NIST
United States Department of Commerce
Technology Administration
National Institute of Standards and Technology

# Report Of The 88th National Conference On Weights And Measures

as adopted by the 88th National Conference on Weights and Measures 2003

NIST Special Publication 1009
2003


# Report of the 88th National Conference on Weights and Measures

***Sparks, NV – July 13 through 17, 2003***
*as adopted by the 88th National Conference on Weights and Measures 2003*

*Editors:*
Henry V. Oppermann, Chief
Linda Crown
Technical Advisors to the Standing Committees

NIST Weights and Measures Division
Gaithersburg, MD 20899-2600

**U.S. Department of Commerce**
Donald L. Evans, Secretary

**Technology Administration**
Phillip J. Bond, Under Secretary
of Commerce for Technology

**National Institute of Standards and Technology**
Arden L. Bement, Jr., Director

NIST Special Publication 1009

May 2004

*The National Conference on Weights and Measures is supported by the National Institute of Standards and Technology and is attended by officials from various States, counties, cities, as well as representatives from U.S. Government, other nations, industry, and consumer organizations.*

# Table of Contents

## Abstract

The 88th Annual Meeting of the National Conference on Weights and Measures (NCWM) was held July 13 through 17, 2003, at the John Ascuaga's Nugget Hotel in Sparks, NV. The theme of the meeting was, "Moving Strategically into the Future."

Reports by the NCWM Board of Directors, Standing Committees, and Special Purpose Committees constitute the major portion of this publication, along with the addresses delivered by Conference officials and other authorities from government and industry.

Special meetings included those of the Scale Manufacturers Association, Meter Manufacturers Association, Gasoline Pump Manufacturers Association, American Petroleum Institute, National Association of State Departments of Agriculture, the Industry Committee on Packaging and Labeling, Associate Membership Committee, and Metrology Subcommittee.



Key words: laws and regulations; legal metrology; meters; scales; specifications and tolerances; training; type evaluation; uniform laws, weights and measures.

Library of Congress Catalog Card Number 26-27766.


**Note:** The policy of the National Institute of Standards and Technology is to use metric units of measurement in all of its publications. In this publication, however, recommendations received by the NCWM technical committees have been printed as they were submitted and, therefore, may contain references to inch-pound units where such units are commonly used in industry practice. Opinions expressed in non-NIST papers are those of the authors and not necessarily those of the National Institute of Standards and Technology. Non-NIST speakers are solely responsible for the content and quality of their material.


Nat. Inst. Stand. Technol. Spec. Pub. 1009, Pages 307 (May 2004) CODEN: NSPUE2

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON: 2004

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: (202) 512-1800 Fax: (202) 512-2250
Mail: Stop SSOP, Washington, DC 20402-0001

## Past Chairmen of the Conference

| Conference | Year | Chairman |
|---|---|---|
| 43rd | 1958 | J. P. McBride, MA |
| 44th | 1959 | C. M. Fuller, CA |
| 45th | 1960 | H. E. Crawford, FL |
| 46th | 1961 | R. E. Meek, IN |
| 47th | 1962 | Robert Williams, NY |
| 48th | 1963 | C. H. Stender, SC |
| 49th | 1964 | D. M. Turnbull, WA |
| 50th | 1965 | V. D. Campbell, OH |
| 51st | 1966 | J. F. True, KS |
| 52nd | 1967 | J. E. Bowen, MA |
| 53rd | 1968 | C. C. Morgan, IN |
| 54th | 1969 | S. H. Christie, NJ |
| 55th | 1970 | R. W. Searles, OH |
| 56th | 1971 | M. Jennings, TN |
| 57th | 1972 | E. H. Black, CA |
| 58th | 1973 | George L. Johnson, KY |
| 59th | 1974 | John H. Lewis, WA |
| 60th | 1975 | Sydney D. Andrews, FL |
| 61st | 1976 | Richard L. Thompson, MD |
| 62nd | 1977 | Earl Prideaux, CO |
| 63rd | 1978 | James F. Lyles, VA |
| 64th | 1979 | Kendrick J. Simila, OR |
| 65th | 1980 | Charles H. Vincent, TX |
| 66th | 1981 | Edward H. Stadolnik, MA |
| 67th | 1982 | Edward C. Heffron, MI |
| 68th | 1983 | Charles H. Greene, NM |
| 69th | 1984 | Sam F. Hindsman, AR |
| 70th | 1985 | Ezio F. Delfino, CA |
| 71st | 1986 | George E. Mattimoe, HI |
| 72nd | 1987 | Frank C. Nagele, MI |
| 73rd | 1988 | Darrell A. Guensler, CA |
| 74th | 1989 | John J. Bartfai, NY |
| 75th | 1990 | Fred A. Gerk, NM |
| 76th | 1991 | N. David Smith, NC |
| 77th | 1992 | Sidney A. Colbrook, IL |
| 78th | 1993 | Allan M. Nelson, CT |
| 79th | 1994 | Thomas F. Geiler, MA |
| 80th | 1995 | James C. Truex, OH |
| 81st | 1996 | Charles A. Gardner, NY |
| 82nd | 1997 | Barbara J. Bloch, CA |
| 83rd | 1998 | Steven A. Malone, NE |
| 84th | 1999 | Aves D. Thompson, AK |
| 85th | 2000 | G. Wes Diggs, VA |
| 86th | 2001 | L. Straub, MD |
| 87th | 2002 | Ron Murdock, NC |

# National Conference on Weights and Measures, Inc.
# Organization Chart
# 2002/2003

## Board of Directors

| Office Representation | Name/Affiliation | Term |
|---|---|---|
| Chairman: | R. Andersen, NY* | |
| Chairman-Elect: | D. Ehrhart, AZ* | |
| Past Chair/NTEP Committee Chair: | L. Straub, MD* | |
| Treasurer: | T. Geiler, MA | |
| Active Membership/Northeastern: | R. McGrath, MA | 2004 |
| Active Membership/Central: | D. Onwiler, NE* | 2005 |
| Active Membership/Southern: | M. Gray, FL* | 2003 |
| Active Membership/Western: | M. Cleary, CA | 2007 |
| At-Large: | M. Pinagel, MI | 2003 |
| At-Large: | D. Frieders, CA | 2006 |
| Associate Membership: | D. Quinn, Fairbanks Scales | 2004 |
| | * National Type Evaluation Program (NTEP) Committee Member | |
| Honorary NCWM President: | A. Bement, Jr., NIST Director | |
| NCWM Executive Secretary: | H. Oppermann, NIST Weights and Measures Division | |
| BOD Advisors: | B. Palys, CAE, Executive Director, NCWM Headquarters | |
| | G. Vinet, Canada | |
| NTEP Committee Technical Advisor: | S. Cook, NIST Weights and Measures Division | |

## Committees

### Laws & Regulations Committee

| | |
|---|---|
| Chair: | D. Johannes, CA (2) |
| Members: | V. Dempsey, OH (1) |
| | J. Gomez, NM (4) |
| | E. Price, TX (4) |
| | J. Cassidy, MA (5) |
| Associate Member Rep: | C. Guay, Proctor & Gamble |
| Canadian Tech. Advisors: | B. Lemon |
| | D. Hutchinson |
| NIST Tech. Advisors: | T. Coleman |
| | S. Cook (for Uniform Natl. Type Evaluation Regulation) |

### Specifications & Tolerances Committee

| | |
|---|---|
| Chair: | R.W. Wotthlie, MD (1) |
| Members: | C. VanBuren, MI (2) |
| | C. Cooney, OR (4) |
| | J. Kane, MT (3) |
| | M. Sikula, NY (5) |
| Canadian Tech Advisor: | T. Kingsbury |
| NIST Tech. Advisors: | J. Williams |
| | R. Suiter |

### Multiple Dimension Measuring Devices Working Group

| | |
|---|---|
| Chair: | C. Skonberg, United Parcel Service |
| NIST Tech. Advisor: | R. Suiter |

### Administration & Public Affairs Committee

| | |
|---|---|
| Chair: | S. Hadder, FL (2) |
| Members: | K. Deitzler, PA (3) |
| | C. Fiksdal, CA (2) |
| | C. Bennett, MI (4) |
| | Vacancy (TBD) |
| Associate Member Rep: | C. Kloos, Colgate-Palmolive |
| NCWM Safety Liaison: | C. Gardner, NY |

### Voluntary Quality Assurance Assessment Program

| | |
|---|---|
| Chair: | S. Colbrook, IL |
| NIST Tech Advisor: | L. Sebring |

### Metrology Committee

| | |
|---|---|
| Chair: | S. Sumner, NM |
| Vice Chair: | M. Harwitz, WI |
| Members: | L. F. Eason, NC |
| | D. Newcombe, ME |
| | J. Rothleder, CA |
| | J. Torres, PR |
| NIST Tech Advisor: | V. Miller |

## Committees (cont'd)

| Nominating Committee | | Legislative Liaison | |
|---|---|---|---|
| Chair: | A. Thompson, AK | Chair: | T. Geiler, MA |
| Members: | R. Andersen, NY | Members: | W. Corey, American Frozen Foods |
| | D. Ehrhart, AZ | | |
| | L. Straub, MD | | |
| | J. Truex, OH | | |
| | R. Davis, Georgia Pacific | | |
| | G. Johnson, Gilbarco, Inc. | | |
| **Credentials Committee** | | **Appointed Officers** | |
| Chair: | (TBD) | Parliamentarian: | A. Thompson, AK |
| Members: | (TBD) | Chaplain: | M. Belue, TN |
| | (TBD) | Sergeants-At-Arms: | (TBD) |
| Coordinator: | L. DiTizio, NCWM Headquarters | Presiding Officers: | R. Andersen, NY |
| | | | G. Buendel, WA |
| | | | C. Fulmer, SC |
| | | | R. Hayes, MO |
| | | | M. Coyne, MA |

| Associate Membership Committee | |
|---|---|
| Chair: | D. Flocken, Mettler-Toledo (1) |
| Vice Chair: | W. Sveum, Kraft Foods North America (1) |
| Secretary/Treasurer: | M. Galletta, Nestle, USA (4) |
| Members: | J. Baker, Pier 1 Imports (5) |
| | C. Frye, International Dairy Foods Association (1) |
| | V. Orr, ConAgra Refrigerated Prepared Foods (3) |
| | G. Lameris, Hobart Corporation (5) |
| | S. Langford, Cardinal Scale Manf. Company (3) |
| | A. Nelson, NW Associates (2) |
| | R. Murnane, Jr., Seraphin Test Measures (4) |

| Regional Weights and Measures Association Contacts For Membership Information | |
|---|---|
| Northeastern Weights and Measures Assn. (NEWMA): | K. Deitzler, PA (717) 787-9089 kdeitzler@state.pa.us |
| Southern Weights and Measures Assn. (SWMA): | W. Sutton, NC (919) 733-3313 Winston.Sutton@ncmail.net |
| Central Weights and Measures Assn. (CWMA): | R. Osterkamp, OK (605) 773-6031 renee.osterkamp@state.sd.us |
| Western Weights and Measures Assn. (WWMA): | C. Cooney, OR (503) 986-4677 ccooney@oda.state.or.us |

## National Type Evaluation Program
## Technical Committees

| Weighing Sector | | Measuring Sector | |
|---|---|---|---|
| Chair: | D. Flocken, Mettler-Toledo | Chair**:** | R. Tucker, Tokheim Corporation |
| Technical Advisor: | S. Cook, NIST | Technical Advisor: | R. Suiter, NIST |
| Public Sector Members: | R. Andersen, NY<br>W. Bates, GIPSA<br>A. Buie, MD<br>T. Butcher, NIST<br>C. Carter, OK<br>G. Castro, CA<br>C. Cotsoradis, KS<br>G. W. Diggs, VA<br>J. Kane, MT<br>D. Onwiler, NE<br>D. Parks, CA<br>G. Shefcheck, OR<br>J. Truex, OH<br>L. Turberville, AL<br>J. Vanderwielen, GIPSA<br>W. West, OH<br>R. Wyckoff, OR<br>E. Klawis, Canada | Public Sector Members: | R. Andersen, NY<br>T. Butcher, NIST<br>J. Butler, NC<br>G. Castro, CA<br>S. Hadder, FL<br>T. Kingsbury, Canada<br>S. Malone, NE<br>C. Nelson, CA<br>W. West, OH<br>R. Wotthlie, MD |
| Private Sector Members: | R. Jimenez, Transportation Technology Center<br>J. Elengo, Contractor<br>R. Feezor, Norfolk Southern Corp.<br>W. GeMeiner, Union Pacific RR<br>D. Hawkins, Thurman Scale Co.<br>J. Hughes, Weigh-Tronix, Inc.<br>D. Krueger, NCR<br>G. Lameris, Hobart Corp.<br>S. Langford, Cardinal Scale Mfg.<br>T. Luna, Scales Unlimited, Inc.<br>L. E. Luthy, Brechbuhler Scales<br>D. Tonini, Scale Manufacturers Assn.<br>J. Wang, A&D Engineering, Inc.<br>O. Warnlof, Consultant<br>W. Young, Emery Winslow Scale | Private Sector Members: | R. B. Beahm, Krohne, Inc.<br>F. M. Belue, Belue Associates<br>M. Buttler, Emerson Processes/Micro Motion<br>R. Cooper, Actaris Neptune<br>M. Forkert, Tuthill Transfer Systems<br>P. Glowacki, Murray Equipment<br>P. Goodier, Syltone<br>M. Hankel, MCH Engineering Assoc.<br>D. Hoffman, TopTech Systems<br>G. Johnson, Gilbarco, Inc.<br>M. Keilty, Endress & Hauser<br>D. Krueger, NCR<br>D. Long, RDM Industrial Electronics<br>W. Mattar, The Foxboro Co.<br>A. Noel, Neptune Technology<br>C. Numrych, Liquid Controls<br>T. Poulter, Syltone<br>D. Resch, FMC Measurement Solutions<br>M. Roach, Verifone, Inc.<br>J. Skuce, FMC Measurement Solutions<br>B. Traettino, Liquid Controls, LLC<br>O. Warnlof, Consultant |

## National Type Evaluation Program
## Technical Committees (cont'd)

| Belt Conveyor Scales Sector | | Grain Moisture Meter Sector and Near-Infrared Protein Analyzer Sector | |
|---|---|---|---|
| Chair: | TBD | Chair: | C. Eigenmann, DICKEY-john Corp. |
| Technical Advisor: | S. Cook, NIST | Technical Advisors: | G. Diane. Lee, NIST<br>J. W. Barber, J. B. Associates |
| Public Sector Members: | A. Buie, MD<br>T. Butcher, NIST<br>L. Turberville, AL | Public Sector Members: | Canadian Grain Commission<br>R. Burns, AR<br>T. Butcher, NIST<br>D. Onwiler, NE<br>S. Colbrook, IL*<br>R. Pierce, GIPSA<br>J. Rothleder, CA<br>C. Tew, NC<br>R. Wittenberger, MO |
| Private Sector Members: | R. Dietrich, Kaskaskia Valley Scale<br>R. Jimenez, Transportation Technology Center, Inc.<br>K. Knapp, Milltronics<br>L. Marmsater, Merrick Industries<br>B. Ripka, Ramsey Technology, Inc.<br>P. Sirrico, Thayer Scale - Hyer Industries, Inc.<br>D. Tonini, SMA<br>T. Vormittag, Sr, Commercial Testing & Engineering Co.<br>O. Warnlof, Consultant | Private Sector Members: | J. W. Barber, J. B. Associates<br>J. Bair, Millers National Federation<br>M. Clements, The Steinlite Corp.<br>C. Hurburgh, Jr., Iowa State University<br>D. Krejci, Grain Elevator & Processing Society*<br>A. Lundstedt, Cognis QTA<br>T. O'Connor, National Grain & Feed Assn.<br>T. Runyon, Seedboro Equipment<br>F. Seeber, Shore Sales Co., Grain Elevator & Processors Society |
| | | | *Grain Moisture Meter Sector only |

# President's Address
# National Conference on Weights and Measures
# Sparks, Nevada
# July 15, 2003

### "Addressing the Challenges"

**Dr. Richard F. Kayser, Director, Technology Services**
**National Institute of Standards and Technology**

## Introduction

It is a pleasure to be here this afternoon representing NIST Director Dr. Arden Bement. Dr. Bement regrets that he was unable to participate in the meeting this year. He greatly enjoyed participating last year and meeting the leaders of the NCWM. He appreciates the critical role that industry and the regulators play in the U.S. commercial measurement system.

The complex infrastructure of the commercial measurement system is something that most consumers take for granted. We are fortunate that this infrastructure has functioned so well over the years; however, the economic slowdown and the budget crises facing many states are forcing major changes in many weights and measures programs, frequently in the form of budget cuts and staff and program reductions.

Many programs are being asked to find their own sources of revenue. But weights and measures programs have always had difficulty competing for funds with education, health care, welfare, and law enforcement. In this post 9/11 era, weights and measures must also compete for funds with Homeland Security.

And nor has industry been immune to the economic downturn. Many companies have been downsizing for years to increase their competitiveness, but the economic slowdown has reduced even further their ability to participate in meetings and activities not considered to have a direct positive effect on the bottom line.

The NCWM theme for this year, "Moving Strategically into the Future," is very appropriate in these challenging times. We all need to reassess our goals and our approaches to achieving those goals, and to set a course for improvement despite the budget constraints we all face. The NCWM has focused its activities on the strategic objectives it developed several years ago. As Ross Anderson pointed out in his letter of invitation to this meeting, the NCWM is facing some fundamental changes in its approach to the National Type Evaluation Program, the use of international standards, and the structure of the NCWM itself.

As has been the case many times in the past, both NIST and the NCWM have many parallel issues as they move "strategically into the future." I'd like to touch on several of those issues. After that, I'll talk briefly about Challenges and Goals before concluding.

## Parallel Issues

The same conditions that are creating budget cuts in state and local weights and measures programs are also resulting in a stagnant budget for NIST. We in weights and measures, both in state and local government and at NIST, must explain and demonstrate the importance of our programs and the value we add to our partners and customers. Like NCWM, NIST as a whole is also reviewing its programs and has identified a set of strategic focus areas and directions for the future.

One activity that Technology Services is leading on behalf of NIST is to describe the national measurement system and why that system is so important to the country, and also to describe NIST's role within that system, and in turn, why that role is so important to the country. Ultimately – and I must stress that this will be a long-term effort – we hope to be able to advise the country – that is, the Administration and Congress – on what needs to be done – not only by NIST, but by

other key players as well – to address the challenges we face in the national measurement system, and on the consequences of not addressing those challenges.

The commercial measurement system is obviously a critical component of the national measurement system. Metrologists, laboratories, manufacturers, packagers, retailers, and regulators are critical contributors to this system, which needs effective, but balanced, technical regulations and the enforcement of those regulations to promote fair competition, to facilitate value comparisons, and to promote consumer protection. I note the considerable similarity between the NIST effort on the National Measurement System and the effort initiated by Aves Thompson on the Fair Measurement Act. I want to commend Aves for his vision, leadership, and hard work in championing this effort. NIST looks forward with enthusiasm to further discussions with Aves, Dennis Ehrhart, Dave Frieders, and all other interested parties.

The effects of globalization represent another area of common interest for NIST and the NCWM. As you heard this morning in the excellent presentation by Chuck Ehrlich and Gilles Vinet, weights and measures technical requirements are part of this global picture.

The NCWM, the Scale Manufacturers Association, and NIST are giving joint presentations at the regional weights and measures association meetings on the importance of aligning U.S. and international legal metrology standards. The alignment of U.S. and OIML standards is not a one-way street. The United States must present effective, technical arguments for its positions. And once acceptable international documents are developed – documents that facilitate trade but do not restrict U.S. technology – we must collectively push to align the U.S. legal metrology standards with the international standards.

In fact, recognition of these issues is what led us to reorganize within Technology Services to bring our efforts in national and international legal metrology together in one organization – the new Weights and Measures Division (WMD). We have already seen significant synergies and benefits from this change.

The current process to revise OIML Recommendations 60 and 76 for load cells and scales, respectively, presents an excellent opportunity for the United States to propose numerous changes to these standards. The U.S. National Working Group for these OIML standards will meet in August to develop the changes that the U.S. will propose and to determine where the U.S. should consider changes to NIST Handbook 44 and NCWM Publication 14. To facilitate these discussions, NIST supported a detailed comparison of the relevant OIML and U.S. standards.

This morning Gilles Vinet talked about the importance that Canada places on the revision of OIML R 117 for liquid-metering devices for liquids other than water. The U.S. National Working Group has been working closely with Canada to develop changes to this important international standard. As for load cells and scales, NIST plans a detailed comparison of the relevant OIML and U.S. standards.

The participation of U.S. industry and U.S. regulatory officials in the review of draft international documents is critical if these documents are to reflect U.S. practices and approaches. Hence, NIST is supporting the participation of several weights and measures officials in the U.S. National Working Groups.

The labeling of consumer packages is another area of mutual interest. As a result of feedback from industry partners, NIST is working to change the Federal Fair Packaging and Labeling Act and other Federal labeling regulations to give packagers the *option* to label the net contents of consumer packages as they do today – that is, in both inch-pound and metric units – *or* to label the contents of packages in metric units only. Most states, through their weights and measures laws and regulations, already provide manufacturers with this labeling option for products that fall under state packaging and labeling requirements only. Last November, NIST sponsored a forum on the proposed changes to the Fair Packaging and Labeling Act to provide interested parties with an opportunity to discuss their different perspectives and to identify potential problems. Lou Straub represented the NCWM in this forum and described the leadership role that the weights and measures community has taken to remove regulatory barriers to the use of metric units. We are planning another forum for this coming November to continue the dialog and to reduce the barriers even further.

It is critical that packagers, retailers, manufacturers of shelf labeling equipment and products, and regulatory officials develop consensus guidelines for labeling and unit pricing in metric units. The labeling guidelines will help companies avoid costly labeling errors and get labeling right the first time. The unit pricing guidelines will reduce confusion in the marketplace and facilitate value comparisons. When these changes occur, effective weights and measures control will be

essential to ensure that packages contain the correct net content and that unit price labels are accurate. Weights and measures enforcement must maintain confidence during the transition.

The need for recognized quality systems for their laboratory measurement services is yet another parallel issue facing NIST and weights and measures laboratories. NIST is now replacing its current quality system with a comprehensive new quality system based on ISO/IEC 17025. One of the external drivers for NIST to follow 17025 was the Mutual Recognition Arrangement of the International Committee on Weights and Measures. This Arrangement requires that national measurement institutes like NIST have a suitable quality system, preferably 17025, in place. A second external driver was the 2002 National Research Council Cross-Cut Panel on Measurement Services, which recommended that NIST adopt a quality system that more visibly conformed to the quality systems used by its customers, namely 17025. L.F. Eason of North Carolina served on this panel. Last night I reported on this activity at the NCWM Metrology Subcommittee meeting.

I know that Georgia Harris and Diane Lee of the Weights and Measures Division have promoted the development of 17025-based quality systems for the state weights and measures laboratories for some time through the incorporation of 17025 requirements in NIST Handbook 143. I am extremely pleased to note that this year every operational state weights and measures laboratory has submitted a quality manual to WMD. Moreover, eight state laboratories have obtained accreditation from NIST's National Voluntary Laboratory Accreditation Program (NVLAP) and many others are in the process. I commend the laboratory administrators and metrologists for their commitment to implementing quality systems for their measurement services.

## Challenges

I'd now like to say a few words about challenges. As I indicated at the outset, we all face the challenge of lack of resources. The current economic crises in the funding of weights and measures programs have changed – and appear to be permanently changing – the way weights and measures activities are funded and carried out. States report that they are being forced to implement a number of revenue-generating activities just to survive. In fact, some states are only performing inspections related to generating revenue, which leaves many areas of the commercial measurement system unregulated. Unfortunately, experience has shown that when weights and measures areas are left unregulated, compliance tends to deteriorate, creating unfair competitive situations and loss of equity in the marketplace. Under these conditions, everyone loses except the unethical business operator.

A key challenge – and opportunity – is this: "How can weights and measures officials, industry, and NIST work together more effectively to achieve greater compliance with legal metrology requirements?" Of course, this Conference brings its members together to work collectively on the standards for weights and measures. In this era of reduced budgets, however, we must seek an even higher level of cooperation in the application of these standards in the retail marketplace. We must explore ways in which weights and measures programs can be more *proactive* and more *creative* in achieving compliance with legal metrology standards, even before products appear on the retail shelves.

Your incoming Chairman, Dennis Ehrhart, has reported on Arizona's effective programs in the areas of corporate education and public relations. These programs stress gaining compliance through the corporate use of correct practices, thereby reducing the need and frequency of weights and measures inspections required to achieve the same results.

We simply must find ways for weights and measures programs to maintain a *sufficient* level of inspection across the entire range of their regulatory responsibilities if we are to continue to ensure equity in the marketplace.

## Goals

We must remember that a primary objective of weights and measures enforcement is not merely to conduct inspections, but to achieve compliance with legal metrology requirements. As in the past, achieving this goal requires a cooperative effort. The NCWM has been a successful example of how state and local weights and measures representatives, industry, consumers, and the federal government can work together collaboratively to benefit the commercial measurement system. The input from both weights and measures regulatory officials and industry is critical to develop balanced and practical technical regulations for the commercial measurement system.

Technology Services has taken the initiative within NIST to use the Baldrige National Quality Program Criteria for Performance Excellence as a framework for improving its products, services, and operations. As we have studied the

Baldrige criteria and the experiences of winners of the National Quality Award – and they'll all tell you that their secrets are not secret – we have learned that many factors are critical to success. These include the following:

- Identify your core activities and responsibilities;
- Identify the requirements that are most important to your customers;
- Identify where you can add the most value;
- Establish organizational goals so that success will benefit the larger system, not just the internal organization;
- Make sure your goals are aligned with those of your partners and customers; and
- Develop and then implement sound, long-term strategies and plans for achieving those goals.

As part of these efforts within Technology Services, WMD has adopted four long-term goals:

- Promote uniform standards and practices in legal metrology;
- Improve the efficiency and effectiveness of the national weights and measures system;
- Facilitate U.S. exports by aligning national and international legal metrology standards; and
- Facilitate the transition to the metric system.

For each of these long-term goals, WMD has developed 3- to 5-year objectives, strategies, desired outcomes, measures, and action plans.

WMD's plans reflect input and feedback from partners and customers. These partners and customers have indicated that they consider NIST's technical expertise and objectivity in legal and laboratory metrology to be critical core activities, and that they expect NIST to provide expert technical analyses, advice, training, and assistance to industry, weights and measures officials, and metrologists.

WMD is currently reassessing its operations and trying to evaluate the current state of flux in weights and measures regulatory programs. As part of these efforts, WMD plans to meet with additional focus groups from industry and weights and measures programs to discuss the current situation and to explore partner and customer needs and requirements. These focus groups will serve both as input and as a "reality check" on WMD's basic assumptions and approaches. As a result of these meetings, WMD will either reaffirm its current objectives and strategies or it will change them to better meet the needs of the commercial measurement system.

## Conclusion

It is more important now than ever for all of us to demonstrate the impact and value-added of our activities, and to deal effectively with the challenges we face. After all, we all want to maintain a fair and equitable commercial measurement system. So, I want to close by taking this opportunity to reaffirm NIST's commitment to that admirable goal and to collaborating with all of you to achieve it as we "move strategically into the future".

I am grateful for the opportunity to share these remarks with you today and I wish you the best for a successful conference. Thank you.

# Chairman's Address
# National Conference on Weights and Measures
# Sparks, Nevada
# July 15, 2003

**Ross J. Andersen**
**New York State Department of Agriculture and Markets**

Honored guests, members, and friends, it is my great privilege to welcome you to Sparks, Nevada and the 88th Annual Meeting of the National Conference on Weights and Measures. I, and the Board of Directors, thank you for your participation.

Serving as Chairman has been a very rewarding experience. I look back at a long line of men and women who served before me, and feel honored to be listed among them. I learned as they did, that you don't so much run this organization, but rather influence it a little. Sort of like trying to keep it pointed in the right direction. It has been demanding, but as Shakespeare wrote, "To business that we love, we rise betime and go to't with delight."

The NCWM is nearing 100 years of age but the Corporation is only five. We are on the move and I chose my theme of "Moving Strategically into the Future" to reflect our approach. I am here to report that the strategic plan it is alive and well. I had the privilege to be the first Chairman to really work the plan. I looked to work on those things in the plan that had to come first, essentially lay the foundations. Others will complete the work. The key is to get started, as the poet Horace wrote, "He has the deed half done who has made a beginning."

Let me start with infrastructure issues. One of our goals is financial security. Your Board of Directors has worked at building zero-based budgets over the last three years so that we could move forward and remain self-supporting. Well over half of our budget funds NTEP. Add in the Interim and Annual Meetings and you will quickly see that there is only a very small piece of the pie that we can call discretionary. We constantly look for alternative, non-dues revenues to support our activities.

The Board is also looking at our relationship with our technical advisors both from Measurement Canada and NIST. It was my great privilege to attend the Canadian Forum on Trade and Measurement last fall, along with Will Whotthlie and Diane Lee. We each felt honored to be able to add to their meetings as they have done so ably for us. When advisors cross borders, there is some natural reluctance to speak out, since it is not your country's laws and regulations. However, we have so much to offer each other and so much to gain from our cooperation, that we should not hesitate. I reported to the Board that we should continue our participation in future Forums and look for other ways to help our neighbors. My thanks to Alan Johnston and all the Measurement Canada staff for their support, their friendship and their hospitality.

Similarly we have been looking closely at our relationship with the NIST Weights and Measures Division (WMD). We have been meeting with the WMD leadership and staff to coordinate priorities and activities as we work together for the benefit of the entire community. I am pleased with many of our successes, particularly with respect to OIML and training. I will elaborate on these a little later. I want to express my sincere appreciation for all of the support provided by Henry Oppermann and his staff to the success of this Organization.

NTEP is our most visible program. I believe our NTEP staff and our participating labs have created a very responsive program. As to quality, our labs are upgrading their quality systems to ISO 17025 and we have a round robin in progress to evaluate uniformity. We constantly seek improvements and spent time at our lab meeting this spring paring down the unmanageable list of scale and measuring device types, harmonizing vehicle scale test procedures, harmonizing various LMD tests that varied between codes, and discussing gray areas surrounding security seals. The problem we face is that code changes lag behind technological change. While manufacturers are pushing the envelope, we are trying to make antiquated specifications fit new and very complex issues. So expect to see more issues coming to the S&T Committee from the sector meetings this fall.

In the NTEP area, the Board has formulated a plan to ensure that production meets type. We aimed to improve initial verification, review certificates periodically, and require certified quality assurance from manufacturers of devices subject to influence factors in order to provide assurances that production devices continue to conform. The Board listened

intently to the comments received yesterday but did not yet have time to address them. We will continue to work on the details and provide opportunities for additional comment as that work progresses.

At the open hearings yesterday we heard concerns about our voting structure. The Board shares your concerns on this difficult issue. The Board will look seriously over the coming year at possible changes to the By-laws.

One major component of the Strategic Plan was to make the organization more nimble. By this I mean flexible enough to respond to both long- term goals and short-term interests. The Board has focused on using smaller work groups instead of fixed committees to do more of the work. Our proposal to restructure the A&P Committee to a work group was just such a move. Smaller work groups make it possible to get the right people working on the issues. They also can do it faster and cheaper using conference calls and email to replace travel to meetings. We also try to break down the work into smaller, more manageable pieces and reduce the commitment by volunteers.

The membership reaction to our A&P proposal clearly indicates to us that we, as a Board, need to do a better job of communicating with our stakeholders. We hear you, and in particular, your desire for some rapid movement on the National Training Program. That has been our desire from the beginning. Following the open hearings we decided on a course of action. We will disband the A&P Committee as planned. However, instead of just making a work group, we will immediately create a new Professional Development Standing Committee utilizing the current members of the A&P Committee with responsibility to spearhead work on the National Training Program. The name was chosen to reflect the new, more focused, direction. The Board will be drafting a specific charge for this new committee, filling the vacancies, and providing necessary support. As a standing committee we will be able to maintain the network connecting the NCWM to the regionals and the membership in related areas. This certainly allows us to reach out to those who don't attend these meeting.

After the infrastructure, I focused on laying foundations in three major program areas, statistics, harmonization with OIML, and the National Training Program.

We need facts to support our programs, particularly in these difficult times. So I created a small workgroup to gather statistics. I am pleased to report that we have survey responses from 40 states, and that the data is now being analyzed. The survey not only looked at the number of devices, inspections and tests, but also the demographics of the states and differences in programs. My thanks to Craig Leisey and his work group. Our next step is to look carefully at the data and conduct follow-up interviews. The workgroup will look for differences in the way states gather and report their statistics. They have been asked to suggest a plan to standardize data collection among the states and form the basis of an annual survey for the NCWM. We want to create a collection of meaningful information on the scope and successes of our weights and measures programs.

The survey confirmed the tremendous state and local contribution for weights and measures in this country, with annual budgets totaling well over $100 million dollars. The total federal commitment is probably not even 5% of that. Aves Thompson is working on one avenue to increase that commitment in the Fair Measurement Appropriation. We need to find ways to support this effort and get it through Congress.

On the OIML front, the US is an island in the world community. That separation is not so much that we use customary instead of metric units, but more that we have different technical requirements. That limits the competitiveness of our industry in the world market. We must ask ourselves if the differences are really necessary? The US has treaty obligations to consider OIML recommendations. That obligation falls squarely on the shoulders of the NCWM and its members, since we set the standards for commercial weighing and measuring devices in the US.

The NCWM is approaching this vital issue from a number of angles. First, we are trying to get more participation on the US working groups reviewing the work of OIML technical committees. Second, we are cooperating with industry and the WMD to educate our state and local leaders about OIML. We gave joint presentations on OIML to the two regionals that met in the spring this year and will continue that for the two in the fall. A presentation at this meeting addressed current opportunities to impact the OIML process. Third, we are seriously looking at the differences between US and OIML requirements. Our goal is to break those differences down into three areas, where OIML should change, where Handbook 44 should change, and where we can harmonize by changing Publication 14. The WMD is sponsoring a work group this fall to look at recommendations in the comparative study of US and OIML scale requirements and set goals and priorities for work toward harmonization. Finally, we want to consider additional mutual acceptance arrangements with other nations, much like the arrangement we now have with Measurement Canada. Please note we expanded that arrangement this year to include some measuring devices.

With regard to training, most of us would agree that our National Training Program needs revision. I want to paraphrase former Chairman Wes Diggs, who articulated that we need a training plan that doesn't tell states how to train but rather what the outcomes should be. I believe I have followed in his footsteps when I asked the A&P Committee to develop a training outline to help us all agree on outcomes. I want to thank the WMD for sponsoring a meeting in mid-June to look at this issue. In those discussions of a national program there were questions of who would develop it, how we would prepare instructors to deliver it, and how we would evaluate its effectiveness. Those are important considerations, but a little premature. We don't even know what "it" is. The training outline I am hoping to develop should pin that down and help organize the curriculum to help answer those other questions.

A training outline, I believe, will naturally result in a hierarchy of weights and measures knowledge grouped in what educators call "common bodies of knowledge." In the process we separate curriculum development from delivery. We create smaller, pre-fabricated blocks, or units, that are mixed and matched to produce training courses. We also can separate basic material from advanced material. With an outline, many can work on the curriculum materials at the same time. Each can work on the piece that is of interest to them, and we all share the final products. The outline serves as a roadmap keeping us all on course. We can also use alternative delivery methods like the Introduction to Weights and Measures course now being developed internally by the State of California on CDROM. California has offered to let the NCWM use and distribute the material. The parts that we have seen could translate easily into a national program.

Most of all I want to eliminate the one-size-fits-all approach that I believe doomed the present program. It always seemed that jurisdictions were asking for short courses. I think they were saying that the student needs to be part of the equation and that part is missing in our current program. The mix and match concept easily allows the jurisdiction to select the parts they need to teach to their students. Neither the NCWM nor the WMD will have resources to do all the training. Our primary roles will instead be in curriculum development, train-the-trainer programs, and perhaps certification. The states will have to take the lead in the delivery and even basic evaluation. So let's use our new standing committee to create the outline and then work together to develop the curriculum to raise the bar for all weights and measures professionals.

Before I close, let me make one final observation. The National Bureau of Standards formed the NCWM in 1905, and for 90 some years it has been a parent-child relationship. The NCWM has grown up. Our relationship must now evolve into a peer-peer relationship. This means changes, and that is hard for both partners. If everyone is to "buy in" then we must all have the opportunity to share in the decision-making. We must find the maturity to avoid that all too common state-federal conflict that always seems to focus on "who" is in control rather than the quality of the decision. We all have to leave our egos at the door.

The strategic plan has set out what the Board intends to do, including taking active roles in the areas of training and in OIML harmonization. State and local jurisdictions must accept responsibility to be more professional, and to be less parochial, taking a broader world-view. We must all work more closely together, and work smarter, as a team.

At the same time, the WMD has to change as well. Decision-making must be less centralized and involve more people with more knowledge. There is a great deal of talent at the state and local level, and, like the staff at the WMD, we share a love and passion for the work. We have the regulatory authority for weights and measures in the US system, shared only with specific, federal regulatory agencies like USDA, FDA and FTC. The WMD has the capability to devote staff time and resources to some issues that state and local officials often can't. But, they can't be making the decisions for us. Our advisors must work with us to ensure we have the necessary facts to make a good decision. Let's make sure we do that as peers and partners, looking carefully to help each other and to avoid competing. There is certainly enough work to go around and incentives to partner to get it done right.

I have a few people to thank. First, I must thank the members of the Board of Directors. It has been my pleasure to work with you and I appreciate all of your support. A very special thank you goes to Lou Straub. He's one of those that went the extra mile for this organization and he has been a very important advisor during my term. Lou has been an outstanding NTEP Chairman for the last two years and I hope he now finds time to get back out on the golf course and spend more time with Debbie.

I want to thank the NCWM staff who helped me in so many ways and I'm sure will continue to do so in my year as NTEP Chair. Beth, Bev, Steve, Grace, Laura, Linda, and Lynn, thank you. I want to thank my office staff and especially my Assistant Director, Mike Sikula. They all pulled extra weight as I delegated a lot over the last two years. I am equally appreciative for the support of my boss, Deputy Commissioner Margaret Becker.

Last and certainly most important is my family, my wife Carole and my son Adam. They have been so supportive, and I really appreciate it. Adam attended his first weights and measures meeting at two months of age and now is tall enough to look me in the eye. Carole teases me about not being able to take it easy even when I do step down. I guess she's right. What am I saying, "I guess?" She is always right. Thank you both.

My career in weights and measures still has a few years to go, I hope, and I will be watching my successors build on the foundations I worked on during my term. I have been asked several times in the last few weeks about the issue of continuity within the NCWM leadership. Those asking were pleased with the things the NCWM is doing now, but wondered if those efforts would continue under future Chairmen. The questions came from different people and in relation to different issues. I was proud to be able to respond that I was just working the strategic plan, and I have confidence that my successors, both Dennis and Dave, and those that will follow them, share that commitment.

Thank you for the honor of being your Chairman.

# NCWM 2003 Annual Meeting Honor Award Recipients

| Name | Firm | Number of Years |
|---|---|---|
| Leon Lammers | Weigh-Tronix Inc. | 10 |
| Neal J. Nover | Nover Engelstein & Assoc., Inc./<br>Win Wam Software | 10 |
| Michael S. Pinagel | Michigan Department of Agriculture | 10 |
| Michael F. Grenier | New Hampshire Department of Agriculture,<br>Markets & Food | 15 |
| Gale Prince | Kroger Company | 15 |
| David W. Quinn | Fairbanks Scales | 15 |
| Vernon Lee Massey | Shelby County Weights & Measures | 20 |

# Report of the Board of Directors

Ross J. Andersen, Chairman
Director, New York Bureau of Weights & Measures

## Introduction

The Board of Directors (BOD) held their quarterly Board of Directors meeting on Saturday, January 11, 2003, and continued the meeting via work sessions during the remainder of the Interim Meeting, January 12-15, 2003, held in Jacksonville, FL. The Board and National Type Evaluation Program (NTEP) Committee invited the membership to dialogue with them during the open hearings on four mega issues: Conformity Assessment, National Conference on Weights and Measures (NCWM) Organizational Structure, the National Training Program, and International Organization of Legal Metrology (OIML).

This is the report of the Board of Directors for the 88th Annual Meeting of the National Conference on Weights and Measures (NCWM). It is based on the Interim Report offered in NCWM Publication 16, "Committee Reports," comments received at the NCWM Annual Meeting, and modifications made to the Interim Meeting report as a result of input received at the NCWM Annual Meeting.

### Table A
### Table of Contents

## Table B
## Appendix



## Conformity Assessment

The Board reviewed and discussed the comments received during the open hearing on this topic. The comments received centered on the expiration time of five years for Certificates of Conformance, quantity of evaluation required, and the role of the states in initial verification. Information was provided that both the EU and Australia send out a questionnaire to initiate the review process. The questionnaire is completed by the Certificate holder and then reviewed by the issuing body. Discussion next centered on if the date should be a review date and not an expiration date. The period of ten years instead of five was discussed. A phase-in period was also discussed.

In its deliberations the Board discussed the many comments received on this issue and made some decisions on its next steps. The Board decided to assign the task of drafting a proposed revision to the Publication 14 Administrative Procedures section on Conformity Assessment to a small work group within the Board. The Board will develop a final draft and distribute it for comment prior to the Annual Meeting in July. The Board will consider all comments received before making its decisions on changes to Publication 14. Since this is only a change to Publication 14, there will be no general membership vote on the item.

The work group will be addressing the three main aspects of the proposed NTEP Conformity Assessment Program.

1. Improving the Certificate of Conformance – This aspect will involve two main efforts:

    a) Review and improve the format and information provided on an NTEP Certificate. The NTEP labs will be asked to participate in this effort with a goal of creating certificates that are uniform, easily understood, and contain necessary information for conducting thorough verifications, both initial and subsequent. This could include more detail on models covered, standard and optional features, pictures, and other inspector aids.

    b) Periodically review certificates on at least a ten-year basis. While the details are yet to be developed by the work group, the goal is to ensure that the information on the Certificate is as current as possible, that production meets type, and the type has been updated to meet requirements added to HB44 since the Certificate was issued. The Board is considering adding a “review date” to the Certificate that will be 10 years after the last laboratory evaluation and test. The manufacturer will be responsible for initiating the review process by that date, i.e., device in the queue. Failure to initiate the review will result in the Certificate going inactive. This review process will require a phase-in period. The review date would be added immediately to all certificates being issued for current evaluations. If a lab evaluates and tests a device to produce an addendum to an existing Certificate, the revision date would be added at that time and set to ten years from that revision date. The revision date would not reset for paper amendments or editorial corrections. The Board has discussed a process that would begin in January 2005 to update existing Certificates. NTEP staff would identify those Certificates with no review date, starting with the oldest Certificates. Each year, a number of certificates would then be selected for review based on the capabilities of NTEP staff and the labs. It is anticipated that by January 2008, all existing certificates will have an established review date. Also by January 2008, the review process will be on schedule such that all certificates with an assigned review date prior to January 1, 2008, will have been reviewed or will be in the queue to be reviewed. NTEP would establish new fees to cover the cost of said evaluations, while labs would charge normal hourly rates for their work.

2. Improving the Initial Verification System – this aspect will involve two main efforts:

   a) Create a core group of evaluators across the country that will conduct thorough initial verifications. This process would include some training of inspectors to become technical experts on certain types of devices and having these inspectors conduct the initial verifications of new devices installed within their jurisdictions.

   b) Create a data collection system to collect data on initial verifications performed by this core group of inspectors to support the Conformity Assessment efforts. This data would be maintained by NCWM and would be used solely for that purpose.

3. Verified Certification of Manufacturer Facilities Responsible for Influence Factor Compliance – This aspect is directed at conformance issues that cannot be verified in initial verification. The program would require that the manufacturer provide NTEP with certification that they have a quality assurance program in place and are taking the necessary steps to ensure that their production devices comply with the influence factor requirements. The present model calls for this to be site specific to the site where the quality control system verifies compliance. The Board is looking at a 2006 implementation date.

The most recent draft proposal was distributed at the open hearings. The Board received feedback on the proposal. The Board will continue to work on moving forward with Conformity Assessment, keeping in mind the feedback on certificate review and the concerns regarding the potential costs associated with conformity assessment.

## NCWM Organizational Structure

The Board reviewed the input of the membership on this issue. The membership expressed their support for any needed changes, provided that the work normally handled by the A & P Committee is reassigned. The Board did not hear any negative comments concerning this issue. Chairman Ross Andersen met with the A & P Committee during the week and reassured them that the work that the Committee had traditionally handled would be reassigned to task forces and work groups. Noting that much of the work traditionally handled by this committee need not be constrained by the Interim/Annual meeting schedule, the Board felt that much more can be accomplished if pieces of the work are tasked to different work groups. One important piece to be handled by a task force is the development of the National Training Program curriculum. The Board also discussed how the Metrology Workgroup and Petroleum Subcommittee fit into the NCWM structure.

NCWM Bylaws, Section 2 – Standing Committees, states, "The Board of Directors may create and disband standing committees in the best interests of the Corporation." After reviewing this section of the Bylaws, the Board made the decision to disband the A & P Committee following the 2003 Annual Meeting. Current committee members will be asked to join a task force working on the National Training Program curriculum. The Board also determined that the Metrology Subcommittee and Petroleum Subcommittee would continue within the current structure without funding. If funding is needed, they will be asked to submit their budget requests as a part of NCWM's normal budgeting process.

## Status of the Administrative & Public Affairs Committee

The Board of Directors determined that it will disband the A & P Committee following this annual meeting. In its place, the Professional Development Committee will be created as a Standing Committee. It will be comprised of the current members of the A & P Committee. Vacancies will be filled. The Board will begin immediately to develop the charge to the Committee so that work can begin as soon as possible. In addition, California's training program on CD Rom is near completion. When it is completed, NCWM Headquarters will mail a complimentary copy to each State Director.

## Dues Change

The Board approved a dues increase as a part of the 2004 budget. Active and associate dues were set at $65. Associate members will continue to contribute $15 per member to the Associate Member Fund in addition to the $65 dues.

## Commitment to Better Communication

Following feedback at the open hearings, the Board has made a commitment to better communication with the membership. In addition to attending the Regionals, the Board will publish a column in the NCWM News that reviews the issues before the Board at each of their meetings.

## Voting/Bylaws Change

The Board will review the issue of the current Bylaws that specifies that in order for an issue to pass, it must receive 27 votes. With the current economic constraints, the Board recognizes that in order for the work of the Conference to proceed, a Bylaws change may be necessary. If a Bylaws change is deemed necessary, it will be presented to the membership at next year's annual meeting for a vote.

## National Training Program Curriculum

Ross Andersen and Mike Cleary from the Board met with the A & P Committee and Henry Oppermann of NIST Weights and Measures Division (NIST WMD) to discuss the National Training Program (NTP). The Committee was asked to take on an assignment to develop a weights and measures training curriculum outline. This outline would serve as the master plan for a long-term effort to modernize the NTP. With a master plan, the NCWM could seek grants to develop the training materials, a good use for money that might come from Aves Thompson's Fair Measurement Act.

The outline would be used to organize the subject material in a hierarchy so that training materials and aids could be developed through a variety of sources (NIST WMD, state and local W&M jurisdictions, industry, etc.) with minimal amounts of redundancy. A review of the current scale modules will quickly reveal that much of the material is repeated in each module. Rather than develop complete courses, the subjects in the outline would be discrete units of knowledge that could be presented independent of each other, yet still combined to cover a specific discipline. It is anticipated that many of the discrete units could be delivered through interactive CD-ROM or Internet formats and these units would have broad appeal across a variety of disciplines. Materials requiring instructor delivery would thus be reduced to maximize the use of instructor time with a student.

The NIST WMD is in agreement that a master plan is needed to improve the NTP. They have offered to assist the NCWM in this effort and to fund a meeting in the spring to bring together a work group on the subject. The NCWM Chairman has asked the current A&P members to work with NIST WMD in this effort. The initial plan is to exchange ideas via email to prepare and then meet at NIST to work through the layout of the curriculum outline.

The State of California reported that it is completing a series of general knowledge CD-ROM courses along the same type of organization. These courses cover a wide range of basic knowledge that would be applicable to almost every W&M official from the administrator to the field inspector. They have offered to allow the NCWM to use their efforts as a starting point to develop the training materials. The California courses contain specific references to their law and regulations and would have to be modified to a certain extent to make them more universal. The A&P Committee was provided with samples of some of the courses that have been completed thus far.

## OIML

The Board identified the U.S. commitment to OIML as an important issue in its strategic planning. In addition to our treaty commitments, it is vital that the U.S. avoid isolation from the international market in commercial measuring devices because of unique design requirements here. The Board has set goals to become more active in the international arena and is working toward this on several fronts.

The NCWM must increase its member awareness of OIML activities and how these affect the commercial devices being produced today throughout the world. In this regard it is important to recognize that OIML deals primarily with device design and type evaluation criteria. The OIML recommendations only indirectly affect field applications and verification procedures. The Board has a number of strategic objectives in this regard including:

- Consideration of current OIML recommendations whenever changes U.S. requirements are proposed.

- Comparisons of U.S. and OIML requirements, where possible, to identify conflicts. To resolve these conflicts, the NCWM should consider harmonizing with the OIML requirement or consider proposing changes to OIML requirements.
- Increasing W&M participation in the U.S. working groups as they review the ongoing work of the OIML technical committees and thus strengthen the U.S. position. Currently the working groups are primarily made up of the NIST staff and interested industry representatives.
- Considering bilateral agreements with other countries to accept type evaluation test data.

The NIST WMD has contracted a study of OIML recommendations R76 on Non-automatic Weighing Devices and R60 Load Cells. The draft of the study is available from NIST WMD on request. The Board will be asking that the NTEP Weighing Sector and the S&T Committee look carefully at the recommendations of the study. Many of the recommendations support changes to Publication 14 and HB 44 to harmonize with OIML and others support changes to OIML requirements. The timing is opportune since the OIML technical committees are looking to begin work on these documents this year. The U.S. Working Group on R117 Measuring Assemblies for Liquids other than Water is also working on a comparison of U.S. vs. OIML requirements as this Recommendation is also presently under review. This is a second opportunity to work toward minimizing conflicts between the U.S. and international standards.

The Board is looking closely at the OIML requirements for load cells, since the present NTEP test procedures are very close to OIML tests with only a few differences. Changing to the OIML tests might have very little impact on U.S. manufacturers who already conform to the international standards or on NTEP. Adoption of the OIML test procedures by NTEP would open the door to potential bilateral agreements to exchange test data with other national bodies (another strategic objective).

The Board also believes that the W&M community needs to gain a better understanding of OIML through education. The Board is working with NIST WMD to plan education sessions for this year's regional weights and measures association meetings. These sessions might help to reduce some of the anxiety that comes from a lack of understanding of the benefits of OIML

## Fair Measurement Appropriation

Ross Andersen will work with Aves Thompson to put together a work group to support Aves' efforts in this area. The Associate Members offered to help promote this issue through their trade associations. A paper detailing the talking points on this issue will be put together so that it can be forwarded to the trade associations. The Board thanks Aves Thompson for his work on the Fair Measurement Appropriation.

## Statistics Work Group

The survey instrument is being finalized and will be released soon to gather some basic statistics on current programs. The immediate goal is to get data that can be used to support weights and measures programs as they compete for budget dollars, including some measure of economic impact on the U.S. marketplace. In addition, the workgroup will be requesting samples of data and reports currently compiled on program activities in our state and local programs. The information will be analyzed to find ways to gather national statistics that are uniform and meaningful in an effort to document the value of our programs. These statistics may be needed soon to support the Fair Measurement Act proposal.

## Canadian Forum on Trade Measurement

Chairman Ross Andersen and S&T Committee Chairman Will Wotthlie recently attended the Canadian Forum on Trade Measurement representing the NCWM. The Trade Forum is somewhat similar to the NCWM as it offers an open forum for industry and the regulators to exchange views on important issues. Chairman Andersen reported to the Board his belief that NCWM should continue to fund participation in the Forum for the Chairman and the S&T Chairman. The NCWM needs to reciprocate where possible for the support Measurement Canada provides to our program. The Forum provides a perfect opportunity to do this. This year was the first time that the S&T Chairman attended the Forum. It is an opportunity to see the issues being raised there and learn from the Canadian discussions as well as provide input regarding U.S. deliberations on those subjects. A key area for Measurement Canada is OIML. Measurement Canada has expressed its interest in both influencing and adopting OIML R117 requirements. Canadian industry expressed concern that they were more concerned with U.S. requirements than OIML, since the United States is the major market for them. It was very important for them to hear that the NCWM also is interested in influencing and adopting OIML requirements. Gilles

Vinet, Measurement Canada, expressed his appreciation to NCWM for their participation in the Forum and welcomed continued support from NCWM.

## Hypertext Handbooks

A decision was made discontinue production of the NCWM hypertext handbook CDs. Instead, the Board has decided to enter into a contract relationship with WinWam to resell their product.

## Financial

The Board reviewed the 2001/02 year-end audited financial report.

| **Statement of Activities ending** | **September 30, 2002** | **2003 Budget** |
|---|---|---|
| **Revenue and Support** | | |
| Dues – government | $ 81,065 | $ 82,000 |
| Dues – associate | $ 51,165 | $ 51,250 |
| Associate member fund | $ 15,460 | $ 15,375 |
| NTEP | $ 437,594 | $ 443,300 |
| Interim Meeting Fees | $ 20,765 | $ 22,950 |
| Annual Meeting Fees | $ 87,616 | $ 83,000 |
| Publication Sales | $ 24,062 | $ 35,500 |
| Interest | $ 9,758 | $ 7,500 |
| Advertising | $ 879 | $ 2,000 |
| AMC Sponsorship News | - | $ 9,000 |
| AMC Sponsorship Hypertext | - | $ 6,000 |
| **Total Revenue and Support** | **$ 728,364** | **$ 757,875** |
| | | |
| **Expenses** | | |
| **Programs** | | |
| Membership | $ 9,821 | $ 10,875 |
| NTEP | $ 362,879 | $ 426,250 |
| Interim Meeting | $ 46,404 | $ 52,462 |
| Annual Meeting | $ 85,257 | $ 107,075 |
| Publications | $ 24,540 | $ 24,775 |
| Newsletter | $ 16,887 | $ 13,819 |
| **Total Programs** | **$ 545,788** | **$ 635,256** |
| | | |
| **Management and general** | | |
| Management Fees | $ 46,000 | $ 46,500 |
| Associate Fund | $ 23,515 | $ 15,000 |
| Board of Directors | $ 18,382 | $ 28,000 |
| Committee Contingency | | $ 1,500 |
| Bank Fees | $ 8,340 | $ 5,750 |
| Website | $ 6,812 | $ 16,885 |
| Board Governance & CEO Symposium | $ 5,637 | - |
| Legal & Accounting | $ 5,590 | $ 8,225 |
| Telephone | $ 2,998 | $ 2,500 |
| Insurance | $ 2,507 | $ 2,600 |
| Office Supplies | $ 1,080 | $ 1,000 |
| Printing | $ 973 | $ 900 |
| Postage | $ 99 | $ 250 |
| Storage space rental | $ 960 | $ 960 |
| **Total Management and general** | **$ 122,893** | **$ 130,070** |
| **Total Expenses** | **$ 668,681** | **$ 765,326** |
| | | |
| **Change in net assets** | **$ 59,683** | **($7,451)** |

## Meetings

The Board received positive feedback on the new format of the Interim Meeting. The new format will continue for future Interim Meetings. In addition, with one exception, there was positive feedback on the CD version of Pub 15. NIST WMD will continue to produce both Pub 15 & Pub 16 in the CD format. Hard copies of the publications will be available at the respective conference.

The Board continued the policy adopted last year to offer a one-time reduced registration fee for the annual conference to members from the region where the conference is being held and who are first time attendees. The reduced registration fee does not permit the attendee to vote on voting items and they must pay an additional fee for the Special Event.

Future Meetings:

Annual

| | | |
|---|---|---|
| 2004 | July 11-15 | Hilton Pittsburgh & Towers, Pittsburgh, PA |
| 2005 | July 10-14 | Hilton in Walt Disney World, Orlando, FL |
| 2006 | July 9-13 | Chicago Marriott, Chicago, IL |

Interim

| | | |
|---|---|---|
| 2004 | January 25-28 | Hyatt Regency Bethesda, Bethesda, MD |
| 2005 | January 23-26 | Fairmont Miramar, Los Angeles, CA |
| 2006 | January 22-25 | Omni Jacksonville, Jacksonville, FL |

## Nominating

The Nominating Committee submitted the following slate for the 2003/04 Board of Directors open positions. Chair – Elect, Dave Frieders, San Francisco, CA; Treasurer, Tom Geiler, Barnstable, MA; Directors: Stephen Pahl, TX, and Chris Guay, Procter & Gamble Co.

## Committee Appointments

Chairman Ross Andersen made the following appointments at the 2002 Annual Meeting:

- Board of Directors – Dave Frieders, San Francisco, CA, to fill the vacancy created by the election of Dennis Ehrhart to Chairman Elect.
- L&R Committee – James Cassidy, Cambridge, MA, replacing Pat D'Errico, NJ, whose term had expired.
- S&T Committee – Michael Sikula, NY, replacing Mark Coyne, Brockton, MA, whose term had expired.
- A&P Committee – Kenneth Dietzler, PA, to fill vacancy created by move of Michael Sikula to the S&T Committee.
- A&P Committee – Cato Fiksdal, Los Angeles, CA, to fill vacancy created by move of Dave Frieders to the Board of Directors.

## NCMW/NIST WMD Relationship

The Board continues to work with NIST WMD to foster a productive partnership. NCWM and NIST WMD are examining each organization's strategic plans for areas of commonality. Where these exist, the two organizations will explore ways to work together to accomplish these goals. The Board of Directors has invited Henry and his key staff to attend a portion of each spring and fall Board meetings to work together to identify areas of commonality and strategies to accomplish goals. The Board is looking closely at the roles of committee chairs, committee members and technical advisors. It has asked Henry Oppermann and WMD staff to update the job descriptions for technical advisors from the NCWM Executive Committee report of the 1993 Annual Meeting. There is also dialogue about areas where NIST WMD might be able to provide some funding support to the work of the NCWM.

## Strategic Partnerships

The Board affirmed its desire to form strategic partnerships with and encourage outreach to related industry associations. The Board will explore the exchange of exhibit space with ISWM.

## Membership

As of December 2002, NCWM had 2,606 members in the following categories:

| | |
|---|---|
| State Government | 852 |
| Local Government | 556 |
| U.S. Government | 35 |
| Foreign Government | 23 |
| Associate | 879 |
| Foreign Associate | 31 |
| Retired | 230 |

## Associate Membership Committee (AMC) Report

*AMC Report from its Meeting at the NCWM Interim Meeting*

| | |
|---|---|
| Chairman: | Darrell Flocken, Mettler-Toledo |
| Vice Chair: | Bill Sveum, Kraft Foods North America |
| Meeting Attendees: | 23 |
| Secretary/ Treasurer: | Mark Galletta, Nestlé USA |

*Financial Condition*

Financial reports were reviewed. Of the $6,000 AMC allocated for training last year, all but $475 was spent. Using the new accrual accounting method, AMC starts the new fiscal year with $32,356 balance remaining.

*Elimination of AMC "Reserve Funds"*

In past years under the cash accounting method, AMC sought to allocate all funds with the exception of $2,500 held in reserve to avoid a zero-balance/closed account. The reserve fund is no longer necessary. Since the NCWM operates under the accrual method of accounting, the funds collected each fiscal year should be dispersed in the same fiscal year. The AMC will review its policies and by-laws to see if any changes are necessary to eliminate this reserve.

*Allocation of Funds*

NCWM-BOD Request
AMC reviewed the NCWM Board of Directors request to allocate $9,000 to help offset costs associated with the NCWM Newsletter.

AMC approved the request with the caveat that the $9,000 is considered a one-time allocation for the development of the newsletter. It is AMC's desire to allocate its funds toward training, scholarships or other special requests and that AMC funds not be requested to cover routine NCWM line-item operating expenses.

Training Scholarships
The AMC will make available to the NCWM the amount of $10,500 to be administered by the A&P Committee. The A&P Committee must advise the AMC Board on the use of the money. The AMC Board will approve the monies use and make the funds available.

Special Event Funding
The AMC will make available to the NCWM a maximum sum of $10,000 for the 2003 Annual Meeting Outing. In the event that the standard 60 % contribution does not require the complete $10,000, the remaining funds are to be returned to the AMC.

*Industry Association Meetings*

AMC needs clarification on the status of NCWM policy regarding costs of meeting rooms for the various industry associations (e.g. ICPL, SMA) that meet during NCWM events. If these associations are charged for meeting room expenses, The AMC is prepared to discuss allocating funds for this purpose provided the AMC is not restricted in its policies or by-laws from doing so.

*Concern for W&M Programs*

AMC discussed concerns regarding jurisdictions facing reduction or elimination of W&M programs. AMC believes in the need for equity and uniformity in the marketplace and will explore potentials for various trade/industry associations (e.g., NFPA, GMA, SMA) to voice concern in these local jurisdictions.

*Newsletter Publication of Unofficial Documents*

AMC discussed the possibility of issuing a statement at the Annual Meeting outlining concerns put forth from ICPL on publication of unofficial guidance documents by NIST in the Newsletter. ICPL will prepare a draft.

*Expiring Terms*

Terms expire this year for Associate Members currently serving the L&R and A&P Committees. AMC members were asked to prepare nominations for the Annual Meeting.

*AMC Report from its Meeting at the NCWM Annual Meeting*

The Associate Membership Committee (AMC) conducted its annual business meeting during the afternoon of July 14, 2003 at the NCWM Annual Meeting. Associate Member Representatives on the Board of Directors (BOD), the L&R, and the A&P Committees gave reports of committee activity.

The AMC members present were informed that Mr. Allan Nelson has resigned from the AMC. We wish Mr. Nelson all the best in his retirement.

Nominations were made and a vote was taken to fill the upcoming vacancies on the AMC Committee: Cary Frye, International Dairy Foods Association, and Darrell Flocken, Mettler-Toledo, were nominated for a second five year term. In addition, Chris Guay, Procter & Gamble will complete the one-year remaining on Mr. Nelson's term. The following AMC officers were elected:

- Chairman: Bill Sveum, Kraft Foods North America
- Vice Chair: Mark Galletta, Nestlé USA
- Secretary/Treasurer: Gary Lameris, Hobart Corporation

The AMC also had the task of recommending two (2) associate members to standing committees replacing Chris Guay on the L&R Committee and Chip Kloos on the A&P Committee. The membership thanked Chris and Chip for their efforts and work on these committees and submit the following recommendations to the Board of Directors.

- Vince Orr, ConAgra Foods for a 5 year term on the L&R Committee.
- John Moore, Lore Consulting for a 5 year term on the Professional Development Committee.

Mr. Aves Thompson provided the membership with an overview and current status of the Fair Measurement Appropriation. To move this effort forward, Mr. Thompson felt that an industry cost of non-conformance would be a strong supporting statement. Some individual companies expressed concerns of publishing an actual dollar value but agreed that companies could, where possible, inform their trade association of this number. These associations will then be asked to consolidate these costs into a single value and make this value available in support of this effort. The AMC thanked Mr. Thompson for the information and agree, by vote, to provide a statement of support for the FMA to the Board of Directors. This statement will be provided to the Board in letterform after this meeting.

The AMC annual meeting was closed with the next meeting scheduled during the 2004 NCWM Interim Meeting in January 2004.

---

R. Andersen, New York, NCWM Chairman

D. Ehrhart, Arizona, NCWM Chairman Elect
L. Straub, Maryland, Past NCWM Chair
T. Geiler, Barnstable, Massachusetts, Treasurer
R. McGrath, Boston, Massachusetts
D. Onwiler, Nebraska
M. Gray, Florida
M. Cleary, California
M. Pinagel, Michigan
D. Frieders, San Francisco, California
D. Quinn, Associate Membership, Fairbanks Scales

Advisors:
G. Vinet, Canada
B. Palys, CAE, NCWM Executive Director

Executive Secretary: H. Oppermann, NIST

## Board of Directors

# Appendix A

## Report on the Activities of the International Organization of Legal Metrology (OIML) and Regional Legal Metrology Organizations

International Legal Metrology Group
Weights and Measures Division, NIST

The International Legal Metrology Group (ILMG) in the Weights and Measures Division (WMD) of the National Institute of Standards and Technology (NIST) is responsible for coordinating U.S. participation in OIML and other international legal metrology organizations. Learn more about OIML at the ILMG website at http://ts.nist.gov/oiml or at the OIML website at http://www.oiml.org on the Internet. Dr. Charles Ehrlich, Group Leader of the ILMG, can be contacted at charles.ehrlich@nist.gov or at 301-975-4834 or by fax at 301- 975-5414.

## Table of Contents



## I. Report on the Activities of the OIML Technical Committees

This section provides a report on the status of work in OIML Technical Committees (TCs) and Technical Subcommittees (SCs) of specific interest to members of the NCWM. Also included are reports on recent activities of those groups and schedules of future activities of Secretariats, the U.S. National Working Groups (NWGs), and the International Working Groups (IWGs) of committees and subcommittees.

*TC 3 Metrological Control (United States of America)*

The 1st draft revision of OIML D1 "Elements for a Law on Metrology" was developed by a joint working group of the OIML, the International Bureau of Weights and Measures (BIPM), and the International Laboratory Accreditation Cooperation (ILAC). A second draft is under development by the International Bureau of Legal Metrology (BIML) and the Laws and Metric Group and will be distributed to the members of TC3 and to the Laws and Regulations Committee for their review. This revision of D1 presents the various elements that should be considered when preparing laws related to metrology. This document gives advice on general laws covering all the aspects of metrology, as well as specific laws related to some distinct aspect of metrology, such as legal units and traceability. It can also be used to evaluate provisions related to metrology in more general laws such as those on consumer protection and conformity assessment. When completed, the document will be a tool that individuals can use in preparing such laws. They can select appropriate elements and adapt them into their legislation. Please contact Kathy Dresser at 301-975-3289 or at kathryn.dresser@nist.gov if you would like to obtain a copy of the 2nd draft revision of D1 or to participate in this project.

*TC 5/SC 1 Electronic Instruments (Netherlands)*

A meeting was held in the Netherlands in October 2002 to discuss comments received on the 2nd committee draft (2CD) of a revision of D11 "General Requirements for Electronic Measuring Instruments." There were a number of new proposals for tests to be added to D11. A procedure was established to consider these proposed amendments to the revision and to require the proposing nation to develop a complete proposal that will be balloted before its incorporation into the D11 revision. The comments received on the 2CD were discussed clause by clause. There was considerable discussion about broadening the scope of application from electronic instruments to include all measuring instruments. The technical committee voted not to change the scope at the present time in order to keep the revision on track. The minutes, decisions, and resolutions of the meeting are available. A third committee draft was circulated by the Secretariat in May 2003. For more information on this activity, contact Dr. Ambler Thompson at 301-975-2333 or at ambler@nist.gov.

*TC 8/SC 3 "Measuring Instruments for Liquids other than Water." (Germany)*

OIML R117 "Measuring Instruments for Liquids other than Water" is undergoing an extensive revision – incorporating new instrument technologies and merging the document with OIML recommendations R86 "Drum Meters" and R105 "Mass Flowmeters." The Netherlands (NMi), as the convener of the International Working Group TC8/SC3/WG2 "Revision of R117," is working closely with the US and Germany to accomplish this task. The United States is making significant contributions on this revision as both a participating member on WG2 and as the convener of the working group tasked with merging R117 and R105. Please contact Ralph Richter at 301-975-4025 or ralph.richter@nist.gov if you would like to participate on this project.

*TC 8/SC 4 "Dynamic Mass Measurements (Liquids other than Water)" (United States)*

ILMG is working on the merger of OIML R105 "Direct Mass Flow Measuring Systems for Quantities of Liquids" (for which the United States is the Secretariat) with OIML R117 "Measuring Systems for Liquids other than Water" (for which Germany is the Secretariat). The United States is the convener of the international working group TC8/SC4/WG1 named "Combination R105/R117." This is a major priority project for OIML. ILMG is working with the U.S. National Working Group on flowmeters, Germany, and the Netherlands (convener of the work group tasked with revising R117) on this effort. Meetings of the U.S. National Working Group (USNWG) on flowmeters were held during the NCWM Annual Meeting in July 2002, the Interim Meeting in January 2003, and the Annual Meeting in July 2003. Measurement Canada has been a strong contributor to this effort. A successful meeting was held in September 2002 at the Physikalisch-Technische Bundesanstalt (PTB) in Germany to review the work already done by the USNWG and to establish an aggressive 2-year timetable for TC8/SC3 and SC4 to complete this major project. The first committee draft of the revised/combined R117 is expected to be distributed in August 2003, and a joint meeting of the two subcommittees working on this project is scheduled for October 2003 in Paris, France.

*TC8/SC5 "Water Meters" (United Kingdom)*

CIML approved a revision of R49 for "mechanical and electronic" water meters in October 1999. Following that adoption, subsequent meetings of TC8/SC5/WG2 were held to develop a test procedure and test report format. The U.S. voted "yes" to OIML TC8/SC5's proposed amendment to OIML R49-1 "Water Meters Intended for the Metering of Cold Potable Water Part 1: Metrological Requirements" to update the referenced standards for disturbance and influence factor testing. The U.S. voted "no" on a CIML ballot to adopt a proposed recommendation OIML R49-2 "Water Meters Intended for the Metering of Cold Potable Water Part 2: Test Methods." The negative ballot resulted from the addition of a series of unnecessary tests which would increase the cost of having meters tested, as well as a failure to follow a committee ballot to delay the CIML submission until 2002. The CIML approved OIML R49-2 at its Annual Meeting in Moscow, Russia, in September 2001. A subsequent meeting of TC8/SC5 held in Brussels, Belgium, in October 2001 involved discussions of the changes required in the OIML R49-1 document to make it consistent with R49-2 and to revise OIML R49-2 as necessary. OIML TC8/SC5 balloted the changes and approved the revisions to OIML R49-1 and OIML R49-2. The amended R49-1 was placed on the OIML web site in April 2002 and since no CIML Member objected it is considered approved and will be republished. The same procedure was followed for the amended version of R49-2 approved by TC 8/SC5. The new corrected versions of R49-1 and R49-2 are now at the printer for republishing. In addition, OIML R49-3 "Test Report Format" was submitted for ballot to TC8/SC5 in August 2002, and the U.S. voted to approve it. Please contact Wayne Stiefel at 301-975-4011 or at stiefel@nist.gov if you would like to participate in this effort.

*TC8/SC7 "Gas Metering" (Belgium and France)*

An International Working Group (IWG) meeting was held in Brussels in March 2001 to discuss a 2nd CD draft OIML Recommendation "Measuring Systems for Gaseous Fuel" to include natural and compressed natural gas. The meeting focused on discussion of comments on the 2nd CD draft Recommendation. A second meeting of the IWG focused on a 2nd CD Recommendation "Measuring Systems for Compressed Natural Gas (CNG) for Vehicles" and annexes covering performance tests for electronic devices and basic test procedures. The Secretariat has circulated a 3rd CD "Measuring Systems for Compressed Natural Gas (CNG) for Vehicles" for comment and vote. In April 2003, the US cast a negative ballot because the testing requirements were unrealistic. Please contact Wayne Stiefel at 301-975-4011 or at stiefel@nist.gov if you would like to obtain a copy of the 3rd CD or participate in this project.

*TC 8/SC 8 "Gas Meters" (Netherlands)*

The Secretariat sent the members of the committee a letter with the results of a questionnaire asking for comments to guide the initiation of a work program to revise R6 "General provisions for gas volume meters," R31 "Diaphragm Gas Meters", and R32 "Rotary Piston Gas Meters and Turbine Gas Meters." A small majority of members voted to produce one new recommendation for gas meters that will replace R6, R31, and R32. The Secretariat reported that they would develop an initial draft. The new document, according to the Secretariat, may consist of a general chapter mainly consisting of R6 and those aspects in common with R31 and R32 and separate chapters on household and industrial gas meters. The U.S. NWG provided comments and will participate in the development of the new Recommendation. Please contact Wayne Stiefel at 301-975-4011 or at stiefel@nist.gov if you would like to participate in this project.

*TC 9/SC 1 "Nonautomatic Weighing Instruments" (Germany and France)*

In May of 2002, Germany and France, the co-secretariats of OIML TC 9/SC 1 "Non-automatic Weighing Instruments" (NAWI), announced that they had initiated the first review of OIML Recommendation 76 "Non-automatic Weighing Instruments" since 1994. This review cycle is of major importance to U.S. interests because R76 serves as the foundation for a majority of the laws and regulations that govern weighing instruments around the world. This review is significant for U.S. weighing instrument manufacturers because the international harmonization of requirements will eliminate technical barriers to trade and reduce the delays and the cost of getting new weighing instruments into the global marketplace. It is also important for legal metrology officials since it is taking place when the NCWM is considering entering into Mutual Acceptance Arrangements for type evaluations with other countries (e.g., Germany). This effort supports one of the Conference's long-range strategies that is to "work toward the harmonization of U.S. (e.g., NIST Handbook 44 "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices") and international standards." The review process for R76 has begun with the Co-Secretariats requesting comments from Member States using a questionnaire that asks for feedback on everything from the basic principles of R76 (e.g., tolerances and accuracy classes) to exploring the addition of new requirements. Some of the new requirements under consideration would allow for the type evaluation of "modules" (e.g., digital indicators and load receiving elements). One question asks whether new tests for electronic instruments are needed. If you would like to receive a copy of the U.S. comments that were submitted in September 2002, or participate in this work please contact Steve Cook at 301-975-4003 or steven.cook@nist.gov.

*TC 9/SC 2 "Automatic Weighing Instruments" (United Kingdom)*

The U. S. voted "no" at the recent CIML meeting on the ballot to adopt a proposed OIML Recommendation on "Automatic Instruments for Weighing Road Vehicles in Motion – Part A: Total Vehicle Weight". The CIML did approve the recommendation, however, which is being published as R134, Part A. The Recommendation specifies requirements for highway weight enforcement scales used to obtain a total vehicle weight of trucks while they are in motion. The negative ballot was cast because the Secretariat failed to accept several U.S. comments regarding the technical accuracy of the terminology used in the proposed standard and because the U.S. did not support the adoption of an incomplete OIML Recommendation. A meeting of the International Working Group was held at the United Kingdom's National Weights and Measures Laboratory in Teddington, England in November 2001. At the meeting it was agreed that a Part B should be developed as a stand-alone Recommendation to apply to both total vehicle weighing (incorporating the requirements from Part A) and axle load determinations. In adopting this approach, it was understood that Part B would eventually supersede Part A, as the requirements for total vehicle weighing will be duplicated. Upon completion of Part B, a decision will be made as to whether Part A should be withdrawn and Part B issued as a new Recommendation or, alternatively, whether Part B should be issued as a revision to Part A, (i.e., as a second edition.) In September of 2002, ILMG received a second committee draft of Recommendation "Automatic Instruments for Weighing Road Vehicles in

Motion – Part B – Axle Loads" that was prepared by the OIML Secretariat in the United Kingdom. After extensive review by the TC, this draft was rejected, and the Secretariat developed a third committee draft. The US voted "no" on the 3CD in July 2003. If you would like to receive a copy of the latest draft of this Recommendation or participate in this work please contact Richard Harshman at 301-975-8107 or harshman@nist.gov.

*TC 9/SC 3 "Weights" (United States)*

A draft revision of OIML Recommendation R111 "Weights…." was adopted by the CIML in the summer of 2002. NIST staff are working closely with Dr. Michael Glaser of PTB (Germany) and Dr. Richard Davis (BIPM) to develop a final draft of R111 that will be sent to the International Committee on Legal Metrology (CIML) for adoption. Adoption of a new edition of this Recommendation is a high priority project for OIML as it is considered one of the most basic and important sets of requirements that member states can adopt as the foundation for their laws on metrology. TC9/SC3 also agreed that OIML R52 "Hexagonal Weights" would not be withdrawn since its requirements may still be used in some developing countries. An updated edition of R52 was recently approved by TC9/SC3 and is currently under consideration by CIML for adoption.

A draft revision of OIML Recommendation 33 "Conventional Value of the Result of Weighing in Air" was adopted by TC9/SC3 in the spring of 2002. The technical committee also voted to change R33 into an OIML International Document. ILMG worked closely with Dr. M. Glaser (PTB) and Dr. R. Davis (BIPM) to develop a final draft that will be sent to the CIML for adoption in November 2003.

*TC17/SC1 "Humidity" (China)*

In February 2001, the 1st Committee Draft Revision of OIML R59 "Moisture Meters for Cereal Grains and Oilseeds" was received from the TC17/SC1 Secretariat, the Peoples Republic of China. The current edition of R59 was developed in the 1980s and includes technical and metrological requirements for both automatic and manual meters. A U.S. National Working Group reviewed the draft revision of R59 and sent comments to the Secretariat in the spring of 2001. In June 2001, Dr. Ambler Thompson and Dr. David Funk of the U.S. Department of Agriculture's Grain Inspection and Packers and Stockyard Administration attended a meeting of TC17/SC1 held in Berlin, Germany. Dr. A. Thompson presented U.S. proposals to clarify the scope and general direction that the revision process for R59 should take and highlighted the need to recognize new technologies and tolerances for these instruments. Another issue is the need to separate the reference moisture method, usually defined by the responsible national authority, from the qualification of instruments since there is not an international agreement for a global reference moisture determination test method. These proposals were well received in particular by France, China, and Germany. The Chairman of the meeting asked the United States to prepare an OIML draft based on the National Conference on Weights and Measures National Type Evaluation Program (NTEP) for review by an International Working Group (IWG) composed of France, Germany, Poland, China and the United States. Dr. Thompson prepared a working draft of the Recommendation based upon requirements for moisture meters in Handbook 44 and Publication 14. This working draft was distributed to the IWG in February 2003 for comment. Based on comments received on the working draft, a first committee draft was distributed to the IWG in May 2003. Both drafts were also distributed to the U.S. National Working Group, which for the most part is a subset of the NTEP Grain Sector. Please contact Diane Lee at 301-975-4405 or at diane.lee@nist.gov if you would like to participate in this working group.

## II. "Framework for a Mutual Acceptance Arrangement on OIML Type Evaluations" (First Draft MAA Document)

The First Draft Mutual Acceptance Arrangement (MAA) Document, along with the associated document "Checklists for issuing authorities and testing laboratories carrying out OIML type evaluations," was distributed to the full CIML for 'preliminary' vote and comment, with a request for written responses by April 2003. All CIML members were invited to a special Workshop on the MAA and were asked to provide comments to assist in the development of a final draft MAA document. The Workshop on the MAA was held in Paris on June 2-3, 2003. Final CIML adoption of the MAA is planned for the 38th CIML meeting in November 2003 in Kyoto, Japan.

It is anticipated that the earlier concerns about some of the provisions of the MAA (cost, peer-review vs. accreditation requirements, signatory responsibility, scope/terminology, and non-allowance of supplementary requirements) by the 'no" voters at the Subcommittee level will still exist, but the Workshop will be structured to explicitly address these issues to attempt to find compromise solutions. The first draft document MAA also contains two new provisions (incorporating

"Associates" to clarify the role of OIML Corresponding Members in the MAA, and including the possibility of an OIML Issuing Authority issuing an OIML Certificate along with an authenticating letter validating a test report) that are intended to provide clarification to the MAA.

The progress of the MAA is of special interest to the NCWM because the Board of Directors have put on hold negotiating a bilateral agreement to exchange test data on type evaluations with Germany's PTB until the future of the MAA is established.

## III. Report on the OIML Presidential Council

*OIML Presidential Council Meeting – February 24-25, 2003*

Dr. C. Ehrlich attended a meeting of the OIML Presidential Council at the OIML Headquarters (the International Bureau of Legal Metrology (BIML) in Paris) on February 24-25, 2003. Other attendees were G. Faber (President, International Committee of Legal Metrology, CIML), M. Kochsiek (CIML First Vice President, Germany), L. Issaev (CIML Second Vice President, Russia), J. Bennett (member, Australia), S. Carstens (new member, South Africa), J. Han (attending for Wang Qinping, new member, China), A. Johnston (member, Canada), M. Tanaka (member, Japan), J. F. Magana (Director, BIML), and G.E.M. Anabe (Chair, OIML Development Council). Attending for part of the meeting were: I. Dunmill (Assistant Director, BIML), A. Szilvassy (Assistant Director, BIML) and C. Pulham (Editor, BIML).

Topics discussed included OIML financial matters (the organization is solvent), the upcoming election of a new CIML President, OIML Technical Activities, and the status of the "Mutual Acceptance Arrangement (MAA) for OIML Type Evaluations" (see separate sections in this report). J. Magana reported that he anticipates needing to hire another staff person when the MAA is passed; this position should be entirely fee-supported (he estimated that annual letter/certificate registration fees associated with the MAA will need to be about $300 per letter/certificate).

A plan was proposed by A. Szilvassy for accelerating some of the OIML technical work by reviewing the distribution of responsibilities for OIML TCs, SCs and projects and identifying areas where new responsibilities could be established. Progress was reported on plans for holding a jointly-sponsored seminar (PTB and NIST), as a sequel to a seminar held in 1998 by PTB on "The role of metrology in social and economic development". S. Carpenter, Director of the NIST Office of International and Academic Affairs, serves on the planning committee.

Significant progress was made in the development of two draft policy papers on "Liaisons between the OIML and other bodies" and "Interactions between the OIML and the Regional Legal Metrology Organizations". It is anticipated that these will be ready for CIML vote at the next CIML meeting (November 2003). The first paper covers how agreements such as the current one between OIML and European Committee for Standardization/European Committee for Electrotechnical Standardization (CEN/CENELEC) will be negotiated in the future. A decision was made to reclassify a draft policy paper on "Horizontal Documents" as a guidance document, due to the complexity of the topic and the difficulty establishing policy.

The progress report by John Birch on his study of the "Benefit of Legal Metrology for the Economy and Society" was discussed, with the conclusion that John should complete the last Chapter (on "Economics of Legal Metrology") before any further decisions can be made as to how to proceed with this report. G. Tassey, NIST Senior Economist, believes that this chapter will be difficult because the studies Birch cites approach the estimation of benefits and costs differently.

*OIML Presidential Council Meeting – September 30, 2002*

Dr. C. Ehrlich attended another meeting of the OIML Presidential Council (Council) last September. Other attendees were G. Faber (President, International Committee of Legal Metrology, CIML), M. Kochsiek (CIML First Vice President), L. Issaev (CIML Second Vice President), J. Bennett (new member), A. Johnston (member), M. Tanaka (member), J. F. Magana (Director, BIML), and G.E.M. Anabe (Chair, OIML Development Council).

Topics discussed included OIML financial matters, the election of a new CIML President, and the status of the "Mutual Acceptance Arrangement (MAA) for OIML Type Evaluations" (see separate section in this report), and draft policy papers. A jointly-sponsored seminar (PTB and NIST) was discussed as possibly being organized after further analysis of potential benefits is conducted as a sequel to one held in 1998 by PTB on "The role of metrology in social and economic development."

The progress of establishing an independent task force to improve the speed and effectiveness of the OIML Development Council was also briefly discussed (see Development Council section of this report).

*Upcoming OIML Meetings*

The next meeting of the OIML Presidential Council will be held in November 2003, in conjunction with the 38th CIML meeting in Kyoto, Japan. The 2004 CIML meeting will be held in conjunction with the next quadrennial OIML Conference in Berlin, Germany, from October 25-29, 2004. The 2005 CIML meeting will be held in Paris to coincide with the 50th Anniversary of the establishment of OIML.

## IV. Report on the 37th Meeting of the International Committee of Legal Metrology (CIML)

Representatives from 54 of the 58 member nations participated in the 37th Annual Meeting of CIML from October 1-4, 2002, in Saint Jean-de-Luz, France. Meetings of the OIML Presidential and Development Councils were also held and are reported on above. Dr. C. Ehrlich is the CIML Member for the United States.

In his opening address, G. Faber raised the issue that his term as President of CIML will be over in 2003 and that the search for a successor has begun. The time for announcing candidacies for this position was extended until January 2003.

The CIML reviewed the OIML Action Plan. It was noted that while progress was good in most areas, the area of standards development to cover software-related issues needs work. Slovenia volunteered to be the Secretariat of OIML TC5 (Electronic Instruments and Software) that covers this topic. New entries in the Action Plan provide for the development of "horizontal documents" that would address matters of general interest (such as software, printers, etc.), and provide for the renegotiation of existing agreements between OIML and CEN/CENELEC to make them more reciprocal.

Albania has become a full Member State, and the Philippines has resigned its membership. Vietnam and New Zealand are looking to become Member States. The financial situation of OIML is stable for this year. The recent addition of two new staff members at the BIML has brought the staffing level back to its 2000 level.

The BIML Director gave a live demonstration of the improved OIML web site (http://www.oiml.org). This site will continue to be upgraded and improved.

The Committee approved the following two draft International Recommendations:

R 84 "Platinum, copper and nickel resistance thermometers (for industrial use)" (revision)

R 134 "Automatic instruments for weighing road vehicles in motion – Part A– Total vehicle weighing" (new)

The CIML endorsed the BIML proposal to approve the revision of OIML R 111 (Weights) by CIML postal vote as soon as the final Draft Recommendation is available from the United States.

The CIML approved the following projects as proposed by:

- TC11/SC3 on "Procedure for the control of the main parameters and characteristics of thermovision instruments,"
- TC17/SC2 on "Automatic refractometers. Method and means for verification," and
- TC17/SC7 to start the revision of R 126 on "Evidential breath analyzers."

Also, TC4 (Slovakia) and TC3/SC1 (U.S.) are requested to work together to decide which technical committee should undertake a new work project on "Verification and inspection intervals of legally controlled measuring instruments" proposed by TC4.

The CIML established a new Subcommittee TC17/SC8 on 'Instruments for quality analysis of agricultural products', allocated the Secretariat to Australia, and approved its first work project on "Measuring instruments used for protein determination in grain".

It was reported that the second edition of the OIML Certificate System will soon be published. This edition contains new provisions such as definitions, requirements, test methods, and test report formats regarding families, modules and families of modules of measuring instruments. It was requested by the CIML that OIML TC3/SC5 (United States and BIML are co-Secretariats) start working on an extension of the System to include "certification of individual measuring instruments," meaning initial verification and production-meets-type issues (component testing is already included in the latest draft). It was also again emphasized that the Certificate System and the Mutual Acceptance Arrangement (MAA) must be mutually compatible.

A report on the status of the OIML Certificate System was presented. As of October 2002, the total numbers of Certificates issued for R76 "Non-Automatic Measuring Instruments" is 447, for R60 "Metrological Regulation for Load Cells" (1991) is 226, and for R60 (2000) is 88. OIML R84 will be applicable within the System when it is published, and OIML R134 and OIML R49-3 "Water meters for cold potable water" will be applicable within the System when the Test Report Format is approved by CIML postal vote and published. The BIML prepares a notice of certificates issued each quarter in the *OIML Bulletin*, reports annually to CIML members on the status of the System, and makes this information available on the OIML web site. The report identifies participating member nations with testing laboratories that are issuing authorities.

Dr. C. Ehrlich gave an extended presentation on the status of the "Mutual Acceptance Arrangement (MAA) for OIML Type Evaluation" and also held a question and answer period (see separate section in this report for current information on the MAA).

John Birch, Honorary CIML Member, has been commissioned by the President of the CIML to carry out a study on 'The Benefits of Legal Metrology for the Economy and Society'. Birch gave an update, reporting that the study will primarily be a compilation of work done to date on this topic, along with whatever quantitative analysis is possible. Representatives from the Regional Legal Metrology Organizations (RLMO) gave reports on activities in their regions so that duplicative efforts could be identified for possible combination or harmonization. The WELMEC (Europe) Chairman gave a presentation on the European Measuring Instruments Directive (MID). Vivian Liu, Secretary of the World Trade Organization (WTO) Technical Barriers to Trade (TBT) Committee, gave a presentation describing regional seminars that the WTO TBT Committee is prepared to conduct in close cooperation with the BIML to discuss trade issues pertaining to legal metrology. She emphasized that the TBT agreement encourages multilateral as opposed to bilateral arrangements.

An OIML distinguished service award was presented (in absentia) to Dr. Ambler Thompson of the NIST ILMG for his dedication, enthusiasm, and commitment to the work of OIML in areas including thermometry, electronic measuring instruments, monitoring environmental pollutants, reference materials, ionizing radiation, bio-electrical instruments, electrical utility meters and instruments for measuring characteristics of agricultural products. Dr. Thompson will be receiving a certificate and a medal for this recognition.

The 2003 CIML meeting will be held in November 2003 in Kyoto, Japan.

## V. Report on the OIML Development Council

The OIML Development Council acts as an advisory body to the CIML on matters of legal metrology in developing countries. This Council is examining possible sources of funding (like the World Bank and United Nations Industrial Development Organization) for legal metrology activities (such as for training, equipment and providing internet access/capabilities) in developing countries. While funding is important, the Council believes that equally important is the development of a legal metrology infrastructure in these countries. Due to limited resources, providing funds for representation and participation by developing countries in the work of the OIML Technical Committees and Subcommittees (TCs/SCs) continues to be deemed not possible at this time.

To stimulate the work of the Development Council, a special Task Group was assembled in October 2002 consisting of representatives from the Americas (SIM), Asia (Japan and Vietnam) and Eastern Europe (COOMET). Among other activities, this Task Group will help identify needs expressed in the Regional Legal Metrology Organizations (RLMOs) and bring them to the attention of the full OIML. A web site has been established for the special independent Task Group. The Group hopes to be able to complete its work next year.

## VI. 9th Annual Asia-Pacific Legal Metrology Forum (APLMF)

The 9th Annual Meeting and Working Group meetings of the Asia-Pacific Legal Metrology Forum (APLMF) were held from November 20-22, 2002, in Ho Chi Minh City, Vietnam. Dr. Charles Ehrlich served as Head of Delegation and was accompanied by Mr. Ross Andersen in his role as the Chairman of the National Conference on Weights and Measures (NCWM). Dr. Ehrlich and Mr. Andersen participated in the Forum's Working Group meetings on Mutual Recognition Arrangements, Training, Grain Moisture Meters, Intercomparison Calibration and Testing, Utility Meters, Medical Measurements, and Goods Packed by Measure. Dr. Ehrlich serves as Chairman of the WG on Mutual Recognition Arrangements, and presented a report on the status of the OIML Mutual Acceptance Arrangement (see separate section in this report). Mr. Gilles Vinet (Measurement Canada) serves as Chairman of the WG on Utility Meters and reported on a comprehensive survey that he conducted covering regulation of utility meters in the economies of the Asia-Pacific regions. Mr. Andersen presented the member-nation economy report for the United States, during which he reported on NCWM strategic-planning interest in OIML activities, on NCWM interest in participating in the OIML MAA and looking into possible bilateral arrangements with other countries, on the proposed change to the U.S. Fair Package and Labeling Act to permit SI-only labeling, on NTEP's look at the production-meets-type and repaired/remanufactured device issues, and on the joint work with American Society for Testing Materials (ASTM) on devices used to measure fat content and other parameters in animal carcasses.

During the report of the WG on Intercomparison Calibration and Testing (Australia is the Secretariat), the recently completed "Report on the Intercomparison of Load Cells" was discussed. While the report finds that "the results are inconclusive and do not necessarily establish the levels of confidence that would be required as the basis for a Mutual Recognition Agreement", the results from the U.S. participation seem quite good and would likely support the establishment of U.S. bilateral arrangements with some other participating countries. Mr. Tom Bartel of the NIST Force Group was acknowledged for his key role in assisting the Secretariat in this project. Anyone interested in seeing the Report should contact Dr. Ehrlich. Also, during discussion of possible future Asia-Pacific Legal Metrology Forum (APLMF) intercomparisons, Mr. R. Andersen said that some U.S. states may be interested in participating in the mass round-robin that the APLMF has been talking about conducting (for field-level F1 masses).

Japan has now served the first year of a two-year term as Secretariat of the APLMF. The President of APLMF is Dr. Akira Ooiwa who is Director of the Mechanical Metrology Division at the National Metrology Institute of Japan. The 2003 APLMF meeting will be held in November 2003, in Kyoto, Japan, in conjunction with the 38th meeting of the International Committee of Legal Metrology (CIML). There will also be a Workshop on Traceability in Legal Metrology held at the same time. The U.S. responded favorably to a request from the Secretariat to host the 2004 APLMF meeting. Mr. Michael Cleary, Director of the California Division of Measurement Standards, has greatly assisted Dr. Ehrlich in making arrangements to host the 2004 APLMF meeting in San Diego. Sponsorship and attendance by all interested U.S. parties is encouraged; please contact Dr. Ehrlich for details.

## VII. Inter-American Metrology System (SIM) Legal Metrology Working Group (LMWG) Meeting

A meeting of the SIM Legal Metrology Working Group took place October 29, 2003 in Santiago, Chile in conjunction with the SIM General Assembly. Mr. Wayne Stiefel served as Head of the U.S. Delegation and was accompanied by Ms. Ileana Martinez of NIST. Cesar Luiz da Silva of Instituto Nacional de Metrologia, Normalização e Qualidade Industrial (INMETRO) in Brazil served as the LMWG Chair. Attending the meeting were representatives from nineteen member countries: Belize, Brazil, Chile, Costa Rica, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Panama, Paraguay, Peru, Santa Lucia, Uruguay, USA, and Venezuela.

*SIM Web Site*

The legal metrology portion of the SIM web site http://www.science.oas.org/SIM/organization/twg/smt_twg_11.htm has improved, and now has more information and links to other sites. The Chair has sent a questionnaire to all countries asking for links with country web sites. The intent is to present legal metrology information by means of links rather than country submissions that have to be regularly updated. The suggestion to include the actual regulations of each country on the website was not supported. The Chair reported on the successful Brazilian experience where the INMETRO web page has state information and links to state pages when they exist.

*Packaging and Labeling Survey*

Mr. W. Stiefel led this discussion. The responses to the first survey were discussed at the Miami December 2001 workshop. Twenty (20) countries responded to the survey. Responses are posted in the SIM LM site http://www.science.oas.org/SIM/organization/twg/smt_twg_11news.htm. As agreed, the survey has been resent so that countries will provide full and updated information on requirements, including those of agencies separate from those responding.

*Objectives and Scopes of the LMWG Sub Groups*

The group examined an October 2002 proposal by the subgroup coordinators Brazil and the USA that clarifies the objectives and scopes of each subgroup (subgroup 1: Laws and Regulations and subgroup 2: Metrological Control of Measuring Instruments and Prepackaged Products). Responding to a question from the representative from Belize on how subgroups fit into the scheme of the LMWG, the Chair indicated that SIM had approved two subgroups, but they have never formally met. Agreement had been reached on which countries would participate in each subgroup; Subgroup 1: Brazil - chair, Argentina, Uruguay and Mexico; and Subgroup 2: USA - chair, Bolivia, Costa Rica and Jamaica. Membership remains open on both subgroups.

*Training Needs*

To find out what training activities would be of interest to member countries, a survey will be conducted, similar to the one conducted by the Asia Pacific Legal Metrology Forum (APLMF). The Chair will circulate this survey to the LMWG members. In addition, members were reminded that in 1998, Ms. Georgia Harris of NIST compiled information on LM authorities - not actual procedures - that could be helpful to Subgroup 2. Mr. Ricardo Munoz of Mexico will obtain a copy of the information compiled by Ms. G. Harris on the legal metrology infrastructure of the SIM countries and will be responsible for developing a similar survey instrument to collect updated information.

*OIML- Law on Metrology*

Mr. W. Stiefel reported that the OIML TC3 committee is working on a draft revision of OIML D1 “Law on Metrology” (see TC3 section in this report). The draft was distributed to the attendees. The Chair indicated that OIML is encouraging wider participation by developing countries in technical activities, principally through regional organizations. Since there was insufficient time to develop SIM comments on D1 on a consensus basis, countries were encouraged to submit their individual comments to the LMWG Chair for forwarding to the US Secretariat. All countries will receive copies of the collated comments.

*OAS Publication*

On behalf of the Organization of American States (OAS), Jose Dajes reported that the OAS has hired a technical writer to develop a publication devoted exclusively to legal metrology, similar to the existing “Metrology for Non-Metrologists”. The content is not yet fully defined, so suggestions have been requested. The Chair will inform contributors where suggestions should be sent.

## VIII. Report on the “International Workshop on the Future of Legal Metrology” - September 2002

The International Organization of Legal Metrology held a Workshop entitled "What will Legal Metrology be in the Year 2020" on September 26-27, 2002, in Saint-Jean-de-Luz, France. Simultaneous English-French interpretation was provided. The aim of this Workshop was to encourage a broad exchange of views among legal metrology authorities and those who are subject to legal metrology requirements. There were 21 presentations, with over 100 people in attendance.

The themes of the Workshop were:

- Globalization
- National and Regional Activities - Mutual Recognitions
- New Scope and Organization of Legal Metrology
- Impact of New Technologies

Key topics included the future of type approval, the impact of electronics and software, and the importance of market surveillance. In particular, it was predicted that traditional means of conducting type evaluation will give way to manufacturers performing such evaluations under accredited quality systems using self-declaration. The question "What is the instrument?" was explored in connection with the software issue. The role of surveys in surveillance was also discussed.

Three U.S. presentations were given: "Issues and Trends in Legal Metrology from a U.S. Perspective" by C. Ehrlich and H. Oppermann, "The Pattern Approval Process: the Past, the Present, the Future as seen by U.S. Instrument Manufacturers" by D. Flocken and D. Tonini, and "Opportunities and Future Trends in Legal Metrology Control of Measuring Instruments" by S. Chappell. At the conclusion of Flocken's talk, there was considerable interest expressed by some of the audience about NCWM awareness of OIML activities, and about the likelihood of the NCWM adopting OIML Recommendations in the future. C. Ehrlich provided verbal information about how the NCWM is kept informed of OIML activities (such as through reports like this), and about studies currently being conducted in the U.S. to identify what differences exist between OIML and NCWM requirements for specific types of measuring instruments.

A summary report of the Workshop was prepared by the BIML and is available on the OIML website at http://www.oiml.org.

# Report of the Committee on Laws and Regulations

Dennis Johannes
Chairman
California Division of Measurement Standards

Reference
Key Number

## 200 Introduction

This is the report of the Committee on Laws and Regulations (L&R Committee) for the 88th Annual Meeting of the National Conference on Weights and Measures (NCWM). It is based on the Interim Report offered in the NCWM Publication 16, "Committee Reports," testimony at public hearings, comments received from the regional weights and measures associations and other parties, the addendum sheets issued at the Annual Meeting, and actions taken by the membership at the voting session of the Annual Meeting. The informational items presented below were adopted as presented when the Committee's report was approved.

Table A identifies agenda items by Reference Key Number, title, and page number. The first three digits of the Reference Key Numbers of the items are assigned from the subject series listed below. Voting items are indicated with a "V" after the item number. Consent calendar items are marked with a "VC." Items marked with an "I" after the item number are informational. Items marked "W" has been withdrawn from consideration. Items marked with a "D" after the key number is developing issues. The developing designation indicates an item has merit; however, the item is returned back to the submitter for further development before any action is taken at the national level. Table B lists the appendices to the report, and Table C provides a summary of the results of the voting on the Committee's items and the report in entirety. This report contains recommendations to amend National Institute of Standards and Technology (NIST) Handbook 130, 2002 Edition, "Uniform Laws and Regulations," or NIST Handbook 133, "Checking the Net Contents of Packaged Goods," Fourth Edition. Revisions proposed by the Committee are shown in **bold face print** by crossing out information to be deleted and underlining information to be added. New items proposed for the handbooks are designated as such and shown in **bold face print.** Proposals presented for information are shown in *italic* type unless identified as informational. When used in this report, the term "weight" means "mass."

**Subject Series**

| | |
|---|---|
| Handbook 130 – General | 210 Series |
| Uniform Laws | 220 Series |
| Weights and Measures Law (WML) | 221 Series |
| Weighmaster Law (WL) | 222 Series |
| Engine Fuels, Petroleum Products, and Automotive Lubricants Inspection Law (EFL) | 223 Series |
| Uniform Regulations | 230 Series |
| Packaging and Labeling Regulation (PLR) | 231 Series |
| Method of Sale of Commodities Regulation (MSCR) | 232 Series |
| Unit Pricing Regulation (UPR) | 233 Series |
| Voluntary Registration of Servicepersons and Service Agencies for Commercial Weighing and Measuring Devices Regulation (VREG) | 234 Series |
| Open Dating Regulation (ODR) | 235 Series |
| National Type Evaluation Regulation (NTER) | 236 Series |
| Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation (EFR) | 237 Series |
| Interpretations and Guidelines | 238 Series |
| Price Verification | 239 Series |
| NIST Handbook 133 | 250 Series |
| Other Items | 260 Series |

## Table A
## Index to Reference Key Items



## Table B
## Appendix

## Table C
## Voting Results

| Reference Key Number | House of Representatives | | House of Delegates | | Results |
|---|---|---|---|---|---|
| | Yeas | Nays | Yeas | Nays | |
| 232-1 | 14 | 14 | 26 | 5 | Item returned to Committee |
| 237-3 | 29 | 0 | 35 | 0 | Passed |
| 237-6 | 20 | 12 | 18 | 19 | Item returned to Committee |
| 237-7 | 32 | 0 | 36 | 0 | Passed |
| 200 Committee Report in its Entirety | 32 | 0 | 37 | 0 | Passed |

## Details of All Items
## (In Order by Reference Key Number)

## 232 Method of Sale of Commodities Regulation

**232-1 V Stored Tare Weights**
(This item did not pass or fail; therefore, it returns to the Committee.)

**Source:** Southern Weights and Measures Association (SWMA)

**Background:** Stored vehicle tare weights are often found to be incorrect. Errors found in vehicle tare weight surveys range from weighing 8900 pounds less than the stored tare to weighing 2680 pounds more than the stored tare. A load of sand or gravel at a cost of $5.50 per ton with a tare error of 750 pounds has a monetary value for each weighing error of $2.06. If this error occurs on four transactions per day for 240 working days, it results in an overcharge of more than $1,977 per year. Since the practice of using stored tare weights is followed by other types of businesses (e.g., landfills and asphalt plants) where prices may reach $70 or more per ton, an error of 750 pounds in the tare weight of a truck would equal $26 per weighment. If this truck were involved in four transactions per day for 240 working days, the overcharge would total more than $25,000 per year.

**Recommendation:** The Committee recognizes the need for a regulation requiring scale operators to maintain accurate "stored" tare weights. In 2002 the Committee reviewed the information concerning this issue and voted to submit the item for a vote, using the language as proposed by the SWMA. In July 2002, the Committee recommended amending NIST Handbook 130, Method of Sale Regulation, Section 3, General, by adding Section 3.5 - Vehicle Tare Weights. This item was not adopted at the 2002 NCWM. In January 2003, the Committee recommended that NIST Handbook 130, Method of Sale Regulation, Section 3, General be amended using alternative language as provided by the Northeastern Weights and Measures Association (NEWMA). The proposed language is as follows:

**3.5. Vehicle Tare Weights. - Whenever stored vehicle tare weights are employed, the following conditions and requirements shall apply:**

**3.5.1. - All stored vehicle scale tare weights shall be determined to the nearest scale division. When stored tare weights are used, issued weight certificates shall identify that fact by placing words such as "stored tare" next to the tare weight. Abbreviations or symbols may be used, provided the terminology is defined elsewhere on the printed ticket.**

**3.5.2. - Stored vehicle scale tare weights shall be verified at regular intervals at a frequency to be determined by the jurisdiction with statutory authority for the device, unless preempted by a more stringent guideline/requirement or modification of the vehicle.**

**Comments:** During the Committee's open hearing a proposal to change the language of this item was heard. After considering this suggestion, the Committee voted to keep the language as proposed by NEWMA.

## 237 Uniform Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation

### 237-1 I Petroleum Subcommittee Agenda Items

**Source:** Petroleum Subcommittee

**Background:** The Committee developed an agenda for the Subcommittee based on the comments received on the following projects:

**Federal Kerosene Dye Information** - It was suggested that information on the new Internal Revenue Service kerosene dye policies be distributed to the states. The Subcommittee will distribute this information.

**NCWM Publication 21 -** The Western Weights and Measures Association recommends that the Petroleum Subcommittee revise the sampling procedures and container requirements in NCWM Publication 21, "Petroleum Products Sampling Procedures and Safety Manual" to include precautions regarding the use of clear glass containers for product samples. This recommendation is based on data presented to the NCWM by Chevron Products Company and the State of Tennessee.

**Update the Engine Fuels, Petroleum Products, and Lubricants Laboratory Guideline -** This guideline is contained in the Interpretations and Guidelines Section of NIST Handbook 130 and was last updated in 1994. Since that time, the cost of equipment has changed and new test methods have been developed. The Subcommittee proposes to revise and update the guideline.

**Automotive Lubricants** - The Engine Fuels, Petroleum Products, and Lubricants Laboratory Guideline (EFR) implies that the document covers lubricants. When the regulation was developed, the Subcommittee gave developing engine fuel requirements priority. The Subcommittee has proposed requirements for lubricants.

**Comments:** Ron Hayes, Missouri, updated the Committee on the Petroleum Subcommittee items. He reported that the "Federal Kerosene Dye Information" would be addressed in a new section to be added to a future version of ASTM D 3699 Standard Specification for Kerosene. Automotive Lubricants and NCWM Publication 21 have been addressed as separate issues (see L&R items 237-2 and 237-3). The Committee has concerns as to the effectiveness of the EFR since it is impossible to keep the document up to date. The Committee is considering two possibilities: 1) if the guideline is to be maintained, it will need to be revised to include additional equipment for testing premium diesel, and the equipment costs must be updated; and 2) remove the guideline from NIST Handbook 130 and post it on the internet where it can be updated on a more frequent basis. The Committee solicits comments concerning the proposed options.

### 237-2 I Uniform Engine Fuels, Petroleum Products, and Lubricants Regulation

**Source:** Western Weights and Measures Association (WWMA)

**Background:** WWMA received numerous recommendations stating the need to update the EFR. EFR has not been updated since 1994. This recommendation is based on data presented to the WWMA by the Chevron Texaco Corporation.

**Comments:** At the WWMA meeting, David Heck, Chevron Texaco Corporation, commented that API supports the latest changes to EFR. The WWMA recommends that the latest amended version, which includes requirements for lubricants and which is contained in Appendix A, move forward as a voting item.

Mike Belue, Belue Associates, reported that the State of California and Chevron Texaco have worked together to include the latest specifications and definitions to the document. Randy Jennings, Tennessee, reported that California (Dave Lazier and Dennis Johannes) and the Subcommittee members from Chevron Texaco have taken the lead on this issue. The SWMA supports the draft and recommends consideration by the Committee.

**Recommendation:** The changes proposed by WWMA to the EFR were published in Appendix A of the Committee's 2002 Final Report. The Committee recommends that the proposed changes be studied at the regional weights and measures meetings and comments be submitted at the 2004 Interim Meeting.

**237-3 V Petroleum Products Sampling Procedures and Safety Manual**
(This item was adopted.)

**Source:** Western Weights and Measures Association (WWMA)

**Background:** WWMA recommends the revision of sampling procedures and container requirements in NCWM Publication 21, "Petroleum Products Sampling Procedures and Safety Manual," to include adequate precautions regarding the use of clear glass containers for product samples. This recommendation is based on data presented to the WWMA by the Chevron Texaco Corporation and the State of Tennessee.

**Recommendation:** Three of the four regional W&M Associations recommended similar changes to NCWM Publication 21. The Committee studied the proposed changes and voted to move the item forward using the changes proposed by the SWMA. The SWMA recommended that the following text replace Publication 21, Section IV, paragraph B.

B. Types of Sample Containers

**Sample containers may be clear or brown glass bottles or metal containers. A clear bottle is advantageous when conducting a visual examination for cleanliness, free water or solid impurities, while brown glass bottles provide protection from light. The samples to be tested for octane or cetane should be protected from light because the light can alter the characteristics of the samples. (See ASTM Research Report RR: D02-1502 for documented effects). Plastic-coated bottles are available which provide protection from shattering. The only suitable metal containers are seamless aluminum bottles or metal cans with seams soldered on the exterior surface with a flux of rosin in a suitable solvent, which is easily removed with gasoline.**

Text to be replaced:

B. Types of Sample Containers

Sample containers may be clear or brown glass bottles, aluminum bottles, or metal cans. The clear bottle is advantageous because it may be examined visually for cleanliness, and also allows visual inspection of the sample for free water or solid impurities. The brown glass bottle affords some protection from light. Plastic coated bottles are available which provide protection against shattering. The only suitable metal cans are those with the seams soldered on the exterior surface with a flux of rosin in a suitable solvent that is easily removed with gasoline or seamless aluminum bottles. NFPA 30A 9.2 (1994 edition) states "No delivery of any Class I or Class II liquid shall be made into portable containers unless the container is constructed of metal or is approved by the authority having jurisdiction, has a tight closure, and is fitted with a spout or is so designed that the contents can be poured without spilling." If a jurisdiction is operating in an area where National Fire Protection Association (NFPA) requirements are adopted, this should be considered in selecting sample containers that will be used at retail locations. Screw caps made of either plastic or metal may be used; the caps should provide a vapor tight closure seal. The screw caps must be protected with liners made of metal foil, teflon, polyethylene, or other material that will not be destroyed by or affect the sample product. Sample containers can be cleaned and used repeatedly as long as they are still serviceable. The caps should be used once and then disposed of, this will help prevent leakage and loss of reliability of the sample.

## 237-4 I Biodiesel Fuel

**Source:** Central Weights and Measures Association (CWMA)

**Recommendation:** Amend EFR Section 1. Definitions, Section 2. Standard Fuel Specifications, and Section 3. Classification and Method of Sale of Petroleum Products as follows:

*Section 1. Definitions*

~~1.8. Biodiesel. means a blend consisting of diesel fuel and a substantial amount of esterfied animal fats and/or vegetable oil(s).~~

Replace with new definitions:

**1.8. Biodiesel. - Means a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100** *(Source: Standard ASTM D 6751).*

**Comments:** Steve Howell, MARC-IV, representing the biodiesel industry testified at the Interim Meeting on each of the three proposed sectional changes. Mr. Howell is the technical director of the National Biodiesel Board (NBB) and serves as chairman of the ASTM Biodiesel Task Force.

The biodiesel industry supports the proposed new definition that is the equivalent to ASTM's definition. The biodiesel industry also recommends adding an additional definition for biodiesel blends which clarifies that "biodiesel blends" are blends of biodiesel and diesel fuel. Mr. Howell stated that the current definition contained in NIST Handbook 130 for biodiesel is incorrect and should be changed. ASTM, along with the biodiesel industry, has worked to define what biodiesel is and is not. ASTM standards also define the difference between pure biodiesel, or B100, and blends of biodiesel with petroleum diesel. The ASTM specification for biodiesel has been developed to insure satisfactory engine operation with B20 (20 % biodiesel) blends and blends less than 20 % biodiesel. Adopting the definitions that ASTM has developed for biodiesel will eliminate confusion between industry standard biodiesel and other materials that have been inappropriately called biodiesel (i.e., coal slurries, raw vegetable oils, partially reacted oils, etc.) that can cause serious engine problems. It will also assist in minimizing confusion on the type of product a consumer purchases, such as biodiesel B100 or a blend of biodiesel with petroleum diesel.

**Recommendation:**

1. Adopt the ASTM definition for Biodiesel B100 as proposed.

   **1.8.1. Biodiesel Blend. - A fuel comprised of a blend of biodiesel fuel with petroleum-based diesel fuel, designated BXX.**

   **1.8.2. In the abbreviation, BXX, the XX represents the volume percentage of biodiesel fuel in the blend.**

2. Adopt a definition for a Biodiesel Blend, as outlined in ASTM D 6751 below:

*Section 2. Standard Fuel Specifications*

**2.1.3.1. B100 biodiesel shall meet the most recent version of ASTM D 6751, Standard Specification for Biodiesel Fuel (B100) Blend Stock for Distillate Fuels**

**2.13.2. Biodiesel and diesel blends shall meet the following requirements: the base diesel fuel shall meet the requirements of ASTM 975, and the biodiesel blend stock shall meet ASTM D 6751.**

**2.13.3. Exception. - Biodiesel may be blended with diesel fuel whose sulfur or aromatic levels are outside Specification D 975 Grades 1-D, 2-D, and low sulfur 1-D and 2-D, provided the finished mixture meets pertinent national and local specifications and requirements for these properties.**

**Comments:** There is no specification for biodiesel contained in Section 2 of NIST Handbook 130 as there are for other fuels. The proposed change would adopt the current language contained in ASTM specification D 6751. The proposed amendment would help ensure that the customer receives fuel that meets ASTM specifications.

The ASTM specification for diesel fuel D 975, which contains biodiesel in blends of B20 or below, is likely to change very soon. This new group of fuels is being termed a "Fill and Go" category of D 975. Separate "fill and go" specifications are also being considered for other fuels such as water-emulsified and ethanol-emulsified diesel. The anticipated change is to place specifications on fuels, which require no engine modifications but are different than conventional petroleum-based diesel fuels that include different parameters than those currently contained in D 975.

The D 975 "fill and go" specification may also impact biodiesel specification D 6751 as it relates to the properties that either parent fuel must meet prior to blending biodiesel B20 and below. If ASTM adopts new specifications, it is hoped that the NCWM would consider similar adoption.

Assuming that the Conference will adopt ASTM changes or modifications to D 975 or D 6751, adopting the language in the current ASTM specification seems to be a prudent course of action.

**Recommendation:** Adopt the specification language as proposed.

*Section 3. Classification and Method of Sale of Petroleum Products*

**3.13. Biodiesel**

**3.13.1. How to Identify Biodiesel. - Biodiesel shall be identified by the capital letter B followed by the numerical value volume percentage. (Example: B20)**

**3.13.2. Retail Dispenser Labeling. - Each retail dispenser of biodiesel shall be labeled with the capital letter B followed by the numerical value volume percent biodiesel and ending with the word 'biodiesel." (Example: B20 biodiesel)**

**3.13.3. Exemption. - Diesel fuel containing 2 % or less biodiesel is exempted from requirements 3.13.1 and 3.13.2."**

**Discussion:** Laws and regulations require that accurate and adequate information be placed on commodities allowing consumers to make price and quantity comparisons. For our economy to function properly, consumers must also be able to rely on manufacturers' product "claims." Products must meet manufacturer specifications and claims.

When ASTM first developed the biodiesel specification in 1993, it proposed a specification for biodiesel use as a pure fuel, called B100. Through the ballot process, several engine companies expressed reservations that they had no experience with using biodiesel in blends over 20 % with diesel fuel (B20). B20 has now been used successfully in over 40 million on-road miles over the last ten years with no changes to the fuel systems on conventional diesel engines. With the higher cost of biodiesel, very few customers used blends higher than B20, and neither the biodiesel industry nor the engine industry was interested in investing the money and resources needed to meet a B100 standard.

Since B20 was the highest level product envisioned with commercial potential, and since the engine community would not support inclusion higher than 20 % without further testing, the ASTM standard was changed from an independent B100 standard to a blend stock standard. The ASTM Biodiesel Task Force developed D 6751 as the set of properties that B100 must meet before being blended into diesel fuel up to 20 % biodiesel by volume. For blends higher than B20, the user should consult with his engine company prior to use. The major questions with blends over B20 are related to costs, rubber and gasket compatibility with high blend of biodiesel, and cold flow properties of high blends.

As a blend-stock standard, the ASTM Biodiesel Standard was developed in a manner similar to that of 1-D and 2-D diesel fuel, which are also frequently blended in the commercial marketplace as a means to improve the cold flow properties of 2-D in winter months. If the parent fuels meet their respective specifications, they can be blended and there is no separate set of specifications for the blended mixture. The current requirement of the biodiesel specification is as follows: if biodiesel meets D 6751 and diesel meets D 975 (either 1-D or 2-D), then the two can be blended up to 20 % biodiesel and there is no separate set of properties required for the B20 mixture. For example, as with 2-D, blends of B20 can contain higher levels of 1-D for improved cold flow properties in winter. This method has served industry and consumers well, especially in the formative stages of biodiesel development.

There are two issues that come up from time to time. The first issue is that since biodiesel costs more than conventional diesel, there is the possibility that fuel distributors will advertise that they are putting in more biodiesel than they are delivering and, thus, derive undue profits. If a distributor claims that they are selling B20 or B2 and they are putting in less than one half of one percent, the distributor is misrepresenting the product. The biodiesel industry claims this is not a pump labeling issue but an enforcement issue.

The second issue is the claim that biodiesel is being blended with diesel fuel when products such as raw vegetable oil or other oils, which do not meet D 6751, are blended with diesel fuel. The biodiesel industry claims this is an enforcement

issue. The National Biodiesel Board has established a quality control program (BQ-9000) that oversees producers and suppliers of biodiesel. Use of BQ-9000-certified suppliers is an effective means to mitigate this potential issue, as is requiring that the distributor provide proof of EPA biodiesel registration. To obtain an EPA registration for biodiesel the supplier must commit to meeting D 6751. Again, aggressive competition, as well as the educational and promotional activities by the industry, have mitigated the requirement that biodiesel must meet D 6751. NCWM adoption of the D 6751 language will help in those efforts.

While B20 and lower levels of biodiesel fuel are considered "fill and go" and require no changes to the engine or fuel system, levels of biodiesel higher than B20 may need to have different gaskets and hoses. While blending biodiesel greater than 20 % does not readily occur in today's market place, it may in the not-too-distant future. Therefore, the biodiesel industry supports accurate labeling for all fuel dispensers and encourages the NCWM to adopt these recommendations.

As the price of biodiesel moves closer to the price of diesel fuel and biodiesel ceases to be a niche product blended into diesel for the Energy Policy Act of 1992 (EPAct) compliance (cleaner air and superior lubricity and cetane), it becomes just one of the myriad compounds which could make up conventional diesel fuel. Refiners could blend in biodiesel to reduce the sulfur content or aromatic content of the finished blend. They could use it to replace their existing lubricity additives. If the price of biodiesel was more equal to diesel, they may add 1 % today, 5 % the next day, and 20 % the next day. As long as the finished blend meets the D 975 "fill and go" specification, the level of biodiesel could range as high as 20 %.

The proposed pump labeling requirement (requiring that pumps containing over 2 % biodiesel be labeled with the blend percentage) would essentially eliminate that flexibility and could significantly reduce the amount of biodiesel that is eventually used and consumed. ASTM is currently developing a biodiesel "fill and go" specification for D 975 that is not based on the parent fuels, but on the finished fuel and which is satisfactory for operation in a diesel engine. This may also mean changes to D 6751, which is a stand-alone specification. The current thinking is that the upper biodiesel concentration limit for the D 975 "fill and go" specification will be 20 % although it is possible that it could be higher or lower. Whatever the concentration of biodiesel, if the finished blend meets the D 975 "fill and go" specification, the fuel is D 975-grade diesel fuel and would have to be labeled such. According to industry, existing labeling contained in NIST Handbook 130 is sufficient.

If the NCWM adopts the future D 975 "fill and go" specification and any changes required for D 6751, then it appears prudent to place the pump labeling exemption at 20 % biodiesel at the present time, with the understanding that it might be higher or lower in the future based on the outcome of the ASTM "fill and go" recommendations.

Ron Hayes, State of Missouri, recommended adding a section requiring fuel suppliers to disclose the biodiesel content on delivery tickets or bills of lading if the biodiesel content exceeds the appropriate level for dispenser labeling requirements.

**Recommendation:** The Committee recommends this item be maintained informational to allow for comments from all interested parties.

**1.8.1. How to Identify Biodiesel and Biodiesel Blends. - Biodiesel and biodiesel blends shall be identified by the capital letter B followed by the numerical value volume percentage. (Examples: B20, B100)**

**1.8.2. Retail Dispenser Labeling. - Each retail dispenser of biodiesel or biodiesel blends shall be labeled with the capital letter B followed by the numerical value volume percent biodiesel and ending with the words "biodiesel blend." (Example: B20 biodiesel blend)**

**1.8.3. Exemption. - Diesel fuel containing *"two"? or "twenty"? (select one for final proposal)* percent or less biodiesel is exempted from requirements 3.13.1 and 3.13.2.**

**1.8.4. Documentation for Dispenser Labeling Purposes. - When the biodiesel blend exceeds *"two"? or "twenty"? (select one for final proposal)* percent biodiesel, the retailer shall be provided, at the time of delivery of the fuel, a declaration of the volume percent biodiesel on an invoice, bill of lading, shipping paper, or other documentation,. This documentation is only for dispenser labeling purposes; it is the responsibility of any potential blender to determine the amount of biodiesel in the diesel fuel prior to blending.**

**237-5 D E diesel**

**Source:** Central Weights and Measures Association (CWMA)

**Recommendation:** To request that E diesel be added to the agenda of the Committee as a “Developing Item".

**Justification:**

(a) There is currently no consensus specification for E diesel, and a specification may need to be developed at a later date.
(b) It may become necessary to develop “retail” labeling guidelines for E diesel.
(c) If specification and labeling guidelines need to be developed, it may become necessary to assign this effort to the Petroleum Subcommittee or a specially selected Task Group.

**Background:** E diesel is a blend of Standard Number 2 diesel fuel containing up to 15 % ethanol by volume. The blend also contains 0.2 % to 5.0 % by volume proprietary additives to maintain certain fuel properties and blend stability. Currently E diesel does not have to conform to any specification designating properties.

E diesel is being sold commercially for off-road applications and is being used in several on-road demonstration fleets. A group of E diesel stakeholders have formed the E diesel consortium to address the technical and regulatory issues with this fuel.

The Consortium has also approached ASTM about developing an E diesel specification.

At the CWMA Interim Meeting in September 2002, E diesel Consortium representative Robert Reynolds provided an update on the activities of the E diesel Consortium and requested that E diesel be put on the Committee agenda as a “Developing Item.”

**237-6 V Nozzle Requirements for Diesel Fuel**
(This item did not pass or fail; therefore, it returns to the Committee.)

**Source:** Central Weights and Measures Association (CWMA)

**Background:** Consumers are dispensing diesel fuel into non-diesel vehicles despite the proper labeling of retail motor fuel dispensers. The Committee feels that the following recommendation will help eliminate the problem.

**Recommendation:** Amend NIST Handbook 130, Uniform Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation, Section 3. Diesel Fuel, as follows:

**3.3. Diesel Fuel**

**3.3.X. Nozzle Requirements for Diesel Fuel. - Each dispensing device from which diesel fuel is sold shall be equipped with a nozzle spout having a terminal end with an outside diameter of not less than 23.63 mm (0.930 in).**

**Comments:** The Committee was made aware of a concern that not all diesel passenger cars manufactured before 1996 may be able accommodate the larger nozzle size, although no supporting data were provided.

**237-7 V Premium Diesel, Single Definition**
(This item was adopted.)

**Source:** Southern Weights and Measures Association (SWMA)

**Background:** SWMA proposed a change to the EFR by deleting the energy content and fuel injector cleanliness requirement.

Justification for changes:

A single definition for premium diesel is imperative for this rule to gain acceptance by states. NCWM passed this definition under the assurance that the Working Group would continue to monitor and work toward a better solution. The SWMA believes that action must be taken based on ASTM activities, recently reviewed survey data, and work group discussions that have included engine manufacturing representatives.

Thermal Stability – Engine manufacturers have expressed that a standard of 80 % should provide an adequate fuel. There was no recommended change to this value from the premium diesel work group. Data reviewed indicates this value should be achievable in most cases.

Energy Content – Fungible issues continue to exist. Engine manufacturer representatives have indicated that removing the requirement would be satisfactory.

Fuel Injector Cleanliness, along with the cafeteria approach, has been a very controversial component of this definition. The working group made a commitment to monitor the progress of L 10 as an ASTM test method. The working group reported to the NCWM that the ASTM effort to pass this method has failed and the ASTM L 10 Surveillance Panel has dissolved. Even without the cost factor, the test can no longer be run. If a laboratory were to offer the test and a failure was cited, it is likely that the cited party would be able to successfully contest the results from a test. Unfortunately, the detergency criteria, which may well provide a benefit to the end user, can no longer be used.

**Recommendation:** Amend NIST Handbook 130, Uniform Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation, Section 2 Standard Fuel Specifications, Subsection 2.2.1. Premium Diesel Fuel, as follows:

Add to Definitions:

**1.XX. Lubricity. - A qualitative term describing the ability of a fluid to affect friction between, and wear to, surfaces in relative motion under load.**

Delete from the current Definitions:

~~**1.17. Energy Content. m**eans the gross energy content of the heating value of diesel fuel as defined by its heat of combustion; the heat released when a known quantity of fuel is burned completely under specific conditions as determined by ASTM Standard Test Method D240.~~

~~**1.21. Fuel Injector Cleanliness.** means a characteristic of the fuel which allows engine operation without fuel contribution to excessive injector deposits. (Added 1998)(Amended 1999)~~

Amend the following:

**2.2.1. Premium Diesel Fuel. -** ~~**Effective January 1, 2000, a**~~ **All** ~~**products**~~ **diesel fuels identified on retail dispensers, bills of lading, invoices, shipping papers, or other documentation with terms such as premium, super, supreme, plus or premier must conform to** ~~**at least two of**~~ **the following requirements:**

~~**(a) Energy Content** - A minimum energy content of 38.65 MJ/L, gross (138 700 BTU/gallon, gross) as measured by ASTM Standard Test Method D 240.~~

~~(b)~~ **(a.) Cetane Number. -** A minimum cetane number of 47.0 as determined by ASTM Standard Test Method D 613.

~~(c)~~ (**b.**) **Low Temperature Operability. -** A cold flow performance measurement which meets the ASTM D 975 tenth percentile minimum ambient air temperature charts and maps by either ASTM Standard Test Method D 2500 (Cloud Point) or ASTM Standard Test Method D 4539 (Low Temperature Flow Test, LTFT). Low temperature operability is only applicable October 1 - March 31 of each year.

~~(d)~~ **(c.) Thermal Stability. -** A minimum reflectance measurement of 80 % **as determined by ASTM Standard Test Method D 6468** ~~using a green filter in the Octel America's Test Method No. F21-61~~ (180 min, 150 °C).

**(d.) Lubricity. - A maximum wear scar diameter of 520 microns as determined by ASTM D 6079. If an enforcement jurisdiction's single test of more than 560 microns is determined, a second test shall be conducted. If the average of the two tests are more than 560 microns, the sample does not conform to the requirements of this part.**

~~**(e) Fuel Injector Cleanliness** - A Coordinating Research Council (CRC) rating of 10.0 or less and a flow loss of 6.0 percent or less as determined by the Cummins L-10 Injector Depositing Test.~~

~~1. When a fuel uses a detergent additive to meet the requirement, upon the request of the Director, the fuel marketer shall provide test data indicating the additive being used has passed the Cummins L-10 Injector Depositing Test requirements when combined with Caterpillar 1-K (CAT 1-K) reference fuel. The Director may also request records or otherwise audit the amount of additive being used to ensure proper treatment of fuels according to the additive manufacturer's recommended treat rates.~~

~~1.1. Upon the request of the Director, the fuel marketer shall provide an official "Certificate of Analysis" of the physical properties of the additive.~~

~~1.2. Upon the request of the Director, the fuel supplier shall provide a sample of detergent additive in an amount sufficient to be tested with CAT 1-K reference fuel in a Cummins L-10 Injector Depositing Test. The regulatory agency requesting the sample shall be responsible for all costs of testing.~~

~~2. When a fuel marketer relies on the inherent cleanliness of the diesel fuel to pass the Cummins L-10 Injector Depositing Test or if the fuel requires a lower detergent additive level than the amount required when the additive is used with the CAT 1-K reference fuel, the fuel marketer shall provide, upon the request of the Director, annual test results from an independent laboratory that confirms the fuel meets the requirements of 2.2.1. (e). The time of fuel sampling and testing shall be at the Directors discretion. The Director may witness the sampling of the fuel and the sealing of the sample container(s) with security seals. The Director may request confirmation from the testing laboratory that the seals were intact upon receipt by the laboratory. The final test results shall be provided to the Director. All costs for sampling, transporting, and testing shall be the responsibility of the fuel supplier. If the annual test complies, any additional testing at the request of the Director shall be paid for by the regulatory agency.~~
~~(Added 1998) (Amended 1999)~~

~~**3.3.3. Labeling Properties of Premium Diesel** -- All retail dispensers identified, as premium diesel must display either:~~

~~1. A label that includes all qualifying parameters as specified in 2.2.1. Premium Diesel Fuel affixed to each retail dispenser. The label shall include a series of check blocks clearly associated with each parameter. The boxes for the parameters qualifying the fuel must be checked. All other boxes shall remain unchecked. The marketer may check as many blocks as apply, or,~~

~~2. A label that includes only the parameters selected by a marketer to meet the premium diesel requirements as specified in 2.2.1. Premium Diesel Fuel. In either case, the label must display the following words:~~

~~"Premium Diesel Fuel" in a type at least 12.7 mm (1/2 in) in height by 1.4 mm (1/16 in) stroke (width of type.)~~

~~When applicable, as determined by the label option and qualifying parameters chosen by the marketer, the label must also display the following information and letter type size:~~

~~The words "Energy Content," "Cetane Number," "Low Temperature Operability," "Thermal Stability," and "Fuel Injector Cleanliness" in a type at least 6 mm (1/4 in) in height by 0.75 mm (1/32 in) stroke (width of type.)~~

~~A declaration of the minimum Energy Content (minimum 38.65 MJ/ L gross [138 700 BTU/gallon]), if energy content is chosen as a qualifying parameter, in type at least 3 mm (1/8 in) in height by 0.4 mm (1/64 in) stroke (width of type.)~~

~~The minimum cetane number guaranteed (at least 47.0) if cetane number is chosen as a qualifying parameter, in a type at least 3 mm (1/8 in) in height by 0.4 mm (1/64 in) stroke (width of type.)~~

~~The date range of low temperature operability enhancement, (e.g., October - March,) along with the qualifying test method (ASTM D 4539 or ASTM D 2500), if low temperature operability is chosen as a qualifying parameter, in a type at least 3 mm (1/8 in) in height by 0.4 mm (1/64 in) stroke (width of type).~~

~~For Example:~~

| ~~**Premium Diesel Fuel**~~ |
|---|
| ~~High Energy Content~~ |
| ~~Cetane Number, 47.0 min~~ |
| ~~Low Temperature Operability (Oct. Mar.,LTFT)~~ |
| ~~Thermal Stability~~ |
| ~~Fuel Injector Cleanliness~~ |

~~or~~

| **Premium Diesel Fuel** |
|---|
| ~~Cetane Number, 47.0 min~~ |
| ~~Low Temperature Operability (Oct. Mar., LTFT)~~ |
| ~~Thermal Stability~~ |

~~The label must be conspicuously displayed on the upper half of the product dispenser front panel in a position that is clear and conspicuous from the driver's position.~~
~~(Added 1998) (Amended 1999)~~

**7.1.1. Premium Diesel. -** The following test methods shall be used to determine compliance with the ~~applicable~~ premium diesel parameters:

~~(a) Energy Content - ASTM D 240~~

~~(b)~~ **(a.)** Cetane Number - ASTM D 613

~~(c)~~ **(b.)** Low Temperature Operability. - ASTM D 4539 or ASTM D 2500 (according to marketing claim)

~~(d)~~ **(c.)** Thermal Stability. - ~~Octel America F21-61 (180 min, 150 EC)~~ ASTM D 6468 (180 min., 150 °C).

**(d.) Lubricity. - ASTM D 6079**

~~(e) *Fuel Injector Cleanliness - The most recent edition of the Cummins L-10 Injector Depositing Test as endorsed by the ASTM L-10 Injector Depositing Test Surveillance Panel.~~

~~* Upon ASTM approval of a standard test methods that are is derived from the above referenced methods, the ASTM standard test methods shall be used to determine compliance with the applicable premium diesel parameter.~~
(Amended 1999, 2003)

**Comments**: During the work session the Committee received a proposal from the Premium Diesel Work Group to modify this item slightly to match the proposal now being considered by ASTM. The Committee reviewed this proposal and accepted the recommendation of the Premium Diesel Work Group. The Committee wishes to sincerely thank the Premium Diesel Work Group for all of their hard work and assistance with this item. The Premium Diesel Work Group is comprised of the following members: R. Jennings, Tennessee; R. Leisenring, Jr, Chevron Texaco; C. Cooney, Oregon; L. Cunningham, Ethyl Corporation; D. Daniels, Octel-Starreon; C. Yarnold, ONDEO Nalco; D. Harvey, Citgo Petroleum;

R. Hayes, Missouri; M. Herman, Herman & Associates; G. Mittermaier, Petroleum Marketers; M. Nikanjam, Chevron Products Co.; J. Peeples, AAE Technologies, Inc; D. Smith, North Carolina; and N. Strete, Lubrizol Corp.

## 239 Price Verification

### 239-1 I Amend NIST Handbook 130, Examination Procedure for Price Verification, Section 6.2

**Source:** Western Weights and Measures Association (WWMA)

**Background:** While the definition of a point-of-sale system includes a requirement for a weighing and measuring device and requires indications to be visible in a direct sale (NIST Handbook 44, G-UR.3.3.), cash registers and computer monitors that do not incorporate a weighing or measuring device are not subject to the requirement that the indication be visible to a consumer. The WWMA recommends that the practice of consumers having access to price information as the transaction is in progress be standardized. Consumers would then be able to instantly confirm prices, businesses could correct incorrect prices during the transaction, and the benefit of correct prices and time saved would help everyone involved. Many businesses that use cash registers or computer monitors currently have remote indicators that meet the requirements, and for the ones that do not, technology and equipment is available to provide such indications at an affordable price.

**Proposal:** Modify NIST Handbook 130, Examination Procedure for Price Verification, Section 6, Inspection 6.2 Other as follows:

Add:

**(a) <u>A cash register or computer monitor used to list and total customer purchases must be positioned so that its indications may be observed from a reasonable customer location and/or have a remote indicator display so that its indications may be observed from a reasonable customer location.</u>**

**Committee Recommendation:** The Committee believes that, while this item is worthy of consideration, it should not be placed in the Examination Procedure for Price Verification contained in NIST Handbook 130. The Committee believes that a more appropriate location for the proposal would be in NIST Handbook 130, Weights and Measures Law, Section 22, Prohibited Acts.

**Comments:** The SWMA considered this to be a problem, but there is concern whether or not this is a weights and measures issue. Additionally, there are concerns that Publication 19, which is now out of print and obsolete, is the appropriate place to add this requirement if it is considered a weights and measures issue. The scope of this requirement is very broad and would impact a wide range of retail establishments, which may not come under the jurisdiction of weights and measures authorities since the systems may not be attached to a scale or a meter.

## 250 NIST Handbook 133, Checking the Net Content of Packaged Goods

### 250-1 W Amend NIST Handbook 133, 4th Edition, Chapter 2, Section 2.3

**Source:** Western Weights and Measures Association (WWMA)

**Background:** NIST Handbook 133, 4th Edition, Chapter 2, Section 2.2 states that a scale/balance having a "scale division no larger than 1/6 of the Maximum Allowable Variation (MAV) for the package size being weighed" is required to test product. The example used to illustrate this concept on page 7 of H-133 uses a 0.002-lb scale division as the largest unit of measure appropriate for weighing these packages. The existing examples on pages 11, 12 and 16 are not consistent with the requirements of Section 2.2 and should be modified. In addition to the device suitability requirement, the reason for recording package errors in terms of "units of measure/dimensionless units" is to simplify and reduce computation errors. WWMA believes that the examples on pages 11, 12 and 16 are unnecessarily restrictive in that they require the use of the smallest scale division without any consideration to the weight of the package, the size of the errors, or the graduations of the scale being used. For example, in a recent series of inspections, shortages as large as 12 lb were found for 60-lb bags of concrete mix. The scale used to conduct the inspection had a minimum division of 0.002 lb, which would require the package errors to be recorded in a unit of measure of 0.001 lb. The recorded errors (in dimensionless

units) for these inspections were as large as 12 000. Use of a larger unit of measure that met the MAV/6 requirement (MAV = 2 % of labeled quantity or 1.2 lb; MAV/6 = 0.2 lb) would not have affected the results of the inspection.

**Recommendation:** Amend NIST Handbook 133, pages 11 and 12, the second and third "Example" contained in the question "How are the specific steps of the Basic Test Procedure and document the inspection identified?" and amend the "Example" on page 16 contained in the question "How are individual package errors determined for the tare sample packages?" as follows:

Pages 11 and 12

**Example:** If the net weight declared on a package is 1 lb, the metric equivalent (accurate to six significant digits) is 453.592 g. Do not round down or truncate values in the calculations until the nominal gross weight is determined and recorded. If the package is also labeled 454 g, then the metric declaration is larger than the inch-pound declaration and should be used to verify the net contents of the package. The Basic Test Procedure does not prohibit the use of units of weight instead of dimensionless units when recording package errors, nor does it prohibit the use of net content computer programs to determine product compliance. Record the unit of measure in box 2. The unit of measure ~~is the minimum division of the unit of measurement used to conduct the test. If a scale is used that reads to thousandths of a pound, the unit of measure is 0.001 lb even if the scale division is 0.002 lb or 0.005 lb,~~ should be less than or equal to MAV/6.

**Example:** ~~If the scale has a scale division of 0.5 g, the unit of measure is 0.1 g. If a weighed package that has an error of "-0.5 g," record the error as "-5" using the dimensionless units." If the scale indicates in increments of 0.002 lb, the unit of measure is 0.001 lb. If a weighed package has an error of "0.016," record the error as "16" using "dimensionless units."~~ **The MAV for packages labeled 2.50 lb is 0.086 lb (see Table 2-5). The MAV/6 is 0.014 lb. If using a scale that reads in hundredths of a pound, the largest appropriate unit of measure should be 0.01 lb. If the scale division is in thousandths of a pound, the unit of measure may be 0.001, 0.002, or 0.005 lb.** When using dimensionless units, multiply package errors by the unit of measure to obtain the package error in weight.

Page 16

**Example:** ~~If weighing in 0.001 increments, the unit of measure is also 0.001 lb~~. **If the unit of measure is 0.001 lb *and*** ~~If~~ the package error for the first package opened for tare is +0.008 lb, instead of recording 0.008 lb in the plus column, record the error as "8" in the plus column. If the second package error is +0.060 lb, record the package error as "60" in the plus column, and so on. (This section does not prohibit the use of units of weight instead of dimensionless units or computer programs.)

**Comments:** Although there may be some benefits to clarifying the language of Handbook 133, the Southern Weights and Measures Association (SWMA) is not convinced that the proposed language is needed or justified to reverse the handbook at this time. The Committee agreed with the interpretation and recommendation of the SWMA and voted to withdraw this item.

## 250-2 W Amend NIST Handbook 133, 4th Edition, Chapter2, Section 2.2

**Source:** Western Weights and Measures Association (WWMA)

**Background:** The WWMA reported that the test procedures in NIST Handbook 44 are designed for commercial weighing and measuring devices. A scale, when used by an official to inspect/test the net content of packaged goods, is in effect a comparator with mass standards. As currently written in NIST Handbook 133, the scale test requirements and the frequency that they are tested are unnecessarily time-consuming and onerous on the regulatory official. This proposal simplifies the verification procedure and allows the official some flexibility. The requirement to hold the scale to tolerances to one-half scale divisions is difficult to determine under field conditions. The proposal to hold tolerances to whole divisions is reasonable bearing in mind that mass standards will determine any error that could then be corrected during the weighing operation.

**Recommendation:** Amend the scale test in NIST Handbook 133, 4th Edition, Chapter 2, Section 2.2, Measurement Standards and Test Equipment, as follows:

***How often should I verify the accuracy of a scale?***

Verify the accuracy of a scale before each initial daily use, each use at a new location, or when there is any indication of abnormal equipment performance (e.g., erratic indications). ~~Recheck the scale accuracy if it is found that the lot does not pass, so there can be confidence that the test equipment is not at fault.~~

***Which accuracy requirements apply?***

Scales used to check packages must meet the ~~acceptance~~ tolerances ~~specified~~ for their **test load and** accuracy class **specified** in **Table 1-2** ~~the current edition of NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices" (NIST HB 44). The tolerances for Class II and Class III digital scales are presented in Section 2.20. Scales, in NIST HB 44.~~

***In testing, which tolerances apply to the scale?***

| Table 1-2 ~~Acceptance~~ Tolerances for Class of Scales based on Test Load in Divisions | | |
|---|---|---|
| Test Load in Divisions | | Tolerance |
| Class II Scale | Class III Scale | |
| 0 to 5 000 | 0 to 500 | Plus or Minus **1** ~~**0.5**~~ Division |
| 5 001 to 20 000 | 501 to 2 000 | Plus or Minus 1 Division |
| 20 001 or more | 2 001 to 4 000 | Plus or Minus **2** ~~**1.5**~~ Divisions |
| Not Applicable | 4 001 or more | Plus or Minus **3** ~~**2.5**~~ Divisions |

Do not use a scale if it has an error that exceeds the **Table 1-2** ~~**specified**~~ tolerance in any of the performance tests described in the following section.

***Which performance tests should be conducted to ensure the accuracy of a scale?***

Use the following procedures **and certified mass standards** to verify the scale. The**se** following procedures **are** based on those required in NIST Handbook 44 **and** have been modified to reduce the amount of time required for testing scales in field situations.

*Increasing-Load Test*

~~Use certified mass standards to c~~**C**onduct an "increasing-load test" with all test loads centered on the load-receiving element. Start the test with the device on zero and progress with increasing test loads to a "maximum test load" of at least 10 % more than the gross weight of the packages to be tested. Use at least three different test loads of approximately equal value to test the device up to the "maximum test load" **with an additional test load approximately equal to the average package tare weight.** Verify the accuracy of the device at each test load. ~~Include the package tare weight as one of the test points.~~

*Decreasing-Load Test*

~~For all types of scales, other than one~~ **Except for equal-arm balances or scales** with a beam indicator ~~or equal-arm balance~~, conduct a "decreasing-load test" with all test loads centered on the load-receiving element. Use the same test loads used in the "increasing-load test" of this section, and start at the "maximum test load." Remove the test loads in the reverse order of the increasing-load test until all test loads are removed. Verify the accuracy of the scale at each test load.

*Shift Test*

Use a test load equal to one-half of the "maximum test load" used for the "increasing-load test." ~~For bench scales (see Diagram 1) place.~~ **Place** the test load **as indicated in diagrams 1 or 2 below.** ~~in the center of four separate~~

~~quadrants, equidistant between the center and edge of the load-receiving element and determine the accuracy in each quadrant for equal-arm balances. For example, where the load-receiving element is a rectangular or circular shape, place the test load in the center of the area represented by the shaded boxes in the following diagrams.~~ **For each position of the test load, verify the accuracy of the scale.**

**Comments:** The tolerances for package checking scales have been in Handbook 133 for approximately 15 years. There appears to be a consensus among SWMA members that the scales used for regulatory inspection should be held to tight tolerances when checking packages. These tolerances have been acceptable for many years. Following the guidelines of Handbook 133 results in a high level of confidence in the inspection results. The SWMA does not want to see the level of confidence diminished by increasing the tolerances for package inspection scales. Consequently, the SWMA recommends maintaining the existing tolerances for package inspection scales as currently stated in Handbook 133. The Committee agreed with the analysis provided by the Southern Weights and Measures Association (SWMA) concerning this item and voted to withdraw the proposal.

## 250-3 D Amend NIST Handbook 133, 4th Edition, Chapter 1, Section 1.2

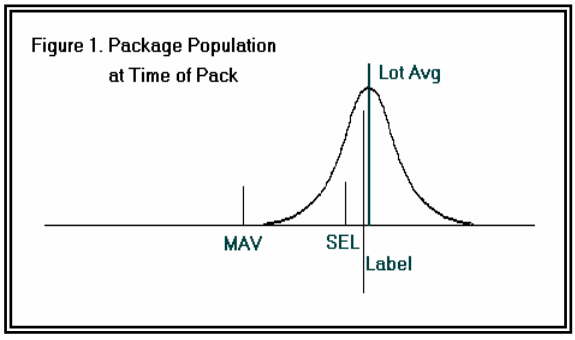
**Source:** Northeastern Weights and Measures Association (NEWMA)

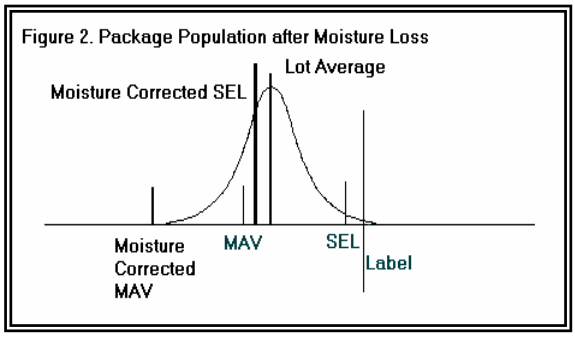
**Recommendation:** Amend the discussion section "**Why do we allow for moisture loss or gain?"** in section 1.2 Package Requirements on page 4 as follows:

**Why do we allow for moisture loss or gain?**
Some packaged products may lose or gain moisture and, therefore, lose or gain weight or volume after packaging. The amount of lost moisture depends upon the nature of the product, the packaging material, the length of time it is in distribution, environmental conditions, and other factors. Moisture loss may occur even when manufacturers follow good distribution practices.

Loss of weight "due to exposure" may include solvent evaporation, not just loss of water**. Note that allowances for loss or gain of moisture only apply to packages of commodities where the moisture has no value to the consumer (see Jones vs Rath).**

For loss or gain of moisture, **you** apply the moisture allowances to the maximum allowable variations permitted for individual packages and to the average net quantity of contents before determining the conformance of a lot. **You may apply the allowance before measuring the package errors or after. When applying the allowance before the measurements, you essentially correct each package back to theoretical weight at time of pack, see Figure 1 at right. When applying the allowance after measuring the package errors, you correct the MAV and SEL to recognize the moisture loss as in Figure 2 at right. You can find specific directions for applying the allowances in tests in Section 2.3.**




This handbook provides "moisture allowances" for some meat and poultry products, flour, and dry pet food (see "Moisture Allowances" in Chapter 2). These allowances are based on the premise that when the average net weight of a sample is found to be less than the labeled weight, but not by an amount that exceeds the allowable limit, either the lot is declared to be within the moisture allowance or more information must be collected before deciding lot compliance or non compliance.

**Comments:** Testimony was provided that indicated additional language would be developed and presented by NEWMA to complete this proposal. As a result of that testimony the Committee designated this item as developmental.

## 250-4 D Amend NIST Handbook 133, 4th Edition, Chapter 2, Section 2.3

**Source:** Northeastern Weights and Measures Association (NEWMA)

**Recommendation:** NEWMA proposes deleting the current "M**oisture Allowances"** discussion in section 2.3 Basic Test Procedure, on pages 17 through 19 and replacing it as follows:

**Moisture Allowances**

***What products have an established moisture allowance?***

Flour and dry pet food have a moisture allowance of 3 % of the labeled net weight. Note: Dry pet food means all extruded dog and cat foods and baked treat products packaged in kraft paper bags and/or cardboard boxes with a moisture content of 13 % or less at the time of pack.

Meat and poultry products from a U.S. Department of Agriculture (USDA)-inspected plant are permitted no moisture allowance when tested under a Category A sampling plan with Used Dry Tare.

Meat and poultry products from a USDA-inspected plant are permitted the following moisture allowances when tested under a Category A sampling plan with Wet Tare. Note: When there is free flowing liquid or absorbent packaging materials in contact with the product, all free liquid is part of the wet tare.

- For packages of fresh poultry that bear a USDA seal of inspection, the moisture allowance is 3 % of the labeled net weight. For net weight determinations only, fresh poultry is defined as poultry above 3 ºC (26 ºF). This is a product that yields or gives when pushed with the thumb.

- For packages of franks or hotdogs that bear an USDA seal of inspection, the moisture allowance is 2.5 % of the labeled net weight.

- For packages of bacon, fresh sausage, and luncheon meats that bear a USDA seal of inspection, there is no moisture allowance if there is no free-flowing liquid or absorbent materials in contact with the product and the package is cleaned of clinging material. Luncheon meats are any cooked sausage product, loaves, jellied products, cured products, and any sliced sandwich style meat. This does not include whole hams, briskets, roasts, turkeys, or chickens requiring further preparation to be made into ready-to-eat sliced product. When there is no free-flowing liquid inside the package and there are no absorbent materials in contact with the product, Wet Tare and Dried Used Tare are equivalent.

These allowances are based on the premise that when the average net weight of a sample is found to be less than the labeled weight, but not by an amount that exceeds the allowable limit, either the lot is declared to be within the moisture allowance, or more information must be collected before deciding lot compliance or noncompliance.

***How do you determine the allowance for products without an established moisture allowance?***

For any product subject to moisture loss/gain, you may determine the appropriate moisture loss allowance based on a valid, scientific study. You may not use arbitrarily chosen allowances for moisture loss/gain. Many packers have conducted studies that they can provide in support of any claim that the product lost/gained moisture. Any such study should have included a variety of environments that simulate the potential distribution chains that could be encountered. You may use the moisture loss limits found in such study as an allowance in a compliance test.

***What is the accepted method to determine the actual moisture loss for a lot?***

Where the packer measures and records the moisture content of product in each lot, you may request a copy of that data to be compared to the moisture content of the product offered for sale. You must select a random sample of the product offered for sale and have it tested for moisture content using a scientifically verified test procedure e.g. like those in the Official Methods of Analysis of the Association of Official Analytical Chemists (See Appendix D). The actual moisture loss is calculated as the moisture content (%) at time of pack minus moisture content (%) at time of sale. Use the difference obtained to calculate the actual moisture loss for the lot by multiplying it times the label

quantity. Use this as the moisture allowance in the official test. In the case of moisture gain, this value will be a negative number.

**Calculations**

***How do you apply a moisture allowance when conducting a test?***

Moisture allowances may be applied either prior to testing or after testing. These two methods are mathematically equivalent means of adjusting both the individual package errors and the sample average. It is common practice to apply the moisture correction prior to the test for those products with established moisture allowances like flour and dry pet food. In most other cases the correction is made after the test since moisture loss data will probably be obtained as part of the follow-up investigation after the initial test has failed.

To compute the moisture loss allowance prior to testing, you correct the nominal gross weight in box 14 for moisture loss. Find the value of the allowance by multiplying the labeled quantity by the decimal percent value of the allowance. Enter this value in box 13a on the form. The nominal gross weight is found by adding the average tare (box 13) to the label quantity (box 1) and subtracting the moisture allowance (box 13a). Lot compliance is evaluated in the normal way using decision criteria in boxes 16 and 24 on the report form.

**Example**: Labeled quantity of a bag of flour is 2 lb and average tare is 0.04 lb (box 13)
Moisture Allowance is 3 % (0.03) of 2 lb = 0.06 lb
*Nominal Gross Wt. = 2 lb + 0.04 lb – 0.06 lb = 1.98 lb record this value in box 14.*

To compute the moisture loss allowance after testing, you correct only the MAV and SEL for moisture loss. Perform your initial test with no moisture allowance in box 13a. When moisture loss data becomes available, find the value of the allowance by multiplying the labeled quantity by the decimal percent value of the moisture loss or allowance. Lot compliance is evaluated using decision criteria in boxes 16 and 24 on the report form and the moisture corrected MAV and SEL respectively.

**Example:** Labeled quantity of a package of rice is 2 lb, average tare is 0.04 lb (box 13), MAV (box 3) is 0.07 lb, and SEL (box 23) is 0.023 lb.
Moisture content at time of pack was 13.4 % (packer data)
Moisture content at time of sale is 10.6 % (lab data)
Moisture loss is (13.4 % to 10.6 %) = 2.8 %
Moisture allowance is 0.028 x 2 lb = 0.056 lb
Moisture Corrected MAV is 0.07 lb + 0.056 lb = 0.126 lb – Compare each package error measured in the initial test to this moisture corrected MAV using criteria in box 16.
Moisture Corrected SEL is 0.023 lb + 0.056 lb = 0.079 lb – Compare the sample average error in the initial test to this moisture corrected SEL using criteria in box 24.

**Justification:** The products that have an established moisture allowance should be clearly stated. Currently the Handbook only poses the question “What is the moisture allowance for flour and dry pet food?” It does not state if any other products have a moisture allowance. In addition, the Handbook gives no guidance on what to do for products that do not have an established moisture allowance.

The “Calculations” section on page 18 is confusing and does not distinguish between applying a moisture allowance before or after testing. NEWMA believes that the current method of comparing the moisture allowance to the difference between the average error and the Sample Error Limit (SEL) is confusing. Simply adjusting the SEL with the moisture allowance is easier and more in line with how the MAV is corrected (see graphs on first page).

The current Handbook does not address commodities that are packed in sealed containers or how to treat commodities packed on the premises. NEWMA requests guidance from the L&R Committee on these two items.

**Recommendation**: The Committee believes that the Fourth Edition of NIST Handbook 133 provides adequate guidance for regulatory officials in the area of Moisture Allowance. The Committee designated the proposal as developmental.

## 260 Other Items

### 260-1 I Enhanced Product – USDA/FSIS Meat and Poultry Products

**Source:** Central Weights and Measures Association (CWMA)

**Comments:** Last year the Committee recommended and the NCWM adopted a proposal to form an Enhanced Product Working Group. This Working Group was not established as of the 2003 Interim Meeting. The WWMA recommended that the Enhanced Product Working Group propose a plan and scope of action for consideration by the NCWM. The WWMA and the SWMA encourage the Working Group to invite participants from USDA, industry, and other interested parties.

The CWMA formed a small committee to develop recommendations for the formation of the working group with the goal of providing those recommendations to the NCWM Chairman and the Committee Chairman in advance of the 2002 NCWM Interim Meeting. NIST Weights and Measures Division, provided copies of a previous NCWM study group protocol to assist in the development of this item.

The Committee voted to maintain this item as "Informational" pending the proposed formation of an Enhanced Product Working Group by the NCWM Board of Directors.

---

D. Johannes, California, Chairman

V. Dempsey, Montgomery County, Ohio
E. Price, Texas
J. Gomez, New Mexico
J. Cassidy, Cambridge, Massachusetts

Associate Membership Committee Representative: C. Guay, Procter & Gamble Company

Petroleum Subcommittee: Randy Jennings, Tennessee, Chairman

Canadian Technical Advisors: B. Lemon and D. Hutchinson
NIST Technical Advisors: T. Coleman and K. Dresser
NIST Technical Advisor on the Uniform Regulation for National Type Evaluation: S. Cook

## Committee on Laws and Regulations

# Appendix A

## Uniform Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation

## Recommendation for 237-2
## Information Item

as adopted by
The National Conference on Weights and Measures*

### 1. Background

In 1984, the National Conference on Weights and Measures adopted section 2.20. in the Uniform Regulation for the Method of Sale of Commodities requiring motor fuel containing alcohol be labeled as such to disclose that information to the retail purchaser. The delegates deemed this action necessary since motor vehicle manufacturers were qualifying their warranties with respect to some gasoline-alcohol blends, motor fuel users were complaining to weights and measures officials about fuel quality and vehicle performance, and the American Society for Testing and Materials (ASTM) had not yet finalized quality standards for oxygenated (which includes alcohol-containing) fuels. While many argued that weights and measures officials should not cross the line from quantity assurance programs to programs regulating quality, the delegates were persuaded that the issue needed immediate attention.

A Motor Fuels Task Force was appointed in 1984 to develop mechanisms for achieving uniformity in the evaluation and regulation of motor fuels.

The Task Force developed the Uniform Motor Fuel Inspection Law (see the Uniform Laws section of this Handbook) and the Uniform Motor Fuel Regulation to accompany the Law.

The recommended Law required registration and certification of motor fuel as meeting ASTM standards. The regulation defined the ASTM standards to be applied to motor fuel.

In 1992 the NCWM established the Petroleum Subcommittee under the Laws and Regulations Committee. The subcommittee recommended major revisions to the Regulation that was adopted at the 80th NCWM in 1995. The scope of the regulation was expanded to include all engine fuels, petroleum products, and automotive lubricants; its title was changed accordingly; and the fuel specifications and method of sale sections were revised to address the additional products. Other changes included expansion of the definitions section and addition of sections on retail storage tanks, condemned product, registration of engine fuels designed for special use, and test methods and reproducibility limits.

### 2. Status of Promulgation

The Uniform Regulation for Engine Fuels, Petroleum Products, and Automotive Lubricants was adopted by the Conference in 1995. The status of State actions with respect to this Regulation is shown in the table beginning on page 8.

**The National Conference on Weight sand Measures is sponsored by the National Institute of Standards and Technology in partial implementation of its statutory responsibility for "cooperation with the States in securing uniformity in weights and measures laws and methods of inspection."*

# Table of Contents

**Section** **Page**

# Uniform Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation

## 1. Definitions

**1.1. ASTM.** - ~~The American Society for Testing and Materials~~ **ASTM International** means the **inter**national voluntary consensus standards organization formed for the development of standards on characteristics and performance of materials, products, systems, and services; and the promotion of related knowledge.

**1.2. Antiknock Index (AKI).** - Means the arithmetic average of the Research Octane Number (RON) and Motor Octane Number (MON): AKI = (RON+MON)/2. This value is called by a variety of names, in addition to antiknock index, including: octane rating, posted octane, (R+M)/2 octane.

**1.3. Automatic Transmission Fluid**. - Means a product intended for use in a passenger vehicle, other than a bus, as either a lubricant, coolant, or liquid medium in any type of fluid automatic transmission, **that contains a torque converter.** ~~or any other type of unit through which or by which, force, energy, or power is transferred from a motor vehicle engine by hydraulic means to the driving assembly.~~ **For the purposes of this regulation, fluids intended for use in continuously variable transmissions are not considered "Automatic Transmission Fluid".**

~~1.3.~~**1.4. Automotive Fuel Rating.** - Means the automotive fuel rating required under the amended Octane Certification and Posting Rule (or as amended, the Fuel Rating Rule), 16 CFR Part 306. Under this Rule, sellers of liquid automotive fuels, including alternative fuels, must determine, certify, and post an appropriate automotive fuel rating. The automotive fuel rating for gasoline is the antiknock index (octane rating). The automotive fuel rating for alternative liquid fuels consists of the common name of the fuel along with a disclosure of the amount, expressed as a minimum percentage by volume, of the principal component of the fuel. For alternative liquid automotive fuels, a disclosure of other components, expressed as a minimum percentage by volume, may be included, if desired.

~~1.4.~~**1.5. Automotive Gasoline, Automotive Gasoline-Oxygenate Blend.** - Means a type of fuel suitable for use in spark-ignition automobile engines and also commonly used in marine and non-automotive applications.

~~1.5.~~**1.6. Aviation Gasoline.** - Means a type of gasoline suitable for use as a fuel in an aviation spark-ignition internal combustion engine.

~~1.6.~~**1.7. Aviation Turbine Fuel.** - Means a refined middle distillate suitable for use as a fuel in an aviation gas turbine internal combustion engine.

~~1.7.~~**1.8. Base Gasoline.** - Means all components other than ethanol in a blend of gasoline and ethanol.

~~1.8.~~**1.9. Biodiesel.** - Means a blend consisting of diesel fuel and a substantial amount of esterified animal fats and/or vegetable oil(s).

~~1.9.~~**1.10. Cetane Index.** - Means an approximation of the cetane number of distillate diesel fuel, which does not contain a cetane improver additive, calculated from the density and distillation measurements.

~~1.10.~~**1.11. Cetane Number.** - Means a numerical measure of the ignition performance of a diesel fuel obtained by comparing it to reference fuels in a standardized engine test.

~~1.11.~~**1.12. Compressed Natural Gas (CNG).** - Means natural gas which has been compressed and dispensed into fuel storage containers and is suitable for use as an engine fuel.

~~1.12.~~**1.13. Denatured Fuel Ethanol.** - Means "ethanol" as defined in 1.19. below.

~~1.13.~~**1.14. Diesel Fuel.** - Means a refined middle distillate suitable for use as a fuel in a compression-ignition (diesel) internal combustion engine.

~~1.14.~~**1.15. Distillate.** - Means any product obtained by condensing the vapors given off by boiling petroleum or its products.

~~1.15.~~**1.16. EPA.** - Means the United States Environmental Protection Agency.

~~1.16.~~**1.17. E85 Fuel Ethanol.** - Means a blend of ethanol and hydrocarbons of which the ethanol portion is nominally 85 to 75 volume percent denatured fuel ethanol.

~~1.17.~~**1.18. Energy Content.** - Means the gross energy content or the heating value of diesel fuel as defined by its heat of combustion - the heat released when a known quantity of fuel is burned completely under specific conditions as determined by ASTM Standard Test Method D 240.
(Added 1998)(Amended 1999)

~~1.18.~~**1.19. Engine Fuel.** - Means any liquid or gaseous matter used for the generation of power in an internal combustion engine.

~~1.19.~~ **1.20. Engine Fuels Designed for Special Use.** - Means engine fuels designated by the Director requiring registration. These fuels normally do not have ASTM or other national consensus standards applying to their quality or useability; common special fuels are racing fuels and those intended for agricultural and other off-road applications.

~~1.20.~~**1.21. Ethanol.** - Also known as "Denatured Fuel Ethanol," means nominally anhydrous ethyl alcohol meeting ASTM D 4806 standards. It is intended to be blended with gasoline for use as a fuel in a spark-ignition internal combustion engine. The denatured fuel ethanol is first made unfit for drinking by the addition of Bureau of Alcohol, Tobacco, and Firearms (BATF) approved substances before blending with gasoline.

~~1.21.~~**1.22. Fuel Injector Cleanliness.** - Means a characteristic of the fuel which allows engine operation without fuel contribution to excessive injector deposits.
(Added 1998)(Amended 1999)

~~1.22.~~**1.23. Fuel Oil.** - Means a refined oil middle distillates, heavy distillates, or residues of refining, or blends of these, suitable for use as a fuel for heating or power generation, the classification of which shall be defined by ASTM D 396.

~~1.23.~~**1.24. Gasoline.** - Means a volatile mixture of liquid hydrocarbons generally containing small amounts of additives suitable for use as a fuel in a spark-ignition internal combustion engine.

~~1.24.~~**1.25. Gasoline-Alcohol Blend.** - Means a fuel consisting primarily of gasoline and a substantial amount (more than 0.35 mass percent of oxygen, or more than 0.15 mass percent of oxygen if methanol is the only oxygenate) of one or more alcohols.

~~1.25.~~**1.26. Gasoline Gallon Equivalent (GGE).** - Gasoline gallon equivalent (GGE) means 2.567 kilograms (5.660 lb) of natural gas.

~~1.26.~~**1.27. Gasoline Liter Equivalent (GLE).** - Gasoline liter equivalent (GLE) means 0.678 kilogram (1.495 lb) of natural gas.

~~1.27.~~**1.28. Gasoline-Oxygenate Blend.** - Means a fuel consisting primarily of gasoline along with a substantial amount (more than 0.35 mass percent of oxygen, or more than 0.15 mass percent of oxygen if methanol is the only oxygenate) of one or more oxygenates.

**1.29. Gear Oil. - Means an oil used to lubricate gears, axles or some manual transmissions.**

~~1.28.~~**1.30. Kerosene.** - (or "Kerosine") Means a refined middle distillate suitable for use as a fuel for heating or illuminating, the classification of which shall be defined by ASTM D 3699.

~~1.29.~~**1.31. Lead Substitute.** - Means an EPA- registered gasoline additive suitable, when added in small amounts to fuel, to reduce or prevent exhaust valve recession (or seat wear) in automotive spark-ignition internal combustion engines designed to operate on leaded fuel.

~~1.30.~~**1.32. Lead Substitute Engine Fuel.** - Means, for labeling purposes, a gasoline or gasoline-oxygenate blend that contains a "lead substitute."

~~1.31.~~**1.33. Leaded.** - Means, for labeling purposes, any gasoline or gasoline-oxygenate blend which contains more than 0.013 gram of lead per liter (0.05 g lead per U.S. gal). NOTE: EPA defines leaded fuel as one which contains more than 0.0013 gram of phosphorus per liter (0.005 g per U.S. gal), or any fuel to which lead or phosphorus is intentionally added.

~~1.32.~~**1.34. Liquefied Natural Gas (LNG).** - Means natural gas that has been liquefied at -126.1 °C (-259 °F) and stored in insulated cryogenic tanks for use as an engine fuel.

~~1.33.~~**1.35. Liquefied Petroleum Gas (LPG).** - Means a mixture of normally gaseous hydrocarbons, predominantly propane, or butane, or both, that has been liquefied by compression or cooling, or both to facilitate storage, transport, and handling.

~~1.34.~~**1.36. Low Sulfur.** - Means low sulfur diesel fuel that meets ASTM D 975 (e.g., Grade Low Sulfur No. 1-D or Grade Low Sulfur No. 2-D) standards. Diesel fuel containing higher amounts of sulfur for off-road use is defined by EPA regulations.

~~1.35.~~**1.37. Low Temperature Operability.** - Means a condition which allows the uninterrupted operation of a diesel engine through the continuous flow of fuel throughout its fuel delivery system at low temperatures. Fuels with adequate low temperature operability characteristics have the ability to avoid wax precipitation and clogging in fuel filters.
(Added 1998)(Amended 1999)

~~1.36.~~**1.38. M100 Fuel Methanol.** - Means nominally anhydrous methyl alcohol, generally containing small amounts of additives, suitable for use as a fuel in a compression-ignition internal combustion engine.

~~1.37.~~**1.39. M85 Fuel Methanol.** - Means a blend of methanol and hydrocarbons of which the methanol portion is nominally 70 to 85 volume percent.

~~1.38.~~**1.40. Motor Octane Number.** - Means a numerical indication of a spark-ignition engine fuel's resistance to knock obtained by comparison with reference fuels in a standardized ASTM D 2700 Motor Method engine test.

**1.41. Motor Oil . - is an oil that reduces friction and wear between the moving parts within a reciprocating internal combustion engine and also serves as a coolant. For the purposes of this regulation, "vehicle motor oil" refers to a motor oil which is intended for use in light-to-heavy duty vehicles comprising cars, sport utility vehicles, vans, trucks, buses, and off-road farming and construction equipment. For the purposes of this regulation, "recreational motor oil" refers to a motor oil which is intended for use in four-stroke cycle engines used in motorcycles, ATVs, and lawn and garden equipment. For the purposes of this regulation motor oil also means engine oil.**

**1.42. Oil. - Means motor oil, engine oil, and/or gear oil.**

~~1.39.~~**1.43. Oxygen Content of Gasoline.** - Means the percentage of oxygen by mass contained in a gasoline.

~~1.40.~~**1.44. Oxygenate.** - Means an oxygen-containing, ashless, organic compound, such as an alcohol or ether, which can be used as a fuel or fuel supplement.

~~1.41.~~**1.45. Reformulated Gasoline.** - Means a volatile mixture of liquid hydrocarbons and oxygenates meeting the reformulated gasoline requirements of the Clean Air Act Amendments of 1990 and suitable for use as a fuel in a spark-ignition internal combustion engine.

~~1.42.~~**1.46. Research Octane Number.** - Means a numerical indication of a spark-ignition engine fuel's resistance to knock obtained by comparison with reference fuels in a standardized ASTM D 2699 Research Method Engine Test.

~~1.43.~~**1.47. SAE.** - Means the Society of Automotive Engineers **International**, a technical organization for engineers, scientists, technicians, and others in positions that cooperate closely in the engineering, design, manufacture, use, and maintainability of self-propelled vehicles.

~~1.44.~~**1.48. Substantially Similar.** - Means the EPA's "Substantially Similar" rule, Section 211 (f) (1) of the Clean Air Act [42 U.S.C. 7545 (f) (1)].

~~1.45.~~**1.49. Thermal Stability.** - Means the ability of a fuel to resist the thermal stress which is experienced by the fuel when exposed to high temperatures in a fuel delivery system. Such stress can lead to formation of insoluble gums or organic particulates. Insolubles (e.g., gums or organic particulates) can clog fuel filters and contribute to injector deposits.
(Added 1998)(Amended 1999)

~~1.46.~~**1.50. Total Alcohol.** - Means the aggregate total in volume percent of all alcohol contained in any fuel defined in this Chapter.

~~1.47.~~**1.51. Total Oxygenate.** - Means the aggregate total in volume percent of all oxygenates contained in any fuel defined in this Chapter.

~~1.48.~~**1.52. Unleaded.** - In conjunction with "engine fuel" or "gasoline" means any gasoline or gasoline-oxygenate blend to which no lead or phosphorus compounds have been intentionally added and which contains not more than 0.013 gram of lead per liter (0.05 g lead per U.S. gal) and not more than 0.0013 gram of phosphorus per liter (0.005 g phosphorus per U.S. gal).

~~1.49.~~**1.53. Wholesale Purchaser Consumer.** - Means any person who is an ultimate gasoline consumer of fuel methanol, fuel ethanol, diesel fuel, biodiesel, fuel oil, kerosene, aviation turbine fuels, natural gas, compressed natural gas, or liquefied petroleum gas and who purchases or obtains the product from a supplier and receives delivery of that product into a storage tank.
(Added 1998)(Amended 1999)

## 2. Standard ~~Fuel~~ Specifications

**2.1. Gasoline and Gasoline-Oxygenate Blends** (as defined in this regulation) shall meet the following requirements:

**2.1.1.** The most recent version of ASTM D 4814, "Standard Specification for Automotive Spark-Ignition Engine Fuel," except that volatility standards for unleaded gasoline blended with ethanol shall not be more restrictive than those adopted under the rules, regulations, and Clean Air Act waivers of the U.S. Environmental Protection Agency (which includes rules promulgated by the State). Gasoline blended with ethanol shall be blended under any of the following three options:

**2.1.1.1.** The base gasoline used in such blends shall meet the requirements of ASTM D 4814, or

**2.1.1.2.** The blend shall meet the requirements of ASTM D 4814, or

**2.1.1.3.** The base gasoline used in such blends shall meet all the requirements of ASTM D 4814 except distillation, and the blend shall meet the distillation requirements of the ASTM specification.

**2.1.2.** Blends of gasoline and ethanol shall not exceed the ASTM D 4814 vapor pressure standard by more than 1.0 psi.

**2.1.3. Minimum Antiknock Index (AKI).** - The AKI shall not be less than the AKI posted on the product dispenser or as certified on the invoice, bill of lading, shipping paper, or other documentation;

**2.1.4. Minimum Motor Octane Number.** - The minimum motor octane number shall not be less than 82 for gasoline with an AKI of 87 or greater;

**2.1.5. Minimum Lead Content to Be Termed "Leaded".** - Gasoline and gasoline-oxygenate blends sold as "leaded" shall contain a minimum of 0.013 gram of lead per liter (0.05 g per U.S. gal);

**2.1.6. Lead Substitute Gasoline.** - Gasoline and gasoline-oxygenate blends sold as "lead substitute" gasoline shall contain a lead substitute which provides protection against exhaust valve seat recession equivalent to at least 0.026 gram of lead per liter (0.10 g per U.S. gal).

**2.1.6.1. Documentation of Exhaust Valve Seat Protection.** - Upon the request of the director, the lead substitute additive manufacturer shall provide documentation to the director that demonstrates that the treatment

level recommended by the additive manufacturer provides protection against exhaust valve seat recession equivalent to or better than 0.026 gram per liter (0.1 g/gal) lead. The director may review the documentation and approve the lead substitute additive before such additive is blended into gasoline. This documentation shall consist of:

**2.1.6.1.1.** Test results as published in the Federal Register by the EPA Administrator as required in Section 211(f)(2) of the Clean Air Act; or

**2.1.6.1.2.** Until such time as the EPA Administrator develops and publishes a test procedure to determine the additive's effectiveness in reducing valve seat wear, test results and description of the test procedures used in comparing the effectiveness of 0.026 gram per liter lead and the recommended treatment level of the lead substitute additive shall be provided.

**2.1.7. Blending.** - Leaded, lead substitute, and unleaded gasoline-oxygenate blends shall be blended according to the EPA "substantially similar" rule or an EPA waiver for unleaded fuel.

**2.2. Diesel Fuel** shall meet the most recent version of ASTM D 975, "Standard Specification for Diesel Fuel Oils."

**2.2.1. Premium Diesel Fuel.** - Effective January 1, 2000, all products identified on retail dispensers, bills of lading, invoices, shipping papers, or other documentation such as premium, super, supreme, plus, or premier must conform to at least two of the following requirements:

**(a) Energy Content.** - A minimum energy content of 38.65 MJ/L, gross (138,700 BTU/gallon, gross) as measured by ASTM Standard Test Method D 240.

**(b) Cetane Number.** - A minimum cetane number of 47.0 as determined by ASTM Standard Test Method D 613.

**(c) Low Temperature Operability.** - A cold flow performance measurement which meets the ASTM D 975 tenth percentile minimum ambient air temperature charts and maps by either ASTM Standard Test Method D 2500 (Cloud Point) or ASTM Standard Test Method D 4539 (Low Temperature Flow Test, LTFT). Low temperature operability is only applicable October 1 - March 31 of each year.

**(d) Thermal Stability.** - A minimum reflectance measurement of 80 % using a green filter in the Octel America's Test Method No. F21-61 (180 minutes, 150 °C).

**(e) Fuel Injector Cleanliness.** - A Coordinating Research Council (CRC) rating of 10.0 or less and a flow loss of 6.0 % or less as determined by the Cummins L-10 Injector Depositing Test.

1. When a fuel uses a detergent additive to meet the requirement, upon the request of the Director, the fuel marketer shall provide test data indicating the additive being used has passed the Cummins L-10 Injector Depositing Test requirements when combined with Caterpillar 1-K (CAT 1-K) reference fuel. The Director may also request records or otherwise audit the amount of additive being used to ensure proper treatment of fuels according to the additive manufacturer's recommended treat rates.

   1.1. Upon the request of the Director, the fuel marketer shall provide an official "Certificate of Analysis" of the physical properties of the additive.

   1.2. Upon the request of the Director, the fuel supplier shall provide a sample of detergent additive in an amount sufficient to be tested with CAT 1-K reference fuel in a Cummins L-10 Injector Depositing Test. The regulatory agency requesting the sample shall be responsible for all costs of testing.

2. When a fuel marketer relies on the inherent cleanliness of the diesel fuel to pass the Cummins L-10 Injector Depositing Test or if the fuel requires a lower detergent additive level than the amount required when the additive is used with the CAT 1-K reference fuel, the fuel marketer shall provide, upon the request of the Director, annual test results from an independent laboratory that confirms the fuel meets the requirements of 2.2.1. (e). The time of fuel sampling and testing shall be at the Directors discretion. The Director may witness the sampling of the fuel and the sealing of the sample container(s) with

security seals. The Director may request confirmation from the testing laboratory that the seals were intact upon receipt by the laboratory. The final test results shall be provided to the Director. All costs for sampling, transporting, and testing shall be the responsibility of the fuel supplier. If the annual test complies, any additional testing at the request of the Director shall be paid for by the regulatory agency.
(Added 1998) (Amended 1999)

**2.3. Aviation Turbine Fuels** shall meet the most recent version of ASTM D 1655, "Standard Specification for Aviation Turbine Fuels."

**2.4. Aviation Gasoline** shall meet the most recent version of ASTM D 910, "Standard Specification for Aviation Gasoline."

**2.5. Fuel Oils** shall meet the most recent version of ASTM D 396, "Standard Specification for Fuel Oils."

**2.6. Kerosene (Kerosine)** shall meet the most recent version of ASTM D 3699, "Standard Specification for Kerosene."

**2.7. Ethanol** intended for blending with gasoline shall meet the most recent version of ASTM D 4806, "Standard Specification for Denatured Fuel Ethanol for Blending with Gasolines for Use as Automotive Spark-Ignition Engine Fuel."

**2.8. Liquefied Petroleum (LP) Gases** shall meet ASTM D 1835, "Standard Specification for Liquefied Petroleum (LP) Gases."
**Note:** Also reference Gas Processors Association 2140, "Liquefied Petroleum Gas Specification and Test Methods."

**2.9. Compressed Natural Gas (CNG)** shall meet the most recent version of SAE J 1616, "Recommended Practice for Compressed Natural Gas Vehicle Fuel."

**2.10. E85 Fuel Ethanol** shall meet the most recent version of ASTM D 5798, "Standard Specification for Fuel Ethanol (Ed75-Ed85) for Automotive Spark-Ignition Engines."
(Added 1997)

**2.11. M85 Fuel Methanol.** shall meet the most recent version of ASTM D 5797, "Standard Specification for Fuel Methanol M70-M85 for Automotive Spark Ignition Engines."
(Added 1997)

**2.12. Vehicle Motor. - Oil shall not be sold or distributed for use unless the product conforms to the following specifications:**

**(a)** ~~It shall meet at least one of the engine oil service categories established in the latest version of SAE J183 or API Publication 1509 *Engine Oil Licensing and Certification* System~~ **Performance claims listed on the label shall be evaluated against SAE J183, API 1509 Engine Oil Licensing and Certification System or other industry standards as applicable.**

**(b) It shall meet its labeled viscosity grade classification as specified in the latest published version of SAE J300.**

**(c) Any engine oil that is represented as "energy conserving" shall meet the requirements established by the latest revision of SAE J1423.**

**2.13. PRODUCTS FOR USE IN LUBRICATING MANUAL TRANSMISSIONS, GEARS OR AXLES shall not be sold or distributed for use in lubricating manual transmissions, gears, or axles unless the product conforms to the following specifications:**

**(a) It is labeled with one or more of the service designations found in the latest revision of the SAE Information Report on axle and manual transmission lubricants SAE J308 and API Publication 1560 and meets all applicable requirements of those designations.**

**(b) The product shall meet its labeled viscosity grade classification as specified in the latest published version of SAE J306.**

**(c) It shall be free from water and suspended matter when tested by means of centrifuge, in accordance with the standard test ASTM D-2273.**

**2.14. Products For Use In Lubricating Automatic Transmissions. - Any automatic transmission fluid sold without limitation as to type of transmission for which it is intended, shall meet all automotive manufacturers' recommended requirements for transmissions in general use in the state. Automatic transmission fluids that are intended for use only in certain transmissions, as disclosed on the label of its container, shall meet the latest automotive manufacturers' recommended requirements for those transmissions. Adherence to automotive manufacturers recommended requirements shall be based on tests currently available to the lubricants industry and the state regulatory agency.**

**Any material offered for sale or sold as an additive to automatic transmission fluids shall be compatible with the automatic transmission fluid to which it is added** ~~and the resulting mixture shall not fall below the minimum specifications for automatic transmission fluids, as established by the director.~~ **and shall meet all performance claims as stated on the label. Any manufacturer of any such product sold in this state shall provide, upon request by a duly authorized representative of the Director, documentation of any claims made on their product label.**

## Section 3. Classification and Method of Sale of Petroleum Products

### 3.1. General Considerations.

**3.1.1. Documentation.** - When gasoline; gasoline-oxygenate blends; reformulated gasoline; M85 and M100 fuel methanol; E85 and E100 fuel ethanol; liquefied petroleum (LP) gases; compressed natural gas; liquefied natural gas; biodiesel; diesel fuel; kerosene; aviation gasoline; aviation turbine fuels; or, fuel oils are sold, an invoice, bill of lading, shipping paper or other documentation, must accompany each delivery other than a retail sale. This document must identify the quantity, the name of the product, the particular grade of the product, the applicable automotive fuel rating, and oxygenate type and content (if applicable), the name and address of the seller and buyer, and the date and time of the sale. Documentation must be retained at the retail establishment for a period not less than 1 year.

**3.1.2. Retail Dispenser Labeling.** - All retail dispensing devices must identify conspicuously the type of product, the particular grade of the product, and the applicable automotive fuel rating.

**3.1.3. Grade Name.** - The sale of any product under any grade name that indicates to the purchaser that it is of a certain automotive fuel rating or ASTM grade shall not be permitted unless the automotive fuel rating or grade indicated in the grade name is consistent with the value and meets the requirements of Section 2, Standard Fuel Specifications.

### 3.2. Automotive Gasoline and Automotive Gasoline-Oxygenate Blends.

**3.2.1. Posting of Antiknock Index Required.** - All automotive gasoline and automotive gasoline-oxygenate blends shall post the antiknock index in accordance with applicable regulations, 16 CFR Part 306 issued pursuant to the Petroleum Marketing Practices Act, as amended.

**3.2.2. When the Term "Leaded" May Be Used.** - The term "leaded" shall only be used when the fuel meets specification requirements of paragraph 2.1.5.

**3.2.3. Use of Lead Substitute Must Be Disclosed.** - Each dispensing device from which gasoline or gasoline oxygenate blend containing a lead substitute is dispensed shall display the following legend: "Contains Lead Substitute." The lettering of this legend shall not be less than 12.7 mm (1/2 in) in height and the color of the lettering shall be in definite contrast to the background color to which it is applied.

**3.2.4. Nozzle Requirements for Leaded Fuel.** - Each dispensing device from which gasoline or gasoline-oxygenate blends that contains lead in amounts sufficient to be considered "leaded" gasoline, or lead substitute engine fuel, is sold shall be equipped with a nozzle spout having a terminal end with an outside diameter of not less than 23.63 mm (0.930 in).

**3.2.5. Prohibition of Terms.** - It is prohibited to use specific terms to describe a grade of gasoline or gasoline-oxygenate blend unless it meets the minimum antiknock index requirement shown in Table 1.

**3.2.6. Method of Retail Sale.** - **Type of Oxygenate Must be Disclosed.** - All automotive gasoline or automotive gasoline-oxygenate blends kept, offered, or exposed for sale, or sold, at retail containing at least 1.5 mass percent oxygen shall be identified as "with" or "containing" (or similar wording) the predominant oxygenate in the engine fuel. For example, the label may read "contains ethanol" or "with MTBE." The oxygenate contributing the largest mass percent oxygen to the blend shall be considered the predominant oxygenate. Where mixtures of only ethers are present, the retailer may post the predominant oxygenate followed by the phrase "or other ethers" or alternatively post the phrase "contains MTBE or other ethers." In addition, gasoline-methanol blend fuels containing more than 0.15 mass percent oxygen from methanol shall be identified as "with" or "containing" methanol. This information shall be posted on the upper 50 % of the dispenser front panel in a position clear and conspicuous from the driver's position in a type at least 12.7 mm (1/2 in) in height, 1.5 mm (1/16 in) stroke (width of type).
(Amended 1996)

**3.2.7. Documentation for Dispenser Labeling Purposes.** - The retailer shall be provided, at the time of delivery of the fuel, on an invoice, bill of lading, shipping paper, or other documentation, a declaration of the predominant oxygenate or combination of oxygenates present in concentrations sufficient to yield an oxygen content of at least 1.5 mass percent in the fuel. Where mixtures of only ethers are present, the fuel supplier may identify either the predominant oxygenate in the fuel (i.e., the oxygenate contributing the largest mass percent oxygen) or, alternatively, use the phrase "contains MTBE or other ethers." In addition, any gasoline containing more than 0.15 mass percent oxygen from methanol shall be identified as "with" or "containing" methanol. This documentation is only for dispenser labeling purposes; it is the responsibility of any potential blender to determine the total oxygen content of the engine fuel before blending.
(Amended 1996)

**3.3. Diesel Fuel.**

**3.3.1. Labeling of Grade Required.** - Diesel Fuel shall be identified by grades No. 1-D, No. 1-D (low sulfur), No. 2-D, No. 2-D (low sulfur), or No. 4-D. Each retail dispenser of diesel fuel shall be labeled according to the grade being dispensed except the words "low sulfur" are not required.

**3.3.2. Location of Label.** - These labels shall be located on the upper 50 % of the dispenser front panel in a position clear and conspicuous from the drivers position, in a type at least 12.7 mm (1/2 in) in height, 1.5 mm (1/16 in) stroke (width of type).

**3.3.3. Labeling Properties of Premium Diesel.** - All retail dispensers identified, as premium diesel must display either:

1. A label that includes all qualifying parameters as specified in 2.2.1. Premium Diesel Fuel affixed to each retail dispenser. The label shall include a series of check blocks clearly associated with each parameter. The boxes for the parameters qualifying the fuel must be checked. All other boxes shall remain unchecked. The marketer may check as many blocks as apply, or,

2. A label that includes only the parameters selected by a marketer to meet the premium diesel requirements as specified in 2.2.1. Premium Diesel Fuel. In either case, the label must display the following words:

- "Premium Diesel Fuel" in a type at least 12.7 mm (1/2 in) in height by 1.5 mm (1/16 in) stroke (width of type).

When applicable, as determined by the label option and qualifying parameters chosen by the marketer, the label must also display the following information and letter type size:

- The words "Energy Content," "Cetane Number," "Low Temperature Operability," "Thermal Stability," and "Fuel Injector Cleanliness" in a type at least 6 mm (1/4 in) in height by 0.79 mm (1/32 in) stroke (width of type).

- A declaration of the minimum Energy Content (minimum 38.65 MJ/L gross [138,700 BTU/gallon]), if energy content is chosen as a qualifying parameter, in type at least 3 mm (1/8 in) in height by 0.4 mm (1/64 in) stroke (width of type).

- The minimum cetane number guaranteed (at least 47.0) if cetane number is chosen as a qualifying parameter, in a type at least 3 mm (1/8 in) in height by 0.4 mm (1/64 in) stroke (width of type).

- The date range of low temperature operability enhancement, (e.g., October - March) along with the qualifying test method (ASTM D 4539 or ASTM D 2500), if low temperature operability is chosen as a qualifying parameter, in a type at least 3 mm (1/8 in) in height by 0.4 mm (1/64 in) stroke (width of type).

**Table 1. Minimum Antiknock Index Requirements**

| Term | Minimum Antiknock Index | |
|---|---|---|
| | ASTM D 4814 Altitude Reduction Areas IV and V | All Other ASTM D 4814 Areas |
| **Premium, Super, Supreme, High Test** | **90** | **91** |
| **Midgrade, Plus** | **87** | **89** |
| **Regular Leaded** | **86** | **88** |
| **Regular, Unleaded (alone)** | **85** | **87** |
| **Economy** | **—** | **86** |

**(Table Amended 1997)**

For example:

| **Premium Diesel Fuel** | |
|---|---|
| High Energy Content | ☐ |
| Cetane Number, 47.0 min | ☐ |
| Low Temperature Operability (Oct.-Mar.,LTFT) | ☐ |
| Thermal Stability | ☐ |
| Fuel Injector Cleanliness | ☐ |

Or

| **Premium Diesel Fuel** | |
|---|---|
| Cetane Number, 47.0 min | ☐ |
| Low Temperature Operability (Oct.-Mar., LTFT) | ☐ |
| Thermal Stability | ☐ |

- The label must be conspicuously displayed on the upper-half of the product dispenser front panel in a position that is clear and conspicuous from the drivers position.
  (Added 1998) (Amended 1999)

**3.3.4. Delivery Documentation. -** Before or at the time of delivery of premium diesel fuel, the retailer or the wholesale purchaser-consumer shall be provided on an invoice, bill of lading, shipping paper, or other documentation, a declaration of all performance properties that qualifies the fuel as premium diesel fuel as required in 2.2.1.
(Added 1998) (Amended 1999)

**3.4. Aviation Turbine Fuels.**

**3.4.1. Labeling of Grade Required.** - Aviation turbine fuels shall be identified by Jet A, Jet A-1, or Jet B.

**3.4.2. NFPA Labeling Requirements Also Apply.** - Each dispenser or airport fuel truck dispensing aviation turbine fuels shall be labeled in accordance with the most recent edition of National Fire Protection Association NFPA 407, "Standard for Aircraft Fuel Servicing." NFPA 407, 1990 Edition: Section 2-3.18 Product Identification Signs. Each aircraft fuel servicing vehicle shall have a sign on each side and the rear to indicate the product. The sign shall have letters at least 3 in (75 mm) high of color sharply contrasting with its background for visibility. It shall show the word "FLAMMABLE" and the name of the product carried, such as "JET A," "JET B," "GASOLINE," or "AVGAS." (**Note**: Refer to the most recent edition.)

**3.5. Aviation Gasoline.**

**3.5.1. Labeling of Grade Required.** - Aviation gasoline shall be identified by Grade 80, Grade 100, or Grade 100LL.

**3.5.2. NFPA Labeling Requirements Also Apply.** - Each dispenser or airport fuel truck dispensing aviation gasoline shall be labeled in accordance with the most recent edition of National Fire Protection Association (NFPA) 407, "Standard for Aircraft Fuel Servicing."

NFPA 407, 1990 Edition: Section 2-3.18 Product Identification Signs. Each aircraft fuel servicing vehicle shall have a sign on each side and the rear to indicate the product. The sign shall have letters at least 3 in (75 mm) high of color sharply contrasting with its background for visibility. It shall show the word "FLAMMABLE" and the name of the product carried, such as "JET A," "JET B," "GASOLINE," or "AVGAS." (NOTE: Refer to the most recent edition.)

**3.6. Fuel Oils.**

**3.6.1. Labeling of Grade Required.** - Fuel Oil shall be identified by the grades of No. 1, No. 2, No. 4 (Light), No. 4, No. 5 (Light), No. 5 (Heavy), or No. 6.

**3.7. Kerosene (Kerosine).**

**3.7.1. Labeling of Grade Required.** - Kerosene shall be identified by the grades No. 1-K or No. 2-K.

**3.7.2. Additional Labeling Requirements.** - Each retail dispenser of kerosene shall be labeled as 1-K Kerosene or 2-K. In addition, No. 2-K dispensers shall display the following legend:

**3.7.2.1.** "Warning - Not Suitable For Use In Unvented Heaters Requiring No. 1-K."

**3.7.2.2.** The lettering of this legend shall not be less than 12.7 mm (1/16 in) in height by 1.5 mm (1/16 in) strokes; block style letters and the color of lettering shall be in definite contrast to the background color to which it is applied.

**3.8. Fuel Ethanol.**

**3.8.1. How to Identify Fuel Ethanol.** - Fuel ethanol shall be identified by the capital letter E followed by the numerical value volume percentage. (Example: E85)

**3.8.2. Retail Dispenser Labeling.** - Each retail dispenser of fuel ethanol shall be labeled with the capital letter E followed by the numerical value volume percent denatured ethanol and ending with the word "ethanol." (Example: E85 Ethanol)

**3.8.3. Additional Labeling Requirements.** - Fuel ethanol shall be labeled with its automotive fuel rating in accordance with 16 CFR Part 306.

**3.9. Fuel Methanol.**

**3.9.1. How Fuel Methanol is to Be Identified.** - Fuel methanol shall be identified by the capital letter M followed by the numerical value volume percentage of methanol. (Example: M85)

**3.9.2. Retail Dispenser Labeling.** - Each retail dispenser of fuel methanol shall be labeled by the capital letter M followed by the numerical value volume percent and ending with the word "methanol." (Example: M85 Methanol)

**3.9.3. Additional Labeling Requirements.** - Fuel methanol shall be labeled with its automotive fuel rating in accordance with 16 CFR Part 306.

**3.10. Liquefied Petroleum (LP) Gas.**

**3.10.1. How LPG is to Be Identified.** - Liquefied petroleum gases shall be identified by grades Commercial Propane, Commercial Butane, Commercial PB Mixtures or Special-Duty Propane (HD5).

**3.10.2. Retail Dispenser Labeling.** - Each retail dispenser of liquefied Petroleum gases shall be labeled as "Commercial Propane," "Commercial Butane," "Commercial PB Mixtures," or "Special-Duty Propane (HD5)."

**3.10.3. Additional Labeling Requirements.** - Liquefied Petroleum Gas shall be labeled with its automotive fuel rating in accordance with 16 CFR Part 306.

**3.10.4.** NFPA Labeling Requirements also apply. (Refer to the most recent edition of NFPA 58.)

**3.11. Compressed Natural Gas.**

**3.11.1. How Compressed Natural Gas Is to Be Identified.** - For the purposes of this regulation, compressed natural gas shall be identified by the term "Compressed Natural Gas" or "CNG."

**3.11.2. Retail Sales of Compressed Natural Gas Sold as a Vehicle Fuel.**

**3.11.2.1. Method of Retail Sale.** - All compressed natural gas kept, offered, or exposed for sale and sold at retail as a vehicle fuel shall be in terms of the gasoline liter equivalent (GLE) or gasoline gallon equivalent (GGE).

**3.11.2.2. Retail Dispenser Labeling**.

**3.11.2.2.1. Identification of Product.** - Each retail dispenser of compressed natural gas shall be labeled as "Compressed Natural Gas."

**3.11.2.2.2. Conversion Factor.** - All retail compressed natural gas dispensers shall be labeled with the conversion factor in terms of kilograms or pounds. The label shall be permanently and conspicuously displayed on the face of the dispenser and shall have either the statement "1 Gasoline Liter Equivalent (GLE) is equal to 0.678 kg of Natural Gas" or "1 Gasoline Gallon Equivalent (GGE) is equal to 5.660 lb of Natural Gas" consistent with the method of sale used.

**3.11.2.2.3. Pressure.** - CNG is dispensed into vehicle fuel containers with working pressures of 16 574 kPa, 20 684 kPa, or 24 821 kPa. The dispenser shall be labeled 16 574 kPa, 20 684 kPa, or 24 821 kPa corresponding to the pressure of the CNG dispensed by each fueling hose.

**3.11.2.2.4. NFPA Labeling.** - NFPA Labeling requirements also apply. (Refer to NFPA 52.)

**3.11.3. Nozzle Requirements for CNG.** - CNG fueling nozzles shall comply with ANSI/AGA/CGA NGV 1.

**3.12. Liquefied Natural Gas.**

**3.12.1. How Liquefied Natural Gas Is to Be Identified.** - For the purposes of this regulation, liquefied natural gas shall be identified by the term "Liquefied Natural Gas" or "LNG."

**3.12.2. Labeling of Retail Dispensers of Liquefied Natural Gas Sold as a Vehicle Fuel.**

**3.12.2.1. Identification of Product.** - Each retail dispenser of liquefied natural gas shall be labeled as "Liquefied Natural Gas."

**3.12.2.2. Automotive Fuel Rating.** - LNG automotive fuel shall be labeled with its automotive fuel rating in accordance with 16 CFR Part 306.

**3.12.2.3. NFPA Labeling.** - NFPA Labeling requirements also apply. (Refer to NFPA 57.)

**3.13. Oil. - Each label for recreational motor oil and vehicle motor oil shall contain the viscosity grade classification preceded by the letters "SAE" in accordance with the SAE International's latest version of SAE J300 and its intended use.**

**Each label for gear oil shall contain the viscosity grade classification preceded by the letters "SAE" in accordance with the SAE International's latest version of SAE J306 or SAE J300.**

**(Exception: Some automotive equipment manufacturers may not necessarily specify an "SAE" viscosity grade requirement for some applications. Gear oils intended to be used only in such application are not required to contain an "SAE Viscosity Grade" on their labels.)**

**The label on each container of vehicle motor oil shall contain the engine service categories met in letters not less than one-eighth inch (3.18 mm) in height, as defined by the latest version of SAE J183 or API Publication 1509, Engine Oil Licensing and Certification System.**

**The label of each container of gear oil shall contain the service categories met in letters not less than one-eighth inch (3.18 mm) in height, as defined by the latest version of SAE J308.**

**Each container of engine vehicle motor oil with a volume of one gallon or less that does not meet an active service category, as defined by the latest version of SAE J183, shall bear a plainly visible cautionary statement in compliance with SAE J183, Appendix A, for obsolete API oil categories.**

**3.14. Automatic Transmission Fluid - Automatic transmission fluid shall be deemed to be mislabeled if any of the following occurs:**

**(a) The container does not bear a label on which is printed the brand name, the name and place of business of the manufacturer, packer, seller, or distributor, the words "Automatic Transmission Fluid", and the duty type classification.**

**(b) The container does not bear a label on which is printed an accurate statement of the quantity of the contents in terms of liquid measure.**

**(c) The labeling on the container is false or misleading.**

**3.14.1. DOCUMENTATION OF CLAIMS MADE UPON PRODUCTS' LABEL - Any manufacturer or packager of any product subject to this article and sold in this State shall provide, upon request to duly authorized representatives of the director, documentation of any claim made upon their products' label.**

## Section 4. Retail Storage Tanks

**4.1. Water in Gasoline-Alcohol Blends, Aviation Gas, and Aviation Turbine Fuel.** - No water phase greater than 6 mm (1/4 in) as determined by an appropriate detection paste, is allowed to accumulate in any tank utilized in the storage of gasoline-alcohol blend, aviation gasoline, and aviation turbine fuel.

**4.2. Water in Gasoline, Diesel, Gasoline-Ether, and Other Fuels.** - Water shall not exceed 50 mm (2 in) in depth when measured with water indicating paste in any tank utilized in the storage of biodiesel, diesel, gasoline, gasoline-ether blends, and kerosene sold at retail except as required in section 4.1.

**4.3. Product Storage Identification.**

**4.3.1. Fill Connection Labeling.** - The fill connection for any petroleum product storage tank or vessel supplying engine-fuel devices shall be permanently, plainly, and visibly marked as to the product contained.

**4.3.2. Declaration of Meaning of Color Code.** - When the fill connection device is marked by means of a color code, the color code shall be conspicuously displayed at the place of business.

**4.4. Volume of Product Information.** - Each retail location shall maintain on file a calibration chart or other means of determining the volume of each regulated product in each storage tank and the total capacity of such storage tank(s). This information shall be supplied immediately to the Director.

## Section 5. Condemned Product

**5.1. Stop Sale Order at Retail**. - A stop sale order may be issued to retail establishment dealers for fuels failing to meet specifications or when a condition exists that causes product degradation. A release from a Stop Sale order will be awarded only after final disposition has been agreed upon by the director. Confirmation of disposition shall be submitted in writing on form(s) provided by the Director and contain an explanation for the fuels' failure to meet specifications. Upon discovery of fuels failing to meet specifications, meter readings and physical inventory shall be taken and reported in confirmation for disposition. Specific variations or exemptions may be made for fuels designed for special equipment or services and for which it can be demonstrated that the distribution will be restricted to those uses.

**5.2. Stop Sale Order at Terminal or Bulk Plant Facility.** - A stop sale order may be issued when products maintained at terminals or bulk plant facilities fail to meet specifications or when a condition exists that may cause product degradation. The terminal or bulk storage plant shall immediately notify all customers that received those product(s) and make any arrangements necessary to replace or adjust to specifications those product(s). A release from a Stop Sale order will be awarded only after final disposition has been agreed upon by the Director. Confirmation of disposition of

products shall be made available in writing to the Director. Specific variations or exemptions may be made for fuels used for blending purposes or designed for special equipment or services and for which it can be demonstrated that the distribution will be restricted to those uses.

## Section 6. Product Registration

**6.1. Engine Fuels Designed for Special Use.** - All engine fuels designed for special use that do not meet ASTM specifications or standards addressed in Section 2 shall be registered with the director on forms prescribed by the director 30 days prior to when the registrant wishes to engage in sales. The registration form shall include all of the following information:

**6.1.1.** Business name and address(es).

**6.1.2.** Mailing address if different than business address.

**6.1.3.** Type of ownership of the distributor or retail dealer, such as an individual, partnership, association, trust, corporation, or any other legal entity or combination thereof.

**6.1.4.** An authorized signature, title, and date for each registration.

**6.1.5.** Product brand name and product description.

**6.1.6.** A product specification sheet shall be attached.

**6.2.** Registration is subject to annual renewal.

**6.3.** Re-registration is required 30 days prior to any changes in Section 6.1.

**6.4.** The director may decline to register any product which actually or by implication would deceive or tend to deceive a purchaser as to the identity or the quality of the engine fuel.

**6.5.** The registration is not transferable.

## Section 7. Test Methods and Reproducibility Limits

**7.1.** ASTM Standard Test Methods referenced for use within the applicable Standard Specification shall be used to determine the specification values for enforcement purposes.

**7.1.1. Premium Diesel. -** The following test methods shall be used to determine compliance with the applicable premium diesel parameters:

(a) Energy Content - ASTM D 240

(b) Cetane Number - ASTM D 613

(c) Low Temperature Operability - ASTM D 4539 or ASTM D 2500 (according to marketing claim)

(d) Thermal Stability - ~~Octel America F21-61 (180 minutes, 150 EC)~~ **ASTM D 6468.**

(e) *Fuel Injector Cleanliness. - The most recent edition of the Cummins L-10 Injector Depositing Test as endorsed by the ASTM L-10 Injector Depositing Test Surveillance Panel.

*Upon ASTM approval of a standard test method~~s~~ that ~~are~~ **is** derived from the above referenced method~~s~~, the ASTM standard test method~~s~~ shall be used to determine compliance with the applicable premium diesel parameter.
(Amended 1999)

**7.2. Reproducibility Limits.**

**7.2.1. AKI Limits.** - When determining the antiknock index (AKI) acceptance or rejection of a gasoline sample, the AKI reproducibility limits as outlined in ASTM D 4814 Appendix X1 shall be acknowledged for enforcement purposes.

**7.2.2. Reproducibility.** - The reproducibility limits of the ASTM standard test method used for each test performed shall be acknowledged for enforcement purposes, except as indicated in 7.2.1.

**7.2.3. Dispute Resolution. -** In the event of a dispute over a reported test value, the guidelines presented in the most recent version of ASTM D 3244, "Standard Practice for Utilization of Test Data to Determine Conformance with Specifications," shall be used to determine the acceptance or rejection of the sample.

# Final Report of the Committee on Specifications and Tolerances

Richard Wotthlie, Chairman
Program Manager
Maryland

Reference
Key Number

## 300 Introduction

This is the final report of the Committee on Specifications and Tolerances (S&T Committee) for the 88th Annual Meeting of the National Conference on Weights and Measures (NCWM). The report is based on the 88th Interim Report offered in NCWM Publication 16, "Committee Reports," the Addendum Sheets issued at the Annual Meeting, and actions taken by the membership at the Voting Session of the Annual Meeting.

Table A identifies the agenda items in the report by Reference Key Number, Item Title, and Page Number. The item numbers are those assigned in the Interim Meeting Agenda. Voting items are indicated with a **"V,**" or if the item was part of the consent calendar by the suffix **"VC"** after the item number. Items marked with an **"I"** after the reference key number are information items. Items marked with a **"D"** after the key number are developing issues. The developing designation indicates an item that while it has merit, it may not be adequately developed for action at the national level. Developing items inform parties about issues that are developing in different localities or in the regional associations. A developing item is returned to the submitter to develop further before any action is taken at the national level. The Committee withdrew items marked with a **"W."** Items marked with a **"W"** generally will be referred to the regional weights and measures associations because they either need additional development, analysis, and input, or did not have sufficient Committee support to bring them before the NCWM. Table B lists the Appendices to the report, and Table C provides a summary of the results of the voting on the Committee's items and the report in entirety.

The attached report contains many recommendations to revise or amend National Institute of Standards and Technology (NIST) Handbook 44, 2003 Edition, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices." Proposed revisions to the handbook are shown in **bold face print** by ~~crossing out~~ text to be deleted, and <u>underlining</u> information to be added. Requirements that are proposed to be nonretroactive are printed in italics. Entirely new paragraphs or sections proposed for addition to the handbook are designated as such and shown in **bold face print.**

**Note:** The policy of the National Institute of Standards and Technology is to use metric units of measurement in all of its publications; however, recommendations received by the NCWM technical committees have been printed in this publication as they were submitted and may, therefore, contain references to inch-pound units.

---

## Table A
## Index to Reference Key Items

## Table B
## Appendices

## Table C
## Voting Results

| Reference Key No. | House of State Representatives | | House of Delegates | | Results |
|---|---|---|---|---|---|
| | Yeas | Nays | Yeas | Nays | |
| 300 (Consent Calendar) | All Yeas | No Nays | All Yeas | No Nays | Passed |
| 310-1A | 31 | 1 | 36 | 1 | Passed |
| 320-2 | 30 | 0 | 34 | 0 | Passed |
| 320-10A | 32 | 0 | 37 | 0 | Passed |
| 320-10B | 32 | 0 | 35 | 0 | Passed |
| 320-10C | 32 | 0 | 34 | 0 | Passed |
| 330-5 (Pulled from Consent Calendar) | 29 | 3 | 31 | 5 | Passed |
| 331-1 | 26 | 6 | 29 | 4 | Returned to Committee |
| 336-1 | 32 | 0 | 35 | 0 | Passed |
| 336-2 | 32 | 0 | 36 | 0 | Passed |
| 300 (Report in its Entirety Voice Vote) | All Yeas | No Nays | All Yeas | No Nays | Passed |

**Details of all Items**
(In order by Reference Key Number)

## 310 General Code

### 310-1A V G-S.1. Identification; Not-Built-for-Purpose Software-Based Devices, G-S.1.1. Not Built-for-Purpose Devices; Software-Based, and Appendix D; Definition of Built-for-Purpose Device

(This item was adopted.)

*(During the 2003 NCWM Annual Meeting Item 310-1 was separated into two parts, 310-1A and 310-1B, to allow a vote on the original proposal for Not-Built-for-Purpose Software-Based devices and still provide assurance that the issue of Built-for-Purpose Software-Based devices would be on the agenda next year.)*

**Source:** Carryover Item 310-1. (This item was developed by the National Type Evaluation Technical Committee (NTETC) Measuring Sector and first appeared on the Committee's 2002 agenda.)

**Recommendation:** Modify NIST Handbook 44, General Code G-S.1. Identification (d) and add a new paragraph (e) as follows:

**G-S.1. Identification. - All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification with the following information:**

**(a) the name, initials, or trademark of the manufacturer or distributor;**

**(b) a model designation that positively identifies the pattern or design of the device;**

**(c)** ***the model designation shall be prefaced by the term "Model," "Type," or "Pattern." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod."***
***[Nonretroactive as of January 1, 2003]***
**(Added 2000) (Amended 2001)**

***[Note: Prefix lettering may be initial capitals, all capitals or all lower case.]***

***(d) except for equipment with no moving or electronic component parts and not built-for-purpose, software-based devices, a nonrepetitive serial number;***
***[Nonretroactive as of January 1, 1968]***

***(e) for not built-for-purpose, software-based devices the current software version designation;***

**(f)~~(e)~~ the serial number shall be prefaced by words, an abbreviation, or a symbol that clearly identifies the number as the required serial number; and**
***[Nonretroactive as of January 1, 1986]***

***(g)~~(f)~~ the serial number shall be prefaced by the words "Serial Number" or an abbreviation of that term. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.).***
***[Nonretroactive as of January 1, 2001]***

***(h)~~(g)~~ For devices that have an NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number, the NTEP CC shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).***
***[Nonretroactive as of January 1, 2003]***

**The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.**
**(Amended 1985, 1991, 1999 and 2000)**

Add a new General Code paragraph G-S.1.1. and renumber existing paragraph G-S.1.1. as follows:

***G-S.1.1. Not Built–For–Purpose Devices, Software-Based. - For not built–for–purpose, software-based devices, the following shall apply:***

***(a) the manufacturer or distributor and the model designation shall be continuously displayed or marked on the device (see note below), or***

***(b) the Certificate of Conformance (CC) Number shall be continuously displayed or marked on the device (see note below), or***

***(c) all required information in G-S.1. Identification. (a), (b), (c), (e), and (h) be continuously displayed. Alternatively, a clearly identified "view only" System Identification, G-S.1. Identification, or Weights and Measures Identification shall be accessible through the "Help" menu. Required information includes that information necessary to identify that the software in the device is the same type that was evaluated.***

***Note: Clear instructions for accessing the remaining required G-S.1. information shall be listed on the CC. Required information includes that information necessary to identify that the software in the device is the same type that was evaluated.***
***[Nonretroactive as of January 1, 2004]***

**G-S.1.~~1~~2. Remanufactured Devices and Remanufactured Main Elements. - All remanufactured devices and remanufactured main elements shall be clearly and permanently marked for the purpose of identification with the following information:**

***(a) the name, initials, or trademark of the last remanufacturer or distributor;***

***(b) the remanufacturer's or distributor's model designation if different than the original model designation.***
***[Nonretroactive as of January 1, 2002]***

Add a new definition to Appendix D, Definitions, for "built-for-purpose devices" as follows:

**built-for-purpose device. Any main device or element which was manufactured with the intent that it be used as, or part of, a weighing or measuring device or system.**

**Discussion/Background:** At the 2002 NCWM Interim and Annual Meetings, the S&T Committee reviewed and received comments on two proposals to address marking requirements for software based "Not Built-for-Purpose devices. One proposal was developed and submitted by the NTETC Measuring Sector. The other proposal was developed and submitted by the NTETC Weighing Sector. The Committee asked that the NTETC Measuring and Weighing Sectors review both proposals and attempt to agree on a single proposal that is acceptable to all parties.

At the Fall 2002 NTETC Sector Meetings, the Weighing Sector developed a new proposal based on both of the proposals submitted in 2001. That proposal was forwarded to the NTETC Measuring Sector for review and comment. The Measuring Sector reviewed the proposal developed by the Weighing Sector and concurred with the intent of the proposal. The Measuring Sector recommended some changes to the proposal and agreed to forward it to the NCWM S&T Committee for consideration. The Measuring Sector's modified proposal was also sent to the Weighing Sector members along with a ballot requesting approval of the modifications. The result of the ballot was 9 affirmative votes, 1 negative vote, and 3 abstentions.

At its October 2002 Annual Meeting, the Southern Weights and Measures Association (SWMA) supported the Measuring Sectors revision and encouraged both to support the proposal.

At the 2003 NCWM Interim Meeting, the Committee heard support for the proposal developed by the Measuring Sector at its October 2002 Meeting. The Committee also heard that the proposal should include "Built-for-Purpose" devices. The Committee agreed that for software-based systems the software version number has greater value than a serial number. The Committee also agreed that the word "may" should be removed from the proposed G-S.1.1. (a), (b), and (c). The Committee agreed to continue limiting the proposal to "Not Built-for-Purpose" devices and to present the item for a vote at the 2003 NCWM Annual Meeting.

At the 2003 NCWM Annual Meeting, the Committee reviewed an alternate proposal submitted by the Scale Manufacturers Association (SMA) that was intended to allow the same alternate methods for providing required identification markings for both "Built-for-Purpose" and "Not Built-for-Purpose" devices. The Committee agreed that there appeared to be no opposition to allowing the same alternate methods for providing required identification markings on "Built-for-Purpose" Software-Based Devices as those proposed for "Not Built-for-Purpose" devices. However, the Committee believed that the SMA alternate proposal to include "Built-for-Purpose" devices needed further review and development by the NTETC Weighing and Measuring Sectors and the Regional Associations prior to a vote. The Committee agreed to split the item into two parts and to present item 310-1A for a Vote and to retain Item 310-1B as an information item. The Committee modified the item title to include the words "Not Built-for-Purpose" and made some editorial changes to the proposal to clarify that the alternative methods for meeting marking requirements only apply to "Not Built-for-Purpose" devices at this time. The SMA expressed concern with the non-level playing field that would be created if the proposed alternate methods for meeting marking requirements applied only to "Not Built-for-Purpose" devices; however, splitting the item into two parts to facilitate adding similar requirements for "Built-for-Purpose Software-Based Devices" probably satisfied that concern. The Meter Manufacturers Association (MMA) and one manufacturer of retail motor-fuel dispensers supported the Committee's decision to split the items. A weights and measures official stated that inspectors should be able to easily access the software version number and adoption of this item will facilitate that access.

For more background information, refer to the 2002 S&T Final Report.

**310-1B I G-S.1. Identification; Built-for-Purpose Software-Based Devices, G-S.1.1. Required Information, G-S.1.2. Location of Marking Information for Built-for-Purpose, Software-Based Devices, G-S.1.3. RequiredInformation for Not Built-for-Purpose, Software-Based Devices, and Appendix D; Definition of Not Built-for-Purpose Device**

*(During the 2003 NCWM Annual Meeting Item 310-1 was separated into two parts, 310-1A and 310-1B, to allow a vote on the original proposal for Not Built-for-Purpose Software Based devices and still provide assurance that the issue of Built-for-Purpose Software-Based devices would be on the 2004 agenda.)*

**Discussion:** See the discussion in Item 310-1A above. The Committee agreed to retain Item 310-1B as an information item as follows:

**G-S.1. Identification. – All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification ~~with the following information~~. The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device. (Amended 1985, 1991, 1999 and 2000)**

**G-S.1.1. Required Information. – Equipment utilizing a plate or badge for identification must be permanently marked with the following information:**

**(a) the name, initials, or trademark of the manufacturer or distributor;**

**(b) model designation that positively identifies the pattern or design of the device;**

***(c) the model designation shall be prefaced by the term "Model," "Type," or "Pattern." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the***

***word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod."***
***[Nonretroactive January 1, 2003]***
**(Added 2000) (Amended 2001)**

***[Note: Prefix lettering may be initial capitals, all capitals or all lower case.]***

***(d) except for equipment with no moving or electronic component parts, a nonrepetitive serial number; [Nonretroactive as of January 1, 1968]***

***(e) the serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number; and***
***[Nonretroactive as of January 1, 1986]***

***(f) the serial number shall be prefaced by the words "Serial Number" or an abbreviation of that term. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.)***
***[Nonretroactive as of January 1, 2001]***

***(g) For devices that have an NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number, the NTEP CC shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for theword "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.)***
***[Nonretroactive as of January 1, 2003]***

~~**The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device. (Amended 1985, 1991, 1999 and 2000)**~~

***G-S.1.2. Location of Marking Information for Built-for-Purpose, Software-Based Devices. – For built-for-purpose, software-based devices, ~~with display capability~~, the following shall apply:***

~~***(a) the manufacturer or distributor and the model designation be continuously displayed or marked on the device*, or***~~

~~***(b) the Certificate of Conformance (CC) Number be continuously displayed or marked on the device*, or***~~

~~***(c) all required information in G-S.1.1. Identification. (a), (b), (c), (e), and (h) be continuously displayed. Alternatively, a clearly identified System Identification, G-S.1. Identification, or Weights and Measures Identification shall be accessible through the "Help"menu. Required information includes that information necessary to identify that the software in the device is the same type that was evaluated.***~~

~~****Clear instructions for accessing the remaining required G-S.1.1. information shall be listed on the CC. Required information includes that information necessary to identify that the software in the device is the same type that was evaluated.***~~
~~***[Nonretroactive as of January 1, 200X]***~~

***(a) All information defined in G-S.1.1. shall be either marked on the unit or continuously displayed. Alternative markings are:***

***1. the manufacturer or distributor name and the model number, or***

***2. the Certificate of Conformance (CC) Number, provided that access to the remaining G-S.1.1. information is available through the "Help" key, or clear instructions are listed on the CC.***

***(b) Information necessary to identify that the software in the device is the same type that was evaluated.***

***G-S.1.3. Required Information for Not Built-for-Purpose, Software Based Devices. – For not built-for-purpose, software based devices, the following shall apply:***

***(a) All information defined in G-S.1.1. (a), (b), (c) and (g) shall be either marked on the unit or continuously displayed. Alternative marking requirements are:***

***1. the manufacturer or distributor name and the model number, or***

***2. the Certificate of Conformance (CC) Number.***

***Provided that access to the remaining required G-S.1.1. information is available through the "Help" key or clear instructions are listed on the CC.***

***G-S.1.~~1~~4. Remanufactured Devices and Remanufactured Main Elements. All remanufactured devices and remanufactured main elements shall be clearly and permanently marked for the purpose of identification with the following information:***

***(a) the name, initials, or trademark of the last remanufacturer or distributor;***

***(b) the remanufacturer's or distributor's model designation if different than the original model designation.***
***[Nonretroactive as of January 1, 2002]***

The above proposed changes lead to the need for two new definitions. Suggestions are:

**Built-for-purpose device. Any main device or element which was manufactured with the intent that it be used as, or part of, a weighing or measuring device or system.**

**Not built-for-purpose device. Any main device or element which was not originally manufactured with the intent that it be used as, or part of, a weighing or measuring device or system**

Editor's note: The definition for "built-for-purpose" was adopted under S&T Agenda Item 310-1A G-S.1. Identification: Not-Built-for-Purpose Software-Based Devices, and Appendix D; Definitions of Built-for-Purpose Device.

For more discussion and background refer to Item 310-1A.

## 320 Scales

### 320-1 I S.1.12. Manual Gross Weight Entries and UR.3.9. Use of Manual Gross Weight Entries

**Source:** Carryover Item 320-4. (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 2002 agenda.)

**Recommendation:** Modify paragraphs S.1.12. and UR.3.9. as follows:

***S.1.12. Manual ~~Gross~~ Weight Entries. – A device shall accept an entry of a manual ~~gross~~ weight value only when the scale is at gross load zero and the scale gross or net* weight indication is at zero ~~in the gross weights display mode~~. Recorded manual weight entries except those on labels generated for packages of standard weights, shall identify the weight value as a manual weight entry by one of the following terms: "Manual Weight," "Manual Wt," or "MAN WT." The use of a symbol to identity multiple manual weight entries on a single document is permitted, provided that the symbol is defined on the same page on which the manual weight entries appear and the definition of the symbol is automatically printed by the recording element as part of the document.***
***[Nonretroactive as of January 1, 1993]***
***[*Nonretroactive as of January 1, 2004.]***

**UR.3.9. Use of Manual ~~Gross~~ Weight Entries. – Manual ~~gross~~ weight entries are permitted for use in the following applications only: (1) on a point-of-sales system interfaced with scales when credit is given for a**

**weighed item ~~on point-of-sale systems interfaced with scales~~, or when an item is pre-weighed and marked with the correct net weight; (2) when a device or system is generate~~s~~ing labels for standard weight packages; (3) when postal scales or weight classifiers are generate~~s~~ing manifests for packages to be picked up at a later time; ~~or~~ and (4) on livestock scale and vehicle scale systems generate weight tickets to correct erroneous tickets.**

**Discussion:** This proposal was developed to address concerns about practices for using manual weight entries on point-of-sale (POS) systems. One national grocery company manually enters weights (obtained from a scale other than the POS system) into its POS system when an item (e.g., watermelons, turkeys, roasts, etc.) exceeds the capacity of the POS scale system or when the scanner system cannot read the Universal Product Code (UPC) on a random weight package (but the weight and price per pound are legible). These applications are not specifically addressed in NIST Handbook 44 regarding the use of manual weight entries.

Several restrictions are placed on the use of manual weight entries in Handbook 44 to deter fraudulent use of the feature and to ensure that entries are properly identified. Paragraph UR.3.9. permits use of manual weight entries in applications where a credit is given on a POS system, to generate labels for standard weight packages, for postal weight manifests when packages are picked up at a later time, or to correct erroneous tickets generated by livestock or vehicle scales. Paragraph S.1.12. permits manual weight entries only when the scale is at gross load zero and the scale indication is zero. This also specifies that manual weight entries must be identified with specific terminology on labels (except standard weight packages) or tickets. The Committee had concerns that adding more applications to the list of weighing operations, where manual entries are permitted, might not adequately recognize all weighing installations where manual weight entries are appropriate.

At the July 2002 NCWM Annual Meeting, the Committee recommended a more complete assessment of the field use of manual weight entries since not all involve gross weights. The Committee reviewed several proposals to modify paragraph UR.3.9. to address specific manual weight entry applications encountered by each submitter. The Committee agreed that the use of manual weight entries occurs with both gross and net weight packages, therefore, the proposals to modify paragraph UR.3.9., as worded, did not address all instances where manual weight entries occur. The Committee also discussed a proposal, developed by the Committee at the 2002 NCWM Interim Meeting that addressed various manual weight entries that occur nationally in weighing operations. The proposal modified paragraph S.1.12. to recognize manual weight entries for both gross and net weight packages and to require the system to identify and print manual tare entries.

The Committee agreed that changes were also necessary to paragraph UR.3.9. to ensure that the requirement is consistent with the proposed modifications to paragraph S.1.12. The Committee agreed to consider recommendations to modify paragraph UR.3.9. because corresponding changes are needed for device operators that use manual weight entries.

In September 2002, the WWMA indicated its support for a proposal to modify paragraph UR.3.9. to recognize manual weight entries on POS systems for marking the correct weight on preweighed items. The WWMA indicated that it is acceptable to manually enter weight and price information and use the POS system as a calculator. The WWMA also proposed removing all references to the term “gross” from paragraph UR.3.9. to correspond with the changes recommended for paragraph S.1.12.

During the 2003 NCWM Interim Meeting, several scale manufacturers indicated it would be too costly to require devices to print manual tare values. Scale manufacturers supported an alternate proposal to modify paragraph S.1.12. to specify that only “direct sale” devices accept manual weight entries.

The Committee was not certain that the WWMA proposal to modify paragraph UR.3.9. as written clearly identified which applications are permitted to use manual weight entries. Additionally, the Committee was not certain that the proposal permits manual weight entries for random weight packages. The Committee agreed the proposed language in paragraph S.1.12. might be misleading as to whether or not the device must print the value for each keyboard-, stored-, push-button- or digitally-entered tare. Consequently, the Committee deleted the proposed language to identify and print manual tare values on labels or recorded representation from paragraph S.1.12. The Committee also modified the proposal to clarify which type of manual weight entries are acceptable for point-of-sale systems and to clarify that the application in paragraph S.1.12. is effective on January 1, 2004, for manual net weight entries. However, the Committee considered keeping the original effective date of January 1, 1993, for simplicity since manual gross and net weight entries already occur and the proposal would make both entries acceptable. The Committee believed that these modifications afforded the flexibility grocers needed to make manual weight entries while providing sufficient safeguards to prevent fraudulent use of the feature.

The Committee acknowledges that there are specific weighing applications where manual gross weight entries are permissible. However, Handbook 44 does not include language to address every transaction that might use the manual weight entry feature and require the recorded value to be identified to prevent fraudulent use of the feature. Handbook 44 specifies that the scale must be at gross load zero and the scale indication at zero in the gross weight display so that the customer realizes that a manual weight entry is taking place.

In the early 1990s, the S&T Committee could not foresee all possible uses of manual weight entries on point-of-sale systems. The Committee believes the current requirements were not intended to prohibit manual weight entries to calculate a new price. Paragraphs S.1.12. Manual Gross Weight Entries and UR.3.9. Use of Manual Gross Weight Entries would permit a point-of-sale system interfaced with a scale to give credit for a net weighed item or when an item is pre-weighed and marked with the correct net weight.

The Committee acknowledges there is confusion about the proper operation of tare features and the specific point in the transaction where values must be identified, in part, because NIST Handbook 44 does not include definitions for the terms, "gross," "net," and "tare." NIST Handbook 130 (Weights and Measures Law Section 1.10) defines "net weight" and Publication 14 addresses push-button, keyboard, programmable, digital, and stored tares. The Committee believes future work on manual weight entry requirements may require defining those terms to clarify what values are appropriate for manual weight entries.

The Committee agreed with industry's concerns about how the proposed modification to paragraph S.1.12. may be interpreted to restrict keyboard tare entries and tare determined on vehicle weigh-in/weigh-out systems. A keyboard entry of tare prior to the entry of a manual weight value is not permitted because the proposal requires that the scale must be at zero load in order to accept a manual weight entry. The proposal would not, for example, permit entry of the tare weight of a vehicle at a recycling operation when the scale is not at a gross zero load. Therefore, the Committee changed the proposal to an information item and recommended that the Weighing Sector revise the language to clarify the original intended use of the manual weight entry feature in existing and other applications that are the result of new technology and today's marketing practices (e.g., tier pricing).

For more background information, refer to the 2002 S&T Final Report.

**320-2 V S.1.2.3. Prescription Scale with a Counting Feature, S.2.5.3. Class I and Class II Prescription Scales with a Counting Feature, Table S.6.3.b. Notes for Table S.6.3.a; Note 13, Table 3 Parameters for Accuracy Classes; Footnote 2, S.6.6. Counting Feature Minimum Piece Weight and Minimum Number of Pieces, N.1.10. Counting Feature Test, T.N.3.10. Prescription Scales with a Counting Feature, Table T.N.3.10. Maintenance and Acceptance Tolerances in Excess and in Deficiency for Count, UR.3.5. Special Designs; Footnote 5, UR.3.11. Minimum Count, and UR.3.12. Correct Stored Average Piece Weight**

(This item was adopted.)

**Source:** Western Weights and Measures Association (WWMA). (This item originated from the Southern Weights and Measures Association (SWMA) and first appeared on the Committee's 2002 agenda as Developing Item 360-3, Appendix A.)

**Recommendation:** Add the following new paragraphs to the Scales Code to address prescription scales with a counting feature:

**S.1.2.3. Prescription Scale with a Counting Feature. - A Class I or Class II prescription scale with an operational counting feature shall not calculate a piece weight or total count unless the following conditions are met:**

**(a) minimum individual piece weight is greater than or equal to 3 e,**
**(b) minimum sample size is greater than or equal 10 pieces**

**S.2.5.3. Class I and Class II Prescription Scales with a Counting Feature. - A prescription scale, Class I or Class II, shall indicate to the operator when the piece weight computation is complete by a stable display of the quantity placed on the load receiving element.**

**S.6.6. Counting Feature Minimum Piece Weight and Minimum Number of Pieces. - A Class I or Class II prescription scale with an operational counting feature shall be marked with the minimum piece weight and minimum number of pieces used to establish an individual piece count.**

**N.1.10. Counting Feature Test. – A test of the counting function shall be conducted on all Class I and Class II prescription scales having an active counting feature. The test should verify that the scale will not accept a sample with less than either the minimum sample piece count or the minimum sample weight. Counting feature accuracy should be verified at a minimum of two test loads. Verification of the count calculations shall be based upon the weight indication of the test load.**

**Note: Test load as used in this section refers to actual calibration test weights selected from an appropriate test weight class.**

**T.N.3.10. Prescription Scales with a Counting Feature. – In addition to Table 6 Maintenance Tolerances (for weight), the indicated piece count value computed by a Class I or Class II prescription scale counting feature shall comply to within the tolerances in Table T.N.3.10. Maintenance and acceptance tolerances are the same.**

**Table T.N.3.10.**
**Maintenance and Acceptance Tolerances**
**in Excess and in Deficiency for Count**

| Indication of Count | Tolerance (piece count) |
|---|---|
| 0 to 100 | 0 |
| 101 to 200 | 1 |
| 201 or more | 0.5 % |

**UR.3.11. Recommended Minimum Count. - A prescription scale with an operational counting feature shall be used to count a quantity of 30 (at a minimum of 30 e) or more pieces.**

**UR.3.12. Correct Stored Average Piece Weight. - For prescription scales with a counting feature, the user is responsible to maintain the correct stored average piece weight; especially when a medicine is reformulated.**

Modify Table S.6.3.b., Note 13; Table 3 Parameters for Accuracy Classes, Footnote 2; paragraph UR.3.5. Special Designs; and Footnote 5 to paragraph UR.3.5. as follows:

**Table S.6.3.b.**
**13. A scale designed for a special application rather than general use shall be conspicuously marked with suitable words visible to the operator and customer restricting its use to that application, e.g., postal scale, prepack scale, weight classifier, etc. **When a scale is installed with an operational counting feature, the scale shall be marked on both the operator and customer side with the statement "The counting feature is not legal for trade," except when a prescription scale complies with sections S.1.2.3., S.2.5.3., S.6.6.***
**[*Nonretroactive as of January 1, 1986]**

***Table 3 Parameters for Accuracy Classes***
***[2] A scale marked For prescription weighing only may have a verification scale division (e) not less than 0.01 g.***

**UR.3.5. Special Designs. - A scale designed and marked for a special application (such as a prepackaging scale or prescription scale with a counting feature) shall not be used for other than its intended purpose.[5]**

**[5]Prepackaging scales and prescription scales with a counting feature (and other commercial devices) used for putting up packages in advance of sale are acceptable for use in commerce if all appropriate provisions of Handbook 44 are met. Users of such devices must be alert to the legal requirements relating to the declaration of quantity on a package. Such requirements are to the effect that, on the average, the contents of the individual packages of a particular commodity comprising a lot, shipment, or delivery must contain at least the quantity declared on the label. The fact that a prepackaging scale may overregister, but within established**

**tolerances, and is approved for commercial service is not a legal justification for packages to contain, on the average, less than the labeled quantity.**

**Discussion:** The WWMA proposed that the counting by weight feature on prescription scales be recognized in NIST Handbook 44. The WWMA developed a proposal based on the following input from prescription scale manufacturers: (1) there is a high level of regulatory oversight by the Food and Drug Administration to ensure that prescription drug dosages are uniform, unlike other commodities sold by count based on weight, (2) pharmacists are trained professionals in search of an accurate method to dispense pills, and (3) device technology provides greater accuracy for filling containers when counting by weight rather than by hand. The WWMA recommended this application be limited to prescription scales because of the controls in place for pill dosages and pill weight.

Past NCWM discussions about the counting feature focused on variability in the size of individual items, compliance with device performance tolerances, and the individual piece weight unit having a higher resolution than the displayed scale division (d). The initial WWMA proposal included language to eliminate labeling requirements for the counting feature on prescription scales from Table S.6.3.b Note 13 and included background information from McKesson that explored some possible sources for counting error when using the weighing function to determine count. The WWMA proposal did not include language for accuracy requirements or modify the notes section to specify test procedures. These issues and others such as the appropriate standards and influence factors must be developed to establish a means for verifying the performance of a metrological feature.

The WWMA recognized that Handbook 44 must be modified to permit a counting feature for prescription scales and further work was needed to ensure that appropriate test procedures were developed. The WWMA indicated that the counting feature was suitable only for prescription scale applications when the device and the counting feature are covered by an NTEP Certificate of Conformance. The WWMA received documents from McKesson that contained the following: (1) establishing piece weight data with reference weight, (2) expanding the reference weight data (optional algorithm for prescription scale program), (3) Recommended Characteristics for a Prescription Scale, (4) Accuracy Test for Prescription Scale Counting Feature, and (5) Two Methods for Verifying Counting Accuracy (see Appendix A for the documents provided by McKesson). The WWMA encouraged McKesson to work with parties such as NTEP, NIST, and the States to make any changes necessary to the proposed test procedures so that they adequately address Handbook 44 requirements.

The SWMA reviewed the WWMA proposal, but due to time constraints the SWMA was not able to study the corresponding documents prepared by McKesson. The SWMA concluded that the type evaluation and field test procedures developed by McKesson must include tolerances and that they need further development. The SWMA recommended the proposal move forward as an information item until all work was completed on the procedures.

The Committee agreed that WWMA proposal and supplemental prescription scale counting feature test procedures developed by McKesson (see Appendix A) were a good start at recognizing that feature. The proposed procedures were supported as metrologically sound by the Scale Manufacturers Association. However, the proposal to only modify Note 13 did not include necessary NIST Handbook 44 specifications, test procedures (influence factors, appropriate standards, etc.) for the counting feature.

During the January 2003 NCWM Interim Meeting, at the Committee's recommendation, the proposal to modify Note 13 was revised by the NCWM membership. The Committee reviewed the alternate proposal shown below to add new specifications for marking the prescription scale with its internal resolution and how the count feature must function:

S.X.X. Pharmacy Scales (Scales used in pharmacy applications). A pharmacy scale installed with an operational counting feature shall be marked with the value of the internal scale division used internally for counting purposes.

S.X.X. Pharmacy Counting Scale Divisions. A pharmacy counting scale shall not count when the scale calculated individual piece weight is less than 30 counting (internal) scale divisions.

The Committee believed that the specifications were also a good start at establishing Handbook 44 requirements for Class II prescription scale counting features. However, Note 13 still required modification because the existing Handbook 44 wording prohibited the counting feature. The Committee made the proposed specifications a voting item with the stipulation that McKesson and other prescription scale manufacturers complete their work with the weights and measures community to fully develop Handbook 44 requirements that adequately address the counting feature on Class II prescription scales, prior to the 2003 NCWM Annual Meeting.

In March 2003, in response to the Committee's request for comprehensive Handbook 44 language to address the counting feature, McKesson along with the S&T Committee and NIST developed an alternate proposal similar to the recommendation above. The recommendation further modified the WWMA's proposal that added language to Table S.6.3.b. Note 13 to recognize prescription scales covered by a Certificate of Conformance that listed a commercial counting feature.

The proposed requirements were developed to ensure that the counting feature functioned properly, did not facilitate fraud, and could be verified in the field. Only Class I or Class II scale technology has sufficient resolution to determine piece weight and use that information as the basis for computing pill count to fill prescriptions. The relationship of the scale division (d) to the verification scale division (e) is already established in paragraph S.1.2.2.1. Class I and II Scales and Dynamic Monorail Scales, where d < e # 10 d. The limits on the value of d and e were considered in the development of the requirement. There is also sufficient internal resolution in Class I and II digital scales to ensure accurate piece weight measurement when d equals e. However, internal resolution cannot be determined by the scale user or customer so this value is not part of the requirement in paragraph S.1.2.3. for verifying the accuracy of the counting feature. The proposed changes also include a modification to Table 3 Parameters for Accuracy Classes Footnote 2 to eliminate any confusion about the relationship of d and e for Class III scales used in a prescription application. Additionally, the scale should not provide an indication of count when the conditions proposed in paragraph S.1.2.3. for establishing minimum piece weight, sample weight, and piece count are not met. Class I and Class II prescription scales used commercially to establish quantity must meet a tolerance for count. Packages filled through a Class I or Class II prescription scale with a counting feature that complies with all proposed Handbook 44 requirements must also comply with all other quantity and labeling requirements.

The NIST Technical Advisors provided the following example of how paragraph S.1.2.3. Prescription Scale with a Counting Feature would apply in the selection and use of a prescription scale. This example is based on a Class II prescription scale with a capacity of 500 g, e = 0.01 g; d = 0.001 g; and $n_{max}$ = 50 000, where the prescription scale does not calculate a piece weight or total count unless all requirements in subparagraphs (a) and (b) are met as follows:

(a) the minimum pill weight must be greater than or equal to 0.03 g (30 mg), and
(b) the minimum number of pieces in a sample used to establish a piece weight count must be greater than or equal to 10 pills, in this case the equivalent of 0.3 g (30 mg).

A field examination procedure based on the proposed Handbook 44 requirements was needed for weights and measures officials. The new test procedure drafted and proposed for inclusion in Examination Procedure Outline Number 1, Retail Computing Scales is as follows:

14. Test count feature for Class II prescription scales. Verify the count accuracy for at least two points.

    a. Place a load equivalent to 29 e on the load receiving element and enter a sample count of 10. The device should not accept the entry.

    b. Place a load equivalent to 30 e on the load receiving element and enter a sample count of 9. The device should not accept the entry.

    c. Place a load equivalent to 30 e on the load receiving element and enter a sample count of 10. The device should accept the entry. Then place a load equivalent to 300e on the load receiving element. Verify that the total count of 100 is accurate.

    d. Place a load equivalent to 200 e on the load receiving element and enter a sample count of 10. The device should accept the entry. Then place a load equivalent to 4 000 e on the load receiving element. Verify that the total count of 200 is accurate.

The Committee also asked for input from the Food and Drug Administration, U.S. Pharmacopeia, and representatives from the pharmaceutical industry on the proposal. One scale manufacturer indicated some concern about the variability in the pill formulation process and the effect on individual pill weight.

The Committee believes that Class I and Class II prescription scales will meet all proposed specifications and tolerances for weighing and counting applications when field test standards are used to conduct accuracy tests. The Committee

questioned whether or not tests using pharmaceuticals will result in inaccuracies in the counting feature because of the effects of environmental factors on individual pill weight. Consequently, the Committee included a note in proposed paragraph N.1.10. to specify that tests shall be performed with appropriate test standards.

The Committee acknowledged that the limits on minimum individual piece weight and sample size result in a calculated minimum sample weight of 30 e and not 20 e that appears in Publication 16. The Committee reworked the proposal to eliminate from paragraph S.1.2.3. any reference to a minimum sample weight and to include the correct test load in the field test procedure used to verify the count feature. Additionally, the Committee believes the scale count feature should operate at a required rather than recommended minimum count of 30 or more pieces.

The Committee agreed that the proposal should clarify when special application marking requirements are not required on scales equipped with the counting feature. The Committee modified Table S.6.3.b. Note 13 to include an exception to the marking requirements when a prescription scale meets the operating, indicating, and marking requirements proposed in paragraphs S.1.2.3., S.2.5.3., and S.6.6.

The Committee agreed with a CWMA recommendation that the proposal should include an additional user requirement to ensure that the pill count is based on up-to-date information from the manufacturer when medicines are reformulated. The Committee modified the proposal to include a new paragraph UR.3.12. Correct Stored Average Piece Weight.

**320-3 I S.6.4. Railway Track Scales**

**Source:** Central Weights and Measures Association (CWMA)

**Recommendation:** Modify paragraph S.6.4. in the Scales Code as follows:

> **S.6.4. Railway Track Scales. - A railway track scale shall be marked with the maximum capacity of each section of the load-receiving element of the scale. Such marking shall be accurately and conspicuously presented on, or adjacent to, the identification or nomenclature plate that is attached to the indicating element of the scale.** ~~***The nominal capacity of a scale with more than two sections shall not exceed twice its rated section capacity. The nominal capacity of a two-section scale shall not exceed its rated section capacity*** [*]~~.*** ***The marked nominal capacity shall not exceed the sectional capacity (SC) multiplied by the number of sections (N) of the scale minus 0.5 sections. The formula is stated as Nominal Capacity ≠ SC x (N - 0.5)*.***
> ***[*Nonretroactive as of January 1, 200~~2~~4]***

**Discussion:** In 2001, paragraph S.6.4. was modified to specify that the maximum nominal capacity for railway track scales with more than two sections must not exceed twice the marked section capacity and the nominal capacity for railway track scales with two sections must not exceed the marked section capacity. The CWMA found that the marked nominal capacity required in paragraph S.6.4. is exceeded on modular railway track scales when railcars are pushed and placed on the scale for weighing. Weighing systems monitor and record all weighments, which includes all instances where loads exceed the marked nominal capacity (except when total platform load is in excess of 105 % of scale capacity). The CWMA proposed changes to the language to permit a greater nominal capacity that is based on the section capacity multiplied by the number of sections minus 0.5 sections; the CWMA believes this change is consistent with the nominal capacity specifications for vehicle scales.

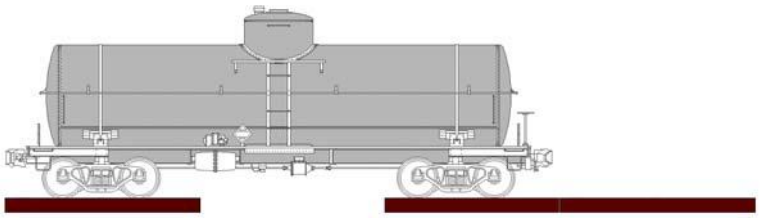
One scale manufacturer indicated that railway track scales are designed to meet American Railway Engineering Maintenance of Way Association and Cooper E-80 specifications as specified by the servicing railroad. System Associates, Inc. reported that modular railway track scales based on Cooper E-80 specifications can withstand loads far greater than the marked nominal capacity limits in existing paragraph S.6.4. The length of scales fabricated from multiple modules is restricted because of nominal capacity limitations specified in current paragraph S.6.4.

The company provided the examples below to demonstrate railway track scale loading, where railcar loads exceed nominal scale capacity limits specified in paragraph S.6.4. The modular railway track scale typically uses 100 000 lb load cells and has a 170 000 lb section capacity. A change to load cell capacity to meet the weight of coupled railcars might require modifications to the scale design and require re-evaluation by NTEP. Railcars are uncoupled at both ends to obtain a true net weight and ensure there is no coupler interaction or weight transfer. The terms used in Examples A through C that are not in Handbook 44 are defined below:

**single scale** – A single module having a 12 ft span that is designed to support three 80 000 lb axles on five foot centers.
**double scale** – A single module having a 25 ft to 26 ft span that is designed to support four 80 000 lb axles on five foot centers.
**truck** – A swiveling framework of wheels located at each end of the railcar.

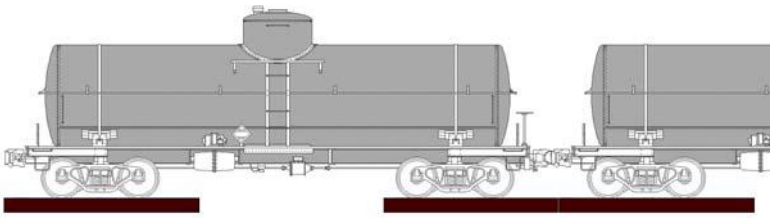
**Examples of Railway Track Scale Loading**

**A - Short Railcar on a Single-Double Scale**



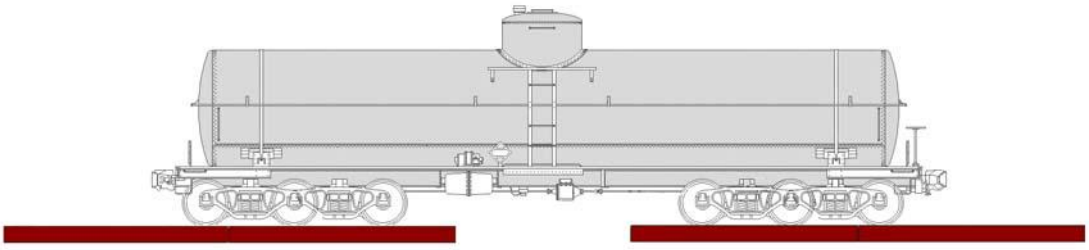
- A short railcar is spotted or placed into position for weighing on a single-double combination scale
- Each truck weighs 131 500 lb for a gross railcar weight of 263 000 lb
- The gross railcar weight does not exceed the nominal capacity of 340 000 lb

**Short Railcar on a Single-Double Scale Where Weighing is NOT Intended**



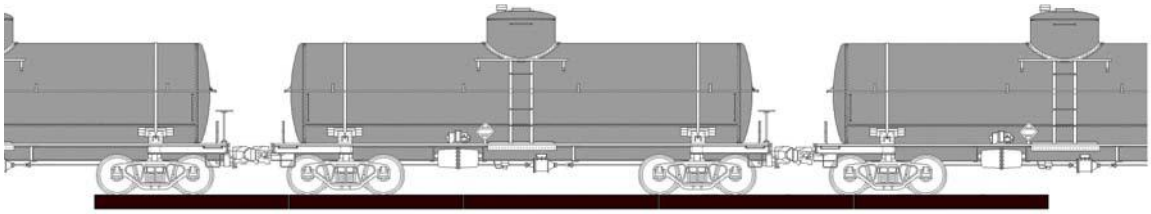
- The next car recouples to push the weighed railcar off the scale
- Each of the three trucks weighs 131 500 lb for a gross weight of 394 500 lb
- With a 340 000 lb nominal capacity, the scale is 54 500 lb overloaded under normal traffic
- The design load capacity (per railroad requirements) of this scale is 560 000 lb
- A nominal capacity of 400 000 lb would be acceptable in most applications

**B - Six Axle Car on a Double-Double Scale**



- Six axle railcar is spotted for weighing on a double-double combination scale
- Each truck weighs 192 000 lb for a gross weight of 384 000 lb
- With a 340 000 lb nominal capacity, this scale is overloaded by 44 000 lb
- The design load capacity of this scale (per railroad requirements) is 640 000 lb
- A nominal capacity of 600 000 lb would be acceptable in most applications

**C - Railcars Moving on a 93-ft Modular Scale Where Weighing is NOT Intended**



- Railcars are moving across a 93 foot scale with seven 12 foot modules
- Each truck weighs 131 500 lb for a gross weight of 526 000 lb
- With a 340 000 lb nominal capacity, this scale is overloaded by 186 000 lb
- The design load capacity of this scale (per railroad requirements) is 1 044 000 lb
- A nominal capacity of 600 000 lb would be acceptable in most applications

The Committee included text in the title of the diagrams above to clarify that the illustrations do not represent the weighing of coupled railcars. The diagrams show movement of multiple coupled railcars across scale modules to position the railcars for weighing. The scale indication may blank out since the combined weight of the coupled cars exceeds the scale's rated nominal capacity, but the indication operates when the railcars are uncoupled for the weighing of a single railcar.

The Committee acknowledged that overloading of scales does occur, for example, when locomotives are driven across scales. However, the overloading of scales is not a problem for scales that are designed to withstand the loads, provided the scale complies with NIST Handbook 44 specification that a scale cannot indicate more than 105 % of scale capacity. Additionally, the scale should be suitable for a particular use with respect to its design, which includes but is not limited to its weighing capacity.

In response to a request from the submitter, the Committee made changes to the formula to align the relationship of the equations in the formula with similar applications elsewhere in Handbook 44. The Committee modified the proposed formula to require a nominal capacity that is less than or equal to the section capacity multiplied by the number of scale sections minus 0.5 sections. The Committee also heard that there may be instances where coupled railway cars are being statically weighed and believes that a user requirement may be needed to resolve this enforcement issue.

The Committee agreed that the proposed formula permits nominal capacities that may exceed the safe load of a railway track scale. Typically, weights and measures jurisdictions do not have sufficient field test standards to test railway track scales that exceed a 640 000 lb nominal capacity at the minimum 12.5 % (80 000 lb) of capacity prescribed in Table 4 Minimum Test Weights and Test Loads.

The Committee believes that the item needs further review by industry and the Weighing Sector to either modify the proposed formula or develop additional language that establishes appropriate capacity limitations for railway track scales. Consequently, the Committee changed the proposal to an information item to allow sufficient time for input on appropriate nominal capacity limitations.

**320-4 I Appendix D; Definition of Counter Scale**

**Source:** National Type Evaluation Technical Committee (NTETC) Weighing Sector

**Recommendation:** Modify the definition of "counter scale" as follows:

**counter scale. ~~One~~ A scale that, by reason of its size, arrangement of parts, and ~~moderate~~ with a nominal capacity no greater than 100 kg (220 lb), is adapted for use on a counter or bench. Sometimes called "bench scale." [2.20]**

**Discussion:** There are some questions regarding whether certain scales are classified as bench/counter scales or classifying them as floor scales. This confusion has led officials to perform different shift tests on the same device. In some instances, the shift tests were based on the requirements in NIST Handbook 44 paragraph N.1.3.1. Bench or Counter Scales, which describes test load positions for bench/counter scales. In other instances, the tests were based on

paragraph N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers which addresses test load positions for other (platform) scales, and were applied to the same device model when it was classified as a floor scale.

Currently, Handbook 44 requires that bench/counter scale shift tests be conducted with a half-capacity test load centered successively at four points equidistant between the center and the front, left, back, and right edges of the load-receiving element (see paragraph N.1.3.1.). Shift tests on other types of platform scales are conducted with a one-half capacity test load centered, as nearly as possible, successively at the center of each quadrant (see paragraph N.1.3.8.). Several manufacturers have indicated that it is an unfair test to place one-quarter scale capacity on the corners of a single load cell scale as compared to placing one-quarter scale capacity in the corners of a scale with four load supports.

NIST Handbook 44 also prescribes different requirements for the maximum loads that can be rezeroed in paragraph S.2.1.3. Scales Equipped with an Automatic Zero-Setting Mechanism for bench/counter scales (0.6 scale division) and for all other scales (1.0 scale division).

In October 2002, the NTETC Weighing Sector recommended a proposal to modify paragraphs N.1.3.1. and N.1.3.8. and to revise the current definition of "counter scale" to distinguish bench/counter scales from floor scales based on the number of platform supports and the device's nominal capacity rating. The Weighing Sector recommended a capacity limit of 100 kg (220 lb) for bench/counter scales since many shipping scales in commercial use on business counters or elevated conveyors have a nominal capacity of 100 lb to 200 lb and 100 kg (220 lb) is consistent with capacity limits set by Measurement Canada.

During its October 2002 Annual Meeting, the Southern Weights and Measures Association (SWMA) agreed with limiting the capacity of a bench scale to 100 kg (220 lb); but the SWMA did not agree with the proposed changes to paragraphs N.1.3.1. and N.1.3.8.

In April 2003, the Scale Manufacturers Association (SMA) supported the recommendation to modify the definition of "counter scale" if it helps in determining an appropriate shift test procedure. However, the SMA could support only limited changes to paragraphs N.1.3.1. and N.1.3.8. to specify the conditions for shift tests on multiple platform supports of bench and counter scales and test loads placed on multiple points for all other scales with a single platform support.

During the 2003 NCWM Annual Meeting, the Committee agreed to continue supporting several points reached at the January 2003 Interim Meeting. The Committee recognized that the Weighing Sector's proposal was intended to align the U.S. and Measurement Canada's shift test procedure that are based on the number of load supports in the scale. The Committee agreed with comments from industry and weights and measures officials that paragraphs N.1.3.1. and N.1.3.8. already adequately address shift test procedures and any change would create confusion. The Committee agreed with comments recommending that the definition of counter scale needs to be modified. However, the Committee decided to amend the definition for clarity only and to include a 100 kg limit on the nominal capacity of a counter scale.

The Committee agreed that the proposal to modify the definition of counter scale as written does not provide weights and measures officials with a means to determine the shift test procedure that is appropriate for a scale design (single or four load supports). The Committee recognized the difficulty or reluctance of field officials to dismantle a scale to determine its design. Consequently, the Committee changed this item's status to an information item and recommended that the Weighing Sector consider the practice of including scale design information on all NTEP Certificates of Conformance to assist officials in performing shift tests.

**320-5 VC N.1.3.4. Vehicle Scales, Axle-Load Scales, and Livestock Scales, N.1.3.4.1. Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales, N.1.3.4.2. Prescribed Test Pattern and Test Loads for Livestock Scales and Combination Vehicle/Livestock Scales With More ThanTwo Sections and N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers**

(This item was adopted.)

**Source:** Carryover Item 320-1B. (This item originated from the National Type Evaluation Technical Committee (NTETC) Weighing Sector and first appeared on the Committee's Agenda in 2001 as Item 320-4.)

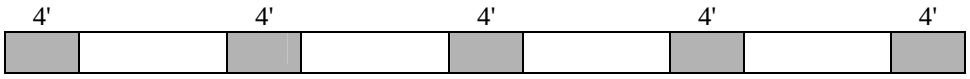
**Recommendation:** Modify paragraphs N.1.3.4. and N.1.3.4.1. as follows:

**N.1.3.4. Vehicle Scales, Axle-Load Scales, and Livestock Scales**

**N.1.3.4.1. Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales –**

**(a) Minimum Shift Test. At least one shift test shall be conducted with a minimum test load of 12.5 % of scale capacity and may be performed anywhere on the load-receiving element using the prescribed test patterns and maximum test loads specified below. ~~(Two-section livestock scales shall be tested consistent with N.1.3.8.)~~ (Combination Vehicle/Livestock scales shall also be tested consistent with N.1.3.4.2.)**

**(~~a~~b) Prescribed Test Pattern and Loading for Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales. The normal prescribed test pattern shall be an area of 1.2 m (4 ft) in length and 3.0 m (10 ft) in width or the width of the scale platform, whichever is less. Multiple test patterns may be utilized when loaded in accordance with Paragraph (~~b~~) (c), (d), or (e) as applicable.**




| Section 1 | Midway between sections 1 and 2 | Section 2 | Midway between sections 2 and 3 | Section 3 |
|---|---|---|---|---|

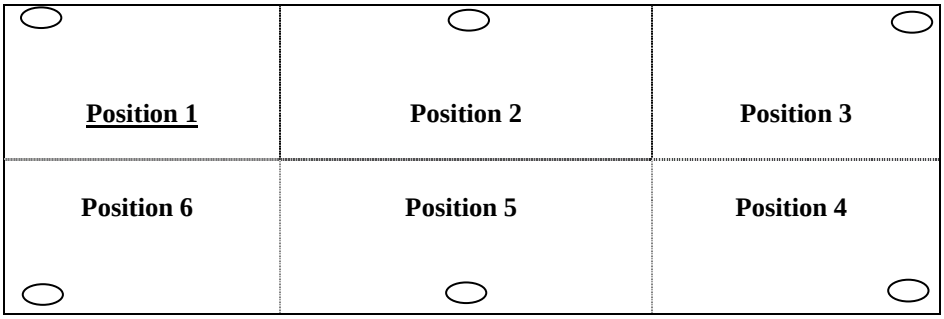
**(~~b~~c) ~~Maximum~~ Loading Precautions *for Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales*. When loading the scale for testing, one side of the test pattern shall be loaded to no more than half of the concentrated load capacity or test load before loading the other side. The area covered by the test load may be less than 1.2 m (4 ft) x 3.0 m (10 ft) or the width of the scale platform whichever is less; for test patterns less than 1.2 m (4 ft) in length the maximum loading shall meet the formula: [(wheel base of test cart or length of test load divided by 48 in) x 0.9 x CLC]. The maximum test load applied to each test pattern shall not exceed the concentrated load capacity of the scale. When the test pattern exceeds 1.2 m (4 ft), the maximum test load applied shall not exceed the concentrated load capacity times the largest "r" factor in Table UR.3.2.1. for the length of the area covered by the test load. For weighing elements installed prior to January 1, 1989, the rated section capacity may be substituted for concentrated load capacity to determine maximum loading. An example of a possible test pattern is shown ~~below~~ above.**

**(~~c~~d) Multiple Pattern Loading. To test the nominal capacity, multiple patterns may be simultaneously loaded in a manner consistent with the method of use.**

**(~~d~~e) Other Designs. Special design scales and those that are wider than 3.7 m (12 ft) shall be tested in a manner consistent with the method of use but following the principles described above.**

Add a new paragraph N.1.3.4.2. and associated diagram as follows:

**N.1.3.4.2. Prescribed Test Pattern and Test Loads for Livestock Scales with More Than Two Sections and Combination Vehicle/Livestock Scales. - A minimum test load of 5000 kg (10 000 lb) or one-half of the rated section capacity, whichever is less, shall be placed, as nearly as possible, successively over each main load support as shown in the diagram below. For livestock scales manufactured between January 1, 1989, and January 1, 2003, the required loading shall be no greater than one-half CLC. (Two-section livestock scales shall be tested consistent with N.1.3.8.)**

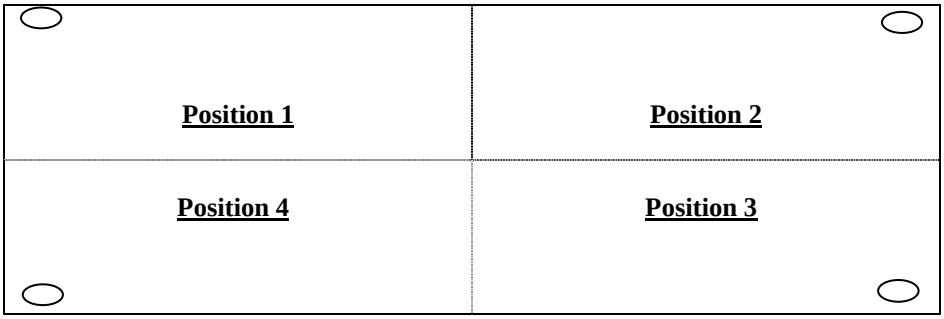



**⬭ = Load Bearing Point**

Modify paragraph N.1.3.8. as follows:

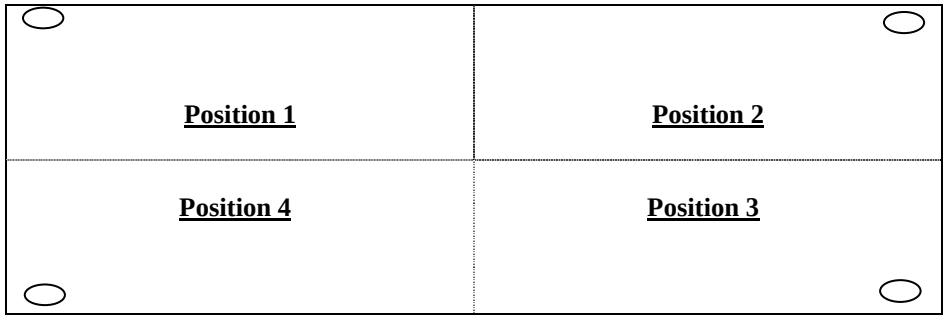
**N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers. – A shift test shall be conducted using the following prescribed test loads and test patterns. ~~with a half-capacity test load centered, as nearly as possible, successively at the center of each quarter of the load-receiving element, or with a quarter-capacity test load centered, as nearly as possible, successively over each main load support.~~ For livestock scales the shift test load shall not exceed one-half the rated section capacity.**

**(a) A shift test load shall be conducted using a one-quarter nominal capacity test load centered as nearly as possible, successively over each main load support as shown in the diagram below, or**




**⬭ = Load Bearing Point**

**(b) A shift test load shall be conducted using a one-half nominal capacity test load centered as nearly as possible, successively at the center of each quarter of the load-receiving element as shown in the diagram below.**




**= Load Bearing Point**

Modify Table S.6.3.a. Marking Requirements Note 22 as follows:

***22. Combination vehicle/livestock scales must be marked with both the CLC for vehicle weighing and the section capacity for livestock weighing. All other requirements relative to these markings will apply. [Nonretroactive as of January 1, 2003.]***

***Note: The marked section capacity for livestock weighing may be less than the marked CLC for vehicle weighing.***

**Discussion:** In 2001, the Committee considered language that prescribed the appropriate test load patterns, the maximum test load, and capacity ratings for safe and adequate performance tests of vehicle and livestock scales. The 2001 proposal also included language to modify the definition of Concentrated Load Capacity (CLC) to remove any reference to livestock scales. In response to comments from industry, weights and measures officials, and Grain Inspection, Packers and Stockyards Administration (GIPSA), the 2001 proposal was referred back to the Weighing Sector for further work to clarify what weighing devices the requirements apply to and the positions of the test load.

In 2002, the Committee agreed to a modified Weighing Sector proposal that places in NIST Handbook 44 the shift tests and test load patterns currently in use when testing livestock and vehicle scales. The 2002 proposal did not receive the majority vote necessary to modify requirements in Handbook 44. The proposal was returned to the Committee. The Committee separated the proposal (Item 320-1B) into two parts, after the 2002 NCWM Annual Meeting to facilitate review of the issues. The proposal to modify the definition of CLC to eliminate any reference to livestock scales now appears as agenda Item 320-9.

At its 2002 Interim Meeting, the Northeastern Weights and Measures Association recommended that the proposal remain an information item to allow sufficient time to address any concerns expressed by the Scale Manufacturers Association (SMA).

The SMA supported the proposal to add new paragraph N.1.3.4.2. and modify Table S.6.3.b. Note 22 shown in the recommendation above.

At its 2002 meeting, the Weighing Sector agreed to submit a separate proposal to make the definition for CLC a separate agenda item (see Item 320-9) from the agenda item which establishes test patterns and test loads for livestock scales. The Weighing Sector agreed with the Central Weights and Measures Association recommendation that a test load of 12.5 % of scale capacity, not to exceed one-half section capacity, is more than adequate to test a main load support. The Sector noted that the test load of 12.5 % of scale capacity provides an adequate test of the performance of the load support and also addresses safety concerns that might arise when stacking weights. The Weighing Sector proposed alternate language for new paragraph N.1.3.4.2. and included the diagram shown above that specifies a minimum test load of 10 000 lb to facilitate the safe application of test weights while applying a load that more closely simulates the potential

concentration of livestock in the corner of the scale. The language in the Weighing Sector proposal permits weights and measures officials and NTEP laboratories to conduct shift tests with a minimum load of 12.5 % of scale capacity.

The Weighing Sector believed that testing of main load supports more accurately reflects the actual usage of livestock scales. The Weighing Sector added broken lines to the test pattern diagram in paragraph N.1.3.4.2. to indicate that test loads should not be centered over the main load bearing points.

The Committee believes the recommendations above included language that addresses the test load patterns, the maximum test load, and capacity ratings for the safe and adequate test of a device's performance in vehicle and livestock scale applications. The Committee decided that the Weighing Sector's proposal for new paragraph N.1.3.4.2. and associated diagram shown above were more appropriate guidelines for the test load and test pattern for livestock scales with more than two sections and combination vehicle/livestock scales. The Committee also agreed with the WWMA's recommendation to add a note to Table S.6.3.a. Note 22 as shown above.

The Committee discussed that there is some confusion about the terms test load and test weight; however, the proposal is technically correct and was not intended to resolve issues over those terms. After making editorial changes to include the word "scale" with each application for consistency with other related requirements in the Handbook 44 Scales Code, the Committee recommended this item for a vote.

For additional background on this item, refer to the 2001 and 2002 S&T Final Reports.

**320-6 W N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers, T.N.3.4. Crane and Hopper (Other than Grain Hopper) Scales, Table 3 Parameters for Accuracy Classes; Footnote 3, Table 7a. Typical Class or Type of Device for Weighing Operations, Table 7b. Applicable to Devices not Marked with a Class Designation, and Appendix D; Definitions of Crane Scale and Hanging Scale**

(This item was withdrawn.)

**Source:** National Type Evaluation Technical Committee (NTETC) Weighing Sector

**Discussion:** The Committee considered a proposal to modify paragraphs N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers and T.N.3.4. Crane and Hopper (Other than Grain Hopper) Scales, Table 3 Parameters for Accuracy Classes Footnote 3, Table 7a. Typical Class or Type of Device for Weighing Operations, and Table 7b. Applicable to Devices not Marked with a Class Designation as follows:

**N.1.3.8. All Other Scales Except ~~Crane Scales~~, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers. – A shift test shall be conducted with a half-capacity test load centered, as nearly as possible, successively at the center of each quarter of the load-receiving element, or with a quarter-capacity test load centered, as nearly as possible, successively over each main load support.**

**T.N.3.4. ~~Crane~~ Class III L Hanging and Hopper (Other than Grain Hopper) Scales. – The maintenance and acceptance tolerances shall be as specified in T.N.3.1. and T.N.3.2. for Class III L, except that the tolerance for ~~crane~~ Class III L hanging and construction materials hopper scales shall not be less than 1d or 0.1 % of the scale capacity, whichever is less.**

**[3] The value of a scale division for ~~crane~~ Class III L hanging and hopper (other than grain hopper) scales shall be not less than 0.2 kg (0.5 lb). The minimum number of scale divisions shall be not less than 1 000.**

| Table 7a.<br>Typical Class or Type of Device for Weighing Operations | |
|---|---|
| Class | Weighing Application or Scale Type |
| I | Precision laboratory weighing |
| II | Laboratory weighing, precious metals and gem weighing, grain test scales |
| III | All commercial weighing not otherwise specified, grain test scales, retail precious metals and semi-precious gem weighing, animal scales, postal scales, scales used to determine laundry charges, hanging, and vehicle on-board weighing systems |
| III L | Vehicle, axle-load, livestock, railway track scales, ~~crane~~ hanging, hopper (other than grain hopper) scales, and vehicle on-board weighing systems |
| IIII | Wheel-load weighers and portable axle-load weighers used for highway weight enforcement |
| Note: A scale with a higher accuracy class than that specified as "typical" may be used. | |

| Table 7b.<br>Applicable to Devices not Marked with a Class Designation | |
|---|---|
| Scale Type or Design | Maximum Value of d |
| Retail Food Scales, ~~50 lb~~ capacity ~~and~~ less than or equal to 50 lb | 1 ounce |
| Animal Scales | 1 pound |
| Grain Hopper Scales | |
| Capacity up to and incl. 50 000 lb | 10 pounds (not greater than 0.05 % of capacity) |
| Capacity over 50 000 lb | 20 pounds |
| ~~Crane~~ Hanging Scales – Capacity 5000 lb and over | not greater than 0.2 % of capacity |
| Vehicle and Axle-Load Scales Used in Combination | |
| Capacity up to and including 200 000 lb | 20 pounds |
| Capacity over 200 000 lb | 50 pounds |
| Railway Track Scales | |
| With weighbeams | 20 pounds |
| Automatic indicating | 100 pounds |
| Scales with capacities greater than 500 lb except otherwise specified | 0.1 % capacity (but not greater than 50 lb) |
| Wheel-Load Weighers | 0.25 % capacity (but not greater than 50 lb) |
| Note: For scales not specified in this table, G-UR.1.1. and UR.1. apply. | |

Delete the Appendix D; Definition of Crane Scale as follows:

~~crane scale. One with a nominal capacity of 5000 pounds or more designed to weigh loads while they are suspended freely from an overhead, track mounted crane.~~

Add the following new definition of "hanging scale" to Appendix D as follows:

hanging scale. A scale designed to weigh loads while they are suspended from a hook on the scale or loads resting on a platter or platform that is suspended from the scale. Hanging scales may be any capacity and may be Class III or III L, whichever is appropriate for the intended use, as long as all parameters for the intended class are met. Sometimes called "crane scale."

The Weighing Sector reported that existing criteria for distinguishing hanging scale applications from crane scale applications are not clear and are inconsistent. Currently, the term "hanging scale" is not defined in NIST Handbook 44 although the term is cited in several requirements in the Scales Code.

The Weighing Sector noted that Handbook 44 Scales Code Table 3 Parameters for Accuracy Classes, Footnote 3 specifies that the minimum permissible capacity for a crane scale is 500 lb; however, the existing Handbook 44 definition states that a crane scale has a nominal capacity of 5000 lb or more. The Weighing Sector also noted that there are inconsistencies in the use of the term "crane scale" in Handbook 44 and in NTEP Certificates of Conformance (CC). Several CCs were issued to families of electronic scales with capacities that range from 1 000 lb to 50 000 lb, where the scales are designated as both "hanging scales" and "crane scales."

The Weighing Sector agreed that the only difference in the installation of hanging scales and crane scales appears to be that hanging scales are suspended from fixed supports while crane scales are suspended from overhead. However, some overhead, track-mounted scales might easily be suspended from other types of supporting structures. The Weighing Sector believed that the design of a scale's support structure (overhead crane, fixed support, etc.) should not be the factor that determines device type.

The Southern Weights and Measures Association recommended further study on how the proposals will impact existing devices.

The Scale Manufacturers Association supported reducing the number of categories of weighing devices, but opposed removing the term crane scale from the Scales Code without further discussion.

- The Committee discussed the Weighing Sector's concern about the large list of terms used to identify various scale types and design. The Committee questioned the existence of Class II hanging scales that may not be included in the proposed definition for "hanging scale." The Committee believes that the Weighing Sector should explore other options to consolidate the terminology used to describe scale types and designs. In addition to examining these issues, the Committee recommends the Weighing Sector examine how devices are designated internationally. The Committee has not heard unanimous support for the proposal from parties affected by the changes. The Committee agreed that the current terminology has not created any situations that require an immediate change to Handbook 44. Given this is not an urgent issue and there is lack of support for the proposal the Committee withdrew the item from its agenda.

**320-7 VC T.N.8.3.1.(a) Power Supply, Voltage and Frequency**

(This item was adopted.)

**Source:** National Type Evaluation Technical Committee (NTETC) Weighing Sector

**Recommendation:** Amend T.N.8.3.1.(a) Power Supply, Voltage and Frequency as follows:

**(a) Weighing devices that operate using alternating current must perform within the conditions defined in paragraphs T.N.3. through T.N.7., inclusive, over the nominal line voltage with the tolerance –15 % to +10 % of the nominal, or the range as marked by the manufacturer. (Range takes precedence) ~~of 100 V to 130 V or 200 V to 250 V rms as appropriate, and over the frequency range of 59.5 Hz to~~ at 60.~~5~~ Hz.**

**Discussion:** NTEP Participating Laboratories reported an increase in the number of devices submitted for type evaluation with voltage ranges wider than the voltages listed in NIST Handbook 44 paragraph T.N.8.3.1. For example, a device might be marked with a voltage range of 80 V to 170 V. The Participating Laboratories believe that testing over the entire voltage range is not supported by language in paragraph T.N.8.3.1.

The NTETC Weighing Sector reviewed the Canadian and OIML requirements for maximum and minimum specified voltage. In the Canadian requirements, devices may be marked with a nominal voltage of 117 V, 225 V, or other voltage. When a device is marked with a voltage range the midpoint is taken as the nominal voltage. The device is tested at –15 % and +10 % of the marked nominal voltage. Devices marked with a range are tested to the greater of –15 % and +10 % of the midpoint of the nominal voltage or the maximum and minimum indicated voltage range values. OIML Recommendation 76-1, Nonautomatic Weighing Instruments, Part 1: Metrological and Technical Requirements - Tests (Edition 1992 E) requires testing the device at +10 % of the maximum marked voltage and –15 % of the minimum marked voltage.

The Weighing Sector's proposal to modify paragraph T.N.8.3.1.(a) required tests over the marked voltage range rather than a specified voltage range. Performance tests would be conducted at the device's marked maximum voltage, marked minimum voltage, and nominal voltage (voltage value at the midpoint of the range).

The Weighing Sector also questioned whether performance tests should be conducted during variations in frequency are appropriate. Currently, NTEP does not test for a change in line frequency of ∀ 0.5 Hz because test equipment is very expensive. Manufacturers indicated that today's weighing devices are capable of performing over a much larger voltage and frequency range than specified in Handbook 44 because devices are equipped with one version of power supply that is suitable for the worldwide marketplace.

The SWMA believes its proposed alternate language provides a requirement that harmonizes with OIML requirements.

The Committee reviewed the following alternate proposals to modify paragraph T.N.8.3.1.(a) submitted by the Weighing Sector and Southern Weights and Measures Association (SWMA), respectively.

T.N.8.3.1.(a) Power Supply, Voltage and Frequency.

(a) Weighing devices that operate using alternating current must perform within the conditions defined in paragraphs T.N.3. through T.N.7., inclusive, over the line voltage range <u>as marked</u> ~~of 100 V to 130 V or 200 V to 250 V rms as appropriate, and over the frequency range of 59.5 Hz to~~ <u>at</u> 60~~.5~~ Hz.

or

T.N.8.3.1. Power Supply, Voltage and Frequency.

(a) Weighing devices that operate <u>from a main power supply must perform within the conditions defined in paragraphs T.N.3. through T.N.7., inclusive if the power supply varies in voltage from – 15 % to + 10 % of the value marked on the device. If a range of voltage is marked, the device shall operate within the conditions defined in paragraphs T.N.3. through T.N. 7., inclusive at a voltage of + 10 % of the maximum voltage marked on the device and at a voltage of –15 % of the minimum voltage marked on the device</u> ~~using alternating current must perform within the conditions defined in paragraphs T.N.3. through T.N.7., inclusive, over the line voltage range of 100 V to 130 V or 200 V to 250 V rms as appropriate, and over the frequency range of 59.5 Hz to 60.5 Hz~~.

After reviewing the alternate proposals, the Committee agreed to modify an alternate SMA proposal to include test at 60 Hz. as shown in the recommendation. The Committee felt the end result was a requirement that provided the clearest guidelines on the voltage and frequency for a performance test.

The Committee recommended that all corresponding power supply, voltage and frequency requirements in other code sections be reviewed for clarity and consistency with the proposed language in paragraph T.N.8.3.1.(a).

**320-8 W UR.1.6. Average Net Load; Class III Scales**

(This item was withdrawn.)

**Source:** Carryover Item 320-3. (This item originated in the Central Weights and Measures Association (CWMA) and first appeared on the Committee's 2002 agenda.)

**Background/Discussion:** The Committee considered a proposal to add new paragraph UR.1.6. Average Net Load - Class III Scales and Table as follows:

*<u>UR.1.6. Average Net Load – Class III Scales. – To be suitable for its application, a Class III scale shall have a division such that the requirements of the following table are satisfied for the minimum and average loads weighed on the scale.</u>*

| *Range of Scale Capacities* | *Average Net Load ** |
|---|---|
| *Capacities up to and including 1000 kg (2500 lb)* | *Average net load ∃ 100d* |
| *Capacities greater than 1000 kg (2500 lb)* | *Average net load ∃ 500d* |

*[Nonretroactive as of January 1, 2003]*

** See Table 8 for recommended minimum load.*

Device suitability for particular commercial applications is a recurrent issue on the S&T Agenda and generates many questions in the weights and measures community. The proposal was intended to incorporate guidelines into NIST Handbook 44 requirements to assist business owners in the purchase of suitable equipment and to provide industry and weights and measures officials with a uniform method for assessing the suitability of a device for an application. The Committee discussed factors such as the size of the purchase (weight load), the size of the scale division, and the commodity price and how these factors affect the magnitude of the weighing error.

In 1992, the Committee considered a proposal from the CWMA to express the suitability requirements for scales as two separate formulas. Scales marked with an accuracy class would have been required to satisfy a formula for the minimum net load and a formula for the average net load. Scales not marked with an accuracy class would have had to comply with Table 7b which specifies a maximum value of d for a particular scale type or design. The scale division value was dependent on the scale capacity. The value of d for scales with capacities from 5 lb to 2500 lb, inclusive, were allowed to be a larger percentage of the minimum net load and average net load than scales with capacities less than 5 lb and greater than 2500 lb.

In 1994, the NCWM adopted guidelines to determine the average net load of purchases on Class III scales. The average net load information was used to evaluate the suitability of a scale for an application. However, the guidelines were not included in NIST Handbook 44 requirements, hence weights and measures officials find it difficult to enforce suitability requirements. Inconsistencies in the determination of a minimum load requirement for a device continue to be a concern to industry and weights and measures officials.

Regional weights and measures associations agreed that better criteria are needed to determine the suitability of a device. Several regional associations recommended that the proposal be made a developing item to allow time to develop appropriate criteria.

During its 2002 Interim Meeting, the CWMA reiterated its belief that weights and measures can obtain information about average net loads from the retailer. In instances where the retailer and weights and measures officials do not agree on the average net load, the burden of proof lies with the retailer. The CWMA also provided the following list of examples submitted by Nebraska which demonstrate how to determine the suitability of Class III scales used in specific applications.

CWMA Suitability Examples for
Average Net Load (ANL)

d – scale division
*NIST Handbook 44 specifies scale division "d" must be expressed in units of 1, 2, or 5

| | Typical Application | Example | Formula* |
|---|---|---|---|
| 1 | Supermarket Checkstand | • Most transactions involve produce that weighs from 0.5 lb to 5 lb, with infrequent weighments above and below that range<br>• The average net load is approximately 2 lb<br>• Using the formula for a scale with a capacity up to 2500 lb: A division of 0.02 lb or less is suitable | d ≤ 1 % x ANL<br>d ≤ 0.01 x 2 lb<br>d ≤ 0.02 lb |
| 2 | Supermarket Deli Scale | • Most transactions involve weighments between 0.25 lb to 3 lb<br>• The average net load is approximately 1 lb<br>• Using the formula for a scale with a capacity up to 2500 lb: A division of 0.01 lb or less is suitable | d ≤ 1 % x ANL<br>d ≤ 0.01 x 1 lb<br>d ≤ 0.01 lb |
| 3 | Specialty Shop Scale – Shopping Mall (30 lb x 0.01 lb electronic scale) | • Most transactions involve weighments of coffee, tea, tobacco, spices, or chocolates between 0.12 lb (2 oz) to 1 lb<br>• The average net load is approximately 0.5 lb<br>• Using the formula for a scale with a capacity up to 2500 lb: A division of 0.005 lb or less is suitable, the scale in use is not suitable for this application | d ≤ 1 % x ANL<br>d ≤ 0.01 x 0.5 lb<br>d ≤ 0.005 lb |
| 4 | Hopper Scale | • The average net load is approximately 9500 lb<br>• Using the formula for a scale with a capacity above 2500 lb: A division of 10 lb or less is suitable | d ≤ 2 % x ANL<br>d ≤ 0.02 x 9500 lb<br>d ≤ 19 lb * d is 10 lb |
| 5 | Platform Scale (500 lb x 4 oz scale for buying aluminum cans-new business) | • Weights and measures informs a business a device is suitable for weighments above 25 lb<br>• However the average net load is approximately 5 lb<br>• Using the formula for a scale with a capacity up to 2500 lb: A division of 0.05 lb or less is suitable | d ≤ 1 % x ANL<br>d ≤ 0.01 x 5 lb<br>d ≤ 0.05 lb |
| 6 | Grain Scale | • Most weighments are used for a moisture test<br>• The average net load is 250 g<br>• Using the formula for a scale with a capacity up to 2500 lb: A division of 0.1 g is suitable, in fact a d < 5 g is suitable | d ≤ 2 % x ANL<br>d ≤ 0.02 x 250 g<br>d ≤ 5 g |
| 7 | Other Scale | • Most weighments are of hog heads or sheep<br>• The average net load is 200 lb<br>• Using the formula for a scale with a capacity up to 2500 lb: A division of 2 lb or is suitable | d ≤ 1 % x ANL<br>d ≤ 0.01 x 200 lb<br>d ≤ 2 lb |
| 8 | Monorail Scale (packing house) | • Most weighments are of carcasses<br>• The average net load is 180 lb<br>• Using the formula for a scale with a capacity up to 2500 lb:<br>A division of 1 lb or less is suitable | d ≤ 1 % x ANL<br>d ≤ 0.01 x 180 lb<br>d ≤ 1.8 lb |

The Committee considered the CWMA's proposal to add new paragraph UR.1.6. Average Net Load – Class III Scales and associated Table to the Scales Code. The Committee acknowledged that guidelines to assist the scale user, service company, and weights and measures official in determining the suitability of a device for a weighing application are needed and long overdue. The Committee recommends that submitters of future proposals for such guidelines review Measurement Canada's table for minimum net loads. The Canadian table includes guidelines for the minimum net load for weighing applications based on the type of materials weighed. Each application has a minimum net load expressed as a multiple of the verification scale interval (e). The Committee finds that the proposal cannot be uniformly applied to all weighing applications it is intended to cover. Industry opposes the proposal citing that the concept is good, but the guidelines are unenforceable and subjective. Consequently, the Committee withdraws this item from its agenda.

For more background information, refer to the 1992 and 2002 S&T Final Reports.

**320-9 VC Appendix D; Definition for Concentrated Load Capacity (CLC); Dual Tandem Axle Capacity**

(This item was adopted.)

**Source:** Carryover Item 320-1B. (This item originated from the National Type Evaluation Technical Committee (NTETC) Weighing Sector and first appeared on the Committee's Agenda in 2001 as Item 320-4.)

**Recommendation:** Modify the definition of Concentrated Load Capacity in Appendix D as follows:

> **concentrated load capacity (CLC) (also referred to as Dual Tandem Axle Capacity (DTAC)). A capacity rating of a vehicle~~,~~ or axle-load~~, or livestock~~ scale, specified by the manufacturer, defining the maximum load ~~concentration~~ applied by a group of two axles with a centerline spaced 4 feet apart and an axle width of 8 feet for which the weighbridge is designed. ~~In the case of vehicle and axle-load scales, it is the maximum axle-load concentration (for a group of two axles with a centerline spaced 4 feet apart and an axle width of 8 feet) for which the weighbridge is designed as specified by the manufacturer.~~ The concentrated load capacity rating is for both test and use. [2.20]**

**Discussion:** In July 2002, the NCWM reconsidered language that prescribed the appropriate test load patterns, maximum test load, and capacity ratings for safe and adequate performance test of vehicle and livestock scales. The NCWM also considered as part of the 2002 proposal, language developed by the Weighing Sector that modified the definition of concentrated load capacity (CLC) to eliminate any reference to livestock scales. The CLC was intended to address the maximum load rating for a weighbridge based on a typical tandem axle vehicle's footprint rather than livestock loading patterns. The Sector's proposal was:

> concentrated load capacity (CLC). A capacity rating of a vehicle~~,~~ or axle-load ~~or livestock~~ scale, specified by the manufacturer, defining the maximum load ~~concentration~~ applied by a group of two axles with a centerline spaced 4 feet apart and an axle width of 8 feet for which the weighbridge is designed. ~~In the case of vehicle and axle-load scales, it is the maximum axle-load concentration (for a group of two axles with a centerline spaced 4 feet apart and an axle width of 8 feet) for which the weighbridge is designed as specified by the manufacturer.~~ The concentrated load capacity rating is for both test and use. [2.20]

The 2002 proposal did not receive the majority vote necessary to make changes to NIST Handbook 44. The item was returned to the Committee and is presented as two separate issues, Item 320-5 (to addresses test load patterns, maximum test load, and capacity ratings) and this recommendation addresses the definition of concentrated load capacity.

At their 2003 meetings, the Western Weights and Measures Association (WWMA) and Southern Weights and Measures Associations (SWMA) agreed to support an alternate proposal to change the definition of CLC. The associations noted that weighbridges are designed for a load applied by a group of two axles with a centerline spaced 4 feet apart and an axle width of 8 feet. The two (dual) axles are routinely referred to as a tandem axle. Industry representatives reported that dual tandem axle capacity (DTAC) is cited in equipment literature rather than CLC because users are not familiar with the concept of CLC. However, some manufacturers declare a CLC based on the amount of test weight applied during a shift test which exceeds the weighbridge design load. The associations were concerned that manufacturers who declare different CLC and DTAC ratings do not recognize that CLC refers to dual axles and that the ratings might mislead buyers.

The Committee agreed to recommend the WWMA and SWMA definition of concentrated load capacity shown in the recommendation above for adoption at the 2003 NCWM Annual Meeting. The WWMA/SWMA definition of CLC

addresses concerns about the appropriate use of the term DTAC in reference to a scale's rating and removes any reference to livestock scales. The Committee discussed that dual tandem axle vehicles are configured with two wheels on the end of the axle (for a total of eight tires) although it is possible for tandem axles with one wheel on each axle. Dual tandem axle capacity and CLC are equivalent and it would be misleading to state there is any difference. The CLC ratings allow the device user to compare the capacities of different devices. The load pattern and capacity for a device is the same for its dual tandem axle capacity and CLC.

For more background information, refer to the 2001 and 2002 S&T Final Reports.

**320-10A V Appendix D; Definitions of Substitution Test and Substitution Test Load**

(This item was adopted.)

*(Item 320-10 was separated into three parts, Items 320-10A, 320-10B, and 320-10C to facilitate review of the issues.)*

**Source:** Carryover Item 320-8 (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 2000 agenda as Item 320-6.)

**Recommendation:** The Committee recommends that the following definitions for "substitution test" and "substitution test load" be added to NIST Handbook 44, Appendix D; Definitions:

> **substitution test. - A scale testing process used to quantify the weight of material or objects for use as a known test load.**
>
> **substitution test load. - The sum of the combination of field standard test weights and any other applied load used in the conduct of a test using substitution test methods.**

**Discussion/Background:** Since 1999, the lack of a definition for the term "substitution test" has created much discussion and confusion between the meaning of the term "substitution load" and other related terms such as "strain load test," "build-up test," and "step test." Many discussions about "substitution tests" have focused on (1) the uncertainties associated with repeating the procedure, (2) the effects of the environment on uncertainties, (3) the ability to bring the amount of substituted materials to the exact amount of known test weights, (4) the need to address operational differences in technology (mechanical vs. electronic) and device types in test procedures, and (5) keeping test procedures separate from definitions.

At the 2002 NCWM Interim Meeting, the Committee agreed that the definition of substitution test developed by the New York Bureau of Weights and Measures adequately described the test load, test procedure, and relevant tolerances without being too restrictive or documenting the details for test procedures. The Committee also agreed with New York's proposed definition of test load which clarified that the term applies to the substitution process.

At the 2002 NCWM Annual Meeting, the Committee also reviewed a NIST recommendation to modify the current definition of "strain-load test" to be more consistent with New York's proposed definition of "substitution test" as follows:

> strain-load test. ~~The test of a scale beginning with the scale under load and applying known test weights to determine accuracy over a portion of the weighing range. The scale errors for a strain-load test are the errors observed for the known test loads only.~~ A scale testing procedure that uses a quantity of unknown material or objects in addition to known test weights in order to test a scale with a load greater than the known test weights. In this procedure, unknown material or objects are used to establish a reference load or tare to which known test weights are added. The tolerances to be applied to the change in indication of the unknown load to the sum of the indications for total unknown load and known test weights are based on the known test weights ~~load used for each error that is determined~~. Substitution test loads can be used in lieu of known test weights.

The proposal developed by New York was kept an information item to allow sufficient time to determine if there are acceptable limits for the variation between the scale indications for known test weight and the substitution load. The Committee also wanted to revise the definition by moving any references to test procedures into the appropriate Examination Procedure Outline.

During its September 2002 Technical Conference, the WWMA agreed to support the definitions for substitution test, substitution test load, and strain load. The WWMA recommended that appropriate procedures be developed for using the substitution test method for mechanical and electronic devices and that the information be included in an Examination Procedure Outline**.**

At its 2002 Interim Meeting, the CWMA developed an alternate proposal for a new definition of "substitution test" and to modify the current definition of "strain-load test" to eliminate language that referenced test procedures. The CWMA also proposed to eliminate any confusion between the terms substitution test and strain-load test by creating separate procedures and tolerances for each test method.

The Committee heard numerous comments from NCWM members who earlier proposed alternate definitions, but were now in favor of the substitution test and substitution test load definitions, and separate test notes and tolerances for substitution test and strain-load test developed by the CWMA. The Committee found the CWMA proposal effectively separates procedural language from the definitions thereby eliminating any confusion about how to conduct the tests.

The Committee agreed to support CWMA's proposal shown in the recommendation above. The Committee split the proposal into three separate items, 320-10A, 320-10B, and 320-10C, as recommended by the CWMA.

The Committee agreed with the Scale Manufacturers Association's recommendation to remove the term "unknown" from the definition for substitution test because it is misleading. The Committee notes that during a substitution test the official knows what materials or objects are substituted but must also quantify them to conduct the test.

For additional background information on this item, refer to the 2000, 2001, and 2002 S&T Final Reports.

**320-10B V N.1.11. Substitution Test and T.N.3.11. Tolerances for Substitution Test**

(This item was adopted.)

*(Item 320-10 was separated into three parts, Items 320-10A, 320-10B, and 320-10C to facilitate review of the issues.)*

**Source:** Carryover Item 320-8 (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 2000 agenda as Item 320-6.)

**Recommendation:** Add new paragraphs N.1.11. Substitution Test and T.N.3.11. Tolerances for Substitution Test to the NIST Handbook 44 Scales Code as follows:

**N.1.11. Substitution Test. - In the substitution test process, material or objects are substituted for known test weights, or a combination of known test weights and previously quantified material or objects, using the scale under test as a comparator. Additional test weights or other known test loads may be added to the known test load to evaluate higher weight ranges on the scale.**

**T.N.3.11. Tolerances for Substitution Test. - Tolerances are applied to the scale based on the entire test load.**

**Discussion:** Since 1999, the Committee has discussed numerous proposals to define "substitution test" and related terms such as "strain-load test" to clarify any confusion about test methods for large capacity scales.

At its 2002 Interim Meeting, the CWMA developed an alternate proposal for a new definition of "substitution test" and to modify the current definition of "strain-load test" to eliminate any references to test procedures. The CWMA also proposed to eliminate any confusion between the terms substitution test and strain-load test by creating separate procedures and tolerances for each test method.

The Committee heard numerous comments from NCWM members who proposed alternate definitions, but were now in favor of the substitution test and substitution test load definitions and separate test notes and tolerances for substitution test and strain-load test developed by the CWMA. The Committee found the CWMA proposal effectively separates procedural language from definitions thereby eliminating confusion about how to conduct the tests. The Committee may revisit this issue when New York completes its work on procedures that will allow officials to assess the uncertainty for specific scale installations and applications.

The Committee agreed to support CWMA's proposal shown in the recommendation above. The Committee split the proposal into three separate items, 320-10A, 320-10B, and 320-10C, as recommended by the CWMA.

The Committee agreed with the Scale Manufacturers Association's recommendation to remove the term "unknown" from the test note for substitution test because it is misleading. The Committee notes that during a substitution test the official knows what materials or objects are substituted but must also quantify them to conduct the test. The Committee also modified the substitution test tolerance to ensure that tolerances are applied to the entire test load which can be test standards or other quantified material.

The background and rationale for this item are provided in Item 320-10A.

**320-10C V N.1.12. Strain-Load Test and T.N.3.12. Tolerances for Strain-Load Test**

(This item was adopted.)

*(Item 320-10 was separated into three parts, Items 320-10A, 320-10B, and 320-10C to facilitate review of the issues.)*

**Source:** Carryover Item 320-8 (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 2000 agenda as Item 320-6.)

**Recommendation:** Add new paragraphs N.1.12. Strain-Load Test and T.N.3.12. Tolerances for Strain-Load Test to NIST Handbook 44 Scales Code as follows:

**N.1.12. Strain-Load Test. - In the strain load test procedure, an unknown quantity of material or objects are used to establish a reference load or tare to which test weights or substitution test loads are added.**

**T.N.3.12. Tolerances for Strain-Load Test. - The tolerances apply only to the test weights or substitution test load.**

Modify Table 4 Minimum Test Weights and Test Loads Note 3 as follows:

**[3] The scale shall be tested from zero to at least 12.5 % of scale capacity using known test weights and then to at least 25 % of scale capacity using either a substitution or strain load test that utilizes known test weights of at least 12.5 % of scale capacity. Whenever practical, a strain-load test should be conducted to the used capacity of the scale. When a strain load test is conducted, the tolerances appl~~ies~~y only to the ~~known~~ test ~~load~~ weights and substitution test load.**

**Discussion:** Since 1999, the Committee has discussed numerous proposals to define "substitution test" and related terms such as "strain-load test" to clarify any confusion about test methods for large capacity scales.

At its 2002 Interim Meeting, the CWMA developed a proposal to modify the current definition of "strain-load test" to eliminate all procedural language. The CWMA also proposed to eliminate any confusion between the terms substitution test and strain-load test by creating separate procedures and tolerances for each test method.

The Committee heard numerous comments from NCWM members who proposed alternate definitions, but were now in favor of the substitution test and substitution test load definitions and separate test notes and tolerances for substitution test and strain-load test developed by the CWMA. The Committee found the CWMA proposal effectively separates procedural language from definitions thereby eliminating confusion on how to conduct the tests. The Committee may revisit this issue when New York completes its work on procedures that will allow officials to assess the uncertainty for specific scale installations and applications.

The Committee agreed to support CWMA's proposal shown in the recommendation above. The Committee split the proposal into three separate items, 320-10A, 320-10B, and 320-10C, as recommended by the CWMA.

The Committee clarified that in the strain-load test procedure it is an unknown quantity of material or objects that are used to establish a reference load or tare to which either test weights or a substitution test load is added to reach scale capacity. The Committee modified paragraph T.N.3.12. for the strain load test tolerance to agree with the strain-load test

tolerances described in Table 4 Minimum Test Weights and Test Loads. The Committee noted that there should be consistency in the terminology used in related requirements in the Scales Code.

The background and rationale for this item are provided in Item 320-10A

**320-11 I N.1.3.4.X. Weight Carts**

**Source:** Northeastern Weights and Measures Association (NEWMA)

**Recommendation:** Add new paragraph N.1.3.4.1. to the Scales Code as follows:

> **N.1.3.4.X. Weight Carts. - Weight carts may be included as part of the minimum required test load required in N.1.3.4. provided that the mass value of the weight cart has been determined by weights and measures and is clearly marked thereon. Further, a certificate of calibration issued by the weights and measures jurisdiction that issued the weight certificate must be available at all times. Said certificate shall contain at a minimum the following information: date of calibration, name, model, and serial number of the weight cart, the minimum graduation of the scale used in the calibration of the weight cart, and the name of the jurisdiction and inspector or metrologist who determined the mass value.**

**Discussion:** This item first appeared on the Committee's 2003 agenda as Developing Item 360-3, Appendix B Item 1. The Committee changed the proposal's status to an information item because corresponding work to develop weight cart standards was nearing completion on NIST 105-8, "Specifications and Tolerances for Field Standard Weight Carts." This proposal is intended to modify the NIST Handbook 44 Scales Code to recognize the use of weight carts during a shift test

The Committee heard comments from the private and public sectors. The Scale Manufacturers Association supported the proposal. Several weights and measures jurisdictions indicated concern about how their weight carts will comply with Handbook 105-8, especially the requirement for a maximum fuel tank capacity of one gallon.

The NIST Working Group on Weight Carts conducted more in depth reviews of fuel tank requirements. The Working Group planned to define a reasonable standard that allows existing weight carts to operate. Other issues briefly discussed were the effects of weight cart uncertainties on the error limits for standards specified in Appendix A Fundamental Considerations Associated with the Enforcement of Handbook 44 Codes.

The Committee upgraded the proposal's status from a developing item to an information item in anticipation of the final publication of Handbook 105-8 to ensure that work on the proposed Handbook 44 standard is consistent with corresponding standards in Handbook 105-8.

The Committee did not receive further comments on this item. The work to complete NIST Handbook 105-8 was scheduled for completion after the Committee met during the NCWM 2003 Annual Meeting. The Committee acknowledged that historically the field standard verification intervals are established as often as regulation and circumstances warrant by the jurisdiction. The weight cart standards for accuracy and traceability are addressed in the Handbook 105 series.

**322 Automatic Bulk Weighing Systems**

**322-1 I Tolerances**

**Source:** Carryover Item 322-1. This item originated from the Northeastern Weights and Measures Association (NEWMA) and first appeared on the Committee's 2002 agenda.)

**Recommendation:** Delete paragraphs T.1.4., T.2., T.2.1, T.3.2. and T.3.3.; renumber paragraphs T.3. and T.3.1.; add new paragraphs T.2.2, T.2.3., and T.2.3.1.,Table 1, and Table 2; and add a new footnote to Section 2.20 Scales Table 1.1.1. as follows:

> ~~**T.1.4. To Tests Involving Digital Indications or Representations. - To the tolerances that would otherwise be applied, there shall be added an amount equal to one-half the value of the scale division. This does not apply to digital indications or recorded representations that have been corrected for rounding using error weights.**~~

~~**T.2. Minimum Tolerance Values. – The minimum tolerance value shall not be less than half the value of the scale division.**~~

~~**T.2.1. For Systems used to Weigh Construction Materials. - The minimum maintenance and acceptance tolerance shall be 0.1 percent of the weighing capacity of the system, or the value of the scale division, whichever is less .**~~

~~**T.3.2. For Systems used to Weigh Grain. - The basic maintenance tolerance shall be 0.1 percent of test load.**~~

~~**T.3.3. For all Other Systems. - The basic maintenance tolerance shall be 0.2 percent of test load.**~~

Renumber paragraphs T.3. and T.3.1. as follows:

**T.~~3~~.2. Basic Tolerance Values.**

**T.~~3~~.2.1. Acceptance Tolerance. -The basic acceptance tolerance shall be one-half the basic maintenance tolerance but never less than 1 division.**

Add new paragraphs T.2.2, T.2.3., and T.2.3.1., Table 1, and Table 2 as follows:

**T.2.2. General. - The tolerance applicable to devices not marked with an accuracy class shall have the tolerances applied as specified in Table 1. below.**

| Table 1. Tolerance for Unmarked Scales | | | |
|---|---|---|---|
| **Type of Device** | **Tolerance** | **Decreasing Load Multiplier** | **Other applicable Requirements** |
| **Grain Hoppers** | **Class III, T.2.3 (Table 2)** | **1.0** | **T.2.1., T.2.3.1** |
| **Other Systems** | **Class III L, T.2.3 (Table 2)** | **1.0** | **T.2.1., T.2.3.1** |

**T.2.3. Tolerances Applicable to Devices Marked III or III L.**

**T.2.3.1. Maintenance Tolerance Values - The maintenance tolerance values are specified in Table 2 below.**

| Table 2. Maintenance Tolerance for Marked Scales (All values in this table are in scale divisions) Tolerance in scale divisions | | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **5** |
| **Class** | **Test Load** | | | |
| **III** | **0 - 500** | **501 - 2000** | **2001 - 4000** | **4001 +** |
| **III L** | **0 - 500** | **501 - 1000** | **(Add 1d for each additional 500 d or fraction thereof)** | |

Add a new footnote to Section 2.20 Scales Code Table 1.1.1. Tolerances for Unmarked Scales as follows:

**[x] Automatic bulk weighing systems see Section 2.22 for specifications and tolerances.**

**Discussion:** NEWMA recommended changing the prescribed tolerances for automatic bulk weighing systems from a percentage basis to division values which are based on the device's accuracy class. NEWMA believes this change will align tolerances in the Automatic Bulk Weighing Systems (ABWS) Code and Scales Code. Additionally, NEWMA believes a footnote should be added to the Scales Code Table T.1.1. to avoid any confusion over which devices that can be classified as automatic bulk weighing systems.

The Committee recognized there is confusion over which weighing systems fall under the Automatic Bulk Weighing Systems Code. At the 2002 NCWM Annual Meeting, the Committee encouraged the Technical Advisors to develop materials on automatic bulk weighing systems in time for presentations at the 2002 fall regional weights and measures association meetings. Consequently, the Committee kept this an information item.

During the its September 2002 Technical Conference, the Western Weights and Measures Association joined the USDA Grain Inspection Packers and Stockyard Administration (GIPSA) in expressing concerns about the proposed increases to tolerances for automatic bulk weighing systems. Consequently, the WWMA recommended the NCWM S&T Committee withdraw this item.

NEWMA reported that New York supports returning the item to voting status. New York believes the changes to the tolerances are necessary to align this code with the Scale Code. At the 2003 NCWM Interim Meeting, New York provided the Committee and GIPSA with charts and tables to demonstrate that the proposed tolerances, based on scale divisions, would result in minor changes in the current tolerances. The charts were available.

The Committee acknowledged there is still confusion about which code applies to hopper scales such as systems used in grain and asphalt applications. The entire weights and measures community would benefit from efforts to clarify this point. The Committee notes that adding a controller to a hopper or a hopper that makes a limited number of drafts (continuous) cannot be classified as an ABWS. Typically, an ABWS must record a load and no load for each successive draft.

The Committee made the proposal an information item to allow GIPSA and New York additional time to work through accuracy class and percentage based tolerance data. Both agencies reiterated their earlier positions on modifying the ABWS Code tolerances. GIPSA indicated there is a problem with the proposal because it represents a tolerance based on accuracy class which results in a substantial cumulative error. New York stated the benefits to an accuracy class tolerance go beyond harmonizing the requirements in the ABWS and Scales Codes. One option discussed to resolve GIPSA's concerns about the impact of the proposed tolerances on weighing operations, where GIPSA has oversight, is to create an exemption for all grain scales similar to what exist in the Scales Code.

The Committee encourages New York and GIPSA to continue their work to develop a set of tolerances that is mutually agreeable and appropriate for ABWS.

For more background information, refer to the 2002 S&T Final Report.

**324 Automatic Weighing Systems**

**324-1 I Tentative Status of the Automatic Weighing Systems Code**

**Source:** Carryover Item 324-1. (This item originated from the Southern Weights and Measures Association (SWMA) and first appeared on the Committee's 2002 agenda.)

**Recommendation:** Change the status of the Automatic Weighing Systems (AWS) Code from tentative to permanent.

**Discussion:** The Automatic Weighing Systems Code was added to the 1996 edition of NIST Handbook 44 as a Tentative Code. In 2002, the adoption of the code as a permanent code in Handbook 44 was delayed to resolve issues with several NTEP test criteria which are based on the code's requirements. On October 2-3, 2002, in Annapolis, Maryland, a work group met to review any remaining code issues. The group discussed Handbook 44 requirements that limit a device to operating in a single unit of measure. The group questioned the need for NTEP laboratories to perform line frequency and barometric pressure tests. The group also noted that there are inconsistencies in the titles of several requirements.
The Committee recognized that the entire AWS Work Group has not had the opportunity to review and comment on a first draft of proposed changes to the AWS Code. The Committee also heard that one member of the AWS Group plans to submit changes to the draft. Therefore, the Committee made the proposal an information item.

During its 2003 NCWM Annual Meeting Open Hearing session, the Committee was notified by NIST that the Work Group's final comments are available in electronic format. The Committee requested that all interested parties review this document. The Committee anticipates that the AWS Work Group will shortly conclude its work on any remaining issues with the AWS Code and any recommendations to modify Handbook 44 will be reviewed at the fall 2003 Weighing Sector and regional weights and measures associations meetings.

For more background information, refer to the 2002 S&T Final Report.

## 330 Liquid-Measuring Devices

### 330-1 I S.2.2.1. Multiple Measuring Elements With a Single Provision for Sealing

**Source:** National Type Evaluation Technical Committee Measuring Sector

**Recommendation:** Add new paragraph to NIST Handbook 44, Section 3.30. Liquid-Measuring Devices S.2.2.1. Multiple Measuring Elements with a Single Provision for Sealing as follows:

> **S.2.2.1. Multiple Measuring Elements with a Single Provision for Sealing. - A change to the adjustment of any measuring element within any multi-product dispenser with a single provision for sealing multiple measuring elements must be identified.**

**Background/Discussion:** At the June 2002 NTEP Laboratory Meeting, one of the participating laboratories indicated that field officials in their jurisdiction are having difficulty with multi-product dispensers that have only one sealing mechanism for two or more measuring elements. If a field official rejects a meter for not meeting performance requirements, they have no way of determining which measuring elements have been recalibrated when they reinspect the dispenser. During reinspection, the field official may be required to test all grades and blends offered through the rejected dispenser to determine that only the rejected measuring element was adjusted.

At its October 2002 meeting, the NTETC Measuring Sector developed the proposal shown above which requires devices to provide a clear indication of which measuring elements have been adjusted. The Sector agreed to forward the proposal to the Committee for consideration.

At its October 2002 Annual Meeting, the SWMA recommended that the proposal to add a new paragraph to NIST Handbook 44, Section 3.30. Liquid-Measuring Devices paragraph S.2.2.1. be forwarded to the Committee as an information item.

At the 2003 NCWM Interim Meeting, the Committee heard support for clearly identifying, in a manner that is readily available to the field official, any measuring element that is adjusted and agreed that the item has merit. Device manufactures stated that identifying any measuring element that is adjusted is possible on dispensers that have only one sealing mechanism for two or more measuring elements. The Committee gave the item informational status to provide device manufacturers the opportunity to study the issue and develop means for complying with the proposed requirements.

At the 2003 NCWM Annual Meeting, the Committee heard support for the item. One manufacturer opposed the item because they believe that the proposal means a lead wire seal is no longer a sufficient method of sealing; however, their company is looking at ways to be able to meet the proposed requirement. The Committee agreed that the item should remain an information item to provide device manufacturers additional time to develop means for complying with the proposed requirements.

### 330-2 VC S.4.4.1. Discharge Rates

(This item was adopted.)

**Source:** National Type Evaluation Technical Committee Measuring Sector

**Recommendation:** Modify NIST Handbook 44, Section 3.30. Liquid-Measuring Devices (LMD) S.4.4.1. as follows:

> ***S.4.4.1. Discharge Rates. - On a retail device with a designed maximum discharge rate of 115 L (30 gal) per minute or greater, the maximum and minimum discharge rates shall be marked ~~on an exterior surface of the device and shall be visible after installation~~ in accordance with S.4.4.2. The marked minimum discharge rate shall not exceed 20 % of the marked maximum discharge rate.***
>
> **Example: With a marked maximum discharge rate of 230 L/min (60 gpm), the marked minimum discharge rate shall be 45 L/min (12 gpm) or less (e.g., 40 L/min (10 gpm) is acceptable). A marked minimum discharge rate greater than 45 L/min (12 gpm) (e.g., 60 L/min (15 gpm)) is not acceptable.**

**Background/Discussion:** During its 2002 Annual Meeting, the NCWM amended LMD Code paragraph S.4.4. Retail Devices by adding a new paragraph, S.4.4.2. *Location of Marking Information; Retail Motor-Fuel Dispenser* that requires that markings for G-S.1. Identification be located within a specified range of heights either inside or on the outside of the dispenser. During the 2002 Measuring Sector meeting, it was noted that the marking requirements for discharge rates are required to be located on an external surface of the device without any reference to being located within a specified height range. The Sector indicated that it is also appropriate to include the markings for discharge rates required in paragraph S.4.4.1. with the other markings in accordance with the requirements of paragraph S.4.4.2. Some weights and measures officials have incorrectly interpreted paragraph S.4.4.1. to mean that a flow rate greater than or less than 20 % of the maximum discharge is not acceptable. The Sector agreed to forward a proposal to the S&T Committee through the SWMA to modify S.4.4.1. that includes an example of how the requirement should be applied as shown above.

At its October 2002 Annual Meeting the SWMA supported the proposed modification to S.4.4.1. and the example and recommended it be forwarded to the S&T Committee as a voting item.

At the 2003 NCWM Interim Meeting, the Committee heard no comments on this item and agreed to present it for a vote at the 2003 NCWM Annual Meeting.

At the 2003 NCWM Annual Meeting, the Committee heard no opposition to this item. The Committee was asked to clarify that the minimum and maximum discharge rates referred to rates marked on the device and not the rates developed at an installation. The committee agreed to modify the proposed S.4.4.1. to clarify that the minimum and maximum discharge rates in the proposal refer to the marked minimum and maximum discharge rates. The committee also agreed that a reference to the example in S.4.4.1. should be added to S.5.2. in Section 3.31. Vehicle-Tank Meters, S.4.2. in Section 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices, S.4.2. in Section 3.35 Milk Meters, and S.4.2. in Section 3.38 Carbon Dioxide Liquid-Measuring Devices.

### 330-3 W UR.1.2. Nozzle Requirements

(This item was withdrawn.)

**Source:** Carryover Item 330-4. (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 2002 agenda.)

**Recommendation:** Add a new paragraph to NIST Handbook 44, Section 3.30. Liquid-Measuring Devices UR.1.2. as follows:

> **UR.1.2. Nozzle Requirements for Diesel. On a retail motor-fuel device any hose from which diesel fuel is sold shall have a nozzle with an outside diameter of not less than 23.6 mm (0.93 in).**

**Background/Discussion:** At the August 2001 WWMA Conference, Idaho Weights and Measures reported receiving complaints from consumers who accidentally put diesel fuel into a gasoline-powered vehicle. The complaints were investigated and inspectors found that the pumps were properly labeled, but people still accidentally selected the wrong product. The intention of the proposed user requirement is to reduce the chances of accidentally putting diesel fuel into a gasoline-powered vehicle. Idaho reported that many retail motor-fuel dispenser manufacturers follow the minimum size specification in the Society of Automotive Engineers (SAE) Recommended Practice, J285, revised September 1992. SAE, J285 recommends that nozzle spouts for unleaded fuels have a nominal outside diameter of 20.6 mm (13/16 in) and that for all other fuels the nominal outside diameter should be 23.8 mm (15/16 in), but not less than 23.6 mm (0.93 in). However, station owners and service agents frequently replace these nozzles with nozzles that have a spout designed for dispensing unleaded gasoline. Since 1992 date automotive manufacturers have recommended for some time that fueling components meet this specification so that nozzles dispensing diesel fuel will not fit into the filler neck of unleaded gasoline powered vehicles.

At the 2002 NCWM Annual Meeting, this item did not pass or fail; therefore, it was returned to the Committee for further consideration.

At its September 2002 Interim Meeting, the Central Weights and Measures Association recommended that this item be moved to the L&R Committee Agenda.

At its September 2002 Annual Meeting, the WWMA received documentation that the SAE Recommended Practice, J285, was reaffirmed in 1999. The WWMA recommended that the proposal be modified to include an effective date of January 1, 2005.

At its October 2002 Interim Meeting, the Northeastern Weights and Measures Association recommended that this item be withdrawn from the agenda.

At its October 2002 Annual Meeting, the Southern Weights and Measures Association was provided information on the cost of a nozzle spout for unleaded fuel and the recommended larger spout for diesel fuel to demonstrate that this proposal would cause no economic hardship for device owners and continues to support this item.

At the 2003 NCWM Interim Meeting, the Committee heard comments similar to those received at previous meetings that relate to whether or not this is a weights and measures enforcement problem. The Committee agreed to present the item for a vote at the 2003 NCWM Annual Meeting and let the NCWM vote the item up or down.

At the 2003 NCWM Annual Meeting, Florida, North Carolina, and Missouri supported this item. California, Iowa, Michigan and the Michigan Weights and Measures Association opposed the item. Wisconsin agreed there is a problem, but didn't believe it is a weights and measures issue and therefore opposed this item. One official stated that passing this item would not solve the problem, he stated that it is the responsibility of service station industry to resolve the problem. Another official stated that this is a weights and measures issue. The Committee agreed that if this item remained a voting item it would not receive sufficient yea votes to pass or nay votes to fail and would return to the Committee as it did last year. The Committee decided that since there is a similar proposal being considered by the Laws and Regulations Committee for adding a requirement to Handbook 130, Uniform Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation, Item 330-3 should be withdrawn from the Committee's Agenda.

For more background information, refer to the NCWM 2002 S&T Final Report.

**330-4 I UR.2.5.1. Measuring Element Identification, and UR.2.5.2. Product Storage Identification**

(This item was changed from a voting item to an information item at the 2003 NCWM Annual Meeting)

**Source:** National Type Evaluation Technical Committee Measuring Sector

**Recommendation:** Modify NIST Handbook 44, Section 3.30. Liquid-Measuring Devices UR.2.5. as follows:

**UR.2.5. Product ~~Storage~~ Identification.**

**UR.2.5.1. Measuring Element Identification.**

**(a) The measuring elements of any multi-product dispenser shall be permanently, plainly, and visibly identified as to product being measured.**

**(b) When the measuring elements of any multi-product dispenser are marked by means of a color code, the color code key shall be conspicuously displayed at the place of business.**

**UR.2.5.2. Product Storage Identification.**

**(a) The fill connection for any petroleum product storage tank or vessel supplying motor-fuel devices shall be permanently, plainly, and visibly marked as to product contained.**

**(b) When the fill connection device is marked by means of a color code, the color code key shall be conspicuously displayed at the place of business.**

**Background/Discussion:** At the June 2002 NTEP Laboratory Meeting, one of the participating laboratories indicated that field officials in their jurisdiction are sometimes unable to determine which measuring element is associated with a particular grade or blend of fuel on multi-product dispensers. This is because some newer dispensers, have measuring elements with no external drive to a pulser or mechanical indicator, and therefore provide no visible means for the official to be able to determine when a specific measuring element is in operation. During a field examination of a multi-product

dispenser if one grade or blend is rejected for not meeting performance requirements, the official does not know which measuring element to mark or tag as rejected. During reinspection, the field official may be required to test all grades and blends offered through the rejected dispenser to determine that only the rejected measuring element was adjusted.

At its October 2002 meeting, the NTETC Measuring Sector developed a proposal that requires a measuring element without an individual physical seal within any multi-product dispenser be plainly and visibly identified as to the product being measured. The Sector agreed to forward the proposal to the Committee through the SWMA.

At its October 2002 Annual Meeting, the SWMA recommended that the proposed modification to NIST Handbook 44, Section 3.30. Liquid-Measuring Devices paragraph UR.2.5. be forwarded to the Committee as a voting item.

At the 2003 NCWM Interim Meeting, the Committee heard support for the proposal. Device manufacturers agreed that this requirement would also assist service agencies to identify measuring elements needing adjustment. The manufacturers also reported that, the majority of the devices currently in the market place have external moving parts that facilitate the association of a specific measuring element with the product type being delivered. The Committee believes it is important that a field official be able to identify the product delivered by each measuring element and agreed to present the item for a vote at the 2003 NCWM Annual Meeting.

At the 2003 NCWM Annual Meeting, a manufacturer of retail motor-fuel dispensers stated that the company makes some dispensers where the measuring elements are not readily accessible. A representative of a fuel distribution company asked if the requirement would be retroactive or nonretroactive. As a retroactive requirement could create a hardship for service station owners. WMD suggested that if color codes are to be used for identifying measuring elements and for product storage within the same facility they should be consistent. The Committee agreed that if a color code is used for identifying measuring elements and product storage fill connections they should be the same. The Committee changed the item to informational and requested that the NTETC Measuring Sector reconsider the proposal to clarify that the requirement is intended to apply to measuring elements that have no visible moving mechanical parts and whether or not the requirement should be retroactive.

### 330-5 V UR.3.6.3. Temperature Compensation Wholesale – When to be Used

(This item was adopted.)

**Source:** Southern Weights and Measures Association (SWMA)

**Recommendation:** Revise NIST Handbook 44, Section 3.30. Liquid-Measuring Devices by adding a new paragraph UR.3.6.3. that requires the buyer and seller of products measured or calculated using temperature compensation to do so for a twelve-month period, unless mutually agreed in writing to do otherwise. The revision is as follows:

> **UR.3.6.3. Period of Use - When fuel is bought or sold on an automatic or nonautomatic temperature-compensated basis, it shall be ~~done~~ bought or sold using this method over at least a consecutive 12-month period, unless otherwise agreed to by the buyer and the seller in writing.**

**Background/Discussion:** At the 2002 SWMA Annual Meeting, a weights and measures official expressed concern that temperature compensation is being selectively used during different times of the year. Depending on the temperature during the measurement, the product may be expanded or contracted and either the buyer or the seller may have an advantage. If a company uses temperature compensation, it must be used for a consecutive 12-month period to prevent selective use of temperature compensation. The SWMA agreed that the issue has merit and recommended it be forwarded to the Committee as an information item.

At the 2003 NCWM Interim Meeting, comments made during the open hearings suggested that the requirement should clearly state that it applies to sales that are compensated for the effect of temperature whether the compensation is done automatically or manually using a calculator and that any agreement between the buyer and seller to not use temperature compensation should be in writing. The Committee agreed and developed the new paragraph UR.3.6.3. (proposed as a revision to paragraph UR.3.6.1.2. in the 2003 Interim agenda) shown above to be presented for a vote at the Annual Meeting.

At the 2003 NCWM Annual Meeting, the Meter Manufacturer's Association (MMA) supported this item. The Committee received objections to this item. The paragraph number for this item was changed in Publication 16, but the

title for this item was not. The Committee modified the title and agreed that in the proposed paragraph UR.3.6.3, the word "done" should be replaced with the words "bought or sold using this method."

**330-6 I Appendix D; Definition of Retail Device**

**Source:** Carryover Item 330-7 (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 1999 agenda as Item 330-5.)

**Recommendation:** Modify the definition of retail devices as follows:

**retail device. A device primarily used for non-resale use.**

~~**single deliveries of less than 378 L (100 gal),**~~

~~**retail deliveries of motor fuels to individual highway vehicles, or**~~

~~**single deliveries of liquefied petroleum gas for domestic use and liquefied petroleum gas or liquefied anhydrous ammonia for nonresale use.**~~
**[3.30, 3.31, 3.32, 3.37]**

**Background/Discussion:** During the 2001 NCWM Annual Meeting, the Committee considered several proposals that define retail devices as those that deliver product to the ultimate consumer. The Committee agreed that these proposals change the classification of some devices, previously classified as wholesale devices, to retail devices that are held to a lesser tolerance.

In 2002 the Committee agreed that if the proposals in Items 330-3A, 330-3B, and 331-3, to base tolerances on accuracy classes rather than the application of the device were adopted, changes to the definition would be unnecessary and this item could be withdrawn from its agenda. Items 330-3A and 331-3 were adopted. Item 330-3B was carried over as informational to provide the regional associations the opportunity to identify and discuss any negative impact it would have on the affected codes in NIST Handbook 44.

At its September 2002 Interim Meeting, the Central Weights and Measures Association agreed that the word "primarily" is ambiguous and should be removed from the proposal.

At its September 2002 Annual Meeting, the WWMA supported the item as proposed.

At its October 2002 Interim Meeting, the Northeastern Weights and Measures Association (NEWMA) agreed that this item is unnecessary if accuracy classes are adopted for Section 3.32. through Section 3.36. and Section 3.38.

At the 2003 NCWM Interim Meeting, the Committee heard that even with the adoption of the accuracy class tables last year, a definition of "retail device" is still needed because the term retail is referenced in several paragraphs in the Liquid-Measuring Devices code and in other measuring device codes of NIST Handbook 44. The Committee believes that the term "primarily" in the retail device definition, is appropriate to provide weights and measures officials some flexibility for determining the applicability of various requirements on a case-by-case basis. The Committee agreed that the item should remain informational to allow further study of all the codes potentially affected by the change.

At the 2003 NCWM Annual Meeting, the Committee heard that at its May 2003 Meeting, the NEWMA received comments that the use of the word "primarily" and the phrase "non-resale use' are not definitive and will lead to further confusion. WMD recommended an alternate definition of retail device as follows:

**retail device. A device primarily used for weighing or measuring a finished product or commodity that will not be offered for sale in the same form.**

The Committee agreed that the item should remain informational to allow further consideration by the regional weights and measures associations.

For more background information, refer to the 1999 through 2002 S&T Final Reports.

## 331 Vehicle-Tank Meters

### 331-1 V Recognition of Temperature Compensation

(This item did not pass or fail; therefore it returns to the Committee.)

**Source:** Carryover Item 331-1 (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 2000 agenda as Item 331-1.)

**Recommendation:** Modify NIST Handbook 44, Section 3.31. Vehicle-Tank Meters Code (VTM) by adding the following paragraphs to recognize temperature compensation as follows:

**S.2.4. Automatic Temperature Compensation for Refined Petroleum Products.**

**S.2.4.1. Automatic Temperature Compensation for Refined Petroleum Products. - A device may be equipped with an automatic means for adjusting the indication and registration of the measured volume of product to the volume at 15 °C (60 °F), where not prohibited by State Law.**

**S.2.4.2. Provision for Deactivating. - On a device equipped with an automatic temperature-compensating mechanism that will indicate or record only in terms of liters (gallons) compensated to 15 °C (60 °F), provision shall be made for deactivating the automatic temperature-compensating mechanism so that the meter can indicate and record, if it is equipped to record, in terms of the uncompensated volume.**

**S.2.4.2.X. Gross and Net Indications – A device equipped with automatic temperature compensation shall indicate and record, if equipped to record, both the gross (uncompensated) and net (compensated) volume for testing purposes. If both values cannot be displayed or recorded for the same test draft, means shall be provided to select either the gross or net indication for each test draft.**

**S.2.4.3. Provision for Sealing Automatic Temperature Compensating Systems. – Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that an automatic temperature-compensating system cannot be disconnected and that no adjustment may be made to the system.**

**S.2.4.4. Temperature Determination with Automatic Temperature Compensation. - For test purposes, means shall be provided (e.g., thermometer well) to determine the temperature of the liquid either:**

**(a) in the liquid chamber of the meter, or**

**(b) immediately adjacent to the meter in the meter inlet or discharge line.**

**S.5.6. Temperature Compensation for Refined Petroleum Products. - If a device is equipped with an automatic temperature compensator, the primary indicating elements, recording elements, and recording representation shall be clearly and conspicuously marked to show that the volume delivered has been adjusted to the volume at 15 °C (60 °F).**

**N.4.1.3. Automatic Temperature Compensating Systems for Refined Petroleum Products. - On devices equipped with automatic temperature-compensating systems, normal tests shall be conducted:**

**(a) by comparing the compensated volume indicated or recorded to the actual delivered volume corrected to 15 °C (60 °F); and**

**(b) with the temperature-compensating system deactivated, comparing the uncompensated volume indicated or recorded to the actual delivered volume.**

**The first test shall be performed with the automatic temperature-compensating system operating in the "as found" condition. On devices that indicate or record both the compensated and uncompensated volume for each delivery, the tests in (a) and (b) may be performed as a single test.**

**N.5. Temperature Correction for Refined Petroleum Products. - Corrections shall be made for any changes in volume resulting from the differences in liquid temperatures between the time of passage through the meter and time of volumetric determination in the prover. When adjustments are necessary, appropriate petroleum measurement tables should be used.**

**T.2.1. Automatic Temperature-Compensating Systems. - The difference between the meter error (expressed as a percentage) for results determined with and without the automatic temperature-compensating system activated shall not exceed:**

**(a) 0.4 % for mechanical automatic temperature-compensating systems; and**

**(b) 0.2 % for electronic automatic temperature-compensating systems.**

**The delivered quantities for each test shall be approximately the same size. The results of each test shall be within the applicable acceptance or maintenance tolerance.**

**UR.2.5. Temperature Compensation for Refined Petroleum Products.**

**UR.2.5.1. Automatic.**

**UR.2.5.1.1. When to be Used. - In a State that does not prohibit, by law or regulation, the sale of temperature-compensated product, a device equipped with an operable automatic temperature compensator shall be connected, operable, and in use at all times. An electronic or mechanical automatic temperature compensating system may not be removed, nor may a compensated device be replaced with an uncompensated device, without the written approval of the responsible weights and measures jurisdiction.**

**[Note: This requirement does not specify the method of sale for product measured through a meter.]**

**UR.2.5.1.2. Invoices.**

**(a) An invoice based on a reading of a device that is equipped with an automatic temperature compensator shall show that the volume delivered has been adjusted to the volume at 15 °C (60 °F).**

**Discussion/Background:** When this item was submitted, weights and measures officials indicated confusion when an NTEP Certificate of Conformance (CC) for a meter includes a temperature-compensation feature, but the application section of the CC is for a vehicle-tank meter (VTM) and Handbook 44 does not recognize temperature compensation for VTMs. The WWMA acknowledged that there are jurisdictions that permit temperature compensated deliveries in applications that are not addressed by NIST Handbook 44. Some states do not allow the use of automatic temperature compensation for the delivery of products using VTMs.

At the 2002 NCWM Interim and Annual Meeting, the Committee received comments in support of this item because the language does not require the use of temperature compensation, but does provide inspection notes for those jurisdictions that have temperature compensated vehicle-tank meters in use. The item provides specifications, tolerances, test notes, and user requirements if a temperature compensated device is used. The Committee did hear some opposition to the proposal from officials who believe they would be forced to accept temperature compensated vehicle-tank meters because there is not a specific prohibition in their weights and measures law; however, the Committee concluded that the opposition was not supported by a technical argument and there are other means for prohibiting the use of temperature compensated vehicle-tank meters in a particular state if the prohibition is justified. The Committee agreed to present the item for a vote at the 2002 NCWM Annual Meeting.

At the 2002 NCWM Annual Meeting, this item did not pass or fail; therefore, it was returned to the Committee for further consideration.

At its September 2002 Interim Meeting, the Central Weights and Measures Association (CWMA) reaffirmed its recommendation that the L&R Committee adopt appropriate language for a method of sale requirement for temperature compensated vehicle-tank meters to promote uniformity.

At its September 2002 Annual Meeting, the WWMA supported this item as proposed and recommended that the Committee move it forward as a voting item.

At its October 2002 Interim Meeting, the Northeastern Weights and Measures Association (NEWMA) recommended that the NCWM S&T Committee move this item forward as a voting item.

At the 2003 NCWM Interim Meeting, the Committee heard both support and opposition to this item for similar reasons expressed at earlier meetings. The Meter Manufacturer's Association (MMA) indicated that the proposed tolerances in T.2.1. of 0.2 % for mechanical automatic temperature-compensating systems and 0.1 % for electronic automatic temperature-compensating systems were too restrictive and should be changed to 0.4 % for mechanical systems and 0.2 % for electronic systems. The Committee agreed with the MMA and modified T.2.1. accordingly. The Committee agreed to present the item for a vote at the 2003 NCWM Annual Meeting as shown above.

At their Spring 2003 Annual Meetings, the CWMA and NEWMA supported this item as written.

At the 2003 NCWM Annual Meeting, the MMA supported the proposal. One official stated that a method-of-sale requirement for temperature compensation of petroleum products delivered using vehicle-tank meters should be in Handbook 130 before this item is adopted. Another official stated that this item is not equitable unless all states require temperature compensation of petroleum products delivered using vehicle-tank meters.

For additional background on this item see the NCWM 2000 through 2002 S&T Final Reports.

**331-2 W S.3.5. Discharge Valve**

(This item was withdrawn.)

**Source:** Western Weights and Measures Association (WWMA)

**Recommendation:** Revise NIST Handbook 44, Section 3.31. Vehicle-Tank Meters by amending S.3.5. as follows:

**S.3.5 Discharge Valve. - A discharge valve may be installed in the discharge line only if the device is of the wet-hose type *or is incorporated within an automatic pump discharge system*, in which case such valve shall be at the discharge end of the line. Any other shutoff valve on the discharge side of the meter shall be of the automatic or semiautomatic predetermined-stop type or shall be operable only:**

**(a) by means of a tool (but not a pin) entirely separate from the device, or**

**(b) by mutilation of a security seal with which the valve is sealed open.**

**Discussion:** A manufacturer of vehicle-tank metering systems put forth this proposal as part of its endeavor to have dry-hose delivery systems recognized in NIST Handbook 44. The changes proposed to NIST Handbook 44 were believed necessary to allow the systems to begin the NTEP process. These systems would have had to be evaluated for accuracy, repeatability and other requirements. The systems are currently in use in Germany and the United Kingdom.

At its September 2002 Annual Meeting, the WWMA recommended this item move forward as an information item.

At its October 2002 Annual Meeting, the Southern Weights and Measures Association (SWMA) recommended that this item move forward as an information item. Because the system uses compressed air to purge the delivery hose the SWMA has concerns with the repeatability and performance accuracy for the described system and does not support changing NIST Handbook 44 until the manufacturer provides performance data for consideration.

At the 2003 NCWM Interim Meeting, the Committee received a request from original submitter of the proposal to withdraw the item because they had encountered difficulty in collecting sufficient data to verify accuracy and

repeatability of their system. The Committee agreed with the support of the committee representatives from the WWMA and the SWMA.

**331-3 W S.3.2.X. Automatic Pump Discharge Unit**

(This item was withdrawn.)

**Source:** Western Weights and Measures Association (WWMA)

**Recommendation:** Revise NIST Handbook 44, Section 3.31. Vehicle-Tank Meters by adding a Specification S.3.2.X Automatic Pump Discharge Unit as follows:

**S.3.2.X. Automatic Pump Discharge Unit. - On an automatic pump discharge unit, the discharge hose may be of the dry-hose type with a shutoff valve at its outlet end, but only if:**

**(a) the pump discharge unit is completely automatic in that all openings and closing of valves incorporated within the system are controlled absolutely by the system, and**

**(b) a means is provided to ensure that the pump discharge system will be dry at the beginning and the end of each delivery, and**

**(c) a means is incorporated within the pump discharge system that detects if the hose end shutoff valve or any other valve downstream of the system is closed prematurely during the purging of the system to its dry state, thus preventing a complete delivery. In this case, means must be provided so that it will be impossible to end the delivery and print a delivery ticket. The system must provide the facility to automatically clear the discharge lines once the hose end shutoff valve has been opened or the obstruction preventing a complete delivery is removed, and**

**(d) in the event that a delivery is terminated before the pre-set quantity is reached or the delivery quantity is unknown at the beginning of the delivery, then means must be provided to return the product contained within the pump discharge system back to the tank truck compartment and be fully discharged so as to bring the system back to its dry state. The system must ensure that product is returned to the tank truck and that this quantity does not form part of the delivered quantity.**

**(e) There shall be incorporated an automatic vacuum breaker or equivalent means to prevent siphoning and to ensure the rapid and complete drainage of the automatic pump discharge unit.**

**Discussion:** A manufacturer of vehicle-tank metering put forth this proposal as part of its endeavor to have dry hose delivery systems recognized in NIST Handbook 44. The changes proposed to Handbook 44 were believed necessary to allow the systems to begin the NTEP process. These systems would have had to be evaluated for accuracy, repeatability and other requirements. The manufacturer states that the systems are currently approved for use in Germany and the United Kingdom.

At its September 2002 Annual Meeting, the WWMA recommended this item move forward as an information item.

At its October 2002 Annual Meeting, the Southern Weights and Measures Association (SWMA) recommended that this item move forward as an information item. Because the system uses compressed air to purge the delivery hose the SWMA has concerns with the repeatability and performance accuracy for the described system and does not support changing NIST Handbook 44 until the manufacturer provides performance data for consideration.

At the 2003 NCWM Interim Meeting, the Committee received a request from original submitter of the proposal to withdraw the item because they had encountered difficulty in collecting sufficient data to verify accuracy and repeatability of their system. The Committee agreed with the support of the committee representatives from the WWMA and the SWMA.

**331-4 W S.3.2.X. Flood Volume Automatic Pump Discharge Unit**

(This item was withdrawn.)

**Source:** Western Weights and Measures Association (WWMA)

**Recommendation:** Revise NIST Handbook 44, Section 3.31. by adding a Specification S.3.2.X. Flood Volume Automatic Pump Discharge Unit as follows:

**S.3.2.X. Flood Volume Automatic Pump Discharge Unit. - When applicable, the volume of product necessary to flood the system when dry shall be clearly, conspicuously, and permanently marked on the system.**

**Discussion:** A manufacturer of vehicle-tank metering put forth this proposal as part of its endeavor to have dry hose delivery systems recognized in NIST Handbook 44. The changes proposed to NIST Handbook 44 were believed necessary to allow the systems to begin the NTEP process. These systems would have had to be evaluated for accuracy, repeatability and other requirements. The systems are currently in use in Germany and the United Kingdom.

At its September 2002 Annual Meeting, the WWMA recommended this item move forward as an information item.

At its October 2002 Annual Meeting, the Southern Weights and Measures Association (SWMA) recommended that this item move forward as an information item. Because the system uses compressed air to purge the delivery hose the SWMA has concerns with the repeatability and performance accuracy for the described system and does not support changing NIST Handbook 44 until the manufacturer provides performance data for consideration.

At the 2003 NCWM Interim Meeting, the Committee received a request from original submitter of the proposal to withdraw the item because they had encountered difficulty in collecting sufficient data to verify accuracy and repeatability of their system. The Committee agreed with the support of the committee representatives from the WWMA and the SWMA.

**331-5 VC UR.1.4. Liquid Measured**

(This item was adopted.)

**Source:** Southern Weights and Measures Association (SWMA)

**Recommendation:** Revise NIST Handbook 44, Section 3.31 Vehicle-Tank Meters by adding a user requirement as follows:

**UR.1.4. Liquid Measured. - A Vehicle-Tank Meter shall continue to be used to measure the same liquid or one with the same general physical properties as that used for calibration and weights and measures approval unless the meter is recalibrated with a different product and tested by a registered service agency or a weights and measures official and approved by the weights and measures jurisdiction having statutory authority over the device.**

**Discussion:** At the October 2002 SWMA Annual Meeting, a weights and measures official stated that paragraph N.1. Test Liquid in the Vehicle-Tank Meters Code requires that a meter test be conducted with the same liquid or a liquid with the same general physical characteristics as the one being commercially measured. However there is no user requirement that requires the user to continue to use the product with which the meter was tested. The SWMA agreed that the issue has merit and recommended it be forwarded to the Committee as an information item.

At the 2003 NCWM Interim Meeting, the Committee received comments that the proposal should be modified to include testing and approval by weights and measures officials. The Committee agreed with the comments, modified the proposal, and decided to present it for a vote at the 2003 NCWM Annual Meeting as shown above.

At the 2003 NCWM Annual Meeting, the Meter Manufacturer's Association supported this item. The Committee heard that at their Spring 2003 Meetings, the Central Weights and Measures Association and the Northeastern Weights and Measures Association supported this item. NIST recommended that the title of the item be modified to be consistent with

terminology used in the paragraph title. The Committee agreed with WMD and modified the title of the item from "Test Liquid" to "Measured Liquid."

**331-6 I N.4.2. Special Tests (Except Milk-Measuring Systems), N.4.5. Product Depletion Test, and T.5. Product Depletion Test**

**Source:** Northeastern Weights and Measures Association (NEWMA)

**Recommendation:** Modify NIST Handbook 44, Section 3.32. Vehicle-Tank Meters paragraph N.4.2. Special Tests (Except Milk-Measuring Systems) as follows:

**N.4.2. Special Tests (Except Milk-Measuring Systems). - "Special" tests shall be made to develop the operating characteristics of a measuring system and any special elements and accessories attached to or associated with the device. Any test except as set forth in N.4.1. or N.4.5. shall be considered a special test. Special test of a measuring system shall be made as follows:**

**(a) at a minimum discharge rate of 20 % of the marked maximum discharge rate or at the minimum discharge rate marked on the device whichever is less;**

**(b) to develop operating characteristics of the measuring system ~~during a split-compartment delivery~~.**

Add new paragraphs N.4.5. Product Depletion Test and T.5. Product Depletion Test to the Vehicle-Tank Meters Code as follows:

**N.4.5. Product Depletion Test. - The effectiveness of the vapor eliminator shall be tested by depleting the product supply and continuing until the lack of fluid causes the meter register to stop completely. The test shall be completed by switching to another compartment with sufficient product on a multi-compartment vehicle, or by adding sufficient product to a single compartment vehicle. When adding product to a single compartment vehicle, allow appropriate time for any entrapped vapor to disperse before continuing the test.**

**T.5. Product Depletion Test. – The difference in the delivered volumes for the normal test and the product depletion test shall not exceed 0.5 % of the equivalent of one minute of flow at the maximum rated flow rate for the system.**

**Discussion:** The proposal intends to recognize that the vapor measured when product is depleted during the vehicle-tank meter split compartment test (product depletion test) is a system problem that is not related to the prover size. The proposal requires a split compartment test (product depletion test) for single compartment vehicles to verify the performance of the air elimination mechanism.

At the 2003 NCWM Interim Meeting, the Committee agreed the proposal has merit because the product depletion test is necessary for vehicle-tank meters and the proposal provides guidelines on the appropriate test conditions. Therefore, the Committee changed the status of this item from developing to an information item. The proposed tolerance, when conducting a product depletion test, is based on the marked flow rate of the meter rather than the size of the prover. The tolerance stays the same regardless of the size of the prover used for the test. NEWMA noted concerns because operators with vehicle-tank meters that fail tests in a jurisdiction using a 100-gallon prover are passing tests in neighboring jurisdictions that use a 200-gallon prover.

The Committee is uncertain that all sizes of vehicle-tank meters can attain the 0.5 % tolerance proposed for the difference in the test results between the normal and product depletion tests. The Committee asks for data that demonstrates the ability of vehicle-tank meters to meet the proposed tolerance. The Committee also recommends NEWMA develop guidelines for switching tanks (compartments) when all tanks are not the same size to ensure an adequate test of the vehicle-tank meters since tanks of different sizes drain at different rates.

At the 2003 NCWM Annual Meeting, the Meter Manufacturer's Association supported this item. The Committee heard that the NEWMA continues to support this item. NIST on noted that other tolerances such as repeatability tolerances that consider the difference between two or more tests also stipulate that all results must be within applicable tolerance. For consistency paragraph T.5. should be modified as follows:

**T.5. Product Depletion Test. - The difference in the delivered volumes for the normal test and the product depletion test shall not exceed 0.5 % of the equivalent of one minute of flow at the marked maximum ~~rated flow~~ discharge rate for the system and all results must be within applicable tolerance.**

The Committee agreed that this item should remain an information item to allow for additional development by the NTETC Measuring Sector and the regional weights and measures associations.

If you would like more information or to participate in test data collection contact Ross Andersen (New York Bureau of Weights and Measures) by telephone at 518-457-3146, by fax at 518-457-5693, or by email at ross.andersen@agmkt.state.ny.us or Stephen Martin (New York Bureau of Weights and Measures) by telephone at 315-487-2250, by fax at 315-487-2408, or by email at weighsyr@agmkt.state.ny.us.

## 332 LPG and Anhydrous Ammonia Liquid-Measuring Devices

### 332-1 VC Tolerances, Table T.2. Accuracy Classes for Section 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices

(This item was adopted.)

**Source:** Carryover Item 330-3B. (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 1999 agenda as Item 330-1.)

**Recommendation:** Add a new Table T.2. to NIST Handbook 44, Section 3.32 LPG and Anhydrous Liquid-Measuring Devices and modify Paragraph T.2. as follows:

**T.2. Tolerance Values. – The maintenance and acceptance tolerances for normal and special tests shall be as shown in Table T.2.**

| | ~~Acceptance Tolerance~~ | ~~Maintenance Tolerance~~ |
|---|---|---|
| ~~Normal Tests~~ | ~~0.6%~~ | ~~1.0%~~ |
| ~~Special Tests~~ | ~~1.0%~~ | ~~1.0%~~ |

**Table T.2. Accuracy Classes and Tolerances for LPG and Anhydrous Ammonia Liquid-Measuring Devices**

| Accuracy Class | Application | Acceptance Tolerance | Maintenance Tolerance | Special Test Tolerance* |
|---|---|---|---|---|
| 1.0 | Anhydrous ammonia, LPG ~~gas~~ (including vehicle tank meters) | 0.6 % | 1.0 % | 1.0 % |

***where applicable**

**Background/Discussion:** At the 2002 NCWM Interim and Annual Meetings, the Committee received no negative comments on Item 330-3B.

Prior to the 2003 NCWM Interim Meeting, Item 330-3B was divided into a separate item for each affected NIST Handbook 44 code. The tolerances shown in the proposed table are the same as the current NIST Handbook 44 tolerances. The proposed table format will facilitate the reformatting of all NIST Handbook 44 Section 3, 3.3X - measuring device codes.

At its September 2002 Annual Meeting, the WWMA recognized that this format will facilitate the reformatting of NIST Handbook 44 and recommends that the Committee move it forward as a voting item.

At its October 2002 Interim Meeting, the Northeastern Weights and Measures Association (NEWMA) recommended that the Committee move this item forward as a voting item.

At the 2003 NCWM Interim Meeting, the Committee heard no comments on the item.

At the 2003 NCWM Interim Meeting, the Committee heard that at their Spring 2003 Meetings, the Central Weights and Measures Association (CWMA) and NEWMA supported this item. WMD noted that in Handbook 44, liquefied petroleum gas is typically abbreviated as LPG and recommend that the use of the term be corrected from LP gas to LPG in the proposed Table T.2. The Committee agreed and modified Table T.2. as shown above.

For additional background on this Item see item 330-3B in the NCWM 2002 S&T Final Report.

**332-2 I UR.2.3. Vapor-Return Line**

**Source:** Carryover Item 332-2. (This item was developed by the Southern Weights and Measures Association (SWMA) and first appeared on the Committee's 2002 agenda.)

**Recommendation:** Modify NIST Handbook 44, Section 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices paragraph UR.2.3. as follows:

UR.2.3. Vapor Return Line. - During any metered delivery of liquefied petroleum gas from a supplier's tank to a receiving container, there shall be no vapor-return line from the receiving container to the supplier tank **except**:

(a) in the case of any receiving container to which normal deliveries can**not** be made without the use of such vapor-return line, or

(b) in the case of any new receiving container when the ambient temperature is ~~below~~ **above** 90 °F, or ~~**in the case of wholesale terminal deliveries.**~~

**(c) in the case of wholesale terminal deliveries.**

**Background/Discussion:** At its September 2001 Annual Meeting, the SWMA heard from the State of Tennessee that vapor-return lines are commonly used at LPG loading rack terminals where large capacity transports are loaded for distribution to bulk LPG dealers. At least some of the companies operating terminals are applying industry derived factors that are used to credit customers for metered product that is returned as vapor to the sellers' storage tanks. Paragraph U.R.2.3. (a) provides an exception for abnormal conditions, such as high pressure in the receiving tank, which prevents delivery without the use of a vapor return line. The SWMA questions whether or not bulk terminal locations fall under this exemption. The terminals where vapor-return lines are being used have insufficient pumping ability to fill the large vessels that are used to distribute LPG to bulk dealer facilities; however, when pumping capacity becomes an issue the condition can be remedied by installing new pumping and metering equipment which is capable of filling the large pressure vessels without a vapor-return line. Additionally, the terminals have the option of weighing the product rather than metering it. These conditions exist at LPG terminals in all regions of the United States, thus, this is not a unique situation only affecting Tennessee.

SWMA agreed with Tennessee that the following points should be reviewed to remove any ambiguity about the appropriateness of vapor return lines in various LPG filling operations:

1. Allow loading rack terminals to use vapor-return lines and review a proposal from industry on applying the vapor factor to credit the purchaser. A mean credit value may be adequate, although it has been determined that the vapor returned is not always consistent from delivery to delivery.

2. Allow a vapor meter to be installed between the receiving vessel and the seller's tanks, then convert the vapor measurements to liquid quantities and credit the purchaser.

3. Provide a consensus opinion that bulk terminal loading-rack installations meet the exception contained in paragraph UR.2.3. (a) and no action is needed by weights and measures officials.

4. Provide a consensus opinion that the conditions do not meet the exception noted in paragraph UR.2.3. and weights and measures official should require terminals currently unable to load without vapor-return lines to take corrective action to comply with NIST Handbook 44.

The SWMA recognized the State of Tennessee's concerns of the and agreed to forward this item to NCWM, but recommends it remain informational to allow Tennessee to develop specific language.

At the 2002 NCWM Interim and Annual Meetings, the Committee gave the item informational status to provide Tennessee time to develop a specific proposal.

Following the 2003 NCWM Interim Meeting, the Committee received the proposal shown in the recommendation above from the State of Tennessee. The Committee agreed the item should remain informational to provide the regional associations an opportunity to review and discuss Tennessee's proposal.

At the 2003 NCWM Annual Meeting, Tennessee recommended that for clarity the last sentence in the original proposal should be made a separate paragraph (c). The Committee agreed and modified the original proposal as shown above. The Committee agreed that the item should remain an information item to provide for additional review and input from industry and the regional weights and measures associations.

## 333 Hydrocarbon Gas Vapor-Measuring Devices

### 333-1 VC Tolerances, Table T.1. Accuracy Classes for Section 3.33. Hydrocarbon Gas Vapor-Measuring Devices

(This item was adopted)

**Source:** Carryover Item 330-3B. (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 1999 agenda as Item 330-1.)

**Recommendation:** Add a new Table T.1. to NIST Handbook 44, Section 3.33 Hydrocarbon Gas Vapor-Measuring Devices and modify Paragraph T.1. as follows:

**T.1. Tolerance Values on Normal Tests and on Special Tests Other Than Low-Flame Tests. - Maintenance and acceptance tolerances <u>for normal and special tests</u> for hydrocarbon gas vapor-measuring devices shall be <u>as shown in Table T.1.</u> ~~3 percent (1.03 proof) of the test draft on underregistration and 1.5 percent (0.985 proof) of the test draft on overregistration.~~**
(Amended 1981<u>and 200X</u>)

| **<u>Table T.1. Accuracy Classes and Tolerances or Hydrocarbon Gas Vapor-Measuring Devices</u>** | | | | |
|---|---|---|---|---|
| **<u>Accuracy Class</u>** | **<u>Application</u>** | | **<u>Acceptance Tolerance</u>** | **<u>Maintenance Tolerance</u>** |
| **<u>3.0</u>** | **<u>Gases at low pressure (LPG vapor)</u>** | **<u>Overregistration</u>** | **<u>1.5 %</u>** | **<u>1.5 %</u>** |
| | | **<u>Underregistration</u>** | **<u>3.0 %</u>** | **<u>3.0 %</u>** |

**Background/Discussion:** At the 2002 NCWM Interim and Annual Meetings, the Committee received no negative comments on Item 330-3B.

Prior to the 2003 NCWM Interim Meeting, Item 330-3B was divided into a separate item for each affected NIST Handbook 44 code. The tolerances shown in the proposed table are the same as the current NIST Handbook 44 tolerances. The proposed table format will facilitate the reformatting of all NIST Handbook 44 Section 3, 3.3X - measuring device codes.

At is September 2002 Annual Meeting the WWMA recognized that this format will facilitate the reformatting of NIST Handbook 44 and recommended that the Committee move it forward as a voting item.

At its October 2002 Interim Meeting the Northeastern Weights and Measures Association (NEWMA) recommended that the Committee move this item forward as a voting item.

At the 2003 NCWM Interim Meeting, the Committee heard no comments on this item and agreed to present it for a vote at the 2003 NCWM Annual Meeting.

At the 2003 NCWM Interim Meeting, the Committee learned that the Central Weights and Measures Association (CWMA) and NEWMA supported this item. WMD noted that in Handbook 44, liquefied petroleum gas is typically abbreviated as LPG and recommend that the use of the term be corrected from LP to LPG in the proposed Table T.1. The Committee agreed and modified Table T.1. as shown above.

For additional background on this item see Item 330-3B in the NCWM 2002 S&T Final Report.

**334 Cryogenic Liquid-Measuring Devices**

**334-1 VC Tolerances; T.2. Tolerance Values, T.2.1. On Normal Tests, T.2.2. On Special Tests and Table T.2. Accuracy Classes for Section 3.34. Cryogenic Liquid-Measuring Devices**

(This item was adopted)

**Source:** Carryover Item 330-3B. (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 1999 agenda as Item 330-1.)

**Recommendation:** Add a new Table T.2. to NIST Handbook 44, Section 3.34 Cryogenic Liquid-Measuring Devices delete paragraphs T.2.1. and T.2.2. and modify Paragraph T.2. as follows:

**T.2. Tolerance Values. - <u>The maintenance and acceptance tolerances for normal and special tests shall be</u> <u>as shown in Table T.2.</u>**

~~**T.2.1. On Normal Tests. - The maintenance tolerance on "normal" tests shall be two and one-half percent (2.5 %) of the indicated quantity. The acceptance tolerance shall be one and one-half percent (1.5 %) of the indicated quantity.**~~

~~T.2.2. On Special Tests. - The maintenance and acceptance tolerance on "special" tests shall be two and one-half percent (2.5 %) of the indicated quantity.~~

**<u>Table T.2. Accuracy Classes and Tolerances for Cryogenic Liquid-Measuring Devices</u>**

| <u>Accuracy Class</u> | <u>Application</u> | <u>Acceptance Tolerance</u> | <u>Maintenance Tolerance</u> | <u>Special Test Tolerance*</u> |
|---|---|---|---|---|
| <u>2.5</u> | <u>Cryogenic products; liquefied compressed gases other than ~~LP gas~~ liquid carbon dioxide</u> | <u>1.5 %</u> | <u>2.5 %</u> | <u>2.5 %</u> |
| ***where applicable** | | | | |

**Background/Discussion:** At the 2002 NCWM Interim and Annual Meetings, the Committee received no negative comments on Item 330-3B.

Prior to the 2003 NCWM Interim Meeting, Item 330-3B was divided into a separate item for each affected NIST Handbook 44 code. The tolerances shown in the proposed table are the same as the current NIST Handbook 44 tolerances. The proposed table format will facilitate the reformatting of all Handbook 44 Section 3, 3.3X -measuring device codes.

At is September 2002 Annual Meeting, the WWMA recognized that this format will facilitate the reformatting of NIST Handbook 44 and recommended that the Committee move it forward as a voting item.

At its October 2002 Interim Meeting, the Northeastern Weights and Measures Association (NEWMA) recommended that the Committee move this item forward as a voting item.

At the 2003 NCWM Interim Meeting, the Committee heard no comments on this item and agreed to present it for a vote at the 2003 NCWM Annual Meeting.

At the 2003 NCWM Interim Meeting, the Committee heard that at their Spring 2003 Meetings, the Central Weights and Measures Association (CWMA) and NEWMA supported this item. WMD noted that LP gas is not a cryogenic liquid. The only cryogenic product presently covered by a separate code is liquid carbon dioxide. WMD recommended that the reference to LP gas in the proposed Table T.2. be replaced with a reference to liquid carbon dioxide. The Committee agreed and modified Table T.2. as shown above.

For additional background on this item see item 330-3B in the NCWM 2002 S&T Final Report.

**334-2 VC Definition of Cryogenic Liquid-Measuring Devices**

(This item was adopted)

**Source:** National Type Evaluation Technical Committee Measuring Sector

**Recommendation:** Modify the NIST Handbook 44 definition for cryogenic liquid-measuring device as follows.

**cryogenic liquid-measuring device. A system including a liquid-measuring element ~~mechanism or machine of (a) the meter of the positive displacement, turbine, or mass flow type, or (b) a weighing type of device mounted on a vehicle,~~ designed to measure and deliver cryogenic liquids in the liquid state. Means may be provided to indicate automatically, for one of a series of unit prices, the total money value of the liquid measured.[3.34] (Amended 1986, 200X)**

**Background/Discussion:** In 1986, paragraph A.1. of Section 3.34. Cryogenic Liquid-Measuring Devices and the definition for cryogenic liquid-measuring devices were modified to include on-board-weighing systems for measuring cryogenic liquid. In 1995 the reference to scales for measuring cryogenic liquids was removed from paragraph A.1., because vehicle on-board weighing systems were recognized in the Scales Code in 1992. At its October 2002 Meeting, the NTETC Measuring Sector recognized that the reference to scales for measuring cryogenic liquids was not removed from the definition for cryogenic liquid-measuring device in 1995 and recommended that the definition be modified to reflect the 1995 change to paragraph A.1.

At its October 2002 Annual Meeting, the Southern Weights and Measures Association supported the proposal and recommended that the Committee move it forward as a voting item.

At the 2003 NCWM Interim and Annual Meetings, the Committee received no comments on this item and agreed to present it for a vote.

## 335 Milk Meters

### 335-1 W Tolerances; Table T.X. Accuracy Classes for Section 3.35. Milk Meters

(This item was withdrawn)

**Source:** Carryover Item 330-3B. (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 1999 agenda as Item 330-1.)

**Recommendation:** Add the following new Table T.X. for Liquid-Measuring Devices to NIST Handbook 44, Sections 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices, 3.33. Hydrocarbon Gas Vapor-Measuring Devices, 3.34. Cryogenic Liquid-Measuring Devices, 3.35. Milk Meters, 3.36. Water Meters, 3.37. Mass Flow Meters, and 3.38. Carbon Dioxide Liquid-Measuring Devices. As an option the entire table could be added as an appendix to these codes.

Table T.X Accuracy Classes for Liquid Measuring Devices Covered in NIST Handbook 44 Sections 3.32 through 3.38

| Accuracy Class | Application | | Acceptance Tolerance | Maintenance Tolerance | Special Test Tolerance* |
|---|---|---|---|---|---|
| 1.0 | Anhydrous ammonia, LP gas (including vehicle tank meters) | | 0.6 % | 1.0 % | 1.0 % |
| 1.5 | Water | Overregistration | 1.5 % | 1.5 % | 1.5 % |
| | | Underregistration | 1.5 % | 1.5 % | 5.0 % |
| 2.0 | Compressed natural gas as a motor fuel | | 1.5 % | 2.0 % | 2.0 % |
| 2.5 | Cryogenic products; liquefied compressed gases other than LP gas | | 1.5 % | 2.5 % | 2.5 % |
| 3.0 | Gases at low pressure (LP vapor) | Overregistration | 1.5 % | 1.5 % | |
| | | Underregistration | 3.0 % | 3.0 % | |

***where applicable**

**Background/Discussion:** At the 2002 NCWM Annual Meeting, the Committee received no negative comments on item 330-3B. The Committee made item 330-3B informational to allow further study on the effect of the proposed tolerances for devices covered by Section 3.32. through Section 3.38.

Item 330-3B was divided into a separate item for each affected Handbook 44 code. The tolerances shown in the proposed table are the same as the current tolerances. The proposed table format will facilitate the reformatting of all Handbook 44 Section 3, 3.3X -measuring device codes.

Following the 2002 NCWM Annual Meeting, NIST noted that proposed table above does not include a specific class designation and tolerances for devices measuring milk as it does for devices measuring other commodities. When Table T.1. for Section 3.31. Vehicle-Tank Meters was adopted in 2002, Table 2. Tolerances for Vehicle-Mounted Milk Meters was not deleted from the code. The existing Table 1. Tolerances for Milk Meters and Table 2. Tolerances for Vehicle-Mounted Milk Meters provide the same tolerances for both applications. If Table 2. Tolerances for Milk Meters is to be replaced with a table providing an accuracy class and tolerances for milk meters, then a class designation and an appropriate percent tolerance need to be developed.

At its September 2002 Annual Meeting, the WWMA agreed that the above table does not include tolerances for milk meters. No specific proposal recommending a single percentage tolerance for milk meters was available for review. The WWMA recommends that this item remain an information item until a specific proposal is submitted for consideration.

At the 2003 NCWM Interim Meeting, the Committee agreed that the current Table 1. Tolerances for Milk Meters in the milk meters code should be retained to be consistent with the milk meter tolerances in the vehicle-tank meters code. The Committee agreed to withdraw this item from its agenda.

For additional background on this item see item 330-3B in the NCWM 2002 S&T Final Report.

**336 Water Meters**

**336-1 V Tolerances; N.3. Test Drafts, N.4.1. Normal Tests, N.4.2. Special Tests, T.1. Tolerance Values, Table N.4.1. Flow Rate and Draft Size for Water Meters Normal Tests, Table N.4.2. Flow Rate and Draft Size for Water Meters Special Tests, and Table T.1. Accuracy Classes for Section 3.36. Water Meters**

(This item was adopted)

**Source:** Carryover Item 330-3B. (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 1999 agenda as Item 330-1.)

**Recommendation:** Modify NIST Handbook 44, Section 3.36 Water Meters paragraphs N.3., N.4.1., N.4.2., and T.1. delete existing Table 1 and Table 2., add new Tables N.4.1., and N.4.2. as shown below.

**N.3. Test Drafts. - Test drafts should be equal to at least the amount delivered by the device in 2 minutes and in no case less than the amount delivered by the device in 1 minute at the actual maximum flow rate developed by the installation. The test drafts shown in Table N.4.1., next page, shall be followed as closely as possible.**

**N.4. Testing Procedures.**

**N.4.1. Normal Tests. - The normal test of a meter shall be made at the maximum discharge rate developed by the installation. Meters with maximum gallon per minute ratings higher than Table N.4.1. values may be tested up to the meter rating, with meter indications no less than those shown.**
**(Amended 1990 and 2002)**

**N.4.1.1. Repeatability Tests. - Tests for repeatability should include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors, such as temperature, pressure, and flow rate are reduced to the extent that they will not affect the results obtained.**
**(Added 2002)**

**N.4.2. Special Tests. - Special tests to develop the operating characteristics of meters may be made according to the rates and quantities shown in Table N.4.2.**

**T.1. Tolerance Values. - Maintenance and acceptance tolerance shall be as shown in Table T.1. ~~and Table 2.~~**

| Table 1. Tolerances for Water Meters<br>Normal Tests | | | | |
|---|---|---|---|---|
| Meter size (inches) | Rate of flow (gal/min) | Maximum Rate | | |
| | | Meter indication | | Tolerance on over- and under-registration |
| | | gal | $ft^3$ | |
| Less than 5/8 | 8 | 50 | 5 | 1.5 % |
| 5/8 | 15 | 50 | 5 | |
| ¾ | 25 | 50 | 5 | |
| 1 | 40 | 100 | 10 | |
| 1 ½ | 80 | 300 | 40 | |
| 2 | 120 | 500 | 40 | |
| 3 | 250 | 500 | 50 | |
| 4 | 350 | 1 000 | 100 | |
| 6 | 700 | 1 000 | 100 | |

| ~~Table 2. Tolerances for Water Meters Special Tests~~ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ~~Meter size (inches)~~ | ~~Intermediate Rate~~ | | | | ~~Minimum Rate~~ | | | | |
| | ~~Rate of flow (gal/min)~~ | ~~Meter indication~~ | | ~~Tolerance on over- and under-registration~~ | ~~Rate of flow (gal/min)~~ | ~~Meter indication~~ | | ~~Tolerance~~ | |
| | | ~~gal~~ | ~~$ft^3$~~ | | | ~~gal~~ | ~~$ft^3$~~ | ~~Under-registration~~ | ~~Over-registration~~ |
| ~~Less than or equal to 5/8~~ | ~~2~~ | ~~10~~ | ~~1~~ | ~~1.5 %~~ | ~~1/4~~ | ~~5~~ | ~~1~~ | ~~5.0 %~~ | ~~1.5 %~~ |
| ~~3/4~~ | ~~3~~ | ~~10~~ | ~~1~~ | | ~~1/2~~ | ~~5~~ | ~~1~~ | | |
| ~~1~~ | ~~4~~ | ~~10~~ | ~~1~~ | | ~~3/4~~ | ~~5~~ | ~~1~~ | | |
| ~~1 1/2~~ | ~~8~~ | ~~50~~ | ~~5~~ | | ~~1 1/2~~ | ~~10~~ | ~~1~~ | | |
| ~~2~~ | ~~15~~ | ~~50~~ | ~~5~~ | | ~~2~~ | ~~10~~ | ~~1~~ | | |
| ~~3~~ | ~~20~~ | ~~50~~ | ~~5~~ | | ~~4~~ | ~~10~~ | ~~1~~ | | |
| ~~4~~ | ~~40~~ | ~~100~~ | ~~10~~ | | ~~7~~ | ~~50~~ | ~~5~~ | | |
| ~~6~~ | ~~60~~ | ~~100~~ | ~~10~~ | | ~~12~~ | ~~50~~ | ~~5~~ | | |

| **Table N.4.1. Flow Rate and Draft Size for Water Meters Normal Tests** | | | |
|---|---|---|---|
| **Meter size (inches)** | **Rate of flow (gal/min)** | **Maximum Rate** | |
| | | **Meter Indication/Test Draft** | |
| | | **Gal** | **$ft^3$** |
| **Less than 5/8** | **8** | **50** | **5** |
| **5/8** | **15** | **50** | **5** |
| **3/4** | **25** | **50** | **5** |
| **1** | **40** | **100** | **10** |
| **1 1/2** | **80** | **300** | **40** |
| **2** | **120** | **500** | **40** |
| **3** | **250** | **500** | **50** |
| **4** | **350** | **1 000** | **100** |
| **6** | **700** | **1 000** | **100** |

| Table N.4.2. Flow Rate and Draft Size for Water Meters Special Tests | | | | | | |
|---|---|---|---|---|---|---|
| Meter size (inches) | Intermediate Rate | | | Minimum Rate | | |
| | Rate of flow (gal/min) | Meter indication/Test Draft | | Rate of flow (gal/min) | Meter indication/Test Draft | |
| | | gal | $ft^3$ | | gal | $ft^3$ |
| Less than or equal to 5/8 | 2 | 10 | 1 | 1/4 | 5 | 1 |
| 3/4 | 3 | 10 | 1 | 1/2 | 5 | 1 |
| 1 | 4 | 10 | 1 | 3/4 | 5 | 1 |
| 1 1/2 | 8 | 50 | 5 | 1 1/2 | 10 | 1 |
| 2 | 15 | 50 | 5 | 2 | 10 | 1 |
| 3 | 20 | 50 | 5 | 4 | 10 | 1 |
| 4 | 40 | 100 | 10 | 7 | 50 | 5 |
| 6 | 60 | 100 | 10 | 12 | 50 | 5 |

| Table T.1. Accuracy Classes and Tolerances for Water Meters | | | | | |
|---|---|---|---|---|---|
| Accuracy Class | Application | | Acceptance Tolerance | Maintenance Tolerance | Tolerance for Special Tests Conducted at the Minimum Flow Rate ~~Tolerances*~~ |
| 1.5 | Water | Overregistration | 1.5 % | 1.5 % | 1.5 % |
| | | Underregistration | 1.5 % | 1.5 % | 5.0 % |
| ~~*where applicable~~ | | | | | |

**Background/Discussion:** At the 2002 NCWM Interim and Annual Meetings, the Committee received no negative comments on Item 330-3B.

Prior to the 2003 NCWM Interim Meeting, Item 330-3B was divided into a separate item for each affected NIST Handbook 44 code. The tolerances shown in the proposed table are the same as the current NIST Handbook 44 tolerances. The proposed table format will facilitate the reformatting of all NIST Handbook 44 Section 3, 3.3X - measuring device codes.

At its September 2002 Annual Meeting, the WWMA supported the concept of having accuracy classes and tolerances in a uniform table format for all Section 3, 3.3X -measuring device codes; however, the existing Table 1 and Table 2 in the Water Meters Code include criteria for test draft sizes and for maximum, intermediate, and minimum flow rates for testing various sizes of water meters. The test draft size and flow rate information in Table 1 and Table 2 needed to be retained. The WWMA recommended that this item remain informational until a proposal to retain the flow rate criteria to accompany the new table for accuracy class and tolerances is developed.

At the 2003 NCWM Interim Meeting, the Committee and the technical advisors developed new test notes and tables to replace the current Table 1 and Table 2 to retain test recommendations for flow rate and draft size. The Committee agreed to present the item for a vote at the 2003 NCWM Annual Meeting.

At the 2003 NCWM Annual Meeting, the California Division of Measurement Standards (DMS) provided editorial comments on this item to the committee. The modified paragraph T.1. and the tables 1 and 2 proposed for deletion were not included in the item as presented in Publication 16. DMS also recommended that the footnote in Table T.1. be changed from "where applicable" to "Only applies to Minimum Rate of Flow Tests." The Committee agreed that while other types of tests could be considered "special tests", as presently written, in Handbook 44 Section 3.36. Water Meters,

tests conducted at minimum flow rates are the only tests where "special test" tolerances apply. The Committee modified the proposal as shown above.

For additional background on this item see Item 330-3B in the NCWM 2002 S&T Final Report.

**336-2 V S.2.3. Multi-Jet Meter Identification, Table T.1. Accuracy Classes and Tolerances for Water Meters; Other than Multi-Jet Meters and Special Tests at the Minimum Flow Rate, and Appendix D; Definition of Multi-Jet Water Meter**

(This item was adopted)

**Source:** Western Weights and Measure Association (WWMA)

**Recommendation:** Add a new paragraph S.2.3 to NIST Handbook 44, Section 3.36 Water Meters, and modify Table T.1. (as proposed in item 336-1) as follows:

**S.2.3. Multi-Jet Meter Identification. – Multi-Jet water meters shall be clearly and permanently identified as such on the device or on the Certificate of Conformance.**

| Table T.1. Accuracy Classes and Tolerances for Water Meters | | | | | |
|---|---|---|---|---|---|
| **Accuracy Class** | **Application** | | **Acceptance Tolerance** | **Maintenance Tolerance** | **Tolerance for Special Tests Conducted at the Minimum Flow Rate ~~Tolerances*~~** |
| **1.5** | **Water other than Multi-Jet** | **Overregistration** | **1.5 %** | **1.5 %** | **1.5 %** |
| | | **Underregistration** | **1.5 %** | **1.5 %** | **5.0 %** |
| **1.5** | **Water Multi-jet** | **Overregistration** | **1.5 %** | **1.5 %** | **3.0 %** |
| | | **Underregistration** | **1.5 %** | **1.5 %** | **3.0 %** |
| ***~~where applicable~~** | | | | | |

Add a new definition to Appendix D:

**Multi-Jet Water Meter. A water meter in which the moving element takes the form of a multiblade rotor mounted on a vertical spindle within a cylindrical measuring chamber. The liquid enters the measuring chamber through several tangential orifices around the circumference and leaves the measuring chamber through another set of tangential orifices placed at a different level in the measuring chamber. These meters register by recording the revolutions of a rotor set in motion by the force of flowing water striking the blades. [3.36]**

**Discussion:** Currently, the Water Meters code does not include any test criteria or tolerances for multi-jet water meters. Multi-jet meters are widely used for metering and sub-metering water. One manufacturer of these meters indicates that the performance curve for a multi-jet meter is different than the performance curve for a positive displacement meter and believes that the tolerances for a multi-jet meter should be equal for underregistration and overregistration at all flow rates. The American Water Works Association (AWWA) has recognized these differences and has developed two standards, C700-02: Cold-Water Meters – Displacement Type, Bronze Main Case and C708-96: Cold-Water Meters – Multijet Type, to allow for the different meter accuracy curves.

At its September 2002 Annual Meeting, the WWMA agreed that test criteria and tolerances for multi-jet water meters should be included in the water meters code and agreed to forward it to the Committee as an information item.

At the 2003 NCWM Interim Meeting, the Committee and the technical advisors developed a new tolerance table T.1. based on the table proposed in item 336-1 that includes tolerances for multi-jet water meters to replace the ones proposed by WWMA which do not follow the new format proposed for all liquid-measuring device codes. The Committee agreed to present the item for a vote at the 2003 NCWM Annual Meeting.

At the 2003 NCWM Annual Meeting, the California Division of Measurement Standards (DMS) provided editorial comments on this item similar to those provided for item 336-1. The Northeastern Weights and Measures Association (NEWMA) stated that the any markings identifying the meter, as being a Multi-Jet Meter, should be on the meter itself. The Committee agreed with DMS and the NEWMA and modified the proposal as shown above.

## 338 Carbon Dioxide Liquid-Measuring Devices

### 338-1 VC Tolerances; T.2. Tolerance Values, T.2.1. On Normal Tests, T.2.2. On Special Tests, and Table T.2. Accuracy Classes for Section 3.38. Carbon DioxideLiquid-Measuring Devices

(This item was adopted)

**Source:** Carryover Item 330-3B. (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee's 1999 agenda as Item 330-1.)

**Recommendation:** Add a new Table T.2., to NIST Handbook 44, Section 3.38 Carbon Dioxide Liquid-Measuring Devices modify Paragraph T.2. and delete paragraphs T.2.1. and T.2.2. as follows:

**T.2. Tolerance Values. - <u>The maintenance and acceptance tolerances for normal and special tests shall be as shown in Table T.2.</u>**

~~**T.2.1. On Normal Tests.** The maintenance tolerance on "normal" tests shall be two and one-half percent (2.5 %) of the indicated quantity. The acceptance tolerances shall be one and one-half percent (1.5 %) of the indicated quantity.~~

~~**T.2.2. On Special Tests.** The maintenance and acceptance tolerance on "special" tests shall be two and one half percent (2.5 %) of the indicated quantity.~~

**Table T.2. Accuracy Classes and Tolerances for Carbon Dioxide Liquid-Measuring Devices**

| Accuracy Class | Application | Acceptance Tolerance | Maintenance Tolerance | Special Test Tolerance* |
|---|---|---|---|---|
| 2.5 | <u>Liquid carbon dioxide</u> ~~Cryogenic products; liquefied compressed gases other than LP gas~~ | 1.5 % | 2.5 % | 2.5 % |
| *where applicable | | | | |

**Background/Discussion:** At the 2002 NCWM Interim Meeting, the Committee agreed with the WWMA recommendation to split item 330-1 into items 330-3A and 330-3B. The Committee also made item 330-3B informational to allow further study on the effect of the proposed tolerances for devices covered by Section 3.32. through Section 3.38. The background and rational for this item are outlined in the 2002 NCWM S&T Agenda Item 330-3A and 331-1 that address the proposed changes to Sections 3.30 and 3.31.

At the 2002 NCWM Annual Meeting, the Committee received no negative comments on this item.

At the 2003 NCWM Interim Meeting, the Committee heard no comments on this item and agreed to present it for a vote at the 2003 NCWM Annual Meeting.

At the 2003 NCWM Interim and Annual Meetings, the Committee heard no negative comments on this item. WMD noted that Liquid Carbon Dioxide is the only product covered by this table and recommended that the reference to liquefied compressed gases other than LP gas be removed. The committee agreed and modified the table as shown above.

**356(a) Grain Moisture Meters**

**356(a)-1 VC Recognize Indications and Recorded Representations of Test Weight per Bushel**

(This item was adopted.)

**Source:** This item originated from the National Type Evaluation Technical Committee (NTETC) Grain Moisture Meter (GMM) Sector and first appeared on the S&T Committee's 2000 agenda as Developing Item 360-3, Appendix D.

**Recommendation:** Modify NIST Handbook 44 Section 5.56(a) Grain Moisture Meters Code to recognize indications and recorded representation of test weight per bushel as follows:

Amend the following paragraphs:

**A.1. - This code applies to grain moisture meters; that is, devices used to indicate directly the moisture content of cereal grain and oil seeds. The code consists of general requirements applicable to all moisture meters and specific requirements applicable only to certain types of moisture meters. Requirements cited for "test weight per bushel" indications or recorded representations are applicable only to devices incorporating an automatic test weight per bushel measuring feature.**

**S.1.1. Digital Indications and Recording Elements.**

**(c) Meters shall be equipped with a communication interface that permits interfacing with a recording element and transmitting the date, grain type, grain moisture results, test weight per bushel results and calibration version identification.**

**(d) A digital indicating element shall not display and a recording element shall not record any moisture content values or test weight per bushel values before the end of the measurement cycle.**

**(e) Moisture content results shall be displayed and recorded as percent moisture content, wet basis. Test weight per bushel results shall be displayed and recorded as pounds per bushel. Subdivisions of ~~this~~ these units shall be in terms of decimal subdivisions (not fractions).**

**(f) A meter shall not display or record any moisture content or test weight per bushel values when the moisture content of the grain sample is beyond the operating range of the device, unless the moisture and test weight representations includes a clear error indication (and recorded error message with the recorded representations).**

**S.1.3. Operating range. - A meter shall automatically and clearly indicate when the operating range of the meter has been exceeded. The operating range shall specify the following:**

**(c) Moisture Range of the Grain or Seed. The moisture range for each grain or seed for which the meter is to be used shall be specified. ~~A m~~Moisture and test weight per bushel values may be displayed when the moisture range is exceeded if accompanied by a clear indication that the moisture range has been exceeded.**

**S.1.4. Value of Smallest Unit. - The display shall permit ~~constituent~~ moisture value determination to both 0.01 % and 0.1 % solution. The 0.1 % resolution is for commercial transactions; the 0.01 % resolution is for type evaluation and calibration purposes only, not for commercial purposes. Test weight per bushel values shall be determined to the nearest 0.1 pound per bushel.**

**S.2.4.1. Calibration Version. - A meter must be capable of displaying either calibration constants, a unique calibration name, or a unique calibration version number for use in verifying that the latest version of the calibration is being used to make moisture content and test weight per bushel determinations.**

**S.2.6. Determination of Quantity and Temperature. - The moisture meter system shall not require the operator to judge the precise volume or weight and temperature needed to make an accurate moisture determination. External grinding, weighing, and temperature measurement operations are not permitted. In addition, if the meter is capable of measuring test weight per bushel, determination of sample volume and weight for this measurement shall be fully automatic *and means shall be provided to ensure that measurements of test weight per bushel are not allowed to be displayed or printed when an insufficient sample volume is available to provide an accurate measurement.***
***[Nonretroactive as of January 1, 2004]***

**S.4. Operating Instructions and Use Limitations. - The manufacturer shall furnish operating instructions for the device and accessories that include complete information concerning the accuracy, sensitivity, and use of accessory equipment necessary in obtaining a moisture content. Operating instructions shall include the following information:**

**(d) the kind or classes of grain or seed for which the device is designed to measure moisture content and test weight per bushel;**

**N.1.1. ~~Air-Oven Reference Method~~ Transfer Standards. - Official grain samples shall be used as the official transfer standards with moisture content and test weight per bushel. Moisture content values are assigned by the reference methods. The reference methods for moisture shall be the oven drying methods as specified by the USDA GIPSA. The test weight per bushel value assigned to a test weight transfer standard shall be the average of 10 test weight per bushel determinations using the quart kettle test weight per bushel apparatus as specified by the USDA GIPSA. Tolerances shall be applied to the average of at least three measurements on each official grain sample. Official grain samples shall be clean and naturally moist, but not tempered (i.e., water not added).**

**N.1.2. Minimum Test. - A minimum test of a grain moisture meter shall consist of tests~~:~~**

**~~(a) with~~ using samples (need not exceed three) of each grain or seed type for which the device is used, and for each grain or seed type shall include the following:**

**(a) tests of moisture indications, ~~(b)with~~ using samples having at least two different moisture content values within the operating range of the device~~.~~ , and if applicable,**

**(b) tests of test weight per bushel indications, with at least the lowest moisture samples used in (a) above.**

**T.3. For Test Weight Per Bushel Indications or Recorded Representations. - The maintenance and acceptance tolerances on test weight per bushel indications or recorded representations shall be ~~0.193 kg/hL or 0.15 lb/bu. The test methods used shall be those specified by the USDA GIPSA.~~ as shown in Table T.3. Tolerances are (+) positive or (-) negative with respect to the value assigned to the official grain sample.**

| Table T.3. Acceptance and Maintenance Tolerances Test Weight per Bushel | |
|---|---|
| Type of Grain or Seed | Tolerance (pounds per bushel) |
| Corn, oats | 0.8 |
| All wheat classes | 0.5 |
| Soybeans, barley, rice, sunflower, sorghum | 0.7 |

**UR.1.1. Value of the Smallest Unit on Primary Indicating and Recording Elements. - The resolution of the moisture meter display shall be 0.1 % moisture and 0.1 pounds per bushel test weight during commercial use.**

**UR.3.4. Printed Tickets**

**(b) The customer shall be given a printed ticket showing the date, grain type, grain moisture results, test weight per bushel and calibration version identification. The ticket shall be generated by the grain moisture meter system.**

**Discussion:** This proposal was developed to provide tolerances and to establish requirements for specific grain types to address grain moisture meters with an optional automatic test weight per bushel (TW) measuring feature.

The following information is excerpted from the 2002 Grain Moisture Meter (GMM) Sector summary. Knowledge of Test Weight per Bushel (TW) is important not only in determining the price a producer receives for grain delivered to a grain elevator; it is also important to the grain elevator when grain stocks in storage are audited for quantity. Grain industry members reported that the proposed tolerances for TW are acceptable to the industry. Stressing that the grain industry urgently needs the capability to simultaneously (and easily) make TW determinations, they urged the GMM Sector to move forward on this issue. Some members were hesitant about moving forward at that time, citing concern about the unresolved issue of large negative bias in the Phase II data for one state. A review of the issue strongly indicates a procedural error at the field level was the cause for questionable data. It was pointed out that even if the GMM Sector recommends moving ahead at this time, the earliest date that changes in the code would become effective was January 1, 2004.

The GMM Sector considered whether the recommended changes should be retroactive or nonretroactive. Sector discussions centered on the requirement that meters measuring TW must provide some means to ensure that measurements of TW are not allowed to be displayed or printed when insufficient sample volume has been supplied. The GMM Sector recognized there is a general assumption that the means will include some sort of a level sensor installed in either the sample hopper or the test cell although the proposed code does not specify how this will be accomplished.

GMM Sector members in favor of making the proposed code retroactive noted that although moisture measurements are not significantly affected when samples are not of sufficient size to completely fill the measuring cell of a GMM, the TW measurement is greatly affected when the cell is not filled. Measurement of TW requires determination of two parameters; volume and mass. The vast majority of GMMs with TW capability presently in the field do not have means to assure that the measuring cell is completely full. If the cell is not filled completely, TW indications will be lower than they should be to the disadvantage of the producer selling grain. Some members in favor of making the code nonretroactive felt that GMMs with a window, through which the test cell could be seen, provide adequate means to verify that the cell is full. A grain industry member expressed the belief that compared to how test weight measurements are being made now, the worry about a sensor was trivial. It was argued that as long as the GMM could produce an accurate TW measurement when properly used, it was not important whether or not the hopper or test cell had a sensor. Some thought this was a facilitation of fraud issue and favored making the sensor requirement retroactive. Other members thought that making the code retroactive would unfairly penalize users of existing NTEP meters with TW capability.

One manufacturer supported making the sensor requirement retroactive and pointed out that the GMMs they manufacture are covered by an NTEP Certificate of Conformance (CC) and are hard coded to add the words “approx” or “approximate” to the display and print out TW measurements. That GMM Sector member also questioned how devices displaying “approximate” TW would be regulated if the sensor requirement was nonretroactive. Weights and measures officials were at first divided on this question. Some were of the opinion that they would permit the continued use of the device and display of “approximate” TW, if the device met the tolerance requirements, since “approximate” was added at the request of jurisdictions permitting a display of TW when tolerances did not exist as regulation. Others were concerned about what would happen in a court case when printed tickets which recorded “approximate” were used as evidence. States that presently do not permit “approximate” TW to be displayed or recorded indicated they would not change their policy.

The Committee discussed concerns about how to ensure meters have sufficient sample volume. The Committee was informed that older meters are equipped with a hopper where the operator can observe the sample volume; however, most new meters do not have a weight sensor. The GMM Sector agreed that the proposed changes to paragraph S.2.6. to require a means for sensing when a sample is not sufficient should be a nonretroactive requirement. The Committee agreed that all issues were resolved and the item is ready for a vote at the 2003 NCWM Annual Meeting.

The Committee considered a proposal to include SI (metric) units of measurement in paragraphs S.1.1.(e), S.1.4., and UR.1.1. and Table T.3. The Committee believes that grain moisture meters currently recognized in the United States indicate and make measurements only in U.S. customary units. Prior to any editorial changes, the Committee asked that NIST determine if including metric units involves straight conversions or other steps. The advisors determined that a straight measurement unit conversion ob lb/bu test weight to kg/hL using the USDA method does not equal the method followed by countries using the metric system, where kg/hL is based on the ISO test method

The Committee also discussed the use of term "approximate" TW (test weight per bushel). The Committee agreed that quantifying terms should not be used in conjunction with indicated or recorded units of measurement.

**356(b) Grain Moisture Meters**

**356(b)-1 VC T.3. For Separate Test Weight Per Bushel Devices**

(This item was adopted.)

**Source:** Central Weights and Measures Association (CWMA)

**Recommendation:** Modify paragraph T.3. as follows:

> **T.3. For Separate Test Weight Per Bushel Devices ~~Indications or Recorded Representations~~. - The maintenance and acceptance tolerances on separate test weight per bushel devices used to determine the test weight per bushel of grain samples for the purpose of making density corrections in moisture determinations ~~indications or recorded representations~~ shall be 0.193 kg/hL or 0.15 lb/bu. The test methods used shall be those specified by the USDA GIPSA using a dockage-free sample of dry hard red winter wheat.**

**Discussion:** Prior to being amended in 1992, Section 5.56.(b) applied to separate test weight per bushel (TW) devices used to determine the test weight per bushel of grain samples for the purpose of making density corrections in moisture determinations. When grain moisture meters were introduced with the capability to automatically indicate and record test weight per bushel values for the grain sample under test for moisture, the paragraph was amended to cover these devices. The tolerance assigned was that used by USDA GIPSA for their quart kettle test weight per bushel apparatus when tested as specified in the USDA GIPSA procedures using samples of hard red winter wheat.

At its August 2002 meeting, the Grain Moisture Meter (GMM) Sector reviewed test weight per bushel data collected in a field evaluation of the proposed tolerances and test methods. The GMM Sector agreed to recommend that only Section 5.56.(a) of the Grain Moisture Meter Code recognize indications and recorded representations in weight per bushel for a vote at the 2003 NCWM Annual Meeting. New devices with test weight per bushel capability will be required to be fully automatic and have means to ensure that measurements of test weight per bushel are not allowed to be displayed or printed when insufficient sample volume is available.

The GMM Sector decided that it was not appropriate for the Sector to recommend modification of Section 5.56.(b) of the Code to add tolerances for grain moisture meters with test weight per bushel capability. Non-NTEP devices with test weight per bushel capability will not be required to determine if a sufficient sample volume has been provided for an accurate measurement. Section 5.56.(b) applies to non-NTEP devices which are not within the purview of the GMM Sector. Weights and Measures officials who are GMM Sector members suggested that paragraph T.3. should be revised to clarify that it applies to separate accessory devices (such as a beam balance test weight apparatus) used to determine test weight per bushel of grain samples for the purpose of making density corrections in moisture determinations. The Committee modified the paragraph title to clarify that the tolerance applies to separate equipment used to determine the TW that is used to make density correction in moisture determinations rather than grain moisture meters.

The Committee heard no unfavorable comments on this item. Therefore, the Committee recommended the item for a vote at the 2003 NCWM Annual Meeting.

## 357 Near-Infrared Grain Analyzers

### 357-1 VC S.1.1. Digital Indications and Recording Elements

(This item was adopted.)

**Source:** National Type Evaluation Technical Committee (NTETC) Near Infrared Grain Analyzer (NIR) Sector

**Recommendation:** Modify paragraphs S.1.1.(c) and (e) as follows:

***S.1.1. Digital Indications and Recording Elements.***

***(c) Analyzers shall be equipped with a communication interface that permits interfacing with a recording element and transmitting the date, grain type or class, constituent values, the moisture basis for each constituent value (except moisture), and calibration version identification. If the analyzer converts constituent results to a manually entered moisture basis, the "native" concentration and the "native" moisture basis must appear on the printed ticket in addition to the converted results and the manually entered moisture basis.***

***(e) Constituent content shall be recorded and displayed as percent of total mass at the specified moisture basis. The moisture basis shall also be recorded and displayed for each constituent content result (except moisture). If a whole grain analyzer that is calibrated to display results on an "as is" moisture basis does NOT display or record a moisture value, it must clearly indicate that results are expressed on an "as is" moisture basis. Ground grain analyzers must ALWAYS display and record a moisture measurement for "as is" content results (except moisture).***

Add new paragraph S.1.1.(h) as follows:

***(h) If the analyzer incorporates a built-in printer or if a printer is available as an accessory to the analyzer, the information appearing on the printout shall be arranged in a consistent and unambiguous manner.***

**Discussion:** During its August 2002 review of NCWM Publication 14 checklist to add additional grains and criteria for moisture basis, the NIR Sector considered including text, "at the specified moisture basis," to the NTEP Publication 14 criteria that is based on NIST Handbook 44 paragraph S.1.1.(e). Total mass is the sum of constituent mass and moisture mass. Moisture mass, in turn, depends on the specified moisture basis. Unless both percent constituent content and its associated moisture basis are known, the actual constituent concentration cannot be known with certainty. To correctly reflect that the constituent percent of total mass depends upon the specified moisture basis and to bring the code into agreement with the Publication 14 NIR Checklist, the NIR Sector agreed that paragraph S.1.1.(e) should be modified as shown in the recommendation above.

It was also noted during the review of the proposed changes to the Publication 14 NIR checklist that the checklist referenced paragraph UR.2.3 Printed Tickets. NIR printed tickets must record specific information such as constituent values and each constituent's associated moisture basis. Publication 14 criteria should be based on specifications rather than user requirements. A review of the NIR code revealed that in cases where an analyzer converts constituent results to a manually entered moisture basis, there is nothing in the NIR Code specifications that requires the device to record the "native" constituent concentration and the native moisture basis along with the converted results and the manually entered moisture basis. There is also no specification that requires the printed information be arranged in a consistent and unambiguous manner.

Consequently, the NIR Sector proposed to amend paragraph S.1.1. (c) to include specifications for recording the "native" constituent value and moisture value along with the converted results and the manually entered moisture basis, to amend paragraph S.1.1.(e) to recognize the need for moisture basis in determining the constituent mass, and to add new paragraph S.1.1. (h) to include a specification that requires the printed information be arranged in a consistent and unambiguous manner.

During the 2003 Interim Meeting, the Committee heard no unfavorable comments on this item. Therefore, the Committee recommended the item for a vote at the 2003 NCWM Annual Meeting.

The Committee considered a proposal to define “nature moisture basis” as the default moisture basis of the sealable constituent calibration (the moisture basis of the device) since the term appears in the proposal, but is not defined in Handbook 44 Appendix D, Definitions. However, a new definition of the term “native moisture basis” is not needed since the term is already defined in paragraph A.3. Calibrations as follows: The "native" moisture basis is the default moisture basis of the sealable constituent calibration (or constituent calibration pair when a non-displayed moisture calibration is also involved).

**357-2 VC S.1.2. Selecting Grain Class and Constituent**

(This item was adopted.)

**Source:** Carryover Item 357-1B (This item originated from the National Type Evaluation Technical Committee (NTETC) Near Infrared Grain Analyzer (NIR) Sector and first appeared on the Committee's 2002 agenda.)

**Recommendation:** Modify paragraph S.1.2. as follows:

***S.1.2. Selecting Grain Class and Constituent. – Provision shall be made for selecting, and recording the type or class of grain and the constituent(s) to be measured. The means to select the grain type or class and constituent(s) shall be readily visible and the type or class of grain and constituent(s) selected shall be clearly and definitely identified in letters (such as HRWW, HRSW, etc. or PROT, etc.). A symbol to identify the display of the type or class of grain and constituents(s) selected is permitted provided that it is clearly defined adjacent to the display. Minimum acceptable abbreviations are listed in Table S.1.2. Meters shall have the capability (i.e., display capacity) of indicating the grain type using a minimum of four characters in order to accommodate the abbreviations listed in Table S.1.2. If more than one calibration is included for a given grain type, the calibrations must be clearly distinguished from one another.***
***[Nonretroactive as of January 1, 200X]***

**Discussion:** In 2002, the Committee indicated it was not appropriate to exempt specialty crops, an undefined commodity, from the entire NIR Code. The Committee agreed that it was more appropriate to address industry concerns about the proprietary nature of specialty crop calibrations by modifying paragraph S.1.2. The Committee proposed including language in paragraph S.1.2. that requires multiple calibrations (i.e., specialty crop calibrations) for a particular grain type to be clearly distinguished from one another.

In an attempt to arrive at a definition of "specialty crop," the NIR Sector considered one member's recommendation that a specialty crop might be one in which the constituents recognized by the NTEP Certificate of Conformance for that crop type (e.g., soybeans: protein, and oil) could not be measured accurately using the normal calibration because the specialty crop had a spectral response that differed significantly from the spectral response of normal varieties of that crop. High oleaic soybeans (soybean varieties developed specifically to yield high concentrations of oleaic acid) were cited as a good example of a specialty crop requiring special oil and protein calibrations. In contrast, "high oil" corn was not considered a good example of a specialty crop, although seed companies may market it as such. It was pointed out that although "normal" corn typically has an oil content in the 3 % to 4 % range, the GIPSA corn oil calibration contains low (3 % to 4 %), mid-range (5 % to 6 %), and high (>7 %) oil samples from three major seed companies. Sector members were in general agreement that it would be misleading to imply that this, or similar, "standard" calibrations are somehow unsuitable for use with high-oil corn samples. There was similar agreement that, from a regulatory point of view, it would not be desirable to allow the use of multiple calibrations (on the same device) for essentially the same commodity.

The NIR Sector searched for wording that would restrict the unnecessary use of multiple calibrations for the same basic grain type, but would still permit the use of proprietary calibrations where there was a legitimate need. The NIR Sector considered amending paragraph S.1.2. to include several variations of the statement "If a non-NTEP calibration is included for a given grain type, it must be clearly distinguished from other calibrations. The calibration description must clearly identify the unique end use property addressed by the calibration."

Ultimately, the NIR Sector decided on the wording in the recommendation above, which was originally proposed by the S&T Committee, adequately addresses requirements for specialty crops.

The Committee heard no unfavorable comments on this item. Therefore, the Committee recommended the item for a vote at the 2003 NCWM Annual Meeting.

**358 Multiple Dimension Measuring Devices**

**358-1 I Tentative Status of the Multiple Dimension Measuring Devices Code**

**Source:** Carryover Item 358-1. (This item originated from the Southern Weights and Measures Association (SWMA) and first appeared on the Committee's 2002 agenda.)

**Recommendation:** Change the status of the Multiple Dimension Measuring Devices Code (MDMD) from tentative to permanent.

**Discussion:** In response to comments from weights and measures officials and industry representatives the Multiple Dimension Measuring Devices Code was considered for permanent status. The Committee also heard comments from industry that the code should be harmonized with the more stringent Canadian requirements. In January 2002, the Committee made the proposal a voting item. During the July 2002 NCWM Annual Meeting, industry representatives cautioned that other issues may exist because the code was developed prior to the introduction of some of the latest electronic technology. Therefore, the Committee changed the proposal's status from a voting item to an information item pending further review.

The Northeastern and Western Weights and Measures Associations recommended the proposal remain an information item until a work group could review the code requirements.

During the 2003 NCWM Interim Meeting, the Committee heard that there remained a number of proposals to modify Canadian requirements for MDMD devices. Consequently, in the interest of aligning U.S. and Canadian requirements, the Committee made the proposal an information item to allow time for review and comparison of U.S. and pending Canadian requirements.

The MDMD Work Group met July 17-18, 2003 to discuss outstanding issues in the MDMD Code. The Work Group plans to submit proposals for changes to NIST Handbook 44 MDMD Code by the January 2004 NCWM Interim Meeting.

For more background information, refer to the 2002 S&T Final Report.

## 360 Other Items

### 360-1 I Revise NIST Handbook 44

**Source:** Carryover Item 360-1 (This item originated from the Southern Weights and Measures Association (SWMA) and first appeared on the Committee's 1999 agenda.)

**Discussion:** The Committee is not aware of any updates on the work to revise NIST Handbook 44. The Committee recommends that all parties interested in learning the status of this project contact the NCWM Board of Directors (BOD).

At its 2002 Interim Meeting, members of the Northeastern and Western Weights and Measures Associations agreed to continue to support the BOD's effort and encourage them to fund this project.

The Committee also encourages the BOD to continue to provide financial support for the project. The Committee believes that the project to revise Handbook 44 is worthwhile and needed by its users.

The Committee believes that Handbook 44 is an important tool for the weight and measures community. The Committee agreed that work should continue to reformat the document to make it more user friendly. The Committee encourages the BOD to continue in its support of the project to revise Handbook 44.

### 360-2 I International Organization of Legal Metrology (OIML) Report

Many issues before the OIML, the Asian-Pacific Legal Metrology Forum (APLMF), and other international activities are within the purview of the S&T Committee. Additional information on OIML activities is available on the OIML web site at http://www.oiml.org/.

For more information on weighing devices, contact Steven Cook (NIST Weights and Measures Division Legal Metrology Devices Group (WMD-LMD)) by telephone at 301-975-4003 or by e-mail at steven.cook@nist.gov. For more information on grain moisture meters, contact Diane Lee (WMD-LMD) by telephone at 301-975-4405 or by e-mail at diane.lee@nist.gov. For more information on the R 117, "Measuring Systems for Liquids Other than Water" and R 105, "Direct Mass Flow Measuring Systems for Quantities of Liquids," and gas meters, contact Ralph Richter (WMD - International Legal Metrology Group (WMD-ILM)) by telephone at 301-975-4025 or by e-mail at ralph.richter.@nist.gov. For more information on measuring devices, contact Wayne Stiefel (WMD-ILM) by telephone at 301-975-4011, or by e-mail at s.stiefel@nist.gov. For more information on electronic measuring devices, contact

Dr. Ambler Thompson (WMD-ILM) by telephone at 301-975-2333 or by e-mail at ambler@nist.gov. For more information on taximeters, contact Juana Williams (WMD-LMD) by telephone at 301-975-3989 or by e-mail at juana.williams@nist.gov. Each WMD representative can also be reached by postal mail at NIST, 100 Bureau Drive-Mail Stop 2600, Gaithersburg, MD 20899-2600 or by fax at 301-926-0647.

The NIST WMD contracted with Mr. John Elengo (Consultant) to create a line item comparison document and analysis of requirements in NIST Handbook 44 Scale Code and OIML Recommendations R 76, "Non-Automatic Weighing Instruments," and R 60 "Metrological Regulations for Load Cells." To obtain a copy of the document, access the WMD web site at www.nist.gov/owm. The work represents the first stages to harmonize U.S. and international requirements for non-automatic weighing systems and load cells. The Committee requests comments on the draft document that compare R 76 and R 60 with corresponding requirements in NIST Handbook 44 Scales Code.

On Monday July 14, 2003 at the NCWM Annual Meeting open hearing session, NIST representatives Dr. Charles Ehrlich (WMD-ILM), Mr. Ralph Richter (WMD-ILM), Mr. Steven Cook (WMD-LMD) and Juana Williams (WMD-LMD) provided updates on OIML activities. For details on the entire OIML Report see Appendix A of the Board of Directors Final Report.

**360-3 D Developing Items**

The NCWM established a mechanism to disseminate information about emerging issues which have merit and are of national interest. Developing items have not received sufficient review by all parties affected by the proposals or may be insufficiently developed to warrant review by the Committee. The developing items are currently under review by at least one regional association or technical committee.

The developing items are listed in Appendix B according to the specific NIST Handbook 44 Code Section under which they fall:

Part 1 – Scales
Part 2 – Vehicle-Tank Meters
Part 3 – Other Items

The status changes to developing items are as follows:

| Old Reference Number | Title of Item | New Reference Number | Status Change |
|---|---|---|---|
| Appendix B Part 1, Item 1 | N.1.3.4.1. Weight Carts | 320-11 | January 2003 upgrade of item to an Information Item |
| Appendix B Part 1, Item 2 | T.N.3.X. Vehicle Scales Equipped Only With Weighbeam and Used to Weigh Aggregate | None | Committee withdrew this item from the developing agenda |
| Appendix B Part 2, Item 1 | N.4.2. Special Tests (Except Milk-Measuring Systems), N.4.5. Product Depletion Test, and T.5. Product Depletion Test | 331-6 | January 2003 upgrade of item to an Information Item |
| Appendix B Part 3, Item 1 | Update NCWM Publication 3, National Conference on Weights and Measures Policy, Interpretations, and Guidelines; Taximeters vs. Odometers Used for Transporting Fare Paying Passengers | 360-4 | January 2003 upgrade of item to a Voting Item |

The Committee encourages interested parties to examine the proposals included in Appendix B and send their comments to the contact listed in each item.

The Committee asks that the regional weights and measures associations and NTETC Sectors continue their work to fully develop each proposal. If an association or Sector decide to discontinue work on a developmenting item, the Committee asks that it be notified.

**360-4 V Update NCWM Publication 3, National Conference on Weights and Measures Policy, Interpretations, and Guidelines; Taximeters vs. Odometers Used for Transporting Fare Paying Passengers**

(This item was adopted.)

**Source:** Southern Weights and Measures Association (SWMA). (This item first appeared on the Committee's 2001 Agenda as Developing Item 360-4, Appendix E. The item appeared in the 2003 NCWM Interim Agenda as Developing Item 360-3, Appendix D. During the 2003 Interim Meeting, the item status was changed to a voting item because there is a national consensus in favor of the proposed policy.)

**Recommendation:** Add the following interpretation to NCWM Publication 3, Section 3 – Specifications, Tolerances, and Device Inspection, Subsection 5 – Linear Measuring and Other Devices:

**3.5.X Taximeters vs. Odometers Used for Transporting Fare Paying Passengers**

**Interpretation**

**Taximeters are required for use in transporting passengers and charging on a "distance traveled" basis. Vehicle odometers are not suitable equipment for such use. Odometers are suitable for use in charging "distance traveled" rates in rental vehicles in which customers pay on a "per-mile" basis for the right to operate the vehicle.**

**NIST Handbook 44 requires that devices must be suitable for their application with regard to their operating abilities, including their capacity, smallest division size, readability, performance, and design.**

**Handbook 44 General Code, which applies to all devices, requires in paragraph *G-UR. 3.3. Position of Equipment* that a device or system *"used in direct sales shall be so positioned that its indications may be accurately read and the weighing or measuring operation may be observed from some reasonable "customer and operator position."* Reasonable customer positions in taxicabs or other vehicles in which a driver transports passengers includes all passenger seats in a vehicle, both front and back. A properly installed taximeter's indications are easily readable from any position in the vehicle, both in darkness and light. An odometer cannot be read accurately from most positions in a vehicle other than the drivers' seat.**

**Handbook 44 General Code also requires specific markings on devices including manufacturer's name or trademark, model designation, and a nonrepetitive serial number. All markings must be located so that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device. The code also requires electronic devices to have provisions for applying security seals that must be broken before any changes that affect the accuracy of the device can be made. While taximeters meet these requirements, most odometers do not.**

**Further supporting the requirement for taximeters over odometers are the tolerances for the two devices prescribed in Handbook 44. Transporting passengers for hire normally involves shorter distances at higher cost-per-distance charges than for rental vehicles. The tolerances for taximeters in the Taximeters Code are *1 % for overregistration* (error in favor of the cab) and *4 % for underregistration plus 100 feet* (in favor of the customer). The tolerances for odometers in the Odometers Code are *4 % for overregistration and underregistration*, allowing 4 times as much error in favor of the operator. As taxi fares are usually much higher than rental car costs on a per mile basis, this allows for unreasonable and unacceptable errors that could be financially injurious to the customer.**

**It should be noted that no taximeter is required in cases where the charges are based on zones or flat rates, providing that such methods are in compliance with local ordinances and are conspicuously posted and understandable to customers. When taximeters are used, the rates for distances traveled and any extras must be posted as well.**

**Background:** The SWMA asked the NCWM to consider a proposal to modify NCWM Publication 3 "Policy, Interpretations, and Guidelines" to include an interpretation in Section 3, Subsection 5 specifying that odometers are not suitable equipment for use in transporting passengers and charging on a "distance traveled" basis.

The Committee concurred with the SWMA that the charging of passengers based on an odometer reading is inappropriate and does not comply with paragraph G-UR.1.1. Suitability of Equipment. The Committee recommends using paragraph G-UR.1.1. as a basis to prohibit odometers from being used to charge passengers for distance fares.

The policy in the recommendation above was developed by SWMA and assist weights and measures officials in requiring taximeters to be used in charging passengers on a distance traveled basis when hiring a vehicle and clarifies that the driver is to transport the passengers at a predetermined rate or rates.

The Committee recognizes that individuals or small taxi companies that operate in less populated or rural communities might obtain all necessary operating permits and licenses from the local government yet begin operations using vehicle odometers, rather than taximeters, as the basis for charging passengers. Local law enforcement agencies (e.g., local police or sheriff's departments) that are involved in the permitting process, but not the inspection of the measuring devices, see no problem in using odometers if they are accurate and demand something written specifically to address the issue before they will offer assistance in obtaining compliance. The Odometer Code and Taximeter Code does not directly address this suitability issue therefore, it must be explained through interpretations such as the one in this proposal. An NCWM endorsed interpretation would be of valuable assistance in obtaining compliance.

The Committee recognizes that NCWM Publication 3 has not been published or updated since 1991, although there have been many changes to Handbook 44 that justify additional interpretations and policies. Currently, weights and measures officials must rely on and reference the NCWM Standing Committee Final Reports for help in interpreting many provisions found in the codes. NIST Handbook 130 now contains the interpretations, policies, and guidelines related to Laws and Regulations issues, which are presumably kept up to date with each new edition unlike Handbook 44. The Committee acknowledges there is no plan for any working group, technical committee, or organization to publish the policy in a procedural document. However, the weights and measures community needs to reference policy that clearly specifies that odometers are not suitable for determining distance fares when transporting passengers.

The Committee has heard only comments in favor of this policy. Consequently, the Committee and the submitter of this proposal believes that the proposed policy is a good start to address the suitability issues that arise when odometers are used to charge passengers for distance fares. The Committee also encourages the SWMA and other weights and measures communities facing similar suitability issues to develop language for the Odometer and Taximeter Codes to further remedy this situation. The Committee recommended a change in the proposal's status from developing item to a voting item at the 2003 NCWM Annual Meeting.

---

Richard W. Wotthlie, Maryland, Chairman

Clark Cooney, Oregon
Jack Kane, Montana
Michael J. Sikula, New York
Craig Van Buren, Michigan

Ted Kingsbury, Canada, Technical Advisor
Richard Suiter, NIST, Technical Advisor
Juana Williams, NIST, Technical Advisor

## Committee on Specifications and Tolerances

# Appendix A

## Prescription Scales – Counting Feature Test and Other Procedures (Item 320-2)

(The following information was excerpted from the 2003 Final Report of the S&T Committee for the Western Weights and Measures Association. The procedures included in this information are provided as background information on the proposal adopted by the 2003 NCWM to recognize the counting feature on Class I and Class II Prescription Scales. The procedures have not been evaluated to determine if they are appropriate for verification of the counting feature. The Committee did not modify the format of the procedures to correspond to existing handbook test notes, type evaluation checklists criteria, or examination procedure outlines (EPO). The Committee developed a test procedure for the field verification of the counting feature (see Item 320-2).

### I - Calculating Piece Weight

**How to Perform Piece Counting with Reference Weight Calculated by the Prescription Scale**

1. Zero the scale
2. Place reference (appropriate sample) number of pieces on scale pan.
3. Input reference quantity data into Prescription scale
4. Prescription scale waits for the weight to become stable
5. Prescription scale calculates reference weight (reference weight = current weight on scale divided by selected reference quantity
6. Scale stores the calculated reference weight and reference quantity
7. Scale switches to a count display with the current quantity displayed
8. Scale is now ready to continue counting – indicated number of pieces = current weight divided by reference weight

**Reference Weight Optimizing Program**
(Optional algorithm for counting feature described above)

When you place a number of pieces on the pan, which is at least three pieces higher than the reference count of pieces, the new reference weight is being recalculated and stored together with this higher reference count. The prescription scale could confirm this by some type of symbol located on the display.

| | Weight [g] | Calculation [pieces] | Display [pieces] | Reference-weight [g/pieces] | Reference-count [pieces] | New Reference Weight |
|---|---|---|---|---|---|---|
| Start | 5.123 | 5 | 5 | 1.024 6 | 5 | Yes |
| 1. count | 25.500 | 24.888 | 25 | 1.020 0 | 25 | Yes |
| 2. count | 26.450 | 25.931 | 26 | 1.020 0 | 25 | No |
| 3. count | 50.700 | 49.706 | 50 | 1.014 0 | 50 | Yes |
| 4. count | 30.050 | 29.635 | 30 | 1.014 0 | 50 | No |

### II – Specifications for Prescription Scales Equipped with a Counting Feature

**Recommended Prescription Scale Characteristics**

- The scales should be Accuracy Class I or II
- Counting mode must be evident on display
- Scale display must be able to differentiate between counting and weighing
- Scale capacity would range from 310 g to 620 g
- Suggested scale divisions of d=0.001 g, e=0.01 g
- Scale is equipped with a zero count indicator
- Scale is equipped with zero-count setting capability
- Verification resolution 0.010 g

- Linearity +/- 0.001 5 g
- Reproducibility +/- 0.001 g

## III - Test Methods to Determine the Prescription Scale's Performance

### Scope

The following guidelines are proposed for testing potential prescription scale equipped with a counting feature to ensure counting accuracy. These procedures describe the tests to be used in determining various parameters of a prescription counting scale.

The prescription counting scale test procedures determine:

a) The precision of determining mean piece weight,
b) The minimum and maximum mean piece weights,
c) The minimum weight and minimum piece count that may be used to determine mean piece weight,
d) The linearity in determining accurate mean piece weight throughout the prescription scale weight range,
e) The linearity and accuracy of determining mean piece weight given a range of pill quantities,
f) The percent of a pill required for indicating the next pill quantity.

### Recommended Method for Determining Prescription Scale Accuracy During Counting Function

The following test plan should be carried out to approximate most of these values. The resolution and accuracy internal to the device cannot be determined; however, these tests may identify significance or a means to approximate the internal resolution.

### Assumptions

a. Tests must be performed in a laboratory setting to minimize external influences. An assumption must be made that the scales are Class I or II balances and testing must be performed under suitable Class I scale conditions that is, free from temperature fluctuations, vibration, draft, calibration, warm-up, level, and free from static or other electro-magnetic sources. Use ASTM E 617 Class 2 (OIML R 111 Class F1) or better calibrated weights, proper weight handling conditions, and ensure weight cleanliness.
b. Tests will be performed on at least two of each scale device. Testing on a third device will be required should significant variations be noted on any one scale of the same class.
c. Class 2 or better (Class 1 preferred during calibration) test weights will be used during testing. Clean and air dry all test weights using an approved method. If unable to determine Class the appropriate 1/2 weight cleaning procedure, assume that the use of denatured alcohol is an approved solvent for cleaning that will result in no residue on weights.
d. Perform all tests using the same test weight set.
e. Preference is for the same operator and same environmental setting be used to perform all like tests. Preference is for all like devices to be tested at the same time or as close as possible.
f. Each test defined below should be performed without interruption in time or concentration. After the test is performed, the same test should be repeated on the second device immediately thereafter. If necessary, a third device should be tested. This is to ensure repeatability under the same or similar conditions.
g. All tests will be performed a minimum of 5 times or as stated in NTEP testing procedures if an equivalent test exists.
h. All test results must be recorded when performed. All exceptions, retries or retesting, significant pauses in testing and aborted tests or scale recalibrations must be noted before, during and after test. Time should be recorded at the beginning and completion of each major test.
i. Once testing begins, **absolutely no recalibration** of the scale may occur throughout the **entire** test sequence. (Should recalibration be needed during the testing; the entire testing must be aborted and properly documented and testing restarted at the beginning.)
    1. Calibrate scale using approximately two-thirds total load of scale
    2. Verify scale calibration conforms to Class I or II (NIST Handbook 44 Table 6)
        i. Verify by approaching calibration weight from below and above as defined in NTEP testing procedures.
    3. Verify linearity across entire range (per NTEP)
    4. Verify corner load (per NTEP)

5. Verify calibration every hour while testing. If greater than +/-0.001 g error; calibration error must be sufficiently explained before resumption of testing. All tests to last known good calibration must be repeated; with original test results also noted.
6. Record all results.

j. Record all results within a spreadsheet. Use formulas wherever possible. Record all significant digits. Display in fixed format. Display all calculated values to 6 significant digits. Note any formula or calculation that uses a rounded or truncated value. Test results sheets should also contain other good laboratory practices background data. (e.g., Time, date, who, SN,)

k. Before starting the tests defined below, perform the following NTEP tests. These tests must be performed daily before testing starts. Use a single test weight nearest the two-thirds total load. (or larger if required)
   1. Verify calibration using approximately two-thirds total load of scale.
   2. Verify return to zero after each test above. Tare as needed. Do not continue testing if repeatability of zero is unreliable (e.g., must repeatedly tare for zero values greater than +/- 0.001 g.)
   3. Verify linearity across entire range (per NTEP) accuracy and repeatability.
   4. Verify corner load (per NTEP). For each test, Record the actual test weight, displayed value, note fluctuations in display as comments. Calculate error, percent error in spreadsheet
   5. Record all results.
   6. Steps 1 and 2 must be performed at the beginning and completion of each test phase to insure test reliability.

l. If a test range of values requested for N are not specified, where N is the ….. Assume 5, 10, 30, 100, 200 or some N to match test weight specified) these represent minimum scale reference quantities and typical in-use values for reference quantities. The maximum N may need to be determined based on the test being performed and the test weight specified.

m. If a test range of values request for test weights is not specified. Assume 0.020 g, 0.030 g, 0.300 g, 0.400 g, 1.000 g and 10.000 g. These values represent the smallest drug weights, average and median drug weights and upper end and maximum drug weights)
   1. Scale communication interface minimum piece weight. All tests for this section assume communication with the scale CPU from a computer or via the RS-232 interface. The recorded value should be to the highest resolution accepted by the scale. (Repeat once)
      i. What is the highest resolution value accepted by the scale? (00.123 45…9… g)
      ii. What is the minimum acceptable piece weight accepted by the scale via the RS-232 interface? (in xx.xxxxx grams format)
      iii. What is the maximum acceptable piece weight accepted by the scale via the RS-232 interface?
      iv. What is the highest resolution value returned by the scale?
      v. What is the resolution recorded in the library? (00.123 4 g)

   2. Scale calculated minimum piece weight. All tests for this section assume the scale is performing the piece weight calculation. (e.g., An operator places N pieces on the scale and the scale calculates by total weight / N = piece weight.) Determine by using the same reference weight(s) and adjusting N. (Note: Reference weight must be greater than scale minimum weight. Preferably 2x to 5x minimum scale weight.) (Repeat once)
      i. What is the maximum resolution piece weight value returned by the scale?
      ii. What is the minimum number of reference pieces accepted for determining reference weight?
      iii. What is the minimum piece weight that will be calculated by the scale?
         1) Does this vary by the number of pieces? (i.e., Changes in N)
      iv. What is the minimum total weight that the scale will calculate a piece weight?
         1) Does this vary by the number of pieces? (i.e., Changes in N)
      v. Record the following
         1) Actual weight used
         2) Reference quantity set (N)
         3) Scales calculated reference piece weight (ActPcWt)
         4) Theoretical reference piece weight (TPcWt)
         5) Error (TPcWt – ActPcWt)
         6) Percent error = (TPcWt – ActPcWt) / TPcWt * 100)
   3. Scale accuracy in determining piece weight. These tests are to determine the scales algorithm in piece weight calculation. Testing assumes use of test weights as a quantity. Where practical, use nearest whole test weight. Otherwise use as few weights as possible.
      i. What is the accuracy of the scale determining piece weight?
      ii. Does the accuracy change by changes in N?

iii. Repeat for N = 5, 10, 30, 60, 100 and 200 using a 5.000g test weight.
iv. Does the accuracy change by changes in total weight?
v. Repeat for approximate piece weight (after scale calculation) to be near 0.020 g, 0.030 g, 0.300 g, 0.400 g, 1.000 g, and 10.0 g with a count in the 60 to 180 range. (i.e., 2.000 g, 5.000 g, 20.000 g, 50.000 g, 100.000 g, and 200.000 g test weights)
vi. Use single reference weight nearest 25 % of total load capacity.
    a) Adjust N as required to achieve average pill pc.weight (0.300 g – 0.400 g). (Example 310.000 g * 0.25; locate nearest single reference weight. Nearest Single Reference Weight / 0.300 = N)
    b) Repeat for 50 % and 90 % of total load capacity by estimating N and then immediately finding N
    c) Record the following
        i) Actual weight used
        ii) Reference quantity set (N)
        iii) Scales calculated reference piece weight (ActPcWt)
        iv) Theoretical reference piece weight (T.PcWt)
        v) Error (TPcWt – ActPcWt)
        vi) Percent error = (TPcWt – ActPcWt) / TPcWt * 100)

4. Next pill tests. These tests are to determine the counting algorithm used within the devices
    i. What percent of a piece weight is required to generate the next count? (i.e. N+1)
    ii. Does this vary by piece weight value?
    iii. Does this vary by count?
    iv. Does this vary by scale settings?
    v. Perform tests at approximately 25, 50, 75 and 90 % of total load
    vi. Choose nearest whole weight (W1)
    vii. Perform test with N = 30 and 100
    viii. Scale to calculate reference piece weight
    ix. Place test weight on scale
    x. Extract and Record scales reference piece weight. (PcWt)
    xi. Record calculated piece weight. (W1 / N)
    xii. Add test weight(s) in 0.001 g increments (or using binary search procedure) until N+1 value is reached.
    xiii. Record total weight (and individual test weights) to nearest 0.001 g (W2) (proper protocol must be followed in approaching the N+1 count. Follow NTEP test procedures for slowly adding test weights in a reliable, predictable fashion. If the >0.001 g added and N+1 event occurs, sufficient test weights must be removed to reliable predict weight required for N+1 threshold. Do not drop weight onto scale pan. Do not touch scale pan when placing weight on scale. Do not touch scale pan when removing weight. Do not press on scale pan when removing weight.)
    xiv. Add test weight(s) in 0.001 g increments (or using binary search procedure) until N+2 value is reached. (W3)
    xv. Record total weight (and specify individual test weights used) to nearest 0.001 g
    xvi. Calculate and Record percent of piece weight required
        a) (W2 – W1) / PcWt * 100 %
        b) ((W3 – ((W3-W2)/2)) / PcWt * 100 %
        c) Note: both values calculated in i) and ii) above should be identical
        d) (W3-W2) = PcWt ???
    xvii. Once weights required for N+2 and N+1 are known; start with weight for N+2 + (PcWt / 2)
        a) Remove weights in 0.001 g increments (or using binary search) until N+1threshold reached.
        b) Record total weight (W4)
        c) Remove weights in 0.001 g increment until N reached
        d) Record total weight (W5)
    xviii. Calculate and record percent of pieces required
        a) W4 – W3 = difference for N+2 event
        b) W5 – W2 = difference for N+1 event
        c) W5 – W4 = PcWt ???

5. Counting accuracy based on known piece weight. These tests are to determine the linearity and accuracy of counting by using known weights and programmed piece weights.
    i. Perform tests with piece weight set to 0.020 g, 0.030 g, and 0.050 1 g
    ii. Test at 20x, 50x, 100x, 150x, 200x counts.
    iii. Record
        a) Actual total weight required

b) Specific test weight(s) used,
c) N
d) Expected total weight,
e) Error in weight
f) Percent error

iv. For 0.0501 g piece weight, test using 100.000 g weight (W1)
a) Set piece weight to 0.0501 g
b) Place the 100.000 g weight on scale
c) Record count (N)
d) Add weight(s) in 0.001 g increments until N+1 count reached (W2)
e) Record
1) Actual total weight added,
2) Specific test weight(s) used,
3) Error in weight
4) Percent error ((calculated weight needed for N+1 – actual weight) / calculated weight needed for N+1)
f) Continue adding weight in 0.001 g increments until N+2 count reached (W3)
g) Record
1) Actual total weight added,
2) specific test weight(s) used,
3) Error in weight
4) Percent error ((calculated weight needed for N+1 – actual weight) / calculated weight needed for N+1)
h) Calculate the following
1) W4 = W2+(W3-W2)/2 (represents N+1)
i) Repeat test above using 200.000 g weight

## IV - Test Methods to Determine the Performance of the Counting Feature

### Verifying Accuracy of a Counting Scale

A counting scale calibration assumes the following parameters are available when operating in the piece counting mode.

D(i) Internal scale resolution used during counting. D(i) will be higher resolution than e and d parameters currently on the weighing scale.

PcWt(min) Minimum mean article weight. PcWt(min) should follow normal distribution curves.

Class (count) Counting accuracy class. Class (count) determines the percent accuracy of the counting feature. Ideally, Class (count) should mimic the weighing Class I, II, III.

In addition, these parameters may be needed internal to a counting scale:

PCs (min) Minimum number of pieces allowed to establish PcWt. The PCs (min) is determined by the article type being counted. To some degree, the PCs (min) are established by the Normal Distribution of the article being counted.

CNT (min) PcWt (min) / D(i) = minimum number of scale intervals ( D(i) ) between each article counted.

Because article counting depends directly on the weight capacity, resolution, and mathematical routines internal to an electronic digital scale, no absolute counting calibration should be necessary or possible. The counting scale will support a method of establishing an article reference weight by either calculation based on an expected quantity or by direct entry (either manually or via a computer interface). However, a means must be provided to verify counting calibration based on an article reference weight.

## Counting Scale – Verification of Counting

Two alternative methods will be available to the scale manufacturer to demonstrate counting accuracy.

- Method #1 - Using a first test weight and a selected quantity to establish the article reference weight. And a second test weight to verify the count accuracy within the Class (count) tolerance.

- Method # 2- Counting scale retrieves a known (and published) article reference weight and a test weight to verify the count accuracy within the Class (count) tolerance.

Both methods assume the scale weighing calibration has been performed and the article reference weight (determined or pre-programmed) is typical for the intended application. The article reference weight must also be selected to result in the use of test weights typical for the Class of scale being used. The test weight value should be an even multiple of the article reference weight to simplify verification by using a singular test weight.

**Method #1 – Using a Reference Quantity to Verify Counting Accuracy**

This method assumes a known (published) reference quantity and a test weight will be used to establish the article reference weight and then this established article reference weight is used to verify the count accuracy to within the specified Class (count) accuracy.

The advantage to this method is that any test weight set for the Class scale may be used to verify proper operation of the counting scale. The operator selects two test weights that are X and 10X to 100X values within the published scale weighing range and greater than the PcWt(min).

The counting scale may support multiple quantities for the operator to select from in establishing the individual reference weight value. These quantities allow the scale to calculate an article reference weight based on a theoretical sample size of N articles.

Determining the Test Weights Needed:

1. Determine the article quantity to be used for establishing the reference weight. (N)
2. Calculate a test weight # 1 (TW1) that is above the PcWt(min) and typical for the articles counted. (Example: PcWt(min) * N < test weight # 1(TW1))
3. Calculate a test weight #2 (TW2) that is 10X to 100X the test weight # 1

Establishing the Article Weight:

4. Place the scale in the counting mode.
5. Place the scale in the mode used to establish article reference weights for the quantity of articles (N).
6. Following the scale manufacturer's direction, place the TW1 on the scale to establish the article reference weight. (Ref.Weight = TW1 / N)
7. Wait for the scale to indicate that the article reference weight calculation is complete.
8. Verify the quantity displayed.

Verify the Counting Accuracy Using the Established Article Reference Weight:

9. Zero the count display.
10. Place test weight # 2(TW2) on the counting scale.
11. Verify the quantity display is 10 to 100 articles (as previously calculated) are within the Class (count) tolerance.

A scale manufacturer may choose to publish the calculated article reference weight, N, TW1, TW2 and tolerance range values and procedures to simplify the verification task. A table of calculated article reference weights, N, TW1, TW2 and tolerance range values may be published for scales with multiple weighing ranges (and therefore counting ranges and corresponding tolerances).

| Calculated article reference weight | N | Test Weight #1 (TW1) | Test Weight # 2 ± (TW2) | Expected Count and acceptable Tolerance |
|---|---|---|---|---|
| 0.020 | 10 | 0.200 gram | 20.000 gram | 100 ± x |
| 0.100 | 10 | 1.000 gram | 100.000 gram | 100 ± x |
| 0.100 | 10 | 1.000 gram | 300.000 gram | 300 ± y |
| 0.300 | 10 | 3.000 gram | 300.000 gram | 100 ± x |

**Method #2 – Using a Reference Article Weight to Verify Counting Accuracy**

This method assumes a pre-programmed, known and published article reference weight will be used to verify the count accuracy to within the specified Class (count) accuracy. The pre-programmed article reference weight should be typical for the articles being counted. The operator may be able to select from a list of article reference weights or program a specific article reference weight.

Determining the Test Weight Needed

1. Calculate the test weight needed to be in the 10X to 100X range of the article reference weight. Pre-programmed article reference weight * 100 = test weight # 1(TW1).

Verify the Counting Accuracy Using the Established Article Reference Weight

2. Zero the count display.
3. Place test weight # 1(TW1) on the counting scale.
4. Verify the quantity display is 10 to 100 articles (as previously calculated) are within the Class (count) tolerance.

A scale manufacturer may choose to publish the article reference weight, TW1 and tolerance range values and procedures to simplify the verification task. A table of article reference weights, TW1 and tolerance range values may be published for scales with multiple weighing ranges (and therefore counting ranges and corresponding tolerances).

| Article Reference weight | Test Weight # 1 (TW1) | Expected Count and acceptable Tolerance |
|---|---|---|
| 0.020 | 20.000 gram | 100 ± x |
| 0.100 | 100.000 gram | 100 ± x |
| 0.100 | 300.000 gram | 300 ± y |
| 0.300 | 300.000 gram | 100 ± x |

# Appendix B

## Developing Items (Item 360-3)

### Part 1, Developing Items - Scales

**Part 1, Item 1 N.1.3.4.X. Weight Carts**

**Discussion:** The status of this proposal was changed to an information item and now appears as Item 320-11.

**Part 1, Item 2 T.N.3.X. Vehicle Scales Equipped Only With Weighbeam and Used to Weigh Aggregate**

**Source:** Central Weights and Measures Association (CWMA)

**Recommendation:** Add new paragraph T.N.3.X. to the Scales Code as follows:

> **T.N.3.X. Vehicle Scales Equipped Only With Weighbeam and Used to Weigh Aggregate. - The minimum tolerance applied to vehicle scales equipped only with a weighbeam and used solely to weigh aggregate products shall be 100 lb.**

**Discussion:** The CWMA requested input on this proposal to increase the tolerances for vehicle scales equipped with only a weighbeam and used to weigh aggregate.

The Committee heard numerous comments that the proposal has no technical merit and the scale tolerances should not be modified to accommodate equipment that is not able to maintain NIST Handbook 44 tolerances and other technical requirements. Consequently the Committee recommends the CWMA withdraw this item from its agenda.

The Committee recognizes the economic challenges faced by industry. The Committee believes the existing tolerances were not intended to be burdensome to either the scale user or customer that purchases a commodity that is weighed on the scale. The Committee can find no technical justification for modifying current Handbook 44 tolerances. Therefore, the Committee is withdrawing this item.

### Part 2, Developing Items – Vehicle-Tank Meters

**Part 2, Item 1 N.4.2. Special Tests (Except Milk-Measuring Systems), N.4.5. Product Depletion Test, and T.5. Product Depletion Test**

**Discussion:** The status of this proposal was changed to an information item and now appears as Item 331-6.

### Part 3, Developing Items – Other Items

**Part 3, Item 1 Update NCWM Publication 3, National Conference on Weights and Measures Policy, Interpretations, and Guidelines; Taximeters vs. Odometers Used for Transporting Fare Paying Passengers**

**Discussion:** The status of this proposal was changed to a voting item and now appears as Item 360-4.

# Report of the Committee on Administration and Public Affairs

Steve Hadder, Chairman
Florida Department of Agriculture and Consumer Services
Tallahassee, Florida

Reference
Key Number

## 400 Introduction

The Committee on Administration and Public Affairs (A&P Committee) submits its Annual Report for the 88th Annual Meeting of the National Conference on Weights and Measures. The Report consists of the Interim Report presented in NCWM Publication 16, "Committee Reports," as amended in the Addendum Sheets issued during the Annual Meeting. The Committee considered communications it received prior to and during the Annual Meeting in developing this report.

Table A identifies items contained in the report by Reference Key Number, Item Title, and Page Number. The item numbers are those assigned in the Interim Meeting Agenda. Presented below is a list of informational items, which are indicated by an **I.** Table B lists the Appendices to the report, and Table C provides a summary of the results of the voting on the report in its entirety.

### Table A
### Index to Reference Key Items

## Table B
## Appendices



## Table C
## Voting Results

| Reference Key Number | House of State Representatives | | House of Delegates | | Results |
|---|---|---|---|---|---|
| | Yeas | Nays | Yeas | Nays | |
| 400 (Report in Its Entirety) Voice Vote | All | No | All | No | Passed |

## Details of All Items
## (In Order by Reference Key Number)

### 401 Program Management

### 401-1 I Voluntary Quality Assurance Assessment (VQAA)

The A&P Committee reviewed checklists submitted for evaluation through January 2003. Reviewer evaluation letters were prepared and sent to the appropriate state directors. At this time the Committee decided not to develop further checklists. The checklists are available on the NCWM website, and regional associations are encouraged to place the checklists on their websites.

The A&P Committee expressed concern that more jurisdictions are not participating in the VQAA Program. Jurisdictions are encouraged to participate in the **confidential** assessment and view participation as an opportunity to improve their programs, rather than to use it as a report card of deficiencies.

### 401-2 I Safety Information

The NCWM Safety Liaison had not received any safety reports as of the 88th NCWM Annual Meeting, July 2003. Safety reports should continue to be submitted to the Regional Safety Liaisons.

The Regional Safety Liaisons are as follows:

| **Western Weights and Measures Association:** | **Northeastern Weights and Measures Association:** |
|---|---|
| Craig Leisy<br>Supervisor Weights and Measures<br>Seattle Licenses and Consumer Affairs<br>805 South Dearborn Street<br>Seattle, WA 98134<br>Tel: 206-386-1129<br>Fax: 312-386-1129<br>Email: craig.leisy@ci.seattle.wa.us | Michael J. Sikula<br>Assistant Director<br>New York Bureau of Weights and Measures<br>Building 7A State Campus<br>Albany, NY 12235-0001<br>Tel: 518-457-3452<br>Fax: 518-457-2552<br>Email: mike.sikula@agmkt.state.ny.us |
| **Central Weights and Measures Association:** | **Southern Weights and Measures Association:** |
| Agatha Shields<br>Inspector<br>Franklin County Weights and Measures<br>373 S. High Street, Auditor's Office<br>Columbus, OH 43215-7380<br>Tel: 614-462-7380<br>Fax: 614-462-3111<br>Email: aashield@co.franklin.oh.us | Steve Hadder, Trainer/Investigator<br>Florida Department of Agriculture and Consumer Services<br>3125 Connor Boulevard<br>Tallahassee, FL 32399-2634<br>Tel: 850-487-2634<br>Fax: 850-922-6655<br>Email: hadders@doacs.state.fl.us |

## 401-3 I NCWM Internet Home Page

The A&P Committee will continue to use the NCWM Internet website to disburse pertinent information to the weights and measures community. At the Interim Meeting the Committee discussed how the NCWM website (www.ncwm.net) can better serve weights and measures programs. The Committee recommends the Board of Directors approve the following for posting to the NCWM website:

1. List the topics available in the "Members Only" section on the main page to let non-members know the benefits of membership.

2. List the participants of Voluntary Quality Assurance Assessment on the NCWM Internet website to show appreciation for participation and encourage other jurisdictions to participate.

3. Make forms that are available on the NCWM website interactive.

4. Place the Associate Membership Committee application for training funds and AMC time line on the NCWM website.

5. Place the results of 2002 "Surf" Day on the website under the "Members Only" section.

6. Add a "New flash/hot item" section on the Home Page (including list of suggested activities) to advertise W&M Week or other important events.

## 401-4 I E-Commerce

**Source:** WWMA A&P Committee

**Discussion:** Jerry Buendel announced the results of a study conducted by Washington State during Weights and Measures Week 2002. Washington inspectors visited 32 websites and found 55 violations. Washington sent letters to the violators asking them to correct the deficiencies. In September 2002 the sites were revisited. Eight of the sites were no longer operational. Four items among the other sites were corrected leaving 37 sites that took no action to make corrections. The Committee members recommended these results be forwarded to NCWM for discussion with Federal Trade Commission officials.

**Decision:** The A&P Committee decided that Internet violations (e.g., package labeling violations) are definitely a problem. With the increase in e-commerce sales expected in the future, it is recommended that those jurisdictions that participate in surfing for violations contact the internet company that is in violation and the state director of the state in which the company resides.

It is recommended that a "surf" day be conducted during future Weights and Measures Weeks and that the results be forwarded to Lynn Sebring (lynn.sebring@nist.gov, 100 Bureau Drive STOP 2600, Gaithersburg, MD 20899-2600, or fax: 301-926-0647).

The Committee recommends that the results of the "surf" days be posted on the NCWM website.

## 402 Education

### 402-1 I National Training Program

**Source:** NCWM Board of Directors

The A&P Committee met with NCWM Chairman Ross Andersen, who explained his vision for revising the National Training Program. Mr. Andersen's vision includes a horizontal, hierarchical approach to training, filtering out the common elements of general information applicable to a wide range of devices and including the most detailed information in courses for specific devices. The A&P Committee presented a draft of a National Training Curriculum Outline, which is appended to the A&P Committee final report as Appendix B.

After hearing concerns from the floor concerning completion of the direction of the proposed plan, Chairman-Elect Dennis Ehrhart assured the A&P Committee of his support to "do whatever it takes" to complete the revised training program initiated by Chairman Ross Andersen.

### 402-2 I Associate Membership Training Funds

**Source:** Southern Weights & Measures Association (SWMA)

**Recommendation:** The SWMA requested clarification of the second bullet of the time line for request and distribution of Associate Membership Committee (AMC) training funds as set forth in the A&P Committee's Report to the 87th National Conference on Weights and Measures, 2002. The second bullet read as follows:

> "The AMC will notify the NCWM A&P Committee of the proposed amount when the BOD approval is given."

**Background:** At the SWMA meeting, an industry representative questioned why it was necessary for the A&P Committee to obtain Board approval on funds provided by the AMC for training purposes. Furthermore, since the AMC funds may be used in a broad sense for training purposes, a request for using the funds for other than training should be sent directly to the AMC for consideration.

**Decision:** The A&P Committee reviewed the questioned bullet and, based on clarification from the AMC, revised the second bullet to read as follows:

> "The AMC will notify the NCWM A&P Committee of the proposed amount after review by the BOD."

At the Interim Meeting, the AMC notified the A&P Committee that $10,500 was available for distribution for fiscal year 2002-2003. The NCWM A&P Committee reviewed applications received for requests of AMC training funds at the Interim Meeting and apportioned those requests based on need. Official notification of the grants was made by January 31, 2003.

The A&P Committee greatly appreciates the generosity of the AMC in making training funds available to the weights and measures community and thanks the AMC for this significant contribution. The AMC Training Funds Report is included in Appendix A.

## 402-3 I NCWM Training

**Source:** Western Weights & Measures Association (WWMA)

**Recommendation:** The WWMA recommended that the NCWM should establish and maintain a database of classroom training programs completed by individual weights and measures officials where the training used NCWM courses (or equivalent) and NIST-certified trainers. The NCWM should also issue certificates to individual weights and measures officials for course completion.

**Discussion:** The WWMA A&P Committee recognized the value of formal training for inspection staff and the credibility these programs provide. Some jurisdictions have formal licensing programs for weights and measures staff, while others rely on informal and less well-documented programs. The WWMA A&P Committee recognized that NCWM is a logical entity to provide standardized training and accreditation programs.

**Decision:** The Board of Directors (BOD) directed the NCWM A&P Committee to develop a new training concept. As that program is developed, the issues recommended by the WWMA will be considered.

## 402-4 I Education Sessions – 2003 Conference

**Source:** Central Weights & Measures Association (CWMA)

**Recommendation:** The CWMA A&P Committee proposed that a technical session on the gas pump technology be presented at 2003 Annual Meeting of the NCWM.

**Decision:** Three technical sessions were presented at the 88th NCWM Annual Meeting. They were as follows:

- Static Electricity: Staying Safe at the Pump – Cindy Gordon, American Petroleum Institute
- Current OIML Opportunities and Their Importance – Gilles Vinet, Measurement Canada & Dr. Charles Ehrlich, NIST Weights and Measures Division
- Fair Measurement Act: What Will It Mean & How Can We Bring It About – Aves Thompson, Alaska Division of Measurement Standards/CVE

## 403 Public Affairs

## 403-1 I Weights and Measures Week

**Source:** Western Weights and Measures Association (WWMA)

**Recommendation:** The WWMA A&P Committee proposed three topics as themes for Weights & Measures Week:

(1) "It's All About Confidence" – This topic would emphasize the role weights and measures plays in assuring consumers and businesses can conduct their transactions with confidence.
(2) "Tare – Pay For The Goods Not For The Packaging" – This topic would alert consumers to be aware that they should only pay for the product.
(3) "Get What You Sell For" – This topic would make the public aware of the need for accurate measurement when dealing with recyclers and the role weights and measures plays in assuring scales are accurate.

Additionally, the Central Weights and Measures Association (CWMA) recommended the following topic at the 88th Annual Meeting of the NCWM:

(4) "Weights & Measures – Its Effect on our Daily Lives."

**Discussion:** The WWMA A&P Committee recognized the value of Weights and Measures Week in promoting consumer awareness. Weights and Measures Week, March 1 through 7, provides members of the WWMA an opportunity to publicize and promote these consumer protection topics and the role of weights and measures officials. Members are urged to submit topics for future Weights and Measures Weeks to the regional and national A&P Committees.

The theme for Weights and Measures Week 2003 is "Weights & Measures: Working for Integrity in the Marketplace." In view of the current trend of questionable business practices, this theme can inspire public confidence in weights and measures' efforts to maintain integrity in the marketplace. The Committee discussed some activities for W&M Week and encourages the Board of Directors to add these to the NCWM website.

The Committee also discussed the importance of educating children on the effect of weights and measures in their lives and how that knowledge can be applied in everyday situations. The A&P Committee will discuss themes for Weights & measures Week 2004 at the Annual Meeting and will offer several suggestions to the BOD for its consideration and final decision.

---

Steve Hadder, Florida, Chairman

Celeste Bennett, Michigan
Ken Deitzler, Pennsylvania
Cato Fiksdal, Los Angeles County W&M, CA
Industry Representative: Chip Kloos, Colgate-Palmolive Company
C. Gardner, Suffolk County, New York, Safety Liaison
L. Sebring, NIST Technical Advisor

## Administration and Public Affairs Committee

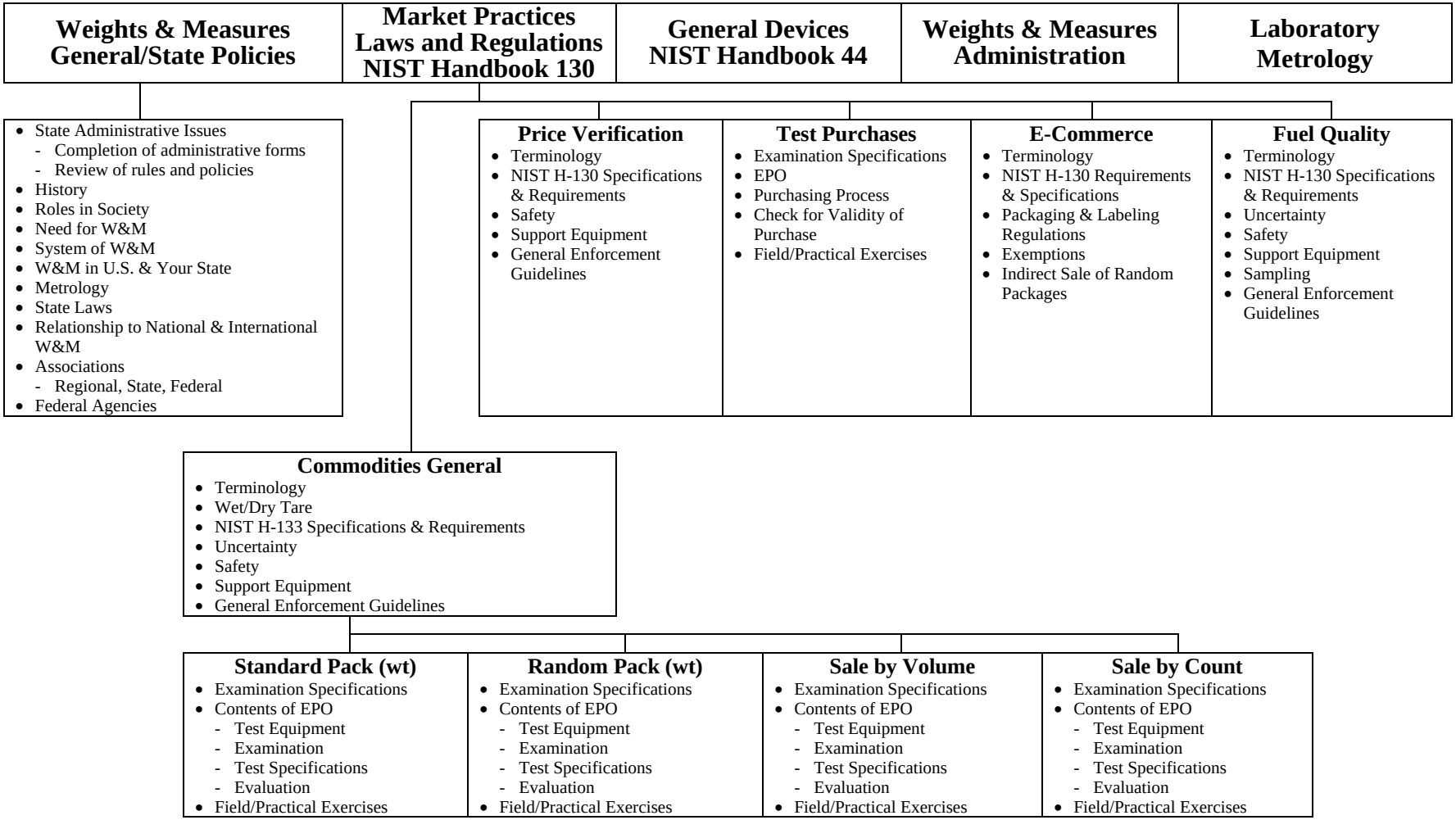
# Appendix A

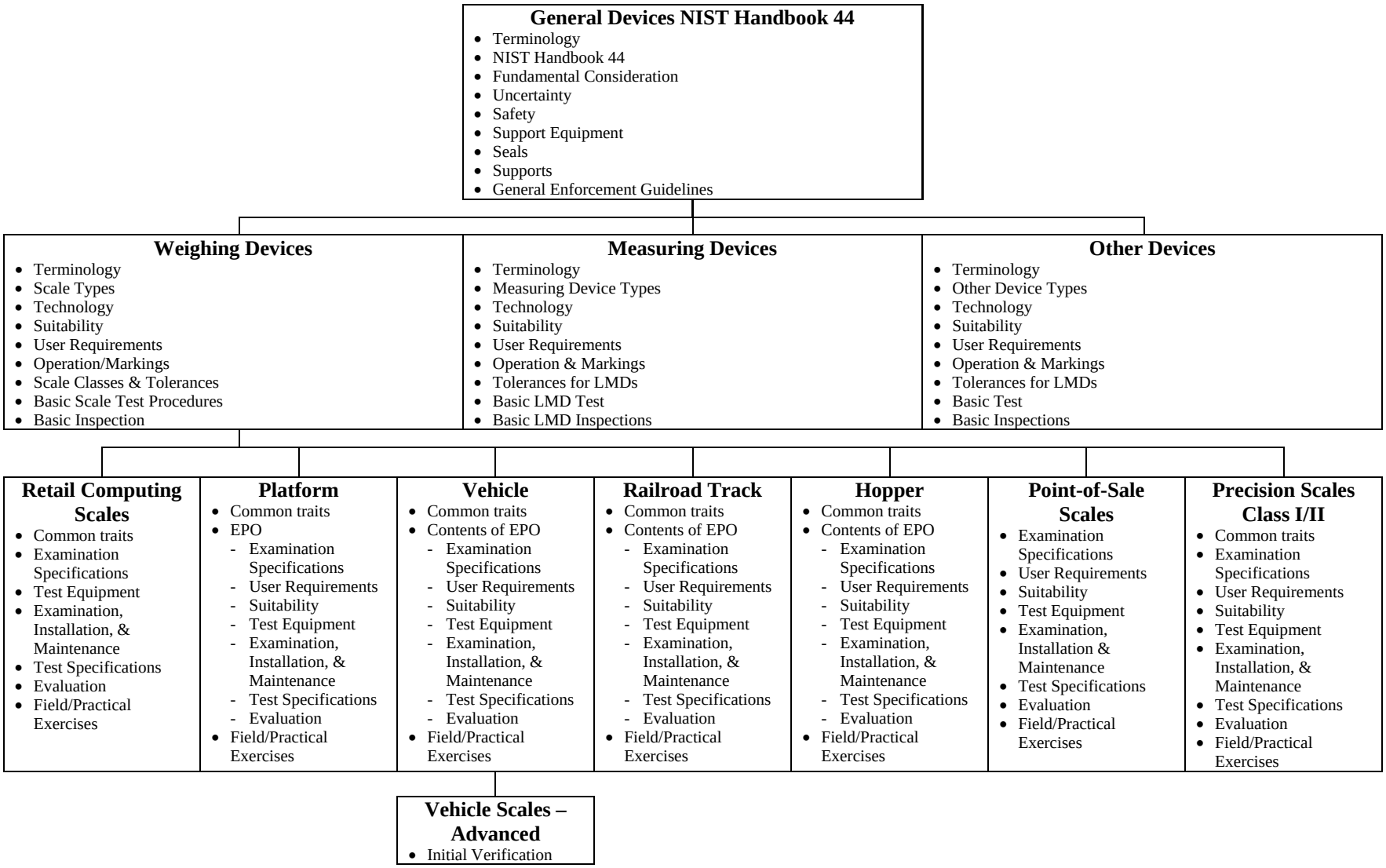
## AMC Training Funds Report 2002-2003

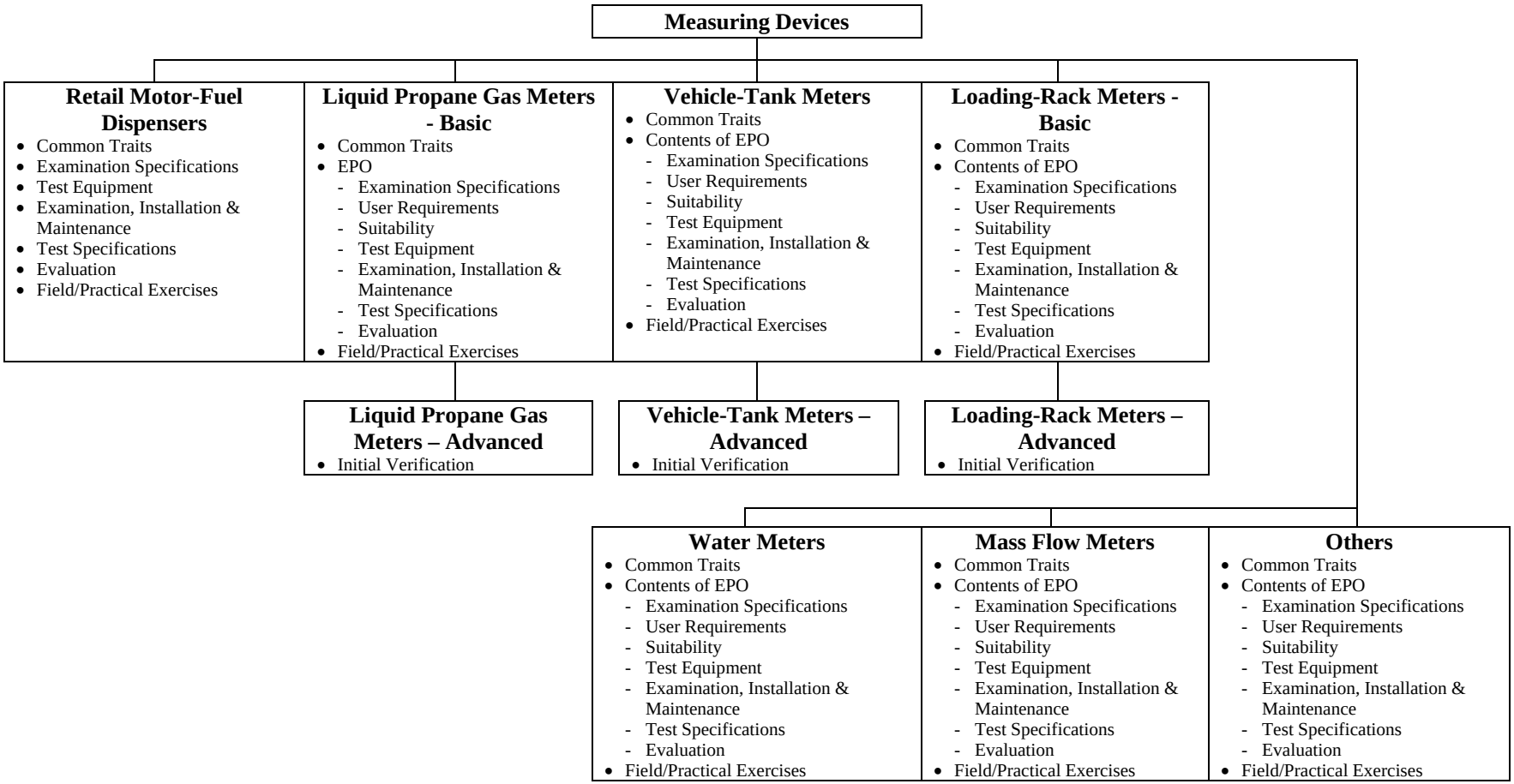
| Jurisdiction | Intended Use | Amount Granted |
|---|---|---|
| Ohio | Videos and books for library | $ 450 |
| Hawaii | Metrologist training at NIST | $ 800 |
| Massachusetts | Room rental charges, course materials, and related expenses for training inspectors | $ 1,000 |
| Idaho | Inspector training on calibration of electronic LPG meters and registers | $ 900 |
| Florida | Purchase of LCD projector to benefit 80 inspectors for training | $ 2,300 |
| Washington | LPG training for 16 inspectors | $ 1,000 |
| Wisconsin | Purchase training aid equipment for W&M inspectors | $ 250 |
| Illinois | USDA/GIPSA training for 9 inspectors in livestock, vehicle & monorail scales | $ 3,800 |
| | **Total AMC Funds Granted** | **$10,500** |

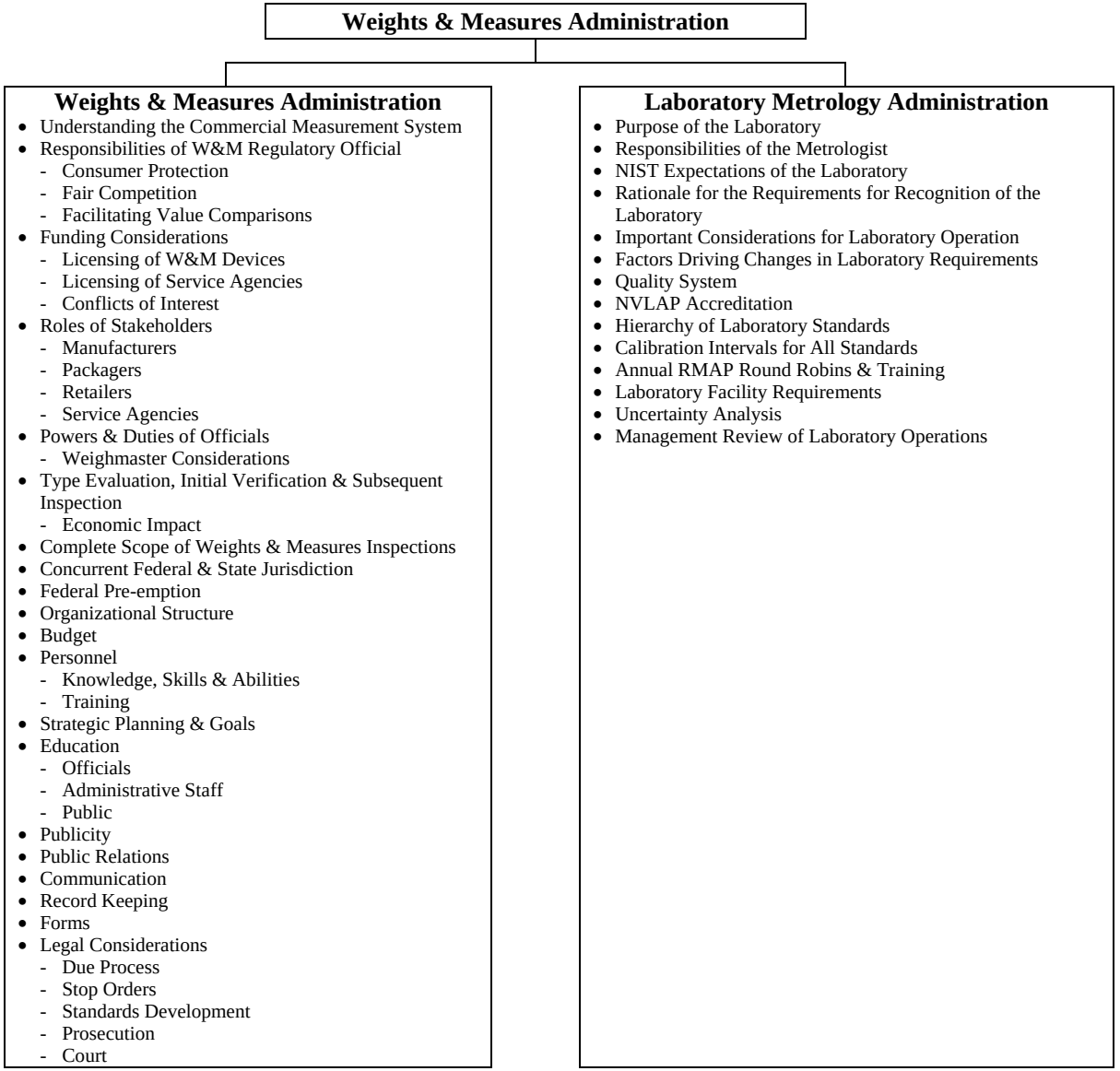
# Appendix B

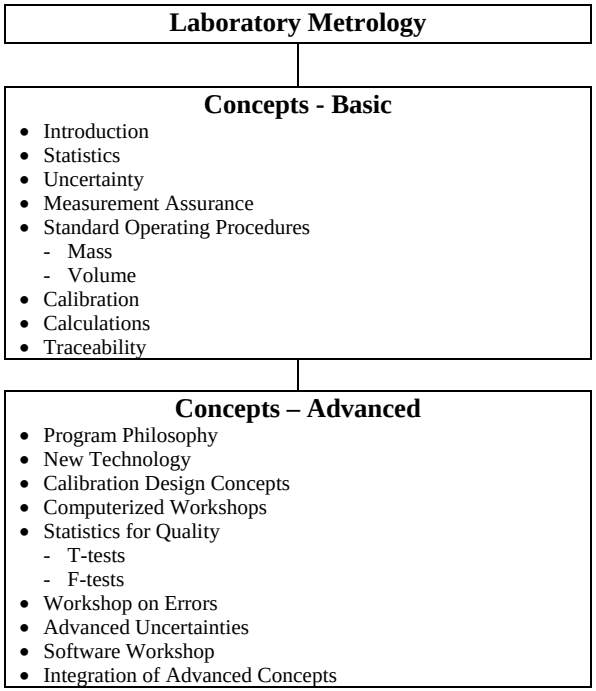
## National Training Curriculum Outline
**(Draft)**




General Devices NIST Handbook 44
Terminology
NIST Handbook 44
Fundamental Consideration
Uncertainty
Safety
Support Equipment
Seals
Supports
General Enforcement Guidelines
Weighing Devices
Terminology
Scale Types
Technology
Suitability
User Requirements
Operation/Markings
Scale Classes & Tolerances
Basic Scale Test Procedures
Basic Inspection
Measuring Devices
Terminology
Measuring Device Types
Technology
Suitability
User Requirements
Operation & Markings
Tolerances for LMDs
Basic LMD Test
Basic LMD Inspections
Other Devices
Terminology
Other Device Types
Technology
Suitability
User Requirements
Operation & Markings
Tolerances for LMDs
Basic Test
Basic Inspections
Retail Computing Scales
Common traits
Examination Specifications
Test Equipment
Examination, Installation, & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Platform
Common traits
EPO
- Examination Specifications
- User Requirements
- Suitability
- Test Equipment
- Examination, Installation, & Maintenance
- Test Specifications
- Evaluation
Field/Practical Exercises
Vehicle
Common traits
Contents of EPO
- Examination Specifications
- User Requirements
- Suitability
- Test Equipment
- Examination, Installation, & Maintenance
- Test Specifications
- Evaluation
Field/Practical Exercises
Railroad Track
Common traits
Contents of EPO
- Examination Specifications
- User Requirements
- Suitability
- Test Equipment
- Examination, Installation, & Maintenance
- Test Specifications
- Evaluation
Field/Practical Exercises
Hopper
Common traits
Contents of EPO
- Examination Specifications
- User Requirements
- Suitability
- Test Equipment
- Examination, Installation, & Maintenance
- Test Specifications
- Evaluation
Field/Practical Exercises
Point-of-Sale Scales
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Precision Scales Class I/II
Common traits
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation, & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Vehicle Scales – Advanced
Initial Verification


Measuring Devices
Retail Motor-Fuel Dispensers
Common Traits
Examination Specifications
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Liquid Propane Gas Meters - Basic
Common Traits
EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Vehicle-Tank Meters
Common Traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Loading-Rack Meters - Basic
Common Traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Liquid Propane Gas Meters – Advanced
Initial Verification
Vehicle-Tank Meters – Advanced
Initial Verification
Loading-Rack Meters – Advanced
Initial Verification
Water Meters
Common Traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Mass Flow Meters
Common Traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises
Others
Common Traits
Contents of EPO
Examination Specifications
User Requirements
Suitability
Test Equipment
Examination, Installation & Maintenance
Test Specifications
Evaluation
Field/Practical Exercises


Weights & Measures Administration
Weights & Measures Administration
• Understanding the Commercial Measurement System
• Responsibilities of W&M Regulatory Official
- Consumer Protection
- Fair Competition
- Facilitating Value Comparisons
• Funding Considerations
- Licensing of W&M Devices
- Licensing of Service Agencies
- Conflicts of Interest
• Roles of Stakeholders
- Manufacturers
- Packagers
- Retailers
- Service Agencies
• Powers & Duties of Officials
- Weighmaster Considerations
• Type Evaluation, Initial Verification & Subsequent Inspection
- Economic Impact
• Complete Scope of Weights & Measures Inspections
• Concurrent Federal & State Jurisdiction
• Federal Pre-emption
• Organizational Structure
• Budget
• Personnel
- Knowledge, Skills & Abilities
- Training
• Strategic Planning & Goals
• Education
- Officials
- Administrative Staff
- Public
• Publicity
• Public Relations
• Communication
• Record Keeping
• Forms
• Legal Considerations
- Due Process
- Stop Orders
- Standards Development
- Prosecution
- Court
Laboratory Metrology Administration
• Purpose of the Laboratory
• Responsibilities of the Metrologist
• NIST Expectations of the Laboratory
• Rationale for the Requirements for Recognition of the Laboratory
• Important Considerations for Laboratory Operation
• Factors Driving Changes in Laboratory Requirements
• Quality System
• NVLAP Accreditation
• Hierarchy of Laboratory Standards
• Calibration Intervals for All Standards
• Annual RMAP Round Robins & Training
• Laboratory Facility Requirements
• Uncertainty Analysis
• Management Review of Laboratory Operations


Laboratory Metrology
Concepts - Basic
Introduction
Statistics
Uncertainty
Measurement Assurance
Standard Operating Procedures
- Mass
- Volume
Calibration
Calculations
Traceability
Concepts – Advanced
Program Philosophy
New Technology
Calibration Design Concepts
Computerized Workshops
Statistics for Quality
- T-tests
- F-tests
Workshop on Errors
Advanced Uncertainties
Software Workshop
Integration of Advanced Concepts

# Report of the National Type Evaluation Program (NTEP) Committee

Louis Straub
Chief
Maryland Weights and Measures

Reference
Key Number

## 500 Introduction

The NTEP Committee submits its Report for the 88th National Conference on Weights and Measures (NCWM). This consists of the Interim Report presented in NCWM Publication 16 as amended in the Addendum Sheets issued during the Annual Meeting that was held July 13-17, 2003, in Sparks, Nevada. The Committee considered communications received prior to and during the 88th Annual Meeting that are noted in this report.

Table A, identifies all of the items contained in the report by Reference Key Number, Item Title, and Page Number. The item numbers are those assigned in the Committee's Interim Meeting Report. Voting items are indicated with a "V" or, if the item was part of the consent calendar, by the suffix "VC" after the item numbers. Items marked with an "I" after the reference key number are information items. An item marked with a "W" means that item has been withdrawn. Items marked with a "W" generally will be referred to the regional weights and measures associations or other groups because they either need additional development, analysis, and input, or they do not have sufficient Committee support to bring them before the NCWM. Table B lists the appendices to the report, and Table C provides a summary of the results of the voting on the Committee's items and the report in entirety.

The attached report may contain recommendations to revise or amend NCWM Publication 14, Administrative Procedures, Technical Policy, Checklists, and Test Procedures or other documents. Revisions proposed by Committee members are shown in **bold face print** by ~~crossing out~~ information to be deleted and underlining information to be added. New items proposed for addition to NCWM Publication 14 or other documents are designated as such and shown in **bold face print.**

### Table A
### Index to Reference Key Items

## Table B
## Appendices



## Table C
## Voting Results

| Reference Key Number | House of Representatives | | House of Delegates | | Results |
|---|---|---|---|---|---|
| | Yeas | Nays | Yeas | Nays | |
| 500 (Report in Its Entirety) Voice Vote | All Yeas | No Nays | All Yeas | No Nays | Passed |

# Details of All Items
# (In Order by Reference Key Number)

## 501-1 I International Organization of Legal Metrology (OIML) Certificate Project

**Source:** Carryover Item 501-1

**Background:** This item was included on the Committee's agenda to provide an update on NTEP's work to issue OIML R 60**,** "Metrological Regulation for Load Cells" and R 76, "Non-Automatic Weighing Instruments" certificates.

***OIML R 76 and R 60 Applications:*** During the 2003 NCWM Interim and Annual Meetings, Stephen Patoray, NTEP Director, and Louis Straub, NTEP Committee Chairman, reported that NTEP received no new applications for R 76 or R 60 tests. The Committee believes that potential applicants for OIML Certificates are waiting for the results of discussions on the Mutual Acceptance Arrangement and Checklists Document.

***OIML Certificate System:*** At the 2003 Annual Meeting, Dr. Ehrlich reported that the 2003 edition of the "OIML Certificate System for Measuring Instruments" was published in April 2003 and is available for use. Most notably, the revised system contains new provisions such as definitions, requirements, test methods and test report formats regarding families, modules, and families of modules of measuring instruments. Please contact Dr. Ehrlich or visit the OIML website at www.oiml.org to obtain a copy of the new document (designated P1).

See the 2002 Final Report of the National Type Evaluation Program (NTEP) Committee for additional background information.

## 501-2 I Test Data Exchange Agreements

**Source:** Carryover Item 501-2

**Background/Discussion:** This item was included on the Committee's agenda in 1998 to provide an update on NTEP's work to establish bilateral and multilateral agreements. Under such agreements and arrangements, manufacturers would be able to submit their equipment to any of the participating countries for testing to OIML-recommended requirements. The resulting test data would be accepted by other participants, as a basis for issuing each country's own type approval certificate. Following is a report on the three types of test data exchange agreements.

***Mutual Acceptance Arrangement (MAA):*** At the 2003 Annual Meeting, Dr. Charles Ehrlich, NIST International Legal Metrology Group, updated the Committee on the status of the MAA, which has moved from the OIML subcommittee level to the full International Committee of Legal Metrology (CIML). Dr. Ehrlich reported that an International Workshop was held on June 2-3, 2003 in Paris to review and discuss the results of a straw vote on the 1st Draft Document MAA and the associated Checklists Document that had been taken of the members of CIML. Only half of the CIML members voted, but of those voting 80 % had voted "yes." In order to achieve better consensus, the remaining key issues were identified and discussed. These included a clarification of the Scope, who the participants should be, allowance of additional requirements other than those in OIML Recommendations, and anticipated costs. The discussions were highly productive and a better mutual understanding and compromise was achieved. One item that was resolved was the issue of ***peer*** review, including on-site assessments in lieu of laboratory accreditation. It is anticipated that the MAA and Checklists Document will be adopted by the CIML at its annual meeting in November 2003. Please contact Dr. Ehrlich for further details. The MAA and Checklists documents can be downloaded from a specially-created WMD web site (http://ts.nist.gov/ts/htdocs/230/235/ilmg/oiml_maa.htm).

The NTEP Committee continues to closely follow the development of the MAA and encourages interested parties to provide comments to the Secretariat. See the 2002 Final Report of the NTEP Committee for additional background information.

***Bilateral Agreements:*** During the 2003 NCWM Interim Meeting, Stephen Patoray, NTEP Director, reported that there was no additional information on possible bilateral agreements. NTEP is awaiting the outcome of the MAA deliberations before further pursuing bilateral agreements.

***NTEP-Canada Mutual Recognition Program***: At the 2003 NCWM Annual Meeting, NTEP Director Stephen Patoray and NTEP Chairman Louis Straub announced that Measurement Canada and the NTEP Participating Laboratories are ready to accept NTEP applications for retail motor-fuel dispensers.

See the 2002 Final Report of the NTEP Committee for additional background information.

## 501-3 I Adoption of Uniform Regulation for National Type Evaluation by States

**Source:** Carryover Item 501-3

**Background/Discussion:** For many years, the Scale Manufacturers Association (SMA) has hosted NTEP adoption and implementation meetings for state directors at each regional weights and measures association conference. These meetings enable jurisdictions to share information about adopting and implementing NTEP in their respective jurisdictions, encourage non-NTEP jurisdictions to adopt the regulation, and allow current NTEP jurisdictions to share ideas on how to make enforcement more effective and uniform among the States. The meetings also provide NTEP management with information related to areas in which the operation and implementation of the program can be improved. Several questions have been posed at these meetings about issues associated with NTEP interpretation or practice. Comments from 1997 to 2002 have been summarized, without attribution, and are available for review and download on the SMA web site at http://www.scalemanufacturers.org.

At the 2002 NCWM Annual Meeting, the SMA reported that it was developing two new standards for weighing devices. The first standard was to define a uniform procedure to access the parameter and calibration counters for Category 1 and 2 scale sealing methods and the event loggers in the Category 3 scale sealing method. Specific requirements for the software sealing methods are contained in NIST Handbook 44 paragraph G-S.8. Provision for Adjusting Electronic Adjustable Components. At the 2003 Interim Meeting, Daryl Tonini, SMA, announced that the SMA standard for software sealing had been finalized and was available on the SMA web site for manufacturers interested in voluntarily using a standard method of accessing audit trail information and for weights and measures officials interested in ongoing efforts to standardize audit trail access information. The second SMA standard, updating RFI/EMI field test procedures to reflect current technology, was withdrawn.

SMA upgraded the standard titled Recommendation on Electrical Disturbances (SMA RED-0499) from “provisional” to “full” status and developed a new standard titled Vehicle Scale Characterization. The Vehicle Scale Characterization standard provides criteria for characterizing the service life of a vehicle scale based on the concentrated load capacity (CLC) rating of the platform. Potential scale owners and operators can use this knowledge to select the proper vehicle scale for a given application. The final versions of the Vehicle Scale Characterization and the Recommendation on Electrical Disturbances standards are available on the SMA web site.

At the 2003 NCWM Annual Meeting, Daryl Tonini, SMA, updated the NTEP Committee on the status of SMA's drive to assist States to adopt the Uniform Regulation for National Type Evaluation (URNTE) and the Uniform Regulation for the Voluntary Registration of Servicepersons and Service Agencies (VRR). It was reported that the Kentucky URNTE and VRR were adopted and became effective on July 1, 2003. Additionally, Michigan completed work on its weights and measures regulation to adopt the URNTE and VRR. SMA also provided the Committee with a copy of the United States map depicting state adoption of the URNTE and VRR. An updated copy of this map (April 2003) has been included as Appendix A of the Final Report of the NTEP Committee.

At the 2003 NCWM Annual Meeting, Louis Straub announced that the Maryland Department of Agriculture Weights and Measures Section submitted a regulation package to adopt a voluntary registered service agency registration program partially based upon the NCWM VRR standard.

See the 2002 Final Report of the NTEP Committee for additional background information.

## 501-4 I NTEP Policy: Challenges to a Certificate of Conformance and Verification that Production Meets Type

**Source:** Carryover Item 501-4

**Background:** This item has been moved to the NCWM Board of Directors Interim Agenda. See the 2002 Final Report of the National Type Evaluation Program Committee for additional background information.

## 501-5 I NTEP Participating Laboratories and Evaluations Reports

**Source:** Carryover Item 501-5

**Background:** NTEP Director Stephen Patoray provided the Committee with a report of the NTEP laboratory and administrative activities from October 1, 2001 to June 2003. Mr. Patoray reported that the number of NTEP applications to date is in line with projected numbers. A report of NTEP Laboratory Activities was distributed to the NTEP Committee at the 2003 NCWM Annual Meeting and is included in the Final Report of the NTEP Committee in Appendix B.

At the 2003 NCWM Interim Meeting, Mr. Patoray reported that a policy to expedite the process for issuing a CC after a device completes a successful evaluation went into effect on January 1, 2003, for NTEP applicants that desire the expedited CC process. The optional NTEP process is in response to concerns from manufacturers that the delay between the date an evaluation was completed and the date CC numbers were assigned would hold up production and distribution of devices. In summary, the plan requires an applicant and NTEP to agree upon the testing to be performed and the contents of a draft CC *prior* to the start of an evaluation. The final CC and number would be ready for signature and distribution at the conclusion of a successful evaluation. The plan was discussed at the 2002 National Type Evaluation Technical Committee (NTETC) Sectors and BOD meetings.

At the 2003 NCWM Annual Meeting, Mr. Patoray reported on an April 2003 joint meeting of the NTEP Weighing and Measuring Laboratories and the Canadian Participating Laboratories in Sacramento, CA. The laboratories discussed several items including recommendations on mix-and-match components for liquid-measuring devices, updating the mutual recognition applications and checklists, and suggested "device types" to be listed on Certificates of Conformance (CC) for both weighing and measuring devices. Many of these items will be developed as proposals for consideration at the 2003 meetings of the NTETC Weighing and Measuring Sectors.

See the 2002 final report of the NTEP Committee for additional background information.

## 501-6 I NTETC Sectors Reports

**Source:** Carryover Item 501-6

**Background:** The Committee received an update on the activities of the National Type Evaluation Technical Committee (NTETC) Sectors at the 2003 NCWM Interim Meeting. Outlined below is a brief summary of Sector activities since the 2002 NCWM Annual Meeting.

***Grain Moisture Meter and NIR Protein Analyzer Sectors:*** The NTETC Grain Moisture Meter and NIR Protein Analyzer Sectors held a joint meeting in Kansas City, MO on August 21-23, 2002. A summary of these joint meetings was distributed to Sector members in October 2002. A draft of the final summary was provided to the Committee prior to the 2003 NCWM Interim Meeting for review and approval. The Committee reviewed the draft and accepted the recommendations from the Sectors.

The next meeting of the Grain Moisture Meter and NIR Protein Analyzer Sectors is scheduled for August 20-22, 2003, in Kansas City, MO. For questions on the current status of Sector work or to propose items for a future meeting, please contact the Sector Technical Advisors, Diane Lee, NIST WMD, or Jack Barber, J.B. Associates. Ms. Lee can be reached by telephone at 301-975-4405, by fax at 301-926-0647, by e-mail at diane.lee@nist.gov, or in writing at NIST, 100 Bureau Drive - Stop 2600, Gaithersburg, MD 20899-2600. Mr. Barber can be reached by telephone at 217-483-4232, by fax at 217-483-3712, by e-mail at jbarber@cityscape.net, or in writing at J.B. Associates, 10349 Old Indian Trail, Glenarm, IL 62536.

***Measuring Sector:*** The NTETC Measuring Sector met October 11-12, 2002, in Richmond, VA. A draft of the final summary of that meeting was distributed to the Sector in January 2003. A draft of the final summary was also provided to the NTEP Committee prior to the 2003 NCWM Interim Meeting for review and approval. The Committee reviewed the draft and accepted the recommendations of the Sector.

The next meeting of the Measuring Sector is scheduled for October 3-4, 2003, in Charlotte, NC, in conjunction with the Southern Weights and Measures Association's Annual Meeting. For questions on the current status of Sector work or to propose items for a future meeting, please contact the Sector Technical Advisor Richard Suiter, NIST WMD. Mr. Suiter can be reached by telephone at 301-975-4406, by fax at 301-926-0647, by e-mail at rsuiter@nist.gov, or in writing at NIST, 100 Bureau Drive - Stop 2600, Gaithersburg, MD 20899-2600.

***Weighing Sector:*** The NTETC Weighing Sector met September 30 - October 2, 2002, in Annapolis, MD. A draft summary was distributed to Sector members in early December 2002. A final draft of the meeting summary was also provided to the Committee prior to the 2003 NCWM Interim Meeting for review and approval. The Committee did not accept the recommendation of the Sector on agenda item 23 titled Inconsistent Language on a CC. The Sector had suggested a list of consistent information that should be included on a Certificate of Conformance for NCWM Publication 14 Administrative Procedures paragraph P. Certificate of Conformance. The Committee disagreed with the Sector and stated that the Sector recommendation is a technical procedural issue and does not affect the administration of NTEP. The Committee returned this item to the Sector and suggested that it develop language for NCWM Publication 14 Technical Policies at their 2003 meeting. The Committee accepted the remaining recommendations (with minor editorial corrections identified by the Committee) in the final draft of the meeting summary.

The next Weighing Sector meeting is scheduled for September 11-13, 2003, in Fresno, CA, and will be held in conjunction with the Western Weights and Measures Association's Annual Meeting. For questions on the current status of Sector work or to propose items for a future meeting, please contact the Sector Technical Advisor Steven Cook, NIST WMD. Mr. Cook can be reached by telephone at 301-975-4003, by fax at 301-926-0647, by e-mail at stevenc@nist.gov, or in writing at NIST, 100 Bureau Drive - Stop 2600, Gaithersburg, MD 20899-2600.

***Automatic Weighing Systems Working Group (AWS):*** The AWS Working Group met on October 2-3, 2002, in Annapolis, MD, following the meeting of the NTETC Weighing Sector and responded to remaining issues related to a proposal to change the status of the tentative AWS Code in NIST Handbook 44. The Work Group dealt with several items related to the current NCWM Publication 14 NTEP Draft Checklist and Test Criteria. The AWS Work Group made several suggestions for amending language in Handbook 44 and submitted their recommendations to the NCWM S&T Committee and the NTEP Committee prior to the 2003 NCWM Interim Meeting. Contact Stephen Patoray, NTEP Director, or NIST WMD Technical Advisor, Steve Cook, to request a copy of the proposed changes. Mr. Patoray can be reached by email at spatoray@mgmtsol.com. Steve Cook can be reached by telephone at 301-975-4003, by fax at 301-926-0647, by email at steven.cook@nist.gov, or in writing at NIST, 100 Bureau Drive-Stop 2600, Gaithersburg, MD 20899-2600.

***NTETC Sector Summaries:*** At the 2002 Annual Meeting, Mr. Straub discussed the whether or not it is necessary to publish the NTETC Sectors summaries as part of the Interim Committee Reports. The summaries currently account for more than one third of the size of the publication. The NCWM Board of Directors and NTEP Committee agreed that the Sector summaries do not need to be published in hard copies of the NCWM Interim Committee Reports for the Annual Meeting. The NTEP Committee will receive copies of the summaries prior to the NCWM Interim Meeting for their review and approval. The NTETC Sector summaries will continue to be included as appendices in the NCWM Annual Reports.

At the 2003 NCWM Interim Meeting, the NCWM Board of Directors and NTEP Committee agreed that electronic copies of the NTETC Sector summaries would be included in electronic versions of NCWM Publication 16 Committee Reports for the Annual meeting. Electronic or hard copies of the NTETC Sector summaries are available upon request from NCWM and NIST. Contact NCWM Inc., or NIST WMD Technical Advisor, Steve Cook, to request electronic or hard copies of the NTEP Sector Summaries. NCWM Inc. can be reached by phone at 240-632-9454 or by email at ncwm@mgmtsol.com. Steve Cook can be reached by telephone at 301-975-4003, by fax at 301-926-0647, by email at steven.cook@nist.gov, or in writing at NIST, 100 Bureau Drive-Stop 2600, Gaithersburg, MD 20899-2600.

## 501-7 I Grain Moisture Meter (GMM) and Near Infrared (NIR) Instruments Dual Certification – Can a Single Certificate be Issued?

**Source:** NTETC GMM and NIR Sector

**Background:** Of the five Grain Moisture Meter (GMM) types with active NTEP Certificates of Conformance (CCs), two are whole-grain Near Infrared (NIR) Instruments with the potential to seek certification as NIR Grain Analyzers. In a previous Sector meeting, the question was raised as to whether a single CC could be issued to cover devices certified as both GMMs and NIR Grain Analyzers. Time constraints caused consideration of this question to be postponed to a future meeting.

In deciding whether a single CC could be issued to cover devices certified as both GMMs and NIR Grain Analyzers, there are two requirements to consider:

1) CCs for GMMs automatically expire July 1. To maintain "active" status, meters must remain in the NTEP ongoing calibration program and the CC's must be reissued annually with valid calibration constants for moisture.

2) NIR Grain Analyzers that display a measured whole grain moisture value are required to comply with the requirements of the GMM Code and be type approved as a grain moisture meter.

When an instrument has been approved under both codes, it would seem that NIR Grain Analyzer CCs are subordinate to GMM CC's, because failure to maintain an "active" GMM CC would automatically invalidate the corresponding NIR Grain Analyzer CC. A single CC, such as a "GMM CC with NIR Grain Analyzer Certification" would have to be reissued annually (and whenever a calibration change is made) so there would be no ambiguity regarding the NTEP status of the instrument and its calibrations. With a single Certificate, weights and measures personnel would have only one CC number to check. Manufacturers would have only one CC to maintain per instrument type. Marking requirements would be simplified. The maintenance fee structure for a CC with a "certification" for compliance with another code could be set to recover any loss in NCWM, Inc. revenue that would result from the elimination of the second certificate.

The Sector agreed to ask the NTEP Committee to consider recommending that NCWM, Inc. authorize issuing a single CC for devices successfully type evaluated using two inter-related codes (e.g., a "Grain Moisture Meter CC with Near Infrared Grain Analyzer Certification" or, simply, "NIR Grain Analyzer with Dual Certification").

The NTEP Committee reviewed the recommendation during the 2003 NCWM Interim Meeting in Jacksonville, FL. and accepted the Sector recommendation to issue a single Certificate of Conformance for a device that has been evaluated using two inter-related codes.

---

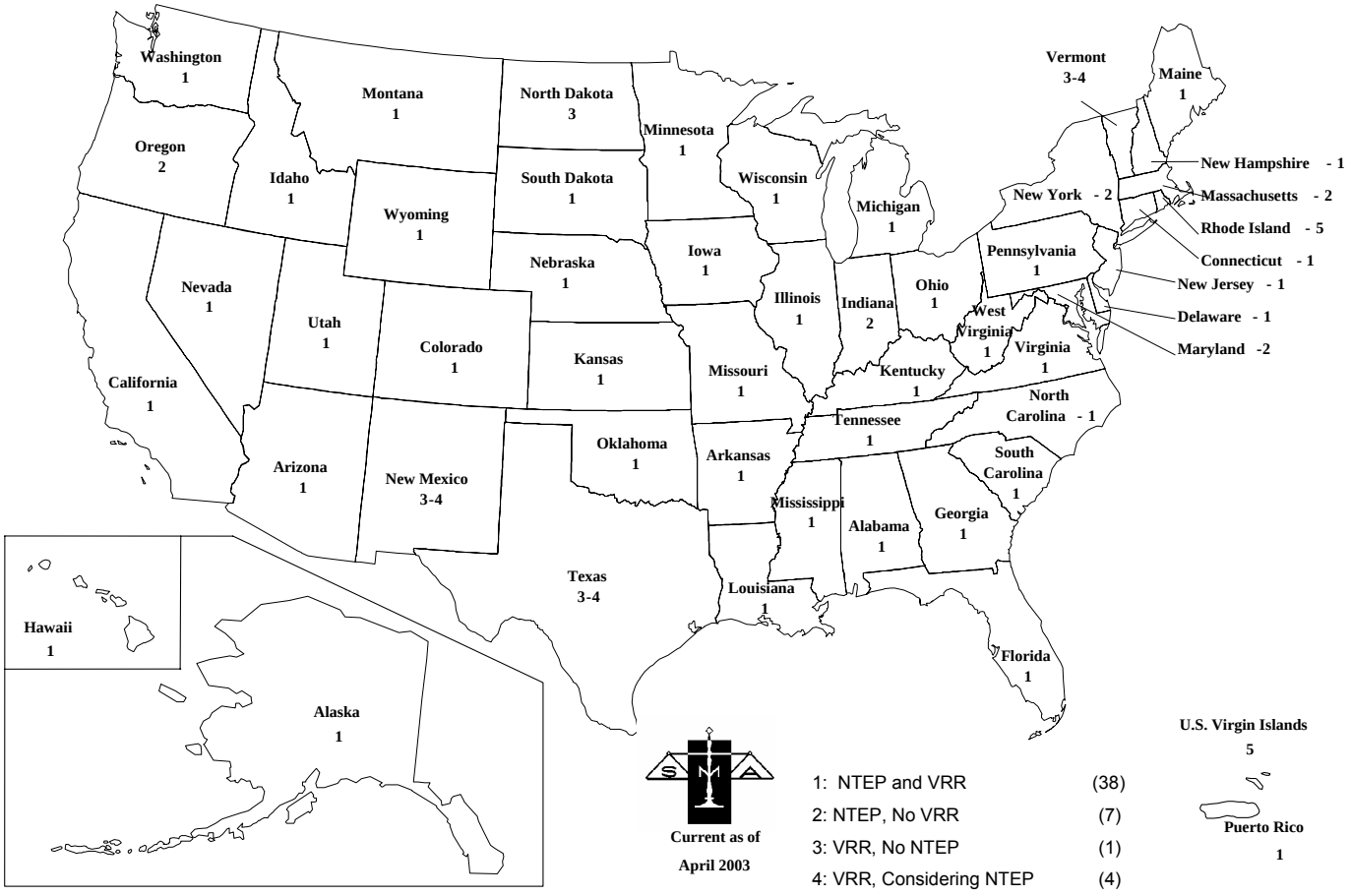
L. Straub, Maryland, Chairman

R. Andersen, New York, NCWM Chairman
D. Ehrhart, Arizona, NCWM Chairman-Elect
D. Onwiler, Nebraska
M. Gray, Florida
NTEP Technical Advisor: S. Patoray, NTEP Director
NIST Technical Advisor: S. Cook, NIST WMD

### National Type Evaluation Program Committee

# Appendix A

## NTEP Status by State




**NTEP: Uniform Regulation for National Type Evaluation**

**VRR: Uniform Regulation for Voluntary Registration of Service Persons and Service Agents**

# Appendix B

## NTEP Participating Laboratories and Evaluations Report

| NTEP Application Statistics - June 2003 | | | |
|---|---|---|---|
| | **2001-2002** | **2002-2003** | **Total** |
| | **10/1/01 6/19/02** | **10/1/02- 6/19/03** | **10/1/00- 6/19/03** |
| Applications Processed | 230 | 188 | 687(41) |
| Applications Completed | 182 | 67 | 466 |
| New Certificates Issued | 193 | 164 | 636 |
| Certificates Distributed to State Directors | 187 | 160 | 618 |
| Certificates Posted To Web Site | 1103 | 158 | 3148 |
| Active NTEP Certificates | - | - | 1549 |

| | **Average** | **Median** |
|---|---|---|
| Time For NCWM To Assign An Evaluation | 12 days | 8 days |
| Time For NCWM To Review A Draft Certificate | 8 days | 6 days |
| Time For Complete Evaluation (Completed NCWM Assignments) | 145 days | 101 days |

# Appendix C

## National Type Evaluation Technical Committee (NTETC)
## Grain Moisture Meter (GMM) Sector

**August 21-22, 2002 - Kansas City, MO**

**Meeting Summary**

**Agenda Items**

★ 1. NIST/Office of Weights and Measures Reorganization
2. Report on Proposed Revisions to OIML IR 59 "Moisture Meters for Cereal Grains and Oilseeds"
3. Proposed Changes and Additions to Publication 14
   a. Identification Marking Requirements
   b. Miscellaneous Editorial Changes
4. Update on Field Evaluation of Proposed Test Weight per Bushel Tolerances
   a. Review of Phase I and Phase II data
   b. Proposal to move the Developing Issue for Test Weight per Bushel forward as a Voting Item
5. Review Latest Draft of Evaluation Procedure Outline (EPO) and Test Procedures for the Field Evaluation of NTEP GMM Devices (air-oven method)
★ 6. A Message from the NCWM Board of Directors
7. Update on NTEP Type Evaluation and OCP (Phase II) Testing
★ 8. A Quality Control Procedure for Grain Analysis at a Country Elevator
★ 9. Time and Place for Next Meeting

**Note:** Because of common interest, items marked with a star (★) will be considered in joint session of the NIR Grain Analyzer and the Grain Moisture Meter Sectors.

---

### 1. NIST/Office of Weights and Measures Reorganization

**Discussion:** As part of a broader reorganization within NIST Technology Services (TS), the Office of Weights and Measures (OWM) has been raised from the program level with the Office of Measurement Services (now the Measurement Services Division) to the Division level within the TS organization structure. Henry Oppermann has been named Chief of the new Weights and Measures Division. In addition to national weights and measures matters, OWM will be responsible for NIST's Metric Program and for international matters relating to legal metrology, including U.S. participation in the OIML. This will provide a closer tie between national and international interests in standards matters.

### 2. Report on Proposed Revisions to OIML IR 59 "Moisture Meters for Cereal Grains and Oilseeds"

**Background:** At the OIML TC17/SC1 meeting in Berlin, Germany on June 22, 2001, the U.S. delegation, put forth a series of proposals relating to the revision of OIML Recommendation IR 59 "Moisture Meters for Cereal Grains and Oilseeds." The U.S. proposals are summarized below:

*Document Purpose*. - The purpose of the revision of IR 59 is to define technical and metrological requirements for type approval and verification of measuring instruments using physical principles to determine the moisture content of cereal grains and oil seeds. These type-approved instruments are intended to be used for moisture measurements in commercial transactions.

*Document Application*. - This document is to be developed for implementation in the OIML Certificate System, therefore necessitating an internationally agreed test procedure and test report format.

*Document Direction*. - The document should be developed for fully automatic direct indicating moisture meters. This means instruments for which all necessary measurements are internal and are self-calculating. Directions for

dealing with instruments of comparable accuracies but a lesser degree of automation would be contained in an annex. This would define a direction for future instruments without precluding existing instruments.

*Maximum Permissible Errors (MPES).* - The testing of the instruments should be carried out with naturally occurring grain samples and the evaluation of instrument errors will be conducted statistically. Grain samples have a large degree of natural variability due to region and climate. A statistical evaluation accounts for this natural variability and is consistent with the U.S. NTEP program.

*Moisture Reference Method*. - The state-of-the-art in grain moisture reference methods has not reached international consensus and application on the best method. The U.S. uses a documented GIPSA air oven reference method and several other methods exist and are utilized internationally. All of these methods suffer to some extent in their absolute accuracy. The U.S. believes that it would be best to separate the international type approval of instruments from the definition of the reference method and proposes that the reference method should be established by the national legal metrology authority in that country and that manufacturers submitting for type approval in that country should take into account the national reference in the calibration of the type approved instrument.

The U.S. proposals were well received, in particular by France, the previous Secretariat, and Germany. Dr. Gunter Scholtz of Physikalisch-Technische Bundesanstalt (PTB), who chaired the meeting, asked the USA to prepare an OIML draft based on the U.S. NTEP program for review by an IWG composed of France, Germany, Poland, China and the USA. The U.S. agreed to this.

**Discussion:** The Sector reviewed a partial draft of Revised IR59 (dated August 2002) prepared by Dr. Ambler Thompson of NIST. Sector members offered the following comments and suggestions:

1. No moisture ranges have been specified for any of the type approval tests. Although some of the tolerances presently suggested are broader than those in Publication 14, it was pointed out that the type approval tolerances in Publication 14 are based on testing specific grains over a specified 6 % moisture range (12 %-18 % for corn; 10 %-16 % for all wheats, soybeans, sorghum, oats, barley and rice; and 6 %-12 % for sunflower). Sample condition, moisture range, and individual grain characteristics all influence the performance of a grain moisture meter and have to be considered in establishing realistic tolerances. Testing at higher moisture levels may cause problems due to sample instability. Sample instability is especially troublesome on tests involving temperature cycling of the samples and on long-term stability tests where samples must be stored for an extended period of time. If Handbook 44 tolerances are specified in place of the existing OIML Maximum Permissible Errors (MPES), type approval testing should be limited to the grain types and moisture ranges specified in Publication 14.

2. There appear to be fundamental differences between the U.S. and proposed OIML approach to moisture meter type approval. In the U.S. initial type evaluation focuses on the instrument itself. Basic instrument tests, which include all of the influence factors listed in Section 5.6.1 of IR59, except grain temperature sensitivity, are conducted using only hard red winter wheat. Calibrations for corn, HRW wheat and soybeans are initially approved based upon type evaluation testing over a 6 % moisture range and manufacturer supplied data over the remainder of the calibration range. Calibrations for other grains are approved based upon data collected as part of the ongoing national calibration program. Continued type approval requires participation in the ongoing national calibration program. Over the moisture range for each of the grains for which a meter is approved, none of the average differences between predicted and reference values for the respective 2 % moisture intervals can exceed one-half the Handbook 44 acceptance tolerance plus a 95 % confidence interval. Revised IR 59 proposes to subject all grains to all influence factors over unspecified moisture ranges.

3. No field evaluation method has been specified. Appropriate values for MPES will depend on the field test method used (meter-to-meter vs. air-oven, number of replicates, sample selection, etc.). The field test method on which the MPES are based should be referenced.

4. Section 3. Terminology. - Definitions of terms appearing in the “Terminology” section should be replaced with corresponding definitions from Handbook 44.

5. Section 3.2. Moisture and Volatile Matter Content. - The need for a definition of "moisture and volatile matter content" was questioned. It was recommended that this term be dropped from the definitions, and that the possible loss of mass due to volatile matter content (other than water) be addressed in a footnote if necessary.

6. Section 3.4. Conversion Tables. - The definition shown is the Handbook 44 definition for "Correction Tables." Fully automated grain moisture meters do not require the use of either Correction Tables or Conversion Tables. If the purpose of defining Conversion Tables is to cover terminology that will be used in an annex to IR 59, then a definition of Correction Tables should also be included.

7. Section 3.5. Zero Value and Test Value. - This paragraph states that moisture meters may give a (zero) indication. The Sector noted that there is no allowance for a zero indication in Section 5.56.(a) of Handbook 44. Paragraph S.1.1.(d) states:

   > A digital indicating element shall not display, and a recording element shall not record, any moisture content values before the end of the measurement cycle.

   Paragraph S.1.1.(f) further states:

   > A meter shall not display or record any moisture content values when the moisture content of the grain sample is beyond the operating range of the device, unless the moisture representation includes a clear error indication (and recorded error message with the recorded representation).

   To comply with these requirements, several manufacturers have chosen to blank the moisture display when the test cell is empty (and do not display a "zero"). A moisture value is not displayed until the end of the measurement cycle. Even though the present wording of 3.5 is permissive ("may" display a zero), it would be preferable to include additional wording to indicate that direct reading instruments "may but are not required to display a (zero) indication."

8. Section 3.6. Test Value. - The wording of this section needs to be revised to make it clear that test values are produced by a meter's built-in self-test features to verify the correct functioning of those elements having a critical effect on the measurement. Grain samples are not required for these self-tests.

9. Section 5.3.2. MPES During Type Approval Testing, Including All Influence Quantity Testing, and on Initial Verification. - The equations add 0.2 % to the MPES for all tests, but Paragraph 5.6.1. shows $\Delta M = 0.35$ % for both instrument temperature sensitivity and grain temperature sensitivity tests and $\Delta M = 0.20$ % for the other influence factor tests.

10. Sections 5.5.4 and 5.5.5. - The reference to "MPES in 5.5.1" should be changed to read, "MPES in 5.3.1".

11. Section 5.6.1. - The reference to "relevant conditions specified in 5.3" for influence factor testing appears to be in error. Paragraph 5.6.2 states, "A description of performance tests for influence factors is given in Annex B." Should 5.6.1 reference "relevant conditions specified in Annex B" or will a table of relevant conditions be added elsewhere?

12. Section 6.2 does not mention near-infrared absorbance as one of the possible quantities that may be related to moisture.

**Conclusion:** Dr. Thompson asked Sector participants and manufacturers to submit additional comments, especially those related to test procedures and MPES, within the next two months so he can obtain a consensus from interested U.S. parties and complete another draft by December. Dr. Thompson can be reached at the following address:

Dr. Ambler Thompson
NIST/TSAP
NIST North (820) Room 248
100 Bureau Drive, Stop 2150
Gaithersburg, MD 20899
e-mail: ambler@nist.gov

## 3. Proposed Changes and Additions to Publication 14

### 3.a. Identification Marking Requirements

**Discussion:** The 86th National Conference on Weights and Measures (NCWM) in 2001 adopted changes to the General Code section of Handbook 44 that require corresponding changes to the Grain Moisture Meter Check List in Publication 14. The changes include:

- A specification of acceptable abbreviations for the word "Model"
- A requirement that devices be permanently marked with the applicable Certificate of Conformance (CC) number or a corresponding CC addendum number.

[For a detailed discussion of the above changes see the report 86th NCWM. NIST *Special Publication 976*.]

Because grain moisture meter (GMM) CCs are reissued annually with incremented addendum numbers, the Sector considered whether devices should be marked with only the original "parent" CC number and not with the addendum number; for example, "CC Number 03-123" and NOT "CC Number 03-123A4." State Weights and Measures representatives indicated that there would be no confusion if CC marking included the addendum number. Inspectors would know to refer to the current version of the CC regardless of the addendum number marked on the device. It was suggested that including the addendum number might be of assistance in helping field inspectors determine whether nonretroactive requirements applied to a particular device.

Also, paragraph S.1.5. of Handbook 44, Section 5.56.(a) was changed by action of the 81st NCWM in 1996 to remove the requirement to mark the operating temperature range on the device. The original draft of the 2002 issue of the grain moisture meter checklist in Publication 14 does not reflect this change.

**Conclusion and Recommendation:** The Sector decided that it would not be necessary to include a note recommending restricting CC marking of GMM's to the "parent" CC number. The Sector agreed to recommend amending and modifying Publication 14, GMM Checklist, Section 1. General**,** to combine related marking requirements and to address the above issues. In addition, the Sector recommended removing the requirements for marking the operating temperature range on the device and moving the paragraph related to Code Reference G-S.1.1., to a more appropriate location following the list of marking requirements. Recommended changes are shown below.

**1. General**

**Code Reference: G-S.1. Identification**

Virtually all measuring equipment (except separate parts necessary to the measurement process but not having any metrological effect) must be clearly and permanently marked with the manufacturer's name or trademark, model designation, and serial number. Additionally, devices that have (or will have) an NTEP Certificate of Conformance (CC) Number, must be marked with the CC number or a corresponding CC addendum number. "Permanent" markings addresses two aspects: (1) the printed information will withstand wear and cleaning, and (2) if the markings are on a plate or badge, then the marking badge must be "permanently" attached to the device. A permanently attached badge means that the identification information required by G-S.1. is not easily removed, and if removed, then it must be obvious that the badge or plate containing this information has been removed. All markings must be clear and easily readable. The following test procedure shall be used to determine the permanence of the identification markings.

Permanence of Lettering: The lettering for the markings are subjected to the following tests to simulate accelerated wear. The markings are then compared with a typical set of labels exhibiting various degrees of wear, graded from minimal effect (1) to excessive unacceptable wear (7).

Attempts are made to remove the marked information, whether on a badge (plate) or on the device itself, using the following means.

1. Rub over one letter of the marking at least 20 times using an ink eraser in the same manner and force as one would normally exert while erasing an inscription written with a ball point pen.

2. Clean the marking or badge with the following cleaners presumed to be "readily available."

   a. Disinfecting cleaning liquid and a damp cloth.
   b. "Soft" household cleaning powder and a damp cloth.
   c. Window cleaning fluids and a damp cloth.

Permanence of Attachment Badge is an attempt to remove the badge by pulling it off or prying off a metal badge that is attached using only adhesive; removal must be "difficult" at all temperatures. If the badge can be removed, it must show obvious evidence that the badge was removed. Acceptable indications are destruction of the badge by tearing, permanent and extensive wrinkling, or repeated exposure of the word "VOID" upon removal of the badge.

As a practical matter, remote moisture displays are not required to have serial numbers because they typically only repeat the moisture information received from the measuring element. Similarly, external printers are not required to have serial numbers because they do not alter the information received from the measuring element.

If the required information is located on the back of a device, the same information must also appear on the side, front, or top. The bottom of a device is not an acceptable surface for these markings.

The identification marking must be permanent and attached with pop rivets, adhesive, or other permanent means. Removable bolts or screws are not permitted. A foil badge may be used provided that it is durable, difficult to remove, and exhibits obvious evidence of an attempt to remove the marking or badge.

The system must be clearly and permanently marked on an exterior surface, visible after installation with the following information:

| | | |
|---|---|---|
| 1.1 | The name, initials or trademark of the manufacturer. A remote display is required to have the manufacturer's name or trademark and model designation. (Code Reference GS.1.(a)) | Yes ☐ No ☐ NA ☐ |
| 1.2 | A model designation that positively identifies the pattern or design of the device. The Model designation shall be prefaced by the word “Model”, “Type”, or “Pattern.” These terms may be followed by the term “Number” or an abbreviation of that word. The abbreviation for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., No or No.). The abbreviation for the word “Model” shall be “Mod” or “Mod.” [Effective January 1, 2003]. (Code Reference G-S.1.(b)&(c)) | Yes ☐ No ☐ NA ☐ |
| 1.3 | A nonrepetitive serial number prefaced by words “Serial Number” or an abbreviation of that term. Abbreviations for the word “Serial” shall, as a minimum, begin with the letter “S,” and abbreviations for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., S/N, SN, Ser.No, and S No.). (Code Reference G-S.1.(d),(e), & (f)). | Yes ☐ No ☐ NA ☐ |

| | | |
|---|---|---|
| 1.4 | The NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number for devices that have (or will have) a CC. The number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the term "Number" or an abbreviation of the word "Number". The abbreviation shall, as a minimum, begin with the letter "N" (e.g., No or No.). (Code Reference G-S.1.(g). Effective January 1, 2003).<br><br>The device must have an area, either on the identification plate or on the device itself, suitable for the application of the CC number. If the area for the CC number is not part of an identification plate, note its intended location and how it will be applied.<br><br>Location of CC Number if not located with the identification information: _____ | Yes ☐ No ☐ NA ☐ |
| 1.5 | If the information required by G-S.1. is placed on a badge or plate, the badge or plate must be permanently attached to the device.<br>(See criteria above for permanence of Attachment of Badge.) | Yes ☐ No ☐ NA ☐ |
| 1.6 | Identifying information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device. | Yes ☐ No ☐ NA ☐ |
| 1.7 | All markings must be clear and easily readable. | Yes ☐ No ☐ NA ☐ |
| 1.8 | The lettering for all markings must be permanent. Record the grade for the permanence of markings. _____. | Yes ☐ No ☐ NA ☐ |
| 1.9 | If the markings for other than device identification required by G-S.1. are placed on a badge or decal, then the badge or decal must be durable (difficult to remove at all temperatures). | Yes ☐ No ☐ NA ☐ |

Code Reference: G-S.1.1. Remanufactured Devices and Remanufactured Main Elements.

Refer to the Section Policy on Remanufactured and Repaired Devices in the NCWM Publication 14 Administrative Policy.

| | | |
|---|---|---|
| 1.10 | If the manufacturer specifies a temperature range, the range shall be at least 20 °C (36 °F). | Yes ☐ No ☐ NA ☐ |

**3.b. Miscellaneous Editorial Changes**

**Discussion:** The Sector reviewed the original draft of the 2002 issue of the grain moisture meter checklist in Publication 14. Several typographical errors were noted.

**Recommendation:** The Sector recommended changes to correct typographical errors. The Sector also recommended changing formulas to use a "bar" over variables that are intended to indicate an "average" or "mean". Recommended changes are shown below.

**Accuracy**. The two tests for accuracy are bias (meter versus oven) and the Standard Deviation of the Differences (SDD) between the meter and the air oven for each of the 2 % moisture intervals. Each instrument will be individually tested.

$$Bias = \frac{\sum_{i=1}^{n} (\bar{x}_i - r_i)}{n}$$

where,

$\bar{x}_i$ = average predicted moisture content for sample $i$ (3 replicates)

$r_i$ = reference moisture content for sample $i$

$n$ = number of samples per 2 % moisture interval ( $n = 10$)

$$SDD = \sqrt{\frac{\sum_{i=1}^{n} (y_i - \bar{y})^2}{n-1}}$$

where,

$y_i$ = $\bar{x}_i - r_i$ (see above)

$\bar{y}$ = average of the $y_i$

$n$ = number of samples per 2 % moisture interval ( $n = 10$)

Tolerances for both of these tests will be one-half the Handbook 44 acceptance tolerance for the appropriate 2 % interval. Use the maximum acceptance tolerance for intervals where the tolerance changes with the moisture content, (i.e., in the 16 %-18 % interval for corn use 0.5 x 0.05 x 18 = 0.45 for the tolerance). Specific tolerances are:

| Grain Type | Moisture Content | Tolerance |
|---|---|---|
| Corn | 12-14 % | 0.40 |
| | 14-16 % | 0.40 |
| | 16-18 % | 0.45 |
| HRW wheat and Soybeans | 10-12 % | 0.35 |
| | 12-14 % | 0.35 |
| | 14-16 % | 0.35 |

The manufacturer may adjust the calibration bias to compensate for differences from the type evaluation laboratory in reference methods or sample sets.

**Repeatability**. The Standard Deviation (SD) of the three replicates will be calculated for each sample in a 2 % moisture interval and pooled across samples. Each instrument will be tested individually. The equation used to calculate SD is:

$$SD = \sqrt{\frac{\sum_{i=1}^{n} \sum_{j=1}^{3} (P_{ij} - \bar{P}_i)^2}{2n}}$$

where,

$P_{ij}$ = predicted moisture for sample $i$ and replicate $j$

$\overline{P}_i$ = average of the three predicted moisture values for sample $i$

$n$ = number of samples per 2 % moisture interval ( $n = 10$)

Tolerances for repeatability are 0.25 x the maximum Handbook 44 acceptance tolerance for the 2 % moisture interval. Specific tolerances are:

| Grain Type | Moisture Range | Tolerance |
|---|---|---|
| Corn | 12-14 % | 0.200 |
| | 14-16 % | 0.200 |
| | 16-18 % | 0.225 |
| HRW wheat and Soybeans | 10-12 % | 0.175 |
| | 12-14 % | 0.175 |
| | 14-16 % | 0.175 |

**Reproducibility**. The results for each of the three replicates will be averaged for each instrument using samples over the 6 % moisture range and the Standard Deviation of the Differences (SDD) between instruments will be calculated using the following equation:

$$SDD = \sqrt{\frac{\sum_{i=1}^{n}(d_i - \overline{d})^2}{n-1}}$$

where,

$d_i$ = $\overline{P}_{1i} - \overline{P}_{2i}$

$\overline{P}_{1i}$ = average of three replicates for sample i on instrument 1

$\overline{P}_{2i}$ = average of three replicates for sample i on instrument 2

$\overline{d}$ = average of the $d_i$

$n$ = number of samples in all three 2 % moisture ranges ( $n = 30$)

Tolerances for reproducibility are 0.3 x the maximum Handbook 44 acceptance tolerance for the 6 % moisture range. Specific tolerances are:

| Grain Type | Moisture Range | Tolerance |
|---|---|---|
| Corn | 12-18 % | 0.27 |
| HRW wheat | 10-16 % | 0.21 |
| Soybeans | 10-16 % | 0.21 |

## V. Criteria for NTEP Moisture Calibration Review

The following criteria are to be applied along with criteria listed in Part IV above to determine "approved" and "pending approval" moisture ranges.

**Special Cases Dealing with Inadequately Represented Moisture Intervals:**

**VI. Standardization of Instruments**

Continuing participation in the ongoing data collection and calibration review program (Phase II) is mandatory for all grain moisture meters. Annually, prior to Phase II data collection, device manufacturers are required to make a side-by-side comparison[1] between their reference standard instruments and instruments of like type in the NTEP Participating Laboratory. The specific details of the comparison tests will vary with the technology involved, but manufacturers will be required to provide details of their test procedures to the NTEP Participating Laboratory and will be required to show that the mean moisture difference between Manufacturer's Laboratory Standard Meters and the corresponding NTEP Laboratory Meters (path A in figure below) does not exceed ±0.2 x the Handbook 44 acceptance tolerance. Manufacturers must demonstrate that their methods for standardizing units in production result in "as shipped" units which agree with the corresponding NTEP Laboratory units (path D in figure below) within ±0.3 x the Handbook 44 acceptance tolerance. Manufacturers must also demonstrate that once units are standardized, moisture results between units of like type will not exceed these tolerances when a grain calibration change is made.

[1] an exchange of samples may be used in lieu of side-by-side testing if mutually agreeable to the NTEP Laboratory and the Manufacturer.

**4. Update on Field Evaluation of Proposed Test Weight per Bushel Tolerances**

**4.a. Review of Phase I and Phase II Data**

**Background:** At the Sector's September 1999 meeting, maintenance tolerances of 0.8 pounds per bushel for corn and oats; 0.5 pounds per bushel for all classes of wheat; and 0.7 for soybeans, barley, rice, sunflower, and sorghum were proposed for further study. States agreeing to participate in a field evaluation of the proposed tolerances and test methods included:

| | | |
|---|---|---|
| Arkansas | Nebraska | Maryland |
| Illinois | North Carolina | Missouri |

The Field Evaluation of Tolerances project was conducted in two phases:

***Phase 1. Standardization of Quart Kettle Test Weight Apparatus.*** - In late September 2000, the USDA/Grain Inspection Packers and Stockyards Administration (GIPSA) sent one portion of a hard red winter wheat HRW standardizing sample to each of the participating State Laboratories. Participating laboratories verified that the quart kettle used in their standard test weight per bushel (TW) apparatus met the requirements spelled out in GIPSA's volume test. They also verified that the apparatus was set up according to GIPSA standards before testing the HRW standardizing samples.

To obtain base-line performance data on the standard quart kettle test method for corn and soybeans, GIPSA sent corn and soybeans samples to the participating laboratories prior to the Sector's August 2002 meeting. Tests were run on each State's standard quart kettle TW apparatus and on any NTEP model Grain Moisture Meter with TW capability that the State had in its laboratory.

***Phase 2. Field Tests of Test Weight per Bushel Capability. -*** Participating laboratories obtained their own samples for this test. Each participating laboratory was to make an initial determination of the test weight per bushel of each sample portion with the standard quart kettle apparatus before sending it to the field. Tests were to be run on TW capable NTEP grain moisture meters and on the kettle test weight apparatus used at each commercial location selected for field-testing. Kettle tests at each location were to be made by the operator who normally made test weight per bushel determinations for commercial transactions. No instruction was to be given to the operator on how to perform the test. The participating laboratory was to make a final determination of test weight per bushel when the sample was returned to the lab. Data was to be collected on no more than twenty instruments per grain sample.

**Discussion:** Diane Lee, OWM, reported on the current status of this project. Phase I data for corn and soybeans had been received from all six participating states. (Wheat samples were sent to the states in late September 2000. With the exception of one State, the test weight apparatuses were within GIPSA's tolerance. GIPSA has since worked with

the State to correct the test weight apparatus that was out of tolerance.) The results for corn and soybeans are summarized below:

**Quart Kettle Method Test Weight per Bushel Test Results for Participating State Grain Moisture Labs with GIPSA Measurements as Reference**

| | Corn | | Soybeans | |
|---|---|---|---|---|
| | Bias (pounds per bushel) (avg. of 3 replicates) | Individual Lab Precision (pounds per bushel) (3 replicates) | Bias (pounds per bushel) (avg. of 3 replicates) | Individual Lab Precision (pounds per bushel) (3 replicates) |
| State 1 | 0.23 | 0.06 | 0.13 | 0.06 |
| State 2 | -0.60 | 0.00 | -0.50 | 0.00 |
| State 3 | 0.07 | 0.06 | 0.00 | 0.00 |
| State 4 | 0.27 | 0.06 | 0.27 | 0.06 |
| State 5 | -0.07 | 0.06 | -0.13 | 0.06 |
| State 6 | 0.30 | 0.00 | 0.07 | 0.06 |
| Avg Bias | 0.03 | --- | -0.03 | --- |
| Intralab SDD | --- | 0.34 | --- | 0.27 |

With the exception of State 2 that reported results significantly lower than the reference for both corn and soybeans, the results indicate that in a laboratory setting the quart kettle method can achieve accuracies (based on the average of 3 readings) that are approximately one-half to one-third the proposed maintenance tolerances of ∀0.8 pounds per bushel for corn and ∀0.7 pounds per bushel for soybeans.

In state moisture labs and in the ongoing calibration maintenance program at GIPSA, the bias on NTEP meters using TW calibrations that had been standardized met the proposed tolerance requirements for corn and soybeans with one exception. The exception, with an error at least seven times greater than meters of the same type, was judged to be an isolated case, most likely indicating the need for service, as results for nine other meters of like type were well within the proposed tolerance limits. Consistent biases on the majority of meter models with TW calibrations that had not been standardized suggest that with proper standardization, these models would also meet the proposed tolerance requirements. The laboratory TW results (from both NTEP and State labs) for GMM's are summarized below.

**Test Weight per Bushel Test Results**
**for**
**Grain Moisture Meters in Participating State Grain Moisture Labs and at the NTEP Laboratory**
**with**
**GIPSA Quart Kettle Measurements as Reference**

| Model | number of meters tested | Corn | | Soybeans | |
|---|---|---|---|---|---|
| | | Average Bias (pounds per bushel) | SDD (pounds per bushel) Based on 3 replicates per meter | Average Bias (pounds per bushel) | SDD (pounds per bushel) Based on 3 replicates per meter |
| Model 1 | 2 | -0.35 | 0.21 | 0.08 | 0.12 |
| Model 2 | 9* | -0.29 | 0.17 | -0.04 | 0.16 |
| Model 3 | 3 | -1.14 | 0.21 | -0.66 | 0.07 |
| Model 4 | 2 | -1.12 | 0.40 | -0.37 | 0.38 |
| Model 5 | 2 | -1.48 | 0.35 | -1.35 | 0.07 |
| * net of 1 outlier | | | | | |

Dr. Richard Pierce, GIPSA, remarked that the repeatability of the meters was impressive, especially in light of the fact that the SD between two inspectors at GIPSA is typically 0.25 pounds per bushel for official inspections. This translates to 0.5 pounds per bushel at a 95 % confidence level.

One Sector member remarked that the samples used for Phase I tests were fairly dry (corn: approximately 13.3 % and soybeans: approximately 10 %). The use of low moisture samples, plus the fact that the samples were also clean and free of foreign material and broken kernels may have contributed to the excellent results obtained in Phase I tests. Official TW determinations by GIPSA, for most large grains, are obtained prior to removal of dockage and foreign material.

It was also pointed out that TW measurements on high moisture samples are not reliable. In normal years, TW will increase as a grain samples loses moisture. The grain kernel tends to shrink somewhat as it dries. In fact, the volume reduction is normally greater, percentage wise, than the reduction in mass due to drying. As a result, TW (weight per unit volume) increases. The surface condition of high moisture corn may also contribute to additional variance in the packing density as the sample is loaded into the test kettle or test cell of a GMM.

Phase II field data were received from Illinois, Missouri, Nebraska and Arkansas. The results are summarized below. The Sector noted that TW errors were essentially the same for both GMM's with TW capability and for the various kinds of stand-alone TW apparatus currently in use in the field. The results for corn and soybeans were especially encouraging considering that most of the field GMM's had not been adjusted for optimum performance on TW.

Phase II biases reported by Arkansas were significantly greater (and all negative with respect to their reference) than those reported for wheat and soybeans by other states on both GMM devices and on kettle test weight apparatus. The Arkansas weights and measures representative said that he would review the data to see if a cause for this difference could be determined.

| Field Evaluation – Bushel Test Weight<br>Hard Red Winter Wheat & Soft Red Winter Wheat<br>State Quart Kettle Apparatus as Reference | | | | |
|---|---|---|---|---|
| **State** | **Grain Moisture Meters** | | **TW Apparatus** | |
| | SDD (pounds per bushel) Based on 3 replicates per meter | Average Bias (pounds per bushel) with respect to reference sample | SDD (pounds per bushel) Based on 3 replicates per device | Average Bias (pounds per bushel) with respect to reference sample |
| All participating states | 0.47 | -0.47 | 0.31 | -0.23 |
| Illinois | 0.43 | -0.52 | 0.50 | 0.02 |
| Missouri | 0.26 | -0.55 | 0.32 | -0.31 |
| Nebraska | 0.29 | -0.02 | 0.23 | -0.19 |
| Arkansas (net of 1 outlier) | 0.45 | -0.92 | 0.23 | -0.36 |

| Field Evaluation – Bushel Test Weight<br>Soybeans<br>State Quart Kettle Apparatus as Reference | | | | |
|---|---|---|---|---|
| **State** | **Grain Moisture Meters** | | **TW Apparatus** | |
| | SDD (pounds per bushel) Based on 3 replicates per meter | Average Bias (pounds per bushel) with respect to reference sample | SDD (pounds per bushel) Based on 3 replicates per device | Average Bias (pounds per bushel) with respect to reference sample |
| All participating states | 0.79 | -0.05 | 0.64 | 0.06 |
| Illinois | 0.40 | -0.09 | 0.41 | 0.25 |
| Nebraska | 0.32 | 0.66 | 0.20 | 0.36 |
| Arkansas (net of 1 outlier) | 0.41 | -1.10 | 0.56 | -1.04 |

| Field Evaluation – Bushel Test Weight<br>Corn<br>State Quart Kettle Apparatus as Reference | | | | |
|---|---|---|---|---|
| **State** | **Grain Moisture Meters** | | **TW Apparatus** | |
| | SDD (pounds per bushel) Based on 3 replicates per meter | Average Bias (pounds per bushel) with respect to reference sample | SDD (pounds per bushel) Based on 3 replicates per device | Average Bias (pounds per bushel) with respect to reference sample |
| All participating states | 0.55 | 0.05 | 0.61 | -0.27 |
| Illinois | 0.60 | 0.33 | 0.46 | 0.37 |
| Nebraska | 0.38 | -0.18 | 0.37 | -0.59 |

**4.b. Proposal to move the Developing Issue for Test Weight per Bushel forward as a Voting Item**

**Discussion:** [For additional background, see also S&T Committee 2002 Interim Report, Developing Issues – Grain Moisture Meters, Item 1, Recognize Indications and Recorded Representations of Test Weight per Bushel, in NCWM Publication 16 dated April 2002.]

Knowledge of test weight per bushel (TW) is important not only in determining the price a producer receives for grain delivered to a grain elevator; it is also important to the grain elevator when grain stocks in storage are audited for quantity. Grain industry members reported that the proposed tolerances for TW are acceptable to the industry.

Stressing that the grain industry urgently needed the capability to simultaneously (and easily) make TW determinations, they urged the Sector to recommend moving forward on this issue. Some members were hesitant about moving forward at this time, citing concern about the unresolved issue of large negative bias in the Arkansas Phase II data. It was pointed out that even if the Sector recommended moving ahead at this time, the earliest date that changes in the code would become effective was January 1, 2004.

The Sector considered whether the recommended changes should be retroactive or nonretroactive. Discussion centered on the requirement that meters measuring TW must provide some means to ensure that measurements of TW are not allowed to be displayed or printed when insufficient sample volume has been supplied. Although the proposed code does not specify how this will be accomplished, it is generally assumed that the means will include a level sensor of some sort installed in either the sample hopper or the test cell.

Those favoring making the proposed code retroactive reminded the Sector that although moisture measurements are not significantly affected when samples are not of sufficient size to completely fill the measuring cell of a GMM, the TW measurement is greatly affected when the cell is not filled. Measurement of TW requires determination of two parameters: volume and mass. The vast majority of GMM's with TW capability presently in the field do not have means to assure that the measuring cell is completely full. If the cell is not filled completely, TW indications will be lower than they should be to the disadvantage of the producer selling grain. Some of those favoring making the code nonretroactive felt that GMM's with a window, through which the test cell could be seen, provided adequate means to verify that the cell had been filled. A grain industry member expressed the belief that compared to how test weight measurements are being made now; the worry about a sensor was trivial. As long as the GMM could produce an accurate TW measurement when properly used, whether the hopper had a sensor or not was not important. Some thought this was a facilitation of fraud issue and favored making the sensor requirement retroactive. Others thought that making the code retroactive would unfairly penalize users of existing NTEP meters with TW capability.

Cassie Eigenmann of DICKEY-john, supporting making the sensor requirement retroactive, pointed out that all existing DICKEY-john GMM's covered by an NTEP CC were hard coded to add the words "approx" or "approximate" to the display and print out of TW measurements. She asked how devices displaying "approximate" TW would be regulated if the sensor requirement was nonretroactive. Weights and measures members were at first divided on this question. Some were of the opinion that they would permit the continued use and display of "approximate" TW if the device met the tolerance requirements, since "approximate" was added at the request of jurisdictions permitting a display of TW when tolerances didn't exist for regulation. Others were concerned about what would happen in a court case when printed tickets presented in evidence of a claim showed "approximate". States that presently do not permit "approximate" TW to be displayed or recorded indicated they would not change their policy.

On a related issue, Don Onwiler, Nebraska Dept. of Agriculture, Div. of Weights and Measures, proposed that Sec.5.56(b) of Handbook 44 be amended to add tolerances for grain moisture meters with test weight per bushel capability. Because new devices with test weight per bushel capability will be required to determine if sufficient sample volume has been provided for an accurate measurement, and because Section 5.56(b) applies to non-NTEP devices which are not within the purview of the Sector, the Sector decided that it was not appropriate for the Sector to recommend modification of Sec. 5.56(b) of the Code to add tolerances for grain moisture meters with test weight per bushel capability. Weights and Measures members suggested that paragraph T.3. should be revised to clarify that it applies to separate accessory devices (such as a beam balance test weight apparatus) used to determine test weight per bushel of grain samples for the purpose of making density corrections in moisture determinations. Don Onwiler offered to recommend this change to paragraph T.3 at the September meeting of the Central Weights and Measures Association.

**Conclusion:** By a vote of 9 to 4, the Sector agreed that the addition to paragraph S.2.6. relating to a means of sensing adequate sample volume should be nonretroactive and recommended that the Specifications and Tolerances (S&T) Committee place the GMM developing issue relating to Indications and Recorded Representations of Test Weight per Bushel, on the NCWM interim agenda with the intent to make it a voting item at the NCWM annual meeting in July 2003. The Sector also agreed to modify paragraph N.1.1.(b) of the developing issue to remove the words "at least" and to several editorial changes. The change to N.1.1.(b) was made to insure that only the lowest moisture sample of each grain used in tests of moisture indications would be used in tests of test weight per bushel indications. The final recommendation is shown below.

**Recommendation:** Modify 5.56(a) Grain Moisture Meter Code Section in NIST Handbook 44 to recognize indications and recorded representations of test weight per bushel as follows:

Amend the following paragraphs:

**A.1. This code applies to grain moisture meters; that is, devices used to indicate directly the moisture content of cereal grain and oil seeds. The code consists of general requirements applicable to all moisture meters and specific requirements applicable only to certain types of moisture meters. Requirements cited for "test weight per bushel" indications or recorded representations are applicable only to moisture meters incorporating an optional automatic test weight per bushel measuring feature.**

**S.1.1. Digital Indications and Recording Elements.**

**(c) Meters shall be equipped with a communication interface that permits interfacing with a recording element and transmitting the date, grain type, grain moisture results, test weight per bushel results and calibration version identification.**

**(d) A digital indicating element shall not display, and a recording element shall not record, any moisture content values or test weight per bushel values before the end of the measurement cycle.**

**(e) Moisture content results shall be displayed and recorded as percent moisture content, wet basis. Test weight per bushel results shall be displayed and recorded as pounds per bushel. Subdivisions of ~~this~~ these units shall be in terms of decimal subdivisions (not fractions).**

**(f) A meter shall not display or record any moisture content or test weight per bushel values when the moisture content of the grain sample is beyond the operating range of the device, unless the moisture and test weight representations include~~s~~ a clear error indication (and recorded error message with the recorded representation).**

**S.1.3. Operating Range. - A meter shall automatically and clearly indicate when the operating range of the meter has been exceeded. The operating range shall specify the following:**

**(c) Moisture Range of the Grain or Seed. The moisture range for each grain or seed for which the meter is to be used shall be specified. ~~A moisture~~ Moisture and test weight per bushel value~~s~~ may be displayed when the moisture range is exceeded if accompanied by a clear indication that the moisture range has been exceeded.**

**S.1.4. Value of Smallest Unit. - The display shall permit ~~constituent~~ moisture value determination to both 0.01 % and 0.1 % resolution. The 0.1 % resolution is for commercial transactions; the 0.01 % resolution is for type evaluation and calibration purposes only, not for commercial purposes. Test weight per bushel values shall be determined to the nearest 0.1 pound per bushel.**

**S.2.4.1. Calibration Version. - A meter must be capable of displaying either calibration constants, a unique calibration name, or a unique calibration version number for use in verifying that the latest version of the calibration is being used to make moisture content and test weight per bushel determinations.**

**S.2.6. Determination of Quantity and Temperature. - The moisture meter system shall not require the operator to judge the precise volume or weight and temperature needed to make an accurate moisture determination. External grinding, weighing, and temperature measurement operations are not permitted. In addition, if the meter is capable of measuring test weight per bushel, determination of sample volume and weight for this measurement shall be fully automatic, *and means shall be provided to ensure that measurements of test weight per bushel are not allowed to be displayed or printed when insufficient sample volume is available to provide an accurate measurement.***

**S.4. Operating Instructions and Use Limitations. - The manufacturer shall furnish operating instructions for the device and accessories that include complete information concerning the accuracy, sensitivity, and**

**use of accessory equipment necessary in obtaining a moisture content. Operating instructions shall include the following information:**

**(d) the kind or classes of grain or seed for which the device is designed to measure moisture content and test weight per bushel;**

**N.1.1. Transfer Standards.[1] - Official grain samples shall be used as the official transfer standards with moisture content and test weight per bushel values assigned by the reference methods. The reference methods for moisture shall be the oven drying methods as specified by the USDA GIPSA. The test weight per bushel value assigned to a test weight transfer standard shall be the average of 10 test weight per bushel determinations using the quart kettle test weight per bushel apparatus as specified by the USDA GIPSA. Tolerances shall be applied to the average of at least three measurements on each official grain sample. Official grain samples shall be clean and naturally moist, but not tempered (i.e., water not added). (Amended 1992)**

**N.1.2. Minimum Test. - A minimum test of a grain moisture meter shall consist of tests~~: (a) with~~ using samples (need not exceed three) of each grain or seed type for which the device is used, and for each grain or seed type shall include the following:**

**(a) tests of moisture indications ~~(b) with~~ using samples having at least two different moisture content values within the operating range of the device, and if applicable,**

**(b) tests of test weight indications, with the lowest moisture samples used in (a) above.**

**T.3. For Test Weight Per Bushel Indications or Recorded Representations. - The maintenance and acceptance tolerances on test weight per bushel indications or recorded representations shall be ~~0.193 kg/hL or 0.15 lb/bu. The test methods used shall be those specified by the USDA GIPSA~~ as shown in Table T.3. Tolerances are (+) positive or (!) negative with respect to the value assigned to the official grain sample.**

| Table T.3. Acceptance and Maintenance Tolerances<br>Test Weight per Bushel | |
|---|---|
| **Type of Grain or Seed** | **Tolerance<br>(pounds per bushel)** |
| **Corn, oats** | **0.8** |
| **All wheat classes** | **0.5** |
| **Soybeans, barley, rice, sunflower, sorghum** | **0.7** |

**UR.1.1. Value of the Smallest Unit on Primary Indicating and Recording Elements. - The resolution of the moisture meter display shall be 0.1 % moisture and 0.1 pounds per bushel test weight during commercial use.**

**UR.3.4. Printed Tickets.**

**(b) The customer shall be given a printed ticket showing the date, grain type, grain moisture results, test weight per bushel, and calibration version identification. The ticket shall be generated by the grain moisture meter system.**

**5. Review Latest Draft of Evaluation Procedure Outline (EPO) and Test Procedures for the Field Evaluation of NTEP GMM Devices (air-oven reference method)**

**Background:** At the March 1998 GMM/NIR Sector meetings three working groups were established to develop Examination Procedure Outlines (EPOs) and Field Evaluation Test Procedures (Inspection Procedures) for GMM and NIR devices to provide guidance to States on implementing NIST Handbook 44 (HB44) as it applies to these devices. The

output of the working groups was first reviewed at the Sector's September 1999 meeting. At the Sector's August 2000 meeting Revised drafts of the Grain Moisture Meter (GMM) Field Evaluation Test Procedures for the air oven reference method and the meter-to-meter method were distributed for review. Because of time limitations, only the meter-to-meter method was reviewed in detail. Following that meeting, the GMM Inspection Procedure – Air-oven Reference Method was split into two separate procedures: The first based on HB-44, §5.56(a), applicable to all NTEP meters as well as any meters manufactured or placed into service after January 1, 1998; and the second based on HB-44, §5.56(b), applicable to all other meters. A similar change was made in the corresponding EPOs. Revised drafts (dated May 2001) were reviewed by the Sector at its August 2001 meeting.

Subsequent to the Sector's 2001 meeting, OWM discussed formatting for EPOs considering what would be best for field inspectors. During these discussions it was noted that EPOs should be in outline form and should remain relatively short so that an inspector has a quick reference to code requirements while testing is being performed. In contrast to EPOs, field manuals should contain more detail to include pictures of the device and more instructions for testing. Field manuals are also intended to be used as teaching tools.

**Discussion:** In the latest round of editing, Diane Lee, NIST/OWM, has revised the GMM Inspection Procedure to address comments and suggestions from the Sector's August 2001 meeting. The revised Inspection Procedure has been rearranged and incorporated into a draft Field Manual titled. ***Examination of Grain Moisture Meters***. The GMM EPO also has been revised to address comments and suggestions from the Sector's August 2001 meeting. It has been incorporated into the Field Manual as Appendix A. The Field Manual includes the following sections: (1) Foreword, (2) References, (3) Definitions, (4) Testing Methods (a description of the test method), (5) Testing Apparatus/equipment, (6) Inspection of Commercial Devices (intended to include pictures, diagrams, or outline drawings), (7) Preparation and Testing of Commercial Devices, (8) Test Report Forms, (9) Reporting a Test, and (10) Appendix A, GMM EPO.

Richard Pierce, GIPSA, noted that the EPO included several checklist items that duplicated evaluations performed during NTEP testing. Ms. Lee pointed out that the phrase "if conditions exist such that they can be evaluated" precedes such checklist items. She explained that these were included, because they represented situations that might be encountered during routine field evaluation. For example, paragraph 6.11, relating to the requirement that power interruption does not cause indicating or recording of values outside of tolerance, would apply only if a power interruption were encountered while the inspector was performing normal accuracy tests on the device.

One attendee mentioned that a significant number of GMM rejections during field test are caused by high moisture grain samples that are beginning to deteriorate. There is a limit to how long high moisture samples can be stored and still remain stable when removed from storage and put into use. The stability problem may not be evident when the samples leave the laboratory, but it becomes evident after the samples have been used several times.

**Conclusion:** The Sector was in general agreement that Section 6.2 Official Samples should incorporate additional precautions relating to the use of high moisture samples. Specific suggestions related to high moisture samples included:

> 6.2.1.4. There is some evidence that moisture level of samples may begin to change after 24 drops (18 drops for high moisture corn and soybeans), as such samples should not be used for more than 24 drops. Samples with moistures over 18 % for corn and over 16 % for soybeans are not recommended for use.

Editorial revisions and suggestions relating to other issues in the main body of the Field Examination Procedure included:

> 3.1. The method for testing grain moisture meters that is addressed in this handbook is using grain samples with known moisture values. The grain samples must be maintained when using this method to ensure that the samples retain their original moisture values and do not deteriorate biologically.
>
> 4.11. Certified digital heat probe thermometer, probe, and carrying case
>
> [**Note**: This requirement is not applicable to NTEP meters.]

and in Appendix A,

4.3 T.3. **Test Weight per Bushel Tolerance.** - The tolerance for test weight per bushel is shown in Table T.3. The tolerance is assigned (plus or minus) to the average of three measurements. Yes ☐ No ☐ NA ☐

[**Note**: The above change assumes that the NCWM will approve the Sector's recommendations to modify the GMM Code in section 5.56(a) of HB-44 to recognize indications and recorded representations of test weight per bushel. See preceding agenda item 4.(b)]

**Inspection Report** – Will need provisions for 3 TW indications, average TW, reference (or standard) TW, and TW error when the GMM Code in section 5.56(a) of HB-44 is amended to recognize indications and recorded representations of test weight per bushel.

**Inspection Report** – Change heading of next to last column of data field to make it clear that this is where the moisture value of the transfer standard is to be entered:

| -% moisture (standard) |
|---|

Time constraints did not allow a complete review of the draft. Additional comments and suggestions should be forwarded to Diane Lee at diane.lee@nist.gov by November 15, 2002.

Manufacturers were urged to forward line drawings/diagrams of their devices via e-mail to Diane Lee at diane.lee@nist.gov for inclusion in the next draft. Especially useful would be drawings of key-pads, control panels, and line drawings of the device identifying components likely to be used, examined, or accessed during a field inspection.

## 6. A Message from the NCWM Board of Directors

Don Onwiler, Nebraska Department of Agriculture, Division of Weights & Measures, representing the NCWM Board of Directors (BOD), informed the Sector that the National Type Evaluation Program (NTEP) is working well, largely due to the efforts of the staff of NIST's Office of Weights and Measures and NCWM, Inc.'s NTEP Director, Steve Patoray. NTEP is solvent; however, the BOD believes that the major work of the GMM & NIR Sectors has been completed and it questions whether annual Sector meetings will be required in the future. The GMM Sector contributes only $500 annually to NTEP. The BOD figures the total staff costs associated with the GMM/NIR Sector is about $15,000. In a cost cutting effort for 2002, no state members received funding for travel to attend this GMM/NIR Sector meeting. However, the Board paid Don Onwiler's travel costs to attend the sector meeting and to provide the sector with an explanation of the BOD's cost cutting efforts, answer questions and address the concerns of the sector.

**Discussion:** Sector members were disturbed about what they heard. Several members believed that the cost of the Sector meeting was a small portion of the $15,000 cited as the cost of Sector support. The 2000, 2001, and 2002 meetings have all been held in Kansas City, MO at the National Weather Service Training Center with no cost for the meeting room or for digital projectors when needed. Sector meeting agendas and meeting summaries are distributed by e-mail. Other than cookies, soft drinks, and Steve Patoray's time and travel, the cost of a Sector meeting should be very small now that funding of public member travel had been withdrawn. One member expressed the hope that the Board would obtain a detailed breakdown of costs directly related to the Sector's recent meeting before making any decisions about withdrawing support for annual meetings. There was concern that support for the GMM NTEP certificate program would be the next thing to be withdrawn. The Sector has always known that there would never be a large number of GMM (or NIR) CC's, but the value of the program to regulating agencies, producers, the grain trade, and industry is many times greater than the annual cost of the program. Rich Pierce, GIPSA, reported that GIPSA and OWM continue to support the program, with each providing $18,000 per year for the NTEP Phase II program. He said GIPSA was interested in expanding the NTEP program to encompass additional devices. GIPSA is making increased use of cross-utilized equipment, in which devices owned by industry are also used by GIPSA for on-site official inspection. The NTEP program is a critical element in that regard. Don Onwiler responded that NCWM is committed to continuing the NTEP program for grain moisture meters. There is no reason for the Sector to go away, but it may not need to meet every year. Diane Lee, NIST-OWM, suggested that it might be possible for OWM to host a technical session for NIST Handbook 44

issues that need to be resolved or that require additional discussion if the NCWM BOD chooses not to host a sector meeting. Dr. Charles Hurburgh, Jr., ISU, suggested that the possibility of obtaining funding through Federal grant programs, for some of the work done by the Sector, should be explored. He noted that requests for funding of projects involving joint efforts of regulators, producers, the grain trade, and industry are usually received positively by the funding authority.

In order to promote greater uniformity in commercial grain inspection results, Congress passed the Grain Quality Incentives Act of 1990 that authorized the Federal Grain Inspection Service to work in conjunction with the National Institute for Standards and Technology and the National Conference on Weights and Measures to:

1) identify inspection instruments requiring standardization;
2) establish performance criteria for commercial grain inspection instruments;
3) develop a national program to approve grain inspection instruments for commercial inspection; and
4) develop standard reference materials or other means necessary for calibration or testing of approved instruments.

In 1992, partly through the efforts of Sid Colbrook, Illinois Department of Agriculture, who was then NCWM Chairman, the GMM and NIR Sectors were established. The Sectors became not only working groups for the development of device standards and test/evaluation methods; they also provided a forum for manufacturers, user groups, state regulators, GIPSA/FGIS, and NIST-OWM to air issues of mutual concern relating to grain inspection and measurement, including Handbook 44 issues and the GMM ongoing calibration maintenance program. If the NCWM Board views the current purpose of the Sectors as limited to dealing with Publication 14 issues uncovered during NTEP testing, then another forum will have to be found for these other issues of interest (and importance) to members of the Sector.

**7. Update on NTEP Type Evaluation and OCP (Phase II) Testing**

Rich Pierce of the Grain Inspection, Processors and Stockyards Administration (GIPSA), the NTEP Participating Laboratory for Grain Moisture Meters, reported that there were currently no active applications for examination of new devices.

The number of meter types in the ongoing calibration maintenance program remains at five, the same as last year. Phase II calibration data are being collected for 2002 crop samples on the following meter types.

| | |
|---|---|
| DICKEY-john Corporation | GAC2000NTEP, GAC2100, GAC2100A |
| Foss North America, Inc. | Infratec 1227, Infratec 1229 |
| Foss North America, Inc. | Infratec 1241 |
| Motomco, Ins. | 919E, 919E-S |
| The Steinlite Corporation | SL 95 |

With five types in the OCP (Phase II), the cost to manufacturers remains at $3,600 per type.

**8. A Quality Control Procedure for Grain Analysis at a Country Elevator**

Dr. Charles Hurburgh, Jr., Agricultural & Biosystems Engineering - Iowa State University, described a quality control system implemented by Farmers Cooperative Elevator Company at its Odebolt, Iowa facility. The system was developed under a grant from the Iowa Grain Quality Initiative with the intention of learning how to develop a quality system and then to replicate it at 32 other locations in northwest Iowa. The initial concept was to use the quality management system for market differentiation – to be able to certify the identity of specialty crops through a documented identity preservation system. During the early stages of the project it became apparent that the quality system had benefits as a management system and had improved operations to the extent that the system was worth implementing even without the prospects of market differentiation through identity preservation. In fact, Dr. Hurburgh estimated that the system has generated two dollars for every one dollar invested.

Four important criteria were deemed necessary for the system: 1) it must be a certified system; 2) it must have established credibility; 3) there must be 3rd party auditing; and 4) it must have international recognition. The system implemented is based on the American Institute of Baking (AIB) International Gold Standard Certification Program which, with certification and auditing through AIB's Quality System Evaluation, includes about 80 % of the requirements of ISO-9000. Some of the key elements of the system include: written work procedures, flowcharts for sampling and grading

processes, setting tolerances for grade factors, using grade factor control charts and comparison charts (in-house measurements compared to official measurements) for both inbound and outbound grade factors. The objective being to make house grades just as accurate as official grades, and to provide documented evidence of this equivalence.

Quality control data was used to evaluate the accuracy of house grades. The initial target was that no more than 5 % of the individual tests would be out of tolerance. Operator training and incentives were based on these data. Control charts and comparison charts made it easy to identify trends and apply corrections before the trends became problems – continuous data is more useful than spot checks. Better accuracy on inbound measurements resulted in more accurate inventory records and assisted in merchandising. The documentation of quality control (QC) data gave customers confidence in house grades.

The widespread implementation of quality management systems (QMS) like the one in Odebolt, Iowa could have major implications on regulatory programs such as those used for grain moisture meters and (soon) near-infrared grain analyzers. If documented references are used, a certified QMS may create more useful data than annual device inspections. The structure of regulatory programs may change to auditing and verification that a quality system is in place. Review of data may replace testing of devices and reference standards may replace monitoring.

**Discussion:**
Following Dr. Hurburgh's presentation, Don Onwiler, Nebraska Dept. of Agriculture, Division of Weights & Measures, suggested that in the case of prepackaging scales (automatic weighing systems) there is already precedence for process verification rather than device inspection. In some states such scales are not checked; instead, the packaged product is checked for correct weight.

**9. Time and Place for Next Meeting**
The next meeting is tentatively planned for the week of August 18, 2003 in the Kansas City, MO area. Meetings will be held in one of the meeting rooms at the National Weather Service Training Center if available. A tentative schedule is shown below.

| | | |
|---|---|---|
| Wednesday, August 20 | 1:00 pm - 5:00 pm | GMM Sector Meeting |
| Thursday, August 21 | 8:00 am - 12:00 noon | GMM Sector Meeting |
| Thursday, August 21 | 1:00 pm - 5:00 pm | Joint Session GMM & NIR Analyzer |
| Friday, August 22 | 8:00 am - 12:00 noon | NIR Grain Analyzer Sector Meeting |

# Appendix D

## National Type Evaluation Technical Committee (NTETC)
## Near Infrared (NIR) Grain Analyzer Sector

**August 22-23, 2002 - Kansas City, MO**

**Meeting Summary**

**Agenda Items**

★ 1. NIST/Office of Weights and Measures Reorganization
2. Report on the 2002 NCWM Interim and Annual Meetings
   a. S&T Items 357-1A and 357-1B
   b. Specialty or Proprietary Calibrations
3. Type Evaluation Issues – Pub 14, Table 2 - Tolerances for Barley, Corn, Soybeans
4. Proposed Changes and Additions to Publication 14 – Identification Marking Requirements
5. Proposed Changes and Additions to Publication 14 to Add Additional Grains and Criteria for Moisture Basis
6. Dual Certification – Could a Single Certificate be Used?
★ 7. A Message from the NCWM Board of Directors
★ 8. A Quality Control Procedure for Grain Analysis at a Country Elevator
★ 9. Time and Place for Next Meeting

**Note:** Because of common interest, items marked with a star (★) will be considered in joint session of the NIR Grain Analyzer and the Grain Moisture Meter Sectors

---

### 1. NIST/Office of Weights and Measures Reorganization

**Discussion:** As part of a broader reorganization within NIST Technology Services (TS), the Office of Weights and Measures (OWM) has been raised from the program level with the Office of Measurement (now the Measurement Services Division) to the Division level within the TS organization structure. Henry Oppermann has been named Chief of the new Weights and Measures Division. In addition to national weights and measures matters, OWM will be responsible for NIST's Metric Program and for international matters relating to legal metrology, including U.S. participation in the OIML. This will provide a closer tie between national and international interests in standards matters.

### 2. Report on the 2002 NCWM Interim and Annual Meetings

#### 2.a S&T Items 357-1A and 357-1B

At the NCWM Interim Meeting held January 27-30, 2002, the Committee on Specifications and Tolerances (S&T) considered the Sector's proposal to amend the scope of the Tentative Code to include a code exemption for specialty crops and to recommend that the amended Tentative Code be made permanent. During the interim meeting the original proposal, Agenda Item 357-1, was separated into two parts to facilitate review of the issues.

**Agenda Item 357-1A** - The S&T Committee recommended that the status of the Near Infrared Grain Analyzer Code be changed from tentative to permanent. This item was given a voting (V) status for the 2002 NCWM Annual Meeting.

**Agenda Item 357-1B** - The S&T Committee opposed the proposal to exempt specialty crop from the entire NIST Handbook 44 (HB-44) NIR Code on the basis that it has no technical merit and would set a precedence for anyone wanting to gain exemptions simply because they operate on a contractual basis. Additionally, the proposal included no definition for specialty crop. To address specialty crop transactions where industry is concerned about the proprietary nature of calibration information, the Committee recommended amending NIST

HB 44 NIR Code, paragraph S.1.2 to include "If more than one calibration is included for a given grain type, the calibrations must be clearly distinguished from one another." This item was given Informational (I) status.

For additional background refer to Committee Reports for the 87th Annual Meeting, NCWM Publication 16, April 2002 and to OWM Position Statement, "2002 S&T Interim Agenda Item 357-1 - Tentative Status of NIR Grain Analyzers Code."

At the 87th Annual Meeting held July 14 – 18, 2002 the Conference voted to accept Agenda Item 357-1A, elevating the Near Infrared Grain Analyzer Code to permanent status, effective January 1, 2003.

**2.b. Specialty Crops and Proprietary Calibrations**

**Discussion:** Sector members discussed NCWM Conference Agenda Item 357-1B at length. In an attempt to arrive at a definition of "specialty crop" it was suggested that a specialty crop might be one in which the constituents recognized by the CC for that crop type (e.g., soybeans: protein, & oil) could not be measured accurately using the normal calibration because the specialty crop had a spectral response that differed significantly from the spectral response of normal varieties of that crop. High oleaic soybeans (soybean varieties developed specifically to yield high concentrations of oleaic acid) were cited as a good example of a specialty crop requiring special oil and protein calibrations. In contrast, "high oil" corn was not considered a good example of a specialty crop, although seed companies may market it as such. It was pointed out that although "normal" corn typically has an oil content in the 3-4 % range, the GIPSA corn oil calibration contains low (3-4 %), mid-range (5-6 %), and high (>7 %) oil samples from three major seed companies. Sector members were in general agreement that it would be misleading to imply that this, or similar, "standard" calibrations are somehow unsuitable for use with high-oil corn samples. There was similar agreement that, from a regulatory point of view, it would not be desirable to allow the use of multiple calibrations (on the same device) for essentially the same commodity.

The Sector searched for wording that would restrict the unnecessary use of multiple calibrations for the same basic grain type but would still permit the use of proprietary calibrations where there was a legitimate need. The following wording was proposed as an amendment to paragraph S.1.2 of NIST HB 44, NIR Code, "If a non-NTEP calibration is included for a given grain type, it must be clearly distinguished from other calibrations. The calibration description must clearly identify the unique end use property addressed by the calibration." Several variations of the foregoing were also considered.

**Conclusion:** In the end, the Sector decided that it would be best to add new text to current paragraph S.1.2. of the NIR Analyzer Code, as shown in the recommendation below, to address specialty crop transactions where industry is concerned about the proprietary nature of calibration information. This is the same wording recommended by the S&T Committee in Conference Agenda Item 357-1B.

**Recommendation:** Amend paragraph S.1.2. as follows:

***S.1.2. Selecting Grain Class and Constituent. – Provision shall be made for selecting, and recording the type or class of grain and the constituent(s) to be measured. The means to select the grain type or class and constituent(s) shall be readily visible and the type or class of grain and constituent(s) selected shall be clearly and definitely identified in letters (such as HRWW, HRSW, etc. or PROT, etc.). A symbol to identify the display of the type or class of grain and constituents(s) selected is permitted provided that it is clearly defined adjacent to the display. Minimum acceptable abbreviations are listed in Table S.1.2. Meters shall have the capability (i.e., display capacity) of indicating the grain type using a minimum of four characters in order to accommodate the abbreviations listed in Table S.1.2. If more than one calibration is included for a given grain type, the calibrations must be clearly distinguished from one another.***

**3. Type Evaluation Issues – Pub 14, Table 2 - Tolerances for Barley, Corn, Soybeans**

**Background:** At its August 2001 meeting, the Sector recommended the addition of Table 2 listing tolerances applicable to the Sample Temperature Sensitivity test as well as tolerances for Accuracy, Precision, and Reproducibility. Only wheat tolerance values were known at that time. Consideration of tolerance values for barley, corn, and soybeans was deferred pending further investigation.

**Discussion**: The Table 2 Accuracy, Precision, and Reproducibility tolerance values for protein in all classes of wheat are based on the following:

| | |
|---|---|
| Accuracy Tolerance: | 1/2 the HB 44 acceptance tolerance applied to individual samples |
| Repeatability Tolerance: | 1/4 the HB 44 acceptance tolerance applied to individual samples |
| Reproducibility Tolerance: | 1/3 the HB 44 acceptance tolerance applied to individual samples |

Dr. Richard Pierce, GIPSA, representing the NTEP Laboratory, reported that it was reasonable to use the above multipliers for the repeatability and reproducibility tolerances for barley, corn, and soybeans, but due to uncertainties with the standard reference methods for the larger grains and oil seeds, accuracy tolerances would have to be increased for corn and soybeans beyond the values obtained using the above multipliers.

The tolerance value of ± 0.35 for the Sample Temperature Sensitivity Test for all classes of wheat was not originally expressed as a fraction of the HB 44 acceptance tolerance applied to individual samples, but Dr. Pierce indicated that an appropriate tolerance for this test would be ± 0.45 for all the constituents of the added grain types.

Accordingly, the repeatability and reproducibility tolerances proposed for barley, corn, and soybeans, were derived using the multipliers mentioned above and rounding the results to the next highest 0.05. Accuracy tolerances proposed for barley were also derived using the multipliers mentioned above and rounding the results to the next highest 0.05. Accuracy tolerances proposed for corn and soybeans were derived by first using the multipliers mentioned above, rounding the results to the next highest 0.05, and then adding an additional allowance to account for uncertainties in the standard reference methods. The calculation of the overall accuracy tolerance for Corn and Soybeans is shown below:

| Grain Type | Constituent | 1/2 the acceptance tolerance applied to individual samples (rounded up to the next highest 0.05) | Additional allowance | Overall accuracy tolerance |
|---|---|---|---|---|
| Corn | Protein | 0.45 | 0.05 | 0.50 |
| | Oil | 0.40 | 0.10 | 0.50 |
| | Starch | 0.55 | 0.45 | 1.00 |
| Soybeans | Protein | 0.45 | 0.10 | 0.55 |
| | Oil | 0.40 | 0.05 | 0.45 |

**Recommendation:** Add tolerance values for barley, corn, and soybeans to Table 2 as shown.

**Table 2. Tolerances**

| Grain Type | Constituent | Sample Temperature Sensitivity Test Tolerance | Accuracy Tolerance | Repeatability Tolerance | Reproducibility Tolerance |
|---|---|---|---|---|---|
| Durum Wheat | Protein | ± 0.35 | 0.30 | 0.15 | 0.20 |
| Hard Red Spring Wheat | Protein | | | | |
| Hard Red Winter Wheat | Protein | | | | |
| Hard White Wheat | Protein | | | | |
| Soft Red Winter Wheat | Protein | | | | |
| Soft White Wheat | Protein | | | | |
| "All-Class" Wheat Calibration | Protein | | | | |
| Two-rowed Barley | Protein | ± 0.45 | 0.40 | 0.20 | 0.25 |
| Six-rowed Barley | Protein | | | | |
| "All-Class" Barley Calibration | Protein | | | | |
| Corn | Protein | ± 0.45 | 0.50 | 0.25 | 0.30 |
| | Oil | ± 0.45 | 0.50 | 0.20 | 0.25 |
| | Starch | ± 0.45 | 1.0 | 0.30 | 0.35 |
| Soybeans | Protein | ± 0.45 | 0.55 | 0.25 | 0.30 |
| | Oil | ± 0.45 | 0.45 | 0.20 | 0.25 |

## 4. Proposed Changes and Additions to Publication 14

### 4.a. Identification Marking Requirements

**Background:** The 86th National Conference on Weights and Measures (NCWM) in 2001 adopted changes to the General Code section of Handbook 44 that require corresponding changes to the Grain Moisture Meter Check List in Publication 14. The changes include:

- a specification of acceptable abbreviations for the word "Model"
- a requirement that devices be permanently marked with the applicable Certificate of Conformance (CC) number or a corresponding CC addendum number.

[For a detailed discussion of the above changes see the report 86th NCWM. NIST *Special Publication 976*.]

**Conclusion and Recommendation:** The Sector agreed to recommend amending and modifying Publication 14, NIR Checklist, Section 1. General**,** to combine related marking requirements and to address the above issues. In addition, the Sector recommended moving the paragraph related to Code Reference G-S.1.1. to a more appropriate location following the list of marking requirements. Recommended changes are shown below.

**1. General**

**Code Reference: G-S.1. Identification**

Virtually all measuring equipment (except separate parts necessary to the measurement process but not having any metrological effect) must be clearly and permanently marked with the manufacturer's name or trademark, model designation, and serial number. Additionally, devices that have (or will have) an NTEP Certificate of Conformance (CC) Number, must be marked with the CC number or a corresponding CC addendum number. "Permanent" markings addresses two aspects: (1) the printed information will withstand wear and cleaning, and (2) if the markings are on a plate or badge, then the marking badge must be "permanently" attached to the device. Permanently attached means that the identification information required by G-S.1. is not easily removed from the badge. If it is removed, then it must be obvious that the badge or plate containing this information has been removed. All markings must be clear and easily readable. The following test procedure shall be used to determine the permanence of the identification markings.

**Permanence of Lettering**: The lettering for the markings are subjected to the following tests to simulate accelerated wear. The markings are then compared with a typical set of labels exhibiting various degrees of wear, graded from minimal effect (1) to excessive unacceptable wear (7).

Attempts are made to remove the marked information, whether on a badge (plate) or on the device itself, using the following means:

1. Rub over one letter of the marking at least 20 times using an ink eraser in the same manner and force as one would normally exert while erasing an inscription written with a ballpoint pen.

2. Clean the marking or badge with the following cleaners presumed to be "readily available."

   a. Disinfecting cleaning liquid and a damp cloth.
   b. "Soft" household cleaning powder and a damp cloth.
   c. Window cleaning fluids and a damp cloth.

**Permanence of Attachment of Badge**: Attempt to remove the badge by pulling it off or prying off a metal badge that is attached using only adhesive; removal must be "difficult" at all temperatures. If the badge can be removed, it must show obvious evidence that the badge was removed. Acceptable indications are destruction of the badge by tearing, permanent and extensive wrinkling, or repeated exposure of the word "VOID" upon removal of the badge.

As a practical matter, remote constituent displays are not required to have serial numbers because they typically only repeat the moisture information received from the measuring element. Similarly, external printers are not required to have serial numbers because they do not alter the information received from the measuring element.

If the required information is located on the back of a device, the same information must also appear on the side, front, or top. The bottom of a device is not an acceptable surface. The identification marking must be permanent and attached with pop rivets, adhesive, or other permanent means. Removable bolts or screws are not permitted. A foil badge may be used provided that it is durable, difficult to remove, and exhibits obvious evidence of an attempt to remove the marking or badge.

The system must be clearly and permanently marked with the following information on an exterior surface that is visible after installation, with the following information:

1.1 The name, initials or trademark of the manufacturer. A remote display is required to have the manufacturer's name or trademark and model designation. (Code Reference GS.1.(a)) Yes ☐ No ☐ NA ☐

1.2 A model designation that positively identifies the pattern or design of the device. The Model designation shall be prefaced by the word "Model", "Type", or "Pattern." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod." (Effective January 1, 2003). (Code Reference G-S.1.(b)&(c)) Yes ☐ No ☐ NA ☐

1.3 A nonrepetitive serial number prefaced by words "Serial Number" or an abbreviation of that term. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser.No, and S No.). (Code Reference G-S.1.(d),(e), & (f)). Yes ☐ No ☐ NA ☐

1.4 The NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number for devices that have (or will have) a CC. The number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the term "Number" or an abbreviation of the word "Number". The abbreviation shall, as a minimum, begin with the letter "N" (e.g., No or No.). (Code Reference G-S.1.(g). Effective January 1, 2003). Yes ☐ No ☐ NA ☐

The device must have an area, either on the identification plate or on the device itself, suitable for the application of the CC number. If the area for the CC number is not part of an identification plate, note its intended location and how it will be applied.

Location of CC Number if not located with the identification information:

_____

_____

1.5 If the information required by G-S.1. is placed on a badge or plate, the badge or plate must be permanently attached to the device. (See criteria below for Permanence of Attachment of Badge.) (Code Reference G-S-1.) Yes ☐ No ☐ NA ☐

1.6 Identifying information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device. Yes ☐ No ☐ NA ☐

| | | |
|---|---|---|
| 1.7 | All markings must be clear and easily readable. | Yes ☐ No ☐ NA ☐ |
| 1.8 | The lettering for all markings must be permanent. Record the grade for the permanence of markings. _____. | Yes ☐ No ☐ NA ☐ |
| 1.9 | If the markings for other than device identification required by G-S.1. are placed on a badge or decal, then the badge or decal must be durable (difficult to remove at all temperatures). | Yes ☐ No ☐ NA ☐ |

Code Reference: G-S.1.1. Remanufactured Devices and Remanufactured Main Elements

Refer to the Section Policy on Remanufactured and Repaired Devices in the NCWM Publication 14 Administrative Policy.

**4.b. Miscellaneous Editorial Changes**

**Discussion:** The Sector reviewed the original draft of the 2002 issue of the Near Infrared (NIR) checklist in Publication 14. Several typographical errors were noted.

**Conclusion and Recommendation:** The Sector recommended changes to correct typographical errors and to remove text referring to sample temperature sensitivity from the first paragraph of part I. Basic Instrument Tests. This change was overlooked when sample temperature sensitivity was moved to part II in an earlier change. The Sector also recommended:

- Adding text defining "room temperature" to part II. Sample Temperature Sensitivity;
- Changing equations and variable definitions to use a "bar" over variables that are intended to indicate an "average" or "mean", and add missing definition of variables for SEP equation.
- Deleting part IV. Tolerances for Calibration Performance in its entirety. This change was recommended at the Sector's 2001 meeting but had not been made in the 2002 review copy provided to the Sector.

Recommended changes follow:

**Type Evaluation Test Procedures and Tolerances**

**I. Basic Instrument Tests**

Basic instrument tests will be conducted using a stable moisture, mid-range protein HRW wheat sample to check the effect of power supply fluctuations, storage temperature, leveling, warm-up time, humidity, instrument stability, and instrument temperature sensitivity. All instrument tests will be conducted on each of the two instruments submitted by a manufacturer. For purposes of these tests, room temperature will be defined as 22 ºC ± 2 ºC.

**II. Sample Temperature Sensitivity.**

Testing is required to verify that accurate results are provided when the sample and instrument are at different temperatures. This will be referred to as the sample temperature sensitivity test. Tests will be conducted with the instrument at room temperature and the sample temperature varying from room temperature + $\Delta T_H$ to room temperature $\Delta T_C$, where $\Delta T_H$ is the manufacturer-specified difference for grain above room temperature, and $\Delta T_C$ is the manufacturer-specified difference for grain below room temperature. In no case will room temperature + $\Delta T_H$ be allowed to exceed 45 °C, but $\Delta T_H$ need not equal $\Delta T_C$. For purposes of these tests, room temperature will be defined as 22 ºC ± 2 ºC.

**Accuracy.** The first replicate for each sample will be used to calculate the Standard Error of Performance (SEP) for each instrument with respect to the reference method. Each instrument will be tested individually.

$$SEP = \sqrt{\frac{\sum_{i=1}^{n}(y_i - \bar{y})^2}{n-1}}$$

where,

$\bar{x}_i$ = average predicted constituent concentration for sample $i$ (3 replicates)

$r_i$ = reference constituent concentration for sample $i$

$y_i$ = $\bar{x}_i - r_i$

$\bar{y}$ = average of $y_i$

$n$ = number of samples in the test set for the constituent calibration being evaluated ($n$ = 50, see Note 1 below regarding "all class" calibrations.)

**Repeatability.** The Standard Deviation (SD) of the three replicates will be calculated and pooled across samples for each class. Each instrument will be tested individually. The equation used to calculate SD is:

$$SD = \sqrt{\frac{\sum_{i=1}^{n}\sum_{j=1}^{3}(P_{ij} - \bar{P}_i)^2}{2n}}$$

where,

$P_{ij}$ = predicted constituent concentration for sample i and replicate j

$\bar{P}_i$ = average of the three predicted constituent concentration values for sample i

$n$ = number of samples in the test set for constituent calibration being evaluated ($n$ = 50, see Note below regarding "all class" calibrations.)

.

**Reproducibility.** The results for each of the three replicates obtained for samples in the test set will be averaged for each instrument and the Standard Deviation of the Differences (SDD) between instruments will be calculated using the following equation:

$$SDD = \sqrt{\frac{\sum_{i=1}^{n}\left(d_i - \bar{d}\right)^2}{n-1}}$$

where,

$d_i$ = $\bar{P}_{1i} - \bar{P}_{2i}$

$\bar{P}_{1i}$ = average of three replicates for sample i on instrument 1

$\bar{P}_{2i}$ = average of three replicates for sample i on instrument 2

$\bar{d}$ = average of the di

$n$ = number of samples in the test set for constituent calibration being evaluated ( $n$ = 50, see Note below regarding "all class" calibrations.)

and delete all of part IV. Tolerances for Calibration Performance.

**5. Proposed Changes and Additions to Publication 14 to Add Additional Grains and Criteria for Moisture Basis**

**Background:** The 86th National Conference on Weights and Measures in 2001 adopted changes to the Handbook 44 tentative code for Near Infrared Grain Analyzers that require corresponding changes to Publication 14, Near Infrared Grain Analyzer Checklist**, §2. Indicating Elements, Recording Elements, and Recorded Representations** and **§3. Design of NIR Analyzers.** The changes include:

- adding requirements for corn protein, oil, and starch; barley protein; and soybeans protein and oil
- adding criteria for moisture basis

[For a detailed discussion of these changes see NIST Special Publication 976, *Report of the 86th National Conference on Weights and Measures Annual Meeting.*]

**Discussion:** The draft copy of the proposed changes to the NIR Grain Analyzer Checklist included two paragraphs relating to Code Reference: UR.2.3. Printed Tickets:

**Code Reference: UR.2.3. Printed Tickets**

2.17 If the analyzer converts constituent results to a manually entered moisture basis, the "native" concentration and the "native" moisture basis must appear on the printed ticket in addition to the converted results and the manually entered moisture basis.

2.18 The information presented on the ticket is arranged in a consistent and unambiguous manner.

Steve Patoray, NTEP Director, reminded the Sector that NTEP does not evaluate User Requirements. A review of the NIR code in Handbook 44 (HB-44) revealed that, under the circumstances described in UR.2.3, there was nothing in the specifications that required the device to be capable of transmitting the "native" moisture basis and constituent concentration (at that basis) or that information on the ticket be arranged in a consistent and unambiguous manner when the device either contains a built-in printer or when a printer is offered by the manufacturer as an optional accessory.

Consideration of the requirements of UR.2.3. led to a discussion of why a user might want to manually enter a moisture basis and whether a manually entered moisture basis should be "flagged" on the ticket.

It was explained that NIR calibrations can be derived using constituent concentration data expressed on any one of a variety of moisture bases. As an example, in the U.S., wheat protein is commonly traded on a 12 % moisture basis. Partly for this reason, some manufacturers have chosen to develop their wheat protein calibrations on a 12 % moisture basis. Russian contracts, however, frequently specify protein values on a dry basis (0 % moisture basis). Other contracts may specify protein on an "as-is" basis. By entering the desired moisture basis using the instrument keyboard, the instrument can produce indications (and recorded representations) not only of the wheat protein value at its "native" moisture basis (in this example, 12 %) but also at the keyboard entered moisture basis, whether the basis is 0 % or any other value. The conversion from "native" moisture basis to any other moisture basis (whether entered via the keyboard or selected for a particular grain at time of set-up) is a straightforward mathematical conversion. It could also be accomplished using a pocket calculator with knowledge of: 1) the moisture basis of the NIR instrument's protein result and 2) the desired moisture basis.

Of greater concern than a keyboard entered moisture basis, which will result in calculation of the correct protein value for the indicated moisture basis (even if the indicated moisture basis is an erroneously entered value), is the fact that some instruments offer several options for processing the measured value produced by the calibration selected for use. Typically, the options include:

1. **No transformation.** - Results are displayed without modification.

2. **Transformation to a "fixed" moisture basis.** - In some instruments, the installer, when setting up this mode, selects one moisture basis from a list of "standard" moisture bases. In other instruments, choosing this mode prompts the installer to enter, via the keyboard, the fixed moisture basis that will be used. In either instance, once this mode has been set up for use with a given calibration, the same specified moisture basis is used to transform all measurements made using that calibration. There are 2 subcategories to this option. The selection of the correct subcategory depends on whether or not the native calibration had been derived on a fixed moisture basis.

    a. Constituent measurement at a fixed native moisture basis (other than "as is") is transformed to a different "fixed" moisture basis for display on the instrument. The installer must specify the native moisture basis for the calibration at time of installation. The instrument does not have to measure moisture in this case.

    b. "As is" constituent measurement at an internally measured "as is" moisture value is transformed to a different "fixed" moisture basis for display on the instrument. This subcategory requires that the instrument measure moisture.

3. **Transformation to a "variable" moisture basis.** - Same as 2a and 2b above except that the target moisture basis is not stored in device memory for use in transforming the measured value produced by the calibration to its value at the target moisture basis. Instead, the user enters the target moisture basis via the keyboard for each sample measured by the device. The result of a measurement will not be displayed until the user has entered the moisture basis desired for that sample.

To obtain correct results, instrument option settings must be appropriate for the calibration used. Selection of the wrong option for a given calibration will result in incorrect constituent values for that calibration. Paragraph S.2.5.2 of the NIR Code requires that CC's (and user instructions) indicate the instrument settings that are appropriate for use with each calibration. These settings are considered "metrologically significant" and are to be sealable [S.2.5.2]. Some members questioned if the option setting should also appear on the printed ticket so that, in the event of challenges or complaints, the ticket would contain sufficient information to resolve the issue. Others were of the opinion that errors due to improper set up would be discovered during field inspection.

Rich Pierce, GIPSA, speaking for the NTEP Laboratory, stated that for practical reasons, instruments submitted for NTEP evaluation must be capable of being set up to transmit results at the standard moisture bases listed in Table N.1.1. of the NIR code. Once set up, instruments must not require manual entry of either a moisture measurement or a target moisture basis.

In reviewing the checklist, several members suggested that the words, "at the specified moisture basis" be inserted at the end of the first sentence of item 2.5 for correctness, and to emphasize that the total mass depends not only on the constituent mass but also upon the mass of moisture at the specified moisture basis. Thus, the percent of total mass represented by the constituent will also depend on the specified moisture basis.

**Conclusion:** The Sector agreed that references to user requirements should not appear in the checklist. They also agreed that HB 44 should be amended to add specifications requiring the device to be capable of transmitting the "native" moisture basis and constituent value in addition to the constituent value and keyed-in moisture basis as described in UR2.3.(b). The Sector did not decide on the exact text for that code change. No final decision was made on the suggestion to flag manually entered moisture bases or the suggestion to include option settings on the printed ticket. These will be considered at a future meeting. The Sector agreed that the NIR Grain Analyzer Checklist of 2002 should be amended and modified as shown below, including the suggested addition to item 2.5.

**Recommendation:** Amend and modify Publication 14, NIR Grain Analyzer Checklist, §2. Indicating Elements, Recording Elements, and Recorded Representations and §3. Design of NIR Analyzers as shown below.

## 2. Indicating Elements, Recording Elements, and Recorded Representations

**Code Reference: S.1.1. Digital Indications and Recording Elements**

2.1 The analyzer shall be equipped with a digital indicating element. Yes ☐ No ☐ NA ☐

2.2 The minimum height for digits used to display constituent values is 10 mm. Yes ☐ No ☐ NA ☐

2.3 The analyzer is equipped with a communication interface that permits interfacing with a recording element and can transmit the date, grain type or class, constituent values, the moisture basis for each constituent value (except moisture), and calibration version identification. Yes ☐ No ☐ NA ☐

2.4 A digital indicating element shall not display, and recording element shall not record, any constituent value before the end of the measurement cycle. Yes ☐ No ☐ NA ☐

2.5 Constituent content is recorded and displayed as a percent of total mass at the specified moisture basis. The moisture basis is also displayed and recorded for each constituent content result (except moisture). Yes ☐ No ☐ NA ☐

2.5.1 If a whole grain analyzer that is calibrated to display results on an "as is" moisture basis does NOT display or record a moisture value, it clearly indicates that results are expressed on an "as is" moisture basis. Yes ☐ No ☐ NA ☐

2.5.2 Ground grain analyzers must ALWAYS display and record a moisture measurement for "as is" content results (except moisture). Yes ☐ No ☐ NA ☐

2.6 Digital and recording elements shall not display or record any constituent values beyond the operating range of the device unless the constituent value representation includes a clear error indication (and recorded error message with the recorded representation). Yes ☐ No ☐ NA ☐

2.7 If an NIR analyzer is used to determine a moisture value, either to determine the moisture of an "as is" constituent content measurement or to convert from one moisture basis to another, the moisture measurement must be concurrent with the measurement of other constituents. Yes ☐ No ☐ NA ☐

**Code Reference: S.1.2. Selecting Grain Class and Constituent**

2.8 The means to select and display the grain type or class and constituent(s) shall be readily visible and the type or class of grain and constituents selected shall be clearly and definitely identified in letters (such as HRWW, HRSW, SWW, etc., or PROT, etc.) or with symbols clearly defined adjacent to the display. The device shall be capable of indicating grain type using a minimum of four characters. Yes ☐ No ☐ NA ☐

2.8.1 If the device uses abbreviations for grain names, they conform to the minimum acceptable abbreviations listed below: Yes ☐ No ☐ NA ☐

| Grain Type | Minimum Acceptable Abbreviation |
|---|---|
| Durum Wheat | DURW |
| Hard Red Spring Wheat | HRSW |
| Hard Red Winter Wheat | HRWW |
| Hard White Wheat | HDWW |
| Soft Red Winter Wheat | SRWW |
| Soft White Wheat | SWW |
| Soybeans | SOYB |
| Two-rowed Barley | TRB |
| Six-rowed Barley | SRB |
| Corn | CORN |

**Code Reference: S.1.3. Operating Range**
An analyzer shall automatically and clearly indicate when the operating range of the device has been exceeded. Analyzers shall not display constituent values when the operating temperature ranges are exceeded. The statement of operating range shall be specified in the operator's manual. A 5 EC tolerance is applied to temperature ranges when testing to verify that results are not displayed or recorded when the temperature range is exceeded.

2.9 The ambient temperature range over which the analyzer may be used is specified and covers a range no less than 10 EC to 30 EC. No constituent values may be displayed when the temperature range is exceeded. An appropriate error message shall be displayed when the temperature of the analyzer is outside its specified operating range. Yes ☐ No ☐ NA ☐

2.10 The constituent range at the moisture basis specified in Table N.1.1 is specified for each grain or seed for which the analyzer is to be used. If a constituent value is displayed when the constituent range is exceeded the device gives a clear indication that the constituent range has been exceeded. Yes ☐ No ☐ NA ☐

*Table N.1.1. Constant Moisture Basis for Type Evaluation and Field Inspection*

| *Grain Type or Class* | *Constituents(s)* | *Moisture Basis* |
|---|---|---|
| *Durum Wheat, Hard Red Spring Wheat, Hard Red Winter Wheat, Hard White Wheat, Soft Red Winter Wheat, Soft White Wheat* | *Protein* | *12 %* |
| *Soybeans* | *Protein*<br>*Oil* | *13 %* |
| *Two-rowed Barley*<br>*Six-rowed Barley* | *Protein* | *0 % (dry basis)* |
| *Corn* | *Protein*<br>*Oil*<br>*Starch* | *0 % (dry basis)* |

2.11 For whole grain analyzers only (this item is not applicable to ground grain instruments). The temperature range is specified for each grain or seed for which the analyzer is to be used. The specified range covers a range no less than 10 EC to 30 EC. No constituent values may be displayed when the temperature range is exceeded. An appropriate error message is displayed when the temperature of the grain sample exceeds the range for the grain. Yes ☐ No ☐ NA ☐

2.12 For whole grain analyzers only (this item is not applicable to ground grain instruments). The maximum allowable difference in temperature between the instrument environment (ambient temperature) and the sample for which an accurate constituent determination can be made is specified. The minimum temperature range shall cover at least 10 EC. For temperature differences outside this range, constituent values are not displayed and an appropriate error message is displayed. Yes ☐ No ☐ NA ☐

**Code Reference: S.1.4.1. Operating Temperature**

2.13 An analyzer shall not display or record any usable values until the operating temperature necessary for accurate determination has been attained, or Yes ☐ No ☐ NA ☐

2.14 The analyzer shall bear a conspicuous statement adjacent to the indication stating that the analyzer shall be turned on for a time period specified by the manufacturer prior to use. Yes ☐ No ☐ NA ☐

2.15 If the analyzer will not meet tolerance requirements because there is an upper internal operating temperature limit that could be exceeded when operating within the ambient temperature range specified by the manufacturer, a means of sensing and indicating an over-temperature condition shall be provided. Yes ☐ No ☐ NA ☐

**Code Reference: S.1.5 Value of Smallest Unit**

2.16 The display permits constituent value determination to both 0.01 % and 0.1 % resolution. (The 0.1 % resolution is for commercial transactions; the 0.01 % resolution is for calibration purposes only, not for commercial purposes.) Yes ☐ No ☐ NA ☐

## 3. Design of NIR Analyzers

**Code Reference: S.2.5.1. Calibration Transfer**

3.6 Instrument hardware/software design and calibration procedures permit calibration development, and calibrations can be mathematically transferred between instruments of like models. Yes ☐ No ☐ NA ☐

**Code Reference: S.4. Operating Instructions**

Operating instructions shall be furnished by the manufacturer with each device and accessories. Complete information concerning the accuracy, sensitivity, and use of accessory equipment necessary in obtaining a constituent value shall be included.

In addition, operating instructions shall include the following information:

| | | |
|---|---|---|
| 3.13 | Name and address or trademark of the manufacturer. | Yes ☐ No ☐ NA ☐ |
| 3.14 | The type or design of the device for which the operating instructions are intended to be used. | Yes ☐ No ☐ NA ☐ |
| 3.15 | Date of issue. | Yes ☐ No ☐ NA ☐ |
| 3.16 | The kind of classes of grain or seed for which the device is designed to measure constituent values. | Yes ☐ No ☐ NA ☐ |
| 3.17 | The limitations of use, including but not limited to constituent range, grain or seed temperature, kind or class of grain or seed, instrument temperature, voltage and frequency ranges, electromagnetic interference, and necessary accessory equipment. | Yes ☐ No ☐ NA ☐ |
| 3.18 | The appropriate user selectable options or settings for each calibration installed in the device. | Yes ☐ No ☐ NA ☐ |

**6. Dual Certification – Could a Single Certificate be Used?**

**Background:** Of the five Grain Moisture Meter (GMM) types with active NTEP Certificates of Conformance (CC's) two are whole-grain Near Infrared (NIR) Instruments with the potential to seek certification as NIR Grain Analyzers. In a previous Sector meeting, the question was raised as to whether a single CC could be issued to cover devices certified as both GMM's and NIR Grain Analyzers. Because of time constraints consideration of this question was postponed to a future meeting.

**Discussion:** In deciding whether a single CC could be issued to cover devices certified as both GMM's and NIR Grain Analyzers, there are two requirements to consider:

1) CC's for GMM's automatically expire July 1. To maintain "active" status, meters must remain in the NTEP on-going calibration program and the CC's must be re-issued annually with valid calibration constants for moisture.

2) NIR Grain Analyzers that display a measured whole grain moisture value are required to comply with the requirements of the GMM Code and be type approved as a grain moisture meter.

When an instrument has been approved under both codes, it would seem that NIR Grain Analyzer CC's are subordinate to GMM CC's, because failure to maintain an "active" GMM CC would automatically invalidate the corresponding NIR Grain Analyzer CC. A single CC, such as a "GMM CC with NIR Grain Analyzer Certification" would have to be re-issued annually (and whenever a calibration change is made), there would be no ambiguity regarding the NTEP status of the instrument and its calibrations. With a single certificate, Weights and Measures (W&M) personnel would have only one CC number to check. Manufacturers would have only one CC to maintain per instrument type. Marking requirements would be simplified. The maintenance fee structure for a CC with a "certification" for compliance with another code could be set to recover any loss in NCWM, Inc. revenue that would result from the elimination of the second certificate.

**Conclusion and Recommendation:** The Sector agreed to ask the NTEP Committee to consider recommending that NCWM, Inc. authorize issuing a single CC for devices successfully type evaluated under two inter-related codes (e.g., a "Grain Moisture Meter CC with Near Infrared Grain Analyzer Certification" or, simply, "NIR Grain Analyzer with Dual Certification").

**7. A Message from the NCWM Board of Directors**

Don Onwiler, Nebraska Department of Agriculture, Division of Weights & Measures, representing the NCWM Board of Directors (BOD), informed the Sector that the National Type Evaluation Program (NTEP) is working well, largely due to

the efforts of the staff of NIST's Office of Weights and Measures and NCWM, Inc.'s NTEP Director, Steve Patoray. NTEP is solvent; however, the BOD believes that the major work the GMM & NIR Sectors has been completed and it questions whether annual Sector meetings will be required in the future. The GMM Sector contributes only $500 annually to NTEP. The BOD figures the total staff costs associated with the GMM/NIR Sector is about $15,000. In a cost cutting effort for 2002, no state members received funding for travel to attend this GMM/NIR Sector meeting. However, the Board paid Don Onwiler's travel costs to attend the sector meeting and to provide the sector with an explanation of the BOD's cost cutting efforts, answer questions and address the concerns of the sector.

**Discussion:** Sector members were disturbed about what they heard. Several members believed that the cost of the Sector meeting was a small portion of the $15,000 cited as the cost of Sector support. The 2000, 2001, and 2002 meetings have all been held in Kansas City, MO at the National Weather Service Training Center with no cost for the meeting room or for digital projectors when needed. Sector meeting agendas and meeting summaries are distributed by e-mail. Other than cookies, soft drinks, and Steve Patoray's time and travel, the cost of a Sector meeting should be very small now that funding of public member travel had been withdrawn. One member expressed the hope that the Board would obtain a detailed breakdown of costs directly related to the Sector's recent meeting before making any decisions about withdrawing support for annual meetings. There was concern that support for the GMM NTEP certificate program would be the next thing to be withdrawn. The Sector has always known that there would never be a large number of GMM (or NIR) CC's, but the value of the program to regulating agencies, producers, the grain trade, and industry is many times greater than the annual cost of the program. Rich Pierce, GIPSA, reported that GIPSA and OWM continue to support the program, with each providing $18,000 per year for the NTEP Phase II program. He said GIPSA was interested in expanding the NTEP program to encompass additional devices. GIPSA is making increased use of cross-utilized equipment, in which devices owned by industry are also used by GIPSA for on-site official inspection. The NTEP program is a critical element in that regard. Don Onwiler responded that NCWM is committed to continuing the NTEP program for grain moisture meters. There is no reason for the Sector to go away, but it may not need to meet every year. Diane Lee, NIST-OWM, suggested that it might be possible for OWM to host a technical session for NIST Handbook 44 issues that need to be resolved or that require additional discussion if the NCWM BOD chooses not to host a sector meeting. Dr. Charles Hurburgh, Jr., ISU, suggested that the possibility of obtaining funding through Federal grant programs, for some of the work done by the Sector, should be explored. He noted that requests for funding of projects involving joint efforts of regulators, producers, the grain trade, and industry are usually received positively by the funding authority.

In order to promote greater uniformity in commercial grain inspection results, Congress passed the Grain Quality Incentives Act of 1990 that authorized the Federal Grain Inspection Service to work in conjunction with the National Institute for Standards and Technology and the National Conference on Weights and Measures to:

1) identify inspection instruments requiring standardization;
2) establish performance criteria for commercial grain inspection instruments;
3) develop a national program to approve grain inspection instruments for commercial inspection; and
4) develop standard reference materials or other means necessary for calibration or testing of approved instruments.

In 1992, partly through the efforts of Sid Colbrook, Illinois Department of Agriculture, who was then NCWM Chairman, the GMM and NIR Sectors were established. The Sectors became not only working groups for the development of device standards and test/evaluation methods; they also provided a forum for manufacturers, user groups, state regulators, GIPSA/FGIS, and NIST-OWM to air issues of mutual concern relating to grain inspection and measurement, including Handbook 44 issues and the GMM ongoing calibration maintenance program. If the NCWM Board views the current purpose of the Sectors as limited to dealing with Publication 14 issues uncovered during NTEP testing, then another forum will have to be found for these other issues of interest (and importance) to members of the Sector.

### 8. A Quality Control Procedure for Grain Analysis at a Country Elevator

Dr. Charles Hurburgh, Jr., Agricultural & Biosystems Engineering - Iowa State University, described a quality control system implemented by Farmers Cooperative Elevator Company at its Odebolt, Iowa facility. The system was developed under a grant from the Iowa Grain Quality Initiative with the intention of learning how to develop a quality system and then to replicate it at 32 other locations in its northwest Iowa. The initial concept was to use the quality management system for market differentiation – to be able to certify the identity of specialty crops through a documented identity preservation system. During the early stages of the project it became apparent that the quality system had benefits as a management system and had improved operations to the extent that the system was worth implementing even without the

prospects of market differentiation by identity preservation. In fact, Dr. Hurburgh estimated that the system has generated two dollars for every one dollar invested.

Four important criteria were deemed necessary for the system: 1) it must be a certified system; 2) it must have established credibility; 3) there must be 3rd party auditing; and 4) it must have international recognition. The system implemented is based on the American Institute of Baking (AIB) International Gold Standard Certification Program which with certification and auditing through AIB's Quality System Evaluation includes about 80 % of the requirements of ISO-9000. Some of the key elements of the system include: written work procedures, flowcharts for sampling and grading processes, setting tolerances for grade factors, using grade factor control charts and comparison charts (in-house measurements compared to official measurements) for both inbound and outbound grade factors. The objective being to make house grades as just accurate as official grades, and to provide documented evidence of this equivalence.

Quality control data was used to evaluate the accuracy of house grades. The initial target was that no more than 5 % of the individual tests would be out of tolerance. Operator training and incentives were based on these data. Control charts and comparison charts made it easy to identify trends and apply corrections before the trends became problems – continuous data is more useful than spot checks. Better accuracy on inbound measurements resulted in more accurate inventory records and assisted in merchandising. The documentation of QC data gave customers confidence in house grades.

The widespread implementation of quality management systems (QMS) like the one in Odebolt, Iowa could have major implications on regulatory programs such as those used for grain moisture meters and (soon) near-infrared grain analyzers. If documented references are used, a certified QMS creates more useful data than annual device inspections. The structure of regulatory programs may change to auditing and verification that a quality system is in place. Review of data may replace testing of devices and reference standards may replace monitoring.

**Discussion:** Following Dr. Hurburgh's presentation, Don Onwiler, Nebraska Dept. of Agriculture, Division of Weights & Measures, suggested that in the case of prepackaging scales (automatic weighing systems) there is already precedence for process verification rather than device inspection. In some such states scales are not checked; instead, the packaged product is checked for correct weight.

### 9. Time and Place for Next Meeting

The next meeting is tentatively planned for the week of August 18, 2003, in the Kansas City, MO area. Meetings will be held in one of the meeting rooms at the National Weather Service Training Center if available. A tentative schedule is shown below.

| | | |
|---|---|---|
| Wednesday, August 20 | 1:00 pm - 5:00 pm | GMM Sector Meeting |
| Thursday, August 21 | 8:00 am - 12:00 noon | GMM Sector Meeting |
| Thursday, August 21 | 1:00 pm - 5:00 pm | Joint Session GMM & NIR Analyzer |
| Friday, August 22 | 8:00 am - 12:00 noon | NIR Grain Analyzer Sector Meeting |

# Appendix E

## National Type Evaluation Technical Committee
## Measuring Sector Annual Meeting

**October 11-12, 2002, Richmond, Virginia**

**Final Summary**



---

### Carry-over Items

### 1. Recommendations to Update NCWM Publication 14 to Reflect Changes to NIST Handbook 44

**Source:** NIST/WMD

**Background:** The 87th National Conference on Weights and Measures (NCWM) adopted the following items that will be reflected in the 2003 Edition of NIST Handbook 44 and NCWM Publication 14. These items are part of the agenda to inform the Measuring Sector of the NCWM actions and recommend changes to NCWM Publication 14.

**Recommendation:** The Sector reviewed the following recommended changes to Publication 14 based on changes to NIST Handbook 44:

**A) S.3.2.(b) Exceptions for Diversion of Measured Liquid**

During its 2002 Annual Meeting, the NCWM agreed to amend Handbook 44 LMD Code paragraph S.3.2. Exceptions as follows:

**S.3.2. Exceptions.** - The provisions of S.3.1. Diversion Prohibited shall not apply to~~:~~

~~(a)~~ truck refueling devices when diversion of flow to other than the receiving vehicle cannot readily be accomplished and is readily apparent. Allowable deterrents include, but are not limited to, physical barriers to adjacent driveways, visible valves, or lighting systems that indicate which outlets are in operation, and explanatory signs;

~~(b) other devices, when all discharge outlets designed to operate simultaneously are 3.8 cm (1.5 in) in diameter or larger.~~

**Recommendation:** The Sector was asked to consider the removal of the reference to discharge lines with a diameter of 3.8 cm (1 ½ in) or larger in Code reference S.3.2. and paragraph 10.5 from Section 10 on page LMD-33 of the Checklist and Test Procedures of NCWM Publication 14, Measuring Devices, Chapter 2, 2002 edition as follows:

**10. Discharge Lines and Discharge Line Valves**

**Code Reference: S.3.2. Exceptions**

If suitable means are provided to prevent the diversion of liquid flow to other than the receiving vehicle, devices that are specifically installed for fueling trucks are exempt from the provisions of S.3.1. and may have two outlets operating simultaneously. ~~Similarly, the requirements of S.3.1. do not apply to devices on which all discharge outlets designed to operate simultaneously are 3.8 cm (1 1/2 in) in diameter or larger.~~

| | | |
|---|---|---|
| 10.4. | For devices that are specifically installed for fueling trucks, two outlets may be operated simultaneously only if suitable means are provided to ensure that diversion of flow to other than the receiving vehicle cannot readily be accomplished and is readily apparent. Such means include, but are not limited to, physical barriers to adjacent driveways, visible valves or lighting systems indicating which outlets are in operation, and explanatory signs. | **Yes** ☐ **No** ☐ **NA** ☐ |
| ~~10.5.~~ | ~~For other devices, two outlets may be simultaneously operated only if all discharge outlets designed to operate simultaneously are 3.8 cm (1 1/2 in).~~ | ~~**Yes** ☐ **No** ☐ **NA** ☐~~ |

**Discussion/Conclusion:** There was no discussion on the amended language for Publication 14, Section 10. The Sector recommends that the NTEP Committee amend Publication 14, Section 10 as shown above.

**B) S.4.4.1 Discharge Rates and S.4.4.2. Location of Marking Information**

During its 2002 Annual Meeting, the NCWM agreed to amend Handbook 44 LMD Code paragraph S.4.4. Retail Devices as follows:

***S.4.4. Retail Devices.***

***S.4.4.1. Discharge Rates. - On a retail device with a designed maximum discharge rate of ~~100~~ 115 L (~~25~~ 30 gal) per minute or greater, the maximum and minimum discharge rates shall be marked on an exterior surface of the device and shall be visible after installation. The minimum discharge rate shall not exceed 20 % of the maximum discharge rate.***
***[Nonretroactive as of January 1, 1985.]***

***S.4.4.2. Location of Marking Information; Retail Motor-Fuel Dispensers. – The required marking information in the General Code, Paragraph G-S.1. shall appear as follows:***

***(a) Placement of this information shall not be on a portion of the device that can be readily removed or interchanged without the use of a tool separate from the device***

***(b) The information shall appear 24 to 60 inches from the base of the dispenser when placed on the outside of the device.***

***(c) When placed behind an access door or panel the information shall appear 24 inches to 60 inches from the base of the dispenser in a readily legible position. The use of a dispenser key shall not be considered a tool separate from the device.***
***[Nonretroactive as of January 1, 2003]***

**Recommendation:** The Sector was asked to consider amending Code Reference S.4.4. in Section 11 on page LMD-33 of the Checklist and Test Procedures of NCWM Publication 14, Measuring Devices, Chapter 2, 2002 edition and add Code Reference S.4.4.2. as follows:

**11. Marking**

**Code Reference: S.4.4.1. Marking Requirements For Retail Devices Only**

| | | |
|---|---|---|
| 11.2 | On a retail device with a designed maximum discharge rate of rates ~~100~~ 115 L/min (~~25~~ 30 gpm) or greater, the maximum and minimum discharge rates shall be marked on an exterior surface of the device and be visible after installation. The minimum rate shall not exceed 20 % of the maximum discharge rate. | **Yes** ☐ **No** ☐ **NA** ☐ |

**Code Reference: S.4.4.2. Location of Marking Information**

| | | |
|---|---|---|
| 11.3 | The required marking information in the General Code, Paragraph G-S.1. shall be located as follows: | **Yes** ☐ **No** ☐ **NA** ☐ |
| | (a) Placement of this information shall not be on a portion of the device that can readily removed or interchanged without the use of a tool separate from the device. | **Yes** ☐ **No** ☐ **NA** ☐ |
| | (b) When placed on the outside to the device the information shall appear 24 to 60 inches from the base of the dispenser. | **Yes** ☐ **No** ☐ **NA** ☐ |
| | (c) When placed behind an access door or panel the information shall appear 24 to 60 inches from the base of the dispenser in a readily legible position. The use of a dispenser key shall not be considered a tool separate from the device. | **Yes** ☐ **No** ☐ **NA** ☐ |

**Discussion/Conclusion:** During the 2002 Measuring Sector meeting, there was no discussion on the recommendation to amend Publication 14, Section 11. The Sector recommends that the NCWM NTEP committee approve the changes shown above.

The Sector also noted that marking requirements for discharge rates are required to be located on an external surface of the device without any reference to being located within a specified height range. The Sector members also indicated that it is also appropriate to include the markings for discharge rates required in paragraph S.4.4.1. with the other markings in accordance with the requirements of paragraph S.4.4.2. One NTEP laboratory stated that some weights and measures officials have incorrectly interpreted paragraph S.4.4.1. to mean that a flow rate greater than or less than 20 % of the maximum discharge is not acceptable. The Sector agreed to forward to the S&T Committee through the SWMA a proposal to modify S.4.4.1. that includes an example of how the requirement should be applied as follows:

***S.4.4.1. Discharge Rates. - On a retail device with a designed maximum discharge rate of 115 L (30 gal) per minute or greater, the maximum and minimum discharge rates shall be marked ~~on an exterior surface of the device and shall be visible after installation~~ in accordance with S.4.4.2. The minimum discharge rate shall not exceed 20 % of the maximum discharge rate.***

**Example: With a marked maximum discharge rate of 230 L/m (60 gpm), the marked minimum discharge rate shall be 45 L/m (12 gpm) or less (e.g., 40 L/m (10 gpm) is acceptable). A marked minimum discharge rate greater than 45 L/m (12 gpm) (e.g., 60 L/m (15 gpm)) is not acceptable.**

**C) Recognize Mass Units of Measurement**

During its 2002 Annual Meeting the NCWM agreed to amend the Handbook 44 Cryogenic Liquid-Measuring Devices Code to recognize units of mass as follows:

**S.1.1.2. Units. - A device shall indicate and record, if equipped to record, its deliveries in terms of: kilograms or pounds; liters or gallons of liquid at the normal boiling point of the specific cryogenic product; cubic meters (cubic feet) of gas at a normal temperature of 21 °C (70 °F) and an absolute**

**pressure of 101.325 kPa (14.696 psia); or decimal subdivisions or multiples of the measured units cited above.**

**S.1.1.3. Value of Smallest Unit. - The value of the smallest unit of indicated delivery, and recorded delivery, if the device is equipped to record, shall not exceed the equivalent of:**

**(a) for small delivery devices**
**(1) 1 L**
**(2) 0.1 gal**
**(3) ~~0.1 m$^3$ of gas~~1 kg**
**(4) ~~10 cubic feet of gas~~ 1 lb**
**(5) 0.1 m$^3$ of gas**
**(6) 10 cubic feet of gas**

**(b) for large delivery devices**
**(1) 10 L**
**(2) 1 gal**
**(3) ~~1 m$^3$ of gas~~ 10 kg**
**(4) ~~100 ft$^3$ of gas~~ 10 lb**
**(5) 1 m$^3$ of gas**
**(6) 100 ft$^3$ of gas**

**S.2.4. Automatic Temperature or Density Compensation. - A device shall be equipped with automatic means for adjusting the indication and/or recorded representation of the measured quantity of the product, to indicate and/or record in terms of: kilograms or pounds; or liters or gallons of liquid at the normal boiling point of the specific cryogenic product; or the equivalent cubic meters (cubic feet) of gas at a normal temperature of 21 °C (70 °F) and an absolute pressure of 101.325 kPa (14.696 lb/in$^2$ absolute).** ***When a compensator system malfunctions, the indicating and recording elements may indicate and record in uncompensated volume if the mode of operation is clearly indicated, e.g., by a marked annunciator, recorded statement, or other obvious means.****
***[*Nonretroactive as of January 1, 1992.]***

**Code Reference: S.1.1.2. Units**

| | | |
|---|---|---|
| 7.7 | The device shall indicate, and record if equipped to record, its deliveries in terms of: kilograms or pounds; liters or gallons of liquid at the normal boiling point of the specific cryogenic product; cubic meters, or cubic feet of gas at a normal temperature of 21 °C (70 °F) and an absolute pressure of 101.325 kPa (14.696 psia); subdivisions or multiples of the measured units cited above. | **Yes** ☐ **No** ☐ **NA** ☐ |

**Code Reference: S.1.1.3. Value of Smallest Unit**

The value of the smallest unit of indicated delivery and recorded delivery if the meter is equipped to record, shall not exceed the equivalent of:

| | | |
|---|---|---|
| 7.8 | (a) for small delivery devices (max. rated flow *75* gpm or less)<br>(1) 1 L<br>(2) 0.1 gal<br>(3) 1 kg<br>(4) 1 lb<br>(5) 0.1 m$^3$ of gas<br>(6) 10 cu. ft of gas | **Yes** ☐ **No** ☐ **NA** ☐ |

7.9 (b) for large delivery devices (max. rated flow greater than *75* gpm) **Yes** ☐ **No** ☐ **NA** ☐
(1) 10 L
(2) 1 gal
(3) 10 kg
(4) 10 lb
(5) 1 $m^3$ of gas
(6) 100 $ft^3$ of gas

**Discussion/Conclusion:** During the 2002 Measuring Sector meeting, there was no discussion. The Sector recommends that the NCWM NTEP committee approve the changes shown above.

**D) Repeatability on Milk Meters**

During its 2002 Annual Meeting the NCWM agreed to include repeatability test notes and tolerances in the Handbook 44 Milk Meters Code as Follows:

**N.4.1.1. Repeatability Tests. – Tests for repeatability should include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors, such as temperature, pressure, and flow rate are reduced to the extent that they will not affect the results obtained.**

**T.3. Repeatability. - When multiple tests are conducted at approximately the same flow rate and draft size, the range of the test results for the flow rate shall not exceed 40 % of the absolute value of the maintenance tolerance and the results of each test shall be within the applicable tolerance. *See also N.4.1.1.***

**Recommendation:** The Sector was asked to consider adding a new Section K on page LMD-77 of the Checklist and Test Procedures of NCWM Publication 14, Measuring Devices, Chapter 2, 2002 edition and re-letter existing Sections K through N as follows:

**K. Repeatability on Milk Meters (Code Reference N.4.1.1. and T.3.)**

When multiple tests are conducted at approximately the same flow rate and draft size, the range of the test results for the flow rate shall not exceed 40 % of the absolute value of the maintenance tolerance and the results of each test shall be within the applicable tolerance.

Tests for repeatability shall include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors, such as temperature, pressure, and flow rate are reduced to the extent that they will not affect the results obtained.

~~**K.**~~**L. Field Evaluation and Permanence Test For Turbine Meters**

~~**L.**~~**M. Permanence Tests for Mass Flow Meters**

~~**M.**~~**N. Testing of Lubricating Oil Meters**

~~**N.**~~**O. Testing of Hot Oil Meters**

**Discussion/Conclusion:** During the 2002 Measuring Sector meeting, there was no discussion. The Sector recommends that the NCWM NTEP committee approve the changes shown above.

**2. Test Draft Size for Initial and Permanence Test for Mass Flow Meters**

**Source:** Maryland NTEP Laboratory

**Background:** At its last meeting the Sector asked the NTEP Laboratories to review the requirement that all test drafts except a test draft for testing Minimum Measured Quantity (MMQ), be equal to at least the quantity that is delivered in one minute at the maximum flow rate, and if appropriate, make recommendations for changes to be considered by the Sector at this meeting. At the June 2002 NTEP Laboratory Meeting, the Measuring Labs agreed that when appropriate scales of different capacities are available, the test draft sizes at lower flow rates do not need to equal one minute of flow at the maximum flow rate of the device under test.

The Sector was asked to consider modifying Section L. on page LMD-78 and LMD-79 of the Checklist and Test Procedures of NCWM Publication 14, Measuring Devices, Chapter 2, 2002 edition as follows:

L. Permanence Tests for Mass Flow Meters

The following tests are considered to be appropriate for mass flow meters:

**Test Drafts.** When only one appropriate scale is available for gravimetric testing ~~Any~~ any test draft (except a test draft for testing the MMQ) shall be equal to at least the quantity that is delivered in one minute at the maximum flow rate. If more that one appropriate scale is available for gravimetric testing, ~~The~~ all test drafts at each flow rate tested shall be equal in quantity ~~regardless of~~ and equal to at least one minutes flow at the ~~rate of flow~~ flow rate being tested. Establish proper flowmeter calibration conditions - steady state conditions at each flow rate. Collect the test data for the selected flow rates. The indication shall be on the basis of apparent mass. A test draft for the test of the MMQ shall be made with a draft size equal to the MMQ at the marked minimum flow rate for the meter being evaluated.

**Discussion/Conclusion:** A member stated that in some cases a single scale could be acceptable for testing with drafts of less than one minutes flow. Multiple range scales and high resolution Class II scales may be appropriate if the uncertainty is within stated limits. The Sector concurred and agreed to recommend the following guidelines on test draft sizes to the NCWM NTEP Committee for addition to Publication 14.

**Test Drafts.** ~~Any test draft (except a test draft fro testing the MMQ) shall be equal to at least the quantity that is delivered in one minute at the maximum flow rate. The test drafts shall be equal in quantity regardless of the rate of flow. Establish proper flowmeter calibration conditions - steady state conditions at each flow rate. Collect the test data for the selected flow rates. The indication shall be on the basis of apparent mass. A test draft for the test of the MMQ shall be made with a draft size equal to the MMQ at the marked minimum flow rate for the meter being evaluated.~~ **All test drafts shall meet the following criteria**

**(a) The minimum quantity for any test draft shall be equal to or greater than the amount delivered in one minute at the flow rate being tested, and**

**(b) any test draft shall be equal to or greater than ten times the division size of the available reference scale(s) divided by the applicable draft tolerance in percent for the device under test. As a formula:**

**Minimum draft size ∃10 (scale "d") /Applicable Draft Tolerance for one minutes flow**

**For example: With a scale division of 0.1 lb (or 1 lb with 10:1 expanded resolution or by using error weights) and an applicable tolerance of 0.2 %, the minimum draft must be equal to or greater than 500 lb.**

**With a scale division of 0.5 lb (or 5 lb with 10:1 expanded resolution / error weights) and an applicable tolerance of 0.3 %, the minimum draft must be equal to or greater than 1667 lb.**

**Gravimetric Standard. As a general guideline for the gravimetric standard, the value of the scale division should not be larger than one-tenth of the tolerance times the smallest test draft.** The combined error of the standard used for testing measuring instruments shall not exceed 20 % of the maximum permissible error to be applied. Using known weight (field standard), determine the error present in the weighing instrument over the

weighing range that will be used in the test. The inherent error, if present, is to be factored out of the measurement. The scale will then be used as a transfer standard.

### 3. Testing Required for an Electronic Indicator with a CC, Interfaced with a Measuring Element with a CC not Previously Evaluated Together

**Source:** NTEP Measuring Laboratories

**Background:** At the May 2001 NTEP Laboratory Meeting, one of the participating laboratories asked for input regarding what testing should be required if the manufacturer of an indicator wanted the CC to recognize the indicator for use with different types of measuring devices, such as PD meters, turbine meters, and mass flow meters. Dan Reiswig (CA NTEP Laboratory) agreed to provide a draft of changes to the Liquid-Measuring Devices Checklist and Procedures that included requirements for indicators intended to be used with more than one device type.

Dan Reiswig was not able to attend the September 2001 Measuring Sector Meeting. The Sector agreed to carry this item forward to the agenda for its next meeting. The following groups and individuals agreed to provide input: the NTEP Measuring Laboratories, Measurement Canada, RichTucker (Tokhiem representing GPMA), John Skuce (FMC-Smith Meter representing MMA), Mike Keilty (Micro Motion), and David Hoffman (Toptech).

At the June 2002 NTEP Laboratory Meeting, the laboratories agreed that an initial performance test conducted by an approved NTEP Laboratory is required. The testing criteria applied should be the same as that applied to a new metering system. Subsequent permanence testing should be at the discretion of NTEP based on the initial performance and could be conducted by a local Weights and Measures Official under the direction and control of the NTEP evaluator performing the initial test.

Prior to the 2002 NTEP Laboratory Meeting Rich Tucker (Tokhiem representing GPMA) submitted the following for consideration by the labs.

**Testing Required for an Electronic Indicator with a CC Interfaced with a Measuring Element with a CC not previously Evaluated Together.**

**Significant Assumptions**
The metering element has already been through NTEP so all the accuracy, permanence, and flow rate information has been tested and meets all requirements of Handbook 44.

The Electronic Indicator has already been through NTEP and all electronic functions and other requirements have been tested and meets all requirements of Handbook 44.

For the Dispenser, the manufacturer can only request flow rates that fall within the meter approval flow limits and products.

With the above scenario, the only open issue is the electronic interface to the pulser and the electronic calculator. The electronic calculator receives pulses directly from the pulser. The calculator converts the pulses into a volume by knowing how many pulses make up a gallon of delivery. For an example Tokheim uses almost explicitly 1000 pulses per gallon of delivery. This is not a standard so other manufacturers use other pulse counts. So the only verification is to make sure the manufacturer has set up the software correctly to match the pulser output and meter delivery.

**Test**
Run calibration test drafts to verify compatibility

**Testing Options** (The manufacturer will, at its option, do the following)
Have a representative from the NTEP go to a test site or the Manufacturers lab to verify compatibility. The manufacturer shall submit data from its lab testing and follow-up test data from an initial verification at one of the first installed sites. Data supplied would be a copy of the Weights and Measures calibration tests performed at the time the equipment is placed in service.

The Sector was asked to consider adding a new Section T to Publication 14, Technical Policy for Liquid-Measuring Devices as follows:

**T. Testing Required for an Electronic Indicator with a CC Interfaced With a Measuring Element With a CC not Previously Evaluated Together.**

An authorized NTEP Laboratory must conduct an initial evaluation following the same performance criteria required for a new device. Subsequent permanence testing may be at the discretion of NTEP based on the initial performance of the system being evaluated. Subsequent permanence testing if required may be performed by a local Weights and Measures Official under the direction and control of the NTEP Official performing the initial evaluation.

**Discussion/Conclusion:** The manufacturers represented want to keep the amount of required testing to a minimum. Several expressed the view that the system will either work or not work properly depending on whether or not the indicator and the measuring element can communicate. If the system is acceptable on an initial inspection, a permanence test is not necessary. The only thing that may cause the system to stop working appropriately is an electronic component failure. The NTEP Laboratories are not comfortable with only an initial evaluation. The Sector agreed that a work group should be formed to consider the issues and provide a proposal for consideration prior to the Spring 2003 meeting of the NTEP Laboratories. The work group members are; Maurice Forkert (Tuthill Transfer Systems), Mark Butler (Micro Motion), Peter Goodier (Syltone), David Hoffman (TopTech Systems Inc.), Rodney Cooper (Actaris Neptune), Charlene Numrych (Liquid Controls), Dave Resch (FMC Measurement Solutions), Mike Keilty (Endress & Hauser Flowtec AG ), and Dan Reiswig (CA NTEP Laboratory). Measurement Canada and NIST agreed to provide input as needed.

**4. On Screen Display of Model and Version Number for Software**

**Source:** NTEP Measuring Laboratories

**Background:** At the May 2001 NTEP Laboratory Meeting, the laboratories discussed marking requirements for software-based devices, such as electronic cash registers (ECR) or control consoles connected to liquid measuring devices. In some cases the indicator for the system is a generic computer display. If the required markings are physically placed on the display at the time of installation and then at some future time the display is replaced, the required markings may be lost. The laboratories agreed that a real time display of the model and software version information on the display screen is preferable. The laboratories also agreed that the information could either be displayed continuously or by pressing a single key or a series of keys if instructions for access are clearly provided when a series of keystrokes is required. The laboratories agreed to develop and forward a proposal to modify G-S.1. to allow real time display of the model and software version number for software-based systems to the Measuring Sector for consideration at its next meeting.

The Sector reviewed the proposal. Ted Kingsbury (Measurement Canada) stated that Canada has a similar requirement for specifications relating to metrological software used in software-based measurement systems. The requirements do not apply to software in devices that are built-for-purpose. Built-for-purpose devices are defined in the Canadian specifications.

The Sector agreed to forward the following recommendation to the NCWM S&T Committee for addition to NIST Handbook 44. The Sector also forwarded a definition for "built-for-purpose device," based on the Canadian definition to be included in the recommendation to the S&T Committee.

The Sector recommended the following modification to Handbook 44, Section 1.10. General Code, G-S.1:

**G-S.1. Identification. - All equipment, except weights and separate parts necessary to the measurement process, but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification with the following information:**

**(a) the name, initials, or trademark of the manufacturer or distributor;**

**(b) a model designation that positively identifies the pattern or design of the device;**

***(c) the model designation shall be prefaced by the term "Model," "Type," or "Pattern." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).***
***[Nonretroactive January 1, 2003]*** **(Added 2000)**

***[Note: Prefix lettering may be initial capitals, all capitals or all lower case.]***

***(d) except for equipment with no moving or electronic component parts, a nonrepetitive serial number;***
***[Nonretroactive as of January 1, 1968]***

***(e) the serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number; and***
***[Nonretroactive as of January 1, 1986]***

***(f) the serial number shall be prefaced by the words "Serial Number" or an abbreviation of that term. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.).***
***[Nonretroactive as of January 1, 2001]***

The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.

**Note: For software-based devices not built-for-purpose the required markings may be shown on the display screen provided the required information is either displayed continuously or by pressing a single key or a series of keys. When a series of keystrokes is required clear, instructions for accessing the marking information must be provided.**

**Definition:** **built-for-purpose device. Any main element which was manufactured with the primary intent that it be used as, or as part of, a weighing or measuring device or system.**

At the 2002 NCWM Interim Meeting, the S&T Committee also received the following proposal from the NTETC Weighing Sector.

**G-S.1. Identification. - All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification with the following information:**

**The required markings may be shown on the display screen provided the required information is displayed either continuously or by an operator action (such as keyboard entries, touch pad, etc). Clear instructions for accessing the information shall be provided, as a minimum, on the Certificate of Conformance unless the information is continuously displayed during normal operation.**

**The manufacture and model designation shall either be continuously displayed or permanently marked on the device.**

**G-S.7. Lettering. - All required markings and instructions shall be distinct and easily readable and shall be of such character that they will not tend to become obliterated or illegible.**

**The required markings may be shown on the display screen provided the required information is displayed either continuously or by an operator action (such as keyboard entries, touch pad, etc). Clear instructions for accessing the information shall be provided, as a minimum, on the Certificate of Conformance unless the information is continuously displayed during normal operation.**

At the 2002 NCWM Annual Meeting, the S&T Committee asked that the NTETC Weighing and Measuring Sectors review both proposals and attempt to agree on a single proposal that is acceptable to all parties. The Measuring Sector will review both proposals and make recommendations to the S&T Committee for an appropriate compromise.

**Discussion/Conclusion:** At its September 2002 Meeting, the NTETC Weighing Sector developed a new proposal based on both of the proposals submitted last year. That proposal was forwarded to the NTETC Measuring Sector for review and comment. The Measuring Sector reviewed the proposal developed by the Weighing Sector and concurred with the intent of the proposal. One member indicated that the software version number is more important for identification purposes than a serial number. The Measuring Sector recommended some changes to the Weighing Sector proposal and agreed to forward it to the NCWM S&T Committee for consideration. The modified proposal to amend G-S.1. as shown below was also sent to the Weighing Sector members along with a ballot requesting approval of the modifications. The results of the ballot was (9) affirmative, (2) negative, and (3) abstain in favor of the Measuring Sector language.

**G-S.1. Identification. - All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification with the following information:**

**(a) the name, initials, or trademark of the manufacturer or distributor;**

**(b) a model designation that positively identifies the pattern or design of the device;**

**(c) the model designation shall be prefaced by the term "Model," "Type," or "Pattern." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod."**
***[Nonretroactive January 1, 2003]***
**(Added 2000) (Amended 2001)**

***[Note: Prefix lettering may be initial capitals, all capitals or all lower case.]***

***(d) except for equipment with no moving or electronic component parts and software-based not built-for-purpose devices, a nonrepetitive serial number;***
***[Nonretroactive as of January 1, 1968]***

**(e) the serial number shall be prefaced by words, an abbreviation, or a symbol that clearly identifies the number as the required serial number; and**
***[Nonretroactive as of January 1, 1986]***

***(f) the serial number shall be prefaced by the words "Serial Number" or an abbreviation of that term. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.).***
***[Nonretroactive as of January 1, 2001]***

***(g) For devices that have an NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number, the NTEP CC shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).***
***[Nonretroactive as of January 1, 2003]***

***The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.***
**(Amended 1985, 1991, 1999 and 2000)**

Add new paragraph G-S.1.1. and renumber existing paragraph G-S.1.1. as follows:

***G-S.1.1. Software-Based, Not Built–For–Purpose Devices.*** - ***For software based, not built–for–purpose devices, the following shall apply:***

***(a) the manufacturer or distributor and the model designation may be continuously displayed or marked on the device*, or***

***(b) the Certificate of Conformance (CC) Number may be continuously displayed or marked on the device*, or***

***(c) all required information in G-S.1. Identification. (a), (b), (c), (g), and the software version designation may be continuously displayed. Alternatively, a clearly identified System Identification, G-S.1. Identification, or Weights and Measures Identification may be accessible through the "Help" menu. Required information includes that information necessary to identify that the software in the device is the same type that was evaluated.***

****Clear instructions for accessing the remaining required information shall be listed on the CC. Required information includes that information necessary to identify that the software in the device is the same type that was evaluated.***

***[Nonretroactive as of January 1, 200X]***

**G-S.1.~~1~~2. Remanufactured Devices and Remanufactured Main Elements. - All remanufactured devices and remanufactured main elements shall be clearly and permanently marked for the purpose of identification with the following information:**

***(a) the name, initials, or trademark of the last remanufacturer or distributor;***

***(b) the remanufacturer's or distributor's model designation if different than the original model designation.*** **[Nonretroactive as of January 1, 2002]**

Add a new definition for "built-for-purpose" devices as follows:

**built-for-purpose device. Any main device or element which was manufactured with the intent that it be used as, or part of, a weighing or measuring device or system.**

**New Items**

**5. Marking of Product Measured on Meters in Multi-Product Dispensers**

**Source:** Maryland Weights and Measures

**Background:** At the June 2002 NTEP Laboratory Meeting, one of the participating laboratories indicated that field officials in their jurisdiction are sometimes not able to determine which measuring element is associated with a particular grade or blend of fuel on multi-product dispensers. During a field examination of a multi-product dispenser one grade or blend is rejected for not meeting performance requirements and the official does not know which measuring element to mark or tag as rejected. During the performance of a subsequent inspection following adjustment or repair of the device the field official may be required to test all grades and blends offered through the rejected dispenser to determine that the correct measuring element and only that element was adjusted.

The Sector was asked to consider the following proposed, developed by Maryland weights and measures and the Technical Advisor, to modify Handbook 44, Section 3.30. Liquid-Measuring Devices UR.2.5. as follows:

**UR.2.5. Product ~~Storage~~ Identification.**

UR.2.5.1. Measuring Element Identification.

(a) The measuring elements of any multi-product dispenser shall be permanently, plainly, and visibly marked as to product being measured.

(b) When the measuring elements of any multi-product is marked by means of a color code, the color code key shall be conspicuously displayed at the place of business.

**(Added 200X)**

UR.2.5.2. Product Storage Identification.

(a) The fill connection for any petroleum product storage tank or vessel supplying motor-fuel devices shall be permanently, plainly, and visibly marked as to product contained.

(b) When the fill connection device is marked by means of a color code, the color code key shall be conspicuously displayed at the place of business.

**(Added 1975 and Amended 1976 and renumbered 200X)**

**Discussion:** One of the NTEP Laboratories stated that it is often difficult to identify which meter is associated with a particular product on dispensers with multiple measuring elements. One manufacturer questioned why it was necessary to physically mark a meter if it has no mechanism for adjustment and no means for a attaching a physical seal directly to the meter. This manufacturer stated that for their equipment it is possible to identify a particular meter in the audit trail.

**Conclusion:** The Sector modified the proposal to require a measuring element without an individual physical seal within any multi-product dispenser be plainly and visibly identified as to the product being measured. The Sector agreed to forward the following proposal to the S&T Committee through the SWMA with the recommendation that the item be given the status of information item or developing issue.

The Sector recommended amending NIST Handbook 44, Section 3.30. Liquid-Measuring Devices UR.2.5 as follows:

**UR.2.5. Product ~~Storage~~ Identification.**

**UR.2.5.1. Measuring Element Identification.**

**(a) The measuring elements with an individual physical seal of any multi-product dispenser shall be plainly and visibly identified as to product being measured.**

**(b) When the measuring elements of any multi-product dispenser is marked by means of a color code, the color code key shall be conspicuously displayed at the place of business.**
**(Added 200X)**

**UR.2.5.2. Product Storage Identification.**

**(a) The fill connection for any petroleum product storage tank or vessel supplying motor-fuel devices shall be permanently, plainly, and visibly marked as to product contained.**

**(b) When the fill connection device is marked by means of a color code, the color code key shall be conspicuously displayed at the place of business.**

**(Added 1975 and Amended 1976 and renumbered 200X)**

**6. Multiple Measuring Elements with a Single Provision for Sealing Adjustable Components**

**Source:** Maryland Weights and Measures

**Background:** At the June 2002 NTEP Laboratory Meeting, one of the participating laboratories indicated that field officials in their jurisdiction are having difficulty with multi-product dispensers that have only one sealing mechanism for two or more measuring elements. If field officials reject a meter for not meeting performance requirements they have no way of determining what measuring elements have been recalibrated when they return to re-inspect the dispenser after a service agency has made adjustments or repairs on the rejected device. If a physical seal is broken or has been replaced the official must test all products to verify that no tampering or misadjustment has occurred on any measuring element.

The Sector was asked to consider the recommendation in agenda item 5, developed by Maryland Weights and Measures and the Technical Advisor, to modify Handbook 44, Section 3.30. Liquid-Measuring Devices UR.2.5.

**Discussion/Conclusion:** A manufacturer of devices that utilizes a single security seal for the adjustment mechanism of multiple measuring elements agreed that at present there is no way for a field official to easily identify what element or elements have been adjusted. The adjustment information is recorded in memory but that information is not readily accessible through the audit trail. The Sector agreed to forward the following proposal to the S&T Committee through the SWMA with the recommendation that the item be given the status of information item or developing issue.

The Sector recommended adding the following new paragraph to NIST Handbook 44, Section 3.30. Liquid-Measuring Devices S.2.2.1. Multiple Measuring Elements with a Single Provision for Sealing.

> **S.2.2.1. Multiple Measuring Elements with a Single Provision for Sealing. - A change to the adjustment of any measuring element within any multi-product dispenser with a single provision for sealing multiple measuring elements must be identified.**

**7. Tolerance for Product Depletion Test**

**Source/Background:** At the September 2001 Measuring Sector Meeting during the discussion of agenda item 5 comparing single compartment testing to split compartment testing a member suggested that it would be appropriate to have separate tolerances for a product depletion test. The Sector agreed to discuss that as a separate agenda item if time permitted. During further discussion of the need for specific tolerances for a product depletion test, a member pointed out that the present criteria is affected by the test draft size. It is possible for a meter to fail at particular draft size; and by sufficiently increasing the draft size for a subsequent test, the same meter could pass without any repairs or adjustments being made. Ross Anderson (NY) indicated that NEWMA at one point had developed a proposal to the tolerance for a product depletion test on the rated maximum flow rate for the meter. That proposal was not available for review. The Sector agreed to include the discussion of a product depletion test tolerance on the agenda for the next Sector meeting. Ross Anderson agreed to prepare a proposal for Sector consideration at that meeting.

Since the 2001 meeting New York began a study to compare the results of a product depletion test conducted on the same meter using different size provers. Mr. Anderson will update the Sector on the progress of the study and may be able to provide guidance to the Sector on how to proceed.

**Discussion/Conclusion:** Mr. Anderson was unable to attend the Sector meeting. The Sector did review the proposal from NEWMA to modify N.4.2. and to add new paragraphs N.4.5. and T.5. shown below. Several Sector members disagreed with the NEWMA proposal for a tolerance based on one minute of flow at the maximum flow rate for the device under test. The Sector believes that the allowable error for a product depletion test should not be dependent on the size of the test draft. The Sector agreed that the item should be carried over to the agenda for the next Sector meeting to allow time for completion of the study being conducted by New York.

**NEWMA Proposal:**

> **N.4.2. - Special Tests (except Milk Metering Systems).** "Special" tests shall be made to develop the operating characteristics of a measuring system and any special elements and accessories attached to or associated with the device. Any test except as set forth in N.4.1. or N.4.5. shall be considered a special test. Special test of a measuring system shall be made as follows:

(a) at a minimum discharge rate of 20 % of the marked maximum discharge rate or at the minimum rate marked on the device whichever is less,

(b) to develop operating characteristics of the measuring system ~~during a split-compartment delivery~~.
(Amended 1978)

**N.4.5. Product Depletion Test -** The effectiveness of the vapor eliminator shall be tested by depleting the product supply and continuing until the lack of fluid causes the meter register to stop absolutely. The test shall be completed by switching to another compartment with sufficient product on a multi-compartment vehicle, or by adding sufficient product to a single compartment vehicle. When adding product to a single compartment vehicle, allow appropriate time for any entrapped vapor to disperse before continuing the test.

**T.5. Product Depletion Test** - The difference between the results of the normal test and the product depletion test shall not exceed 0.5 % of the equivalent of one minute of flow at the maximum rated flow rate for the system.

**8. Product Family Tables for MAG Meters**

**Source:** Liquid Controls LLC

**Background:** At present, there is no product family criteria for Mag Meters. If a manufacturer wants a CC which covers multiple products, testing must be conducted on each product. Liquid Controls is asking the Sector to consider the adoption of a product family of liquids criteria for MAG Meters and will provide a specific proposal for Sector consideration at the September 2002 Meeting.

**Discussion/Conclusion:** Liquid Controls provided a handout base on input from an Italian mag meter manufacturer for the members to review as a starting point for developing a product family table for mag meters. One member stated that the performance for mag meters is very installation dependent. Measurement Canada indicated having had difficulty trying to categorize products. Some of the key factors include corrosiveness, coating factors, and abrasiveness. At present they prefer to test each product separately. The Sector agreed to form a small work group to develop the issue, collect data, and provide input for the next Sector meeting. Measurement Canada agreed to prepare a list of concerns for the work group. The work group members are; Mike Keilty (Endress & Hauser), Charlene Numrych (Liquid Controls), Paul Glowacki (Murray Equipment), Krone America (TBD), California NTEP Laboratory (TBD), and Measurement Canada.

**9. Use of Discount and Loyalty Cards and Discounts for Actions After the Completion of a Retail Motor-Fuel Delivery**

**Source:** NTEP Laboratories

**Background:** At the June 2002 NTEP Laboratory Meeting, the laboratories agreed that there is a need for guidance for determining whether or not a specific discount program or application is appropriate and meets NTEP requirements.

Examples include: The change to a discount price when a club card is inserted and the automatic return to the nonmember price at the completion of the delivery; a change in the posted price to include a discount for the purchase of a car wash or other item when a credit card is used at the pump but is not available at the pump in a post pay situation; a discount to the unit price for the purchases of certain items after the delivery has been completed.

The Laboratories did not have a specific recommendation, but asked the Sector to organize a work group to identify the issues and develop consistent guidelines and requirements for the use of various discount programs.

**Discussion/Conclusion:** At the meeting, one of the NTEP Laboratories provided examples of problems with the use of loyalty cards. One example was that of a super market selling fuel where the unit price could be discounted after the delivery was completed by purchasing one or more specific items. The Laboratories asked if tests need to be developed for the use of loyalty cards during type evaluation. One manufacturer stated that marketing schemes come from device users not the device manufacturers. The manufacturers have no control over the various types of loyalty card programs. The Sector agreed that a work group should be formed to develop the issue and provide input for the next Sector meeting.

The work group members are; Gary Castro (CA NTEP), Rich Tucker (Tokheim), Mike Roach (VeriFone), Steve Covington (AutoGas Systems), Gordon Johnson (Gilbarco), Dresser Wayne (TDB), and Mike Belue (Belue Associates).

**10. Acceptable Symbols or Wording to Identify Unit Price, Total Price, and Quantity on a Retail Motor-Fuel Dispenser**

**Source:** Maryland NTEP Laboratory

**Background:** At the June 2002 NTEP Laboratory Meeting, one of the participating laboratories requested guidance on what are acceptable symbols or wording to identify the unit price, total sale, and quantity delivered on a retail motor-fuel dispenser. The Laboratories recommended that the question be added to the 2002 Measuring Sector Agenda.

**Recommendation:** The Sector was asked to consider the following proposal to modify to NCWM Publication 14, Chapter 2 Measuring Devices.

**A. Add a new Paragraph 7.41.1. as follows:**

7.41 The unit price shall be expressed in dollars and decimals of dollars using a dollar sign. A common fraction shall not appear in the unit price, (e.g., $1.299 not $1.29 9/10). Yes ☐ No ☐ NA ☐

7.41.1. Examples of Acceptable Unit Price Identity

Unit Price, Price per Gallon (or Liter), $/Gallon (or Liter), $/Gal , Price/Gal (or Liter). This list is neither exclusive or all inclusive. NTEP may or may not approve other forms of identity.

**B. Add a new Paragraph 7.43. as follows:**

7.43. Examples of Acceptable Delivered Quantity Identity

Total Gallons (Liters), Total Gal, Gallons, Gal. This list is neither exclusive or all inclusive. NTEP may or may not approve other forms of identity.

**C. Add a new paragraph 7.44. as follows:**

7.44. Examples of Acceptable Total Price Identity

Total Sale, Sale $, Total $, $. This list is neither exclusive or all inclusive. NTEP may or may not approve other forms of identity.

**Discussion/Conclusion:** The Sector was unable to reach a consensus on a list of acceptable symbols or wording to identify the unit price, total sale, and quantity delivered on a retail motor-fuel dispenser. The GPMA agreed to develop guidelines and provide input on this issue for the Sector to consider. The Sector agreed to carry this item over for the agenda of its next Sector meeting.

**11. NTEP Laboratory Recommendations for Changes to NCWM Publication 14**

**Source:** NTEP Laboratories

**Background:** At the June 2002 NTEP Laboratory Meeting, the laboratories identified a need for several minor editorial changes to Publication 14 to clarify particular sections or paragraphs.

**Recommendation:** The Sector was asked to consider the following modifications to NCWM Publication 14 as shown in the following items:

A. Modify Section B. Tolerance Application, Normal Test on page LMD-2 as follows:

**B. Tolerance Application**

**Normal Test Tolerances**

~~Based on Handbook 44, for~~ For the purposes of calculating tolerances, normal tests conducted in an NTEP evaluation may be performed at any flow rate down to:

[50 % of the rated maximum flow rate + the rated minimum flow rate]/2

For example: For a meter with a rated maximum flow rate of 60 gallons/minute (gpm) and a minimum flow rate of 12 gpm, the maximum discharge rate developed in an actual installation may be as low as 30 gpm. Therefore, for NTEP tests, calculate the "breakpoint" between normal and special tests as:

[(50 % x 60) + 12]/2 = 21

Thus, in the example, NTEP test runs at flow rates between 60 and 21 gpm are considered normal tests.

**C. Modify paragraph 5.4.2. on page LMD-21 as follows:**

**Code Reference: S.1.5.3. Width**

5.4. Width of the index of an indicator:

5.4.1. The width of the index shall not exceed the width of narrowest graduation. This requirement applies to liquid measuring devices covered in Handbook 44 Section 3.30. Liquid-Measuring Devices ~~(effective 2002).~~ **Yes** ☐ **No** ☐ **NA** ☐

~~5.4.1. The width of the index shall not exceed the width of widest grad uation. This requirement applies to liquid measuring devices not covered in Handbook 44 Section 3.30. Liquid-Measuring Devices (effective 2002).~~ **Yes** ☐ **No** ☐ **NA** ☐

**D. Modify paragraph 7.7.2 on page LMD-24 to include examples of rounding as follows:**

7.7.2. The indicated or recorded quantity, unit price, and total sales price values shall be in mathematical agreement to the closest cent (i.e., within each element, the values indicated or recorded must meet the formula [quantity x unit price = total sales price] to the closest cent). **Yes** ☐ **No** ☐ **NA** ☐

Examples: $1.5549 rounds to $1.55
$1.5551 rounds to $1.56
$1.5550 may round to either $1.55 or $1.56

**E. Modify the note to paragraph 16.2.5. on page LMD-36 as follows:**

16.2.5. Authorize with card #1 (do not turn the "handle" on) and interrupt power for at least 10 seconds. This should de-authorize the dispenser. **Yes** ☐ **No** ☐ **NA** ☐

Resupply power; turn the "handle" on; try to dispense. The dispenser shall not deliver product.

**Note: The term "handle" generically refers to the handle, flapper, start button, on/off switch, or other mechanism used to activate or deactivate the dispenser.**

**F. Add a note to 16.2.6. on page LMD-35 as follows:**

16.2.6. Authorize with card #1; turn the "handle" on, and then interrupt power. This should de-authorize the dispenser. **Yes** ☐ **No** ☐ **NA** ☐

Resupply power and authorize the dispenser with card #2. Then, complete a delivery.

Verify that the transaction is charged to card #2.

**Note: This test is not required if the device under test complies with paragraph 16.1.**

**Discussion/Conclusion:** The Sector supported the changes suggested by the NTEP Laboratories recommends that the NCWM NTEP committee approve the changes shown above.

During the discussion of the above changes a member noted that the tolerances shown in Section I on page LMD-77 of Publication 14 also need to be updated to be consistent with Handbook 44. The Sector agreed and recommended that the tolerances be changed to 1.0 % of the test draft for mechanical automatic temperature compensating systems; and 0.5 % of the test draft for electronic automatic temperature compensating systems.

**12. Definition for Cryogenic Liquid-Measuring Device**

**Source:** NIST/OWM

**Background:** In 1986 paragraph A.1. of Section 3.34. Cryogenic Liquid-Measuring Device and the definition for cryogenic liquid-measuring devices were modified to include on-board-weighing systems for measuring cryogenic liquid. In 1995 the reference to scales for measuring cryogenic liquids was removed from paragraph A.1., but not from the definition for cryogenic liquid-measuring device.

The Sector was asked to review the following proposal to modify the following NIST Handbook 44 definition for cryogenic liquid-measuring device and if acceptable, forward it to the S&T Committee for consideration.

**cryogenic liquid-measuring device.** A system including a ~~mechanism or machine of (a) the~~ meter of the positive displacement, turbine, or mass flow type~~, or (b) a weighing type of device mounted on a vehicle,~~ designed to measure and deliver cryogenic liquids in the liquid state. Means may be provided to indicate automatically, for one of a series of unit prices, the total money value of the liquid measured.[3.34]
(Amended 1986, 200X)

**Discussion/Conclusion:** During the meeting a member recommended that "meter of the positive displacement, turbine, or mass flow type" be changed to "liquid measuring element" to recognize other measurement technologies. The Sector concurred and agreed that the following proposal be forwarded to the NCWM S&T Committee for consideration.

The Sector recommends modifying the NIST Handbook 44 definition for cryogenic liquid-measuring device as follows:

**cryogenic liquid-measuring device.** A system including a liquid measuring element ~~mechanism or machine of (a) the meter of the positive displacement, turbine, or mass flow type, or (b) a weighing type of device mounted on a vehicle,~~ designed to measure and deliver cryogenic liquids in the liquid state. Means may be provided to indicate automatically, for one of a series of unit prices, the total money value of the liquid measured.[3.34]
(Amended 1986, 200X)

**13. Next Meeting**

The Sector discussed the time and location for its next meeting.

**Discussion/Conclusion:** The Sector recommended that the next meeting of the NTETC Measuring Sector be scheduled for October 3-4, 2003 at the Hyatt Charlotte in Charlotte, NC immediately prior to the next Southern Weights and Measures Association Annual Meeting.

## Additional Item

### 14. Update LMD Section of Publication 14

During the meeting a member stated that the entire LMD Section of Publication 14 should be reviewed, updated, and reorganized as necessary. When conducting evaluations of some devices it is necessary to look in several places to find all the requirements that may apply. The Sector concurred and agreed to add it to the agenda for the next Sector Meeting.

| Name | Company/Agency | Address | Telephone # | E-Mail Address |
|---|---|---|---|---|
| Alain Casademont | Measurement Canada | Stds Bldg #4 Tunney's Pasture – Ottawa Ontario K1A0C9 | 613 952 0636 | Casademont.alain@ic.gc.ca |
| Charlene Numrych | Liquid Controls | 105 Albrecht Dr - Lake Bluff IL 60044 | 847 283 8330 | cnumrych@idexcorp.com |
| David Hoffman | Toptech Systems | 280 Hunt Park Cove - Longwood FL 32750 | 407 332 1774 | dhoffman@toptech.com |
| David Resch | FMC Measurement Solutions | 1602 Wagner Ave, Box 10428 – Erie, PA 16514 | 814 898 5214 | Dave.resch@fmcti.com |
| Douglas Long | RDM Industrial Electronics | 850 Harmony Grove Rd – Nebo, NC 28761 | 828 652 8346 | doug@wnclink.com |
| Gary Castro | State of California Meas Stds | 8500 Fruitridge Rd - Sacramento CA 95826 | 916 229 3026 | gcastro@cdfa.ca.gov |
| Gordon Johnson | Marconi Commerce Systems Inc | 7300 W Friendly Ave – Greensboro NC 27420 | 336 547 5375 | gordon.johnson@marconi.com |
| John Skuce | FMC - Smith Meter | 1602 Wagner Ave Box 10428 - Erie PA 16514 | 814 898 5405 | john.skuce@fmcti.com |
| Mark Butler | Micro Motion | 7070 Winchester Circle - Boulder CO 80301 | 303 530 8231 | mark.butler@emersonProcess.com |
| Maurice Forkert | Tuthill Transfer Systems | 8825 Aviation Dr - Ft Wayne IN 46809 | 219 747 7529 | mforkert@Tuthill.com |
| Mike Belue | Belue Associates | 1319 Knight Dr - Murfreesboro TN 37128 | 615 867 1010 | bassoc@aol.com |
| Mike Keilty | Endress & Hauser Flowtec AG | 2350 Endress Place - Greenwood IN 46143 | 317 535 2745 | michael.keilty@us,endress.com |
| Mike Roach | VeriFone | 4011 Barwood Court – Tampa, FL 33624 | 813 205 0876 | Mike_r4@verifone.com |
| Paul Glowacki | Murray Equipment, Inc. | 2515 Charleston Place – Fort Wayne, IN 46808 | 260 484 0382 | pglowacki@murrayequipment.com |
| Peter Goodier | Syltone Industries Inc. | 2501 Constant Comment Place – Louisville, KY 40299 | 502 266 6677 | pgoodier@Syltone.com |
| Randy Byrtus | Measurement Canada | Stds Bldg Tunney's Pasture – Ottawa Ontario K1A OC9 | | byrtus.randy@ic.gc.ca |
| Rich Tucker | Tokheim | P.O. Box 360 - Ft Wayne IN 46801 | 260 470 4610 | Richard.Tucker@Tokheim.com |
| Richard Wotthlie | State of Maryland | 50 Harry S. Truman Parkway - Annapolis MD 21771 | 410 841 5790 | wotthlrw@mda.state.md.us |
| Richard C. Suiter | NIST/OWM | Stop 2350 100 Bureau Dr - Gaithersburg MD 20878 | 301 975 4406 | rsuiter@nist.gov |
| Rodney Cooper | Schlumberger Neptune | 1310 Emerald Rd - Greenwood SC 29646 | 864 942 2226 | rcooper@greenwood.rms.slb.com |
| Steve Patoray | NTEP/NCWM | 1239 Carolina Dr - Tryon NC 28782 | 828 859 6178 | spatoray@mgmtsol.com |
| Steve Covington | AutoGas Systems, Inc. | 1000 N. Walnut Suite 201 – New Braunfels, TX 71830 | 830 620 6252 | Steve_Covington@autogas.com |
| Steven Cook | NIST/OWM | Stop 2350 100 Bureau Dr - Gaithersburg MD 20878 | 301 975 4003 | steven.cook@nist.gov |
| Ted Kingsbury | Measurement Canada | Stds Bldg Tunney's Pasture – Ottawa Ontario K1A OC9 | 613 941 8919 | kingsbury.ted@ic.gc.ca |
| Trevor Poulter | Syltone Industries Inc. | 2501 Constant Comment Place – Louisville, KY 40299 | 502 266 6677 | tjpoulter@syltone.com.uk |
| William D. West | State of Ohio Dept of Agriculture | 8995 E Main St - Reynoldsburg OH 43068 | 614 728 6290 | west@odant.agri.state.oh.us |

# Appendix F

## National Type Evaluation Technical Committee
## Weighing Sector Annual Meeting

**September 29 to October 1, 2002, Annapolis, MD**

**Final Summary**



| Reference Item | Attachment Description |
|---|---|
| Attachment to Item 1 | Scale Manufacturers Association Letter dated September 20, 2002 |
| Attachment to Item 16 | Proposals for Vehicle Scale Test Procedures |

## Carry-Over Items

### 1. CLC on Livestock Scales

**Background:** For additional background information, refer to the October 2001 Weighing Sector Summary Agenda Item and the Report of the 77th Annual Meeting of the National Conference on Weights and Measures (NCWM), Specifications and Tolerances Committee (S&T) Agenda Item 320-1B. As a result of the vote of the NCWM, the item was been returned to the S&T Committee and the Weighing Sector for additional development.

The Sector should make a recommendation to the NCWM S&T Committee that the proposed amendment to the CLC definition be treated as a separate agenda item. The Sector may also want to consider reducing the amount of test load prescribed in proposed paragraph N.1.3.4.2. to approximately 500 d. This number has been selected because it complies with the minimum load requirements in paragraph UR.3.8. Minimum Load for Weighing Livestock, test loads can be safely applied to the scale, and the minimum test load is an adequate test load to verify that individual load bearing points are accurately adjusted. The NIST Technical advisor suggested the following language for consideration by the Sector:

> N.1.3.4.2. Prescribed Test Pattern and Test Loads for Livestock Scales with More Than Two Sections and Combination Vehicle/Livestock Scales. A minimum test load of 5000 kg (10 000 lb) or one-half of the rated section capacity, whichever is less, shall be placed, as nearly as possible, successively over each main load support as shown in the diagram below. For livestock scales manufactured between January 1, 1989, and January 1, 2003, the required loading shall be no greater than one-half CLC. (Two-section livestock scales shall be tested consistent with N.1.3.8.)

**Discussion:** At its 2002 meeting, the Weighing Sector supported the recommendation that the definition for concentrated load capacity (CLC) be considered as a separate agenda item from the proposals for paragraphs N.1.3.4., N.1.3.4.1., N.1.3.4.2., and N.1.3.8.

The Sector also discussed the proper test patterns and test loads described in Handbook 44 Scales Code paragraph N.1.3.4.2. Prescribed Test Pattern and Test Loads for Livestock Scales with More Than Two Sections and Combination Vehicle/Livestock Scales. The Sector considered the Central Weights and Measures Association recommendation that the shift test load be 12.5 % of scale capacity, but no more than ½ section capacity, to be an adequate test of a main load support. The NIST Technical Advisor recommended that a minimum test load of 10 000 lb be specified to facilitate the safe application of test weights while applying a load that more closely simulates the potential concentration of livestock in the corner of the scale. The Sector noted that a test load of 12.5 % of scale capacity that does not exceed the ½ section capacity is an appropriate test of the performance of the load support and also addresses the safety concerns associated with stacking weights. Public sector members expressed concerns that the test load changes to N.1.3.4.2. should include language that allows the field official or an NTEP evaluator to apply test loads for load supports of up to ½ section capacity.

The Scale Manufacturers Association (SMA) distributed a letter dated September 20, 2002 documenting their concerns on S&T Agenda Item 320-5. The letter stated that the test loads were too large; the test patterns were undefined; and that the shift test pattern for livestock scales be simply defined as it was prior to 1988:

> N.1.3.4.2. Livestock Scales With More Than Two Sections. - A shift test equal to one-half the rated sectional capacity shall be conducted with test loads distributed over each section of the scale. (Two section livestock scales shall be tested consistent with N.1.3.8.)

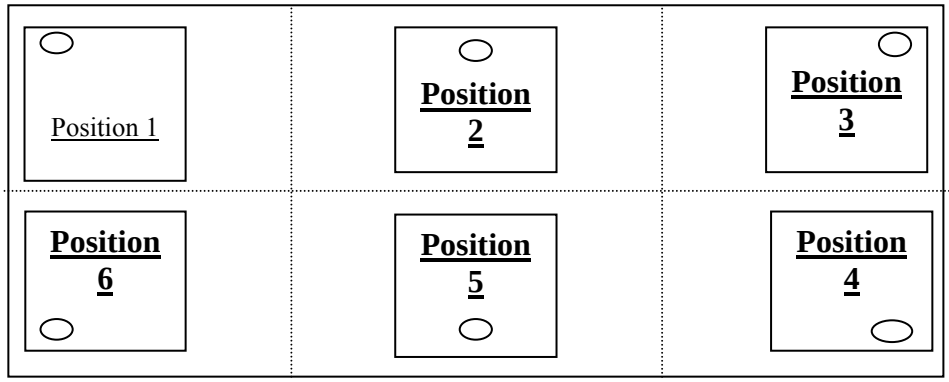
The Weighing Sector discussed the SMA proposal and continues to believe that testing which includes test loads positioned over the main load supports more accurately reflects the actual usage of livestock scales.

One of the private sector members noted that the test loads can not be centered over the main load bearing point and suggested adding lines to the diagram for paragraph N.1.3.4.2. similar to the lines in the diagram for paragraph N.1.3.8. (a) All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers.

**Conclusion:** At its 2002 meeting, the Weighing Sector agreed to support a separate proposal making the definition for concentrated load capacity a separate agenda item from the item to establish test patterns and test loads for livestock scales. The Weighing Sector agreed with the Central Weights and Measures Association recommendation that a test load

of 12.5 % of scale capacity, not to exceed one-half section capacity is an adequate test of a main load support. The Sector noted that a test load of 12.5 % of scale capacity addresses safety concerns when stacking weights however those test loads are excessive should not be required for subsequent tests. The Weighing Sector proposes an alternate new paragraph N.1.3.4.2. and associated diagram shown in the recommendation above that specifies a minimum test load of 10 000 lb to facilitate the safe application of test weights while applying a load that more closely simulates the potential concentration of livestock in the corner of the scale. The language is also intended to permit weights and measures officials and NTEP laboratories to conduct a shift test of up to 12.5 % of scale capacity.

N.1.3.4.2. Prescribed Test Pattern and Test Loads for Livestock Scales with More Than Two Sections and Combination Vehicle/Livestock Scales. A minimum test load of 5000 kg (10 000 lb) or one-half of the rated section capacity, whichever is less, shall be placed, as nearly as possible, successively over each main load support as shown in the diagram below. For livestock scales manufactured between January 1, 1989, and January 1, 2003, the required loading shall be no greater than one-half CLC. (Two-section livestock scales shall be tested consistent with N.1.3.8.)




**2. NCWM Publication 14, Technical Policy E, Modification of Type - Conversion of a Vehicle Scale to a Livestock Scale**

**Background:** See the 2001 NTETC-Weighing Sector Final Summary, agenda item 4, for additional background information.

NCWM Publication 14, Technical Policy E, Modification of Type, - Conversion of a Vehicle Scale to a Livestock Scale (including vehicle scales used to weigh livestock or combination vehicle/livestock scales) requires the device manufacturer to request on the NTEP application that a Certificate of Conformance (CC) cover both a vehicle and livestock scale application. The evaluation must include an NTEP test of the livestock scale if this is a new application. To include the livestock application on an existing CC, NTEP requires at least a "one time" test to 90 % of the CLC rating.

The Sector acknowledges that the S&T Committee reviewed an item that removes the CLC marking requirements and includes section capacity markings for livestock scales. The proposal to remove livestock scales from CLC marking requirements was adopted by the NCWM at its 2002 Annual Meeting. As a result, a vehicle scale used for weighing livestock would also be required to have a section capacity marking, and a livestock scale used to weigh vehicles would also have to have a CLC marking.

This subject was also discussed at the NTEP Participating Laboratories 2002 meeting in Albany, New York. It was determined that a consistent policy is needed, not only for vehicle scales used to weigh livestock, but also platform scales used to weigh single animals and railroad track scales used to weigh highway vehicles. Combination vehicle/axle load scales will not be evaluated because axle scales can't be used to determine legal-for-trade axle weights (unless the vehicle is weighed as a single draft) or are Accuracy Class IIII devices.

Steve Patoray, NTEP Director, suggested an approach used for vehicle scale deck types be considered as a possible solution. An applicant requesting multiple "use applications" at the time an evaluation is requested would have the choice of two separate evaluations or a combined evaluation. If two separate evaluations were the preferred option, the second

evaluation would only consist of an initial evaluation and an applicable follow-up test from NIST Handbook 112 to verify the device is still working correctly after 21-days and that the minimum use requirements have been met. Additionally, the sentence "Only loads which have been applied using a method representative of the scales intended use can be counted." needs to be changed, e.g., dynamic vs. static load, vehicle vs. livestock, railroad cars vs. vehicles, animals vs. pallet load applied by forklift or overhead crane.

At their 2002 meeting, the Sector, considered the following underlined amendments developed by the participating laboratories at their 2002 meeting in Albany, NY.

Section 62. Performance and Permanence Tests for Counter (Bench) Scales (including Computing Scales)

61.11.2. Only static loads which have been applied using a method representative of the scales intended use can be counted.

Section 63. Performance and Permanence Tests for Floor Scales

63.1.3. Only pallet or container loads~~,~~ which have been applied using a method representative of the scales intended use~~,~~ can be counted.

Section 64. Performance and Permanence Tests for Livestock Scales

64.32. Only loads of livestock which have been applied using a method representative of the scales intended use, can be counted.

Section 65(x) Performance and Permanence Tests for (X) Vehicle Scales and Permanently-Installed Axle-Load Load-receiving elements

65(x).7.2. Only static loads~~,~~ which have been applied using a method representative of the scales intended use~~,~~ can be counted.

Section 67. Performance and Permanence Tests for Railway Track Scales Used to Weigh In-Motion

Permanence Tests - Note: There are no minimum use requirements.

Section 68. Performance and Permanence Tests for railway Track Scales Used to Weigh Statically

Permanence Tests - Note: There are no minimum use requirements.

Section 69. Performance and Permanence Tests for Dynamic Monorail Scales

Permanence Testing:

During the permanence period, the system will be run with the following:

- Only livestock carcasses, which have been applied using a method representative of the scales intended use, can be counted.
- At least 100 % of the loads must be above 20 % capacity of the device capacity.
- At least 50 % of the loads must be above 50 % of device capacity.

**Discussion:** Some of the public sector members expressed continued concern about the differences in the way loads of livestock are placed on vehicle scales. The forces induced by highway vehicles are typically along the length of the scale and that vehicle scales are appropriately designed for the weight and direction of these forces. The forces induced by livestock on vehicle scales are in all directions and it can't be assumed that all vehicle scale designs can continue to perform within tolerance over an extended period of time due to the effect of the direction and violent movement of livestock. A public sector member cited an example of a vehicle scale that was used in an installation where vehicles were making short turns off the end of the scale and that the scale failed to maintain tolerances. The service agent added a side-to-side checking system designed for vehicle scales used to weigh livestock in order to maintain scale calibration.

Another comment indicated that the addition of stock racks and/or concrete barriers as part of the stock racks may be of sufficient weight and location to cause a detrimental effect on the performance of the scale. One of the public sector members also indicated a preference for the compromise test policy and procedures developed by the NTEP Participating Laboratories at their meeting in June 2002 (see background information above).

The Scale Manufacturers Association technical committee disagrees with the positions in the previous paragraph and responded with the following comments as part of a letter to the NCWM S&T Committee dated September 20, 2002:

1. The movement of a vehicle on the scale deck causes the deck to move in an elliptical pattern, which is why all vehicle scales limit transverse as well as longitudinal movement. The recent use of "rocker" type load cells drives this point home. These cells will rotate because of the elliptical deck movement and if rotation is not controlled by design, the cell cable will wind around the cell and break. To conclude that vehicle scales are not checked for transverse movement is simply not factual and to conclude that scale movement created by moving livestock is more abusive to a vehicle scale than the movement of a vehicle is technically incorrect.

2. The load capacity of an average vehicle scale section is 100 000 pounds (50 000 pound capacity load cells). Assuming a 4-section concrete deck scale, the dead load on each section will be in the area of 9 000 pounds and the live load on each section at maximum rated capacity will be less than 50 000 pounds. Total load on the section is 59 000 pounds or only 59 % of section capacity. The addition of racks and gates to the scale adds an additional 4500 to 5000 pounds at most and is well within scale design limits. These modifications are subject to Handbook 44 UR.2.7, UR.4.1., and UR.4.3., and are usually approved by the manufacturers of the scale. In addition, because the live load uses such a small portion of the total output of each load cell, an increase in dead load will not change the linearity of the device.

3. A legal highway truck can have a gross weight of 80 000 pounds. For the sake of this discussion, assume a maximum gross weight of 60 000 pounds. Also assume an average vehicle scale size of 70 feet x 10 feet (700 square feet). The average speed for a vehicle entering onto a vehicle scale load receiver is between 3 and 5 mph. The load receiver is at rest when the front axle of the vehicle first touches the load receiver causing the load receiver to move in the direction of the truck movement. The average 70 foot x 10 foot concrete deck load receiver weighs about 35 000 pounds so the dynamic forces of the load receiver moving from rest is severe. When the truck stops on the load receiver, the inertial force created by stopping the moving 60 000-pound load causes an equal force on the load receiver. The same dynamics take place when the vehicle begins to accelerate to leave the scale. By loading the same 700 square feet of load receiver with cattle the average maximum load would be 77 000 pounds. The cattle enter the load receiver, not as a single 77 000-pound mass like a vehicle; but rather randomly until the load receiver has no space for more. Loaded to 110 pounds per square foot, the cattle cannot move at all. To reduce the load of cattle to 60 000 pounds (same as vehicle) the square footage they would occupy gathered together would be 545 square feet allowing 155 square feet of open area in which to move freely. For these cattle to even simulate the dynamics of the vehicle the entire herd would have to move as one single mass coming onto the scale and leaving the scale in like manner. Experience dictates this is not likely. What if an individual animal ran from side-to-side or attempted to get off the scale by climbing the stock racks? An average head of commercial beef cattle weighs less than 1300 pounds and certainly cannot create dynamic forces that come close to the vehicle scale design limits.

Ross Andersen, New York, strongly believes that vehicle scales can be used with livestock without additional evaluation. It is a platform that weighs.

The NIST Technical Advisor and one of the private sector members noted that the results of testing for permanence using livestock to meet the minimum use requirements might not be repeatable from one evaluation to another. One location may be at a feedlot with passive livestock, where another location might be a livestock receiving and slaughtering facility with very active livestock. It was also noted that it is frequently difficult for an applicant to find a test site that will permit an interruption to their operation to conduct type evaluation testing.

**Conclusion:** The Sector agreed that there may be differences in test procedures between livestock scales and vehicle scales pending the action of the NCWM at its 2003 Annual Meeting on the proposed new paragraph 2.20. Scales Code paragraph N.1.3.4.2. Prescribed Test Pattern and Test Loads for Livestock Scales With More Than Two Sections. If the item is adopted by the NCWM, NTEP may be able to justify different type evaluation procedures between livestock and vehicle scales based upon the different test procedures in Handbook 44. Additionally, there will be Handbook 44

justification to establish NTEP technical policies for adding an option for weighing livestock to new and existing vehicle scale certificates, and adding an option for weighing vehicles to new and existing livestock scale certificates.

The Sector did not come to a conclusion on the language recommended by the participating laboratories at their 2002 meeting in Albany, NY. Additionally, the Sector could not reach a consensus on whether livestock shall be used as the loads necessary to meet permanence test minimum use requirements, or if static loads such as vehicles, lift trucks, pallets, etc. can be used to meet minimum use requirements.

The Sector Chairman requested a vote. The Sector voted against "requiring livestock be used to meet minimum use requirements for permanence testing" (4 in favor, 10 opposed). Depending on the actions of the NCWM Board of Directors and NTEP Committee, this item will be carried over to the 2003 Weighing Sector.

### 3. T.7.3.1. Power Supply, Voltage, and Frequency Tests for Automatic Weighing Systems (AWS)

**Source:** Maryland NTEP Laboratory and NIST Weights and Measures Division (formerly OWM)

**Background:** This item was resolved with recommended language for voltage testing that was incorporated into Publication 14. The NTEP Participating Laboratories were to discuss the reasoning for not conducting frequency variation tests at their 2002 NTEP Participating Laboratory meeting.

This item was not discussed at the 2002 NTEP Participating Laboratory meeting. Scale Code paragraph T.N.8.3.1. Power Supply, Voltage, and Frequency includes language similar to the AWS Code and has never been included as part of the influence testing required in Publication 14.

**Discussion:** The NTETC Weighing Sector reviewed the Canadian and OIML voltage requirements. In the Canadian requirements for maximum and minimum specified voltage, devices may be marked with a nominal voltage of 117 V or 225 V or other voltage. When a device is marked with a voltage range the midpoint is taken as the nominal voltage. The device is tested at –15 % and +10 % of the marked nominal voltage. Devices marked with a range are tested to the *greater* of –15 % and +10 % of the midpoint nominal voltage or the maximum and minimum marked voltage range values. OIML R 76-1, Nonautomatic Weighing Instruments, Part 1: Metrological and Technical Requirements – Tests (Edition 1992 E) requires test of the device at –15 % of the maximum marked voltage and +10 % of the minimum marked voltage.

There was also discussion of test requirements for compliance with line frequency variations. Several of the manufacturers indicated that there is no need to do this with today's power supplies built into the scales. The devices can easily meet performance requirement with the narrow range of line frequency variation specified in Handbook 44 and OIML R 76. The manufacturers state that the tests for compliance with line frequency variations are not conducted during OIML R 76 evaluations. The Sector noted that similar requirements and language are also in Handbook 44 codes for Automatic Weighing Systems and Near-Infrared Grain Analyzers.

**Conclusion:** The Weighing Sector recommended that a proposal to modify paragraph T.N.8.3.1.(a) that require tests over the marked voltage range rather than a specified voltage range be developed. Performance tests would be conducted at the device's marked maximum voltage, minimum voltage, and nominal voltage (voltage value at the midpoint of the range).

NTEP does not test for a change in line frequency of ∀ 0.5 Hz because the test equipment is very expensive. The Sector agreed to recommend continuing the existing policy and consistently apply the same policy to other devices covered by NCWM Publication 14.

The NIST Technical Advisor developed and submitted the following language to the Southern Weights and Measures Association (SWMA) Specifications and Tolerance Committee for consideration at their 2002 Annual Conference. The language is based on OIML R 76 recommendations and test procedures to modify paragraph T.N.8.3.1.(a) as follows:

T.N.8.3.1.(a) Power Supply, Voltage and Frequency.

(a) Weighing devices that operate using alternating current must perform within the conditions defined in paragraphs T.N. 3. through T. N. 7., inclusive, over the line voltage range as marked ~~of 100 V to 130 V or 200 V to 250 V rms as appropriate, and over the frequency range of 59.5 Hz to~~ at 60~~.5~~ Hz.

***NIST Technical Advisor note: At their 2002 Annual Meeting, the SWMA recommended alternative changes to paragraph T.N.8.3.1.(a) as follows:***

***T.N.8.3.1.(a) Power Supply, Voltage and Frequency.***

(a) Weighing devices that operate from a main power supply must perform within the conditions defined in paragraphs T.N.3. through T.N.7., inclusive if the power supply varies in voltage from – 15 % to + 10 % of the value marked on the device. If a range of voltage is marked, the device shall operate within the conditions defined in paragraphs T.N.3. through T.N. 7., inclusive at a voltage of + 10 % of the maximum voltage marked on the device and at a voltage of –15 % of the minimum voltage marked on the device ~~using alternating current must perform within the conditions defined in paragraphs T.N.3. through T.N.7., inclusive, over the line voltage range of 100 V to 130 V or 200 V to 250 V rms as appropriate, and over the frequency range of 59.5 Hz to 60.5 Hz~~.

**4. Listing of Device Types (Families of Scales with Capacities Above and Below 30 000 lb)**

**Source:** 2001 Carryover Item 8a

**Background:** At the 2001 NTEP Participating Laboratories meeting, the Participating Labs and the NIST Technical Advisor were assigned to create an outline of device types based upon accuracy class, special use (e.g., vehicle, livestock, etc.), and physical design. Refer to Attachment to Item 4 for a complete draft copy of the outline.

The NIST Technical Advisor and the Participating Labs have made no progress on this item**.**

**Discussion:** The Sector considered if further development of the outline format is necessary. The Sector noted that one of the concerns has come from the fact that more than 10 types of flat platform scales can be considered as a bench scales in Handbook 44. Additionally, there are several different types of references to vehicle scales, and livestock scales on NTEP Certificates of Conformance (CC) (e.g. livestock or vehicle scales, load-receiving elements, weighing elements, and weighing/load-receiving elements). One of the consequences of the inconsistency of the terminology is trying to search for CCs by device type on the Internet. Some devices and their manufacturers are not listed in queries because of variations in wording.

Several manufacturers are in favor of limiting device types to Handbook 44 Accuracy Class designations with suitability determined by factors such as capacity, minimum interval, minimum use, size and conditions of the installation. For example, a Class III hanging scale can be used in place of a Class III bench scale (if both are suitable for the installation).

Many regulators prefer that Handbook 44 device types continue to be "application driven" rather than "Accuracy Class" driven. They are concerned that scale purchasers assume a scale is suitable for an application, without considering division size, typical usage and etc., if it has an NTEP CC. Purchasers may verify that a scale has a CC (e.g. on the internet) and buy a scale that is unsuitable for the application. This makes it difficult for regulators to reject a scale on suitability requirements after it has been purchased and installed.

One of the participating laboratories indicated that there is inconsistent language used in the certificates and suggested that the idea of templates and "drop down menu selections for device types" be further developed.

There was also a suggestion that the NTEP database be upgraded to include word search capability in order to obtain a more comprehensive list of device type and help the regulator find certificates by "device type." The NTEP Director agreed that a "keyword search" is useful on occasion, but stated that there would be costs involved and added that there would have to be an increased interest of this feature to justify the costs.

**Conclusion:** The Sector recommends that the NTEP Board of Directors consider adding a "keyword search" capability to the NTEP CC database. The Sector also agreed that Handbook 44 has an excessive number of device types in the Scale Code and that the list of device types could be shortened and used consistently by the participating laboratories and in Handbook 44. The NIST Technical Advisor mailed the list of device types submitted in the 2001 Sector agenda and

requested specific suggestions for developing a shortened list of device types. The NTEP Director, NIST Technical Advisor, and the Sector Chairman will compile the comments and develop a recommendation for the 2003 Participating Laboratories and Weighing Sector meetings.

**5. Scope of the Certificate of Conformance**

**Source:** 2001 Weighing Sector Item 8b - See attachment to Agenda Item 5 for the copy of the 2001 Sector Summary for Item 8b.

**Background:** This item was discussed during the 2001 Sector meeting. There was no consensus on the scope of the Certificate of Conformance and whether the Certificate should list the manufacturer's intended application(s).

**Discussion:** Ross Andersen, NY, stated that the Certificate of Conformance (CC) should not be application specific or limiting, however, there are application specific devices according to Handbook 44. Some of the Sector members commented that an applicant should be able to request that the device under evaluation be limited to specific applications.

The NTEP Director commented that an applicant to NTEP should indicate what they want covered on the certificate. After that, the participating laboratory will test the device to applicable checklist requirements and will draft the CC according to the features and option that have been evaluated (and passed). Many of the current applications have a place for the applicant to describe the intended use, applications, particular installation requirements, or other observations and comments.

A participating laboratory suggested that the NTEP Application not include "general purpose" as an open-ended description of intended use and that the applicant must make a selection of one or more checkboxes relating to the Handbook 44 application device types.

Some of the participating laboratories indicated that the term "general purpose" listed in the "Application" paragraph of the certificate give the appearance that the device is suitable for any application regardless of division size since Handbook 44 does not provide enough guidance to determine suitability. One of the manufactures stated that scale dealers and distributors should be capable of determining suitable devices to sell to their customers.

The NTEP Director indicated that most states have indicated that the "Application" paragraph of the CC is limiting. One of the participating laboratories indicated that limiting CCs is also a problem in that some devices certified for one application are perfectly suitable for other Handbook 44 applications.

**Conclusion:** There was no consensus on whether the Certificates of Conformance, as a rule, should limit device applications. The Sector agreed that greater responsibility should be placed on the applicant in providing information on device limitations when filling out the NTEP application. No changes on the scope of the NTEP Certificate of Conformance are recommended by the Sector.

The Sector further recommends that the NTEP application be modified to indicate appropriate boxes to identify the intended use and applications; and add a statement that based on the information provided and the results of the evaluation; NTEP will determine the applicable tests to be conducted and information to be included on the Certificate of Conformance. The Sector did not submit specific amendments to the NTEP Application. This item will be carried over to the next meetings of the NTEP Participating Laboratories and NTETC Weighing Sector.

**6. Policy for Initial Test Only vs. Full Evaluation when a Modification is Made which Requires Testing**

**Source:** 2001 Weighing Sector Item 10

**Background:** See 2001 Sector Summary Agenda Item 10 for additional background information.

**Discussion:** The NTEP Director reported that NTEP has been implementing the 2001 Sector recommendation and has encountered no major problems. Most of the requests for amendments have involved repeating influence factor or permanence testing. The NIST Technical Advisor and some of the sector members indicated that the policy would promote uniformity among the labs and provide some advance notification to NTEP applicants if the policy were documented and published as part of the NTEP application, administrative policies, or technical policies.

SMA reported that their document is still an "in-house" draft but could be used by the NTEP Director and the participating laboratories as guidelines to assist in making a decision on the extent of NTEP re-evaluations.

There was also discussion that a minimum list of metrologically significant components be developed with a statement relating to a minimum amount of re-evaluation associated with each component. A consensus could be gathered using information from the NTEP Director, participating laboratories, original equipment manufacturers (OEM) and other knowledgeable parties. Manufacturers are typically reasonable and it is to the OEMs benefit to agree on a common list

**Conclusion:** The Sector recommended that the NTEP Committee consider the following underlined amendments for Publication 14, NTEP Administrative Policy, paragraph D.2.

**D.2 Responsibility for Reporting Occurrence of Modification**

**b. NTEP Options**

On the basis of the manufacturer's notification, NTEP will decide whether or not to require an evaluation for approving the modification or issuance of a new Certificate of Conformance (CC). When a metrologically significant modification is to be applied to a device with an existing CC, the manufacturer and NTEP shall attempt to agree upon the extent of reevaluation that might be required before such modification is applied. In the event of a disagreement, a full reevaluation shall take place. NTEP will notify the manufacturer accordingly.

The decision of NTEP can be appealed to the NCWM Board of Directors according to NCWM Publication 14 Administrative Policies, Section T. Appeal and Review Process.

Additionally, SMA Guidelines are to be to be submitted to the Sector by the middle of May 2003 for consideration at the next Sector meeting.

**7. NCWM Publication 14 Administrative Procedures – Conformity Assessment**

**Source:** NCWM

**Background:** At the 2002 Annual Meeting, Mr. Patoray reported that the Work Group was formed and included Dennis Krueger (NCR), Bill West (Ohio NTEP lab), Steve Cook (NIST Technical Advisor), Joe Dhillon, (NIST Conformity Assessment Advisor), Ray Bales (Weigh-Tronix and Scale Manufacturers Association member), and Frank Rusk (First Weigh), with additional input from Rich Tucker (Tokheim and Gasoline Pump Manufacturers Association member). The Work Group met twice and developed a preliminary outline for an NTEP Conformity Assessment Program. Mr. Patoray discussed the ideas and possible direction during a presentation to the NCWM Board of Directors (BOD). The BOD requested that Mr. Patoray present the outline to other interested parties so that they may provide the BOD with additional feedback

**Discussion/Conclusion:** A presentation on Conformity Assessment was made available for review and comment by interested parties. No action was recommended by the Sector.

## 8. Multiple Load-Receiving Elements Attached To One Indicator

(This item has been combined with agenda item 10)

**Source:** 2001 Weighing Sector Agenda Item 13 - NTEP Participating Laboratories

**Background:** An application was submitted for an indicator with the capability to display the weight reading for up to 32 load-receiving elements. The Digital Electronic Scales Checklist, Section 34 lists the criteria for evaluation of a single indicator connected to two or more load-receiving elements. Currently, indicating elements have been connected with up to four load-receiving elements with the ability to continually monitor or display each one. It is not clear how the operator will be able to monitor 32 scales connected to the indicator. Additionally, it is not clear how the technology actually performs its task. NCWM Publication 14 does not specify how many load-receiving elements must be simulated and or/submitted for type evaluation.

At the 2001 Sector meeting, there appeared to be a consensus that the number of load-receiving elements interfaced with a single indicating element should not be limited by NTEP. However, there was no consensus on specific recommendations for type evaluation procedures. The Ohio Participating Laboratory was requested to evaluate the device in question with all load inputs connected to the indicating element. The inputs would include a combination of at least two scales and simulated power loads on the remaining inputs. The Ohio Participating Laboratory was to draft suggested test procedures for review and comment at the next NTEP laboratory meeting in June 2002. The draft procedures and any additional concerns will be submitted to the Weighing Sector during the 2002 Sector meeting for review and comment.

**Discussion:** The Sector reviewed on the language submitted by Bill West and Darrell Flocken. The Sector generally agreed with the language at their meeting but wished to reserve final agreement until paragraph numbers were added to the language.

**Conclusion:** The Sector was balloted on this item which recommended the language in the following underlined text be added to NCWM Publication 14, Weighing Devices Chapter 1, Section 34, Page DES-54 for ZERO and TARE on indicators interfaced to multiple load-receiving elements. The results of the ballot were 6 in favor (with one affirmative vote requesting language clarification) and 4 voters abstaining (one voter abstained pending changes to the wording for clarification) and no negative votes. The following language has been edited for clarification based on the comments.

**34. Multiple Load-Receiving Elements (Page DES-54 2002 Edition)**

**(No changes to current contents before this point!)**

**34.7. Zero-setting mechanism.**

There must be means for setting each load-receiving element to a zero balance indication. The zero-setting mechanism shall not operate independently on a summed weight indication when values for individual load-receiving elements can be displayed.

**34.7.1. Individual indications for each load-receiving element - no summed indication.** There must be means for setting each load-receiving element to a zero balance condition. Each load-receiving element shall be evaluated as an independent scale and must meet appropriate requirements. **Yes ☐ No ☐ NA ☐**

**34.7.2. Single indicator with two or more load-receiving elements that can be selected individually** – The indicator must provide some means to monitor zero for each of the load-receiving elements individually, regardless of whether or not they can be summed. (This may require a "center of zero" indication for each load-receiving element.) **Yes ☐ No ☐ NA ☐**

**34.7.3** **Individual indications for each load-receiving element - with summed indication**. Each individual load-receiving element display must operate within the guidelines defined in section 34.7.1. or 34.7.4. If the instrument has the ability to operate in a "Sum Only" mode, the summed display must operate within the guidelines in section 34.7.4. **Yes** ☐ **No** ☐ **NA** ☐

In this case, when the system is zeroed;

(a) all indications must be set to zero, including the summed display, or

(b) the zero command must be rejected by the indicator.

**34.7.4.** **Sum only indication.** The summed display shall be evaluated as an individual scale and must meet appropriate requirements. The indicator may provide a display for each load-receiving element, but the only display that will be considered "legal for trade" will be the summed display. In this case, the total number of divisions for the system shall not exceed 10 000 for Class III and IIIL. **Yes** ☐ **No** ☐ **NA** ☐

When testing these configurations;

- at least two load-receiving elements must be connected to the indicator if the A/D converter for the load-receiving elements is not in the indicator.
- the evaluation will be performed with the maximum number of load-receiving elements requested by the manufacturer (to be covered by the CC) if the indicator has A/D converters for each load-receiving element.
- proper operation shall be confirmed with test weights applied to all individual load-receiving elements, and then in combination if the system has a summed display. Testing may be performed in the laboratory using load cell simulators or load-receiving elements, or a combination of both load cell simulators and load-receiving elements.
- the capacity by division for each load-receiving element in the system must appear adjacent to the weight display or on the display itself.
- each load-receiving element must be identified, and the load-receiving element that is in use must be automatically identified by the indicator and if connected to a printer the recorded representation shall identify the load-receiving element (or elements) from which the weight was obtained.

**34.8.** **Tare mechanism.**

**34.8.1.** **Individual indications for each load-receiving element - no summed indication.** Each load-receiving element shall be evaluated as an independent scale and must meet appropriate requirements. **Yes** ☐ **No** ☐ **NA** ☐

**34.8.2.** **Individual indications for each load-receiving element - with summed indication.** If the instrument has the ability to select individual load-receiving elements and sum, each must operate within the guidelines defined in section 34.8.1. or 34.8.3. **Yes** ☐ **No** ☐ **NA** ☐

**34.8.3. Sum only indication.** The summed display shall be evaluated as an individual scale and must meet appropriate requirements. **Yes** ☐ **No** ☐ **NA** ☐

When testing these configurations;

- At least two load-receiving elements must be connected to the indicator.
- Proper operation shall be confirmed with test weights applied to all individual load-receiving elements and then in combination if the system has summed display capability. Testing may be performed in the laboratory using load cell simulators and load-receiving elements or a combination of load cell simulators and load-receiving elements.
- The indication for each load-receiving element in the system must indicate whether it is in gross or net mode. If the system is capable of summing the weights, the summed indication must also indicate whether it is in gross or net mode.
- Depending on the application, when tare is entered, it may be appropriate to either (check all that apply):
  - ❑ Switch all indications in the system to net
  - ❑ Switch only the scales involved plus the summed indication to net
  - ❑ Leave all the individual scales at gross and only switch the summed weight to net

  **Note**: It is not appropriate to switch all scales in the system to net mode if any platforms are at zero load. This would in effect allow taking zero tare on those platforms that are at zero.
- ~~Each load-receiving element must be identified, and the load-receiving element that is in use must be automatically identified by the indicator and if connected to a printer the recorded representation shall identify the load-receiving element (or elements) from which the weight was obtained.~~ (Technical Advisors note. This has been deleted since the information required is the same as paragraphs 34.3 and 34.4)

34.9. Capacity by division markings.

~~34.8.1.~~34.9.1. no change to current contents…..

~~34.8.2.~~34.9.2. no change to current contents….

~~34.8.3.~~34.9.3. no change to current contents…..

~~34.8.4.~~34.9.4. no change to current contents…..

### 9. G-S.1. Identification, and Table S.6.3. Markings; Software Based Built-for-Purpose Devices

**Source:** 2001 Weighing Sector Agenda Item 16

**Background:** At the May 2001 NTEP Laboratory meeting, the Measuring Sector Laboratories discussed marking requirements for "software-based" devices such as electronic cash registers or "smart recording elements" interfaced with devices. In some cases, the indicator for the system is a generic computer display. If the required markings are placed on the display at the time of installation and then at some time future time the display is replaced, the required markings may

be lost. The laboratories agreed that a real time or "software-based" display of the model, capacity, unit of measurement, and other required markings on the display are preferable. The laboratories also agreed that the information could either be continuously displayed or displayed by pressing a single key (a series of keystrokes could be permitted with on-screen prompts and directions). The laboratories forwarded the following proposed language to the Measuring Sector for consideration at its 2001 meeting. The intent of the proposal is to modify Handbook 44 paragraph G-S.1.1 to allow a real time display of the required marking information for software-based systems.

The NCWM Specifications and Tolerances Committee (S&T) has already addressed the issue of capacity marking requirements of video display terminals. At the 77th NCWM Annual Meeting in 1992, the NCWM adopted the following:

> The Committee recommends that Table S.6.3.a. and S.6.3.b. (note 3) be interpreted to permit the required capacity and scale division marking to be presented as part of the scale display (e.g., displayed on a video terminal or in a liquid crystal display), rather than be physically marked on the device. As part of the current language in the tables and this interpretation, the capacity by division statement must be adjacent to the weight display and continuously displayed when in the weighing mode. However, if the weighing mode of the scale permits different menus for selecting operations to be displayed, the weight information and capacity by division statement must be continuously displayed if this display is the customer's only display. These requirements apply to all of the weighing modes that may be selected for commercial transactions. The statement does not have to be displayed when the indicating element operates in modes other than the weighing mode. This does not require a change to Handbook 44. This interpretation will be included in NCWM Publication 14 and NCWM Publication 3.
>
> The statement that the capacity by scale division is not required to be displayed when in modes other than the weighing mode refers to situations where the scale is in the supervisor's mode and manager functions are being performed.

For additional background information, see the Report of the 87th National Conference on Weights and Measures, Specifications and Tolerances Committee agenda item 310-1.

This item is currently before the NCWM S&T Committee. The Committee asked that the NTETC Weighing and Measuring Sectors review both proposals and attempt to agree on a single proposal that is acceptable to all parties. Additionally, the NIST Technical Advisor will develop language for Publication 14, Section 1, Marking-Complete Scales, page DES-13 and Section 2, Marking-Indicating Elements, page DES-18.

**Discussion:** The Weighing Sector, at its 2002 meeting, discussed this item at length and reviewed comments from the NCWM S&T Committee and from other interested parties at the 2002 NCWM Interim and Annual Meetings. The Sector also discussed the above information and agreed to limit the scope of the proposal to not built-for-purpose devices.

Will Whottlie, Maryland, (NTETC Measuring Sector, NCWM S&T Committee, and SWMA S&T Committee) also participated in the discussions and presented the concerns of the 2001 Measuring Sector, and the regional and national S&T Committees. He stated that Measuring Sector manufacturers were concerned about requiring G-S.1. Identification. information to be continuously displayed in the video terminal since all the area (real estate) on the display is needed for other purposes during the normal mode of operation.

The Weighing Sector discussed the use of keyboard/keypad entries but was concerned that without a standardized access method, there would be no information on the device or system to help locate the appropriate Certificate of Conformance. As a minimum, the device needs to display minimum information needed to find the Certificate of Conformance Number in order to look up, among other things, the instructions for accessing the identification information.

The Weighing Sector agreed that minimum information would not have to be displayed on the device if there was a single standardized method to access the information documented in Handbook 44. The Sector felt that the standardized method should be determined by a consensus of weighing and measuring device manufacturers.

The Weighing Sector considered location of the proposed added language in paragraph G-S.1. Identification. The NIST Technical Advisor suggested that adding another note to G-S.1. may be confusing in that the note may not be clear that it applies to all of G-S.1. The majority of the Sector did not show a strong preference whether the proposed language be part of G-S.1. or be written as a sub paragraph of G-S.1.

**Recommendation:** The 2002 Weighing Sector recommends the following language be incorporated into Handbook 44 General Code 1.10, paragraph G-S.1.1.- Software Based, Not Built–For–Purpose Devices., renumber existing paragraph G-S.1.1. and add a definition for "built-for-purpose device:"

G-S.1. Identification. -

G-S.1.1.- *Software Based, Not Built–For–Purpose Devices. For software based, not built–for–purpose devices, the manufacturer and a model designation, or the Certificate of Conformance (CC) Number, shall be continuously displayed or permanently marked on the device. Clear instructions for accessing the remaining required information shall be listed on the CC. Alternatively, all required information in G-S.1. Identification. (a) through (g), may be continuously displayed or accessible by (a specified H-44 method such as Help/About).*

Renumber existing G-S.1.1. Remanufactured Devices and Remanufactured Main Elements. to G-S.1.2.

Add a new definition for "built-for-purpose" devices as follows:

built-for-purpose device. Any main element, which was manufactured with the ~~primary~~ intent that it be used as or part of a weighing or measuring device or system.

The NIST Technical Advisor reported the recommendations of the 2002 Weighing Sector to the 2003 Measuring Sector.

The following changes recommended by the Measuring Sector at their 2002 meeting were balloted to the Weighing Sector for their concurrence.

**Amend G-S.1. Identification *(d)* as follows:**

**G-S.1. Identification.** -

*(d) except for equipment with no moving or electronic component parts and software-based not built-for-purpose devices, a nonrepetitive serial number;*
*[Nonretroactive as of January 1, 1968]*

Add new paragraph G-S.1.1. and renumber existing paragraph G-S.1.1. as follows:

***G-S.1.1.- Software Based, Not Built–For–Purpose Devices.*** *For software based, not built–for–purpose devices, the following shall apply:*

*(a) the manufacturer or distributor and the model designation may be continuously displayed or marked on the device*, or*

*(b) the Certificate of Conformance (CC) Number may be continuously displayed or marked on the device*, or*

*(c) all required information in G-S.1. Identification. (a), (b), (c), (g), and the software version designation may be continuously displayed. Alternatively, a clearly identified System Identification, G-S.1. Identification, or Weights and Measures Identification may be accessible through the "Help" menu. Required information includes that information necessary to identify that the software in the device is the same type that was evaluated.*

**Clear instructions for accessing the remaining required information shall be listed on the CC. Required information includes that information necessary to identify that the software in the device is the same type that was evaluated.*

*[Nonretroactive as of January 1, 200X]*

**G-S.1.~~1~~2. Remanufactured Devices and Remanufactured Main Elements. -**

Add a new definition for "built-for-purpose" devices as follows:

built-for-purpose device. Any main device or element which was manufactured with the intent that it be used as or part of a weighing or measuring device or system.

The vote count for the Weighing Sector was as follows:

AFFIRMATIVE: (9), NEGATIVE: (1), ABSTAIN: (3). Five ballots were not returned. The NIST Technical Advisor forwarded the results and comments to the 2003 NCWM S&T Committee for their consideration.

**10. Zero and Tare on a Single Indicating Element Interfaced with Multiple Platforms**

(This item was combined with the 2002 Weighing Sector Agenda Item 8)

**Source:** 2001 Sector Agenda Item 18

**Background:** The Ohio NTEP Participating Laboratory has received several applications for indicating elements with multiple displays interfaced with multiple load-receiving elements that have the ability to simultaneously display the indication of each load-receiving element in addition to a summed weight display.

Publication 14 for Digital Electronic Scales, Section 34.7. Multiple Load Receiving Elements states:

"There must be a means for setting each load-receiving element to a zero balance indication. The zero-setting mechanism shall not operate independently on a summed weight indication when values for individual load-receiving elements can be displayed."

**Discussion/Conclusion:** This item was combined with agenda item 8. Please see the Discussion and Conclusion for agenda item 8.

**11. Screen Savers on Electronic Cash Registers and Point-of-Sale Systems (ECR/POS)**

**Source:** 2001 Sector Agenda Item 19

**Background:** In the past few years, ECR manufacturers have been adding screen saver features to CRT displays. The function of the screen saver can be metrologically significant because zero information may not be available to the customer and operator at the start of a transaction. Therefore the screen saver feature needs to be evaluated by NTEP to insure compliance to all requirements. This is particularly important if the CRT is also the primary display.

At its 2001 meeting, the Sector agreed to recommend that the three examples listed in the agenda be incorporated into Publication 14 ECRs Interfaced with Scales checklist and, where applicable, in the Digital Electronic Scales Checklist. The NIST Technical Advisor developed language for both checklists. The language was circulated and balloted among the sector members in mid-December 2001 with comments and suggestions due by January 4, 2002.

The Sector voted in favor of recommending language proposed by the NIST Technical Advisor for the 2002 Edition of NCWM 14 to the NTEP Committee (9 Affirm, 3 Neg., 3 Abst.) on the language for the Scales Checklist and (8 Affirm, 3 Neg., 4 Abst.) on the language for the ECR Interfaced with Scales Checklist. Based upon comments received, there appeared to be some confusion in the proposed language to be included in the weighing devices checklist and a technical issue on the language for the electronic cash register interfaced with scales checklist. The participating weighing device laboratories reviewed the proposed language and provided the NIST Technical Advisor with additional guidance.

**Ballot Discussion (sleep/screen saver mode on scales):** One of the comments during the ballot process indicated that it was not clear if a scale had to comply with one or all of the solutions listed in the proposed language. The NIST Technical Advisor modified the language to make it clear that a scale with a sleep or screen saver mode had to comply with only one of the solutions in the proposed language (see attachment to item 11).

Additional comments indicated that the marking of a legend that describes the indication other than zero (such as a scrolling message or a series of dashes across the display) is a new marking requirement and is not supported by language in Handbook 44.

The NIST Technical Advisor and one of participating laboratories report that it was the intent of the NCWM that a label defining the other than digital zero indication is necessary if the indication representing the zero condition is not clear in its meaning.

The following is from the 1992 Weighing Sector Meeting:

> **Conclusions:** Those commenting on this issue indicated that it is appropriate to allow the use of other than a continuous indication of zero provided that the device inhibits use or otherwise clearly indicates an out-of-balance condition if present. The Committee generally agreed this issue is most appropriately addressed by the NCWM.

The following is from the Report of the 78th of the NCWM Annual Meeting, Specifications and Tolerances Committee Item 320-1 S.1.1. Zero Indication (page 293):

> **Discussion:** Scale manufacturers are designing scales with indications for zero other than a digital representation. Alternative indications may be a zero annunciator, a series of sequencing dashes moving across the display, or a scrolling message moving across the customer display. These latter indications must be clearly defined on the device as the zero indication as required by General Code paragraph *G-S.6.* Marking Operational Controls, Indications, and Features.
>
> When a shared weight display was incorporated into a point-of-sale scanner scale in 1986 and 1987, many Conference members had serious reservations about the absence of a digital zero indication. Since that time, weights and measures officials appear to have become much more comfortable with devices having zero indications other than the digital zero. Comments submitted to the Committee indicate that weights and measures officials are willing to accept alternative forms for indicating the zero balance condition if clearly defined.
>
> Consequently, the Committee recommends that all scales be permitted to indicate the zero balance condition by means other than a digital zero indication; however, scales using other than a digital zero indication for the zero-balance condition must either inhibit the weighing operation or return to a continuous digital weight indication when the scale is no longer at zero. This alternative is also extended to point-of-sale systems, as indicated by deleting the qualifying phrase at the beginning of S.1.1. (c) which previously restricted part (c) to point-of-sale systems.

It appears that the intent of the NCWM was to allow alternate forms of the zero balance condition, provided that it is clearly defined and that the scale "inhibit the weighing operation or return to a continuous digital weight indication when the scale is no longer at zero." **Ballot Discussion (sleep/screen saver mode on ECR interfaced with scales):** One of the comments received during the ballot process indicated that the intent of the of the NCWM S&T Committee in the previous discussion also apply to electronic cash registers interfaced with scales (ECR). Therefore, the screen saver (or other information is displayed on the ECR) is intended to represent a zero indication other than a digital zero, and that the ECR display needs to be labeled with a statement defining the other than zero indication.

The NIST Technical Advisor agreed that the zero indication would have to be defined in the case a transaction could be continued or initiated ***without*** requiring operator intervention, giving the operator and customer time to verify the zero condition of the scale. In many cases, the ECR automatically logs off the cashier requiring the cashier to log back on to the ECR to initiate or continue a transaction. This allows sufficient time for the operator to verify the zero condition of the scale as required in UR.4.1. Balance Condition.

The commenter indicated that field inspectors have reported that ECR operators still ignore the zero indication of the POS scale during the log in process and that items have been on the scale during the log in of an ECR. Additionally, most electronic stand-alone scales display to a zero or an error condition (if weight on the scale is out of range of the zero limits) when turning on a scale where the video display immediately goes from the screen saver/sleep mode to displaying the information sent from the POS scale.

**Participating Laboratory Discussion:** At the 2002 Participating Laboratories meeting in Albany NY, the weighing devices laboratories discussed this item and information from past discussions of the NCWM S&T Committee. The weighing labs generally agreed that the procedures for evaluating the sleep mode on scales are technically correct. They have not reviewed the amended language in the attachment. Additionally, the weighing labs did not reach a consensus on the ECR sleep/screen saver mode and agreed that the NIST Technical Advisor agreed to develop two versions of the language for ECRs interfaced with scales. One version did not require a label defining the other than zero indication if

the operator is required to log on to the ECR (after the ECR automatically logged off to enter the sleep mode) to continue or initiate a transaction. The other version would require that "zero indication" be defined and labeled regardless of the automatic log off and operator log in procedures (see attachment to item 11).

**Discussion:** The Sector reviewed the proposed language in the attachment for Sector agenda item 11. The attachment contained language to evaluate sleep modes on scales and two versions for evaluating the sleep/screen saver mode on ECRs interfaced with scales.

The discussion focused on two different issues.

***Part 1***. Some of the Sector members (both manufactures and participating laboratories) indicated that a zero condition was adequately represented by scrolling messages or other non-weight information; and a label defining the zero indication is not required provided that there are automatic means for the scale to return to an active weighing mode when the scale is in a non zero condition. The NIST Technical Advisor and other sector members agreed that that adequate customer protection was provided. However, the customer does not know what the scrolling messages in place of the weight information (other than a digital zero indication) represents. The Sector members referred to the 1993 Report of the 78th NCWM (S&T Item 320-1), which discussed the need for a descriptive label as required by General Code paragraph G-S.6. Marking Operational Controls, Indications, and Features.

***Part 2***. In the case of electronic cash registers (ECRs) interfaced with scales, the issue the Sector considered was whether or not the act of logging onto the ECR was considered adequate operator intervention in order to verify the zero condition of the scale prior to a new transaction without requiring a descriptive label. Two versions of the "ECRs Interfaced with Scales" checklist were submitted to the sector. The proposals differed in that version 1 allows the customer to put a load on the scale and then, the operator must log on and check the zero condition of the system (the POS system does not have to label and define the screen saver/sleep mode as zero). Version 2 requires the system to be labeled that the screen saver/sleep mode represents a zero indication; or that the system be interlocked from weighing until a digital zero has been displayed to the customer and operator.

During the discussion of part 2, one of the participating laboratories reported that field inspectors have observed that operators were logging onto ECRs with an operational sleep/screen saver where items were already on the scale. The operators were not checking the zero condition of the scale and proceeded with the transaction.

One of the ECR manufacturers stated that there is a problem with current Publication 14 language and that there are inconsistencies among the participating laboratories. Additionally, after-market modifications are being made to the way the scale display is represented on ECRs. This is a metrological change to the system (and should require a version change) that is frequently not submitted for evaluation or detected by the field official during subsequent testing. Jurisdictions are experiencing problems with minor inconsistencies. Additionally it is aggravating and costly for manufacturers to compete with others that do not comply. The manufacturer also noted that there is a problem with "screen saver" terminology.

**Conclusion:**

***Part 1***. The Sector voted on the following:

> Should an indication other than a digital zero be considered a form of zero indication without defining it on the device?
>
> The results were; 1 yes vote (yes this is okay), 15 no votes (this is not okay), and 3 abstaining votes.

***Part 2***. There was general support of version 2 and little support for version 1 in the attachment for sector item 11. The Sector agreed not to include the proposed language in version 2 because: (1) the proposed language is nearly identical to the language recommended for the DES checklist; (2) it has the same requirements; and (3) the introduction to the ECRs Interfaced with Scale states that ECR checklist is a supplement to the DES checklist. Additionally, the participating laboratories will continue to develop a proposal for reporting size of the weight display, its location, and weight information area on Certificates of Conformance for consideration during the 2003 meeting of the Weighing Sector.

The Sector recommends the following amendments to Publication 14, Chapter 1, Digital Electronic Scales (DES), Section 11. Additionally, the NIST Technical Advisor recommends an additional statement be added to Publication 14, Chapter

6, ECRs Interfaced with Scales, Section 8, Indicating and Recording Elements informing applicants and participating laboratories to refer to Publication 14, Chapter 1 DES for applicable requirement and test procedures for ECRs and systems that provide the only representation of the primary weight indication.

**11. Indicating and Recording Elements - General (DES-33)**

**Code Reference: G-S.5.1., G-S.2., G-S.6., S.1.1., and S.1.12.**

11.8.4. ~~When in the "sleep" or "screen saver" mode the zero indication must be defined.~~ Does the scale or indicating element have a screen saver, sleep mode or power save feature?

Yes ☐ No ☐

***Note:*** *Other than a continuous zero indication may be used to indicate zero; however, some indication must be used and the indication must be clearly defined. For example, when in the sleep mode, a scale may display dashes while at zero.* ~~*In this case, a legend must be included adjacent to the display to indicate that the dashes in display indicates the scale is on zero (See also Code Reference S.1.1. Zero Indication).*~~

Manufacturers have been adding screen savers and sleep modes to scales for the purpose of prolonging the useful life of displays or provide promotional or other information on displays during periods of scale inactivity.

Additionally, some scales have automatic shut-off, or power (battery) save modes. These features promote energy conservation or prolong battery life in battery-operated scales. This feature either automatically turns off the scale after a period of inactivity or only turns off the display. If the power or battery save mode only turns off the display to save power, the feature is considered to be a sleep mode and should be evaluated using the screen saver/sleep mode criteria.

The function of a screen saver, sleep mode and power save feature can be metrologically significant because zero information may not be available to the customer and operator at the start of a transaction.

NIST Handbook 44 Scales Code paragraph S.1.1. (c) Zero Indication. states that the zero-balance condition can be indicated by other than a continuous digital zero indication provided that effective means are provided to inhibit a weighing operation or to return to a continuous digital indication when the scale is in an out-of-balance condition.

The zero indication must be defined if the zero condition of the scale is represented by other than a digital representation. In this case, a legend must be included as part of, or adjacent to the display to indicate that indications other than a digital zero (e.g. dashes in display or other indications such as scrolling messages) indicate the scale is on zero (See also General Code Reference G-S.6. Marking Operational Controls, Indications, and Features).

The following are examples of acceptable screen saver/sleep mode operations. Checks the method(s) used by the scale or describe the screen saver, sleep mode, or power save feature operation if it is not one of the examples listed below.

- The primary weight indication is continuously displayed while in the screen saver/sleep mode.
- A clearly defined zero annunciator that is active only when the scale is in a zero gross load condition.
- Activation of the sleep or battery/power save mode turns off the scale requiring the operator to turn on the scale before a weighing operation can be performed.
- Activation of the sleep or battery/power save mode only turns off the primary weight display or the primary weight display is replaced by scrolling messages or dashes. The method of indicating a zero balance condition must be clearly defined as the zero indication as required by General Code paragraph G.S.6. Marking Operational Controls, Indications, and Features. The legend must state, "scrolling messages indicates scale is at zero" or similar statement.

If the scale goes off of zero, the scale must either:

- ❑ return to the active weight display, or
- ❑ prevent the initiation of a weighing transaction until the scale has returned to a digital zero indication.
- ❑ _____

**At least one of the following methods in 11.8.4.1. through 11.8.4.3. must be used to determine screen saver/sleep mode compliance.**

11.8.4.1. The scale shall not enter the screen saver/sleep mode when the scale is at other than a zero load condition unless the scale is automatically powered off. **Yes** ☐ **No** ☐ **NA** ☐

To verify that power has been turned off during the sleep mode, apply a test load on the scale and monitor the condition of the display until the screen saver/sleep mode is enabled and the display goes blank. Changing the load on the scale and depressing operator or customer-operated keys cannot activate the display.

Turned the scale back on with the power switch/button weight on the scale, the scale must return to zero, or display an error code or other meaningless information.

As soon as the scale is ready to weigh, check the "warm-up" accuracy of the scale by placing a test load of one-half scale capacity (or maximum available weight if one-half capacity is not available). The weight indication shall be within applicable tolerance. **Yes** ☐ **No** ☐ **NA** ☐

11.8.4.2. If the primary weight display disappears in the screen saver/sleep mode with the scale at zero and the power to the scale is not automatically shut off, the display must comply with a or b below:

(a) The zero indication or zero annunciator must be displayed, or defined if zero is indicated by other than a digital zero indication or annunciator. **Yes** ☐ **No** ☐ **NA** ☐

If a legend is used to define zero, it must be included adjacent to the display to indicate that the information (dashes, scrolling message, and etc.) indicate the scale is on zero. **Yes** ☐ **No** ☐ **NA** ☐

The screen saver/sleep mode shall be deactivated and the continuous weight display automatically returns under the following conditions unless means are provided to inhibit a weighing transaction until the scale has returned to a digital zero indication: **Yes** ☐ **No** ☐ **NA** ☐

The scale drifts above zero **Yes** ☐ **No** ☐ **NA** ☐
Weight is added to the scale **Yes** ☐ **No** ☐ **NA** ☐
The scale drifts below zero **Yes** ☐ **No** ☐ **NA** ☐
The scale is in an overcapacity condition. **Yes** ☐ **No** ☐ **NA** ☐

(b) Means are provided to inhibit a weighing transaction until the operator has returned the scale to a digital zero indication. **Yes** ☐ **No** ☐ **NA** ☐

**8. Indicating and Recording Elements - General (page ECRS-10)**

**Code Reference: G-S.5.1., G-S.2., and S.1.12.**

A point-of-sale (POS) system shall be designed to provide clear, definite, and adequate indications. Its features and operations shall be designed so that they minimize the potential of both intentional or unintentional errors. The price-look-up (PLU) capability shall prevent the interaction of weight and nonweight PLUs, (e.g., weight-related PLUs must require a weight input and nonweight PLUs shall not respond to weight input). Manual weight entries are permitted only under specific conditions. Transaction information shall not be lost or unrecorded in the event of a power failure.

Computing scales that have both the multiple sales accumulation capability and price-look-up capability that can operate simultaneously are considered to be electronic cash registers. These systems shall issue sales receipt tapes that are similar to those issued by cash registers. If the total prices computed using PLUs cannot be included in the sales accumulation capability, the scale is not required to issue a cash register receipt.

*An increasing number of POS system manufacturers and distributors have been replacing the primary gross weight indication provided by the POS scale (either built into the scale or a pedestal mounted display) with a primary and continuous gross weight indication included as part of the customer display provided by the POS manufacturer or distributor. The primary and continuous weigh indications, that are the only source of the primary gross weight information, are considered primary indicating elements and shall be evaluated according to Publication 14, Chapter 1, Digital Electronic Scales.*

Paragraphs 8.1. through 8.9. remain unchanged.

**12. NTEP Evaluations and User Requirements in the Scales Code**

**Source:** Maryland NTEP Participating Laboratory

**Background:** There has been some recent discussion that NTEP should not be evaluating devices for user requirements.

At its 2001 meeting, the Sector recommended that Steve Cook, NIST Technical Advisor, and Stephen Patoray, NTEP Director, work together and review Publication 14 to verify that all checklist requirements and procedures are referenced to applicable Handbook 44 paragraphs. During the process of converting NCWM Publication 14 2000 edition from WordPerfect to MS Word, the NTEP Director and the NIST Technical Advisor corrected any remaining references to "User Requirements."

**Recommendation:** The NIST Technical Advisor and NTEP Director have deleted nearly all references to User Requirements and replaced them with appropriate references to Specifications, Tolerances, and Test Notes. No evaluation criteria were deleted. No further action was required on this item.

**13. NTEP Technical Policy Publication 14 Section B.5.b. Change Platform Area to Length and Width**

**Source:** 2001 Weighing Sector Item 22

**Background:** During a discussion of a proposal from the Maryland Participating Laboratory to change Publication 14 Section B.5.b. Weighing Systems, Scales, or Load-receiving elements of 30 000 lb or Less, the Sector asked the SMA technical committee to draft platform size criteria (for scales less than or equal to 30 000 lb) for capacities that are between the capacities submitted for evaluation. For example, if two scales are submitted for evaluation (a 3'x3', 2000 lb and a 8'x10', 10 000 lb), what are the platform size parameters that can accepted on the CC for intermediate capacities (8'x10', 2500 lb)?

**Discussion/Conclusion:** The participating Laboratories discussed this item prior to the sector meeting and agreed that the only way to interpret the existing guidelines is that any capacity not tested can be as large as the next higher capacity tested. The Sector concurred with the participating laboratories interpretation and reported that there have been no reported problems. The Sector agreed to recommend that Publication 14, Section B. Certificate of Conformance Parameters, guideline 7. Weighing Systems, Scales, or Load-Receiving Elements of 30 000 lb or Less be amended as

follows to clarify that in a family of scales, the next size larger or smaller of the device tested can be covered on the Certificate of Conformance provided they do not exceed the next size of device tested.

**7. Weighing Systems, Scales Or Load-Receiving Elements Of 30 000 lb Capacity or Less**

**Note:** When submitting a family of devices that has capacities above and below 30 000 lb, the average of the highest and lowest capacities listed on the application will be determined. If the average is at or below 30 000 lb, the guidelines in Section 7 will be used as the selection criteria. If the average is above 30 000 lb, the guidelines in Section 8 will be used as the selection criteria. Scale families that are evaluated under Section 7 guidelines cannot extend the maximum capacity of the family without further evaluation. The applicant may request that Section 8 criteria be applied to take advantage of the 50 % to 135 % capacity range (8.1.a.) provided all other requirements of Sections 8 and 8.1 are met. The applicant should be aware of the differences in the selection criteria and what can be covered on the Certificate of Conformance based upon the applicable criteria.

The models to be submitted for evaluation shall be those having:

a. the lowest capacity and the highest capacity[1]
b. the largest platform area for each of the capacities submitted
c. the most resolution (highest number of scale divisions)
d. the smallest scale division value (d).

A CC will apply to all models that:

a. are within the range of capacities,
b. have platform areas up to but not larger than that evaluated at each capacity, with lengths or widths no greater than 125 % of either dimension tested (i.e. If a 5' x 5' scale is tested and passes evaluation, then a 6' x 4' scale could be included on the CC. A 3' x 8' scale could not be included without additional testing),
   ~~i. have platform areas for intermediate capacities not submitted for evaluation up to but not larger than the next higher capacity submitted for evaluation, (i.e. If a 2000 lb 3' x 3' and 10 000 lb 8' x 10' scales were submitted for evaluation, then the CC would cover a 3000 lb capacity scale a platform area up to 80 ft$^2$).~~
c. have platform areas *for intermediate capacities not submitted for evaluation* down to but no smaller than the next lower capacity submitted for evaluation and no larger than the next higher capacity submitted (i.e. If a 2000 lb 3' x 3', 10 000 lb 8' x 10' and a 25 000 lb 12' x 12' scales were submitted for evaluation, then the CC would cover a 5000 lb capacity scale with a platform area down to 9 ft$^2$ and up to 80 ft$^2$),
~~e~~d. have the same number of scale divisions or fewer,
~~d~~e. are within the range of the values of the scale division,
   ~~e~~f. have a platform construction with material similar to that of the equipment evaluated.

**New Items**

**14. Publication 14 Changes to Reflect NCWM Changes to Handbook 44, 2003 Edition**

**Source:** NIST WMD (formerly OWM)

**Background:** The following items (a to c) represent amendments to NIST Handbook 44 requirements based on changes accepted at the July 2002 NCWM Annual Meeting. Recommendations from the Sector will be submitted to the NTEP Committee for consideration to amend NCWM Publication 14 Technical Policy, Checklists, and Test Procedures.

### 14.(a). Examples of Manufactured, Repaired, and Remanufactures Devices and Elements

**Background:** During its 2002 Annual Meeting, the NCWM agreed that the examples of manufactured, repaired, and remanufactured devices and elements be posted on the NCWM or NIST websites for review and comment. The NCWM agreed with the S&T Committee's recommendation that new examples of these devices not currently listed be reviewed by the appropriate NTETC Sector for a recommendation on whether the device needs supplemental markings indicating that it has been remanufactured or that the repair or remanufacture results in a device that is no longer covered by its CC. If the Sector determines that the example results in a device no longer covered by a CC, then the Sector will provide the NTEP Committee references to existing Publication 14 technical policies or technical justification and suggested language to amend existing policies.

**Recommendation/Conclusion:** The Sector recommended no further action on this item.

### 14.(b). Definition of "Element"

**Background:** At its 2002 Annual Meeting, the NCWM adopted the following definition of "element."

> **element. A portion of a weighing or measuring device or system which performs a specific function and can be separated, evaluated separately, and is subject to specified full or partial error limits**.

**Recommendation/Conclusion:** The Sector agreed that the definition appears to be consistent with existing references to element in NCWM Publication 14 and recommended no further action on this item.

### 14.(c). S.6.5. Livestock Scales, Nominal Capacity and Marking Requirements

**Background:** At its 2002 Annual Meeting, the NCWM adopted the following new paragraph for the determination of the nominal capacity and marking requirements for livestock scales manufactured after January 1, 2003.

> ***S.6.5. Livestock Scales. - A livestock scale shall be marked with the maximum capacity of each section of the load-receiving element of the scale. Such marking shall be accurately and conspicuously presented on, or adjacent to, the identification or nomenclature plate that is attached to the indicating element of the scale. The nominal capacity of a scale with more than two sections shall not exceed twice its rated section capacity. The nominal capacity of a two-section scale shall not exceed its rated section capacity*.***
> ****Nonretroactive as of January 1, 2003]***

**Recommendation/Conclusion:** The Sector reviewed the proposed language developed by the NIST Technical Advisor and agreed to delete the terms "vehicle scale used as livestock scales." The Sector further recommended that NCWM Publication 14, Chapter 1, Section 5 and Section 64 be amended as follows:

Page DES-22 Section 5

**5. Marking - Livestock, Vehicle, and Railway Track Scales**

**Code References: S.6., S.6.5., Table S.6.3.a., and Table S.6.3.b.**

| | | |
|---|---|---|
| 5.1. | The section capacity of ~~a~~ railway track and livestock scales shall be marked on or adjacent to the identification badge on the indicating element. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 5.2. | ~~A v~~Vehicle~~,~~ or axle-load~~, or livestock~~ scales shall be marked with the concentrated load capacity of the scale. Such marking shall be identified as "concentrated load capacity" or by the abbreviation "CLC" and shall be accurately and conspicuously shown: | **Yes** ☐ **No** ☐ **NA** ☐ |
| 5.2.1. | On, or adjacent to, the identification or nomenclature plate that is attached to the indicating element of the scale; and | **Yes** ☐ **No** ☐ **NA** ☐ |

5.2.2. On the load-receiving element of the scale. These capacity markings shall be added to the load-receiving element of any such scale not previously marked at the time of modification. **Yes** ☐ **No** ☐ **NA** ☐

~~5.3. If a vehicle scale is marked with maximum load ratings in addition to the required CLC, the ratings shall not exceed the maximum specified in UR.3.2.1. below and the accompanying table.~~ ~~**Yes** ☐ **No** ☐ **NA** ☐~~

5.3. ~~5.4.~~ The marked nominal capacity on all vehicle~~,~~ and axle-load~~, and livestock~~ scales shall not exceed the concentrated load capacity times the quantity of the number of sections in the scale minus 0.5. **Yes** ☐ **No** ☐ **NA** ☐

5.4 ~~5.5~~ Combination railway track/vehicle, and combination vehicle/livestock scales shall be marked with (1) the nominal capacity and CLC for vehicle weighing, and (2) the nominal capacity and section capacity for railway and livestock weighing. The $e_{min}$ for both vehicle weighing and railway weighing shall also be marked. **Yes** ☐ **No** ☐ **NA** ☐

**Note:** Combination scales (railway track /vehicle, and vehicle/livestock) shall be marked with all required information.

Page DES-25 Section 5 Marking - Livestock, Vehicle and Railway Track Scale. Delete Table UR.3.2.1. Span Maximum Load (references a User Requirement)

Page DES-84 Section 64 Performance and Permanence Tests for Livestock Scales

**64. Performance and Permanence Tests for Livestock Scales**

64.1. Initial Type Evaluation (Field) Performance Tests

64.1.1. Performance Tests for Livestock Scales with 2 Sections:

64.1.1.1. Conduct two sets of increasing load and shift tests over each corner at 1/4 the nominal capacity of the scale. Be careful not to exceed the ~~CLC~~ section capacity of a section when loading the weights. Record increasing/decreasing load indications as you add weights to or remove weights from the platform in at least five equal intervals. For the first set, perform this test on each corner and check zero balance before going on to the next corner. For the second set, complete the increasing load build up on one corner and move the weights to the next corner without unloading the scale. For each set when all the weights have been removed, record the return to zero. The scale must return to zero within one-half of a scale division. When analyzing the return to zero, consider the length of time the load was on the scale and for possible temperature changes that may have occurred during the test. Next, conduct an increasing/decreasing load test to the scale nominal capacity or at least to the used capacity by distributing the test load over the platform in at least five equal intervals and record the error for each interval.

64.1.2. Performance Tests for Livestock Scales with More than 2 Sections:

64.1.2.1. At least two complete sets of shift tests shall be conducted over each section. This is to determine the repeatability of the scale. Each set must include determination of error at a minimum of five intervals of test loads up to 90 % of the ~~CLC~~section capacity repeated over each section. For the first set, perform this test on each section, unloading the weights and checking zero balance before going on to the next section. For the second set, complete the increasing load build-up on one section and move the weights to the next section without unloading the scale. Take several readings as the weights are being removed. When all the weights have been removed, record the return to zero. The scale must return to zero within one-half of a scale

division. When analyzing the return to zero, consider the length of time the load was on the scale and for possible temperature changes that may have occurred during the test. Determine scale errors at more points if desired. Avoid decreasing load tests when testing a section. Next, conduct an increasing load test to the scale nominal capacity or at least to the used capacity by distributing the test load over the platform in at least five intervals and record the error for each interval. Be careful not to exceed the ~~CLC~~section capacity or a section when loading the weights and distribute loads across the section. Record decreasing load indications as you remove weights from the platform in at least five intervals.

Conduct decreasing load tests after the sections have been tested to their maximum load and the weights are removed from the scale.

**Note**: Decreasing load tests only apply to automatic indicating devices.

64.1.3. At least one complete set of shift tests to at least 90 % of the ~~CLC~~ section capacity shall be conducted at mid-span between sections.

64.3. Permanence Test Minimum Use Requirements

64.3.3. For livestock scales with a nominal capacity over 75 000 lb:

64.3.3.1. 50 % of the loads must be above 50 000 lb or 80 % of the ~~CLC~~section capacity, whichever is greater; and

64.3.3.2. 100 % of the loads must be above 20 000 lb or 50 % of the ~~CLC~~section capacity, whichever is greater.

64.3.4. For all other scales:

64.3.4.1. 50 % of the loads must be above 50 % of the scale capacity; and

64.3.4.2. 100 % of the loads must be above 20 % of the scale capacity.

64.3.5. The minimum number of days that a device is required to be in use is 20 days. A minimum number of weighing operations to be conducted each day for the test period is not specified; however, the weighments should represent the scale's normal in-service use.

64.3.6. The device will be tested to at least the ~~CLC~~ section capacity on the second test.

**Note:** Substitution or strain test methods are acceptable as long as all conditions above are met.

**15. Publication 14, Incorporation of OIML R 60 with Exceptions**

**Source:** NTEP Committee

**Background:** In view of the increased interest for bilateral and mutual recognition of test data agreements, it has been suggested to the NCWM NTEP Committee and the Board of Directors that the incorporation of OIML R 60 Edition 2000 (E) Metrological Regulation for Load Cells into Publication 14 would be a logical step towards these agreements. There are a very few NIST Handbook 44 references to load cells. Therefore, few changes would be necessary to make OIML R 60 compatible with Handbook 44. The load cell test facilities at the NIST Force Group have already demonstrated that they can generate internationally accepted test data. The Force Group also has the ability to test for changes in barometric pressure.

For load cells without electronics (analog load cells), the major differences that must be addressed are:

1. There is an extra tolerance step (Table 2, page LC-3) currently in Publication 14 that is supported by Handbook 44 tolerances for scales. Harmonization would likely require a change to Handbook 44 to support the application of OIML R 60 tolerances.
2. One-hour time dependence test in Publication 14 is not compatible with the OIML R 60 30-minute Creep Test. This may also require a change to Handbook 44 paragraph T.N.4.5. Time Dependence (either as separate language for load cells or as an amendment to the one-hour time requirement to more closely align with R 76 and R 50).
3. There is no equivalent Accuracy Class III L in OIML R 60. This may have to remain in Publication 14 as an exception.
4. Accuracy class marking requirements (A, B, C, D) in OIML R 60. This may also require a change in NIST Handbook 44 (for load cells manufactured after January 1, 200X).
5. Humidity markings and testing in OIML R 60 would require a change in Handbook 44 to support marking and testing of load cells for humidity.

Other differences include the selection criteria for the load cell to be submitted for test and is described on page 16 and Annex B in OIML R 60.

The NIST Technical Advisor is not aware of any discussions regarding the testing of load cells with electronics (digital load cells). Additional OIML R 60 testing includes tests for warm-up time, power supply variations, short-term power reductions, bursts, electrostatic discharge, electromagnetic susceptibility, and span stability.

**Recommendation/Conclusion:** The Sector discussed the above recommendations. The NTEP Director provided additional background information and indicated that no changes need to be made to Handbook 44 because load cell certificates are based upon data evaluation and the same data can be used to verify compliance with Handbook 44 and OIML R 60. Darrell Tonini stated that he would bring this subject up to the Scale Manufacturers Association Technical Committee and refer their comments to the NTEP Director.

The Sector recommends no action on this item.

**16. Vehicle Scale Testing Procedures**

**Source:** NTEP Participating Laboratories

**Background:** At the 2002 Participating Laboratory Meeting, the various labs demonstrated the procedures used to test vehicle scales. The exercise demonstrated that the participating labs were correctly testing the scales. However the language in the current procedures may cause an evaluator to conduct additional testing. The NTEP Participating Laboratories have amended the existing vehicle scale test procedure that offers additional clarity to the procedures and promotes the uniform application of test weights and test loads.

**Discussion:** The Sector reviewed and discussed the two proposals to amend the vehicle scale test procedures. The procedures are included with the attachment for Agenda Item 16.

The first proposal breaks up the long paragraphs in Publication 14, 2002 Edition vehicle scale test procedures in (hopefully) easier to follow steps. The second proposal is included in a letter from Ross Anderson, NY, describing the vehicle test procedures that include the steps in a table format and describes test weights and weight cart positions and usage. Ross Anderson will present additional proposed language, at the Sector meeting. The Sector also reviewed a Power Point presentation developed by Ross Anderson. Additionally, the Sector reviewed information provided by the Ohio participating laboratory for possible Checklist Items and Test Report Forms.

The Maryland participating laboratory indicated that section 65.a.3.1.(a) is confusing and recommended deleting the last half of the paragraph.

The manufacturers were concerned about conducting a 5-point increasing load test in conjunction with the shift test. For scales with a large concentrated load capacity rating, this represents a lot of weight on the scale for a long lime and increases the possibility of a zero change due to creep. It was pointed out that Publication 14 recognizes that consideration must be given for the length of time the load was on the scale and possible temperature changes that may

have occurred during the test. *(The NIST Technical Advisor noted the above consideration is located in Section 65a.4.5. Strain Load Test and will add a similar statement to Section 65a.3. Shift Tests in the list of recommended editorial changes to the 2003 Edition of Publication 14.)*

It was noted that the basic differences between the two proposals is that the proposal from Ross Andersen includes the 5-step increasing and decreasing load while conducting the strain test. Publication 14, as written in Section 65a.4., does not include the 5-step increasing load test as part of the strain test.

The discussion shifted to the concern raised in the Ross Andersen proposal regarding the use of weight carts because the position of the fully loaded carts would place a large load in an area of the deck that is smaller than the typical truck wheel span.

Many of the manufacturers indicated that there was no problem with using weight carts in this manner. The maximum amount of weight down the centerline of the scale using typical weight carts would be 20 000 lb to 30 000 lb. The manufactures have a greater concern with placing weight carts end to end thereby increasing the test pattern, which results in an inadequate test to the CLC rating of the scale.

The participating laboratories indicated that applicants should be made aware of the test equipment provided by the labs selected to conduct the evaluation. Applicants are already responsible for providing additional weights and equipment necessary to conduct the evaluation. If the applicant is concerned about the use of weight carts, then they should be responsible for providing adequate test weights and equipment.

**Conclusion:** This subject will be carried over to the next meetings of the NTEP Participating Laboratories and the NTETC Weighing Sector for further clarification of the strain load test procedures and how to respond to changes to zero when a test load is on the scale for an extended period of time.

The Sector agreed to support the proposal developed by the participating laboratories with the clarification recommended by the Maryland participating laboratory and recommends the following amendments to Publication 14, Chapter 1, Section 65(a)3.1. through 65(a).3.3. (page DES-86):

65a.3.1. Shift Tests. Conduct at least two complete sets of shift tests over each section to at least 90 % of the rated concentrated load capacity (CLC) of the scale. ~~This is to determine the repeatability of the scale. Determine the scale error at a minimum of five equally spaced test loads. Determine scale errors more points if desired. If two weight carts are used, they should travel along the paths the wheels of a vehicle would take when moving across the scale. Decreasing load tests are to be avoided when testing a section. Do not back a truck onto the scale in order to place weights on the inner sections. Conduct decreasing load tests after testing the sections to their maximum load and remove the weights from the scale. Do not exceed the CLC capacity. Distribute the load across the section.~~ A single complete shift test is defined in steps a through d. When analyzing the return to zero, consideration must be given for the length of time the load was on the scale and possible temperature changes that may have occurred during the test.

a. The shift test will be conducted by loading one end section to the first of at least five test loads, moving the load to each section.

b. Record the error moving the load to each section until the opposite end of the scale is reached, recording the error at each section and at each load.

c. ~~d.~~ Repeat the shift test procedure above in steps a, and b above for each weight increment until at least 90 % of the CLC is reached. While at the maximum test load, locate the test weights and record the errors at each section, mid-span between sections, and on modular scales, each on the right and left side of the module connection line located at each section.

d. ~~e.~~ Conduct a decreasing load lest on the section at the end of the scale where the weights can be reloaded.

(**Note**) If possible, the first increment of test weights should equal 500e. If weights cannot be conveniently applied that equal 500e, the first load should equal just below 500e as nearly as possible. The other tolerance breakpoints should be tested if possible.

~~65a.3.3. If a scale consists of modules that are connected together to comprise the weighbridge, conduct shift tests by placing the load so that it straddles the connection between the modules. Later, conduct at least one shift test on the scale with the test load placed first on one side of the connection line off the module then on the other side of the connection line.~~

~~65a.3.4. The results of shift tests must agree within the absolute value of the applicable maintenance tolerances and must be within acceptance tolerances~~

65a.4. Strain Load Test . . . .

**17. Publication 14, Section 7, Footnote 1 on DES-3**

**Source:** NTEP Participating Laboratories

**Background:** In footnote for Publication 14, Section 7 the phrase "narrow range" is confusing and facilitates different interpretations of device selection criteria. The current location of the footnote in (a) makes it impossible to comply with (d) without having to submit a second device. Additionally, there is a problem with the interpretation of the language in the footnote. Is the capacity in the middle of the 2:1 range of capacities submitted for test defined as a narrow range or is a narrow range defined as a 4:1 range of capacities? If the range is 50, 100, and 200, do you test the 100. If the range is only 2:1, which scale is tested, the 100 or the 200? – Footnote is useless or does the footnote supersede the specific requirements in d?

**Discussion:** There were several suggestions to delete the footnote. However, it was noted that the problem of narrow range families of scales still existed. One of the manufactures suggested establishing upper limits to the range of capacities in defining a family of scales similar to what they have experienced with other countries in addition to better defining what is considered a narrow range and suggested the ratio of capacities be limited to 10:1 when defining the limits to a range of capacities.

There were also concerns among the participating laboratories about eliminating the requirements for testing smallest division size ($e_{min}$) and largest capacity for families with a narrow range. Many of the Sector members stated that it is not technically correct to test a single device with two different capacities and $e_{min}$ values because it was likely the manufacturer would use different load cells and strengths of steel for the different scales.

The Sector requested that the NTEP Director and NIST Technical Advisor develop criteria and examples to clarify the existing language. The criteria and examples were developed overnight and reviewed the next day. The guidelines established that the highest and lowest capacities must be submitted for evaluation if the range of capacities in the family is 10:1 or less. Additional capacities must be submitted if the range is wider than 10:1. A narrow range is defined as a 2:1 range of capacities. Only one device is required for evaluation if conditions 7(b), 7(c), and 7(d) are met; otherwise, two devices shall be submitted. There was general agreement on the amended criteria, footnotes and examples.

**Conclusion:** The Sector recommended that Publication 14, Chapter 1, Technical Policies B7 for Weighing Systems, Scales, or Load-Receiving elements of 30 000 lb or Less be amended as follows:

7. Weighing Systems, Scales or ~~Weighing~~ Load-Receiving Elements of 30 000 lb Capacity or Less

7.1. The models to be submitted for evaluation shall be those having:

a. The lowest capacity and the highest capacity[1]

[1] For the family, the range of capacities from lowest to highest shall not exceed a 10:1 ratio. To cover a wider range of capacities additional devices in the family will be tested. If the range of capacities is quite narrow and is a ration of less than or equal to 2:1, it ***may*** be that only one device near the mid-range needs to be submitted. For example, a family of scales with a narrow range of capacities from 500 lb to 1000 lb, the manufacturer could submit one model near the

b. The largest platform area for each of the capacities submitted
c. The most resolution (highest number of scale divisions)
d. The smallest scale division value (d).

[1] ~~If the range of capacities is quite narrow (e.g., 50 lb, 100 lb, and 200 lb) and is a ratio of less than or equal to 2:1, it may be that only a device near mid range needs to be submitted. If the range of capacities is extremely wide (e.g., 10 lb to 10 000), it may be necessary that a device near mid range also be submitted.~~

~~Example: For a family of scales with a range of capacities from 500 lb to 999 lb, the manufacturer could submit one model with a capacity of 750 lb. If the 750 lb model successfully passed full evaluation, the entire family could be covered by the CC. If the range for a family included capacities from 10 lb to 100 lb, the manufacturer would be required to submit three devices. The devices required to be submitted for evaluation would include the highest and lowest capacity as well as one near mid range.~~

For the family, the range of capacities from lowest to highest shall not exceed a 10:1 ratio. To cover a wider range of capacities additional devices in the family will be tested. If the range of capacities is quite narrow and is a ratio of less than or equal to 2:1, it ***may*** be that only one device near the mid-range needs to be submitted. For example, a family of scales with a narrow range of capacities from 500 lb to 1000 lb, the manufacturer could submit one model near the midrange with a capacity of 750 lb. If no midrange device is available, the largest capacity device ***may*** be evaluated. In all cases, requirements found in items b. c. and d. must be met.

Examples: for a family from 10 lb to 100 lb, a 10 lb and a 100 lb would be evaluated
for a family from 10 lb to 1000 lb, a 10 lb, a 100 lb and a 1000 lb device would be evaluated
for a family of 30 x 0.01 lb and 50 x 0.01 lb, the 50 lb device would be evaluated
for a family of 30 x 0.01 lb and 50 x 0.02 lb, the 30 lb device would be evaluated
for a family of 15 x 0.005 lb and 30 x 0.01 lb, the 15 lb device would to be evaluated (meets b, c, & d)
for a family of 2500 x 0.5 lb and 5000 x 1 lb the 2500 lb device would be evaluated (meets b, c, & d)

7.2. A CC will apply to all models that:

**18. Define Bench/Counter Scales**

**Source:** NTEP Laboratories

**Background:** There is some confusion in the classification of bench/counter scales and floor scales and the location of test load while performing a shift test. Bench and counter scale shift tests are conducted with a half capacity test load centered successively at four points equidistant between the center and the front, left, back and the right edges of the load-receiving element (N.1.3.1.). Shift tests on other platform scales are conducted with a one-half capacity test load centered, as nearly as possible, successively at the center of each quadrant. Additionally, manufacturers frequently design a family of scales that can be used on a bench or on the floor. Automatic zero setting mechanism requirements are different based upon the classification of the scale. Bench or counter scales have an automatic zero-setting mechanism (AZSM) limitation of 0.6 e where "other than bench or counter" scales have an AZSM limitation of 1.0 e.

**Discussion:** The Sector considered amending the current definition of a counter scale that limits the capacity or recognize the differences in the test pattern based upon the number of load bearing points and Handbook 44 shift test paragraphs as shown below: (Note: If it is determined that a capacity limitation is suitable for the definition, the Canadian Technical Advisor would prefer that 100 kg (200 lb) be the limit between bench and floor scale.)

---

midrange with a capacity of 750 lb. If no midrange device is available, the largest capacity device ***may*** be evaluated. In all cases, requirements found in the items b. c. and d. must be met.

Examples: for a family from 10 lb to 100 lb, a 10 lb and a 100 lb would be evaluated
for a family from 10 lb to 1000 lb, a 10 lb, a 100 lb, and a 1000 lb device would be evaluated
for a family of 30 x 0.01 lb and 50 x 0.01 lb, the 50 lb device would be evaluated
for a family of 30 x 0.01 lb and 50 x 0.02 lb, the 30 lb device would be evaluated
for a family of 15 x 0.005 lb and 30 x 0.01 lb, the 15 lb device would be evaluated (meets b., c., & d.)
for a family of 2500 x 0.5 lb and 5000 x 1 lb, the 2500 lb device would be evaluated (meets b., c., & d.)

**counter scale.** One that, by reason of its size, arrangement of parts, and ~~moderate~~ nominal capacity no greater than 100 kg (200 lb), is adapted for use on a counter or bench. Sometimes called "Bench scale" [2.20] (***Note:*** *There are single load cell load-receiving elements up to 600 lb capacities and there are four load cell load-receiving elements down to at least 25 lb capacities.*)

**N.1.3.1. Bench or Counter Scales.** – For bench or counter scales with a single platform support, a ~~A~~ shift test shall be conducted with a half capacity test load centered successively at four points equidistant between the center and the front, left, back, and right edges of the load-receiving element. Bench or counter scales with four platform supports, a shift test shall be conducted with a half-capacity test load centered, as nearly as possible, successively at the center of each quarter of the load receiving element, or with a quarter-capacity test load centered, as nearly as possible, successively over each main load support.

**N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers.** - For all scales with four platform supports, a ~~A~~ shift test shall be conducted with a half-capacity test load centered, as nearly as possible, successively at the center of each quarter of the load-receiving element, or with a quarter-capacity test load centered, as nearly as possible, successively over each main load support. For scales with a single platform support, a ~~A~~ shift test shall be conducted with a half-capacity test load centered successively at four points equidistant between the center and the front, left, back, and right edges of the load-receiving element.

The Sector also considered the following alternative language submitted by Bill West and Darrell Flocken:

**counter scale.** A scale ~~One~~ that, by reason of its size, arrangement of its parts and moderate nominal capacity no larger than 200 lb (100 kg), is adapted for use on a counter, table, or bench,. Sometimes called a "bench scale". A counter scale will be a class III scale. [2.20]

**floor scale.** A scale designed to be placed on the floor or permanently installed in a pit. Nominal capacity will generally be larger than 200 lb (100 kg). Sometimes called a "platform scale". A floor scale may be either class III or III L, depending on the intended use, as long as all parameters for the intended class are met. [2.20]

The Sector also discussed the bench/counter scale terminology in NCWM Publication 14 2002 Edition, Section 62.3, Shift Test Procedures (page DES 77). The Sector agreed to remove the bench, counter and "other platform scale" terminology and conduct the shift test based upon the design of the scale (single load cell or more than one load support).

Further Sector discussions noted that the classification of bench/counter scales as floor scales has lead to confusion about where to place the test load when performing a shift test. Sometimes the same scale could be placed either on a counter or bench resulting in different shift test positions since paragraph N.1.3.1. describes test load positions for bench/counter that are different than the test load positions described in N.1.3.8. for other (platform) scales. Currently NIST Handbook 44 for bench/counter scale shift tests are conducted with a half capacity test load centered successively at four points equidistant between the center and the front, left, back and the right edges of the load-receiving element (paragraph N.1.3.1.). Shift tests on other types of platform scales are conducted with a one-half capacity test load centered, as nearly as possible, successively at the center of each quadrant. Additionally, manufacturers have indicated that it is an unfair test to place one-quarter scale capacity on the corners of a single load cell scale when compared to placing one-quarter scale capacity in the corners of a scale with four load supports.

**Conclusion:** The Sector agreed to submit a recommendation to the NCWM S&T Committee amending the definition of counter scales and paragraphs N.1.3.1. and N.1.3.8. as follows:

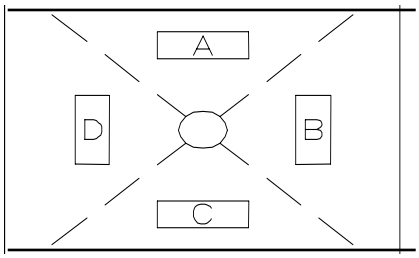
**counter scale.** ~~One that~~ A scale, that by reason of its size, arrangement of parts, and ~~moderate~~ nominal capacity no greater than 100 kg~~, is adapted for use on a counter or bench~~. Sometimes called "bench scale" [2.20]

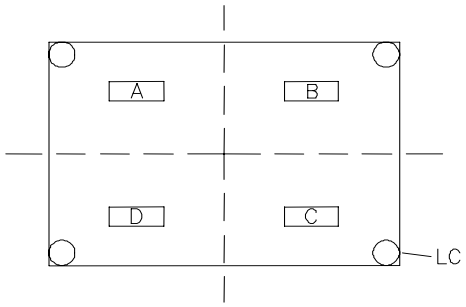
**N.1.3.1. Bench or Counter Scales.** – For bench and counter scales with a single platform support, a ~~A~~ shift test shall be conducted with a half capacity test load centered successively at four points equidistant between the center and the front, left, back, and right edges of the load-receiving element. For bench and counter scales with four platform supports, a shift test shall be conducted with a half-capacity test load centered, as nearly as possible, successively at the center of each quarter of the load receiving element, or with a quarter-capacity test load centered, as nearly as possible, successively over each main load support.

**N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers.** - For all scales with four platform supports, a ~~A~~ shift test shall be conducted with a half-capacity test load centered, as nearly as possible, successively at the center of each quarter of the load-receiving element, or with a quarter-capacity test load centered, as nearly as possible, successively over each main load support. For scales with a single platform support, a ~~A~~ shift test shall be conducted with a half-capacity test load centered successively at four points equidistant between the center and the front, left, back, and right edges of the load-receiving element.

Additionally, the Sector recommends the following changes to NCWM Publication 14, Section 62.3, page DES-77 as follows:

~~**Bench, Counter or Hanging Scales**~~ ~~**Other Platform Scales**~~
~~(one single load cell)~~ ~~(More than one single load cell)~~
**Platform Scales With One Single Load Cell** **Platform Scales With More Than One Load Support**




**19. Definitions of Hanging and Crane Scales**

**Source:** NTEP Participating Laboratories

**Background:** It has been recognized that there are some inconsistencies in NIST Handbook 44 and NTEP Certificates of Conformance (CC) with reference to crane scales. Table 3 footnote 3 indicates that a crane scale can have a capacity as low as 500 lb. The only difference appears to be that hanging scales can only be installed where suspended from fixed supports and crane scales can only be installed in overhead track-mounted cranes. CCs have been issued with capacities of scales from 250 lb to 5000 lb, with both III and III L Accuracy Class designations, and both hanging and crane scale device classifications. The NIST Technical Advisor has observed large-capacity scales installed on overhead track-mounted cranes that can just as easily be installed on other types of cranes and supporting structures. The participating laboratories are of the opinion that the condition of the scale support (overhead crane, fixed support, etc.) should not be a factor in determining device type.

**Discussion/Conclusion:** The Sector agreed to make the following recommendation to the S&T Committee to remove the crane scale definition, define hanging scale, remove the reference to crane scale from Table 7a and paragraph N.1.3.8., and change remaining crane scales references to hanging scale in NIST Handbook 44:

Add a definition of hanging scale and remove the definition of crane scale, and amend Table 3 Parameters for Accuracy Classes footnote 3, paragraph N.1.3.8. and paragraph T.N.3.4., and Tables 7a and 7b as follows:

hanging scale. A scale designed to weigh loads while they are suspended from a hook on the scale or loads resting on a platter or platform that is suspended from the scale. Hanging scales may be any capacity and may be Class III or III L, whichever is appropriate for the intended use, as long as all parameters for the intended class are met. Sometimes called "crane scale."

~~crane scale. One with a nominal capacity of 5000 pounds or more designed to weigh loads while they are suspended freely from and overhead, track-mounted, crane. [2.20]~~

*[3] The values of a scale division for ~~crane~~ Class III L hanging and hopper (other than grain hopper) scales shall not be less than 0.2 kg (0.5 lb). The minimum number of scale divisions shall be not less than 1000.*

N.1.3.8. All Other Scales Except ~~Crane Scales,~~ Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers.

T.N.3.4. ~~Crane~~ Class III L Hanging and Hopper (Other than Grain Hopper) Scales. – The maintenance and acceptance tolerances shall be as specified in T.N.3.1. and T.N. 3.2. for Class III L, except that the tolerance for ~~crane~~ Class III L hanging and construction materials hopper scales shall not be less than 1d or 0.1 % of the scale capacity, whichever is less.

| **Table 7a.<br>Typical Class or Type of Device for Weighing Operations** | |
|---|---|
| Class | Weighing Application or Scale Type |
| I | Precision laboratory weighing |
| II | Laboratory weighing, precious metals and gem weighing, grain test scales |
| III | All commercial weighing not otherwise specified, grain test scales, retail precious metals and semi-precious gem weighing, animal scales, postal scales, scales used to determine laundry charges, hanging, and vehicle on-board weighing systems |
| III L | Vehicle, axle-load, livestock, railway track scales, ~~crane~~hanging, hopper (other than grain hopper) scales, and vehicle on-board weighing systems |
| IIII | Wheel-load weighers and portable axle-load weighers used for highway weight enforcement |
| Note: A scale with a higher accuracy class than that specified as "typical" may be used.<br>(Amended 1985, 1986, 1987, 1988, 1992, and 1995) | |

| **Table 7b.<br>Applicable to Devices not Marked With a Class Designation** | |
|---|---|
| Scale Type or Design | Maximum Value of d |
| Retail Food Scales, 50-lb capacity and less | 1 ounce |
| Animal Scales | 1 pound |
| Grain Hopper Scales<br>Capacity up to and incl. 50 000 lb<br>Capacity over 50 000 lb | <br>10 pounds (not greater than 0.05 % of capacity)<br>20 pounds |
| ~~Crane~~ Hanging Scales – Capacity 5000 lb and over | not greater than 0.2 % of capacity |
| Vehicle and Axle-Load Scales Used in Combination<br>Capacity up to and including 200 000 lb<br>Capacity over 200 000 lb | <br>20 pounds<br>50 pounds |
| Railway Track Scales<br>With weighbeam<br>Automatic indicating | <br>20 pounds<br>100 pounds |
| Scales with capacities greater than 500 lb except otherwise specified | 0.1 % capacity (but not greater than 50 lb) |
| Wheel-Load Weighers | 0.25 % capacity (but not greater than 50 lb) |
| Note: For scales not specified in this table, G-UR.1.1. and UR.1. apply.<br>(Added 1985) (Amended 1989) | |

**20. List of Acceptable Abbreviations and Symbols**

**Source:** New York Participating Laboratory

**Background:** The participating laboratories reviewed a document titled “General Letters, Symbols mathematical - statistical Symbols, and Markings for Legal Metrology” (German) provided by Darrell Flocken, Mettler-Toledo.

Previous sector meetings discussed the German (CECIP) list but decided that many of the symbols were not acceptable to the group.

Canada’s list is an interpretation of the existing statute, and items not on the list are not acceptable for viewing by the customer.

The NIST Technical Advisor has sent a copy of the document to the participating weighing labs for their suggestions of acceptable symbols and symbols that are not acceptable to be viewed by the customer.

The participating Measuring Device Laboratories are also concerned with the use of symbols. Where practical, proposed lists of symbols should be consistent among the Weighing Devices, Liquid Measuring Devices and other applicable sections in NCWM Publication 14.

**Discussion/Conclusion:** The participating laboratories reported that there has been no progress on this item. Darrell Tonini (SMA) reported that the SMA Technical Committee was working on a similar document that should be ready in time for the next meeting of the participating laboratories. The NIST Technical Advisor will distribute the SMA document as soon as it becomes available. The Sector Chairman requested that the participating laboratories review and comment on abbreviations in both documents and prepare a proposal for consideration prior to the 2003 meeting of the Weighing Sector. Examples of questionable symbols and abbreviations that are part of an active evaluation will be reviewed by participating laboratories and NTEP Director on a case-by-case basis for a determination of the acceptability of the symbol or abbreviation.

**21. Shift Testing on Multi-Interval Scales**

**Source:** Ohio Participating Laboratory

**Background:** Publication 14, Section 31, page DES-49 does not address shift tests on multi-interval scales. The participating laboratories have been taught to treat each range as a separate scale for the determination of tolerances. Publication 14 is unclear if shift tests for multi-interval devices should be conducted at one-half capacity of each weighing range where the shift test load might end up in the first range; or, if the shift test load should be determined based on the maximum capacity of the scale with the tolerance being based upon the weighing range of the test load.

The NIST Technical Advisor reviewed both OIML and Handbook 44 documents for references to shift tests. Neither document makes any special references to shift test for multi-interval scales.

OIML R 76 paragraph 3.6.2.1. Eccentric loading (page 25) states:

> 3.6.2.1. Unless otherwise specified hereafter, a load corresponding to one-third (1/3) of the sum of the maximum capacity and the corresponding maximum additive tare effect shall be applied." There are no additional references to eccentric loading with respect to multi-interval scales.

NIST Handbook 44 states:

> **N.1.3.1. Bench or Counter Scales.** - A shift test shall be conducted with a half-capacity test load centered successively at four points equidistant between the center and the front, left, back, and right edges of the load-receiving element.

**Discussion**: Some of the Sector members indicated that it is possible to have two test loads in the same range if testing is performed at ½ capacity of each range. Manufacturers also noted that multi-interval and multiple range scales should be treated differently because a multiple range scale with ***n*** ranges is essentially ***n*** number of scales (where ***n*** represents the number of ranges). A multi-interval scale with more than one minimum interval is still one scale. It is technically incorrect for Publication 14 to state that a multi-interval scale has ranges.

**Conclusion:** Darrell Flocken, Mettler-Toledo, volunteered to review US/Canadian training manuals to identify differences between U.S. and Canada. Additionally, they agreed to work with the NIST Technical Advisor in developing Publication 14 shift test procedures for multi-interval scales. The 2003 meetings of the participating laboratories and Weighing Sector will review the procedures.

**22. Manual Multi-Interval Scale**

**Source:** Ohio Participating Laboratory

**Background:** NCWM Publication 14, Chapter 1, Section 32, page DES-51discusses the performance of manual multi-interval scales. The participating laboratories, the NIST Technical Advisor, and the NTEP Director are unaware of any such devices and believe that the language has been carried over from earlier editions where manual multi-interval scales were redefined as multiple range scales.

**Discussion/Conclusion:** The manufacturers reported that no devices of this type are being manufactured. The NIST Technical Advisor reported that this section was drafted prior to the adoption of the current definitions of multi-interval and multiple range devices and that it was intended for scales and indicators that had a physical switch that toggled between two scales or one scale with different capacities and minimum increments. The Sector agreed to recommend that Publication 14 Section 32 Manual Multi-Interval Scales (page DES –52) be deleted.

**23. Inconsistent Information on a CC**

**Source:** Maryland Participating Laboratory

**Background:** It was noted that features and options both metrological and non-metrological are still being included on NTEP Certificates of Conformance (CCs). For example, screen tare should be defined if it is not a well-understood term and "memory recall" should describe what is stored in memory (e.g., tare, gross, net, weights, unit prices, customer information). Features on CCs that have not been successfully tested or evaluated should not be listed on the CC. It was also noted that it is important to list peripheral equipment in test conditions. This subject was discussed during the 1992 Weighing Sector (item 6) but never made it into the Pub 14. Section "Models" to be submitted.

The following is from the June 1992 Weighing Sector Agenda item 6:

**6. Identifying the Main Elements of a Scale on Certificates of Conformance**

***Background and Discussion:*** It was proposed that CCs for Class III L scales should be written for complete scales (that is, list all of the main elements and components used during the evaluation) and that the CC should not be issued for just the weighing/load-receiving elements. It was also commented that the main elements and load cells used to comprise the complete system must be certified components.

NTEP issues separate CCs for main elements and load cells in order that the manufacturer, installer, and user will have the flexibility of choosing from among compatible main elements that have been evaluated by NTEP. It was stated that this substitution can only be made if information about the indicator used in the evaluation of the weighing/load-receiving element is known; this, along with the use of applicable formulas, would enable the customer and weights and measures official to judge whether or not a given indicator is compatible for substitution. This information has not been consistently identified on the CC in the past.

The primary area of concern with this issue appeared to be that of indicators (separable indicating elements) without NTEP CCs being used during NTEP evaluations of large-capacity weighing/load-receiving elements. It was commented that the load cell(s) used during an NTEP evaluation is (are) required to have a valid NTEP CC and that the indicator should also be required to have a valid CC. NTEP has not always required the indicator used during an NTEP evaluation of a weighing/load-receiving element to have a valid NTEP CC. If an indicator without an NTEP CC performed worse than an indicator with an NTEP CC, then the performance of the weighing/load-receiving element may not be as good. If the manufacturer is willing to risk the results of the evaluation by using a non-NTEP indicator, the NTEP laboratories feel that the manufacturer should be permitted to make this choice. It is expected that use of the weighing/load-receiving element with an indicator that has an NTEP CC (as would be required by the weights and measures official) should be better than the performance observed with the non-NTEP indicator.

***Conclusions:*** **The Committee agreed that CCs should detail the main elements, load cells, and auxiliary devices used during an evaluation, including model designation and other significant parameters, under the "Test Conditions" portion of the CC. The Committee agreed that Certificates should not limit a scale system to the specific combination of load cell, indicator, and weighing/load-receiving element used during the type evaluation; substitutions ("mixing and matching") of metrologically equivalent components should continue to be recognized according to current NTEP policy. Each weights and measures jurisdiction should require that the individual main elements and load cells comprising a weighing system (the indicator, load cell(s), and weighing/load-receiving element) each have a valid NTEP CC and that the components are compatible and suitable for the installation. The Committee agreed that NTEP will continue to permit non-NTEP evaluated indicators and peripheral equipment to be used in the evaluation of a weighing/load-receiving element under certain conditions; however, the load cell used in electronic or electro-mechanical devices must have a current NTEP CC.**

**Discussion/Conclusion:** The Sector reviewed the above background information and agreed that the language in the conclusion of the June 1992 Sector Summary would benefit field inspectors and NTEP evaluators. The Sector reconfirmed that non-metrological accessories and peripheral equipment (printing elements, video displays, and etc.) used as part of the evaluation should be listed in the "Test Conditions" paragraph as verification that metrological features such as indicated and recorded representations have been evaluated. Additionally, the Sector reconfirmed that the CC does not limit the use of non-metrological peripheral equipment to those listed.

The Sector recommended that the following underlined language be added to the NTEP Publication 14 Administrative Procedures in paragraph P. Certificate of Conformance to facilitate consistent information included on the Certificate of Conformance.

> P.6. CCs should detail the main elements, load cells, and auxiliary devices used during an evaluation, including model designation and other significant parameters, under the "Test Conditions" portion of the CC. Only the standard features and options that have been evaluated will be included on the CC.

***Technical Advisor Note:*** *The NTEP Committee considered the above recommendation during the 2003 NCWM Interim Meeting. The Committee did not agree with the Weighing Sector and stated that the recommended policy does not affect the administration of NTEP and should be considered as a technical policy. The Committee recommends the participating laboratories and Weighing Sector reconsider the item at their next meetings. The NIST Technical Advisor will submit the following addition to Publication 14., Chapter 1, NTEP Technical Policy for Scales for consideration by the participating laboratories during their next meeting:*

B. Certificate of Conformance Parameters (Page DES-1)

> Certificates of Conformance (CC) should detail the main elements, load cells, and auxiliary devices used during an evaluation, including model designation and other significant parameters, under the "Test Conditions" portion of the CC. Only the standard features and options that have been evaluated will be included on the CC.
>
> The following guidelines apply.

**24. 85 to 240 VAC Voltage NTEP Submissions**

**Source:** Maryland Participating Laboratory

**Background:** Handbook 44 paragraph T.N. 8.3.1. Power Supply, Voltage and Frequency currently states:

> **T.N.8.3.1. Power Supply, Voltage and Frequency.**
>
> (a) Weighing devices that operate using alternating current must perform within the conditions defined in paragraphs T.N.3. through T.N.7., inclusive, over the line voltage range of 100 V to 130 V or 200 V to 250 V rms as appropriate, and over the frequency range of 59.5 Hz to 60.5 Hz.

More devices are being submitted to NTEP for evaluation with larger ranges of voltages than those listed in the above paragraph. The Participating Laboratories reviewed language used for Canadian requirements. The consensus of the laboratories is to recommend the Canadian language to amend Handbook 44 paragraph T.N. 8.3.1. Power Supply, Voltage and Frequency. The following language has been submitted by Canada for review.

> **Maximum and minimum voltage specified**
>
> 1. If the nominal voltage is not indicated on the marking plate, 117 volts or 225 volts is deemed to be the nominal voltage. Then, the minimum and maximum voltages are 100 volts or 191 volts (-15 %) and 129 volts or 247.5 volts (+10 %) respectively.
>
> 2. If the marking plate indicates a nominal voltage other than 117 volts, the indicated voltage will be considered as the nominal voltage. The minimum and maximum voltage will be calculated from the **nominal voltage indicated on the plate.**

3. If a voltage range is indicated (i.e. 100 volts to 130 volts), the mid point of the range will be taken as the nominal voltage. The device will be tested to the greater of: 1) the **nominal voltage -15 % / +10 %** or 2) the voltage range indicated on the plate.

   If a voltage range is indicated (i.e., 117 volts to 225 volts), the mid point of the range will be taken as the nominal voltage (i.e., 171 volts). The device will be **tested to the greater** of: 1) the nominal voltage -15 % / +10 % (i.e., 145 volts and 118 volts) or 2) the voltage range indicated on the plate (i.e., 117 and 225 volts).

   Therefore, in this case the greater of the two is 117/225 volts and the device would (only) be tested at these extremes.

4. If the device ceases to indicate weight values while the voltage is well within the -15 % / +10 % range limits, the tests will be performed at the limits of indication.

**Discussion:** The Sector agreed that testing over the entire range is not supported by current NIST Handbook 44 language. The NTETC Weighing Sector reviewed language used in Canadian requirements. The consensus of the Sector is to recommend that Handbook 44 paragraph T.N. 8.3.1. Power Supply, Voltage and Frequency be amended to eliminate specific voltage ranges. Additionally, there is confusion regarding the frequency range reference in the existing language. NTEP does not test for a change of line frequency of plus or minus one half cycle because testing equipment is very expensive. Manufacturers have stated that power supplies in current weighing devices are capable of performing over a much larger voltage and frequency range than specified in Handbook 44 because they only manufacture or purchase one version of power supply that is suitable for the worldwide marketplace.

**Conclusion:** The Sector agreed to make the following recommendation to the NCWM S&T committee to amend NIST Handbook 44 Scales Code paragraph T.N8.3.1.(a) Power Supply, Voltage and Frequency as follows:

T.N.8.3.1. Power Supply, Voltage and Frequency.

(a) Weighing devices that operate using alternating current must perform within the conditions defined in paragraphs T.N.3. through T.N.7., inclusive, over the line voltage range as marked ~~of 100 V to 130 V or 200 V to 250 V rms as appropriate, and over the frequency range of 59.5 Hz to 60.5~~ at 60 Hz.

(***Note:*** *The Weighing Sector proposal was considered at the 2002 Annual Meeting of the Southern Weights and Measures Association, Specifications and Tolerance Committee. The committee recommended additional language be added to the proposal stating that a weighing device shall perform at minus 15 % of the lowest stated nominal voltage and at plus 10 % of the highest states nominal voltage.*)

**25. Audit Trail Information During Power Failure**

**Source:** Ohio Participating Laboratory

**Background:** During the evaluation of a device with an electronic means of sealing, the laboratory noted that the device accepted the updated calibration and configuration, but the event counters remained at their previous count if there was a power loss while in the calibration mode. The Participating Laboratories agreed that this could be used fraudulently to avoid giving an indication that a calibration or configuration adjustment had occurred and that NCWM Publication 14 should be amended to look for this condition.

**Discussion:** The participating laboratories reported that this and similar conditions have been discovered on more than one type of device. In another example, a scale appeared to accept calibration and configuration changes. However, the final act of pressing a button to accept the change was not performed. The scale appeared to be operating with the updated parameters until power was turned off. The scale reverted to the previously stored parameters and event counter information.

One of the manufacturers was concerned about changes to the count indicated on the event counter. Replacement of the event counters or a master reset on a computer causes a change of audit trail information that can be investigated by the field inspector. One of the manufactures stated that it is unlikely that a non-resetable event counter can be set to specific counts in order to match the counter that is being replaced.

Some of the participating laboratories indicated that a change in event counters or a master reset of the computer is not the issue of this item because there is a change in the audit trail information that can be investigated by an inspector. The issue at hand is primarily the intentional or unintentional change in calibration or configuration parameters without advancing the information on the event counters.

The manufacturers understand that an event is when there is a change. The reported problems are likely caused by programmers who did not specify that sealable parameter settings and event counter information should be stored in the event of a power failure (or provide an error indication).

**Conclusion:** The Sector recognized that replacing printed circuit boards may clear existing audit trail information and that the resultant change in event counter information is in compliance with Handbook 44. It is the responsibility of the inspector to investigate the change(s) before enforcement action can be taken. Additionally, service and repair companies would likely have information available to the inspector documenting changes to calibration and configuration and even the replacement of printed circuit boards and microprocessor chips affecting event counter information.

The Ohio and California participating laboratories agreed to develop language to verify audit trail change information during the event of power interruptions and improper calibration procedures. The language should be available for review and comment prior to the 2003 meeting of the participating laboratories and Weighing Sector.

**26. Performance and Permanence Testing**

**Source:** NTEP Director and NIST Technical Advisor

**Background:** The NTEP Director has noted inconsistencies in the following performance and permanence sections in Chapter 1:

Section 62. Performance and Permanence Tests for Counter (Bench) Scales (including Computing Scales). Section 62.9.5.1. is not consistent with 62.9.10. in that the 500-lb maximum test load is not mentioned in 62.9.10.

Section 63. Performance and Permanence Tests for Floor Scales, Paragraphs 63.2. Initial Review and 62.3 Initial Type Evaluation Permanence Test, and 63.4. Subsequent Type Evaluation Permanence Test. Paragraph 62.4 can be misinterpreted as meaning that if a device fails, the scale is then adjusted and retested as an initial test in 63.2 and test ed 20-30 days later as a subsequent test. The terminology used should be consistent. Similar concerns are noted in paragraphs 65.5.5.

Section 65 (x). Performance and Permanence Tests for . . . Vehicle Scales. . ., paragraphs 65(x).5.1., 65(x).7, and 65(x)7.6. Paragraph 65x.5.1. states that a minimum of 40 000 lb of known test weights are required for the subsequent type evaluation field permanence test and appears to be in conflict with 65x.7.6. that states that the device will be tested to at least the CLC on the second test. Testing to the CLC does not appear to be supported in doing research into past Sector Summaries.

**Discussion/Conclusion:** The NIST Technical Advisor and NTEP Director will make the referenced editorial corrections and submit the amended language to the Sector and the NTEP Committee prior to publishing the 2003 edition of Publication 14.

**27. Center Dump Option on Vehicle Scales**

**Source:** NTEP Director

**Background:** Clarification has been requested regarding the acceptability of a center dump option on mechanical vehicle scales. The following is from the June 1991, November 1996, and 1997 Sector Summaries:

(June 1991)

C. Several manufacturers have modified the design of a lever system by moving the backbone lever that runs along the longitudinal centerline of the scale to outside the edge of the scale (see attachment). The manufacturers have contended that this change does not require another type evaluation, claiming the design has not changed

significantly. The NTEP policy has been to require these scales to undergo another type evaluation. The NTEP Technical Committee is requested to review this issue as part of the technical policy.

NTEP requires that scales of different designs must be evaluated separately. NTEP laboratories have had to make judgments as to what comprise significant modifications to designs that necessitate additional NTEP testing. For example, NTEP considers a load-cell-based scale with the main girders of the weighbridge under the platform under the path of tires to be significantly different from a scale with the main girders forming side rails for the platform. The specific issue being addressed by this agenda item is the design of mechanical lever systems where the location of the transverse lever is changed. The following figure illustrates the variations (*figure not available*).

The Committee agreed that the design differences in examples B and C were relatively minor and that the two designs were sufficiently similar so that one type evaluation could cover both designs. However, the Committee agreed that the design illustrated in example A required the weighing/load-receiving element to be engineered differently. Consequently, that design had to be evaluated separately. Hence, based on G-S.1. and this decision for type evaluation, the design illustrated in example A shall have a different model designation since a separate type evaluation is required. In the case of examples B and C, the same model designation may be used; but the specific design that was evaluated must be described in the test conditions of the NTEP Certificate. The Committee will continue to rely on the judgment of the NTEP laboratories when a new Type evaluation is required.

**4. Modification of Type (1996)**

Dump Option

***Conclusion:*** **The Sector heard arguments for and against allowing the modification of an NTEP approved scale with a dumping mechanism without additional testing. Some believed that this would be considered a modification of type and needed additional testing. Others were unsure what effect, if any, this would have on the scales performance. Still others believed that this was not a modification of type and should be allowed. No clear agreement or disagreement was reached in the discussion. The Sector may want to revisit this at a later date. The Sector also asked for input from Scale Manufacturers Association's (SMA) Technical Committee.**

Replacement of Concrete Decks with New Steel Decks

***Conclusion:*** **The Sector agreed that changing deck material (for example, concrete vs. steel) on a scale is a modification of type in some designs of scales and, in those designs, both types of decks would have to be tested to include both types on the Certificate of Conformance. The Sector noted that there are some designs where replacement of the deck material would not affect the performance of the scale.**

**b) Adding a dump option (1997)**

***Background and Discussion:***

b) At the last Sector meeting the issue of adding a dump option was not resolved. The SMA Technical Committee was asked to provide input. The sector has been asked to reconsider this item (Attachment; Carry-over Item I b)

***Discussion:*** Comments were made that this is a design consideration, not a performance consideration. Field officials have expressed concern that the addition of this option may, over time, cause performance problems with the repeated lifting and lowering of the deck. The Sector generally agreed that, if it is a new device and new technology, it might require testing. However, since the option does require field verification, there is no reason to require an additional permanence test.

***Conclusion:*** **The Sector agreed that a dump-type option could be added to a scale with an existing NTEP CC without the need to perform additional testing. With a dump option the original load-receiving**

**element (deck) is replaced with the dumping mechanism. The original structural weighbridge is still in place and keeps the load-receiving elements (levers or load cells) in place.**

**Discussion:** The past discussions have dealt primarily with mechanical scales with a deck that lifts or tilts off of the weighbridge to dump the commodity.

A member of the railroad industry commented that an improvement to a railway track scale changes the structure of the scale. Many railroads require that existing railway track scales must be brought up to all railroad requirements when these modifications or improvements are made. This sector member considers a center-dump option a modification of type that requires new evaluation. Any proposal to permit such a modification without additional evaluation should apply only to vehicle scales.

Additionally, there are low profile railway track scales that do not meet AREMA standards and are allowed to use the deck plate for structural integrity. Although changes can be done properly without affecting the structural integrity of the scale, that does not mean changes will always be done properly. Therefore, a jurisdiction should verify the changed device complies. Typically, the jurisdictions do not look at the construction or may not have the expertise to evaluate structural changes.

Some of the manufactures commented that modifications should be evaluated and certified by a scale engineer according to Handbook 44 Scales Code paragraph UR.4.3. Scale Modification. One of the Sector members stated that if guidelines are not documented in Publication 14 and the NTEP Director is not familiar with a type of modification, then further testing may be required depending upon the NTEP Director, participating laboratory, or field official that is being asked to make the determination.

The Sector was directed to the existing diagrams in Publication 14 (pages DES-8 and DES-9) that dealt with large capacity scale platforms and whether or not additional evaluations would be required if the manufacturer requested a change to the deck type. Previous Sectors agreed that no additional evaluations would be required for a change in deck material if the deck were not part of the support structure of the weighbridge. Additional evaluation for modification of deck types would be required if the deck is part of the weighbridge support structure.

The Sector was asked if the same rationale could be used to determine if additional evaluations would be required for a "dump through" feature. Many Sector members agreed that this rationale would be a useful guideline for use by the NTEP Director, participating laboratories and field officials. Some of the Sector members stated that the "dump through" feature or option should however be listed on the Certificate of Conformance for the device. Some of the manufacturers disagreed with this stating that it is up to the manufacturer to determine if a modification to the type is metrologically significant.

The Sector also agreed that changes to the position of the lever or load cells would be considered a metrologically significant modification that would require additional type evaluation testing.

**Conclusion:** There was no clear consensus on this item however, the majority of the Sector voting members voted to recommend that the following language be added to Publication 14, Chapter 1, NTEP Technical Policy for Scales, Section E. Modification of Type (6 yes, 3 no, 5 abstain):

7. Adding a dump-through option/modification, without modifying the lever system or load cell placement, to vehicles scales where the vehicle support primarily comes from the beams and girders on a scale with a combination steel and concrete weighbridge or all steel weighbridge construction, does not require evaluation for an existing CC to apply, however, the modification option must be listed on the CC.

8. Adding a dump-through option/modification, to vehicle scales with composite construction; unitized steel deck (vehicle support primarily come from the scale deck) requires an evaluation to be listed on a new or existing CC.

**Note.** One of the manufacturers voting against the proposed language commented that changes to create a dump scale fall under the structural design requirements in the rail codes. Modifications to create a dump scale are not typically done to a truck scale. The manufacture acknowledges that NCWM comes to the manufacturers for general guidance. The manufacturer further stated that the best policy is to rely on the original equipment manufacturer to report metrologically significant changes.

**28. ECR Loyalty Programs**

**Source:** Maryland Participating Laboratory

**Background:** From the 1998 Weighing Sector Meeting:

*NTEP continues to receive questions as to the proper method for presenting information relative to "frequent shopper" discount programs on customer receipts. NTEP has also heard complaints related to the accuracy of price computations on some of the receipts. The Sector was asked to provide guidance to the NCWM for the development of possible requirements or regulations in this area.*

**Conclusion:** The Sector recognized that some issues related to frequent shopper programs are under the purview of the Sector (those functions related to the interface with the point-of-sale scale) and some are under the purview of the Laws and Regulations Committee (those functions related to method of pricing and printing of package labels). The Sector acknowledged the need for input from other groups. Dennis Krueger, NCR, agreed to contact representatives from FMI (Food Marketing Institute) to investigate how the Sector might work with representatives from FMI on this issue. Dennis will work with Steve Cook, (formerly from CA), to bring back recommendations to the Sector on how to proceed further with this issue.

This issue has not been resolved. Nearly every major supermarket chain has some form of member discount program. The NTEP labs and the field inspector need a uniform method of examining this feature.

Handbook 44 indirectly addresses the method of recording member discount prices:

Section S.1.8.4. of Handbook 44 notes:

S.1.8.4. Recorded Representations, Point-of-Sale Systems. - The sales information recorded by cash registers when interfaced with a load-receiving element shall contain the following information for items weighed at the checkout stand:

(a) the net weight,[1]
(b) the unit price,[1]
(c) the total price, and
(d) the product class or, in a system equipped with price look-up capability, the product name or code number.

Unit price is defined in Handbook 44 as:

**unit price.** The price at which the product is being sold and expressed in whole units of measurement.[3.30] (Added 1992)

The two sections noted above indicate that the unit price noted on the receipt must be the price at which the sale was determined. Noting an original unit price for an item and a total discount for the transaction does not meet HB 44.

ex: regular price is $3.00/ lb and the member price is $1.50 lb
1.00 lb @ 3.00/lb 3.00
-1.50

**Discussion:** The Sector reviewed the language recommended by the earlier weighing sector and considered making the following recommendation to the NCWM Specifications and Tolerances Committee:

To clarify Handbook 44, amend the footnote to paragraph S.1.8.4. as follows:

S.1.8.4 (a) the net weight [1]
S.1.8.4 (b) the unit price [1]

[1] Weight values shall be identified by kilogram, kg, grams, g, ounces, oz, pound, lb, or the sign "#." For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams. If the

system utilizes a member discount feature, the unit price at which the product is being sold must be recorded on the receipt. The net weight of pre-weighed items shall not be altered by the system.

The Sector also reviewed the proposed language for incorporation into NCWM Publication 14 submitted by the Maryland Participating Laboratory.

The Sector members agreed that manipulating weights facilitates fraud. Additionally, NIST Handbook 130 defines net weight as the gross weight minus the weight of the packaging material or container and does not permit the manipulation of a legal measurement. Unintentional manipulation of the original weight (due to mathematical rounding) can also occur when discounts are given because net weights are determined by dividing the original total price by the original unit price.

A member of the Measuring Sector stated that there are similar concerns with discount programs, but the proposed language for Publication 14 would not solve the problems associated with liquid measuring devices

Several Sector members supported the language proposed for Publication 14, stated that it is sufficiently backed up by Handbook 44, and that no changes to Handbook 44 are required for this item.

One of the manufacturers agreed with the proposed language for Publication 14. However, the following note should be deleted because is may be confusing and is not appropriate for a national document:

"Please note that this feature may not be acceptable in some jurisdictions. The suitability of this feature is determined by the enforcement policy of each jurisdiction."

**Conclusion:** The Sector agreed to recommend that the following underlined language be added to Publication 14, Chapter 6, Section 12 (new):

**Section 12 of Electronic Cash Register Interfaced with Scales**

**Member Discount Program Feature**

**Code References: G-S.2, G-S.5.1, G-S.5.5, and S.1.8.4**

A "member discount" feature applies discounts to applicable items in the store. To receive the discount(s), the customer must be enrolled in the program and must present their member number before the total sales transaction is tendered. This feature applies to weighed and non-weighed items.

Because the feature has a significant potential to facilitate fraud if not properly designed, the following type evaluation criteria must be met.

Check all that apply:

☐ Discounted weighed transactions
☐ Discounted non-weighed transactions
☐ Original net weight (count) and original total price determined at the POS
☐ Original net weight (count) and original total price determined at the pre-packaging scale

| | | |
|---|---|---|
| 12.1 | The net weight shall not be altered. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 12.2 | The total price of all weighed items shall be determined using the original net weight determination. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 12.3 | All calculations shall be rounded to the nearest cent. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 12.4 | The receipt shall be clear, easily understood when reading from left to right. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 12.5 | The receipt shall be mathematically correct for all calculations. | **Yes** ☐ **No** ☐ **NA** ☐ |

| | | |
|---|---|---|
| 12.6 | If the discount is based on a percentage or a fixed cents off of the total price, the receipt shall indicate the following: | |
| | 8.6.1 The original unit price and total price. | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 8.6.2 The monetary discount, or the new total price. | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 8.6.3 The net weight (If applicable). | **Yes** ☐ **No** ☐ **NA** ☐ |
| | ***Note: If the Member Discount number is entered before the item to be discounted (or the receipt is not generated until the completion of the customer transaction), the original unit price and the original total price are not required*** | |
| 12.7 | If the discount is based on a percentage or a fixed cents off of unit price reduction (ex. $ .10/lb discount off the original total price), the receipt shall indicate the following: | |
| | 12.7.1 The original unit price and total price, | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 12.7.2 The unit price discount, | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 12.7.3 The monetary discount or the new total price, and | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 12.7.4 The net weight (If applicable). | **Yes** ☐ **No** ☐ **NA** ☐ |
| | ***Note: If the Member Discount number is entered before the item to be discounted (or the receipt is not generated until the completion of the customer transaction), the original unit price and the original total price are not required.*** | |
| 12.8 | If the discount is based on a discount unit price, the receipt shall indicate the following: | |
| | 12.8.1 The original unit price and the original total price, | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 12.8.2 The discount unit price and the discount total price, and | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 12.8.3 The net weight (If applicable). | **Yes** ☐ **No** ☐ **NA** ☐ |
| | ***Note: If the Member Discount number is entered before the item to be discounted (or the receipt is not generated until the completion of the customer transaction), the original unit price and the original total price are not required.*** | |
| 12.9 | If the total price, of a random weight pre-packaged item, is determined by weight and the final calculation is made at the POS system, the information that the calculation is based on must be provided on the receipt. | **Yes** ☐ **No** ☐ **NA** ☐ |

**29. Range of IZSM on Indicating Elements**

**Source:** Maryland Participating Laboratory

**Background:** Electronic indicating elements have been submitted with an Initial Zero-Setting Mechanism (IZSM) of 100 % of the configured capacity of the indicator. When the participating laboratories inform the manufacturer that the indicator would have to be tested up to the maximum IZSM range with a load-receiving element, they have always reduced the IZSM range.

NTEP does not test load-receiving elements up to 200 % of their configured capacity. Therefore NTEP should not allow an indicating element to have an IZSM range up to 100 % of the capacity of the load-receiving element used during the evaluation of the indicator. The NIST Technical Advisor notes that load-receiving elements, from bench scales to railroad track scale load-receiving elements have not been submitted or tested with an IZSM feature unless the submission was to be treated as a complete scale with a specific indicating element. Therefore, the possibility exists that many load-receiving elements, that consist of only load cell support structures may not comply with an indication element configured with IZSM enabled. Should electronic indicating elements have IZSM? If so, how much? Should IZSM be limited to just complete scales?

The Sector reviewed the following Canadian requirements.

**LG-15.04 IZSM Range (Maximum Range of Initial Zero-Setting Mechanism)**

The load-receiving element to which an electronic indicator tested and approved separately will be interfaced will not have been tested up to 200 % of Max. Consequently, the maximum Initial Zero-Setting Mechanism range of electronic indicators must be limited to 20 % of Max.

An electronic indicator tested and approved separately is deemed to comply with the requirements when the total range of the Initial Zero-Setting Mechanism (absolute value of -ve portion of the range plus the +ve portion of the range) does not exceed 20 % (or can be set to a maximum of 20 % and sealed) of the DUT's maximum capacity (Max); The IZSM range of a complete electronic device may exceed 20 % of Max if the device performs within tolerances when the IZSM is set at the minimum and maximum points of its range.

When the IZSM range is limited to 20 %, performance tests are conducted once: at the maximum IZSM setting. When the IZSM range exceeds 20 %, certain performance tests are conducted twice: at the minimum and at the maximum setting of the range. See description of the performance tests in Part 3.

Some of the manufacturers stated that IAZM on separable indicating elements is just an electronic starting point and that there should be not performance difference settings up to 100 %. The manufacturer of the load-receiving element has the responsibility to make their device perform with the maximum live and dead load (i.e. a 100 lb load-receiving element with a 500 lb load cell).

Other Sector members stated that if the IZSM is adjustable to 20 % or less on an indication element, no additional testing should be required. If the IZSM is adjustable beyond 20 %, applicant shall provide equipment (load-receiving element, a switch box, etc) to facilitate testing up to the IZSM limit.

Many of the manufacturers were concerned that prohibiting or limiting the size of IZSM on separable indicating elements may restrict the modular “mix and match” approach because the manufacturer of the indicating element may not know the amount of IZSM permitted on devices the indicating element will be interfaced to.

Canada reported that IZSM above 20 % is permitted on indicating elements. However, Canada will test all IZSM above where the IZSM can be adjusted above 20 %.

One of the manufacturers suggested that the Sector review European Cooperation in Legal Metrolog (WELMEC) 2.1 Guide for Testing Indicators.

**Conclusion:** The Sector discontinued discussion due to lack of time. The Sector has been requested to review US/Canadian checklist requirements for possible harmonization and WELMEC 2.1 Guide for Testing Indicators - (Non-Automatic Weighing Instruments) (http://www.welmec.org/publications/2-1.asp). This item will be carried over to the next meeting of the Weighing Sector.

**30. IZSM Test Procedures**

**Source:** Maryland Participating Laboratory

**Background:** The following is from the 1998 Weighing Sector Report:

***Background:*** At the June 1998 meeting of the NTEP Laboratories the participants were asked to review a procedure for testing the initial zero-setting mechanism (IZSM) of a scale in the field. At this time, there also is no procedure in Publication 14 for testing this feature during an evaluation.

During a September 1998, Asia Pacific Legal Metrology Forum (APLMF) R76 training class a procedure was presented for testing IZSM. That procedure has been revised and adapted for possible inclusion in Publication 14 as outlined in the Appendix G below. Unless the Sector objects, the procedure was proposed to be included in the next edition of Publication 14. (See Attachment below)

***Discussion:*** The Sector Discussed the proposed procedure and pointed out that the last sentence needs to be changed from "determine if the device complies" to "indicates that additional testing should be performed". One of the labs indicated that some field officials have a difficult time determining if a device has an IZSM, particularly when the "on/off" switch is used to activate the zero setting mechanism. The proposed procedure can be used for both lab and field evaluations.

***Conclusion:*** The Sector agreed that the laboratories would (will) begin using the procedure included in Appendix G. The procedure will be incorporated in Publication 14. The last sentence of the draft procedure will be changed from "determine if the device complies" to "indicates that additional testing should be performed." The laboratories are asked to provide feedback to the Sector on any problems they encounter with the procedures.

The 1998 Weighing Sector proposed the following:

**1. Change to Handbook 44 Scales Code**

**S.2.1.5. Initial Zero-Setting Mechanism. -**

(a) Scales of accuracy classes I, II, and III may be equipped with an initial zero-setting device.

(b) Complete Scales. An initial zero-setting mechanism shall not zero a load in excess of 20 % of the maximum capacity of the scale unless tests show that the scale meets all applicable tolerances for any amount of initial load compensated by this device within the specified range.

*(c) Separable Indicating Element Covered by a Separate CC. The maximum Initial Zero-Setting Mechanism range (absolute value of the maximum load that can be removed from the dead load plus the maximum load that can be added to the dead load) of electronic indicators must be limited to 20 % of the scale capacity.*

**2. Changes to PUB 14 (2002 edition, page DES-61)**

**40. Zero Indication**

**Code References: S.1.1., S.1.1.1., S.2.1.5, and G-S.5.1.**

**A digital electronic scale must indicate or record a zero balance condition. An out-of-zero-balance indication on both sides of zero is required. The zero balance indication may be a continuous digital zero indication or indicated by some other means, provided the scale either automatically inhibits the scale operation or returns to a digital weight indication when an out-of-zero-balance condition exists. The alternative zero indication must be defined on the front of the device.**

A digital zero balance indication shall represent zero within ±0.5 scale division (±0.5 d). A digital indicating scale shall either automatically maintain a "center-of-zero" condition to ±0.25 d or less (through AZSM) or have a supplemental center-of-zero indicator that defines the zero-balance condition to ±0.25 d or less. The center of zero requirement applies to the gross load zero, but the center of zero indication may also be operational at the net load zero.

Neither a + or - sign may appear with the zero indication. Appropriate indications for the zero balance and out-of-zero balance conditions are specified.

If the scale is equipped with an initial zero-setting mechanism (IZSM), then the scale must be tested for compliance with the influence factors with the maximum load zeroed through the IZSM.

~~This is mandatory if the range~~ When the IZSM range (absolute value of the maximum load that can be removed from the dead load plus the maximum load that can be added to the dead load) exceeds 20 % of the scale capacity, performance tests are conducted at the maximum setting of the range.

The IZSM range of a complete electronic scale may exceed 20 % of capacity if the device performs within tolerances.

When the IZSM range is # 20 %, performance tests are conducted once: at the maximum IZSM setting.

| | | |
|---|---|---|
| 40.1 | Is the scale equipped with an IZSM? | **Yes** ☐ **No** ☐ **NA** ☐ |
| | If yes, then what is the range of the IZSM? | **Yes** ☐ **No** ☐ **NA** ☐ |
| 40.2 | The maximum Initial Zero-Setting Mechanism range of an electronic indicator tested and approved separately: | |
| | 40.2.1 does not exceed 20 % of the scale capacity | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 40.2.2 can be set to a maximum of 20 % and sealed | **Yes** ☐ **No** ☐ **NA** ☐ |
| 40.~~1~~.3 | The scale defines zero within ±0.5 d by a continuous zero indication. | **Yes** ☐ **No** ☐ **NA** ☐ |

Record the type of weight unit, (e.g., lb/kg) selection.
☐ EXTERNAL ☐ INTERNAL ☐ N/A

Record the actual zero width in d (note whether avoirdupois, metric, or other unit).

AVOIRDUPOIS ____ d
METRIC ____ d
OTHER UNITS: Specify Unit _____ ; _____ d

| | | |
|---|---|---|
| 40.~~2~~4 | For indicators without a continuous zero indication, an automatic means inhibits the weighing operation or returns the device to a continuous digital indication when the scale is in an out-of-balance condition.<br><br>***Note:*** *See also Code Reference G-S.6. elsewhere in this checklist pertaining to marking of indications, and see Code Reference G-S.5.2.2., and S.1.2. elsewhere in this checklist pertaining to identification of the zero indication when a sleep mode is used.* | **Yes** ☐ **No** ☐ **NA** ☐ |
| 40.~~3~~.5 | A + or - sign must not appear when the scale is indicating zero in any of the available weight units. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 40.~~4~~.6 | The device automatically maintains the "center of zero" to ±0.25 d, or | **Yes** ☐ **No** ☐ **NA** ☐ |
| 40.~~5~~.7 | If the device does not automatically maintain the "center of zero", then there is a center of zero indicator that defines zero within ±0.25 d scale division. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 40.~~6~~.8 | If provided, the "center of zero" indicator is inhibited at all displayed positive weight values other than zero. | **Yes** ☐ **No** ☐ **NA** ☐ |

**Conclusion:** The Sector did not have time to review this item and it will be carried over until the next meeting of the Weighing Sector. The Sector is requested to review the above recommendation from the 1997 Weighing Sector. If there

are no major discussions on this item or significant updates to the proposed language, the Sector will consider recommending the above underlined language into NCWM Publication 14, Weighing Devices Technical Policy, Checklist, and Test Procedures.

**31. Weight Accumulators**

**Source:** Maryland Participating Laboratory

**Background:** The following is from the 1997 Weighing Sector final Summary:

**Source:** NTEP Weighing Labs

**Background:** Publication 14 does not adequately address the new features that labs are seeing on scales with weight accumulation features.

**Recommendation:** The Sector was asked to review language in the attachment to item 5 (see below) submitted by the NTEP labs for addition to Publication 14 under the section on scales with weight accumulation features.

**Conclusion:** The Sector agreed to add the proposed procedure and criteria in the attachments to Publication 14.

The Maryland Participating Laboratory proposed the following language:

**Weight Accumulation**

This section is not applicable to automatic bulk weighing systems and automatic weighing systems. The weight accumulation feature adds and/or subtracts multiple weighments. Please note that total weight accumulators may not be acceptable in some jurisdictions and is not acceptable in all applications. The suitability of this feature is determined by the enforcement policy of each jurisdiction. Because the accumulation feature has a significant potential to facilitate fraud if not properly designed, the following type evaluation criteria must be met.

Identify the methods of weight accumulation:

- Manual Total: The operator must enable the mechanism for each weighment added to (or subtracted from) the accumulated total.
- Auto Total: Once this mode is enabled, the device will automatically add each weighment to the accumulated total. The auto total feature may not be acceptable in all jurisdictions and is not acceptable in all applications. The auto total feature is not acceptable when the loading or unloading of the device is likely to activate the auto total feature.

1. GROSS and NET weighments cannot be added to (or subtracted from) the same TOTAL accumulator. **Yes** ☐ **No** ☐ **NA** ☐

2. The device has motion detection capability that prevents the device from accumulating weighments before the weight display has stabilized within specified limits. The limits for motion detection are: **Yes** ☐ **No** ☐ **NA** ☐

   (a) ∀ 3 scale divisions for axle load, railway track, vehicle scales, and hopper (other than grain hoppers) scales with a capacity exceeding 22 000 kg (50 000 lb); and **Yes** ☐ **No** ☐ **NA** ☐

   (b) ∀ 1 scale division for all other scales. **Yes** ☐ **No** ☐ **NA** ☐

   It is recommended that the indicator simultaneously display the TOTAL weight and the current weight on the load-receiving element. Devices equipped with accumulation capability must provide a clear indication that a weighment has been entered. This indication may be a TOTAL display

mode, a lighted legend, or an annunciator such as total entered.

| | | |
|---|---|---|
| 3. | The method used to indicate that a weighment has been entered: | |
| | 3.1. A separate continuous indication of the TOTAL weight display mode. | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 3.2. The device has selectable "current weight" and "TOTAL weight " display modes with proper descriptors. | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 3.3. A lighted legend or annunciator of "weight entered" or a similar statement is used to indicate that a weighment has been added to the TOTAL weight. | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 3.3.1. An entry of "zero" should not activate the annunciator, or the item count. | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 3.4. Other: _____ | **Yes** ☐ **No** ☐ **NA** ☐ |
| | 3.4.1. The method is acceptable. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 4. | If units are converted, the weight unit selector switch must convert both the current weight display and the TOTAL weight display. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 5. | If the device has a current/total switch, the TOTAL weight display must be inhibited when a load is on the platform. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 6. | The device shall indicate the number of items accumulated whenever the TOTAL weight is displayed. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 7. | If the device can simultaneously accumulate transactions for more than one customer, customer identification codes must be displayed. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 8. | The device must return to gross load zero between each weighment accumulated. | **Yes** ☐ **No** ☐ **NA** ☐ |
| 9. | The TOTAL key does not act as a repeat key. | **Yes** ☐ **No** ☐ **NA** ☐ |

**Conclusion:** The Sector did not have time to review this item and it will be carried over until the next meeting of the Weighing Sector. The Sector is requested to review the above recommendation from Maryland Participating Laboratory.

**32. Last Item: Tentative Date and Location of Next Meeting**

California is next on the rotation for meeting locations. The next meeting of the NTETC Weighing Sector has been scheduled for September 11-13, 2003, at the Picadilly Inn in Fresno California and will be held prior to the Annual Western Weights and Measures Technical Conference.

# Attachments

# Attachment to Agenda Item 1

**SCALE MANUFACTURERS ASSOCIATION**

6724 Lone Oak Blvd. Naples, FL 34109
Tel: 239-514-3441 . Fax: 239-514-3470
Web Site: http://www.scalemanufacturers.org

To: NCWM S&T Committee September 20, 2002

From: SMA Technical Committee

Subject: S&T Item 320-1

Reference Dave Quinn's January 2002 letter, subject as above

As pointed out in Dave Quinn's above referenced letter, S&T Agenda Item 320-1B is "not a single item but a number of normally separate items rolled into one leaving no way to discuss, much less vote, on each individual item. One simply has to look at the title of the agenda item to see the potential problems and complexities". Mr. Quinn states that this " item proposes that for N.1.3.4., (1) the dimensions of the shift test pattern for a vehicle scale be changed, (2) that livestock scales be removed from N.1.3.4., (3) a different shift test pattern be defined for livestock scales with more than two sections, and (4) Table S.6.3. be changed to document the above changes. The item also incorporates "a new revised definition for Concentrated Load Capacity and some new H44 terminology for a "Combination Vehicle/ Livestock" scale for which there is no definition and which, in fact, is not a product produced by any manufacturer. A summary of the current and proposed N.1.3.4. requirements is attached.

Mr. Quinn also correctly points out that "the item also requires accepting the practice of defining devices based on weighing application as opposed to the design criteria required for particular class of scale.

Mr. Quinn goes on to remark "Item 320-1B is also proposing that a vehicle scale designed for weighing load concentrations of 1500 pounds – 2000 pounds per square foot must also be marked as a "livestock" scale if it is to be used to weigh livestock which create a load concentration of 110 pounds per square foot. It may seem to lack logic, and it does, but that is what the item proposes. We urge the S&T to step back and reconsider trying to define the infinite spectrum of what can or cannot be weighed on a scale and go back to classifying scales based on the worst-case design loads that are required. If this is not done the door is open to try and define what commodities can be weighed on a bench scale, floor scale, hopper scale etc."

The SMA Technical Committee also agrees with Mr. Quinn that "A vehicle scale is designed for the worst case conditions dictated by the dynamic loads of weighing over the highway trucks driving on or off a scale and a livestock scale is designed for a much lower level of dynamic loading. Weighing pallets, bins, vehicles, or livestock are within the design parameters of a vehicle scale as long as the minimum load requirements are met. It is not necessary to stipulate that the vehicle scale can be used for weighing pallets, bins, or livestock: it is simply logical that this is appropriate. On the other hand, although the livestock scale is not designed for the rigors of highway truck weighing, it is perfectly acceptable to weigh other items such as pallets, bins, and small vehicles like cars and pickup trucks as long as the minimum load requirements are met and nominal capacity not exceeded."

Therefore, the SMA TC joins Fairbanks' recommendation that the shift test pattern for livestock scales be simply defined as it was prior to 1988:

**N.1.3.4. Vehicle Scales, Axle-Load Scales, and Livestock Scales With More Than Two Sections.**

**N.1.3.4.1. Vehicle Scales and Axle Load Scales. -**

**At least one shift test shall be conducted with a minimum test load of 12.5 % of scale capacity and may be performed anywhere on the load-receiving element using the prescribed test patterns and maximum test loads specified below. . . .**

**N.1.3.4.2. Livestock Scales With More Than Two Sections. - A shift test equal to one half the rated sectional capacity shall be conducted with test loads distributed over each section of the scale. (Two section livestock scales shall be tested consistent with N.1.3.8.)**
**(Amended 1991, 2000, and 200X)**

We also concur that ". . .two section livestock scales should use the existing H-44 N.1.3.8. and that it is not necessary to define the physical dimensions of the livestock scale shift test pattern

The rationale for the above recommendations and comments is contained in the following pages.

Sincerely

Daryl Tonini
Chairman, SMA Technical Committee

Attach: Summary of Current and Proposed N.1.3.4 Requirements

Cs. Regional W&M S&T Committees
NTEP Weighing Sector

**RATIONALE:**

Subject: S&T Item 320-1B

This particular item is difficult to comment on. It has become very complex because of the sheer number of inputs that are based on conclusions that are neither technically correct nor factually supported and show some degree of a lack of understanding of both history and application. Some examples are:

1. A "Combination Vehicle/Livestock" scale requires a special design for the load-receiving elements and load receiver differing from that of a standard vehicle scale.

2. Vehicle scales used to weigh livestock must be tested side to side because cattle will gather in corners.

3. Livestock, especially cattle, are more abusive to a vehicle scale than truck traffic.

4. Stock racks and gates added to a vehicle scale increase the dead load on the scale beyond that tested in an NTEP evaluation and therefore additional testing is required.

5. A truck on a vehicle scale load-receiving element causes movement from end to end and not side-to -side as livestock would. Vehicle scales have checking only for this end-to-end movement and therefore require modification to deal with livestock movement.

6. A new mindset that a shift-test must have a specific weight pattern detailed in H-44.

The following is an attempt to clarify and present technical support refuting the above points:

**1. A "Combination Vehicle/Livestock" scale requires a special design for the load-receiving elements and load receiver differing from that of a standard vehicle scale.**

The term "Combination vehicle livestock" scale dates back to at least 1958 and was used by manufacturers to describe a standard vehicle scale and indicator package that was suitable for weighing livestock on a vehicle scale and priced as a single catalog item. The "special" features added to a standard vehicle scale were an indicator (usually a beam) with 5pound divisions as required by P&S, and mechanical restraints to stabilize the weight reading due to livestock movement. Nothing else was done to the vehicle scale. No modifications were made in the weighbridge enabling the scale to be used for this application. Today if such a package priced item were to exist for a "Combination vehicle livestock" scale, it would be simply a standard vehicle scale, no special additions, and an electronic instrument with filtering capable of stabilizing the weight reading due to livestock movement.

**2. Vehicle scales used to weigh livestock must be tested side to side because cattle will gather in corners**.

A vehicle scale is designed for the load concentration of a dual tandem axle applied to the load receiver of the scale. This load concentration is in an area of 4 feet x 8 feet and is defined in H-44 as Concentrated Load Capacity (CLC). A typical CLC would be 60,000 pounds for a dual tandem axle. Assume for this discussion that the vehicle scale platform is 10 feet wide. The load bearing points under the load receiver are, by design, normally about 6 inches inboard from each side, placing them 9 feet apart on a 10 foot-wide scale. Studies have shown that the drivers will tend to observe the left side of the scale from his position in the cab to place the vehicle 6 to 12 inches from the left side of the scale platform. This results in the load bearing points under the dual tandem nominally sharing the load approximately 50/50.

The H-44 Scale Code shift test pattern for a vehicle scale, N.1.3.4., describes a weight pattern of 4 feet x 10 feet, which, on the 10 foot-wide scale, loads the load bearing points exactly 50/50. The area of the shift test pattern is 40 square feet and the concentrated load of 60,000 pounds is distributed at 1,500 pounds per square foot. The shift test pattern correctly tests the scale "as used" simulating the weight distribution of a dual tandem axle over the load bearing points. It is not necessary to test a 10 foot-wide vehicle scale side to side because an "as used" weight distribution is nominally 50/50 side to side. Note: As a load receiver increases in width the vehicle position on the scale remains the same relative to the left side and the weight distribution begins to change with more of the vehicle weight on the left load-bearing points and less of the vehicle's load on the right load-bearing points. With scale widths over 12 feet, side-to-side differences may begin to show up. The new shift test pattern dimensions adopted by NCWM in 2001 should be used to test side to side on vehicle scales over 12 feet in width.

Some years ago P&S conducted a study to determine the concentrated load of cattle on a scale platform. The purpose of this study was to determine the amount of weight necessary to check a livestock scale to its used capacity. Numerous sized load receivers were used and cattle were pressed onto the loading surface to fill the area completely. The result was that when no more cattle could be squeezed onto the weighing surface the total weight averaged 110 pounds per square foot. (This fact was confirmed with a retired P&S employee involved in the study.) The load concentration of cattle on a load receiver is only 7 % of the load concentration of the shift test pattern above (1,500 pounds per square foot). A 34,000 pound legal over the highway dual tandem axle in the same design spacing of 4 feet x 8 feet would distribute the axle load over 1063 pounds per square foot. Based on the 50/50 weight distribution to the transverse load points, the shift test pattern would load each side of the scale to 30,000 pounds (area 4 foot x 5 foot) and the legal dual tandem axle would load each side to 17,000 pounds (area 4 foot x 5 foot). Based on the P&S study, the worst-case condition created by cattle gathering in this 4 foot x 5-foot area would be a load concentration of 2,200 pounds as opposed to the 17,000 pounds legal dual tandem axle or the 30,000 pounds shift test pattern. Cattle do tend to gather together on a load receiver and do so in the two corners at the end of a vehicle scale. Assuming this "gathering" weighs a total of 17,000 pounds, the weight would be spread over 155 square feet an area 5 times that occupied by the 32 square feet of the dual tandem axle weighing 34,000 pounds.

The minimum load of livestock on a vehicle scale is 500 divisions or 10,000 pounds with a division size of 20 pounds. This minimum load would occupy 91square feet, an area greater than twice the load distribution of the 40 square feet in the vehicle scale shift test pattern. Testing side to side on a normal width (10 feet to 12 feet) vehicle scale is not necessary due to normal distribution of livestock weight. Testing the same scale side to side if it is to be used in livestock weighing

follows no logic. For that reason P&S did no special testing of vehicle scales used to weigh livestock, if they had been tested and certified as a vehicle scale by local jurisdictions. If P&S did test a vehicle scale they conducted only the normal test over sections. (This fact was also confirmed with a retired P&S employee.)

**3. Livestock, especially cattle, are more abusive to a vehicle scale than truck traffic.**

A legal highway truck can have a gross weight of 80,000 pounds. For the sake of this discussion, assume a maximum gross weight of 60,000 pounds. Also assume an average vehicle scale size of 70 feet x 10 feet (700 square feet). The average speed for a vehicle entering onto a vehicle scale load receiver is between 3 and 5 mph. The load receiver is at rest when the front axle of the vehicle first touches the load receiver causing the load receiver to move in the direction of the truck movement. The average 70 foot x 10-foot concrete deck load receiver weighs about 35,000 pounds so the dynamic forces of the load receiver moving from rest is severe. When the truck stops on the load receiver, the inertial force created by stopping of a the moving 60,000-pound load causes an equal force on the load receiver. The same dynamics take place when the vehicle begins to accelerate to leave the scale.

By loading the same 700 square feet of load receiver with cattle the average maximum load would be 77,000 pounds. The cattle enter the load receiver not as a single 77,000-pound mass like a vehicle but rather randomly until the load receiver has no space for more. Loaded to 110 pounds per square foot, the cattle cannot move at all. To reduce the load of cattle to 60,000 pounds (same as vehicle) the square footage they would occupy gathered together would be 545 square feet allowing 155 square feet of open area in which to move freely. For these cattle to even simulate the dynamics of the vehicle the entire herd would have to move as one single mass coming onto the scale in unison and leaving the scale in like manner. Experience dictates this is not likely. What if an individual animal ran from side-to-side or attempted to get off the scale by climbing the stock racks? An average head of commercial beef cattle weighs less than 1300 pounds and certainly cannot create dynamic forces that come close to the vehicle scale design limits.

**4. Stock racks and gates added to a vehicle scale increase the dead load on the scale beyond that tested in an NTEP evaluation and therefore should require additional testing.**

The load capacity of an average vehicle scale section is 100,000 pounds (50,000 pound capacity load cells). Assuming a 4-section concrete deck scale, the dead load on each section will be in the area of 9,000 pounds and the live load on each section at maximum rated capacity will be less than 50,000 pounds. Total load on the section is 59,000 pounds or only 59 % of section capacity.

The addition of racks and gates to the scale adds an additional 4500 to 5000 pounds at most and is well within scale design limits. These modifications are subject to Handbook 44 UR.2.7, UR.4.1., and UR.4.3., and are usually approved by the manufacturers of the scale. In addition, because the live load uses such a small portion of the total output of each load cell, an increase in dead load will not change the linearity of the device.

**5. A truck on a vehicle scale load receiver causes movement of the load receiver from end to end and not side-to-side as livestock would. Vehicle scales have checking only for this end-to-end movement and require modification to deal with livestock movement.**

The movement of a vehicle on the scale deck causes the deck to move in an elliptical pattern which is why all vehicle scales limit transverse as well as longitudinal movement. The recent use of "rocker" type load cells drives this point home. These cells will rotate because of the elliptical deck movement and if rotation is not controlled by design, the cell cable will wind around the cell and break. To conclude that vehicle scales are not checked for transverse movement is simply not factual and to conclude that scale movement created by moving livestock is more abusive to a vehicle scale than the movement of a vehicle is technically incorrect.

**6. A new mindset that shift tests must have a specific weight pattern detailed in H-44.**

The S&T item 320-1B attempts to place dimensions on a shift test pattern for livestock scales with no apparent technical basis for the dimensions used. Specific dimensions are essential in the shift test pattern for a vehicle scale to simulate the manufacturer's concentrated design load on the load receiver as applied by a dual tandem axle with 4-foot centers and a width of 8 feet. To provide for better use of available test equipment, NCWM and vehicle scale manufacturers agreed to a shift test pattern of 4 feet x 10 feet.

One must ask: What is the rationale proposed by the S&T Committee for a 4 foot x 5 foot pattern concentrated over a load bearing point equal to ½ "sectional" capacity? Vehicle scales do not have a sectional capacity rating they have a CLC rating (dual tandem axle rating) which one would reasonably assume is the capacity of a section. Assume the 60,000-pound CLC vehicle scale from the above discussion. The S&T Committee is proposing to do a shift test on a vehicle scale used in a livestock weighing application with a load of 30,000 pounds concentrated in a 4 foot x 5 foot pattern. This load equates 1,500 pounds per square foot as opposed to the as used 110 pounds per square foot concentrated load of cattle. The proposal lacks technical basis and logic. A load of 30,000 pounds of cattle would occupy 273 square feet, not 20 square feet as proposed by the S&T agenda. Spread over this 273 square feet the load is distributed side to side across the scale. P&S did section testing of livestock scales with more than two sections, not corner testing, and with no specific dimensions on a test pattern. In fact, other than the vehicle shift test pattern which must have specific dimensions to simulate the dual tandem axle for which the scale is designed, no other shift test, regardless of scale type, is defined by dimensions in H-44.

**Conclusions:** It is important to understand that "floor scale", "bench scale", "hopper scale", "livestock scale" and "vehicle scale" are terminology used to describe the design criteria that a manufacturer must use to provide a product suitable for a type of application. However, the design is not limited to that specific application. A bench scale is designed to take full capacity loads anywhere on the load receiver and should be tested to insure that the scale can, in fact, perform to that specification. During an NTEP evaluation of a bench scale, the initial verification procedure is tested with weights and a permanence test is conducted after a specified number of cycles of test load are applied to the scale. In the market place it is understood that the bench scale can weigh produce, meat, hardware, etc.. The scale is not NTEP evaluated for each application. From a manufacturing standpoint, there is no difference in the load receiver of a grain hopper scale or the same hopper scale used to weigh sand or cement. The difference is in tolerances allowed in H44~~,~~. If the NTEP test of a hopper is based on the tightest H-44 requirements then it should be understood that less stringent applications are an acceptable use of the hopper scale. Likewise, a vehicle scale designed for the dynamic loads created by large masses that stop and go quickly on the load receiver. No one would question that a pallet of metal castings could properly be weighed on a vehicle scale as long as the load met the minimum weight requirements for a vehicle scale. Yet the S&T item suggests that if livestock are to be weighed on a vehicle scale, the scale must be tested as a "livestock" scale. We are letting long-standing "classifications" of scales get in the way of valid requirements. A scale classified as a "livestock" scale is specifically designed for livestock weighing by a manufacturer and the design criteria is based on dynamics that are well below the dynamics that must be considered for a scale classified as a "vehicle" scale. Understanding the design of a vehicle scale, logic dictates that livestock weighing dynamics are well within the dynamic design limits of a vehicle scale. Given an appreciation of the dynamics of a livestock scale design, logic would dictate that most vehicles would exceed the dynamic design limits of a scale classified as a "livestock". However, that being said, this does not preclude the weighing of vehicles that are obviously within the specified design limits of a scale classified as a "livestock" scale. Example a 20 ton, 10 ton per section "livestock" scale could weigh a pick up truck of baled hay and be well within the design limits of the livestock scale.

NTEP is not nor was it ever intended to define all the applications acceptable for a specific "class" of scale. It has always been and continues to be the responsibility of the local W&M authority to determine the suitability of a scale for the application. This judgment has to be based on logic and understanding of both the device design and the application in question and must be applied nationally in a uniform basis.

# Attachment to Agenda Item 16

The first proposal breaks up the long paragraphs in Publication 14, 2002 Edition vehicle scale test procedures in (hopefully) easier to follow steps.

The second proposal is included in a letter from Ross Anderson, NY, describing the vehicle test procedures that includes the steps in a table format and describes test weights and weight cart positions and usage. Ross Anderson will present additional proposed language, at the Sector meeting.

The Sector also reviewed information provided by the Ohio participating laboratory for possible Checklist Items and Test Report Forms.

**Proposal 1:**

65a.3.2. Shift Tests. Conduct at least two complete sets of shift tests over each section to at least 90 % of the rated CLC. A single complete shift test is defined in steps a through d.

a. The shift test will be conducted by loading one end section to the first of at least five test loads, moving the load to each section, increasing the load to the next increment (at the opposite end of the scale) and repeating up to at least 90 % of the CLC using loads that are as evenly incremented as possible with the available equipment.

b. Record the error moving the load to each section until the opposite end of the scale is reached, recording the error at each section and at each load.

c. Conduct a decreasing load lest on the section at the end of the scale where the weights can be reloaded.

(Note from NIST Technical Advisor: Is step c. necessary since a decreasing load is done with 90 % CLC (worst case) during the shift test (step e.) and during the strain-load tests? Discuss at next sector meeting?)

d. Repeat the shift test procedure above in steps a, b, and c for each weight increment until at least 90 % of the CLC is reached ~~and on this test where the maximum applied test weights are loaded on the scale~~. While at the maximum test load, locate the test weights and record the errors at each section, mid-span between sections, and on modular scales, each on the right and left side of the module connection line located at each section.

e. Conduct a decreasing load test on one end section of the scale.

(**Note:** If possible, the first increment of test weights should equal 500e. If weights cannot be conveniently applied that equal 500e, the first load should equal just below 500e as nearly as possible. The other tolerance breakpoints should be tested if possible.)

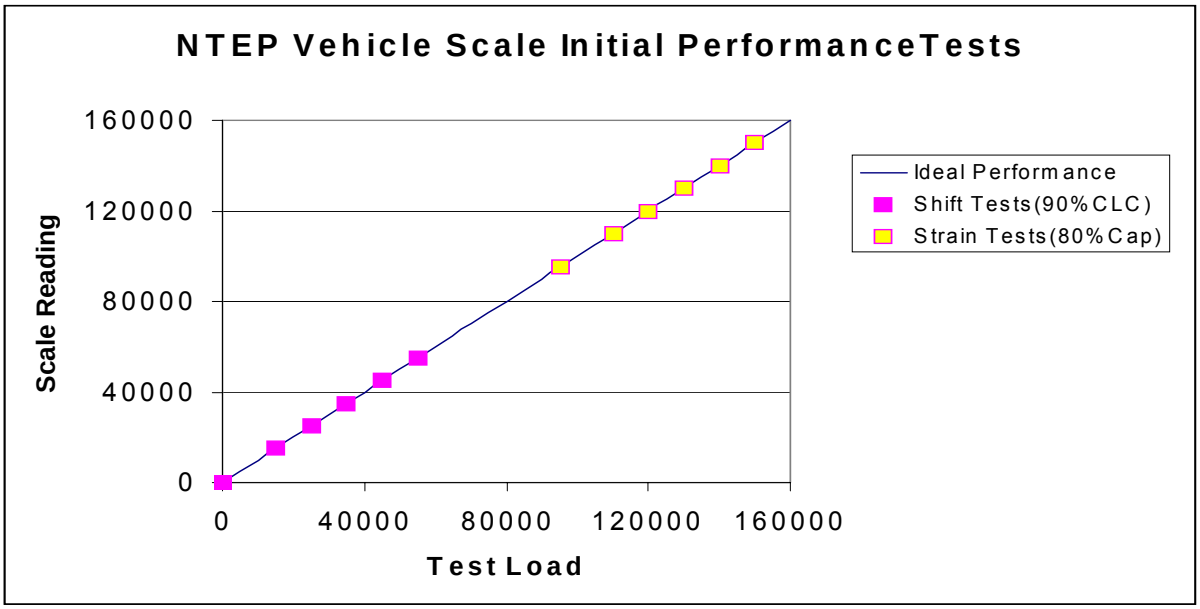
Delete 65a.3.2. and 65a.3.3.

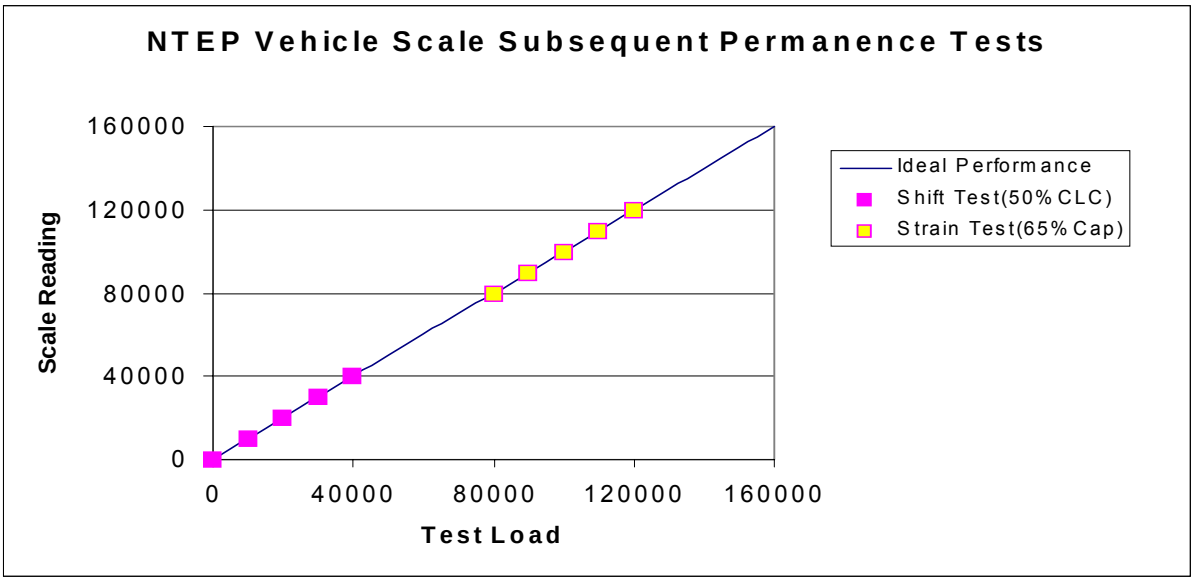
The weighing labs reviewed the remaining procedures for strain load testing and testing of side-by-side and extra wide vehicle scales and felt that, other that the shift test procedures being made clearer consistent with the above recommendation, the procedures, test patterns, and test load positions were representative of these scales potential usage.

**Proposal 2:**

Outline of Typical NTEP Vehicle Scale Evaluation from Pub 14
By Ross Andersen, New York State
August 29, 2002

This outline is my interpretation of the current Pub 14 Checklist items for testing vehicle scales. It is also based on my participation in the Weighing Sector meetings during their development and training from Henry Oppermann. The diagrams below illustrate that these tests as written will evaluate performance over a fairly wide range of the scale's capacity.




**Note:** For each X in the tables below, the evaluator shall determine actual errors at each test load and application point. Loading shall be within limits specified by the manufacturer as per scale capacity and CLC. All examples are based on the three-section scale pictured in Pub 14. Test points would be added for additional sections as necessary following the same patterns.

**65.3.1. Two complete Sets - Loads 1-5 should be approximately evenly spaced over the test range to reach 90 % of CLC. This does leave some leeway to use test loads close to the tolerance break points and that are convenient to using the weight carts available to maximum advantage. The objective is to provide data that demonstrates increasing load performance over each section of the scale and at each mid-span.**

| Load \ Location | Sect 1 | Mid Span 1-2 | Sect 2 | Mid Span 2-3 | Sect 3 |
|---|---|---|---|---|---|
| 1st Test Load 1 | X | | X | | X |
| 1st Test Load 2 | X | | X | | X |
| 1st Test Load 3 | X | | X | | X |

| Load \ Location | Sect 1 | Mid Span 1-2 | Sect 2 | Mid Span 2-3 | Sect 3 |
|---|---|---|---|---|---|
| 1st Test Load 4 | X | | X | | X |
| 1st Test Load 5 | X | | X | | X |
| 2nd Test Load 1 | X | | X | | X |
| 2nd Test Load 2 | X | | X | | X |
| 2nd Test Load 3 | X | | X | | X |
| 2nd Test Load 4 | X | | X | | X |
| 2nd Test Load 5 | X | | X | | X |

65.3.2. One set of shift tests at mid span (May be done in conjunction with one of the sets of shift tests in 65.3.1.)

| Load \ Location | Sect 1 | Mid Span 1-2 | Sect 2 | Mid Span 2-3 | Sect 3 |
|---|---|---|---|---|---|
| Mid-span Load 1 | | X | | X | |
| Mid-span Load 2 | | X | | X | |
| Mid-span Load 3 | | X | | X | |
| Mid-span Load 4 | | X | | X | |
| Mid-span Load 5 | | X | | X | |

65.3.3. Test of Module Connections for Modular Scales – Assumes tests in 65.3.1 were done with test load straddling the joint between module 1 and 2. (May be done in conjunction with one of the sets of shift tests in 65.3.1.)

| Load \ Location | Left Side Sect 2 | Right Side Sect 2 |
|---|---|---|
| Maximum feasible load e.g. 5 | X | X |

65.4. Strain Load Tests (65.4.2. - 65.4.5.)

| Load \ Location | End A | End B |
|---|---|---|
| 1st Test - Strain Load distributed on End A | Strain Load | Ref Val |
| 1st Test - Inc Test Load 1 (applied to End B) | Strain Load | X |
| 1st Test - Inc Test Load 2 | Strain Load | X |
| 1st Test - Inc Test Load 3 | Strain Load | X |
| 1st Test - Inc Test Load 4 | Strain Load | X |
| 1st Test - Inc Test Load 5 | Strain Load | X |
| 1st Test - Remove Test Load 5 | Strain Load | Ref Val |
| 1st Test con't - Inc Load 1 | Strain Load | X |
| 1st Test con't - Inc Load 2 | Strain Load | X |
| 1st Test con't - Inc Load 3 | Strain Load | X |
| 1st Test con't - Inc Load 4 | Strain Load | X |
| 1st Test con't - Inc Load 5 | Strain Load | X |
| 1st Test con't - Dec Load 4 | Strain Load | X |
| 1st Test con't - Dec Load 3 | Strain Load | X |
| 1st Test con't - Dec Load 2 | Strain Load | X |
| 1st Test con't - Dec Load 1 | Strain Load | X |
| 1st Test con't - Dec Load @ Strain load) | Strain Load | X |
| Remove strain load and rezero scale | | |
| 2nd Test - Strain Load distributed on End B | X | Ref Val |
| 2nd Test - Inc Test Load 1 (applied to End A) | X | Strain Load |
| 2nd Test - Inc Test Load 2 | X | Strain Load |
| 2nd Test - Inc Test Load 3 | X | Strain Load |
| 2nd Test - Inc Test Load 4 | X | Strain Load |
| 2nd Test - Inc Test Load 5 | X | Strain Load |
| 2nd Test - Remove Strain Load leaving Dec Test Load 5 on End A | X | |
| 2nd Test - Dec Test Load 4 | X | |

| Load \ Location | End A | End B |
|---|---|---|
| 2nd Test - Dec Test Load 3 | X | |
| 2nd Test - Dec Test Load 2 | X | |
| 2nd Test - Dec Test Load 1 | X | |
| 2nd Test - Dec Test Load at zero | X | |

**Notes on Initial Performance Tests**: I expect that the two sets of shift tests will probably be combined as follows to be as efficient as possible. Note: The two tables below include all the required tests in Pub 14 Section 65.3.

Shift Tests (Set One)

| Load \ Location | Sect 1 | Mid Span 1-2 | Sect 2 | Mid Span 2-3 | Sect 3 |
|---|---|---|---|---|---|
| Test Load 1 | • | • | • | • | • |
| Test Load 2 | • | • | • | • | • |
| Test Load 3 | • | • | • | • | • |
| Test Load 4 | • | • | • | • | • |
| Test Load 5 | • | • | • | • | • |

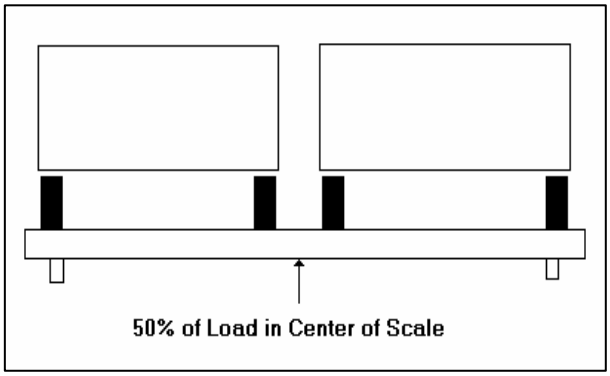
It has been suggested that the strain tests should be done between the two sets of shift tests to ensure that loading the scale near capacity does not change performance.

Shift Tests (Set Two)

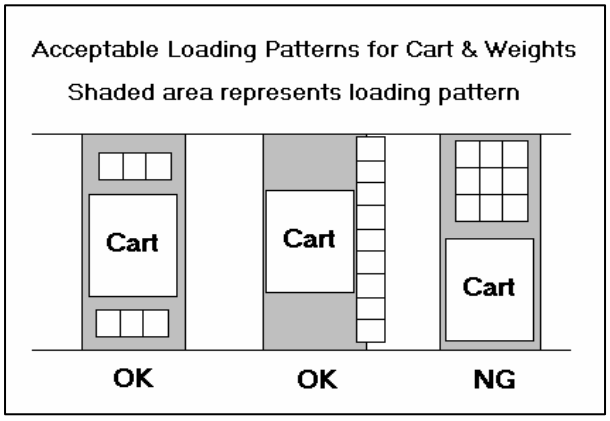
| Load \ Location | Sect 1 | Left Joint-2 | Sect 2 | Right Joint 2 | Sect 3 |
|---|---|---|---|---|---|
| Test Load 1 | • | | • | | • |
| Test Load 2 | • | | • | | • |
| Test Load 3 | • | | • | | • |
| Test Load 4 | • | | • | | • |
| Test Load 5 | • | • | • | • | • |

**Remaining Questions:**

? How do you use more than one weight cart? The two carts must be loaded end-to-end to avoid loading the center of the platform. Most carts can't be loaded side by side since they have wheelbases in the 5-6 foot range. Even if they could be loaded side-by-side, the loading pattern would not be acceptable since this would result in 50 % of the test load being loaded on the centerline of the deck where no truck tire can ever reach. Loading the center-line of the platform was industry's big beef on this subject.




? How should weights be loaded in conjunction with a weight cart? To keep loading approximately symmetrical in a pattern, I believe that the weights should either be loaded equally on both sides of the cart or lined up completely across the test pattern immediately in front of or behind the cart.




? What additional tests should be done to cover livestock weighing? We'll cover this subject another day!

65.5. Permanence Tests 20-30 days later after period of use with test loads of at least 40,000 lb or 50 % CLC, whichever is greater. Typically this will only result in four test loads (4 tolerance bands).

65.5.2. Shift Test - One set minimum

| Load \ Location | Sect 1 | Mid Span 1-2 | Sect 2 | Mid Span 2-3 | Sect 3 |
|---|---|---|---|---|---|
| 1st Test Inc Load 1 | X | X | X | X | X |
| 1st Test Inc Load 2 | X | X | X | X | X |
| 1st Test Inc Load 3 | X | X | X | X | X |
| 1st Test Inc Load 4 | X | X | X | X | X |

65.5.3. Strain Load Tests - One set minimum

| Load \ Location | End A | End B |
|---|---|---|
| 1st Test - Strain Load distributed on End A | Ref Val X | |
| 1st Test - Inc Test Load 1 (applied to end B) | Strain Load | X |
| 1st Test - Inc Test Load 2 | Strain Load | X |
| 1st Test - Inc Test Load 3 | Strain Load | X |
| 1st Test - Inc Test Load 4 | Strain Load | X |
| 1st Test - Dec Load 3 | Strain Load | X |
| 1st Test - Dec Load 2 | Strain Load | X |
| 1st Test - Dec Load 1 | Strain Load | X |
| 1st Test - Dec Load (Strain) | Ref Val X | |
| 1st Test - Remove strain load - Dec Load @ zero | | X |
| Reestablish zero Reference | | |
| 2nd Test - Strain Load distributed on End B | | Ref Val X |
| 2nd Test - Inc Test Load 1 (applied to end A) | X | Strain Load |
| 2nd Test - Inc Test Load 2 | X | Strain Load |
| 2nd Test - Inc Test Load 3 | X | Strain Load |
| 2nd Test - Inc Test Load 4 | X | Strain Load |
| 2nd Test - Remove Strain Load leaving Dec Test Load 4 on end A | X | |
| 2nd Test - Dec Test Load 3 | X | |
| 2nd Test - Dec Test Load 2 | X | |
| 2nd Test - Dec Test Load 1 | X | |
| 2nd Test - Dec Test Load at zero | X | |

**Note:** The use of four test loads is based on standard procedure of taking one reading in each tolerance band over the range of weight used in the test.

**OHIO NTEP Lab Vehicle Scale Test Procedures and Report Forms**

**Large Capacity Platform And Vehicle Scales Checklist**

**Table Of Contents**

**Table of Contents** **Page**



**Section 1. Information**

Date of Test _____ Control Number _____ CC Number _____
Scale Owner _____
Address _____
City _____ State _____ Zip Code _____
Manufacturer _____
Address _____
City _____ State _____ Zip Code _____
Telephone _____ Fax _____

**Section 2. Device**

Scale Model Number _____ Scale Capacity _____
Division Size _____ Number of sections _____ Size of Platform(s) _____
Serial Number _____ CC Number _____
CLC _____ Accuracy Class _____

**Section 3. Markings**

**Section 4. Load Cells**

Load cells for which Certificates of Conformance have been issued under the National Type Evaluation Program shall be marked with the following:

1. the accuracy class of III, III L corresponding to the scale accuracy class for which its use is intended

2. the maximum number of scale divisions (stated in units of 1 000) for which the accuracy class requirements are met

3. a “S” or “M” for single or multiple cell applications, respectively, in conjunction with the maximum number of scale divisions for each class and application in which the load cell may be used

4. the direction of loading, if not obvious

5. special limits of working temperature if other than 14 °F to 104 °F (-10 °C to 40 °C); and

6. the name and address of the manufacturer or the manufacturer's trademark, model designation, minimum dead load, maximum capacity safe load limit, and load cell verification interval ($v_{min}$).

The required information may be given on a plate attached to the load cell or, alternatively, in an accompanying document. If the document is the source of the information, the serial number of the load cell shall be marked on the load cell plate and also given in the document. Yes ☐ No ☐

Load Cell Manufacturer _____ Model Number _____
Is/Are load cell(s) NTEP approved Yes ☐ No ☐
CC Number _____ Number of load cells _____
Load Cell Capacity _____ Number of divisions _____ $V_{min}$ _____

Load Cell Serial Numbers:

| | |
|---|---|
| 1. | 2. |
| 3. | 4. |
| 5. | 6. |
| 7. | 8. |
| 9. | 10. |
| 11. | 12. |
| 13. | 14. |
| 15. | 16. |
| 17. | 18. |
| 19. | 20. |

**Load Cell Formulas:**

For scales without lever system and N is the number of load cells in the scale: $\mathbf{v_{min}\#d\ )\ /N}$
$v_{min}$ of the load cell must be less than or equal to the scale division divided by the square root of the number of load cells.

For scales with a lever system: $\mathbf{v_{min}\#\ d\ )\ (/N\ x\ scale\ multiple)}$
$v_{min}$ of the load cell must be less than or equal to the scale division divided by the square root of the number of load cells multiplied by the scale multiple.

**WORKSHEET**
**FOR NEW VEHICLE & LIVESTOCK SCALE INSTALLATIONS**
**HANDBOOK 44 MARKING REQUIREMENTS & SUITABILITY CRITERIA**

| MARKINGS | INDICATING ELEMENT | WEIGHING ELEMENT | LOAD CELL(s) |
|---|---|---|---|
| **Manufacturer** | | | |
| **Model** | | | |
| **CC Number** | | | |
| **Serial Number** | | | |
| **Class III, III L, III/III L** | | | |
| **Capacity** | | | ***NA*** |
| **"d" Scale Division Value** | | **NA** | **NA** |

| MARKINGS | INDICATING ELEMENT | WEIGHING ELEMENT | LOAD CELL(s) |
|---|---|---|---|
| "$e_{min}$" Minimum Scale Division | NA | | NA |
| "$n_{max}$" Maximum Number of "d" | | | |
| "$V_{min}$" Verification Scale Div. | NA | NA | |
| Single Cell (S) or Multiple Cells (M) | NA | NA | |
| "CLC" Concentrated Load Cap. | | | NA |

| Suitability Criteria | Meets Requirements yes no NA |
|---|---|
| Is $e_{min}$ ≤ d ? _____ ≤ | |
| Is "n"(for system) ≤ $n_{max}$ (smallest of any one) ? _____ ≤ | |
| Is capacity ≤ [(no. sections - 0.5) x CLC]? _____ ≤ | |
| Is $V_{min}$ # d)/N ? (scales without levers) _____ ≤ | |
| Is $V_{min}$ # d)(/N x scale multiple)?(Lever Systems) _____ ≤ | |

**3/94 (C:\wp51\wkstIIIL)**

**WORKSHEET**
**FOR NEW CLASS III SCALE INSTALLATIONS (CAPACITY > 2000 lb)**
**HANDBOOK 44 MARKING REQUIREMENTS & SUITABILITY CRITERIA**

| MARKINGS | INDICATING ELEMENT | WEIGHING ELEMENT | LOAD CELL(s) |
|---|---|---|---|
| Manufacturer | | | |
| Model | | | |
| CC Number | | | |
| Serial Number | | | |
| Class III, III/III L | | | |
| Capacity | | | NA |
| "d" Scale Division Value | | NA | NA |
| "$e_{min}$" Minimum Scale Division | NA | | NA |
| "$n_{max}$" Maximum Number of "d" | | | |
| "$V_{min}$" Verification Scale Div. | NA | NA | |
| Single Cell (S) or Multiple Cells (M) | NA | NA | |

| *Suitability Criteria* | Meets Requirements yes no NA |
|---|---|
| Is $e_{min}$ ≤ d ? _____ ≤ | |
| Is "n"(for system) ≤ $n_{max}$ (smallest of any one) ? _____ ≤ | |
| Is $V_{min}$ ≤ d ) /N ? (scales without levers) _____ ≤ | |
| Is $V_{min}$ ≤ d ) (/N x scale multiple)? (lever systems) _____ ≤ | |

**Section 5. Weight Information**

**Vehicle scales:**

1. The minimum amount of test weights needed for the test is 90 % of the concentrated load capacity.

2. The minimum load for the strain load test in the initial test is at least 80 % of the scale capacity.

3. The minimum load for the strain test in the subsequent test is at least 65 % of the scale capacity.

4. The maximum number of scale divisions for a scale cannot exceed the lesser of the number of divisions for which the load cells and indicator were evaluated separately, i.e., if the load cells have an NTEP Certificate for a maximum of 10 000 divisions and indicator has an NTEP Certificate of 8 000 divisions, then the scale is limited to a maximum of 8 000 divisions.

**Section 6. Evaluation Criteria**

These evaluation criteria are to be used in conjunction with the applicable NTEP requirements for Digital Electronic Scales (Section 1 of NCWM Publication 14). Also see HB 44 General Code Requirements.

**Provisions for Sealing Adjustable Components on Electronic Devices**
**Code Reference: G-S.8., S.1.11**

Due to the ease of adjusting the accuracy of electronic scales, there must be a provision for applying a security seal so that the security seal must be broken before any adjustment that affects the performance of the electronic device can be made. Performance adjustments generally refer to accuracy and sensitivity adjustments. Yes ☐ No ☐

**Antifriction Means**

Frictional effects shall be reduced to a minimum, by means of suitable antifriction, at all points where system parts may come into contact with each other.

1. System components are properly designed to prevent binds or interfere with the weighing operation.
   Yes ☐ No ☐

2. Frictional effects have been reduced to a minimum. Yes ☐ No ☐

**Adjustable Components**
**Code Reference: S.4.2**

An adjustable component, such as a nose iron or potentiometer, shall be held securely in adjustment and shall not be adjustable from the outside of the device except for a component for adjusting level or a no-load reference value.
Yes ☐ No ☐

**Repeatability of the Device**
**Code Reference: G-S.5.4, T.5**

A device shall be capable of repeating its indications and recorded representations. The results obtained by several weights of the same load under reasonable static test conditions shall agree within the absolute value of the maintenance tolerance for that load, and shall be within applicable tolerances. This requirement shall be met irrespective of repeated manipulation of any element of the device in a manner approximating normal usage and of the repeated performance of steps or operations that are embraced in the testing procedure.

Repeatability - Indications. Yes ☐ No ☐

**Installation Requirements - Protection from Environmental Factors**
**Code Reference: UR.2.1**

The indicating elements, the lever system or load cells, the load-receiving element, and any permanently installed test weights shall be adequately protected from environmental factors such as wind, weather, and RFI that may adversely affect system operation or performance. Yes ☐ No ☐

**Installation Requirements - Foundation, Supports, and Clearance**
**Code Reference: UR.2.2**

The foundation and supports of any system shall be such as to provide strength, rigidity, and permanence of all components. Clearance shall be provided around all live parts so that no contact can result before or during operation of the system.

1. Adequate system foundation and supports are provided. Yes ☐ No ☐

2. Sufficient clearance around all live parts is provided. Yes ☐ No ☐

**Section 7. Performance and Permanence Tests for Vehicle Scales**

Performance tests are conducted to ensure compliance with the tolerances and, in the case of nonautomatic indicating scales, the sensitivity requirements specified in NIST Handbook 44.

The test described here, apply primarily, to the weighing element. It is assumed that the indicating element used during the test has already been examined and found to comply with applicable requirements. If the design and performance of the indicating element is to be determined during the same test, the applicable requirements for weigh beams, poses, dials, electronic digital indications, etc., must also be referenced.

**Weighbeams**

The sensitivity test is conducted at zero load and at maximum load. The sensitivity test is conducted by determining the actual test weight value necessary to bring the beam from a rest point at the center of the trig loop to rest points at the top and bottom of the trig loop. The maximum load at which the sensitivity test is conducted need not be comprised of known test weight.

**Increasing Load and Shift Tests**

At least two complete sets of shift tests shall be conducted over each section to at least 90 % of the concentrated load capacity (CLC) of the scale. This is to determine the repeatability of the scale. The scale error should be determined at a minimum of five equally spaced test loads. Scale errors may be determined at more points if desired. If two weight carts are used, they should travel along the paths the wheels of a vehicle would take when moving across the scale. Decreasing load tests are to be avoided when testing a section. A truck many not be backed onto the scale in order to place weights on the inner sections. Decreasing load test shall be conducted after the sections have been tested to their maximum load and the weights are being removed from the scale. Do not exceed the CLC capacity. The load is to be distributed across the section.

At least one complete set of shift tests to at least 90 % of the CLC shall be conducted at midspan between sections.

If a scale consists of modules that are connected together to comprise the weighbridge, shift tests shall be conducted by placing the load so that it straddles the connection between the modules. At least one shift test is to be conducted on the scale where the test load is placed first on one side of the connection line of the module, then on the other side of the connection line.

The results of the shift tests are required to agree within the absolute value of the applicable maintenance tolerances and must be within acceptance tolerances.

| NTEP Vehicle Scale Test Report | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Company: | | | | | Wind Conditions: | | | Test No: | |
| Model: | | | | | SN : | | | Temp: | |
| Device Type: | | | | | Capacity x Division | | | Tech: | |
| No. of Sections: | | | Platform Size: | | | CLC: | | Date: | |
| Type of Test: Shift ☐ Position ☐ Strain ☐ Weight of Strain Load:_____ Test Weight Amt:_____ | | | | | | | | | |
| Test Load | | / | | / | | / | | / | Tolerance |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

Comments: _____

_____

_____

**Strain Load Test**

At least one strain load test shall be conducted at each end of the scale. The maximum load applied during the strain load shall be in the range of 80 to 100 % of scale capacity. The load is to be distributed over the load-receiving element.

Load the scale with a vehicle or vehicles so the addition of test weights will provide a gross load of 80 to 100 % of the scale capacity. Determine the "reference point" for the start of the strain load test. Add the test weights to one of the ends of the scale without exceeding the CLC.

Do not conduct a decreasing load test or a return to the strain load referenced weights as part of this particular strain load test. After removing the test weights from the end of the scale, reestablish the strain load reference value and reapply the test weights to verify that the strain load values repeat the initial values. Conduct a decreasing load test and return to the strain load reference value as the weights are removed as part of this test cycle. The return to the strain load reference value shall be within one-half of a scale division with consideration given for the creep and for an temperature changes that may have occurred during this last cycle.

Remove the known test weights and strain load. Zero the scale, place the strain load on the other end of the scale, and establish the strain load reference value. **Do not** use the zero setting mechanism to set the strain load to zero; the tare mechanism may be used to tare out the strain load. The gross load zero value is needed to conduct a decreasing load test as the strain load is removed in the test.

Repeat the strain load test on the other end of the scale. After reaching the maximum test load for the strain load test, remove the strain load but leave the known test weights on the scale. The weight indication for the decreasing load test must be within tolerance for the known test load. Continue the decreasing load test by removing the known test weights. Take several readings as the weights are being removed. When all the weights are removed, record the return zero. The scale must return to zero within one-half of a scale division. When analyzing the return to zero, consideration must be given for the length of time the load was on the scale and for possible temperature changes that may have occurred during the test.

Acceptance tolerances are applied only to the known test load in the strain load test.

**Section 8. Strain Test**

| Test Load | Known Weight | Indication | Error | Tolerance |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**Permanence Test**

The permanence test shall be conducted at least 20 days after successful completion of the initial performance test. Performance during both tests must be within acceptance tolerances. A minimum of 40 000 lb of known test weights or 50 % of the CLC, whichever is greater is needed. At least one complete set of section tests shall be conducted over each section and at midspan between each section using the known test weights. At least one strain load test shall be conducted at each end of the scale. The maximum applied load shall be in the range of 65 to 100 % of the scale capacity. If a device fails a subsequent permanence test, the entire permanence test must be repeated.

**Permanence Test Use Requirements for Vehicle Scales**

A minimum of 300 weighing operations are required during the test period (20-30 days). The manufacture is to log the date, time and weight. Each entry is to be initialed by the person conducting the weighing. Only loads which have been applied using a method representative of the scales intended use can be counted.

**For vehicle scales with a nominal capacity over 75 000 lb:**

50 % of the loads must be above 50 000 lb or 80 % of the CLC, whichever is greater and
100 % of the loads must be above 20 000 lb or 50 % of the CLC, whichever is greater.

**For all other scales:**

50 % of the loads must be above 50 % of the scale capacity; and
100 % of the load must be above 20 % of the scale capacity.

The minimum number of days that a device is required to be in use is 20 days. The committee did not specify that a certain number of weighing operations needed to be conducted each day for the test period, but recommended that use of the scale be representative of normal in service use.

The device will be tested to the CLC on the subsequent type evaluation (field) performance test.

**Section 9. General Considerations**

The technician shall ensure that the scale systems main elements and components are NTEP approved, have each been issued an NTEP Certificate of Conformance (CC), and is a replica of that which is described in the CC. Only those features and options evaluated and described in the CC are allowed.

**1. Suitability of Equipment**

Weighing equipment shall be suitable for the application for which it is to be used, and shall conform to the appropriate sections of HB-44 as correct with respect to its elements of design, including but not limited to its weighing capacity, its computing capability, the character, number, size, and location of its indicating or recording elements, and the value of its smallest division.

**2. Environment**

Equipment shall be suitable for the environment in which it is used including, but not limited to, the effects of wind, weather and radio frequency interference.

**3. Interchange or Reversal of Parts**

Parts of a device that may readily be interchanged or reversed in the course of field assembly, or of normal usage, shall be so constructed that their interchange or reversal will not materially affect the performance of the device. Parts that may be interchanged or reversed in normal field assembly shall be:

a. constructed to ensure any interchange or reversal does not affect the performance of the device, or

b. marked to show their proper position.

**Section 10.** Status: Scale Meets NTEP Requirements? Yes ☐ No ☐

Test Performed By: NTEP: _____
And Witnessed _____ State: _____
By: _____ Manufacturer _____
(The following chart contains the applicable acceptance tolerances)

**Section 11:** Applied Class III L Acceptance Tolerances for 10, 20, and 50 pound scale divisions

| **Weight applied** | **10 lb "d"** | | **20 lb "d"** | | **50 lb "d"** | |
|---|---|---|---|---|---|---|
| | d | lb | d | lb | d | lb |
| Zero | 0 | 0 | 0 | 0 | 0 | |
| 10 000 | 1 | 10 | 0.5 | 20 | 0.5 | 25 |
| 20 000 | 2 | 20 | 1 | 20 | 0.5 | 25 |
| 30 000 | 3 | 30 | 1.5 | 30 | 1.0 | 50 |
| 40 000 | 4 | 40 | 2.0 | 40 | 1.0 | 50 |
| 50 000 | 5 | 50 | 2.5 | 50 | 1.0 | 50 |
| 60 000 | 6 | 60 | 3.0 | 60 | 1.5 | 75 |
| 70 000 | 7 | 70 | 3.5 | 70 | 1.5 | 75 |
| 80 000 | 8 | 80 | 4.0 | 80 | 2.0 | 100 |
| 90 000 | 9 | 90 | 4.5 | 90 | 2.0 | 100 |

| Weight applied | 10 lb "d" | | 20 lb "d" | | 50 lb "d" | |
|---|---|---|---|---|---|---|
| 100 000 | 10 | 100 | 5.0 | 100 | 2.0 | 100 |
| 110 000 | N/A | N/A | 5.5 | 110 | 2.5 | 125 |
| 120 000 | N/A | N/A | 6 | 120 | 2.5 | 125 |
| 130 000 | N/A | N/A | 6.5 | 130 | 3 | 150 |
| 140 000 | N/A | N/A | 7 | 140 | 3 | 150 |
| 150 000 | N/A | N/A | 7.5 | 150 | 3 | 150 |
| 160 000 | N/A | N/A | 8 | 160 | 3.5 | 175 |
| 170 000 | N/A | N/A | 8.5 | 170 | 4 | 200 |
| 180 000 | N/A | N/A | 9 | 180 | 4 | 200 |
| 190 000 | N/A | N/A | 9.5 | 190 | 4 | 200 |
| 200 000 | N/A | N/A | 10 | 200 | 4 | 200 |

# New Chairman's Address

**Dennis Ehrhart**
**Arizona Department of Weights & Measures**
**July 17, 2003**

Thank you, Ross, the Members of the National Conference on Weights and Measures, and their guests.

On behalf of Ross Andersen, the Chair > > >NO! I don't have to say that any more! ! !

I want to thank you for the opportunity to be of service to the NCWM and our partners for this short time. It is an honor and a privilege that you are allowing me to sit in the wheelhouse for the upcoming year. I am especially thankful to all those who have agreed to serve on committees that will be addressing not only technical issues but also the business of the Conference. I am proud to report to you that, to a person, every one contacted has agreed to serve.

Forgive me for beginning with what could be construed as a trite phrase but… this is indeed a humbling experience.

I have the great fortune of being considered for the position of Director of the Arizona Department of Weights and Measures, as well assuming the Chair of the NCWM. I'm just a little overwhelmed.

However, I have resigned myself to placing these two obligations just behind God and Country.

As a member of the NCWM Board of Directors, as well as the Chairman-Elect of the Conference, I was charged with visiting all of the regional associations to give those attendees an idea of some of the challenges and opportunities facing the NCWM, as well as an idea of what I would like to accomplish as Chairman of the Conference.

It's hard for me to put into words the gratifying experience of traveling nationwide to see how the other regional associations work and to meet their members. I have met quite a variety of folks in the private and public sectors and yes, even a few recovering metrologists.

First, let me put your minds at ease -- the NCWM is indeed solvent. During this annual meeting the Board finalized the Conference budget at a modest deficit, much like last year's, of approximately $7,000. Considering that we are in the same economic turndown as the rest of the country, showing a minimal loss, without the bookkeeping hocus-pocus seen in big business and some segments of the public sector, is no less than a minor miracle. Part of that balancing act is due to the NCWM; not unlike industry, we are experiencing increases for services and increased costs related to the meetings to address the business of the Conference. The NCWM staff and the Board continue to explore cutting costs for the Conference without reducing services and searching for non-dues revenue.

I do my share of public speaking in front of TV cameras, consumer groups, and corporate education seminars, but far and away the most difficult audiences for me to address are the weights and measures professionals. That difficulty stems from the respect I have for the work WE do and those who perform the tasks of not only protecting consumers but also ensuring a level playing field for industry.

I'd like to give you some idea of what I would like to pursue during my greatly anticipated year as Chairman of the NCWM. During my year as Chairman, I will support and urge the Board, as well as the Conference as a whole, to support in whatever manner possible the Fair Measurement Appropriation. As you know, the idea of the FMA was brought to us by one of my colleagues from the WWMA, Aves Thompson from Alaska. Aves made his presentation, titled "A Bold New Challenge," first to the Board of Director's and then to the attendees of the last annual meeting. The idea presented in this paper is to woo federal funding for State weights and measures programs and let's just say, as Aves pointed out, "those who don't ask, don't get." I would challenge each of you to read "The Fair Measurement Appropriation" and take the concept to your administrators, attorneys general, legislators, or whoever could say yea or nay to this concept and urge them to support the FMA.

One of the challenges the NCWM faces is CONFORMITY ASSESSMENT, or "does production meet type?"

This is one of the ongoing projects that I will support and continue the dedication of resources toward the development of a workable and meaningful program. So many resources have been expended and the policy portion has been drafted, but

as we continue to receive input, we realize there are still changes to be made. With continued hard work we can make this a workable and meaningful program.

At the same time, the weights and measures community must consider making some changes to our operations to really ensure that production devices meet the same standards as the prototype that NTEP tested. Most of us need to increase the training of our staff in this valuable exercise called "initial verification." And this is where the weights and measures community can initiate those changes to our operations to really ensure that production devices meet the same standards as the prototype that NTEP tested. In concert with training and implementation, we will need to capture the results of initial verification so that those results can provide feedback on device type conformance. Both training and gathering of statistics are on the project list of the Board and they are important parts of our strategic plan.

Another challenge the Board has addressed and that I will continue to support is the issue of a National Training Program. I believe in the hierarchy format to minimize redundancy within training materials. The work has already begun. An outline to organize the subject material has been created. That outline is available and I urge you to take a copy with you to share the direction with your region and/or staff. The format of these training materials would be interactive CD-ROM and or Internet.

The State of California has a set of 14 units, which Mike Cleary and his staff have generously offered to the NCWM to distribute, which could lay the groundwork for states to use as a guideline.

Another challenge I would present to you is Conference Structure. We have reviewed the processes and direction of our corporate culture. It is imperative that we as a Conference motivate volunteers to produce more Conference work throughout the year, as well as support the diversification of the functions of the committees. The length of commitment to a committee may be keeping prospective members from becoming involved, and perhaps a change is needed to that time frame, as we know it.

The Board of Directors concluded that the A&P Committee could be better used as a redirected, renamed standing committee called the Professional Development Committee. This committee, comprised of those members of the A&P wishing to remain and those chosen to fill the vacancies, will focus on the National Training Program. Under the direction of the Board, working groups can be given specific tasks that once appeared on the agenda of the A&P and, when completed or near the end of the project, a new group could be assembled to follow through or begin a different project if need be.

The Petroleum Sub-Committee will continue working independently and will continuously monitor ASTM for new test procedures or fuels. Then, as the need arises, it will notify the Board of important issues and propose those issues go before the L&R committee for consideration of adoption into Handbook 130. The NCWM would be well served to have an active body to stay abreast of the changes in the volatile petroleum industry. No pun intended.

The Metrology Committee will continue to be funded to meet annually with NIST and will continue to work on standards and procedures in the arenas of state laboratories and legal metrology. At the direction of the Board, this committee could also function as a work group to accomplish stratified projects such as weight carts.

I'd like to take a moment to urge you all to think about the mentoring process. Each year the NCWM, as well as your jurisdictions and businesses, lose talented people due to retirement, changes of career path, or even to other jurisdictions. It becomes crucial to bring your best and brightest under your wing to expand their horizons and teach them the numerous facets of the Weights and Measures administrator's duties. Duties, not just in the sense of how to discharge the "adminis-trivia" of day-to-day operations of your shop, but how to exercise authority, the art of delegation, how to regulate fairly and, perhaps most important of all, instill the sense of duty to the NCWM.

We in the NCWM are part of a unique system. Our system of creating equitable regulations for weights and measures is indeed a remarkable process. The process of meeting with regulated parties to share information and be exposed to industry's idiosyncrasies in order to make informed decisions is rare. Take a moment. Who will be your successor? Who will represent your jurisdiction at the NCWM?

I would like to address our relationship with OIML. I would hope from the presentation Gilles and Chuck delivered Tuesday you can see that accepting and influencing OIML recommendations is not only part of the Board's Strategic Plan, but essential to improving the United States' posture in the Global Marketplace. I also hope you understand the

adoption of any OIML recommendations would most likely only affect Pub 14 and type evaluation, and our day-to-day tasks of ensuring compliance with Handbook 44 will not change.

And finally, with all that on our plate and funds stretched at best, there is one new task I want to focus on.

I have dedicated additional resources to a program called "Recognition through Transparency." Transparency is a term borrowed from the World Trade Organization's Technical Barriers to Trade Agreement meaning, ". . .all essential information regarding current work, draft work, proposals under consideration as well as the final results should be made easily accessible to at least interested parties throughout all stages of standards development." This is a body that does not operate in secrecy. Our work is conducted in a fishbowl. We want to share the end results of the work we do here.

One way to accomplish this is to allow--no, encourage--the media to get our story out. I want "weights and measures" to be a household phrase. A lofty goal, eh? But I know it's possible to at least increase the number of Americans who know who that unknown force is that looks out for consumers.

In Arizona, with just the addition of a PIO who is willing and able to be persistent with media sources, we appear on the FOX affiliate once a month with a live consumer spot and the NBC affiliate in Tucson every other month with a taped consumer tip or our portion of an investigative piece. Each November our UPC Scanning and Price Posting results are released. Every TV and radio station statewide wants an interview just in time for the upcoming holiday shopping season. In FY '02 we enjoyed $1.8 million of TV airtime FOR FREE. FY '03 should be even higher. I'd like to expand this coverage to a national level.

There is a phenomenon known as branding. Things go better with COKE; drivers wanted – Volkswagen; and Zoom Zoom - Mazda. We need this type of recognition. We affect 52 percent of the GDP. We are in virtually every state. We are in hundreds of counties and cities. I think it is worth exploration. Perhaps the most advantageous effect of an increased media profile is that our audience can help sell our programs to those who hold the purse strings.

There are several issues in the Strategic Plan that deal with enhancing public awareness. To that end, I will create a working group to create an action plan to offer direction to the Board to enhance the public awareness of the NCWM and weights and measures in this country. I know of at least three people that are members of the Conference; my PIO, Dee Ann Deaton, Dave Frieders' PIO who is an IT person -- Amy Sinclair in San Francisco -- and Agatha Shields from Franklin County, Ohio, who would jump at the chance to influence the public awareness of weights and measures nationwide. I'm certain there are more members, given the opportunity to volunteer, a modest budget and some basic direction, whose work could yield big dividends.

Item last, we have developed a strategic plan that is not static, is not collecting dust, but is being consulted to drive the efforts and direct the resources of the NCWM. The Board heard membership Tuesday; we need to and will continue to communicate our direction (yet another definition of Transparency). I want to invest the time necessary at our next Board meeting to examine our Strategic Plan. Invest the time to check milestones and record and report progress to the membership of the Conference.

In closing, I would like to reiterate my challenge for you to keep abreast of and support the "Fair Measurement Appropriation." Forward any blinding flashes of insight about Conformity Assessment to any NCWM Board member. Please continue to support the National Conference and your regional association with your attendance and input.

And, I'd like to thank you, the members of the National Conference on Weights and Measures, for giving me this opportunity to serve.

I'd also like to thank the NCWM staff for once again facilitating a seamless NCWM Conference,

And, a special thank you to my ex-boss, my mentor and my friend, Sandy Williams, recently retired Director of the Arizona Department of Weights and Measures, for her support. When others have not only limited, but also eliminated out-of-state travel, I have been allowed to attend ***this*** Conference and also continue my time and travel commitment to the NCWM.

Thank you very much.

And, may God bless America

Now I'd like to take care of just one more piece of business, committee appointments.

First, I'd like to welcome Chris Guay of Proctor and Gamble Company and Steven Pahl from the State of Texas to the Board of Directors. I am looking forward to working with them, and I am sure they will be a great asset to the Board.

I am appointing to the L&R Committee Vicky Dempsey, State of Ohio, to a five-year term;
the L&R Committee as the Associate Member replacing Chris Guay, Vince Orr of ConAgra;
the S&T Committee Carol Fulmer, State of South Carolina (5 years);
the Professional Development Committee, the members of the former A&P Committee:
Steve Hadder, State of Florida, (1 year)
Ken Deitzler, State of Pennsylvania (2 years)
Cato Fiksdal, Los Angeles, California. (1 year)
Celeste Bennett, State of Michigan (3 years),
to fill the vacancy on the former A&P Committee: Agatha Shields, Franklin County, Ohio (5 years),
and to the Professional Development Committee, the Associate Member John Moore of LORE Consulting.

# 2003 Annual Meeting Attendees

**Cary Ainsworth**
USDA GIPSA
75 Spring Street, # 230
Atlanta, GA 30303-3309
(404)562-5840, FAX: (404)562-5848
Email: L.Cary.Ainsworth@usda.gov

**Ross J. Andersen**
New York Bureau of Weights & Measures
1 Winners Circle
Albany, NY 12235
(518)457-3146, FAX: (518)457-5693
Email: ross.andersen@agmkt.state.ny.us

**Rudi Baisch**
Emery Winslow Scale Company
73 Cogwheel Lane
Seymour, CT 6483
(203)881-9333, FAX: (203)881-9477
Email: rpbaisch@emerywinslow.com

**John A. Baker**
Pier 1 Imports
301 Commerce Suite 600
Fort Worth, TX 76102
(817)252-8306, FAX: (817)252-6220
Email: jabaker@pier1.com

**Steven Beitzel**
Systems Associates, Inc.
1932 Industrial Drive
Libertyville, IL 60048
(847)367-6650, FAX: (847)367-6960
Email: sjbeitzel@systemsassoc.com

**F. Michael Belue**
Belue Associates
1319 Knight Drive
Murfreesboro, TN 37128
(615)867-1010, FAX: (615)867-0609
Email: Bassoc@aol.com

**Paul Boch**
Nevada County Weights & Measures
255 South Auburn Street
Grass Valley, CA 95945
(530)273-2648, FAX: (530)273-1713
Email: agdept@co.nevada.ca.us

**Dennis F. Bray**
Alameda County
224 West Winton Avenue, Room 184
Hayward, CA 94544
(510)670-5232, FAX: (510)783-3928
Email: dennis.bray@acgov.org

**Bartholomew Brooks**
Ocean County New Jersey
1027 Hooper Ave. Building 2
Toms River, NJ 08754-2191
(732) 929-2166, FAX: (732) 505-5330
Email: bbrooks@co.ocean.nj.us

**Darryl Brown**
Iowa Department of Agriculture
502 East 9th
Des Moines, IA 50319
(515)281-5716, FAX: (515)281-6800
Email: Darryl.Brown@idals.state.ia.us

**Norman R. Brucker**
Precision Measurement Standards, Inc.
1665 135th Street West
Rosemount, MN 55068
(651)423-3241, FAX: (651)322-7938
Email: sharnoma@mninter.net

**Gerald A. Buendel**
Washington Department of Agriculture
PO Box 42560
Olympia, WA 98504-2560
(360)902-1856, FAX: (360)902-2086
Email: jbuendel@agr.wa.gov

**Tina G. Butcher**
NIST
Building 820 Rm 223
Gaithersburg, MD 20899
(301)975-2196, FAX: (301)926-0647
Email: tina.butcher@nist.gov

**Jerry W. Butler**
North Carolina Department of Agriculture
PO Box 27647 Dept SD
Raleigh, NC 27611
(919)733-3313, FAX: (919)715-0524
Email: jerry.butler@ncmail.net

**Russell Campbell**
Alaska Div of Measurement Standards/CVE
12050 Industry Way, Bldg O, Ste. 6
Anchorage, AK 99515
(907)345-7750, FAX: (907)345-6835
Email: Russ_Campbell @dot.state.ak.us

**Judy Cardin**
Wisconsin Department of Agricultural & Consumer Protection
PO Box 8911
Madison, WI 53708-8911
(608)224-4945, FAX: (608)224 4939
Email: judy.cardin@datcp.state.wi.us

**Duane Carlile**
Foster Farms
843 Davis Street
Livingston, CA 95334
(209)394-7901, FAX:
Email: carliled@fosterfarms.com

**Stacy K. Carlsen**
Marin County Weights & Measures
1682 Novato Boulevard Ste 150-A
Novato, CA 94947-7021
(415)499-6700, FAX: (415)499-7543
Email: scarlsen@co.marin.ca.us

**Charles H. Carroll**
Massachusetts Division of Standards
One Ashburton Place, Room 1115
Boston, MA 2108
(617)727-3480, FAX: (617)727-5705
Email: Charles.Carroll@state.ma.us

**James P. Cassidy, Jr.**
Cambridge Weights & Measures
831 Massachusetts Ave
Cambridge, MA 2139
(617)349-6133, FAX: (617)349-6134
Email: jcassidy@CI.Cambridge.MA.US

**Nolton Causey**
McKesson Automated Prescription Systems
Two Crown Point Court, Suite 420
Cincinnati, OH 45241
(513)842-0156, FAX: (513)842-0163
Email: nolton.causey@mckesson.com

# 2003 Annual Meeting Attendees

**Richard Claussen**
Porter County
155 Indiana Avenue, Room 206
Valparaiso, IN 46383
(219)465-3585, FAX: (219)465-3592
Email:

**Michael Cleary**
California Division of Measurement Standards
8500 Fruitridge Road
Sacramento, CA 95823
(916)229-3000, FAX: (916)229-3026
Email: mcleary@cdfa.ca.gov

**Gary Cohrs**
Calibron Systems, Inc.
7861 East Gray Road
Scottsdale, AZ 85260
(480)991-3550, FAX: (480)998-5589
Email: gcohrs@calibron.com

**Thomas Coleman**
NIST
100 Bureau Drive M/S 2350
Gaithersburg, MD 20899-2350
(301)975-4868, FAX: (301)926-0647
Email: t.coleman@nist.gov

**Steven E. Cook**
NIST
100 Bureau Drive M/S 2600
Gaithersburg, MD 20899-2600
(301)975-4003, FAX: (301)975-0647
Email: steven.cook@nist.gov

**Clark Cooney**
Oregon Department of Agriculture
635 Capitol Street, N.E.
Salem, OR 97301-2532
(503)986-4677, FAX: (503)986-4784
Email: ccooney@oda.state.or.us

**Rodney Cooper**
Actaris Neptune
1310 Emerald Road
Greenwood, SC 29646
(864) 942-2226, FAX: (864) 223-0341
Email: rcooper@actaris.com

**Kevin Coyne**
Division of Measurement Standards
2300 McLeod Street
Las Vegas, NV 89104
(702)486-4690, FAX: (702)486-4695
Email: kcoyne@govmail.state.nv.us

**Mark P. Coyne**
Brockton Weights & Measures
City Hall Rm B12 45 School Street
Brockton, MA 02301-9927
(508)580-7120, FAX: (508)580-7173
Email: mcoyne@ci.brockton.ma.us

**Pasquale D'Errico**
New Jersey Weights & Measures
1261 US Route 1 & 9 South
Avenel, NJ 7001
(732)815-4842, FAX: (732)382-5298
Email: pat.derrico@lps.state.nj.us

**Richard L. Davis**
Georgia-Pacific
1915 Marathon Avenue
Neenah, WI 54957-0899
(920)729-8174, FAX: (920)729-8089
Email: Richard.davis@gapac.com

**Kenneth Deitzler**
Bureau of Ride & Measurement Standards
2301 North Cameron Street
Harrisburg, PA 17110-9408
(717)787-9089, FAX: (717)787-4158
Email: kdeitzler@state.pa.us

**Vicky Dempsey**
Montgomery County Weights & Measures
451 West Third Street
P.O. Box 972
Dayton, OH 45422-1027
(937)225-6309, FAX: (937)224-3927
Email: dempseyv@mcohio.org

**John Dewald**
Tiffin Loader Crane
4151 West State Route 18
Tiffin, OH 44883
(419)448-8156, FAX: (419)448-9558
Email: john@tiffincrane.com

**G.W. (Wes) Diggs**
Virginia Product & Industry Standards
PO Box 1163 Room 402
Richmond, VA 23218
(804)786-2476, FAX: (804)786-1571
Email: gdiggs@vdacs.state.va.us

**Kathryn Dresser**
NIST Weights & Measures Division
100 Bureau Drive M/S 2000
Gaithersburg, MD 20899-2000
(301)975-3289, FAX: (301)948-1416
Email: kathryn.dresser@nist.gov

**L.F. Eason**
North Carolina Department of Agriculture
4040 District Dr
Raleigh, NC 27607
(919)733-3313, FAX: (919)733-8804
Email: LF.Eason@ncmail.net

**John D. Edmond, Jr.**
USDA GIPSA
Room 3412 SOAGB 14 & Independence Ave. SW
Washington, DC 20250
(202) 720-5841, FAX: (202) 690-3207
Email: john_d.edmond@usda.gov

**Dennis Ehrhart**
Arizona Department of Weights & Measures
4425 W. Olive Avenue, Suite 134
Glendale, AZ 85302
(623)463-9937, FAX: (602) 255-1950
Email: dehrhart@wm.state.az.us

**Dr. Charles Ehrlich**
NIST
100 Bureau Drive, MS 2600
Gaithersburg, MD 20899-2600
(301)975-4834, FAX: (301)926-0647
Email: charles.ehrlich@nist.gov

**James F. Etter**
City of Hammond
649 Conkey Street
Hammond, IN 46324
(219)853-6377, FAX: (219)853-6403
Email: etterj@hmdin.com

# 2003 Annual Meeting Attendees

**Cato R. Fiksdal**
Los Angeles County Weights & Measures
12300 Lower Azusa Road
Los Angeles, CA 91006-5872
(626)575-5451, FAX: (626)350-3423
Email: cato@acwm.co.la.ca.us

**Jerry Flanders**
Georgia Department of Agriculture
Agr Building 19 MLK Drive Room 321
Atlanta, GA 30334
(404)656-3605, FAX: (404)656-9648
Email: jflander@agr.state.ga.us

**Darrell E. Flocken**
Mettler-Toledo Inc
1150 Dearborn Drive
Worthington, OH 43085
(614)438-4393, FAX: (614)438-4355
Email: darrell.flocken@mt.com

**Kurt Floren**
San Diego County Dept. of Weights & Measures
5555 Overland Avenue, Building 3
San Diego, CA 92123
(858)694-2193, FAX: (858)505-6484
Email: kurt.floren@sdcounty.ca.gov

**Maurice J. Forkert**
Tuthill Transfer Systems
8825 Aviation Drive
Fort Wayne, IN 46809
(206)747-7529, FAX: (260)747-7064
Email: Mforkert@tuthill.com

**David Frieders**
San Francisco City and County
501 Cesar Chavez # 109A
San Francisco, CA 94124
(415)285-5010, FAX: (415)285-8776
Email: dave.frieders@sfgov.org

**Carol P. Fulmer**
South Carolina Department of Agriculture
PO Box 11280
Columbia, SC 29211
(803)737-9690, FAX: (803)737-9703
Email: cfulmer@scda.state.sc.us

**Mark Galletta**
Nestle USA
800 North Brand Blvd
Glendale, CA 91203
(818)549-6089, FAX: (818)637-3348
Email: mark.galletta@us.nestle.com

**Thomas F. Geiler**
Town of Barnstable
PO Box 2430 230 South Street
Hyannis, MA 2601
(508)862-4670, FAX: (508)778-2412
Email: Tom.Geiler@town.barnstable.ma.us

**Gary R. Gist**
Howard County Weights & Measures
100 S Union-City Hall Floor 1
Kokomo, IN 46901
(765)456-7466, FAX: (765)456-7571
Email:

**Joe Gomez**
New Mexico Department of Agriculture
MSC 3170, PO Box 30005
Las Cruces, NM 88003-8005
(505)646-1616, FAX: (505)646-2361
Email: jgomez@nmda.nmsu.edu

**Marlene Goodwin**
Defiance Co Weights & Measures
Courthouse 221 Clinton St
Defiance, OH 43512
(419)782-1926, FAX: (419)784-2761
Email:

**Cindy Gordon**
American Petroleum Institute
1220 L Street, NW
Washington, DC 20005
(202)682-8482, FAX: (202)682-8051
Email: gordonc@api.org

**Don Goudie**
Stowe Research International
1000 Business Center Circle, Suite 207
Thousand Oaks, CA 91320
(805)498-5450, FAX: (805)449-3640
Email: dgoudie@stoweresearch.com

**Sandy Goudie**
Stowe Research International
1000 Business Center Circle, Suite 207
Thousand Oaks, CA 91320
(805)498-5450, FAX: (805)449-3640
Email: sgoudie@stoweresearch.com

**Steven T. Grabski**
Bureau of Weights & Measures
Division of Measurement Standards
2150 Frazer Avenue
Sparks, NV 89431
(775)688-1166, FAX: (775)688-2533
Email: sgrabski@govmail.state.nv.us

**Maxwell Gray**
Florida Dept of Agriculture & Consumer Svcs
3125 Conner Boulevard, Lab 2
Tallahassee, FL 32399-1650
(850)488-9140, FAX: (850)922-6064
Email: graym@doacs.state.fl.us

**Louis E. Greenleaf**
New Jersey Weights & Measures
1261 US Route 1 & 9 South
Avenel, NJ 7001
(732)815-4842, FAX: (732)382-5298
Email: louis.greenleaf@lps.state.nj.us

**Michael F. Grenier**
New Hampshire Department of Agriculture Markets & Food
PO Box 2042
Concord, NH 03302-2042
(603)271-3709, FAX: (603)271-1109
Email: mgrenier@agr.state.nh.us

**Christopher B. Guay**
Procter & Gamble Co
2 Procter & Gamble Plaza
Cincinnati, OH 45202
(513)983-0530, FAX: (513)983-8984
Email: guay.cb@pg.com

**Brett Gurney**
Utah Department of Agriculture & Food
PO Box 146500
Salt Lake City, UT 84114-6500
(801)538-7158, FAX: (801)538-4949
Email: bgurney@utah.gov

# 2003 Annual Meeting Attendees

**Charles Hackett**
City of Kokomo Weights and Measures
100 South Union Street
Kokomo, IN 46901
(765)456-7466, FAX:
Email: chackett@cityofkokomo.org

**Steve Hadder**
Florida Dept. of Agriculture & Consumer Services
3125 Conner Boulevard, Room 14, Building 1
Tallahassee, FL 32399-1650
(850)487-2634, FAX: (850)922-6655
Email: hadders@doacs.state.fl.us

**Georgia Harris**
NIST
100 Bureau Drive M/S 2350
Gaithersburg, MD 20899-2350
(301)975-4014, FAX: (301)926-0647
Email: gharris@nist.gov

**Ronald G. Hayes**
Missouri Department of Agriculture
PO Box 630
Jefferson City, MO 65102
(573)751-2922, FAX: (573)751-8307
Email:
Ron_Hayes@mail.mda.state.mo.us

**David K. Heck**
Chevron Products Co
6001 Bollinger Canyon Rd Building L-1096
San Ramon, CA 94583-2348
(925)842-6033, FAX: (925)842-8710
Email: dkheck@chevrontexaco.com

**Maureen Henzler**
Kansas Department of Agriculture/Weights & Measures Division
PO Box 19282/Forbes Field Building 282
Topeka, KS 66619-0282
(785) 862-2415, FAX: (785) 862-2460
Email: mhenzler@kda.state.ks.us

**Stephen R. Hill**
Orange County Sealer's Office
1750 S. Douglass Road, Bldg D
Anaheim, CA 92806-6031
(714)447-7100, FAX: (714)567-6203
Email: steve.hill@pfrd.ocgov.com

**Joe Hjermstad**
South Dakota Weights & Measures
118 West Capitol Avenue
Pierre, SD 57501-2080
(605)773-3697, FAX: (605)773-6631
Email: joe.hjermstad@state.sd.us

**J. Mike Honsberger**
Marathon Ashland Petroleum, LLC
425 S 20th St
Tampa, FL 33605-6025
(813)248-6730, FAX: (813)247-2102
Email: jmhonsberger@mapllc.com

**Jeff Humphreys**
Los Angeles County Weights & Measures
11012 Garfield Ave
South Gate, CA 90280
(562)940-8922, FAX: (562)861-0278
Email: jeffh@acwm.co.la.ca.us

**Doug Hutchinson**
Measurement Canada
232 Yorktech Drive
Markham, Ontario L6G 1A6
Canada
(905)943-8732, FAX: (905)943-8738
Email: hutchinson.doug@ic.gc.ca

**Stanley W. Jankowski**
McKesson Automated Prescription Systems
2309 Butler Logan Road
Tarentum, PA 15084-3821
(412)209-4098, FAX: (412)209-3930
Email: stan.jankowski@mckesson.com

**Randy F. Jennings**
Tennessee Department of Agriculture
PO Box 40627 Melrose Station
Nashville, TN 37204
(615)837-5147, FAX: (615)837-5335
Email: randy.jennings@state.tn.us

**Rafael Jimenez**
Transportation Technology Center, Inc.
P.O. Box 11130, 55500 D.O.T. Road
Pueblo, CO 81001
(719)584-0691, FAX: (719)584-0770
Email: rafael_jimenez@ttci.aar.com

**Dennis Johannes**
California Division of Measurement Standards
8500 Fruitridge Road
Sacramento, CA 95826
(916)229-3000, FAX: (916)229-3026
Email: DJohannes@cdfa.ca.gov

**Gordon W. Johnson**
Gilbarco, Inc.
7300 West Friendly Avenue
Greensboro, NC 27420
(336)547-5375, FAX: (336)547-5516
Email: Gordon.Johnson@gilbarco.com

**Alan Johnston**
Measurement Canada
Main Building No. 3, Tunney's Pasture
Ottawa, Ontario K1A0C9
Canada
(613)952-0655, FAX: (613)957-1265
Email: Johnston.alan@ic.gc.ca

**Jack Kane**
Montana Bureau of Weights & Measures
P.O. Box 200516
Helena, MT 59620-0512
(406)841-2240, FAX: (406)841-2060
Email: jkane@state.mt.us

**Rich Kayser**
NIST
100 Bureau Drive M/S 2000
Gaithersburg, MD 20899-2350
(301)975-4500, FAX: (301)975-2183
Email: richard.kayser@nist.gov

**Michael J. Keilty**
Endress & Hauser Flowtec AG
2350 Endress Place
Greenwood, IN 46143
(317)535-2745, FAX: (317)535-1341
Email: michael.keilty@us.endress.com

**Steven Kendra**
ISWM
2525 Tollgate Road
Quakertown, PA 18951
(215)536-4400, FAX: (215)536-4096
Email:
steve_kendra@precisionsolutionsinc.com

# 2003 Annual Meeting Attendees

**Robert L. Kennington**
Quantronix Inc
380 S 200 W PO Box 929
Farmington, UT 84025-0929
(801)451-7000, FAX: (801)451-0502
Email: rkennington@cubiscan.com

**Grant Kimura**
Chevron Texaco
6001 Bollinger Canyon Road, A-2116
San Ramun, CA 94583
(925)842-3436, FAX: (925)842-3610
Email:
grantkimura@chevrontexaco.com

**Ted Kingsbury**
Measurement Canada
Standards Building # 4, Tunney's Pasture,
Holland Avenue
Ottawa, Ontario K1A0C9
Canada
(613)941-8919, FAX: (613)952-1736
Email: kingsbury.ted@ic.gc.ca

**Steve Kleer**
Marathon Ashland
2990 South Dixie Highway
Lima, OH 45804
(419)228-2049, FAX: (419)224-4568
Email: sjkleer@mapllc.com

**Chip Kloos**
Colgate-Palmolive Company
PO Box 1343 909 River Rd
Piscataway, NJ 08855-1343
(732)878-7101, FAX: (732)878-7844
Email: Chip_Kloos@colpal.com

**Ron Koch**
Master Meter, Inc.
112 Deer Valley
Sewickley, PA 15143
(412)749-0836, FAX: (412)741-3882
Email: ronkoch@mastermeter.com

**Dennis A. Krueger**
NCR Corporation
2651 Satellite Boulevard
Duluth, GA 30096
(770)623-7743, FAX: (770)623-7827
Email:
dennis.krueger@atlantaga.ncr.com

**Gary Lameris**
Hobart Corporation
Executive Offices 701 Ridge Avenue
Troy, OH 45374
(937)332-3053, FAX: (937) 332-3007
Email: gary.lameris@hobartcorp.com

**Leon Lammers**
Weigh-Tronix Inc.
1000 Armstrong Dr
Fairmont, MN 56031-1439
(800)533-0456, FAX: (507)238-8255
Email: leon.lammers@weigh-tronix.com

**Robert L. Land**
Anderson Weights & Measures
120 East 8th Street
Anderson, IN 46016
(765)648-6186, FAX: (765)648-5917
Email: rland@cityofanderson.com

**Stephen Langford**
Cardinal Scale Mfg Co
203 East Daugherty PO Box 151
Webb City, MO 64870
(417)673-4631, FAX: (417)673-5001
Email: slangford@cardet.com

**Brian Lemon**
Industry Canada-Competition Bureau
400 St. Mary Ave 4th Floor
Winnipeg, Manitoba R3C 4K5
Canada
(204)983-8911, FAX: (204) 983-5511

**Paul A. Lewis, Sr.**
Rice Lake Weighing Systems
230 West Coleman Street
PO Box 272
Rice Lake, WI 54868-2404
(715)234-3494 x5322, FAX: (715) 234-6967
Email: paulew@rlws.com

**Harvey Lodge**
Dunbar Manufacturing, LLC
2400 Egg Harbor Road
Lindenwold, NJ 8021
(856)346-0666, FAX: (856)346-0016
Email: hlodge@dunbarusa.com

**Douglas Long**
RDM Industrial Electronics
850 Harmony Grove Road
Nebo, NC 28761
(828)652-8346, FAX: (828)652-2697
Email: doug@wnclink.com

**Robert Lopez**
San Luis Obispo County Weights & Measures
2156 Sierra Way Suite D
San Luis Obispo, CA 93401
(805)781-5910, FAX: (805)781-1035
Email: rnlopez@co.slo.ca.us

**Anthony Lori**
Retired Weights & Measures Official
10 Troy Hills Road
Whippany, NJ 7981
(973)887-0211, FAX:
Email:

**L. Edward Luthy**
Brechbuhler Scales Inc
1424 Scale Street SW
Canton, OH 44706
(330)458-2424, FAX: (330)458-3068
Email: eluthy@brechbuhler.com

**Rodney Lynch**
Navajo Nation Weights & Measures
PO Box 663
Window Rock, AZ 86515
(928)871-7367, FAX: (928)871-7381
Email: lynch_rodney@yahoo.com

**John Mack**
Defiance County Auditor's Office
221 Clinton Street
Defiance, OH 43512
(419)782-5311, FAX: (419)784-2761
Email:

**Keith L. Mahan**
Merced County Weights and Measures
2139 Wardrobe Ave
Merced, CA 95340-6495
(209)385-7431, FAX: (209)725-3961
Email: kmahan@co.merced.ca.us

# 2003 Annual Meeting Attendees

**Steven A. Malone**
Nebraska Division of Weights & Measures
Box 94757/301 Centennial Mall South
Lincoln, NE 68509-4757
(402)471-4292, FAX: (402)471-2759
Email: stevenam@agr.state.ne.us

**Vernon Lee Massey**
Shelby County Weights & Measures
157 Poplar Suite 402
Memphis, TN 38103
(901)545-3920, FAX: (901)545-3906
Email: vmassey@co.shelby.tn.us

**Richard McMurry**
Monroe County Weights & Measures
119 W 7th St
Bloomington, IN 47401
(812)349-2566, FAX: (812)339-6481
Email: remslm712@insightbb.com

**Joseph Moran**
Henry Troemner, LLC
201 Wolf Drive/ PO Box 87
Thorofare, NJ 08086-0087
(856)686-1600, FAX: (856)686-1601
Email: jmoran@troemner.com

**Robert Murnane, Jr.**
Seraphin Test Measures/
Pemberton Fabricators, Inc.
PO Box 227 30 Indel Avenue
Rancocas, NJ 08073-0227
(609)267-0922, FAX: (609)261-2546
Email: rmurnane@seraphinusa.com

**O.R. "Pete" O'Bryan**
Foster Farms
PO Box 457
Livingston, CA 95334-9900
(209)656-5049, FAX: (209)656-5055
Email: obryan@fosterfarms.com

**Don Onwiler**
Nebraska Department of Agriculture/Division of Weights & Measures
301 Centennial Mall S/PO Box 94757
Lincoln, NE 68509
(402) 471-4292, FAX: (402) 471-2759
Email: donlo@agr.state.ne.us

**James Maloy**
Fulcrum, Inc.
23 Carol Street
Clifton, NJ 7014
(973)473-6900, FAX: (973)777-8302
Email: jq.maloy@verizon.net

**Terence McBride**
Memphis Weights & Measures
590 Washington St
Memphis, TN 38105
(901)528-2905, FAX: (901)528-2948
Email:
terence.mcbride@cityofmemphis.org

**Val Miller**
NIST
100 Bureau Drive
Gaithersburg, MD 20899-2350
(301)975-3602, FAX: (301)926-0647
Email: val.miller@nist.gov

**Thomas L. Morrow**
TEC America Inc
4401 A Bankers Circle
Atlanta, GA 30360
(770)449-3040 x184, FAX: (770)453-0866
Email: morrowtl@tecamerica.com

**Steve Murray**
Murray Equipment Inc
2515 Charleston Place
Fort Wayne, IN 46808
(260)484-0382, FAX: (260)484-9230
Email: smurray@murrayequipment.com

**Milton O'Haire**
Stanislaus County Department of Agriculture/Weights & Measures
3800 Cornucopia Way Suite B
Modesto, CA 95358
(209)525-4730, FAX: (209)525-4790
Email: miltono@mail.co.stanislaus.ca.us

**Henry Oppermann**
NIST
100 Bureau Drive Room 223 M/S 2350
Gaithersburg, MD 20899-2100
(301)975-5507, FAX: (301)926-0647
Email: henry.oppermann@nist.gov

**Gene Martini**
Mettler Toledo
1900 Polaris Parkway
Columbus, OH 43240
(614)438-4970, FAX: (614)438-4770
Email: gene.martini@mt.com

**Robert McGrath**
City of Boston Weights & Measures
Boston ISD, 1010 Massachusetts Avenue
Boston, MA 02118-2606
(617)961-3376, FAX: (617)635-5383
Email: robert.mcrath.isd@ci.boston.ma.us

**Richard Miller**
FMC Measurement Solutions
1602 Wagner Avenue
Erie, PA 16510
(814)898-5286, FAX: (814)899-3414
Email: rich.miller@fmcti.com

**Nate Moster**
McKesson Automated Prescription Systems
Two Crowne Point Court, Suite 420
Cincinnati, OH 45241
(513)842-0156, FAX: (513)842-0163
Email: nate.moster@mckessonaps.com

**Neal J. Nover**
Nover Engelstein & Assoc., Inc./Win Wam Software
Atrium Executive Suites 3000 Atrium Way, Suite 2203
Mt. Laurel, NJ 08054-3910
(856)273-6988, FAX: (856)751-0559
Email: sales@winwam.com

**Daniel Okon**
United Parcel Service
55 Glenlake Parkway, NE B157
Atlanta, GA 30328
(404)828-6787, FAX: (404)828-7857
Email: dokon@ups.com

**Vincent R. Orr**
ConAgra Refrigerated Prepared Foods
3131 Wood Creek Drive
Downers Grove, IL 60515
(630)512-1070, FAX: (630)512-1124
Email: vince.orr@conagrafoods.com

# 2003 Annual Meeting Attendees

**Michelle I. Phillips**
Indianapolis Weights & Measures
148 East Market Street, Suite 609
Indianapolis, IN 46204
(317)324-4272, FAX: (317)327-4291
Email: p5618@indygov.org

**Richard L. Philmon**
Illinois Department of Agriculture
PO Box 19281 801 East Sangamon Avenue
Springfield, IL 62794-9281
(217)785-8301, FAX: (217)524-7801
Email: rphilmon@agr.state.il.us

**Michael Pinagel**
Michigan Department of Agriculture
940 Venture Lane
Williamston, MI 48895
(517)655-8202 ext 301, FAX: (517)655-8303
Email: PinagelM@michigan.gov

**Marvin G. Pound**
Georgia Department of Agriculture
815 Milledeville Hwy
Devereux, GA 31087
(404)656-3605, FAX: (404)656-9648
Email: mpound@agr.state.ga.us

**Jerry Prieto, Jr**.
Fresno County Department of Agriculture
1730 S. Maple
Fresno, CA 93702
(559)456-7510, FAX: (559)456-7379
Email: jprieto@fresno.ca.gov

**Gale Prince**
Kroger Company
1014 Vine Street
Cincinnati, OH 45202-1100
(513)762-4209, FAX: (513)762-4372
Email: gale.prince@kroger.com

**David W. Quinn**
Fairbanks Scales
4153 Telfair Lane SE
Southport, NC 28461
(910)253-1424, FAX: (910)253-1426
Email: dave.w.quinn@mindspring.com

**Mark Quisenberry**
Sutter Co Weights & Measures
142 Garden Highway
Yuba City, CA 95991
(530)822-7500, FAX: (530)822-7510
Email: sutterag@co.sutter.ca.us

**Robert A. Reinfried**
Scale Manufacturers Association
6724 Lone Oak Boulevard
Naples, FL 34109
(239)514-3441, FAX: (239)514-3470
Email: bob@scalemanufacturers.org

**David Resch**
FMC Measurement Solutions
1602 Wagner Avenue
PO Box 10428
Erie, PA 16514
(814)898-5214, FAX: (814)899-3414
Email: dave.resch@fmcti.com

**Robert E. Reynolds**
Downstream Alternatives Inc
PO Box 2587
South Bend, IN 46615
(574)231-8974, FAX: (574)231-8975
Email: rreynolds-dai@earthlink.com

**Ralph A. Richter**
NIST
100 Bureau Drive MS2150
Gaithersburg, MD 20899-2150
(301)975-4025, FAX: (301)975-5414
Email: ralph.richter@nist.gov

**Bill Ripka**
Thermo Ramsey
501 90th Ave NW
Minneapolis, MN 55433
(763)783-2664, FAX: (763)780-1537
Email: bill.ripka@thermo.com

**Frank Rusk**
Coti, Inc.
122 Export Circle
Huntsville, AL 35806
(256)859-6010, FAX: (256)859-5024
Email: frankjrusk50@hotmail.com

**Mark Sakaniwa**
McKesson Automated Prescription Systems
700 Waterfront Drive
Pittsburgh, PA 15222
(412)209-3745, FAX: (412)209-2977
Email: mark.sakaniwa@mckessonaps.com

**James Santarpio**
Dunbar Manufacturing, LLC
2400 Egg Harbor Road
Lindenwold, NJ 8021
(856)346-0666, FAX: (856)346-0016
Email: hsantarpio@dunbarusa.com

**Brett Saum**
San Luis Obispo County Weights and Measures
2156 Sierra Way, Suite A
San Luis Obispo, CA 93401-4556
(805)781-5922, FAX: (805)781-1035
Email: BSaum@co.slo.ca.us

**Alex Schuettenberg**
ConocoPhillips Petroleum
148 AL, Phillips Research Center
Bartlesville, OK 74004
(918)661-3563, FAX: (918)661-8060
Email:
alex.schuettenberg@conocophillips.com

**Steve Schultz**
Division of Measurement Standards
2150 Frazer Avenue
Sparks, NV 89431
(775)688-1166, FAX: (775)688-2533
Email:

**Lynn Sebring**
NIST
100 Bureau Drive M/S 2350
Gaithersburg, MD 20899-2350
(301)975-4006, FAX: (301)926-0647
Email: lynn.sebring@nist.gov

**George S. Shefcheck**
Oregon Department of Agriculture
635 Capitol Street, N.E.
Salem, OR 97301-2532
(503)986-4668, FAX: (503)986-4784
Email: gshefche@oda.state.or.us

# 2003 Annual Meeting Attendees

**Kent Shelhamer, Jr.**
Pennsylvania Department of Agriculture
2301 North Cameron Street
Harrisburg, PA 17110
(717)787-9089, FAX: (717)783-4158
Email: kshelhamer@state.pa.us

**Steven B. Steinborn**
Hogan & Hartson
555 13th Street, NW
Washington, DC 20004
(202)637-5969, FAX: (202)637-5910
Email: sbsteinborn@hhlaw.com

**Richard C. Suiter**
NIST, Weights & Measures Division
100 Bureau Drive M/S 2600
Gaithersburg, MD 20899-2600
(301)975-4406, FAX: (301)926-0647
Email: rsuiter@nist.gov

**David Swogger**
Dekalb County Weights & Measures
1390 County Road # 5
Corunna, IN 46730
(260)281-2047, FAX: (260)281-2747
Email:

**Merrill S. Thompson**
Baker & Daniels
PO Box 8500 Main Street
Bridgeton, IN 47836
(765)548-2211, FAX: (765)548-2214
Email:

**Bernard Toussant**
NCR Corporation
2651 Satellite Boulevard
Duluth, GA 30096
(770)623-7743, FAX: (770)813-3867
Email: bernard.toussant@ncr.com

**Larry M. Turberville**
Alabama Department of Agriculture & Industry
PO Box 3336
Montgomery, AL 36109-0336
(334)240-7133, FAX: (334)240-7175
Email: lturbervil@aol.com

**Agatha Shields**
Franklin County Weights & Measures
373 South High Street 21st Floor
Columbus, OH 43215-6310
(614)462-7380, FAX: (614)462-3111
Email: aashield@co.franklin.oh.us

**Mike Stivers**
Kentucky Department of Agriculture
Capitol Annex, Room 188
Frankfurt, KY 40601
(502)564-5126, FAX: (502)564-5016
Email: Mike.Stivers@Kyagr.com

**Steve Sumner**
New Mexico Department of Agriculture
MSC 3170, PO Box 30005
Las Cruces, NM 88003-8005
(505)646-1616, FAX: (505)646-2361
Email: ssumner@nmda-bubba.nmsu.edu

**R.S. Tanwar**
Stowe Research International
1000 Business Center Circle, Suite 207
Thousand Oaks, CA 91320
FAX:
Email:

**Michael W. Timmons**
City of Medford
85 George P. Hassett Drive
Medford, MA 2155
(781)393-2463, FAX: (781)393-2415
Email: mwtimmons@medford.org

**Robert M. Traettino**
Liquid Controls LLC
105 Albrecht Drive
Lake Bluff, IL 60044-9951
(847) 283-8300, FAX: (847) 295-1057
Email: btraettino@idexcorp.com

**Craig VanBuren**
Michigan Department of Agriculture
940 Venture Lane
Williamston, MI 48895-2451
(517)655-8202, FAX: (517)655-8303
Email: vanburenc9@michigan.gov

**Joseph Silvestro**
Consumer Protection/Wgts & Msr
152 North Broad Street, Box 337
Woodbury, NJ 8096
(856)853-3358, FAX: (856)853-6813
Email:

**Louis E. Straub**
Maryland Department of Agriculture
50 Harry S Truman Parkway
Annapolis, MD 21401
(410)841-5790, FAX: (410)841-2765
Email: strauble@mda.state.md.us

**Winston Sutton**
North Carolina Department of Agriculture
PO Box 27647 Dept SD 2 W Edenton St
Raleigh, NC 27611
(919)733-3313, FAX: (919)715-0524
Email: Winston.Sutton@ncmail.net

**Aves D. Thompson**
Alaska Div of Measurement Standards/CVE
12050 Industry Way Bldg O, Ste. 6
Anchorage, AK 99515
(907)341-3210, FAX: (907)341-3220
Email: Aves_Thompson@dot.state.ak.us

**Daryl Tonini**
Scale Manufacturers Association
1720 Eversedge Drive
Alpharetta, GA 30004-7165
(540)822-4506, FAX: (540)234-0177
Email: dtonini@earthlink.net

**James C. Truex**
Ohio Department of Agriculture
8995 East Main St
Reynoldsburg, OH 43068-3399
(614)728-6290, FAX: (614)728-6424
Email: truex@odant.agri.state.oh.us

**Gilles Vinet**
Measurement Canada
Standards Building - Tunneys
Ottawa, Ontario K1A0C9
Canada
(613)952-8918, FAX: (613)952-1736
Email: vinet.gilles@ic.gc.ca

# 2003 Annual Meeting Attendees

**Richard Walker Jr.**
Convergent Label Technology, Inc.
620 Ware Blvd
Tampa, FL 33619
(813)621-8128, FAX: (813)620-1206
Email:
rwalker@convergentlabeltech.com

**Guy Watelle**
Xactec Technologies Inc.
400 boul. Jean-Lesage, West Hall, Suite 21
Quebec City, Quebec G1K 8W1
Canada
(418)681-6515, FAX: (418)681-6217
Email: guy.watelle@xactec.net

**Rich Whiting**
American Wood Fibers
9841 Broken Land Parkway # 302
Columbia, MD 21046
(410)290-8700, FAX: (410)290-7664
Email: rwhiting@awf.com

**William M. Wilcox**
Madison County Weights & Measures
PO Box 248
Wampsville, NY 13163
(315)363-5739, FAX: (315)363-5739
Email: WMWilcox@att.net

**Juana Williams**
NIST
100 Bureau Drive M/S 2350
Gaithersburg, MD 20899-2350
(301)975-3989, FAX: (301)926-0647
Email: juana.williams@nist.gov

**Robert G. Williams**
Tennessee Dept of Agriculture Weights & Measures
PO Box 40627 Melrose Station
Nashville, TN 37204-0627
(615)837-5109, FAX: (615)837-5015
Email: robert.g.williams@state.tn.us

**Kathy Winters**
Viterra Energy Services
7250 Engineer Road, Suite H
San Diego, CA 92111
(858)737-2733, FAX: (858)244-2477
Email: kwinters@viterrausa.com

**Richard W. Wotthlie**
Maryland Department of Agriculture
50 Harry S Truman Parkway
Annapolis, MD 21401
(410)841-5790, FAX: (410)841-2765
Email: wotthlrw@mda.state.md.us

**Gail Wunderlin-Beigh**
McKesson Automated Prescription Systems
Two Crowne Point Court, Suite 420
Cincinnati, OH 45241
(513)842-0156, FAX: (513)842-0163
Email: gail.wunderlin-beigh@mckessonaps.com

**Walter M. Young**
Emery Winslow Scale Company
73 Cogwheel Lane
Seymour, CT 06483-3919
(203)881-9333, FAX: (203)881-9477
Email: wmyoung@emerywinslow.com

**James Young**
Emery Winslow Scale Company
5129 Kenneth Avenue
Fair Oaks, CA 95628
(916)966-8268, FAX:
Email: ewwestscale@comcast.net

**Jesus P. Zapien**
A&D Engineering Inc
1555 McCandless Drive
Milpitas, CA 95035
(408)263-5333 xt 241, FAX: (408)263-0119
Email: jzapien@andweighing.com

# 2003 Annual Meeting Guest Attendees

*Carole Andersen*

*Dawn Beitzel*

*Rose Brown*

*Sharon Bruckner*

*Lynell Causey*

*June D'Errico*

*Cindy Deitzler*

*Von Etter*

*Grete Fiksdal*

*Linda Forkert*

*Diane Frieders*

*Gary Gist, Jr.*

*Sandy Goudie*

*Cynthia Greenleaf*

*Denise Kayser*

*Judy Kingsbury*

*Rose Marie Lammers*

*Lisa Lunstra*

*Marcia Malone*

*Donnie Massey*

*Vendrick Massey*

*Shirley McMurry*

*Cynthia Prieto*

*Shirley Quinn*

*Sheila Santarpio*

*Debbie Straub*

*Elizabeth Sumner*

*Carol Swogger*

*Phyllis Thompson*

*Bonnie Wotthlie*