would like to participate

It's important to note that you don't have to be an NCSLI member delegate to join our committees. The Glossary Committee meeting is open to everybody with an interest in volunteering.

Current Surveys

Please open Link 1 below and reply with comments and suggestions on existing definitions or propose new definitions vice VIM, VIML, GUM, ISO 17025 or EUROMET Project 595. I will present the summary at the upcoming meeting during NCSLI Conference in Salt Lake City.

Link 1: < <http://www.ncsli.org/resources/glossary.cfm> >

Link 2: <http://www.ncsli.org/committees/committee_detail.cfm?id_com=133>

SOMEONE YOU SHOULD KNOW



Jeff Gust

V.P., Industrial Systems

Jeff Gust is our electoral candidate for Executive V.P., for 2005, and thus is someone our membership should get to know. His first experience with the NCSLI happened like many of us. In 1995, he presented a paper at the annual NCSLI conference in Dallas, TX.

At that time he was a metrology technician working for GTE (now Verizon) in Southern California. He credits the conference experience and exposure that he received within his company with advancing his career. It was less than two months after the conference that he was promoted to a metrology engineering position in the GTE, Fort Wayne, Indiana office.

He relocated to Fort Wayne, and in September of that year was selected to be the NCSLI section coordinator for Northern Indiana. He has been active in the NCSLI ever since. When Dave Nebel moved from Midwest region coordinator to the NCSLI Board of Directors Jeff moved to the Midwest region coordinator position.

In 1999, the Eastern Division of the NCSLI was divided into two areas; Northeast, and Southeast, in order to better represent the local membership. Jeff was appointed to be Northeastern Division Vice-President by Klaus Jaeger in the fourth quarter of 1999. As the northeastern division vice president, he has worked diligently to support and represent the local members. He continued activities on the NCSLI conference committee, serving as the Co-Chair of entertainment for one year, and as the Chair of the best paper award for two years. He also volunteered to speak at 13 different NCSLI sections.

Here is an interesting aside on Jeff, which illustrates his dedication to metrology and the NCSLI. In 1995 when he moved to Fort Wayne, he soon met the woman who was to become his wife. Korrine and Jeff married in August of 1996. When they set the date for the wedding, Jeff cleverly had timed the activities carefully so they could spend a few days on a Honeymoon in Niagara Falls, and then proceed to the NCSLI conference in Monterey California, to continue an extended honeymoon. Korrine was able to enjoy the beautiful California coast while Jeff attended the technical sessions of the conference. (Yeah, NCSLI Conferences are certainly a romantic getaway.)

Jeff was born in Bozeman, Montana, and raised in Ellensburg Washington. He grew up working on farms and cattle ranches, and while enjoying the work, he felt that logging or ranching was not the career path for him. So young Jeff joined the U.S. Marines upon graduating High School in 1984, and spent four years serving as a TMDE repair technician. Upon discharge from the Marines in 1988, he was immediately employed by Tektronix, at their Irvine, California service center as a calibration technician. He became active in the Orange County chapter of the Precision Measurement Association. Then he began college classes at California State University, Fullerton, working on a bachelor's degree in physics.

After the move to Indiana, he transferred to the Purdue University campus in Fort Wayne in 1995, and completed his bachelors degree (finally) in 2001.

In 2003, Jeff left Verizon for a new challenge. He accepted a position as vice president for the Quametec corporation, and was tasked with developing a new division for the company, Quametec Proficiency Testing Services. He has taken the challenge of building this business from the ground up. He has developed the quality system for their proficiency testing program, which was recently accredited by A2LA. He also developed the ten accredited proficiency testing programs that Quametec currently offers, as well as others that are in development. Jeff also consults on behalf of the Quametec Corporation, and serves as an A2LA assessor in their calibration program.

Jeff published papers at the 1995 and 2000 NCSLI conferences, had several papers published in CAL LAB magazine, and is a co-author on NISTIR 7802, *Proficiency Test Policy and Plan (for State Weights and Measures Laboratories)* and co-authored *NIST Special Publication 960-12, NIST recommended practice guide, Stopwatch and Timer Calibrations*.

Jeff has been married to Korrine since 1996, and they have four children; two boys, and two girls. Korrine is a professor at a small private college in North Manchester, Indiana, teaching education and special education to future teachers. They live in Columbia City, Indiana, and are active in their church. As supportive parents, they spend much of their time transporting the children to and from activities such as basketball and showchoir. He volunteers as an assistant coach for the High school wrestling team, and for the local freestyle/Greco-Roman wrestling club. He owns a Model-T Ford that was passed down from his father, and if any spare time shows up, he plans on restoring it.

Editor's Note: Jeff's story is a real testimonial for NCSLI membership; present a conference paper and get promoted. Actually, his entry into NCSLI activities is also very familiar, you start on a committee or in region work, and suddenly you find yourself being asked to take on more authority, and in a few years, there you are as Exec. V.P. It reminds me of my story way back in 1972. I wouldn't trade my 32 years of NCSLI work for any other life experience.

I have continuously reminded our member delegates that one of the true benefits of membership is all of the lifelong personal friendships which have resulted from common projects and spouses meeting at Board meetings or conferences. But Jeff, this perk of bringing your new bride to an annual conference is a new one for me. It may have been your way of introducing her to the magical world of metrology. Attending the conference exhibits and joining in the spouse's activities and banquets is also a very friendly introduction to our technology world.

SOMEONE YOU SHOULD KNOW



Chris Grachanen

*South Central US Region Coordinator
(Industrial Volunteer to the World)*

NCSL International's South Central US regional coordinator, Chris Grachanen, has been a calibration practitioner since 1979. Chris's formal metrology career started as a cross-trainee into the USAF Precision Measurement Equipment Specialist program

commonly referred to as PMEL (Chris's original USAF career field was in avionics sensor systems). As a condition for attending the PMEL School at Lowry AFB in Denver CO, Chris extended his enlistment by two years (the basic PMEL School was at the time a 6 hour-a-day, 5 day-a-week program spanning 1232 hrs).

After graduating from PMEL, Chris finished his enlistment supporting general test equipment calibrations at a tactical fighter base located in the southwest all the while attending night school in order to complete an Associates degree in applied science from the Community College of the Air Force. Upon leaving the USAF, Chris contracted for U.S. Navy calibration laboratories in Adak, Alaska and in Bermuda. While in Bermuda, Chris finished his first Bachelor of Science degree in Technology and Management from the University of Maryland (overseas extension program).

Chris left Bermuda to work a short time at the instrumentation facility at David Taylor Naval Research Center in Caderock, MD, before accepting a position at NASA Lewis (renamed John Glenn) Space Center calibration facility in Cleveland, OH (not far from his home town of North Royalton). At NASA Lewis, Chris focused on automating calibration systems and providing general engineering support for calibration technicians.

Soon after the Challenger accident, Chris transferred to the Kennedy Space Center (KSC) shuttle calibration laboratory. It was here that Chris finished his second Bachelor of Science degree in electronics engineering from the Cook's Institute of Electronics Engineering. It was also at KSC that Chris attended his first NCSLI regional meeting in Orlando, FL. Chris remembers his time at KSC as his best learning experience due in large part to his manager who allowed him to work in many different calibration disciplines depending on who needed engineering support. His exposure ranged from dimensional/mechanical and physical disciplines to electrical and RF & microwave.

After three successful shuttle launches, Chris accepted a position with Digital Equipment Corporation (DEC) managing their Hudson, MA metrology facility in support of semiconductor manufacturing (Alpha chip development). A year and half later, Chris accepted a senior engineering position at Compaq Computer's corporate metrology facility. Prior to the Compaq/Hewlett-Packard (HP) merger in 2001, Chris took over the management of the facility now known as the HP Houston Metrology Group.

The Houston Metrology Group supports the Houston engineering/manufacturing complex (formally Compaq Computer Corporation's corporate headquarters) and nine other HP sites in the U.S. and overseas. The group specializes in support of RF & microwave test equipment (spectrum analyzers, synthesizers, impedance analyzers, high frequency oscilloscopes, etc.) and agency-related equipment (EMI receivers, ESD simulators, EFT generators, line impedance stabilization networks, etc.). In addition to the group's traditional calibration services, Chris

provides signal integrity measurement services to design engineering groups utilizing single-ended and differential time domain reflectometry (TDR) and vector network analysis (VNA). To better deal with the administrative and financial aspects of managing the group, Chris recently completed an MBA from Regis University.

Many of Chris's contributions to the measurement / metrology community have been, in his words, 'labors of love' as exemplified by his creation and dissemination of his three freeware software packages; Tolerance Calculator, Uncertainty Calculator and Mismatch Uncertainty Calculator. These packages were developed to make the job for the 'folks on the bench' a little bit easier as well as helping in the accreditation of his laboratory (the first calibration laboratory in North America to be NVLAP accredited in support of FCC methods).

Hundreds of registrations from all over the world spanning national laboratories to small "mom and pop" shops attest to the popularity of these packages as well as the many e-mailings he receives asking advice about using these packages to perform uncertainty analysis in support of accreditation efforts. Chris has authored many metrology-focused articles that have appeared in Test & Measurement Magazine, NASA's Metrology and Calibration Proceedings, ASQ's Measurement Quality Division's (MQD) The Standard and Cal Lab Magazine. Chris has the distinction of being Cal Lab's most prolific author, his most recent article, Promoting the Metrology Agenda, appearing in Q1 2004 edition.

Chris's most recent literary contribution is as a co-author of ASQ Quality Press's The Metrology Handbook. All that activity withstanding, Chris's efforts in spearheading the creation of a certification program for calibration technicians may stand out as his greatest accomplishment. ASQ's Certified Calibration Technician (CCT) program was four years in the making, involving hundreds of calibration practitioners and metrology professionals from all over the U.S.

Chris has been a volunteer supporting the metrology agenda in several capacities including; technical advisor for the National Association for Proficiency Testing (NAPT), member of ASQ's Certification Board, editorial advisor for Cal Lab Magazine and secretary and certification chair of ASQ MQD. Chris is currently NCSL International's South Central US regional coordinator, ASQ MQD Liaison, and is past chair of the Measurement Decision Risk Analysis subcommittee.

Chris has received several industry awards including; co-recipient of NCSL International's 1998 Dr. Allan V. Astin Award for best paper *NVLAP Calibration Laboratory Accreditation - A Working Example*, ASQ's Certification Board 2003 Excellence Award and Test and Measurement World magazine's 2004 Test Engineer of the Year. Chris was recently profiled in the May edition of ASQ *Quality Progress* magazine's *The Face of Quality*.

Chris and his wife Patricia have two children, Christopher [12] and Abbey [11] and make their home in Spring, TX (north of Houston). Chris loves the outdoors and especially enjoys camping, fishing, hiking, jogging and being by the water.

Editor's Note: Geez, when does Chris find time to do his regular job, with all his professional volunteerism? Chris also deserves about 10 Attaboys for his recent honor from Test and Measurement World for Test Engineer of the Year. He donated his \$20,000 award to several of our Metrology schools such as Butler County Community College and others.

REPORTS FROM THE REGIONS

REORGANIZATION PLANS FOR THE INTERNATIONAL DIVISION

Klaus Jaeger, V.P.-International

In recent months the Board of Directors (BoD) and specifically the President, Dave Agy, have instructed me to review the international division and to plan reorganization as needed.

To start the task, I first reviewed the overall membership and the distribution of the international members worldwide. In addition, information on worldwide metrology meetings and conferences was gathered and reviewed. (This was accomplished with the help of Mr. Graham Cameron and Dr. Malcolm Smith.) Using all this input, the reorganization was started with the approval of the full BoD. Some of the immediate steps taken or being taken are outlined below.

The international division is one of five divisions of the NCSLI, the other four being domestic divisions in the US. All five divisions include roughly the same number of members. Each division is represented by a VP and carries one vote on the BoD. Whereas the domestic divisions' members are localized in the continental US (Northeast, Southeast, Central, and West), the international division members are spread out all over the globe. It includes Canada (the largest international group), Mexico, all of Central and South America, Europe, Middle East, Africa, Central Asia, Asia, and Asia Pacific. The diversity is vast, spanning many cultures and languages. In the Americas alone, the following languages come into play: English, French, Spanish, Guaraní, and Portuguese.

All domestic NCSLI divisions are organized into regions and sections with the Section Coordinators reporting to the Region Coordinators and the Region Coordinators reporting to the cognizant division VPs. Internationally, members have been recognized by a mix of regional coordinators and countries as shown in every issue of the Newsletter. Over the years this led to inconsistencies and to the current state whereby many members in many countries are not covered under a regional international coordinator.

The functions of international coordinator are also different from that of the domestic coordinator. In the former, the coordinator needs to communicate in several languages in many cases way beyond the expertise of one person. Hence a common language has to be agreed upon, which nowadays is usually English. Nevertheless, it can be an issue and certainly requires such coordinators to be fluent in English. Furthermore, to organize international regional metrology meetings under the NCSLI umbrella is almost impossible since each country has its requirements and restrictions on travel and meeting needs. Hence the only plausible solution is to organize such meetings in conjunction with other Metrology events scheduled in particular world regions.

In combining all these arguments, it became clear very early on that a re-organization needed to take place not only to embrace all current and possible future members, but also to allow adequate attention by the NCSLI organization to serve these world regions. The

first step was a change in the regional coordinators. Let us use Europe as an example. We have decided on six (6) regions. (In some cases it is still prudent to indicate individual countries for political reasons.)

These regions are: United Kingdom (includes members from England, Scotland, Wales), and Ireland.

- Nordic (to include members from Iceland, Norway, Sweden, Finland, Denmark, Latvia, Lithuania, and Estonia).
- Central Europe (to include members from Netherlands, Belgium, Luxemburg, Germany, Austria, Switzerland, Czech Republic, and Slovakia).
- Southern Europe (to include members from France, Spain, Portugal, Italy, Greece, Croatia, Slovenia, and other Mediterranean countries).
- Eastern Europe (to include members from Poland, Hungary, Rumania, Bulgaria and other Eastern European countries).

Similar approaches are in the planning stages for Middle East/Africa, Asia Pacific, Central Asia, and the Americas (outside the USA).

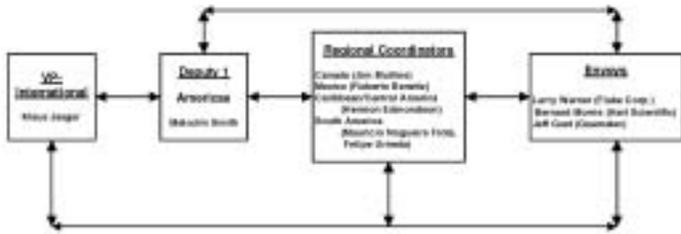
As is evident from the above, it is a huge task for one person to pay adequate attention to all these regions, provide adequate communications to the coordinators and members, and to attend meetings and conferences. It was therefore decided to appoint five (5) Deputies, all of them reporting directly to the VP-International. Each of these Deputies will be responsible for one of the following regions: Americas, Europe, Middle East/Africa, Asia Pacific, and Central Asia.

These deputies will be responsible for providing detailed information from the NCSLI to the cognizant regions, be aware of all the metrology and related meetings and conferences in their regions, and provide that information to the VP and BoD. In this way, the NCSLI can plan and budget for representatives to attend important metrology meetings anywhere in the world. The workload will now be divided and becomes doable for an organization managed and operated by volunteers.

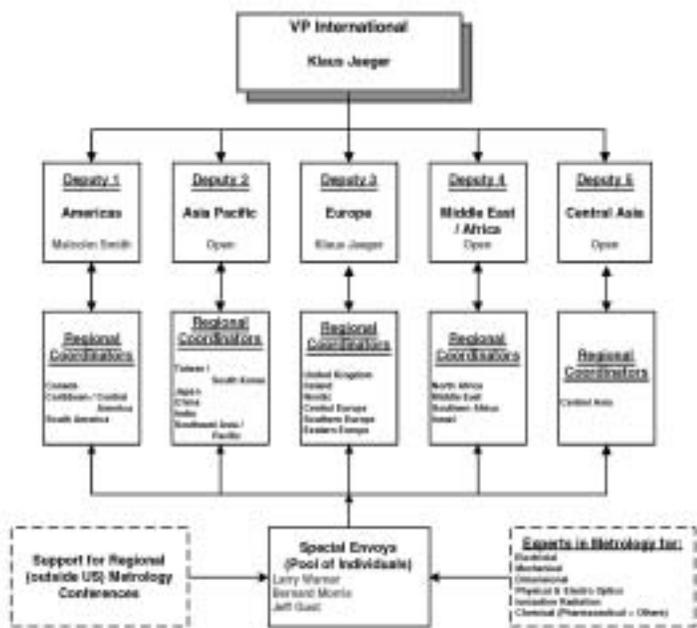
In addition, it was decided to establish a pool of individuals, called Envoys. These individuals are volunteers from companies or organizations who are members of the NCSLI. They would act as ambassadors on worldwide metrology meetings by helping the cognizant Deputy and Regional Coordinator to provide NCSLI related information. They will not man the NCSLI exhibit booth but instead make relevant literature available like copies of the Newsletter, conference announcements, and, of course, membership application forms.

Reports from the Regions

A typical flow is indicated next, using the Americas as an example.



In summary, the reorganization as outlined in this article will serve to provide communication links with all international members. By dividing the tasks, time and travel once again become manageable and doable for an organization that is supported by volunteers.



INTERNATIONAL REGION REPORT

Klaus Jaeger, V.P.

Together with Mr. Harry Moody, Executive V.P., I scheduled and participated in:

The Workshop and General Assembly Meeting of EUROLAB on March 18 and 19, 2004 in Lisbon, Portugal. Presented a presentation on NCSLI and accreditation status in North America.

Visit to the BIPM in Paris, France to partake in a guided tour hosted and conducted by the Director of BIPM, Prof Andrew Wallard. The NCSLI Regional Coordinator for France, Mr. Jean Claude Krynicki, joined us in this activity. The tour included visits to:

- Main Office (Overview of BIPM by Dr. Andrew Wallard)
- Electricity Division (Dr. Thomas Witt)
- Length Division (Dr. Lennart Robertsson)

- Kilogram Manufacturing Shop (Mr. Jose Sanjaime)
- Main Office for Discussion on the Watt-Balance (Dr. Michael Stock)
- Time and Frequency Division (Dr. Felicitas Arias)
- Ionization Radiation Division (Dr. Penny Allisy-Roberts)
- Chemistry Division (Dr. Michael Esser)

We visited the Bundesanstalt für Materialforschung und Prüfung, BAM (Federal Institute for Materials Research and Testing) in Berlin, Germany. This visit was hosted by Prof Horst Czichos, past Director of BAM.

- President's Hall
- Introduction to BAM by the Präsident, Prof. Manfred Hennecke
- Quality in Testing by Prof. Bernd Steffen
- Quality Assurance and Methodology in Chemical Analysis, Prof. Werner Hässelbarth

We toured some facilities, hosted by Dr. Horst Czichos and Dr. Anita Schmidt.

- Analysis and Structure of Polymers, Dr. Jörg Friedrich
- Nuclear Analysis, Dr. Wolf Görner
- Structural Safety, Dr. Milad Mehdiannpour
- Surface and Thin Films Analysis, Dr. Wolfgang Unger
- Materials Protection; Non-Destructive Testing, Prof. W. Paatsch

We visited the Physikalisch-Technische Bundesanstalt (PTB) in Braunschweig, Germany. The visit was hosted by Prof. Michael Kühne, Member of the Presidential Board; and Dr. Jörn. Stenger, Head of the Presidential Sector.

- Introduction to PTB by Prof. Michael Kühne
- Discussion regarding worldwide metrology and accreditation issues
- A tour of several facilities was arranged and with Dr. Uwe Arz escorting us.
- Optical Clocks, Dr. E. Peik
- Direct Current and Low Frequency, Dr. H. Bachmair and Dr. M. Klonz
- Photometry and Applied Radiometry, Dr. J. Metzendorf
- Realization of Force and Torque, Dr. R. Kumme

We reorganized the "Nordic" section in Europe (3200) and appointed Haakan Nilsson as coordinator.

Dr. Ilyan Kuselman was appointed as the new coordinator in Israel.

Dr. Jia-Ruey Duann was appointed as new coordinator in Taiwan.

We established a new region called 6000 Central Asian Region. Coordinator to be determined.



May 26, 2004
 Dayton T. Brown, Inc.
 Bohemia, NY
 Don Bansen
 New York City
 Section Coordinator

The NCSLI New York City Section Spring meeting was held on May 26, 2004, at Dayton T. Brown, Inc., in Bohemia, New York. Don Bansen, Calibration Lab Supervisor at Dayton T. Brown, Inc., made welcoming statements and introductions. Don welcomed all attendees and briefly discussed the services offered at Dayton T. Brown's various divisions, including; Technical Communications, Test Systems, Precision Sheet Metal Fabrication and an A2LA and NVLAP accredited Engineering and Test Lab.

Rob Flynn gave a presentation entitled "*Fundamentals of Pressure Measurement: Its Role in Metrology.*" Rob showed how pressure units are derived and the differences between relative and absolute accuracy. He also showed the differences between the reference modes that consist of absolute, gage, and differential pressure. Rob discussed the performance characteristics that need to be evaluated in the calibration of a pressure device, including resolution, linearity, hysteresis/dead-band, sensitivity, stability, repeatability, and temperature and pressure coefficients.

Mike Eckart, of TEGAM, gave a presentation entitled "*Calibrating RF Power Sensors with a Type IV Power Meter.*" Mike began his presentation by defining what a RF power sensor is and detailed the different types, including thermocouple, diode detector, thermistor, and barretter. He discussed sensor effective efficiency, calibration factors, and defined VSWR and the effect it has on power sensor calibration. Type IV power meters were described in theory as self-balancing bridge circuit with two legs. One leg has a precision resistance of 200 ohms, while the other leg contains a thermistor element. RF power sensor calibration using a thermistor standard and a Type IV power meter is still the method of choice for many organizations, including NIST. The stability and repeatability of thermistors coupled with the advantages of using DC substitution are what make this method ideal for that application.

Dr. John Rumble, acting Deputy Director of NIST Technology Services, presented a review of NIST measurement services, traceability and other issues of interest to NCSLI members. Dr. Rumble explained that NIST offers over 500 services, and performs over 3000 calibrations every year. He discussed NIST's new Micro Force Laboratory for vibration, and shock services. Also new are 3D dimensional calibrations, and new facilities including the Advanced Metrology Lab (AML), Advanced Chemical Standards Lab (ACSL), and National Center for Neutron Research (NCNR). Dr. Rumble discussed NIST traceability support and how it is detailed on their web site. Also new at NIST is a quality system based on ISO 17025, where each Lab Director acts as the Quality Manager for that lab.

Steve Griffin, of Fluke Corporation, gave a presentation entitled, "*Precision Reference Multimeters, Migrating from Classical*

Techniques to Modern Measurements." Until the late 1980s, Steve explained, electrical calibration systems used to compare primary and secondary voltages and resistance standards consisted of several different components. However, as new innovative technology and techniques were introduced, these systems were soon replaced.

The development of artifact calibration has not only consolidated the system into a single device, but has also enabled full automation of the calibration process. Also, the design of modern calibrators incorporates pulse width modulation (PWM) techniques that provide extremely repeatable source linearity. Furthermore, Zener reference technology improved, and, when incorporated within calibration equipment, subsequently improved stability, reducing uncertainties.

Finally, high resolution DMMs then managed to combine these features into a highly accurate electrical measurement instrument. This has enabled metrologists to perform highly accurate and automated measurement tasks within a single instrument, replacing the need for Kelvin-Varley dividers, null detectors, resistance bridges and even PRT (Platinum Resistance Thermometer) calibrators. This ultimately means faster calibrations, reduced support costs, greater throughput and minimal manual operations.

The meeting concluded with door prize raffles and thank you gifts for the presenters.



This table centerpiece at Dayton T. Brown company begs for an explanation.

Attendees:

- | | |
|---------------------|---------------------------------|
| Mike Bozza | Retlif Testing Labs |
| John Brower | MCS Calibration Services |
| Blanca Calderon | Exphil Calibration Laboratories |
| Michael Daniels | Datascope Corporation |
| Mike Eckart | TEGAM |
| Rob Flynn | GE Druck |
| Ray Fonseca | Exphil Calibration Laboratories |
| Charles Gortakowski | Dayton T. Brown, Inc. |
| John Gregg | Dayton T. Brown, Inc. |
| Steve Griffith | Fluke Corporation |
| Edward Haney | BAE Systems TW & DS |
| Kevin Kaufman | TEGAM |
| Gil Lipper | Advanced Technical Marketing |
| Dr. John Rumble | NIST |
| Bruce Shroyer | Calibrated Instruments, Inc. |
| Michael Tedaldi | Quality Consultants |



April 15, 2004
The Bionetics Corporation
Heath, OH 43056-6118
Charles E. Mays
Southern Ohio/Kentucky
Section Coordinator

The NCSLI Southern Ohio/Kentucky Section 1132 held its spring meeting on Thursday, April 15, 2004. The meeting was hosted by The Bionetics Corporation at the USAF Primary Standards Laboratory in Heath, Ohio.

Before I begin, I would be remiss if I did not thank colleagues Phil Smith, RDP Corporation, and Dilip Shai, E=MC3, for their efforts in recruiting our speakers; and a special thanks to Karen Semer, Chief, Primary Standards Laboratory & Information Systems Division for coordinating the visit of the NIST Division Chiefs with our NCSLI meeting.

Eighty-one attendees represented a wide variety of government, contractor, and commercial entities, plus a group of personnel from NIST.

We began with the comment I used in the invitation, "We have a very ambitious agenda; a stellar array of guest speakers; and an intriguing selection of subjects." This meeting has been the icing on the cake for me, as this may be my last NCSLI Section meeting prior to my planned retirement September 1, 2004.

The meeting opened with coffee, tea, assorted pastries, and a welcome from Ben Fullen, AFPSL Program Manager and Mr. David Baker, Acting Director of the USAF Metrology and Calibration Program.

Speaker: Jeff Gust, NCSLI, Vice-President Industrial Programs
Topic: Board of Directors (BOD) Update

Provided an update of the Board of Directors' latest meeting. He informed the attendees of the appointment of several new Vice presidents, the new assignments within the Board of Directors and the approval for publication, RP-10, Establishment and Operation of an Electrical Utility Metrology Laboratory.

Speaker: Dr. Klaus Jaeger, NCSLI, VP International Division
Topic: NCSLI 2004 Conference Tutorial Review, Updated Plans for the International Division
The scoop on Dr. Klaus Jaeger's trip to EUROLAB, BIPM, PTB, & BAM

Dr. Jaeger was very enthusiastic with the response NCSLI has had thus far for the tutorial this year. Several were so popular that the Tutorial Committee is bringing them back for a repeat. Dr. Jaeger reviewed his plans to realign the international members into a more homogeneous grouping based on demographics, centered on National Metrology Institutes (NMIs), where possible. It was very exciting knowing we were the first to see his proposed plans, even before he has had a chance to brief the BOD.

Dr. Jaeger concluded with an overview of his trip to Europe and visits to EUROLAB, BIPM, PTB, & BAM.

Speaker: Jeff Gust, Vice-President & Director of Quametec Proficiency Testing Services

Topic: Improving Temperature Calibration Processes through Proficiency Testing

Jeff began with the question, Why Proficiency Test?, followed by the answer. Proficiency Testing is a means to verify:

- Laboratory measurement method
- Technical training
- Traceability of standards
- Uncertainty budgets are correct
- Reporting of results is appropriate
- Laboratory understands what measurement the customer wants

After stepping through the proficiency testing process, he reviewed common mistakes such as math blunders, temp probe drift, and bath stability overlooked by some laboratories. We were lucky to be his guinea pigs, being present with his full presentation. He mentioned that he will have to tailor the presentation to a mere 15-20 minutes for the NCSLI seminar.

Speaker: Shawn Mason, St. Jude Medical, A2LA Assessor & Measurement Advisory Committee

Topic: Laser Interferometer Measurement of Glass Scales

Shawn provided a very in-depth review of the in-house development and implementation of a calibration process for Glass Scales using a Laser Interferometer, Precision Stage, Video Camera and Optics. He discussed the history of glass scale calibration; issues and problems encountered during the development; uncertainty components and an uncertainty budget; selection and modification of hardware; the calibration process; benchmarking and interlaboratory comparisons. He concluded with projected future improvements planned for their process.

Speaker: Charlie Francis, Product Manager, Mettler-Toledo
Topic: Good Weighing Practices in the Mass Laboratory

The Right Weigh! Charlie began his presentation with a quote, What the USP says, "Measurement uncertainty is satisfactory if three times the standard deviation of not less than ten replicate weighings divided by the amount weighed, does not exceed 0.001 (0.1%)." He quickly followed with, "How can we determine the Minimum Sample Weight?" Using a 50 mg weight as an example he walked us through the math to determine balance requirements.

Charlie related the most frequent problems encountered; balance is unstable, poor reproducibility, or the balance is too slow. The most common causes: incorrect handling of weighing sample, ignorance of the technical data, or unsuitable balance location. At this point we said, what else could go wrong with the process? He continued with problems and solutions to, dynamic (air) buoyancy, air buoyancy, electrostatics, magnetic weighing samples, and moisture. And you thought weighing was easy?

Speakers: Dr. James R. Whetstone, Chief, Process Measurements Division;
Dr. James K. Olthoff, Chief, Electricity Division; &
Dr. Kent Rochford, Chief, Optoelectronics Division,
National Institute of Standards & Technology
Topic: What's new at NIST

A description of their briefing, in one word, WOW! You had to be there! Their briefing is over 17 megabytes and they have graciously

agreed for me to provide power point copies to those that are interested. I need your mailing address for a copy.

Speaker: Dr. Henrik Nielsen, HN Metrology Consulting, Inc.
Topic: *Coordinate Measuring Machines (CMM) Calibration & Uncertainties*

Dr. Nielsen related problems laboratories encounter in proficiency testing using their CMMs. Many factors add to the variation in CMM measurements. Some originate in the machine itself or the environment. Some come into play in every measurement and some depend on the probe configuration used, including probe articulations or changes. Others depend on the part being measured; its rigidity and thermal properties and still others depend on the measurement strategy and point distribution chosen by the operator.

Since geometrical requirements, whether specified using ANSI/ASME Y14.5 or ISO 1101, apply to a continuous surface, it is impossible to measure GD&T "in accordance with the standard" on a CMM. Therefore CMM measurements of geometry become a question of what constitutes an acceptable approximation. For these reasons and because there is a lack of formalized ways of estimating the uncertainty of CMM measurements, proficiency testing can be a valuable reality check for how well one can measure with a CMM.

The meeting was adjourned followed by drawings for door prizes provided by NCSLI, Bionetics, and St. Jude Medical. Comments following the meeting validated my thoughts, what a way to end my watch as section coordinator! Many thanks to all of you that have made our section meetings something to look forward to. My secret; get some great speakers, invite everyone within a five state area, and you'll get a great turn-out.

Editor's Note: Words to live by, in this NCSLI organizing business. Congrats Charlie, and thanks for your exemplary service.



Charlie scored THREE NIST division chiefs for his mid-Ohio section meeting. Amazing. (L-R) Dr. James Olthoff, Dr. Kent Rochford, Dr. James Whetstone.



A fine turnout for Charlie Mays' probable last meeting. We are going to miss your dedication, Charlie (the good looking dude on the far right), keep in touch as you enjoy your retirement. I guess metrology professionals can figure how to implement the delay shutter function on the digital cameras, so he appeared in the scene.

Attendees:

- David Baker
- Doug Baker
- Dave Beier
- Willie Bertini
- Terry Blackstone
- Art Burris
- Mike Cadenhead
- Tom Carpenter
- Alice Chaffin
- Alan Clune
- Felipe Concha
- Lee Crader
- Steve Croasmun
- Robert Dreier
- Mike Eckart
- Donald Erden
- Walter Firth
- Jennifer Fleenor
- Charles Francis
- Sandy Frank
- Ben Fullen
- Andy Gabriel
- J. Matthew Garran
- Bill Gebel
- Jody Gettys
- Martin Girard
- Jay Goletz
- Wanda Gross
- Jeff Grossman
- Dan Gumbish
- Jeff Gust
- Jim Hendershot
- Ken Henderson
- Jeff Hetrick
- N. Gerald Hilliker
- Steve Hogue
- Bruce Humphrey
- Dr. Klaus Jaeger
- Kevin John
- Ed Justus
- David Kennedy
- Tom Kessinger
- Scott Knight
- Greg Levy
- Allan Long
- Bob Lovsey Tosoh
- Dave Madden
- Dick Magalski
- Darrell Martin
- Shawn Mason
- Charlie Mays
- Bill McAlpine
- Bill McCarver
- Angela McKibben
- Brad Mettert
- James Meyer
- Robert Nappier
- David Nebel
- Dr. Henrik Nielsen
- Steve Nielsen
- Dr. James K. Olthoff
- Earl Paazig
- Emery (Duke) Payne
- AFMETCAL Det1/ML
- AFMETCAL Det1/ML
- Instrument Calibration Solutions
- The Bionetics Corporation
- AFMETCAL Det1/ML
- AFMETCAL Det1/ML
- The Bionetics Corporation
- AFMETCAL Det1/ML
- Battelle Columbus Labs
- AFMETCAL Det1/ML
- AFMETCAL Det1/ML
- Accu-Check Instrument Service, Inc
- AFMETCAL Det1/ML
- Electro-Lab Services, Inc.
- TEGAM
- AFMETCAL Det1/ML
- MIE - WKM
- AFMETCAL/Det1/ML
- Mettler-Toledo, Inc.
- Cincinnati Precision Instruments, Inc.
- The Bionetics Corporation
- General Electric Co.
- Euclid-Hitachi Technical Center
- The Bionetics Corporation
- The Bionetics Corporation
- DHI
- AFMETCAL/MLEM
- AFMETCAL Det1/ML
- DH Instruments
- AFMETCAL Det1/ML
- Quametek Proficiency Testing Services
- The Bionetics Corporation
- Cannon Instrument Company
- The Bionetics Corporation
- Michigan Rivet Corp.
- CPI
- Lockheed Martin
- The Bionetics Corporation
- AFMETCAL/MLEM
- AFMETCAL Det1/ML
- The Bionetics Corporation
- General Electric
- The Bionetics Corporation
- The Bionetics Corporation
- The Bionetics Corporation
- SMD Inc.
- AFMETCAL Det1/ML
- The Bionetics Corporation
- Instrument Calibration Solutions
- St. Jude Medical
- The Bionetics Corporation
- AFMETCAL Det1/ML
- Battelle Memorial Institute
- Indianapolis Scale Co., Inc.
- Toledo Transducers
- Battelle Memorial Institute
- AFMETCAL Det1/ML
- DEN Technical Services
- HN Metrology Consulting, Inc.
- AFMETCAL Det1/ML
- NIST
- AFMETCAL Det1/ML
- Sverdrup Technology, Inc.

Reports from the Regions

Chris Pero	The Bionetics Corporation
Jim Raptoulos	AFMETCAL/Det1/ML
Francis E. Riddell Jr.	AFMETCAL Det1/ML
Randy Roberts	AFMETCAL/Det1/ML
Dr. Kent Rochford	NIST
Dave Schick	AFMETCAL Det1/ML
Karen Semer	AFMETCAL Det1/ML
Dilip Shah	E=MC3 Solutions
David Smeeth	AFMETCAL Det1/ML
Philip Smith	RDP Corporation
Steve Smith	AFMETCAL/MLEM
Jerry Steffen	AFMETCAL Det1/ML
Bill Strzepiek	The Bionetics Corporation
Richard Thompson	AFMETCAL Det1/MLEM
Dan Weiland	Tosoh SMD Inc.
Dr. James R.	WhetstoneNIST
Dave Wingrove	AFMETCAL/Det1/ML



Kansas City, Section 1314
NCSLI Meeting Notice

The next meeting of the Kansas City Section of NCSLI will be on Thursday, October 7, 2004, at 8:30 AM at Midwest Research Institute, 425 Volker Blvd. Kansas City, MO 64110 . The meeting is being hosted by Keith Wilson of Midwest Research Institute.

Contact Roger Burton at 816 997 5431, or Keith Wilson at 816 753 7600.



May 12, 2004
Lockheed-Martin
Eagan, MN
Shawn Mason
Section Coordinator

The May 12, 2004 meeting of the Twin Cities Section of NCSLI was hosted by Lockheed Martin and held at their facility in Eagan, MN and was attended by 63 participants from 35 companies. We thank Jim Schepers and Lockheed Martin for providing an excellent meeting room along with coffee, soda, pastries, and cookies in the afternoon. He also gave tours after the meeting with 23 attendees.

Speaker: Tim Stark - Guildline
Topic: *Resistance*

Tim started by providing a definition of the ohm and the traceability chain. Tim explained what the world wants for Resistance Standards and their challenges, which included the following: range, low uncertainties, heat/power dissipation, environmental effects, voltage effects, and measurement techniques. He also talked about the different standards that include Long Scale DMM's and Resistance Standards, with issues of uncertainty, maximum current, calibration current and resistance ranges versus resistance values.

Tim also spoke about the development of carbon resistors, metal film or oxides, and wire wound resistors used as standards and shunts. He described the issues with using shunts and to have them calibrated in the same conditions that they are used and use the specification for how they were calibrated. He related a story on "are tires insulators" with an example of lightning hitting his car two times, blowing out three tires and taking out his car computer at 65 mph. He then talked about high resistance standards with issues of dielectric breakdown and environmental effects. Finally he spoke about where technology is going, which included the following: low uncertainty, provide inputs for measuring temperature, reportable data, and data trending.

Speaker: Mike Czech- St. Jude Medical
Topic: *Interval Analysis and Adjustment*

Mike started out with the question; Why perform interval analysis and adjustment? He stated the reasons as follows: assure reliability targets are achieved, balance quality and cost, measurement risk supports product requirements, and it is integral to the calibration program. The next question that was posed was; How do we implement interval analysis, and the reasons are as follows: establish measurement risk and reliability targets, condition the data, define equipment groups, import the data, review the reliability model, perform the analysis, and finally look at cost and corrective actions.

He described in detail each step in the process with examples. An acceptable formula for determining the Reliability Targets for multi-parameter equipment is $0.95^{\text{number of parameters}} \times 100 = \text{new EOP Target}$. The biggest hurdle in doing an Interval Analysis is to condition the data, which includes having the data consistent and the fields not containing errant blanks or non-printing characters. He also talked about reliability models; for example: Exponential, Mixed Exponential, Weibull, and the Warranty model. Mike described in detail the adjustment methods of S2 and A3.

Next, Mike talked about the issues of cost, which may not be favorable, may result in more calibration hours or an added outside expense. As part of the cost evaluation the following results were part of the cost abatement: Review the process for any data handling errors, review the process for incomplete data cleanup, perform any corrective actions and rerun the analysis. Things to consider when determining the reliability targets are as follows: if you have a lower reliability target you may see longer calibration intervals, and increased measurement risk. Alternate method: increase accuracy ratios, use more accurate standards, change from a 4:1 accuracy ratio to a 10:1 accuracy ratio to allow EOP In-Tolerance to decrease to 85% and still maintain .92% risk, reduction from 95% to 85% EOP to lengthen intervals and reduce cost, and a one-time capital investment can reduce costs each year.

Lessons learned from the Interval Analysis: Make sure to have consistent data, ignore administrative events in the calibration record, have homogeneity of groups and classes, and the Interval Analysis will result in higher quality levels at a reduced cost. Finally, further improvements include the following: achieve the correct Reliability Levels, cost-effective management of the calibration program, customer training in risk assignment, and total integration in the manufacturing process.

Speaker: Carol Hockert - VP Conference Management
Topic: *NCSLI Updates*

Carol Hockert provided highlights of the Board of Directors meeting that was held on April 18-23 at the new Boulder training center. She also mentioned that the first training class on Measurement Uncertainty Analysis was taught there on April 19-22 by Dr. Howard Castrup.

Speaker: Terry Conder - North Central US Region Coordinator
Topic: *NCSLI Round Robins*

Terry Conder and two colleagues from 3M presented the results of the current round robins that were completed and the results. Jeff Otto talked about the pneumatic and hydraulic pressure Round Robin and Ross Nelson talked about the Plug Gauge Round Robin. Jim Dolezal from United Standards Lab talked about the End Standards Round Robin that should be completed in about three months and a new one to be started shortly on micrometers, calipers and indicators.

Speaker: David Dikken - Measurement Technology Laboratories
Topic: *Featured Lab*

David gave a presentation on his company that he started about 8 years ago that does metrology and computer integration consulting. David previously worked in the metrology lab at the MN Department of Commerce. He gave examples of micro balance projects that he was working on.

Speaker: Doug Older, Techlogic, Inc.
Topic: *ISO-17025 Technical Requirements*

Doug started by giving a review of sections 1-4. The main presentation went over section 5, the *"Technical Requirements"*. Doug first posed the ISO-17025 questions:

Are your test procedures appropriate, will they provide acceptable results, do you understand the science and engineering, do you know the procedures and limitations, and do you have the correct resources? Doug also talked about the purpose of the standard, which is to demonstrate the technical competence of the staff, does the lab have well defined tests methodologies, do they meet the equipment management and calibration requirements, and are the test reports and certificates adequate. Doug gave an in-depth presentation with examples of what to do to meet the ISO-17025 standard. At the end of his presentation he included flow charts on the following: communications, conducting tests and measurements, continuous improvement, quality system management, routine operations, and finally, repair.

Attendees:

Bjerstedt, Steve	3M Corp Metrology
Conder, Terry	3M Corp. Metrology
Lamin, Sema	3M Corp. Metrology
Nelson, Ross	3M Corp. Metrology
Otto, Jeff	3M Corp. Metrology
McDonald, Mike	3M Ctr Calibration Lab
Paulson, Dennis	3M Ctr Calibration Lab
Regal, Chuck	3M Ctr Calibration Lab
Lund, David	3M Si1 Sigma
Meza, Silverio	Alliant Techsystems
Killian, Jay	Andersen Corp.
Anderson, Mark	Boston Scientific
Spinks, Harry	Boston Scientific
Kruta, Kevin	Calmetrics Inc
Urban, Gregory	Computype, Inc
Zemaitis, Roger	Dytec Instruments
Wuollet, Todd	Emerson Process
McGillis, Pat	Fastenal Company Lab
Drees, Julia	Guidant Company
Imholte, Mike	Guidant Company
Quach, Dung	Guidant Company
Roden, Larry	Guidant Company

Rubischko, Brian	Guidant Company
Witte, Jason	Guidant Company
Stark, Tim	Guidline Company
Franzwa, Stacy	Hutchinson Tech. Inc.
Martell, Scott	Hutchinson Tech. Inc.
McVine, Joel	Hutchinson Tech. Inc.
Snitker, Craig	Hutchinson Tech. Inc.
Donahue, Dave	IBM
Peterson, Ryan	IBM
Thatcher, Anita	IBM
Brandenburg, Ralph	Mankato Engineering
Burch, Douglas	Medtronic
Carpenter, Ruel	Medtronic
Hebrink, Chris	Medtronic
Hentz, Derrick	Medtronic
Nowacin, Walter	Medtronic
Persell, Vicki	Medtronic
Scheible, Curtia	Medtronic
Disrud, Scott	Minnesota Rubber
Dikken, David	MTL Company
Gingerich, Scott	MTS Systems
Grangroth, Julie	MTS Systems
Johnson, Kevin	MTS Systems
Kreitlow, Dave	MTS Systems
Moser, Bill	MTS Systems
O'Neil, Tiia	MTS Systems
Remer, Bob	MTS Systems
Rust, Kevin	MTS Systems
Gruetzman, Jim	Mueller Sales
Brady, Dennis	Palen Kimball Company
Broekemeier	Palen Kimball Company
Evink, Douglas	Palen Kimball Company
Kueffler, Jon	Polarfab
Tremmel, Tom	Productivity Quality
Huerta, Tony	Ridgewater College
Larson, Jon	Ridgewater College
O'Neil Timothy	Ridgewater College
O'Neil, Herb	Ridgewater College
Binning, Douglas	Roductivity Quality
Wetterstrom, Ed	Rosemount, Emerson Process Mgmt.
Howard, Don	Sensor Systems, Goodrich
Hudson, Nathaniel	Smiths Medical
Czech, Mike	St. Jude Medical
Maon, Shawn	St. Jude Medical
Meysenbourg, Andy	St. Jude Medical
Adams, Bruce	State of Minnesota
Hockert, Carol	State of Minnesota
Zasadny, Mark	State of Minnesota
Older, Doug	Techlogic Inc
Brooks, Mark	Thin Film Technology
Kendall, Walt	Trane Company
Shepard, Ivan	Trane Company
Stremcha, Terry	Trane Company
Jensen, Cindy	Truth Hardware
Newman, LeRoy	Truth Hardware
Lane, Claude	TRW Automotive Electronics
Tibor, Mark	TRW Automotive Electronics
Dolezal, Jim	United Standards



May 13th, 2004
 Bone Care International
 Middleton, WI
 Jay Bucher
 Madison Section Coordinator

Twenty one people were in attendance at the May 13th, 2004, Madison Section meeting held at Bone Care International in Middleton, Wisconsin. Bone Care furnished excellent facilities and snacks, while lunch was "pay as you go" for this meeting.

Erin Quinn, the meeting hostess, welcomed everyone, and opened the meeting by having all the attendees give their name, company and what they do. There was a large variety of companies and experience on hand.

Jay Bucher gave a presentation entitled *"Setting Accuracy and Range Specifications for Balances in a Biotech and/or Pharmaceutical Environment."* The discussion after the presentation was lively and informative.

Reports from the Regions

Don Navis, after a brief introduction, led a round table discussion on being audited, both by internal and external auditors. Many views and experiences were exchanged, with much needed information passed on to those that have not had the enjoyable experience of being 'under the microscope' by an outside agency. Another well-received topic with lively discussion by all attendees.

After the group picture was taken, lunch was had at either Bone Care's cafeteria, or at one of the numerous area restaurants. Erin Quinn gave a very informative presentation on "The 'Ins & Outs' of Qualifying Test Equipment for the FDA." And a "hat trick" occurred with a third lively discussion by the attendees. No doubt, one of the best "participated" section meetings to happen in Madison, Wisconsin.

Karl Wigdal, from Promega, gave an update on ASQ's CCT, and Keela Sniadach, also from Promega, presented information from NCSLI's latest Board of Director's meeting, and, as the section's Membership Chair, informed everyone of the benefits of membership, the different types of membership, and solicited volunteers for our section Steering Committee.

Door prizes were handed out, with all attendees receiving something from Bucherview Metrology Services, Promega Corporation, NCSLI International, Bone Care International, or 3M. We would like to express our gratitude to Terry Condor, our Regional Coordinator for his attendance and participation, along with the great door prize he furnished on behalf of 3M.

I would like to thank all of the attendees for their participation and interest in the topics presented. We had a varied group of people, and it is hoped that future meetings can be attended with the same vigor and enthusiasm. I would also like to thank Erin Quinn for hosting another section meeting, and Bone Care International for the excellent facilities.



I think I could trust this stellar group with calibrating my medical equipment.

Editor's Note: My wife just had surgery two months ago, and I can tell you that when I read digits on those wonderful medical machines she was hooked up to, I'd like to think that people like our NCSLI members, such as this group of mostly medical folks, have been involved in their regular measurement assurance.

Attendees:

Terry Conder
Joe Petersen
Bob Mielke
Erin Quinn
Cheryl Conard
Randy Skellenger
Don Navis
David Kramka
Mike Tipton

3M
Abbott Laboratories
Abbott Laboratories
Bone Care International
Bone Care International
Bone Care International
Covance
Covance
Covance

Jason Eyer
Rodney VanRite
John Roethke
Jay Bucher
Cori Pinchard
Karl Wigdal
Keela Sniadach
Gene Kernan
Mike Wilson
Steve Bloes
Shawn McCord
Dan Christianson

Harlan Sprague Dawley
J.H. Metrology
PJV
Promega Corporation
Promega Corporation
Promega Corporation
Promega Corporation
SPL
SPL
SPL
United Scale and Engineering Corp.
United Scale and Engineering Corp.



April 22, 2004
Agilent Technologies
Denver, CO
Dale Varner,
Denver/Boulder Section
Coordinator

The NCSLI Boulder/Denver Section meeting was hosted by Agilent Technologies at their facility in Englewood, Colorado on April 22, 2004. The meeting agenda included quite a diverse set of technical presentations and is listed below. We had 31 attendees representing 17 companies/organizations, which are also listed below.

Welcoming and Introductions

...Dale Varner, Lockheed Martin Denver Metrology Services
...Jeff Forristall, Agilent Technologies

ISO 17025 Guide to Uncertainty in Measurements (GUM)

...Bob Brown, Agilent Technologies

Break / Networking

Radio Controlled Clocks

...Michael Lombardi, NIST - Boulder

Lunch (Box Lunches compliments of Agilent Technologies)

Update for NCSLI Board of Directors Meeting

...Tom Wunchsh, Sandia National Laboratories/NCSLI
Central US VP

The Many Faces of Humidity

...Bruce McDuffee, Vaisala

Break / Networking

Current Specs. for Precision Mass Standards - OIML R111 & ASTM E617-97 and Short Notes on NIST Weights & Measures Div. State Lab. Programs

...Diane Wise, Colorado Dept. of Agriculture, Weights and Measures Div.

Improved Customer Service Through Customer Training

...Mark Sanders, Lockheed Martin Denver Metrology Services

American Society for Quality Certified Calibration Technician Discussion

...Dale Varner, Lockheed Martin Denver Metrology Services

Awarding of Door Prizes and Discussion of Fall 2004 and Spring 2005 NCSLI Boulder/Denver Section Meeting Logistics.

The Fall 2004 NCSLI Boulder/Denver Section meeting will include the Measurement Uncertainty Road Show, which consists of industry experts presenting mini-seminars on measurement uncertainties in various measurement disciplines such as dimensional, general electronic, pressure, and temperature.

The meeting will be held on Thursday, October 21, 2004 at the new NCSLI Business Office located at 2995 Wilderness Place, Suite 107 in Boulder, Colorado. Ball Aerospace has volunteered to host the Spring 2005 NCSLI Boulder/Denver Section meeting.

Attendees:

Dave Agy	Fluke / NCSLI
Sam Azzam	Agilent Technologies
Laura Bozeman	Agilent Technologies
Bob Brown	Agilent Technologies
Bruce Burchfield	Ball Aerospace
Greg Burnett	GB Metrology
Marsha Davis	Lockheed Martin Space Systems
Dennis Destefan	High Current Technologies
Jeff Forristall	Agilent Technologies
Mark Fritz	Saratorious - North America
Craig Gulka	NCSLI
John Harms	Sypris
Georgia Harris	NIST / NCSLI
Adam Hostetter	Agilent Technologies
Leif Johnsen	Frontier Airlines
Steve Katz	Ball Aerospace
Garrett Lees	Agilent Technologies
Michael Lombardi	NIST
Laura Lowe	Agilent Technologies
Bruce McDuffee	Vaisala
Tyle Messenger	Agilent Technologies
Harry Moody	NCSLI
Jennifer Oznoff	CDA - Weights & Measures Division
Ian Randall	Particle Measuring Systems
Mark Sanders	Lockheed Martin Technical Operations
Mike Schwartz	Cal Solutions
Bob Smith	Lockheed Martin Technical Operations
Dale Varner	Lockheed Martin Technical Operations
Randall Whisenhunt	Lockheed Martin Technical Operations
Diane Wise	CDA - Weights & Measures Division
Tom Wunsch	Sandia Labs / NCSLI



April 1, 2004
 LSI Logic
 Milpitas, CA
 Guy Fleming
 Central California/Nevada
 Region Coordinator

On April 1st, 2004, the NCSLI Region 1410 held its spring meeting at the LSI Logic's executive conference room in Milpitas, Ca. This meeting was hosted by Chuck Laughlin, VP of LSI Logic and chaired by Guy Fleming, of Lockheed Martin Technical Operations. Guy opened the meeting by introducing the agenda and presenters and outlined a few housekeeping rules. Once Chuck Laughlin gave an overview of LSI Logic, the meeting went into full swing.

The first presentation was made by Derek Porter, Northwest US Region V.P. for NCSLI, who was at our meeting to coordinate the Uncertainty Road Show. Derek gave an overview of the last Board of Director's meeting held in Monterey, California on January 19-21, 2004. He mentioned the upcoming conference in Salt Lake City as well as Uncertainty road shows, the new Boulder Office, the proposal for organizing the international activities, RP-10 approval and BOD workshops.

The second and fourth presentations were made by Dr. Jim Salsbury who is the Corporate Metrologist at Mitutoyo America Corporation. Jim gave a delightful yet intuitive discussion on dimensional measurements and associated measurement uncertainties.

The third presentation was made by Karl Kurtz of DH Instruments. Karl's presentation discussed the uncertainties as related to pressure. In many ways today the uncertainty of much of the equipment is so small that the main concern is related to parameters outside the control of the manufacturer, a point for all of us to consider when doing uncertainty analysis.

Both lunch and breaks were hosted by LSI.

Our final presentation was made by Dave Deaver of the Fluke Corporation. His presentation was called, "Having Confidence in Specifications." This gave all of us a better understanding of deciphering specs from manufacturer's manuals, looking at what is important and what is not per our applications.

In summary, the meeting went very well. My thanks to all individuals that made this a special event and taking time out from their busy schedules. Special thanks also go to Brad Charles of MPC who had brought along a scanner that would check the level of antioxidants in your body. The unit was made by Pharmanex. It was shown from the sample of attendees that most scored in the 20,000 range where optimum numbers should be 30,000 and above. Is there a message here?



You've got to admire all these Northern California attendees for responding to Coordinator Guy Fleming's invitation for an April Fool's Day meeting. The minutes do not record any pranks.



Everyone shapes up outside on a bright, cheery day in the East Bay.

Reports from the Regions

Attendees:

Tom Allen	United Airlines
Charlie Balkon	Self
Steve Bremer	Intel Corp
Tom Brunner	Precision Measurements, Inc
Brad Charles	Micro Precision
Victor Cleland	United Airlines
Tom Daniels	Asset Management Systems
Dave Deaver	Fluke
Dennis Dingmann	Lockheed Martin
Duy Doan	TSS
Dennis Dubro	PGE
Romona Etemadieh	Agilent Technologies
Charlie Fallon	SMUD
Richard Fertell	Proteus Industries
Jon Finch	Agilent Technologies
Steve Firkey	Protein Design Lab
Andy Fleming	Agilent Technologies
Guy Fleming	Lockheed Martin
Antony Foldenaur	Lifescan Metrology Operations
David Funston	Agilent Technologies
Dan Gilbuena	Pratt & Whitney Space
George Hafely	Lockheed Martin
Ronald Heitert	Lockheed Martin
Jeff Huselid	Valley Comm Engr
Karl Kurtz	DH Instruments
Godfrey Kwan	Kwan Research
Chuck Laughlin	LSI Logic
Ryan Leandro	Protein Design Lab
Joe Maraszek	Self
Halina Mccauley	Grundfos Mfg
Dave McDaniel	Lockheed Martin
Richard Midgley	Pratt & Whitney Space
Dan Montgomery	Baxter Healthcare
Shala Moss	LSI Logic
Alex Narodistky	Berlex Laboratories
Tien Nguyen	SMUD
Jeff Parker	Parker Test Equipment
Mathew Patrick	Anritsu
Dennis Plowman	Lockheed Martin
Mike Pluchar	Ward Davis Assoc
Derek Porter	Boeing
Pete Prior	Alza Corp
Jim Quinn	Precision Measurements, Inc
Victor Quiroz	Grundfos Mfg.
Mark Ruefenacht	Heusser Neweigh
Jim Salsbury	Mitutoyo America Corp
Woody Salyer	Ward Davis Assoc
David Slater	United Airlines
Arif Suchedina	United Airlines
Christie Sullivan	LSI Logic
Bruce Townsend	LSI Logic
Phung Tran	Rockwell Collins
Tom Tripp	Rentel Co
Carlos Valdez	Precision Measurements, Inc
Nguyen Vuong	Baxter Healthcare
Judith Walker	Agilent Technologies
Tim Wofford	Elan Pharmaceuticals
Jim Wookey	Fluke
York Xu	Proteus Industries



May 21, 2004
Seattle Museum of Flight
Seattle, WA
Keith Cable,
Northwest Region Coordinator

First of all, thanks to all the volunteers and sponsors who helped make our May 21st 2004 meeting a resounding success.

The meeting was held at the Seattle Museum of Flight on Boeing Field. The Museum of Flight is an independent non-profit cultural foundation dedicated to the preservation of aircraft and related artifacts. This venue was sponsored by the Boeing Puget Sound Metrology Group under the auspices of Frank Rasor. Approximately eighty attendees from throughout the Pacific Northwest enjoyed opportunities to tour the facilities and also to participate in the wide range of presentations on aspects of metrology, calibration quality, calibration customer service and calibration specifications.

Our meeting opened with a presentation by Dave Agy, NCSLI President, providing a clear and comprehensive perspective on present and future plans to increase national and international membership in the world's foremost metrology and calibration organization, NCSL International.

The first technical paper was presented by Patrick Snyder of Boeing on "*The van der Pauw Method for Measuring Conductivity*." Patrick defined electrical conductivity and the "long bar method" for measuring conductivity and the advantages and disadvantages of the van der Pauw method. He also discussed the design for a conductivity block fixture.

David Alderman of NIST covered some of the issues and his experiences relating to NIST's efforts to bring about standardizing calibration requirements within several governmental agencies. One of the biggest obstacles to this concept is the differing viewpoints regarding calibration requirements within the FDA, FAA, DOD, DOE, etc.

Charles Gaugh of Davidson Optronics presented several options or methods for calibration of optical standards including autocollimators.

Malcolm Smith of Wescan Calibration elaborated on "good" assessors and the impact that relationships have in determining positive or negative assessments. The personalities of those involved are keyed to success or failure. The very bottom line is to be prepared!

Derek Porter, our NCSLI Western Region VP, followed Malcolm with an informative presentation regarding the NCSLI Board of Directors April 2004 meeting in Boulder, Colo. Region 1430 attendees were treated to a "slide tour" of our new NCSLI facilities. The Boulder offices of NCSLI include facilities available for training or scheduled meetings. Some classes have already been scheduled.

Greg Powell of The Signal Group in Vancouver, Canada focused on the value of services provided by commercial and private calibration laboratories. "Customers" of these laboratories should be polled on a regular basis to establish the effectiveness (or ineffectiveness) of their services. To quote Greg, "Good service is about people and teamwork."

Dave Deaver of Fluke presented an original paper entitled "*Having Confidence in Specifications*," that addressed issues faced when creating specifications from a manufacturer's perspective and at the same time the difficulties experienced when end users calculate estimates of uncertainties. Our thanks to Dave for enlightening us on these potential difficulties and suggestions on avoiding them.

We were privileged to have as our closing speaker, Mike Suraci, who is retiring from NCSLI after several decades of dedicated service including serving as NCSLI President.

Mike exhorted the Region 1430 gathering to recruit and develop NCSLI leaders from the ranks of our current membership. Mike reminded us that NCSLI exists as an international organization almost entirely due to volunteers. So step up and offer assistance! Mike, it will take several "volunteers" to take your place. You will be missed.

The meeting was adjourned and everyone headed for the museum exhibits. Thanks from Keith and Derek to all attendees for participating in our Region 1430 Spring 2004 meeting. We will keep in

touch regarding the November 2004 meeting. Hope to see you in Salt Lake City in July.

Ciao---



Metrologists work around such interesting technologies. A Mach-2 airliner in this case, the Harley Davidson factory, submarines, the space center at Kennedy, you name it. Keith Cable turns out another fine crowd in Seattle.

Attendees:

Bruce McMasters	Boeing
Chris Yeeles	Boeing
Clinton Cluzel	Boeing
Daniel G. Kadyle	Boeing
Dave Larson	Boeing
Derek Porter	Boeing
Frank Rasor	Boeing
Patrick Snyder	Boeing
Paul A. Mott	Boeing
Richard Mayberry	Boeing
Vicki Dunlop	Boeing
Wayne Cooper	Boeing
William Schansteen	Boeing
Cliff Nahm	Cascade Engineering
Dennis G. Kringer	Cascade Engineering
Seyed Jarad	Cascade Engineering
Mike Suraci	Consultant
Charles Gaugh	Davidson Optronics
Tamara Branch	Don-SWFPAC

David Agy	Fluke
Gary Bennett	Fluke
Jorge Martins	Fluke
Dianne Rake	GCS
Shirley Rake	GCS
Charles Heidlage	Goodrich ATS
Dawn Jensen	Goodrich ATS
John Era	Goodrich ATS
Michael Falcone	ICOS
Pete Zampardi	ICOS
Carolyn Johansen	JJ Calibrations
Jan Johansen	JJ Calibrations
Armida Sarkinsian	Korry Electronics
Joe Rodriguez	Korry Electronics
Cliff Smithson	Lockheed Martin
Peter G. Bartlett	Lockheed Martin
Ray Rogers	Lockheed Martin
David Wallace	Navy
Derek Stoner	NCS
Joe Ridler	NCS
Miron DuPont	NCS
Keith W. Cable	NCS
David Alderman	NIST
Frank Jump	North Seattle Community College
Mike Burkett	NSCC
Scott Schafer	NSWC Corona
Charles Jezick	OEKV
Kevin Kline	On-Site Calibrating
Mark Lovell	OSC
Brad Price	Pacific Edge
Ed Wadagnolo	Pacific Edge
Lokrishna Naidu	Philips Medical System
Bill Paulsen	Precise Tool & Gage
Robert C. Osrowske	Retired
Bob Robb	Robb Precision Tool Service
John Lange	SWFPAC
Sheri Maurer	SWFPAC
Craig Howland	Syntek
Dean Shipman	Syntek
Al Caravone	Tektronix
Del Knapp	Tektronix
Son Nguyen	Tektronix
Greg Powell	The Signal Group
Richard Trinies	Tyco Health Care
Andrew Johnson	US Navy
Austin Erickson	US Navy
Fred Grauel	Verizon
Malcolm Smith	Wescan Calibration
Paul Hausser	Work Place Training
Mark Claudia	

SCENES FROM THE BOULDER BOARD MEETING



The selection committee for finding and approving the new business office stands for posterity. Craig Gulka, Jack Ferris, Georgia Harris, Larry Nielsen, Dave Agy, Mike Suraci and Harry Moody.



I'll be honest, except for Palo Alto, I'd be willing to consider living and going to work every day in mile-high Boulder at this new NCSLI office.



Wouldn't you expect that the NCSLI worker bees would be SO anxious to get into their new office that they would just break through the ribbon like a sprinter? Larry Johnson, Doris Schaffner, Dave Agy, Joan Wilshire and Craig Gulka.



Dr. Belinda Collins, Acting Director of Technology Services at NIST, sits with V.P. Georgia Harris, ready to join in the long, 3-day meeting agenda. Belinda is our newly appointed NIST Representative to the NCSLI Board. Welcome to industrial volunteering.



The NCSLI high command tries out the new meeting facilities at the new NCSLI business office. Jack Ferris, Harry Moody, Dave Agy, and Steve Stahley.



We met the new King Agy last issue, and I infer from this photo that he has not yet been deposed.

COMMITTEE NEWS

NCSLI LEGAL METROLOGY ACTIVITIES AT SALT LAKE CITY

Sunday, July 11, Hilton, Room Canyon I

9:00 AM

1. Develop NCSLI Legal Metrology Committee Charter, Long Term Goals, and Deliverables for achieving committee status.
2. 2005 State Laboratory Survey

1:00 PM

1. OIML, Dr. Jean-Francois Magana, Director, International Bureau of Legal Metrology (BIML) and Dr. Charles Ehrlich, NIST Weights and Measures Division International Legal Metrology Group Leader

2:00 PM

2. 2005 State Laboratory Survey

Monday, July 12, Salt Palace Room 150 D

4:15 PM

3. ASTM E41.06 OPEN meeting discussing documents of interest to the Legal Metrology Community, George Rodriguez, ARTEL, chair

Description of Activities

Develop NCSLI Legal Metrology Committee Charter, Long Term Goals, and Deliverables

Each committee of the NCSLI needs a Charter, Short-term and Long-term Goals and Objectives. We will develop/review these documents and the routine deliverables for this committee. Time will also be dedicated to discussion of the process by which a new committee gains recognition as part of the NCSLI organization.

2005 State Laboratory Survey

Every two years the State weights and measures metrology laboratories operating under the technical direction of the NIST Weights and Measures Division, Laboratory Metrology Group, conduct a survey compiling information to quantify the workload of the State laboratories and to document its impact on the United States economy. The survey contains a standardized core set of questions, to which additional specific requests are occasionally added.

The resulting survey information is used to plan and maximize the effectiveness of the State Laboratory Program and to gain support and recognition for the State laboratories and the work that they perform. The information has also been helpful in preparation of budgets and is useful in identifying the diversities of the State laboratory workload on a national level. These sessions will be used for planning the 2005 Survey and for evaluating the fit of the gathered information into other NCSLI survey reports.

OIML

This session will include a presentation by Dr. Jean-Francois Magana, Director, International Bureau of Legal Metrology (BIML), and Dr. Charles Ehrlich, NIST Weights and Measures International Legal Metrology Group Leader. Discussions will include information on current work in progress and the mechanism by which input may be provided for revision of OIML documentary standards.

The Bureau International de Métrologie Légale (BIML) is the Secretariat and headquarters of the International Organization of Legal Metrology (OIML), ensuring both the day to day running of activities and the planning of longer term actions. The BIML coordinates and informs International Committee of Legal Metrology (CIML) Members of technical work undertaken by the eighteen OIML Technical Committees, organizes OIML Conference and Committee Meetings and manages the finances of the Organization. Liaisons are also maintained with Regional, International and National Organisms. Another key aspect of BIML work is the issuing of OIML Publications: Recommendations, Documents, Vocabularies, the quarterly Bulletin and maintenance of the Web Site.

ASTM

In conjunction with the meeting of the NCSL International conference, the ASTM E41.06 sub committee on weighing devices will hold an OPEN meeting. The agenda for the meeting will include an informational report on recent activities, including an overview of open work items and task groups the E41 committee. Those attending will be informed of recent changes in ASTM procedures, guidance documents, and web initiatives. We will also conduct a systematic review of the standards within the 41.06 subcommittee, with the goal of establishing a prioritized list to guide future work of the subcommittee.

In addition to the work of the 41.06 subcommittee, those attending will learn about opportunities to participate in related ASTM work including participation in the task group for revision of single mark volumetric flasks (E 288), and to evaluate and prioritize updates to the volumetric calibration procedure (E 542). Recent activity of the ANSI/ASTM TAG to ISO TC48 will also be reviewed.

Those planning to attend this meeting should contact the subcommittee chair, George Rodrigues, so that background materials can be supplied prior to the meeting. Suggestions for agenda items are also welcome. George can be reached at: <grodrigues@artel-usa.com>, or at (207)591-6326.

MEASUREMENT SCIENCE & TECHNOLOGY

Richard B. Pettit, V.P.

Technical Program Chair Activities: 2004 NCSLI Conference

The following special sessions have been organized:

1. Rob Parchinski: Delay Dated Calibration of M&TE
2. NIST & NASA: US Charters of Freedom
3. Malcolm Smith: Small Business Forum
4. NMI Response to SAR's
5. Thursday Afternoon Session:
 - Ehrlich: Revision of the VIM
 - Woeger: Supplements to the GUM
 - Shah: ASQ Certified Calibration Tech. Exam

AUTOMATIC TEST & CALIBRATION SYSTEMS

Scott Sowerby (now Dave Seaver)

- Did not have committee meeting at MSC (no shows).
- Scott must resign; reassigned to new project. All Verizon metrology activities moved to Verizon National Metrology Center (Grapevine, TX).
- Began working on identifying a replacement Chair.
- Committee will continue to work on RP titled "Validation & Verification of Metrology Software."
- Also developing an Open Data Specification for instrumentation.

MEASUREMENT COMPARISON PROGRAMS

Jim Wheeler & Al Teruel

- Held committee meeting at MSC.
- Updating RP-15: "Recommended Practice for Interlaboratory Comparisons."
- Mass ILC is in process.
- The RF Power ILC is nearing completion.
- One Megohm ILC is about completed; waiting for final calibration results from NIST.
- Many microwave connector kits for network analyzers continue to be supported.
- Several new ILC's proposed, including torque, UV, chilled mirror hydrometer, electrolytic conductivity, and temperature. See latest Newsletter for details.

INTRINSIC & DERIVED STANDARDS

John Ball (now Dave Deaver)

- Held committee meeting at MSC.
- The group would like to drop the term "Derived" from its name, but still stay actively involved with these types of top-level standards in addition to intrinsic standards. Seeking a replacement term; suggestions welcome.
- Several reports are in process, including: Revision to the Catalogue of Intrinsic/Derived Standards; Argon Triple Point Cell RISP; Platinum Resistance Thermometer Handbook; Revision to the Pressure RISP (will have a status report presentation at the 2004 Conference by Ruben Salazar, Boeing); Bob Harding working on additional humidity uncertainty example, with support from Thunder Scientific.
- The next Josephson Volt ILC is now planned to start in CY 2005. There will be an organizational meeting at the 2004 NCSLI Conference.
- John Ball has relinquished the Chair of the committee; he is retiring on May 1, 2004. Dave Deaver, Fluke, has agreed to be the new Chair. Pat Kuykendall, Army, will replace John Ball on the committee.

CHEMICAL METROLOGY

Burt Sutherland

- Burt Sutherland has re-evaluated the current committee goals and has developed a more focused long-range plan.
- Tom Ouimet deserves a lot of credit and thanks for getting the committee up and going. He has also supported NCSLI with special technical sessions on Chemical Metrology issues over the past four years.

INDUSTRIAL PROGRAMS

Jeff Gust, V.P.

HEALTHCARE METROLOGY

David Walters

David Walters is working with the committee to establish priorities of projects. David has developed a Questionnaire for committee members and any interested parties which is available at the NCSLI website. The results of the survey will be used to determine committee priorities at this summer's NCSLI conference.

UTILITIES

John Nystrom

John Nystrom will be looking for a chair to replace him at the committee meeting held at this summer's NCSLI conference. The committee, having recently completed a re-write of NCSLI RP-10, will be establishing the next project during the committee meeting to be held at the annual conference.

EQUIPMENT MANAGEMENT FORUM

Rob Parchinski

Rob Parchinski will be facilitating a committee meeting at the annual conference. The committee is presently working on two documents for publication.

AIRLINE METROLOGY

Victor Cleland

Our meeting was held in a United Flight Ops conference room on April 6, 2004, in the Denver Airport. Representatives from United, Delta, and Northwest Airlines attended.

The NCSLI Airline Metrology Committee would like to welcome Frontier Airlines and the members look forward to Frontier's participation .

After Vic Cleland called the meeting to order, Carl Closmore led us through a review of the gap analysis of requirements of FAR 145 and ISO 17025. This gap analysis was prepared for us by Barbara Belzer of NIST.

Some issues of concern brought up during this review are data collection requirements and uncertainty analysis. Vic provided copies of "Introduction to Measurement Uncertainty", from Mitutoyo Corp. It was suggested we invite Jim Salsbury from Mitutoyo to provide a training seminar for our committee. NCSLI RP-1 was recommended as a tool to provide statistical methods to justify calibration frequencies. An issue that was discussed was the control of uncalibrated tooling. Some areas of certain airlines have tool room control of some of this tooling. The general consensus was that if a tool is uncalibrated, it should not need to be controlled.

Joe Cebulski provided two torque wrenches from Delta Air Lines to be used in an interlaboratory comparison. Carl will take them to Northwest for calibration. They will then be shipped to and calibrated by other members interested in joining this round robin. As an

improvement over our last round robin (of ring gages), each lab will remain anonymous. The calibration data will be submitted with a six-digit identifier code for each lab. Contact Joe soon if you would like to be signed up for this round robin.

Kevin Smith, Craig McCormick, and Steve Boyd exchanged ideas and suggestions for calibration of machine tools. Renishaw, HP, and Optidyne laser products are used to perform these calibrations.

It was noted as a concern that many of us write our own calibration procedures, and it would be a valuable improvement to have tech writers or engineers to review these occasionally. This may be a topic of discussion in future meetings

Steve requested we expand our scope to address some issues with line tools. He will bring a list of tools of particular concern to the next meeting.

Vic invited all interested airline metrology personnel to make plans to attend our next committee meeting at the NCSLI Conference in SLC on Monday, July 12 at 4:15-6:00 in room 150C.

Attendees:

Victor Cleland,	Chair United Airlines
Carl Closmore	Northwest Airlines
Craig McCormick	United Airlines
Tim Dunbar	Northwest Airlines
Bob Anderson	Northwest Airlines
Arif A. Suchedina	United Airlines
Steve Boyd	United Airlines
Siraj Rajabali	United Airlines

AUTOMOTIVE METROLOGY

Timothy W. Kypka

This group is planning to meet at the NCSLI conference in Salt Lake City. Timothy W. Kypka is planning to turn the committee chair position over to a new volunteer this year.

TESTING LABORATORIES

Marlene Moor

The Testing Laboratory committee will be holding its first meeting at the annual conference this summer. We have a volunteer for the committee chair, Marlene Moor, from Advanced Systems Inc. Marlene is an ISO/IEC 17025 Assessor for test laboratories. Letters of invitation are being drafted that target regular NCSLI conference attendees, and potential new members for the committee meeting.

SMALL BUSINESS INITIATIVE

Dr. Malcolm Smith

The small business committee is hosting a panel session at Salt Lake, session 2A. Presenters are Harry Moody, Jim Jenkins, Carol Rake, and Craig Gulka. The main purpose of the meeting is to introduce small business members and other interested parties to resources available within NCSLI. This action has taken place as a result of the previous survey to the small business community.

DOCUMENTARY STANDARDS APPLICATIONS

Larry E. Nielsen, V.P.

LABORATORY EVALUATION RESOURCES

Vacant

Reactivation of this committee is being explored to develop a handbook to ANSI/ISO/IEC 17025:2000 similar to the Z540.1-1994 handbook. Committee chair to be recruited.

LABORATORY FACILITIES

Dr. David Braudaway

Doug Cooper

Work continues on an update of RP-14, Recommended Practice for Selecting Standards Laboratory Environments. No new activity to report.

METROLOGY PRACTICES

Dr. Howard Castrup

Five documents presently in work by this committee include those identified in the attached report. The status of subcommittees and expanded newsletter coverage of committee activities will be discussed at the board meeting.

Report:

Some years ago, this committee's charter was changed from the Calibration Interval committee to the Metrology Practices committee to expand the scope of coverage to include other areas of analytical metrology. Recently, this was further expanded to include uncertainty analysis and the development of a revision to RP-12, Determining and Reporting Measurement Uncertainties.

Subcommittees were formed to better organize and manage the work. These subcommittees were proposed a few years back at a Board meeting that I attended. My understanding at the time was that a committee could establish whatever subcommittees were felt necessary to accomplish certain objectives without getting approval from anyone. However, I agree that some change may be warranted. For one thing, the level of effort needed to accomplish the goals of each subcommittee is turning out to be worthy of official committee status.

The current subcommittee chairs are

- Calibration Intervals; Don Wyatt, Diversified Data Systems
- SPC for Metrology; Howard Castrup, Integrated Sciences Group
- Measurement Decision Risk Analysis; Karl Haynes, Electro Rent Corporation
- Decision Support Analysis; Pat Snyder, Boeing Commercial Airplane Group
- Measurement Uncertainty Analysis; Suzanne Castrup, Integrated Sciences Group

With regard to current status, one of our main objectives for RP-12 is to significantly expand the documented examples, hopefully covering most measurement disciplines. Sue is making good progress on this incorporating and updating GUM methodology and has many eager contributors. She's also keeping in touch with people who are working on the GUM supplements.

A revision for RP-1, Calibration Intervals, is in the works with some fairly substantial additions and a few updates (What we said about computing capability in 1996 is obviously way out of date, for example.).

At present, material for SPC for Metrology is being assembled somewhat indirectly in the form of software specifications currently under development. We intend to be as compatible as possible with the AIAG's Measurement Systems Analysis document and with the Six Sigma criterion. I'm also working on an analysis of variance (ANOVA) model that applies to metrology and calibration. It's pretty involved since it has to work with history data rather than data obtained from controlled experiments.

As for Measurement Decision Risk Analysis, a face-to-face two- or three-day meeting with Karl Haynes is way overdue. The pieces are there. We just need to assemble them and write supporting editorial material. Perhaps we can get together soon to work things out.

Derek Porter recently had to hand over his Decision Support work to Pat Snyder of Boeing. Pat and I have exchanged emails, but I need to step up the effort a bit. Derek sent me a draft to review. This is in progress, but will take some time. It's a big topic. It looks like we'll need a document whose main body is light on math but has an appendix with the necessary analysis methodology. Actually, a paper has already been written that covers much of this. Incidentally, Derek will still be involved with the Metrology Practices Committee, just not as a subcommittee chair.

WRITING COMMITTEE

Jesse Morse

The present focus is on development of a replacement standard for Z540.1-1994.

Report:

Since my last report there have been several activities regarding Z540.1, membership changes, and committee rules and procedures.

Z540.1 Activity

It was decided at the meeting at MSC to survey the committee membership for input regarding the proposed Draft 3.2 document developed by working group one during Q4 under the leadership of Del Caldwell. Seventy one percent (71%) of the "174" committee and alternates responded to the survey. The results of the survey showed that two-thirds of the respondents disagreed that the approach taken in Draft 3.2 was the correct one. And, two-thirds disagreed that the scope of the document was right for use as an initial draft.

Commentary returned with the surveys occupies more than thirty pages and is too lengthy for this report. Del Caldwell has compiled all the comments into a single document which can be sent to those interested by contacting me. The results of the survey being what it is puts the committee into a situation to re-think the next action. A PIN has been submitted, so alternative directions may require the secretariat and me to take action with ANSI.

This topic will be our main topic at the conference.

I would like to offer my thanks to the entire WG-1 team, and especially Del Caldwell, for the tireless work, travel, and time contributed by them personally and by their organizations in developing a proposed Z540.1 revision draft.

Membership Changes

The effort of last December has reduced the size of the committee to 31 members and 15 alternates. This will make forming a quorum for business much easier. I have been directing members to fairly represent their constituent's views and opinions in committee business, not their personal agendas. And, I have stressed the requirement by ANSI (policy) that members be active. Several members have retired or left the business and have been replaced with new members. Other members have asked to be designated as "Observer Status" as they are not able to be as active as our policy requires. These members will bring fresh input to the business of revisions, but will also need time to understand how the proceedings go.

ANSI Policy and Procedures

During 2003, ANSI revamped their policies and procedures governing the development of and publishing of National Standards. I was not able to attend a web "training" session ANSI provided (although I did pay for it). However, Craig Gulka (Secretariat) did attend. I have worked with Craig in the Boulder office on April 16th learning the new requirements and preparing to re-write the Committee Procedure document that I wrote last fall to replace the one ANSI eliminated.

General

In keeping with ANSI's requirement that the committee activity be well-publicized to the affected users of our standards, I attended a meeting of D.O.E. metrology managers in March to present the "Z540.1 Committee" presentation that has been used over the last two years at NCSLI meetings. Three other committee members were also present, making it a great discussion, especially the part about Z540.1 revision activity. I also took the opportunity to make a presentation developed by Dave Agy regarding NCSLI in general.

ACCREDITATION RESOURCES

James Jenkins

The committee's final draft of RP-9, Calibration Laboratory Capability Documentation Guideline, was submitted for processing. This document will be reviewed with the committee chair and edited prior to submission to Publications Oversight on or about 30 June.

CALIBRATION PROCEDURES

Dale Varner

Work continues on an update to RP-3, Calibration Procedures and maintenance of the NCSLI calibration procedure database. Dale may attend the board meeting and provide further amplification.

(Continued on page 47)

There is probably no class of instruments that need calibration more than RF/microwave products, which is the field where I spent most of my career. Such analog signals need care and feeding more than any other; careful shielding, RFI considerations, multiple superheterodyne subsystems, fixed and variable oscillators all over the place, signal filters of all types. I remember we used to disparage the engineers over in the computer divisions, saying all they had to do was build their digital circuitry onto printed circuit boards. Digital "smog" was all over the place, yet their computers seemed to work just fine.

Up to a point. It wasn't long until those computer clock rates got high enough to cause significant troubles to the integrity of their digital signals, and they were soon asking our RF engineers to come over and teach them about RF/analog signal transmissions. Suddenly ALL instruments were sporting microprocessors, keyboards, keypad and CRT and digital displays, even highly-analog ones like spectrum analyzers. Digital synthesizers, fixed and variable, with complex phase-lock loops, solved frequency drift problems.

Meantime, professional metrology had been progressing along with instrumentation technology. NIST was well along in inventing clever all-around calibration techniques by offering SRMs--standard reference materials. SRMs checked the end result data with materials of known characteristics. These were ideal for chemical testing but worked well for some physical measurements too; semi-conductor mask-making dimensions, for example. Dave Michell's Rockwell lab came up with the "pretzel," a small mechanical fixture with precise steps, rods and cavities. Instead of calibrating things like craftsmen's micrometers back in the cal lab, they brought the pretzel out on the line and asked the craftsman, himself, to measure a dozen parameters, thus measurement-assuring both the micrometer and the technician procedure.

By the 1980s, traceability to national standards was getting VERY sophisticated. Backing this up were processes introduced by NCSLI itself, such as round-robin techniques for shipping a measurement artifact (Barry Taylor taught me the french word, etalon, which probably came from the VIM.) around to multiple labs for comparison measurements. These processes nicely tied a circle around both the instruments and the operator's technique at each participating lab, and distributed sophisticated standards to many places.

With the 1990's, the magic of computer power was pushing ALL measurement technology to the limit. Chemical, pharmaceutical, medical, and soon the magical world of genome sequencing were expanding the need for accurate measurement. NCSLI moved with the trend by establishing committees for such adjacent technologies, reaching out to bring some standardization to their measurement assurances. At the same time, measurement technologies moved globally, with many US companies establishing fabrication and manufacturing facilities around the world. Components and products moved in every direction.

The 1990s are where the impact and reach of NCSLI came into its own. While many of the world's National Measurement Institutes (NMIs) had established liaisons, NCSLI became NCSLI and welcomed into its membership ranks the measurement technology leaders of the world. NCSLI assumed a leading role in coordinating activities on certification and accreditation standards along with international standardization organizations. The conference agendas of recent NCSLI annual conferences are impressive indeed.

Quality systems have progressed too. Acronyms have come and gone; Edwards Deming and his quality vision, TQC, 6-sigma, you name it. Customers of this millennium have come to expect formal quality systems such as ISO 9000 and ISO 17025.

So, Calibration-2004 is FAR different from Calibration-1960. Yet,

when we unfortunately end up in the hospital, connected to medicine-dispensing tubing, we expect that the delivery rate shown in the nice comforting digital display is actually correct, +/-1%. Or that the gasoline delivery pump yields equity in trade. Or that the machine which is sequencing genome C-G-A-T data is calibrated properly. Or that the new electronic voting machines read and accumulate vote counts with ZERO error or susceptibility to fraud. Or that our computer applications software is impervious to viruses--well that may be too much to hope for, for now.

One thought I've had over the past few years revolves around the fact that most instruments now are so good that they are often used in situations where the instrument is so much better than the requirements of the measurement. You can get a high precision DVM for less than \$1000 to test a 5-volt power supply on the manufacturing line. In a way, this reduces people's belief that calibration is really necessary since they typically don't have problems.

Of course, the other side of the coin also comes into play. Pushing spec limits even tighter, especially in the wireless arena, is common now, to assure performance and to cut down on manufacturing expense. Maybe there's a bimodal distribution here. In the vacuum tube days, almost everything needed to be calibrated. Now there are two groups: most measurements where the instruments are far better than the need, and those cases where technology is pushing the measurement limit.

I am reminded of the dark humor cartoon of the 1960s, showing two astronauts sitting on the top of the Saturn rocket, ready for launching to the moon. One says to the other, "Isn't it a bit sobering to realize that all the parts below us have been supplied by the lowest bidder." We, in our business, might replace that cartoon with, "Are all the important things we are responsible for (below us) calibrated properly?"

One of my proudest accomplishments was that during my presidency in 1978, at my urging, Bob Willett's committee on calibration procedures worked out a "two-tier" specification definition. Previously, instrument manufacturers like HP would write long detailed specifications, with all of them treated equally. This forced calibration labs to measure all those parameters, even trivial things like, say, the nominal input impedance of an audio input.

Manufacturers like HP began--slowly--to implement two classes of product data: specifications ("hard" specs), which were warranted and checked, and supplemental characteristics ("soft" specs), which were useful and nominal descriptions of performance, but were not checked. Which spec ended up in which category was an engineering call, using metrology judgments of what the instrument did.

So, in many ways, that is where we are today. Our calibration processes are far advanced from the aerospace technologies of 1970. You can tell that from looking at the membership of NCSLI. Even with the digitalization of instrumentation, there is still that absolute need for creativity and innovation for engineering in the metrology lab. There is the need to categorize what is crucial and what is not. There is that need to tie an uncertainty value into the circle around national or intrinsic standards and the measurement on the line.

And there is that indefinable quality of Cal Lab managers and engineers to use your judgment daily to determine which parameters are critical to your mission, and which categories are useful but not critical to the needs of your company and its products.

I'm indebted to Dave Abell for an interesting conversation about this topic.

John Minck
Editor

NEWS FROM THE NMIs

OUR OWN NCSLI V.P. GEORGIA HARRIS NAMED AS ONE OF THE FEDERAL GOVERNMENT'S BEST AND BRIGHTEST

The Arthur S. Flemming Awards Commission has named 12 of the best and brightest in federal government service as recipients of the 55th annual Flemming Awards. Recognized by the President of the United States, agency executives and the private sector, the Flemming Awards honor individuals with three to 15 years of public service experience for their extraordinary contributions to the federal government.

The awards ceremony took place June 7, hosted by The George Washington University. This year's keynote was delivered by Nobel Laureate and past Flemming Award winner, William D. Phillips.

Georgia was honored with the following citation:

Georgia Lee Harris, Group Leader, Laboratory Metrology, National Institute of Standards and Technology.

Georgia Lee Harris has provided vision, leadership and skilled management in the development and implementation of a comprehensive long-term approach to improve advanced measurement techniques, uncertainty analysis and traceability concepts. She has helped upgrade state metrology laboratories, improved the quality of measurements, and established extensive proficiency testing and evaluation systems to monitor and assess the measurements made by state metrology laboratories. Harris has promoted and assisted laboratories to comply with international criteria and quality systems, which has resulted in 12 accredited state weights and measures laboratories with five more under review.

Two other NIST scientists received awards.

About the Arthur S. Flemming Awards: In a speech before the Washington, D.C. Downtown Jaycees in the late 1940s, Dr. Arthur Sherwood Flemming suggested that the group create an award to recognize exceptional young employees within the federal government. Flemming felt that a chapter in the nation's capital could educate the public about the contributions young civil servants make to America. Since then, more than 400 individuals have received the award to date.

Flemming's exemplary career spanned seven decades of service to the federal government and higher education. His career began as a member of the U.S. Civil Service Commission in 1939. He went on to serve as president of three universities, director of the Office of Defense Mobilization, secretary of the U.S. Department of Health, Education and Welfare, chairman of the U.S. Commission on Aging, the U.S. Commission on Civil Rights and the Citizens Commission on Civil Rights, and co-chair of Save our Security Coalition. In 1994, President Clinton awarded Flemming, who passed away in September 1996, the Medal of Freedom in recognition of his peerless dedication to his country.

WORLD'S BEST "RULERS" WILL MAKE BETTER CLOCKS

Lasers that emit pulses of light lasting just 10 femtoseconds (10 quadrillionths of a second) can reliably measure time and frequency more precisely than any other "rulers," according to recent tests conducted at the National Institute of Standards and Technology (NIST).

The experiments demonstrated that femtosecond laser devices could be used to reproducibly generate and accurately control wavelengths of light to serve as the "gears" that translate ultrahigh frequency "ticks" from next-generation optical atomic clocks into practical electronics-based timekeeping. Applications for ultra-precise timekeeping include navigation, telecommunications and basic scientific research.

The devices are called "frequency combs" because a graph of the oscillating electromagnetic waves looks like the teeth of a hair comb. The experiments are the first to compare the operation of multiple femtosecond frequency combs [thereby demonstrating reproducibility] and to verify that both the starting position of a comb and the spacing between the teeth can be controlled precisely.

The work, described in the March 19, 2004, issue of the journal *Science*, is a significant step toward next-generation "atomic clocks" based on optical rather than microwave frequencies. Such clocks are expected to be as much as 100 times more accurate than today's best timekeeping systems. A frequency comb would work like the gears in a transmission to convert the very fast oscillations of optical clocks into lower frequency signals that can be compared with current primary timekeeping standards based on microwave sources. The signal then could be distributed with conventional electronics through the Global Positioning System and broadcasts from NIST's time signal radio stations.

The scientific team compared the operation of four femtosecond laser systems of different designs—two built at NIST, one by the Bureau International des Poids et Mesures in France, and one by East China Normal University in Shanghai. The three labs collaborated on the tests along with OFS Laboratories in New Jersey.

See < www.nist.gov/public_affairs/releases/bestrulers.htm >.

DELVING INTO DEFECTS SPURS PROSPECTS FOR CHIP INSULATOR

A warm winter coat doesn't work nearly as well if it's full of holes. The same is true for hafnium oxide, a promising insulator for the next generation of smaller, faster microchips.

While hafnium oxide prevents currents from leaking through the ultrathin layers of semiconductor chips more than 1,000 times better than conventional silicon oxide, its prospects have been dampened by too many current-draining defects.

Now a team of NIST and IBM researchers reports in the March edition of *Electron Device Letters* that they have quantified these "electrical capture defects" in a way that may help chipmakers reduce the defects or at least devise a way around them.

NIST researcher John S. Suehle called the team's measurements a "critical first step" for improving manufacturing processes.

Using a method called "charge pumping," the NIST and IBM scientists found where the defects occur near the interface between the silicon substrate and the hafnium oxide and how those locations are ultimately detrimental to transistor operation. The method involves applying a voltage pulse and then measuring the current coming from a transistor. By changing the characteristics of the voltage pulse used, the scientists were able to measure the electrical-capture capacity of the defects.

Contact: Scott Nance, (301) 975-5226

SCALING FRICTION DOWN TO THE NANO/MICRO REALM

An improved method for correcting nano- and micro-scale friction measurements has been developed by researchers at the NIST. The new technique should help designers produce more durable micro- and nano-devices with moving parts, such as tiny motors, positioning devices or encoders.

Friction measurements made at the micro- and nano-scale can differ substantially due to changes in applied load. In a series of experiments described by nanotribologist Stephen Hsu at a technical meeting held May 17-20 in Toronto,* NIST scientists confirmed that many of the measured differences appear to be caused by unintended scratching of the surface by the sharp tips used in making the measurements themselves.

The NIST team used a specially designed friction tester developed jointly by NIST and Hysitron Inc. of Minneapolis. A carefully calibrated force was applied to diamond tips having a range of sizes. Friction forces were then measured as each tip was slid across a very smooth surface of silicon. Friction at the macroscopic scale is usually straightforward-doubling the force between two objects produces twice the friction. However, work at NIST and elsewhere has shown that friction at the microscale does not always obey this scaling rule. Forces greater than about 2 milliNewton** produced substantially greater friction values than expected.

Images of the test surface made with an atomic force microscope confirmed that unintentional scratching produced the extra friction. To correct for this effect, NIST researchers developed a way to measure precisely the size, shape and orientation of the diamond tips so that friction forces caused by "plowing" can be subtracted to produce a more accurate final measurement.

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*The work was presented at the Society of Tribology and Lubrication Engineers annual meeting.

** For comparison, a penny held against Earth's gravity produces a force of about 25 milliNewtons.

DEVELOPING TOOLS FOR RELIABLE "GENE CHIP" MEASUREMENTS

Microarrays, sometimes called "gene chip" devices, enable researchers to monitor the activities of thousands of genes from a single tissue sample simultaneously, identifying patterns that may be novel indicators of disease status. But generating consistent, verifiable results is difficult because of a lack of standards to validate these analyses, scientists from the NIST and collaborators warn in the May 20 online issue of *Clinical Chemistry*.

Microarrays are keychain-sized devices with as many as several million tiny spots, each of which examines genes of interest simultaneously using minute sample volumes. This highly sensitive technology is relatively new, and standard procedures to ensure the reliability and comparability of results are only beginning to emerge. For instance, results can change as a result of differences in how tissues are collected and processed; variations in how the molecules are counted, attached to substrates and labeled for detection; deviations from recommended protocols by lab personnel; and malfunctioning or miscalibrated equipment. Such variations need to be controlled before this technology can be used reliably in clinical settings and in devices requiring regulatory approval, according to the paper.

As a first step toward addressing reliability issues, a consortium coled by NIST and industry is developing standards that will satisfy needs identified at a 2003 workshop. At the workshop, organized and hosted by NIST, leaders in the microarray field from industry, government and universities recommended the development of a well-characterized set of ribonucleic acid (RNA) molecules whose identity and concentration are known. RNA is an important product of gene activity. Users will be able to validate the results of gene chip analyses by adding such a reference material to their samples and comparing the measured values to what would be expected for them. Such a reference material also will enable technology developers and researchers to assess the performance of their assays.

The paper was co-authored by scientists from Genomic Health, Inc., Agilent Technologies, the U.S. Food and Drug Administration, and The Institute for Genome Research.

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REDUCING STANDARDS-RELATED BARRIERS TO TRADE

A new report from the U.S. Department of Commerce released on May 18 makes more than 50 recommendations for reducing standards-related trade barriers and calls for broader collaboration across government and with U.S. industry to prevent technical obstacles that impede U.S. exports.

"Standards and related technical regulations affect an estimated 80 percent of world trade," Commerce Secretary Donald L. Evans told an audience of industry and standards community representatives. "The recommendations in this report can improve how we tackle standards-related issues that distort trade and undermine our competitiveness."

"In the face of intensifying global competition, neither industry nor government can be complacent about standards-related issues," said Under Secretary for Technology Phil Bond. "The Secretary's Standards Initiative emphasizes best practices, provides critical education and training, expands our early warning tools, and creates greater collaboration with industry and government. Collectively, these actions will go a long way towards an effective rapid response system when standards become trade barriers."

The new report, Standards and Competitiveness-Coordinating for Results, also summarizes key industry standards issues in international markets. Some of this information was gathered from more than 200 industry associations and standards organizations in 13 industry roundtables convened over the past year.

The report seeks to improve the efficiency and effectiveness of the Department's standards-related programs and policies. Its recommendations will help the Department identify new opportunities and better ways to work with the private sector and other U.S. government agencies on standards-related issues.

In March 2003, Evans launched the Department of Commerce Standards Initiative, an eight-point plan that responds to industry concerns that divergent standards, redundant testing and compliance procedures, and regulatory red tape are becoming one of the greatest challenges to expanding exports.

The report can be accessed at < <http://www.technology.gov> >.

NEW SECURITY CERTIFICATION GUIDELINES FOR IT SYSTEMS

NIST recently published guidelines on the security certification and accreditation of federal information systems. *NIST Special Publication 800-37, Guide for the Security Certification and Accreditation of Federal Information Systems*, is one of several key documents being developed by NIST to support the implementation of the Federal Information Security Management Act (FISMA) of 2002.

The new guidelines provide a standardized approach for assessing the effectiveness of the management, operational and technical security controls in an information system. In addition, they can aid management officials in making a determination about the acceptable level of risk to an agency's operations and assets brought about by the operation of that system.

NIST Special Publication 800-37 will be used in conjunction with the new mandatory security standard, *Federal Information Processing Standard Publication 199, Standards for Security Categorization of Federal Information and Information Systems*, and *NIST Special Publication 800-53, Recommended Security Controls for Federal Information Systems* (currently in draft), to help improve the security posture of federal agencies and their information systems.

The security certification and accreditation guidelines are applicable to all federal information systems other than those systems designated as national security systems as defined in FISMA. Federal agencies are required to conduct security certification and accreditation in accordance with standing policy from the Office of Management

and Budget. State, local and tribal governments, as well as private-sector organizations comprising the critical infrastructure of the United States, are encouraged to consider the use of these guidelines, as appropriate.

NIST Special Publication 800-37 is available from NIST's Computer Security Resource Center at < <http://csrc.nist.gov/publications> >. A complete description of the NIST FISMA Implementation Project is available at < <http://csrc.nist.gov/sec-cert> >.

PORTABLE 'RAINBOW' SOURCE IMPROVES COLOR CALIBRATIONS

Editor's Note: Part of my middle career at HP, circa 1970, was involved in the R&D and production of early LED numerical digits. In fact our group was responsible for the 15-digit display of the first HP-35 electronic slide rule, an exciting time of our lives. I can't tell you how much heartburn we suffered in manufacturing those early deep red (almost infrared) LEDs. I always recall that Bill Hewlett didn't much like that deep red because his aging eyes saw the digits as blurred because we had to drive up the intensity to compensate for the eye's poor response to 455nm. Green and yellow and blue and now white LEDs seemed an impossible dream, although to be honest, we were working on more colors.

I marvel at the technology of this day, and this innovative NIST color calibrator. It's a little like going to Sears and ordering a can of paint with the color set by its wavelength.

It's a bit egotistical of me, but if you want to read some of my reminiscences on the original HP-35 hand-held computer of 1972, try this website:

< http://users.easystreet.com/writer/Minck%27s_HP_35_story.html >



NIST's new portable "rainbow" source for calibrating color measurement instruments. In the background are a sampling of colors generated with the source. Photo courtesy National Institute of Standards and Technology.

If you need bright blue light at a very specific wavelength, the NIST can make it, and fast.

In the world of color, this is no small accomplishment. NIST's traditional light sources, such as incandescent lamps, are thermal. A blue thermal source would need to function at such a high temperature that components would melt. Lack of blue light sources introduces uncertainty when calibrating instruments that measure the color of things like bright stars or the open ocean. Knowing the exact color is important because it allows scientists, for example, to use remote satellites to judge the concentration of plant life in the ocean, which in turn affects global climate.

Now NIST has developed a "rainbow source" that can be tuned across the entire visible light spectrum, from red to blue light. This unique source exploits recent materials advances in light-emitting diodes (LEDs) of different colors. By mixing exact percentages of

LEDs at different wavelengths of visible light with the desired brightness, the optical properties of the source (such as the color) can be changed and tailored for a particular application. The source uses commercial LEDs. NIST researchers characterized them and developed the packaging, electronics and software. In addition, the tunable light source is highly portable. It is a sphere about 30 cm (1 foot) in diameter and weighs about two kilograms (5 pounds). Battery-operated versions have been developed for field applications.

NIST researchers described the invention on April 14 at the Ocean Color Research Team Meeting in Washington, D.C. The National Oceanic and Atmospheric Administration has ordered a simplified version of the rainbow source to reduce uncertainties in calibrations of a satellite that measures ocean color, as part of a program that monitors the carbon balance between the ocean and atmosphere. The source also could simplify color calibrations in industrial and other research applications.

Additional details were presented at a meeting at NIST in Gaithersburg, Md., on May 10-14 sponsored by NIST, the InterSociety Color Council, and the Council for Optical Radiation Measurements.

Contact: Laura Ost, (301) 975-4034

WHEN MICRONS MATTER: WEB SITE SMOOTHS THE WAY

A new NIST Web site enables manufacturers to check the accuracy of measurement software used to verify the smoothness of product surfaces.

Automotive, aerospace and optic industry engineers should find the NIST virtual surface calibration Web site particularly useful. Those industries rely on precise measurements of surface smoothness to ensure the efficiency of cylinder-piston engines, to make high-performance metal wind tunnels, and to produce better optical components.

Until now, manufacturers have had difficulty spotting errors in results calculated by the analysis software of measuring instruments. An undiscovered surface flaw can make a multimillion dollar line of finished products useless.

Visitors to the free NIST Web site can validate software measurements without access to proprietary software codes. The Internet site contains NIST two-dimensional surface texture analysis software and a database of approximately 10 different types of surface profiles or "silhouettes" including surface parameters calculated by NIST. Surface parameters indicate how smooth or rough a surface is or specify the shape of a surface profile.

Visitors can download surface profiles from the NIST Web site and run these profiles through their own measurement software. The surface parameters produced by the visitor's software later can be compared with those of NIST. Manufacturers also can upload their own surface profiles to NIST and run the data through the NIST analysis software. If the results agree, the users can have more confidence in the accuracy of their software. The NIST virtual surface calibration Web site was developed in consultation with the University of North

Carolina at Charlotte. It is available at < <http://www.ats.nist.gov/VSC/jsp> >. NIST expects to add three-dimensional topographic data and associated calculated parameters to the site in 2005.

NIST SUPPORTS CHIP GROUP DATA STANDARDS EFFORT

The NIST has launched a new effort with International SEMATECH Manufacturing Initiative (ISMI), a subsidiary of the global semiconductor consortium International SEMATECH, to support e-manufacturing requirements of data standards for improving microprocessor manufacturing.

ISMI and several task forces at the Semiconductor Equipment Manufacturing International (SEMI) standards organization are creating standards using the extensible markup (XML) computer language. The new standards will help chipmakers collect more data about their manufacturing processes and further automate chip production.

XML is similar to HyperText Markup Language (HTML), the set of standard, descriptive words and characters or tags that are used to build Web pages. But where HTML tags are static, XML allows users to define their own tags to customize data to a greater degree.

Semiconductor manufacturers would like a standard set of industry XML tags for collecting data about critical manufacturing processes.

That's where NIST comes in. NIST is well-positioned to help develop tools that will be used to improve the quality of the standards and also to accelerate adoption of these new standards. SEMATECH sought NIST's help because of NIST's reputation for expertise both in semiconductor manufacturing processes and computer programming. Additionally, NIST is seen as a neutral third party within the industry.

The overall goal of the new project is to create a well-defined set of XML tags for collecting semiconductor-processing data that fully describe the key parameters affecting quality control, while avoiding redundancy. Chipmakers would like to be alerted to defects earlier in manufacturing and someday be able to exert real-time control to correct the defects, preventing waste. This requires receiving more data from the manufacturing equipment during operation. The XML standards will help in the collection and presentation of that data.

NIST researchers also are developing a new tool that will read XML data from chip manufacturing machines and provide a visual "diagnosis" of the process during operation.

Contact: Scott Nance, (301) 975-5226

HOMELAND SECURITY STANDARDS HELP STATE/LOCAL GOVERNMENTS

Featuring contributions from NIST, newly adopted Department of Homeland Security (DHS) standards for first-responder equipment and radiation detectors provide state and local governments with clear guidance to ensure that they purchase the best available gear for public safety and counterterrorism personnel.

Coinciding with the new department's first anniversary, DHS has announced its adoption of a set of eight standards that provide performance requirements for respirators and other critical personal protective equipment for first responders. For DHS, NIST's Office of Law Enforcement Standards is coordinating accelerated efforts to develop specifications for garments and other gear that protect against chemical, biological, radiological, nuclear and explosive hazards.

A second set of DHS-adopted standards, four in all, will ensure that detectors ranging from hand-held alarming devices to shipping-container-sized monitors will reliably discern above-background levels of radiation. These standards are the products of a year-long, NIST-led collaboration of diverse government and private-sector organizations.

Contact: Mark Bello, (301) 975-3776

NIST STUDY HELPS AUTO ENGINEERS BY THE NUMBERS

Using rigorous statistical analysis, NIST researchers identified a potential source of error in the surface roughness data used in the automotive industry to predict how friction affects production of metal parts during forming. With this improved analysis, automakers should be able to more easily incorporate lighter weight materials in their products and improve fuel efficiency.

The NIST scientists presented their findings at the Society of Automotive Engineers' World Congress 2004, held in Detroit, March 8-11. The NIST researchers found industry often tries to draw specific conclusions about the surface with mathematically averaged roughness data that are too general. They also demonstrated that the current industrial practice for interpreting surface roughness may produce the same roughness values for two surfaces with markedly different topographies. This could lead to inaccurate predictions of friction because this surface roughness measurement only quantifies the average peak heights and valley depths, not the spacing between them.

Friction is key in auto part production. Too little friction during manufacturing leads to parts wrinkling and buckling. Too much friction can cause parts to tear.

The NIST team is continuing its work and is developing a new analytical approach for industry use for more reliable predictions of surface roughness and friction.

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LIGHT WAVE MEASUREMENTS MAKE CIRCUITS BETTER

Talk about precision. New measurements of key wavelengths of ultraviolet light-down to a few millionths of a nanometer-are among the most precise ever reported and are improving calibrations of microlithography tools used in making integrated circuits such as those in computer chips. The dimensions involved are 10,000 times smaller than hydrogen atoms, the smallest of all atoms.

To make the measurements, physicists at the NIST used a spectrometer so sophisticated that it is one of only five of its kind in the world, two of which are at NIST. The spectrometer, which separates and detects specific wavelengths of light radiation, provides 10 times better resolution than similar instruments used in calibrations for highly demanding applications such as the Hubble Space Telescope. The work is reported in the February issue of the Journal of the Optical Society of America.

The scientists measured the wavelengths of light emitted by excited atoms of iron, germanium and platinum. These elements are used as reference standards for calibrating argon fluoride (ArF) excimer lasers, among the latest tools for printing integrated circuits on silicon wafers. ArF lasers are tunable over a range of approximately 0.7 nanometer (nm) centered at 193.4 nm. Precise calibration ensures that the laser light is focused properly to produce the desired circuit patterns. Improved calibrations are expected to help the semiconductor industry make circuits smaller.

The measurements were partially funded by Lambda Physik, a major supplier of lasers for microlithography applications. The results have been incorporated into commercial laser systems.

Contact: Laura Ost, (301) 975-4034

CERAMICS DATA ENTER A NEW PHASE

It's an anthology that is likely to be very popular with designers and manufacturers of ceramics and related materials worldwide.

The NIST and the American Ceramic Society (ACerS) have compiled, into a single compact disk, nearly 20,000 phase-equilibria diagrams for more than 15,000 chemical systems. Each diagram is akin to a ceramics "road map" for a particular mixture of compounds-a graphical representation of how chemical composition and structure vary with changes in temperature, pressure or other conditions. Covered materials range from those that superconduct to those that vibrate, resonate or withstand inferno-like temperatures.

The collection contains all 20 volumes of critically evaluated phase diagrams that the ACerS-NIST collaboration has published since 1964. As important, the new CD-ROM features a variety of enhancements to improve search capabilities, ease of use and options for manipulating, presenting and analyzing data. Each phase diagram is accompanied by a brief scientist-written commentary that summarizes the source of the information, methods of data collection and key facets of the diagram.

Accurate, reliable phase diagrams reduce the potential for design and processing errors, and they may point the way to new types of materials with superior properties. The ACerS-NIST program also

saves research time and money by sparing individual scientists and organizations from the necessity of gathering the data themselves, usually from disparate sources, and evaluating its reliability. A 1997 assessment of the program estimated that each \$1 spent on data collection, evaluation and publication in this program produced \$10 in benefits to the R&D community.

For details on ACerS-NIST Phase Equilibria Diagrams CD-ROM Database Version 3.0, see

<www.nist.gov/srd/nist31.htm > or < www.ceramics.org/phasedd >.

GENES APPEARED BEFORE "JUNK" DNA

A rigorous statistical analysis of so-called "junk" DNA from a wide variety of biological kingdoms (plants, animals, fungi, etc.) has shown that this mysterious genetic material was added late in the evolution of life on earth-after the formation of modern-sized genes that contain instructions for making proteins.

The new research appears to resolve a debate about whether "introns"-sections of DNA with unknown function plopped in the middle of genes-were present in ancient life forms or appeared for the first time after bacteria and higher organisms split into separate evolutionary paths billions of years ago.

The work was conducted at the Center for Advanced Research in Biotechnology (CARB), which is jointly operated by the NIST and the University of Maryland Biotechnology Institute. A Furman University researcher collaborated on the project. Their findings are reported in the March 10 online edition of *Molecular Biology and Evolution*.

Using publicly available genetics sequences, the CARB study analyzed data for 10 families of protein-coding genes in animals, plants, fungi and their relatives, encompassing 1,868 introns at 488 different positions. While most such studies work with one genetic sequence family at a time, the CARB study developed software to automate the analysis of dozens of sequence families simultaneously.

The new results refute a once-popular theory that introns may have served as genetic glue to assemble modern-sized genes out of ancient mini-genes. The CARB analysis shows that the probability of a modern intron's presence in an ancestral gene common to the genes studied is roughly 1 percent, indicating that the vast majority of today's introns appeared after the origin of the genes.

For more information, see <http://www.nist.gov/public_affairs/news-fromnist_junkdna.htm>.

TOOLKIT FOR EVALUATING PUBLIC R&D FUNDING

It's hard to measure innovation. While public support for research and development long has been recognized as an important tool for enhancing economic growth, determining which programs are most effective has been problematic for just as long.

The Advanced Technology Program (ATP) at the NIST has more

than 14 years of experience evaluating R&D and has been recognized by the National Research Council for setting "a high standard for assessment." Using a variety of research tools, including surveys, econometric models, detailed case studies and literature analysis, ATP economists have assembled a significant body of research and data on the innovation process and contributed to the development of the academic theory on assessing R&D programs.

A new ATP publication, *A Toolkit for Evaluating Public R&D Investment*, assembles in one volume a decade's worth of ATP experience in the measurement of innovation, including a general framework for evaluation, a discussion of an evaluation logic model, fundamentals and methods, demonstrations of the ATP's use of evaluation methods, and a summary of an emerging body of knowledge from ATP studies on firm behavior, collaboration, spillover effects, interfaces with state and international technology programs, and the overall performance of the program. It also includes a glossary of terms, methods bibliography and a quick reference guide to evaluation models and methods.

Single copies of the toolkit are available by writing the Economic Assessment Office, Advanced Technology Program, NIST, 100 Bureau Drive, Mail Stop 4710, Gaithersburg, MD 20899-4710, or by sending an e-mail to <atp-eao@nist.gov>. The report also is available on-line at <www.atp.nist.gov/eao/gcr03-857/contents.htm>.

UNCERTAINTY IN CLINICAL TESTS RAISES HEALTH CARE COSTS

Small measurement uncertainties in clinical laboratory tests can add large amounts to health care costs, according to a newly released study commissioned by the NIST.

The study,* conducted by RTI International (Research Triangle Park, N.C.) and the Mayo Clinic (Rochester, Minn.), estimates that calibration errors in measurements of calcium levels in blood may add between \$60 million and \$199 million to U.S. health care costs annually. High calcium levels can be a symptom of diseases such as cancer and thyroid disorders.

Accurate measurements are critical because calcium levels in healthy people fall within a narrow range, between 8.9 to 10.1 milligrams (mg) per deciliter (dL). Through interviews with laboratory managers and equipment manufacturers, the researchers estimated that results for up to 15 percent of calcium laboratory tests contain calibration errors of between 0.1 and 0.5 mg per dL. This means that some results that fall in the center of the "normal" range, say 9.7 mg/dL, may in fact be for patient samples with elevated calcium, defined as 10.2 mg/dL and above. At the same time, patients with measured values above the threshold, but who actually have normal calcium levels, may receive unnecessary follow-up procedures such as hormone measurements and chest X-rays.

The study analyzed data for more than 89,000 patients receiving serum calcium tests at the Mayo Clinic from 1998 to 1999. It found that calibration errors added between \$8 and \$89 per patient to the health care costs of approximately 3.55 million patients.

Major sources of calibration error include differences in analysis methods used by different laboratory instruments, lot-to-lot varia-

tions in calibration materials, and lack of "traceability" between secondary reference materials and primary standards such as Standard Reference Materials produced by NIST.

Full text of the report is available at <
<http://www.nist.gov/director/prog-ofc/report04-1.pdf> > .

* *The Impact of Calibration Error in Medical Decision Making*, printed copies available by contacting Denise Herbert, (301) 975-2667, < denise.herbert@nist.gov > .

SUPERCONDUCTING R&D WIRE ACHIEVES MAJOR MILESTONE

Using improved processing equipment developed with support from the NIST's Advanced Technology Program, American Superconductor Corporation (AMSC) has produced lengths of record-breaking high-temperature superconductor (HTS) wire.

The company recently announced that it achieved electric current carrying capacity in multiple 10-meter lengths of second-generation (2G) HTS wire equal to or better than 250 Amperes per centimeter of width, an industrial world record that approaches performance levels required for commercial applications. The company's 2G results were achieved through a reel-to-reel liquid deposition production process that has been designed to be scalable to high-volume, low-cost manufacturing.

Large-scale use of 2G HTS wire carrying high amperage electrical current with virtually no resistance promises dramatic gains in energy efficiency. Today about 10 percent of transmitted electricity is wasted, largely due to resistance. The new technology also can increase the efficiency of large electric motors by as much as 50 percent and enable smaller, more powerful magnetic resonance imaging machines for medicine.

The 2G wires will cost less than first-generation HTS wire. AMSC received ATP support to develop a large-scale continuous-process reaction furnace for producing 100-meter lengths of 2G HTS ribbon, a key element for practical commercial production of the wire.

More information on the AMSC 2G HTS wire project and a white paper on the technology may be found on the company's Web site: <
www.amsuper.com > .

SOFTWARE CORRECTS CHIP ERRORS EARLY

Microchip miniaturization is making quality control-related measurement of features during the production process increasingly difficult. New National Institute of Standards and Technology (NIST) software and research results* should help manufacturers reduce errors in measuring microchip features which today measure less than 37 nanometers (about 1.5 millionths of an inch) in width and are expected to shrink to 25 nanometers (about 1 millionth of an inch) by 2007.

Currently, most semiconductor manufacturers use scanning electron microscopes (SEMs) to measure circuitry lines when the chip is first being patterned. Circuit dimensions are formed when ultraviolet light is shined on a thin film of polymer laid over silicon. Exposed areas harden, allowing unexposed areas to be chemically etched into tiny troughs for laying down circuit lines. Errors caught before etching may be correctable, while those caught later may result in scrapping the wafer and loss of a sizeable investment.

The NIST software equips the SEMs with a "model library" of possible line measurements. Technicians can use the enhanced SEMs to match measured images with library images in order to more accurately determine the shapes and sizes of features. Using the new software can cut measurement errors from tens of nanometers down to a few nanometers. The new method also is more reliable. There is about three times less variation among repeated measurements of the same circuit feature using the software than with the current most commonly used method.

NIST and International SEMATECH, a consortium of leading semiconductor manufacturers that represent about half the world's semiconductor production, funded the "model library" work. Contact: John Blair, (301) 975-4261

QUICK LINKS

Quantum Information Science and Emerging Technologies

A workshop designed to engage industry representatives in a continuing dialogue with the National Institute of Standards and Technology (NIST) and other federal agencies on emerging quantum information technologies will take place on April 28-30, 2004, at NIST's facilities in Boulder, Colo. The meeting will provide an introduction to quantum computing and communications, descriptions of current research results in the field, a review of federal perspectives, and opportunities for industry comment on NIST program directions. See <www.nist.gov/public_affairs/confpage/new040428.htm> .

Four New Members Named to NIST's Technology Advisory Committee

NIST Acting Director Hrach Semerjian has named four distinguished industry and business experts to serve on the Visiting Committee on Advanced Technology, the agency's primary private-sector policy advisor. The new VCAT members are: Donald B. Keck, Corning, N.Y., chief technology officer, Infotonics Technology Center, Inc.; Edward J. Noha, Chicago, Ill., chairman emeritus, CNA Financial Corp.; Thomas A. Saponas, Colorado Springs, Colo., retired senior vice president and chief technology officer, Agilent Technologies; and James W. Serum, West Chester, Pa., president, SciTek Ventures. See <www.nist.gov/public_affairs/releases/newvcats.htm> .

Simplifying U.S./Canada Trade of Telecom Equipment

U.S. makers of telecommunication equipment now can certify their products in the United States and ship directly to Canadian markets, thanks to the latest step in carrying out a 1998 trade agreement. This streamlining of the regulatory approval process results from the

Canadian government's recent recognition of seven U.S. testing and inspection organizations that had been recommended as "certification bodies" by the NIST. Two-way trade of telecommunications equipment between the two neighbors totals about \$7 billion a year. For more information, see < www.nist.gov/public_affairs/releases/apec.htm >.

President Presents Seven with Baldrige Awards

At a March 9 ceremony, President George W. Bush and Commerce Secretary Don Evans honored Medrad, Inc.; Boeing Aerospace Support; Caterpillar Financial Services Corp. U.S.; Stoner, Inc.; Community Consolidated School District 15; Baptist Hospital, Inc.; and Saint Luke's Hospital of Kansas City with the 2003 Malcolm Baldrige National Quality Award in recognition of their performance excellence and quality achievements. This is the most Baldrige Award recipients since the program started in 1988 and the first time that recipients were named in all five (manufacturing, service, small business, education and health care) Baldrige Award categories. See < http://www.nist.gov/public_affairs/releases/baldrige2003.htm >.

Committee Reports (continued from page 38)

CONFERENCE MANAGEMENT

Carol Hockert, V.P.

2004 CONFERENCE DIRECTOR

Bernard Morris

The conference planning has gone smoothly and we are on schedule. 25,000 CDs have been distributed. Registration and housing are both up and running.

Registration counts look encouraging..

Meeting Planner Report - Tom Huttemann
Registration/Exhibits/Sponsors - Craig Gulka
Technical Program - Dick Pettit
Tutorials - Klaus Jaeger
Publicity - Jesse Morse
Finance - Jack Ferris
Best Paper - Jeff Gust/Doug Sugg
Conference Evaluation - Larry Yates
Entertainment - Hockert/Morris/Gulka
Door Prizes - Mike Suraci
Site Selection Chair - Tony Anderson
2005 Conference Director - Gary Jennings
Exhibit Sales for 2005 Conference - Tom Huttemann/Craig
2006 Conference Director - Ed Pritchard

NCSLI NEWSNOTES

US VOTES AFFIRMATIVE ON ISO 17025

Roxanne Robinson

The United States voted affirmatively on the amendment to 17025. The standard received four negative votes but that does not mean failure. WG25 is going to meet (in June?) to address the negative votes and other comments that were received. If the edits result in a substantive change in the document, it will have to go out for another vote, up or down only.

NCSLI PUBLICATIONS CLUB RULES

NCSLI provides a process for member organizations to leverage their main membership with multiple copies of all NCSLI publications without taking out multiple memberships.

The Publications Club grants NCSLI organizational member delegates the right to post NCSLI publications on an Intranet site for a nominal annual fee. Posting publications for organization use - without authorization - is a violation of the NCSLI copyright policy regarding 1) unlimited distribution and 2) systematic and multiple reproductions."

WORLD METROLOGY DAY

It's a bit late to plan any parades or celebrations, but World Metrology Day was May 20, 2004, as proclaimed by BIPM. This URL gives an informative rundown on how metrology affects our daily lives, so it might be useful for you to hand to schools or other interested people.

< <http://www1.bipm.org/en/bipm/metrology/> >

LIAISON NEWS

ASQ MEASUREMENT QUALITY DIVISION (MQD)

Christopher L. Grachanen, Liaison Delegate

Metrology Handbook

The American Society for Quality (ASQ) Measurement Quality Division (MQD), in cooperation with ASQ's Quality Press, are proud sponsors of The Metrology Handbook. The handbook's editor is no other than Jay Bucher, NCSLI Madison, WI, regional coordinator. This handbook provides an overview of metrology and calibration principles and practices geared toward intermediate and advanced users with a basic understanding of the subject matter. Examples and figures are used throughout the book to aid in practically applying the material along with a helpful list of acronyms and abbreviations, a glossary of terms, and a bibliography for easy reference.

Contents:

History and Philosophy of Metrology and Calibration
Quality Systems (including Audit Requirements and Industry Specific Requirements)
General Metrology Knowledge (including concepts, methods, specifications, substituting standards, and proficiency testing)
Mathematics and Statistics: Their Use in Measurement
Uncertainty in Measurement
Managing a Metrology Department or Calibration Laboratory

The handbook may be obtained at:
<<http://qualitypress.asq.org/perl/catalog.cgi?item=H1215>>

NCSLI Conference 2004

Representatives from ASQ's Measurement Quality Division will be available at the International Accreditation Service, Inc. (IAS) booth to answer your questions and provide literature about the division, CCT program, The Metrology Handbook, etc. - hope to see you there.

Conference 2004

ASQ's Measurement Quality Division, in conjunction with ASQ's Inspection Division, is pleased to announce a joint division conference on September 23-24, 2004. The conference will be held at the USAF Primary Standards Laboratory, Conference & Cafeteria Facilities, Newark Metrology Operations in Heath, Ohio. Heath is conveniently located 20 miles east of Columbus off I-70 and served by Columbus airport. Many hotel and dining facilities exist in the surrounding area.

Abstracts addressing metrology-related topics are invited. Please limit abstracts to 100 words or less and submit them to Hershal Brewer at <hbrewer@iasonline.org>. Proposals for workshops on September 22, 2004 are also invited from workshop sponsors. A limited number of exhibit tables and promotional sponsorships are also available for a nominal cost.

For conference information, please visit <<http://www.measurementquality.org/index.html>> or contact Dilip A. Shah: <emc3solu@aol.com>.

Certified Calibration Technician (CCT) Program

Since our last CCT program update there have been two CCT workshops held at the American Society for Quality (ASQ) headquarters in Milwaukee, WI. These workshops were open to individuals that had already passed the CCT exam. Workshop participants are volunteers who believe that certification of calibration technicians is good for the Metrology profession and as such give up their free time to contribute to the CCT program (travel, lodging and meals are reimbursed by ASQ). The first workshop, the Exam Review Workshop, was held on the weekend of March 5th.

The goal of the Exam Review workshop is to produce a final CCT exam that tests candidates' knowledge while meeting the specifications established in the CCT body of knowledge (several CCT exam versions are used to ensure testing integrity). Some of the topics focused on in the workshop concern overlap and cueing among test items, and how the individual test items contribute to the exam as a whole. The following individuals participated in the March 5-6, 2004 Exam Review Workshop:



L/R) Graeme Payne, Al Germann, Bill Klodt, Dave Brown, Karl Wigdal, Roger Spitz, Elias Monreal, Jim Klein, Keela Sniadach, Tracy Omdahl, Jay Bucher

The second CCT workshop, the Item Writing Workshop, was held on the weekend of April 23rd. The goal of the Item Writing Workshop is to review and refine test items that may be used in future exams. The Item Writing Workshop focuses on candidate test item accuracy, source reference (all test items must be substantiated by a published reference available in the public domain), readability and alternate choice feasibility congruent with the CCT body of knowledge. Of the 100 candidate test items reviewed, 82 were approved for future CCT exam offerings. The following participated in the April 23-24, 2004 Item Writing Workshop:



(L/R) James Stainsby, Al Germann, Steve Niesen, Jim Klein, Brian Samuelson (background), Brian Keeler, Graeme Payne (background), Steve Arndt, David Richart, Dave Brown, Mike Gaddy, Jose Cayuela (background), Roger Spitz (background), Sharry Masarek, Elias Monreal

As of May 1, 2004, there are 5 individuals scheduled to sit for the CCT exam on Sunday, May 23, in Toronto, Ontario, Canada prior to ASQ's Annual Quality Congress. There are 159 people scheduled for the June 5, 2004 exam offering. The total number of individuals who are Certified Calibration Technicians as of December 6, 2003 is 138. The following is a summary of the past two CCT exam offerings:

Date of Exam	Sat for Exam	Passed Exam	% Passed
June 7, 2003	97	69	71%
December 6, 2003	107	69	65%

To learn more about the CCT program please visit ASQ's Measurement Quality Division website at: < <http://www.measurementquality.org/> >. CCT exam dates, exam fees and CCT exam application may be found at: < <http://www.asq.org/cert/types/cct/> >

ISA INTERNATIONAL

Mike Suraci, Liaison Delegate

Communications has been maintained with staff at ISA. The parallel activities of the 2 organizations present opportunities to share experiences.

Training information has been forwarded as applicable.

Areas discussed have included:

1. Long term Conference planning
2. Web site activities
3. Training opportunities
4. Headquarters requirements
5. Publications

NORTH AMERICAN CALIBRATION COOPERATION

Doug Faison, Liaison Delegate

The North American Calibration Committee (NACC) held its most recent meeting in January 2004, at the Disney Hotel in Anaheim, CA. Due to scheduling conflicts two of our members participated via telephone conference call, which worked well.

Members include the National Metrology Institutes (NMI's) of Canada, the United States, and Mexico, respectively the National Research Council (NRC), the National Institute of Standards and Technology (NIST), and the Centro Nacional de Metrologia (CENAM), and the recognized representatives of the laboratory accreditation systems of the three countries, respectively the Standards Council of Canada (SCC), the National Cooperation for Laboratory Accreditation (NACLA) and the entidad mexicana de acreditación (ema).

The Committee welcomes Dr. Malcolm Smith, representing NACLA and Jean Lafortune, representing NRC, to the group.

At this meeting we continued to work on revising our documentation to align them to the new MOU. We are currently working on the remaining two, which deal with how we conduct interlaboratory comparisons and other technical activities.

We also discussed current and future ILC activities. While there are no final results available to report at this time, we did conclude that the 1 ohm resistance ILC is progressing and preliminary results should be available shortly. It is planned to add an additional petal with 5 labs to make this ILC more meaningful. Other possibilities for ILCs were discussed and plans are being considered where resources allow.

The next NACC meeting is to be held at CENAM contiguous with the Simposio de Metrologia scheduled for October 25-27, 2004, in celebration of CENAM's 10th anniversary. The committee is tentatively scheduled to meet Thursday, October 28th and Friday, October 29th.

NACC has published its first in what is hoped to be a series of guidance documents. NACC G 001-2004; titled "Laboratory Accreditation, Traceability, and the Role of Mutual Recognition Arrangements," is a brief description of the roles of laboratory accreditation, the mutual recognition arrangements amongst laboratory accreditation bodies, and the mutual recognition arrangement amongst national metrology institutes as they relate to issues of traceability of measurement results. It should be a very useful document for those with cross border trade and/or traceability issues. This document has been posted on the NACC web site at <<http://www.nacc-web.ca/index.html>>. Questions/comments may be directed to C. D. Faison, of NVLAP, at <faisond@nist.gov>.

Editor's Note: I have a .pdf copy of the document NACC G001-2004 on request.

(Continued on page 51)

President's Message (Continued from page 1)

He is Secretary of the International Committee on conformity assessment (CASCO), which develops policy and produces international standards and guides on conformity assessment matters. Graeme will have some very interesting things to say about standards development and maintenance.

The three Luncheon speakers are Blaine Lee, Franklin Covey; Bob McGuinness, Director National Physical Laboratory; and Karl Roepke, US Olympics Team. Look for a complete report on the 2004 Salt Lake City Conference in the October Newsletter.

Award Winner

It gives me the greatest pleasure to announce that the Flemming Commission has awarded our own Georgia Harris, VP Operations, one of the 2004 Flemming Awards. It was presented at The George Washington University, to a small group of the "best and brightest" in federal government service. See the full story on p.40. I know I speak for the entire organization when I say congratulations Georgia, way to go!

April Board Meeting

Our April meeting was held in Boulder at the new NCSLI office. We had the official ribbon-cutting ceremony on Sunday evening prior to the Board meeting. (Page 34) Howard Castrup and the Integrated Science Group used the new training facility for the first time.

The Board continues to work on the breakthrough objectives for 2004. During the meeting, we held a workshop on membership. Harry Moody heads up an ad hoc committee whose charter is to find ways to attract new members, as well as retain existing members. Derek Porter reported that the first of several 'road shows' on measurement uncertainty was held in Northern California. If you are interested in having an uncertainty workshop in your area, contact your region/section coordinator.

There are three new publications available on the NCSLI web page. Members (only) can access these documents by clicking 'Publications' and then 'New Publications.' Non-members may purchase these publications and others. See the Publications List on page 64. The three are:

- 2003 Benchmarking Survey,
- RP-10, Establishment & Operation of Electrical Utility Metrology Laboratory (rewrite)
- Companion Volume to The Guide to Achieving Laboratory Accreditation

Several more publications will be available in the next year or so.

The International Division's reorganization plan was approved by your Board of Directors. (See page 23.)

ISO/IEC 17025

Late last year, the ISO Committee on Conformity Assessment (CASCO) issued a draft amendment (DAM) to the ISO/IEC 17025:2000, General Requirements for the Competence of Testing and Calibration Laboratories. Reviewers had a five-month period to provide comments and to vote.

The proposed amendment by the CASCO Working Group (WG) 25 was to align 17025 with ISO 9001:2000. WG25's recommendations were to make minimal changes that would satisfy the statement that the quality management system requirements of 17025 would now align with the principles of ISO 9001:2000. For the documents to be completely aligned, a major revision would have been required.

At the end of the voting period, there were four negative votes. The United States voted affirmatively. The working group is planning to meet in early summer to address the negative votes and comments received during the five-month period. The modified document could then be issued for another vote, but only 'yes' or 'no' to adopt. If everything goes according to schedule, the standard could be reissued as ISO/IEC 17025:2004 by the end of the year.

Once the revised standard is adopted, WG25 will have until 2009 to begin work on the next amendment that could, among other things, bring 17025 into complete alignment with ISO 9001:2000 or its replacement.

VIM Review

NCSLI has been invited to review Draft 3 of the International Vocabulary of Basic and General Terms in Metrology (VIM). Emil Hazarian, Glossary Committee Chair, has agreed to be the vocal point for all reviews, see page 16 in this newsletter for details.

CENAM Celebrates 10-Year Anniversary

During the semi-annual Council Meeting of Systema Interamericano de Metrologia (SIM), Malcolm Smith, on behalf of NCSLI, presented a plaque to Dr. Hector Nava Jaimes, Director General of CENAM. The plaque recognizes the 10-year anniversary of the Mexican NMI. The story is on page 15.

Musings

In my other job, you know, the one that puts food on the table and pays the bills; I have an opportunity to talk to hundreds of metrologists all over the world. Recently I was speaking with a long-time friend and colleague, Andy Salaka. Andy's laboratory is located at the Kennedy Space Flight Center. We talk several times a month about all manner of measurement issues. On that day, Andy commented that metrology training, for any discipline, is getting more difficult to find. Andy is not alone in this belief. Many of the people I talk with feel the same way.

In years gone by, we relied on the military metrology schools to provide the training that eventually found its way into industry. This happened when the enlisted men and women retired from the services and became employed in the private sector. There are, of course, colleges and universities that offer classes in measurement science and quality management; some offer degreed programs. I pointed out to Andy that NCSLI is an educational organization - where most of our effort is to offer 'training' in numerous forms. From our publications Standards, Recommended Practices, Recommended Intrinsic/Derived Standards Practices, and laboratory management practices, to the yearly workshop & symposium (including the tutorials), and the region/section meetings - all of which are meant to provide training to our members and other metrologists.

However, NCSLI can't do this alone. So, we rely on training provided by organizations like NIST and companies in the private sector that offer very specific training, usually on their own products and services. This training takes many forms, including: self-paced training on CDs/DVDs, face-to-face training in classrooms and, more recently, training over the web using services like WebEx. And, of course, many of the larger companies have their own in-house metrology training. Another option is the new ASQ Certified Calibration Technician program. Studying and understanding the 'body of knowledge' required to pass this examination is a good measure of a person's metrology education.

So what's the point to all of this? While the military is no longer providing the quantity of trained metrologists it once did, there are other avenues to pursue to find the necessary training. Is there enough training? Absolutely not! For that reason, I would encourage our member organizations, that don't offer training today, to consider offering it in the future. We all have knowledge that should be shared in our community. If training is not an option, consider becoming a member of one or more of the NCSLI committees. The RPs, RISPs, and other NCSLI publications are generated in these committees. If we all pitch in, you'd be surprised at just how much we could get done.

Dave Agy
NCSLI President

COUNCIL FOR OPTICAL RADIATION MEASUREMENTS (CORM)

Sally Bruce, Liaison Delegate

The annual CORM conference was held May 12-14 at NIST in Gaithersburg, MD. The theme for this year's conference was Advances in Color and Appearance Metrology. The latest developments in the fields of Retroreflection, Haze, Gloss, Goniospectrophotometry, Color Imaging, and Fluorescence were topics of presentations.

This year's Franc Grum Memorial Lecturer was Dr. Roy Berns from Rochester Institute of Technology (RIT). The speakers for the conference came from industry and government including 3M, Munsell Color Science Laboratory, RIT, SENAI/CETIQT Colour Institute - Rio de Janeiro, BRAZIL, National Research Council of Canada, NIST, the Commonwealth Science and Industrial Research Organization of Australia, DuPont, and the National Transportation Safety Board.

The CORM conference was scheduled to immediately follow the Inter-Society Color Council Conference that began on May 10. This schedule allowed participants to stay for both conferences and the organizers of both conferences to host a joint reception and poster session. The CORM conference concluded during the afternoon of May 14 with tours of the NIST facilities.

Editor's Note: I love big words, like goniospectrophotometry, but now I have to find out what it means. This one is the bigger than the one I had in memory up until now-sesquipedalian-which means a weakness for using big words like sesquipedalian.

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2004 NCSLI INTERNATIONAL WORKSHOP & SYMPOSIUM July 11-15, 2004 Salt Lake City, UT

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Tutorials Program	Klaus Jaeger	(408) 867-1743	FAX (408) 867-3705
Guest Program	Tom Huttemann	(252) 763-1600	FAX (252) 255-1927
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Best Paper Selection	Jeff Gust	(260) 244-7450	FAX (260) 244-7905
	Doug Sugg	(909) 273-5380	FAX (909) 273-5500
Conference Evaluation	Larry Yates	(941) 429-4377	FAX (941) 429-4377
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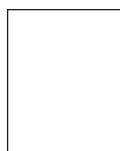
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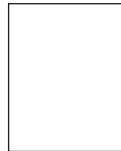
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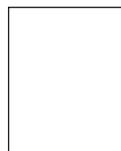
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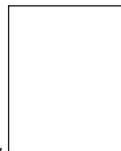
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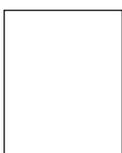
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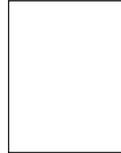
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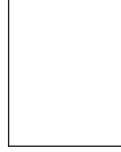
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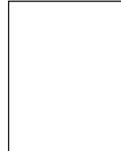
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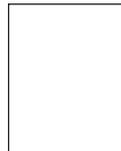
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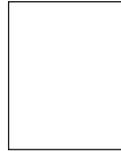
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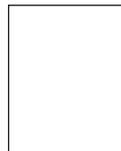
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NCSL International

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 info@ncsli.org • www.ncsli.org

2004 Application for Membership in NCSL International

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.

<input type="checkbox"/> New Corporate Member Fee (Jan-Dec 2004)	\$400
<input type="checkbox"/> New Educational Institution Member Fee (Jan-Dec 2004)	\$400

New Membership above plus annual dues renewal (Advance payment is guaranteed at \$325 per year. No refund for advance payment.)

New Member \$400 + 2005 dues \$325 = \$725

New Member \$400 + 2005/2006 dues \$650 = \$1,050

New Member \$400 + 2005/2006/2007 dues \$975 = \$1,375

New Member \$400 + 2005/2006/2007/2008 dues \$1,300 = \$1,700

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Pres.	Div. VP	Reg.	Coord.
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NCSL MEETING PLANNER



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BOARD OF DIRECTORS' MEETING DATES

July 11, 16-17, 2004
Salt Palace
Salt Lake City, UT
(In conjunction with the NCSL International Workshop &
Symposium, July 11-15, 2004)

October 3-6, 2004
Crowne Plaza Hotel
Ottawa, ON Canada

NEWSLETTER EDITORIAL SCHEDULE FOR 2004-05

Issue Date	In Mail	To Printer	Last Editorial to Editor
Oct. 04	10 Oct. 04	15 Sept. 04	1 Sept. 04
Jan 05	10 Jan. 05	15 Dec. 04	1 Dec. 04
Apr 05	10 Apr. 05	15 Mar. 05	1 Mar. 05
Jul. 05	10 Jul. 05	15 Jun. 05	1 Jun. 05

EDITOR'S NOTE:

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

FUTURE CONFERENCES

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

2005 NCSL International Workshop & Symposium
August 7-11, 2005
Washington, DC

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

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

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. The Publications Club grants NCSLI organizational member delegates the right to post NCSLI publications on an Intranet site for a nominal annual fee. Posting publications for organization use - without authorization - is a violation of the NCSLI copyright policy regarding 1) unlimited distribution and 2) systematic and multiple reproduction. Contact the Business Office for details - (303) 440-3339. See inside for application, or visit the NCSL International web site at <www.ncsli.org>



NCSLI NEWSLETTER

NCSL International
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Boulder, CO 80301-5404

The NCSLI Vision

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

The NCSLI Mission

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

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



**Come to Salt Lake City
NCSL International 2004
Annual Workshop & Symposium
July 11-15, 2004**

