

## Appendix C

### National Type Evaluation Technical Committee (NTETC) Weighing Sector

August 31 - September 2, 2010  
Columbus, Ohio

#### Meeting Summary

<b>Carry-over Items:</b> .....	<b>NTEP - 2</b>
1. Recommended Changes to Publication 14 Based on Actions at the 2010 NCWM Annual Meeting .....	NTEP - 2
1.a. Scales, ABWS, and AWS Codes - Automatic Zero-Load Adjustment. ....	NTEP - 2
1.b. T.N.4.5.3. Zero-Load Return. ....	NTEP - 3
1.c. UR.2.6. Approaches.....	NTEP - 4
2. HB 44, G-S.8. Provisions for Sealing Adjustable Components .....	NTEP - 4
3. DES Section 66 (c) – Remove.....	NTEP - 5
<b>New Items:</b> .....	<b>NTEP - 6</b>
4. HB 44, Scales Code – T.N.4.7. Amend Creep Recovery Tolerances for III L Load Cells .....	NTEP - 6
5. DES Section 11 - Indicating and Recording Elements – Use of the Comma as a Decimal Marker. ....	NTEP - 7
6. DES Section 42 - Zero-Load and Tare Adjustment - Rounding of Intermediate Values in an Equation. ....	NTEP - 8
7. HB 44 -2.10. T.N.4.5.1. Creep and Creep Recovery Requirements for Class III Scales with n > 4000 divisions. ....	NTEP - 10
8. NTEP Policy Clarification on Adding a CIM Controller to a Static RR Track Scale. ....	NTEP - 11
9. ECRS Section 8 - Power Failure .....	NTEP - 12
10. Acceptable Symbols/Abbreviations to Display the CC Number via a Device’s User Interface.....	NTEP - 13
<b>Next Sector Meeting:</b> .....	<b>NTEP - 17</b>
<b>Appendix A - Recommendations for Amendments to Publication 14</b> .....	<b>NTEP - 18</b>
Agenda Item 1.a. ....	NTEP - 18
Agenda Item 1.b. ....	NTEP - 21
Agenda Item 2. ....	NTEP - 22
Agenda Item 5. ....	NTEP - 24
Agenda Item 6. ....	NTEP - 24
Agenda Item 9 .....	NTEP - 25
<b>Appendix B - List of Attendees</b> .....	<b>NTEP - 26</b>
<b>Attachments</b> .....	<b>NTEP - 28</b>
Agenda Item 4. T.N.4.7. Amend Creep Recovery Tolerances for III L Load Cells.....	NTEP - 28

---

<b>Glossary of Acronyms</b>			
ABWS	Automatic Bulk Weighing Systems	NTEP	National Type Evaluation Program
AWS	Automatic Weighing Systems	NTETC	National Type Evaluation Technical Committee
CC	NTEP Certificate of Conformance	OIML	International Organization of Legal Metrology
CIM	Coupled-in-Motion (Railway Track Scales)	S&T	NCWM Specifications and Tolerances Committee
CWMA	Central Weights and Measures Association	SWMA	Southern Weights and Measures Association
ECRS	Electronic Cash Registers Interfaces with Scales	WG	Work Group
GIPSA	Grain Inspection Packers and Stockyards Administration	WMD	NIST Weights and Measures Division
NCWM	National Conference on Weights and Measures	WWMA	Western Weights and Measures Association
NEWMA	Northeastern Weights and Measures Association	WS	NTETC Weighing Sector
NIST	National Institute of Standards and Technology		
Unless Otherwise Stated:			
- “Handbook 44” (HB 44) means the 2010 Edition of NIST Handbook 44, “Specifications Tolerances, and Other Technical Requirements for Weighing and Measuring Devices.”			
- “Handbook 130” (HB 130) means the 2009 Edition of NIST Handbook 130, “Uniform Laws and Regulations in the areas of legal metrology and fuel quality.”			
- “Publication 14” (Pub 14) means the 2010 Edition of NCWM Publication 14 - Weighing Devices - Technical Policy - Checklists - Test Procedures.			
Note: NIST does not imply that these acronyms are used solely to identify these organizations or technical topics.			

## Carry-over Items:

### 1. Recommended Changes to Publication 14 Based on Actions at the 2010 NCWM Annual Meeting

**Source:** The National Institute of Standards and Technology (NIST) Technical Advisor, Mr. Steve Cook, provided the Sector with specific recommendations for incorporating test procedures and checklist language based upon actions of the 2010 Annual Meeting of the 95th National Conference on Weights and Measures (NCWM). The Sector was asked to briefly discuss each item and, if appropriate, provide general input on the technical aspects of the issues.

#### 1.a. Scales, ABWS, and AWS Codes - Automatic Zero-Load Adjustment.

**Background:** See the 2009 Summary of the Weighing Sector (WS) Agenda Item 8 and the Interim and Annual Reports of the 2010 NCWM Specifications and Tolerances (S&T) Committee agenda items 320-2, 322-1, and 324-1 for the adopted language and additional background information on items to amend Handbook 44 (HB 44) Scales Code paragraph S.2.1.1. General (Zero-Load Adjustment), ABWS Code paragraph S.2.1. Automatic Zero-Tracking (AZT) Mechanism, and AWS Code paragraph S.2.1.1. Automatic Zero-Tracking Mechanism. This item was originally proposed by a subgroup of the 2008 WS. However, at its 2009 Annual Meeting, the Sector reached a consensus among the attendees that an Automatic Zero-Setting Mechanism does not have any value, and at times will facilitate inaccurate weight determinations either against the buyer or seller. The NCWM considered the recommendations of the WS and additional comments at the NCWM Interim and Annual meetings, and agreed to amend Scales and Automatic Weighing System (AWS) codes to clarify that automatic zero adjustments beyond the AZT limits are not permitted. The WS also agreed with the amendment to the Automatic Bulk Weighing Systems (ABWS) code to clarify that an automatic zero-setting mechanism is prohibited. The NCWM adopted the WS recommendations to amend Scales Code

paragraph S.2.1.1., ABWS paragraph S.2.1., and AWS paragraphs S.2.1.1. in the 2011 Edition of HB 44. The NCWM also adopted a new definition of automatic zero-setting mechanism (AZSM) in HB 44 Appendix D, since the term is used in the ABWS code.

The background information may be obtained online at:

2009 WS – [http://ncwm.net/sites/default/files/meetings/weighing/2009/09\\_Weighing\\_Summary.pdf](http://ncwm.net/sites/default/files/meetings/weighing/2009/09_Weighing_Summary.pdf)

2010 S&T Interim Report – [http://www.ncwm.net/sites/default/files/meetings/annual/2010/10\\_Pub\\_16\\_ST.pdf](http://www.ncwm.net/sites/default/files/meetings/annual/2010/10_Pub_16_ST.pdf)

2010 S&T Annual Report – <http://www.nist.gov/pml/wmd/index.cfm>

**Discussion/Conclusion:** The NIST Technical Advisor provided the Sector with specific recommendations for incorporating test procedures and checklist language into Publication 14 based upon actions of the 2010 Annual meeting of the 95<sup>th</sup> NCWM. The WS discussed each item and provided the following input regarding the technical aspect of the issues:

- Pub 14 DES 43. Zero-Tracking Mechanism: A question was raised by a member of the WS whether the Publication 14 would automatically change as the result of R 76 being amended, since the language recommended excluded the reference to a specific edition of R 76. The WS recommended that the year “2006” be added to specifically indicate that it is the language from that particular edition, and no other, that was being agreed upon by members of the WS. The WS also agreed to replace the words “a period of time” with “30 minutes” when it was pointed out that Canada had adopted 30 minutes as a standard and “a period of time” is too subjective.
- Pub 14 ABWS Section 8. The WS agreed to recommend that the new sentence proposed by the NIST Technical Advisor prohibiting AZSM be added.
- Pub 14 AWS Section 16. The WS agreed to recommend that the new sentence proposed by the NIST Technical Advisor prohibiting an automatic zero adjustment beyond the limits of AZT be added. However, rather than adding the new sentence to Section 16 as proposed, the WS recommends that the sentence be added to Section 25.
- Pub 14 AWS Section 25. The WS discussed the need to include a specific period of time as a condition in which AZT may operate rather than “after a period of time” as proposed in language developed and recommended by the NIST Technical Advisor. The WS agreed to recommend “30 minutes” as the time period.

Additionally, the WS agreed to amend procedures proposed by the NIST Technical Advisor for verifying that a device does not automatically re-zero an amount greater than the limit of AZT. The procedures developed by the NIST Technical Advisor recommended the test be conducted by placing a load just above the limit of AZT. A WS member questioned the meaning of “just above the AZT limits,” and the WS concluded that the procedures should indicate a specific amount of weight. The WS agreed to recommend that the procedure specify the test be conducted with a load 1 to 3 d above the limit of AZT. These recommendations can be found in Appendix A, Agenda Item 1.a.

#### **1.b. T.N.4.5.3. Zero-Load Return.**

**Background:** See the Final Report of the 2010 NCWM S&T Committee Agenda Item 320-3 for the adopted language and additional background information on the item to amend HB 44 Scales Code paragraphs T.N.4.5.1. Time Dependence, T.N.4.5.2. Time Dependence (III L), and add new paragraph T.N.4.5.3. Zero-Load Return ([http://www.ncwm.net/sites/default/files/meetings/annual/2010/10\\_Pub\\_16\\_ST.pdf](http://www.ncwm.net/sites/default/files/meetings/annual/2010/10_Pub_16_ST.pdf)). The NCWM agreed to amend the existing paragraphs (T.N.4.5.1. and T.N.4.5.2.) by moving creep recovery tolerances and adding them in a new paragraph (T.N.4.5.3.), to align creep recovery tolerances on scales with the equivalent tolerances for load cells, which were adopted in 2009.

**Discussion/Conclusion:** The NIST Technical Advisor provided the Sector with specific recommendations for incorporating test procedures and checklist language into Publication 14 based upon actions of the 2010 Annual Meeting of the 95<sup>th</sup> NCWM. The WS reviewed the item and suggested the technical advisor review the applicable references for weighing segment and weighing range. The WS agreed to recommend the proposed changes to the time dependence test form with the editorial corrections noted above be added to Publication 14. The proposed changes can be found in Appendix A, Item 1b.

### 1.c. UR.2.6. Approaches

**Background:** See the Final Report of the 2010 NCWM S&T Committee Agenda Item 320-4 for additional background information on the item to amend HB 44 Scales Code paragraphs UR.2.6. Approaches.

**Conclusion:** The WS agreed with the NIST Technical Advisor recommendation that no changes to Publication 14 are needed.

## 2. HB 44, G-S.8. Provisions for Sealing Adjustable Components

**Source:** NCWM S&T Committee – 2009 WS Agenda Item 13.

**Background:** At its 2009 meeting, the WS reviewed the comments from the S&T Committee, the background information in the NCWM 2008 Annual and 2009 Interim Reports, and the summary of proposals provided by the NIST Technical Advisor. The WS believes that existing language in HB 44 is sufficient and that the sectors review existing type evaluation criteria to verify that devices shall be designed with:

1. provision(s) for applying a physical security seal that must be broken before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism; or
2. other approved means of providing security to document any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism (e.g., data change audit trail) available at the time of inspection.

During the fall 2009 WWMA Technical Conference, Mr. Darrell Flocken, Mettler-Toledo, speaking as Chairman of the WS, reported the Sector's position as stated above, and noted that the Sector can develop additional guidance in NCWM Publication 14 to ensure uniform interpretation of the requirement during type evaluation.

At its October 2009 meeting, the National Type Evaluation Technical Committee (NTETC) Measuring Sector provided the Committee with the following comments:

The Sector stated that measuring devices with National Type Evaluation Program (NTEP) Certificate of Conformances (CCs) have been evaluated to either:

- 1) not function in the calibration or configuration mode;
- 2) not be sealed in the calibration or configuration mode; or
- 3) clearly indicate the device is in the calibration or configuration mode.

The Measuring Sector agreed that these options reflect the intent of General Code paragraph G-S.8., and, because the intent of the paragraph is understood and appropriately applied by the measuring community, the Measuring Sector recommends that no changes be proposed to General Code paragraph G-S.8.

Additional information on the past S&T Committee discussion on the item can be found at:

- 2008 Final Report – <http://ts.nist.gov/WeightsAndMeasures/Publications/SP1080.cfm>
- 2009 Final Report – <http://ts.nist.gov/WeightsAndMeasures/Publications/sp1099.cfm>

- 2009 WS Summary – [http://www.ncwm.net/sites/default/files/meetings/weighing/2009/09\\_Weighing\\_Summary.pdf](http://www.ncwm.net/sites/default/files/meetings/weighing/2009/09_Weighing_Summary.pdf)
- 2010 Interim Report – <http://ts.nist.gov/WeightsAndMeasures/Publications/10-Pub16.cfm>
- 2010 Annual Report – <http://www.nist.gov/pml/wmd/index.cfm>

**Discussion:** The WS reviewed the sealing procedures in Publication 14 Scales and compared them with Publication 14 for Liquid Measuring Devices, and also compared applicable HB 44 sealing requirements in the General, Scales, and Liquid Measuring Device (LMD) codes. A small WG was formed to develop more detailed procedures for determining compliance of the methods for sealing and requested the WS to consider its recommendations for Publication 14, DES Section 10. The WS reviewed the recommendations and was asked to determine whether the guidance in the WG recommendation ensures uniform interpretation of sealing requirements during type evaluation.

During the discussions, Mr. Flocken, Chairman, reported that the goal is to add additional guidance in Publication 14. Mr. Jim Truex, NTEP Administrator, stated that NTEP has received numerous reports of scales found left in the calibration/configuration mode with physical seals intact. Mr. Nigel Mills, Hobart Corp., added that the use of the phrase “clearly indicate” in the first paragraph of the WG recommendation is ambiguous without additional clarification and subject to multiple interpretations. The WS discussed various examples of indications intended to clearly indicate that a device is in a calibration/configuration mode. Some of the examples were considered by the WS to be acceptable, while other examples were deemed unacceptable (e.g., flashing weight indications or blanking units of measure). Mr. Truex suggested that as a starting point a small list of acceptable and unacceptable means of providing clear indication be developed by the WS. Mr. Cook volunteered to develop a short list as a starting point before the conclusion of the meeting. The WS reviewed the list and discussed additional acceptable and unacceptable indications that were then added. The list should not be limiting or all inclusive and that other indications may be acceptable. Mr. Flocken suggested that the WG recommendation, with suggestions from the WS, be forwarded to the S&T Committee and Scale Manufacturers Association (SMA) for consideration prior to the 2011 NCWM Interim Meeting.

**Conclusion:** The WS agreed with the revised proposal to amend Publication 14 Section 10. This recommendation can be found in Appendix A, Agenda Item 2. The WS also agreed to forward the amended language for Publication 14 to the S&T Committee with a recommendation that the S&T item be withdrawn from the Committee’s Agenda.

### 3. DES Section 66 (c) – Remove.

**Source:** Mr. Ed Luthy, formerly of Brechbuhler Scales – 2009 WS agenda item 15

**Background:** Mr. Luthy requested the WS to consider deleting DES Section 66 (c). Performance and Permanence Tests for “Side-by-Side” Modular and Non-Modular Vehicle Scales, stating that the time and expense is too large for the value added to having the option listed on an NTEP CC.

At its 2009 meeting, the WS stated that it is not in favor of removing the section. The purpose of the original proposal to delete DES Section 66(c) is intended to reduce the expense of type evaluation on these devices. The scale manufacturers in attendance volunteered to form a small work group (WG) to review the existing procedures and develop proposals to amend existing language for a possible abbreviated test procedure.

**Discussion/Conclusion:** The WS recommended this item be removed from the its Agenda upon learning from the NIST Technical Advisor that no activity had been reported by the small WG since the item was first introduced at the 2009 Annual WS meeting. Additionally, Mr. Luthy requested the item be removed since he no longer represents Brechbuhler.

**New Items:**

**4. HB 44, Scales Code – T.N.4.7. Amend Creep Recovery Tolerances for III L Load Cells**

**Source:** Mr. Kevin Fruechte, Avery Weigh-Tronix

**Background:** Avery Weigh-Tronix reported that HB 44 Creep Recovery tolerances for Class III load cells with  $n > 4000$  divisions in Scales Code paragraph T.N.4.7., is now greater than creep recovery tolerances applicable to Class III L load cells. In terms of  $mV/V$  equivalency, a Class III/III L load cell can now pass Class III and fail Class III L creep recovery tolerances.

Prior to 2009, the tolerance for Class III load cells was  $0.5v$ . This was increased by a factor of  $5/3$  to arrive at the  $0.83 v$  tolerance in the current requirement. This recommendation proposes to increase the existing  $1.5 v$  tolerance for Class III L load cells by the same  $5/3$  factor. Thus the new tolerance would be  $1.5 v \times 5/3$  or  $2.5 v$ .

The following is an example of a 50 000 lb load cell marked with both III and III L accuracy classes that illustrates the problem.

Class III	Class III L
$n_{\max} = 5000$	$n_{\max} = 10\ 000v$
$v_{\min} = 10\text{ lb}$	$v_{\min} = 5\text{ lb}$

The Class III creep recovery tolerance is  $0.83 v$  ( $0.83 v \times 10\text{ lb}/v = 8.3\text{ lb}$ )

The Class III L creep recovery tolerance is  $1.5 v$  ( $1.5 v \times 5\text{ lb}/v = 7.5\text{ lb}$ )

The proposed Class III L creep recovery tolerance is  $1.5 v \times 5/3 = 2.5v$  ( $2.5 v \times 5\text{ lb}/v = 12.5\text{ lb}$ )

Avery Weigh-Tronix also notes the increased cost involved with meeting Class III L VCAP (voluntary Conformity Assessment Program) requirements with a tolerance that is less than Class III. Multiplying the Class III L tolerance by  $5/3$ , as was done with Class III, would be more cost effective for a load cell manufacturer.

**Discussion/Conclusion:** The NIST Technical Advisor to the WS provided the sector with a summary of creep recovery test results from October 1, 2007, through August 12, 2010, for Class III L load cells from the NIST Force Group that shows that Class III L load cell creep recovery type evaluation compliance rate is 76 % using existing tolerances (See Attachment for Agenda Item 4.). The compliance rate for Class III load cells over the same time period is 69 % using the expanded tolerance adopted in 2009. Mr. Fruechte, Avery Weigh-Tronix, explained to the WS the need to amend the creep recovery tolerances for Class III L load cells based on the example provided by the NIST Technical Advisor. A WS member stated that using the  $5/3$  factor would reconcile the differences between U.S. Class III L creep recovery tolerances with comparable International Organization of Legal Metrology (OIML) R 60 Class C load cell tolerances. The WS agreed to submit the language to amend paragraph T.N.4.7. to the S&T Committee and regional weights and measures associations as follows:

**T.N.4.7. Creep Recovery for Load Cells During Type Evaluation.** – The difference between the initial reading of the minimum load of the measuring range ( $D_{\min}$ ) and the reading after returning to minimum load subsequent to the maximum load ( $D_{\max}$ ) having been applied for 30 minutes shall not exceed:

- (a) 0.5 times the value of the load cell verification interval ( $0.5 v$ ) for Class II and III load cells;
- (b) 0.5 times the value of the load cell verification interval ( $0.5 v$ ) for Class III load cells with 4000 or fewer divisions;
- (c) 0.83 times the value of the load cell verification interval ( $0.83 v$ ) for Class III load cells with more than 4000 divisions; or
- (d) ~~2.5~~ ~~1.5~~ times the value of the load cell verification interval (~~2.5~~ ~~1.5~~  $v$ ) for Class III L load cells.

(Added 2006) (Amended 2009 **and 201X**)

## 5. DES Section 11 - Indicating and Recording Elements – Use of the Comma as a Decimal Marker.

**Source:** Mr. Steven Cook, NIST Weights and Measures Division (WMD)

**Background:** WMD has received a request for clarification about the use of commas as a decimal marker. There is no specific prohibition of the use of commas in HB 44 and Handbook 130 (HB 130). Additionally, Publication 14 DES section only uses periods or dots when decimals markers are used. However, Pub 14 Liquid-Measuring Devices Section 1.20., states that “Symbols for decimal points shall clearly identify the decimal position. (Generally acceptable symbols are dots, small commas, or x.)”

The use of the dot as the decimal marker is customary in the United States and WMD believes that the use of a comma is not appropriate for commercial applications. HB 44 references the words “decimal point” in the General Code. The “decimal point” is generally defined as a dot, point, or period and is based on the terminology having a general meaning found in several U.S. dictionaries. Additionally, the comma is not used universally in international marketplaces where it conflicts the customary usage of the country. WMD believes that there is general resistance to the use of the comma by U.S. consumers and regulatory officials based on concerns over potential misinterpretations of indications and printed representations of weight or volume on weighing and measuring devices. The “Forward” of Handbook includes language that recognizes potential issues with the use of the “comma” where it states that:

“. . . a space has been inserted instead of commas in all numerical values greater than 9999 in this document, following a growing practice, originating in tabular work, to use spaces to separate large numbers into groups of three digits. This avoids conflict with the practice in many countries to use the comma as a decimal marker.”

Additionally, our recollections are that other NTEP applicants were denied the use of the comma as a decimal marker before the administration of NTEP was transferred from NIST to the NCWM.

The following references to the use or prohibition of the commas as a decimal marker were used to develop the WMD response.

U.S. Government Printing Office Style Manual

12.27. Fractions ( $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ ,  $\frac{3}{8}$ ,  $\frac{5}{8}$ ,  $\frac{7}{8}$ ,  $\frac{1}{2954}$ ) or full-sized figures with the shilling mark ( $\frac{1}{4}$ ,  $\frac{1}{2954}$ ) may be used only when either is specifically requested. A comma should not be used in any part of a built-up fraction of four or more digits or in decimals. (See rule 12.9e.)

12.9. e. Use spaces to separate groups of three digits in a decimal fraction.  
(See rule 12.27.) 0.123 456 789; but 0.1234

Extract from NIST Tech Beat by Ms. Carol Hockert, November 2006

The specification of the use of only the decimal comma in English language international standards has been a source of antagonism for native English speaking people developing and using international standards for decades. Building upon a recent General Conference on Weights and Measures (CGPM 2003) resolution endorsing the use of the point on the line as the decimal sign, NIST, through ANSI, the official U.S. representative body in ISO and IEC, has recently been successful in gaining the acceptance of using the decimal point instead of the decimal comma in new English language international standards. This change in policy by ISO and IEC reflects customary usage of native English speakers and eliminates the disparity in practice between ISO and IEC standards and English language documents of other international organizations.

Extract from the NIST Monthly Highlights February 2004

### 22<sup>nd</sup> CGPM Unanimously Adopts Decimal Marker Resolution

The 22<sup>nd</sup> General Conference on Weights and Measures (CGPM), at its meeting in Paris on Oct. 13 - 17, 2003, unanimously adopted a resolution initiated by NIST declaring that "the symbol for the decimal marker shall be either the point on the line or the comma on the line," thereby giving full equality to the two symbols. In the same resolution, the 22<sup>nd</sup> CGPM reaffirmed that "Numbers may be divided in groups of three in order to facilitate reading; neither dots nor commas are ever inserted in the spaces between groups."

In the International System of Units (SI), which is the modern metric system, values of quantities are normally expressed as a number times an SI unit. Often the number contains multiple digits with an integral part and a decimal part. The symbol that separates the integral part from the decimal part is called the decimal marker. The established custom in English, as well as in many other languages, is to use the point on the line as the decimal marker, while in other languages, including French, the comma is used.

Despite these long-standing customs, some international bodies employ the comma as the decimal marker in their English language publications, and two of the world's most influential international standardizing bodies specify that the comma shall be the symbol for the decimal marker in all languages. Clearly, the specification of the comma as the decimal marker is in many languages in conflict with customary usage and could lead to much confusion if followed.

To address this issue, the 22<sup>nd</sup> CGPM unanimously adopted the NIST-initiated resolution. NIST will now work with international standardizing bodies, such as ISO and IEC, to bring the documentary standards of such bodies into agreement with the resolution.

**Discussion/Conclusion:** The WS agreed that the use of the comma as a decimal marker instead of the point or dot would be confusing in the U.S. marketplace. It was noted by Mr. Luciano Burtini, Measurement Canada (MC) that it would not be confusing in the Canadian marketplace since the use of the decimal point or comma depended upon whether a person spoke English or French. The WS agreed to recommend that Publication 14 DES Section 11 Indicating and Recording Elements - General be amended as proposed by the NIST Technical Advisor, and that the decimal point would be used in United States/Canada mutual recognition type evaluations. This recommendation can be found in Appendix A, Agenda Item 5.

## 6. DES Section 42 - Zero-Load and Tare Adjustment - Rounding of Intermediate Values in an Equation.

**Source:** Mr. Steven Cook, NIST WMD

**Background:** Publication 14 DES Sections 42 - Zero-Load Adjustment – Monorail Scales currently reflects language in HB 44 regarding the setting of zero and tare value less than 5 % of the scale capacity to within 0.02 % of scale capacity according to HB 44 Scales Code paragraphs S.2.1.4 (Monorail Scales) and S.2.3.1.(Monorail Scales Equipped with Digital Indications). In other words, a 1000 lb x 1 lb monorail scale shall have the capability to set tare values up to 50 lb to within a resolution of 0.2 lb (1000 x 0.02 %).

However, there are no procedures in Section 42 to verify that a correct zero-load balance or semiautomatic, keyboard entered, or stored tares are not rounded to the nearest value of d (1 lb) before the net weight is calculated. In the above example, a tare that is rounded before the net weight calculation introduces an extra 0.5 lb uncertainty in the net weight. This can be a problem if an average tare value of 7.6 lb for a series of trolleys is entered as tare. Objects (animal carcasses) will be consistently short weighed if the tare is rounded from 7.6 lb to 8 lb before the net weight is calculated. This may present economic harm to sellers or producers of livestock that are paid based on the weights from the monorail scale. Conversely, average tare weights that are rounded down to the nearest displayed scale division may present economic harm to the buyers, typically processors, that pay the producers based on the weights from the monorail scale.

Another question is whether the net weights are determined using the digital indicator's internal or displayed resolution of the gross weight in the calculation of the net weight.

The following is additional background information supporting the correct rounding (and significant digits) of values in an equation:

**NIST SP 811-Guide for the Use of the International System of Units (SI), Barry N. Taylor and Ambler Thompson (2008)**

**B.7.2 Rounding converted numerical values of quantities**

The use of the factors given in Secs. B.8 and B.9 to convert values of quantities was demonstrated in Sec. B.3. In most cases the product of the unconverted numerical value and the factor will be a numerical value with a number of digits that exceeds the number of significant digits (see Sec. 7.9) of the unconverted numerical value. Proper conversion procedure requires rounding this converted numerical value to the number of significant digits that is consistent with the maximum possible rounding error of the unconverted numerical value.

Example: To express the value  $l = 36$  ft in meters, use the factor  $3.048 \text{ E-}01$  from Sec. B.8 or Sec. B.9 and write

$$l = 36 \text{ ft} \times 0.3048 \text{ m/ft} = 10.9728 \text{ m} = 11.0 \text{ m.}$$

**Rounding guidelines found on the Internet:**

- In any math problem you should wait until the end to round; Only the final answer should be rounded. Carry as many significant digits as you can throughout the problem.
- Round Off Rule: Round only the final answer not the intermediate values that occur during the calculation. Carry at least twice as many decimal places as will be used in the final answer.
- Do the math, then round the answer so that the number of significant figures is equal to the least number of significant figures found in any one measurement in the equation.

**Discussion:** WMD asked the sector to consider the following suggestions to address the specific issues of correctly rounding values in the calculation of net weight determinations on monorail scales, develops test procedures, and support a general guideline in the rules for rounding in HB 44.

**Part 1 Technical Advisor Recommendation:** WMD requested that the WS consider adding language to DES 42 that clarifies that rounding is not performed until the last mathematical operation is completed to read as follows (Note that the language is consistent with the rounding requirements in DES Section 12.3.2.3. for converting units of measure):

**42. Zero-Load and Tare Adjustment - Monorail Scales**

**Code References: S.2.1.4. and S.2.3.1.**

Under the regulations of the Packers and Stockyards Administration, the rollers and hooks used on monorail scales within a facility are required to be nearly the same weight. Since monorail scales typically have scale divisions of 1 lb, a monorail scale must be capable of setting tare weights that are less than 5 % of the scale capacity to a weight value less than the displayed scale division. This reduces the rounding error in the tare weight that would otherwise be present if the tare weight were rounded to the nearest displayed scale division.

- 42.1. Means must be provided for setting the zero-load balance and any tare value less than 5 % of the scale capacity to within 0.02 % of scale capacity. Yes  No  N/A
- 42.2. For an in-motion system, the conditions above must be automatically maintained. Yes  No  N/A

**42.3. Rounding is not performed until the last mathematical operation to reduce the uncertainty of the net weight calculation.** Yes  No  N/A

**Part 1 Conclusion:** The WS agreed to recommend that Publication 14 Section 42 be amended to clarify rounding procedures for monorail scales. This recommendation can also be found in Appendix A, Agenda Item 6.

**Part 2 Technical Advisor Recommendation:** WMD believes that that compliance with HB 44 paragraphs S.2.1.4. (Monorail Scales) and S.2.3.1. (Monorail Scales Equipped with Digital Indications) should be verified with documented and agreed upon test procedures. The NIST Technical Advisor suggests that a small WG be formed that includes a member representing manufacturers of monorail scale digital indicating elements, and a representative from Grain Inspection Packers and Stockyards Administration (GIPSA). The group may also want to address the appropriate method of calculating net weight using the digital indicator's internal or displayed resolution of the gross weight.

**Part 2 Conclusion:** The WS agreed to form a small WG to develop test procedures for verifying correct rounding of net weight determinations on monorail scales. Mr. Cook and Mr. Truex will contact holders of monorail NTEP CCs and request their involvement. GIPSA will be consulted on any recommendations from the WG.

**Part 3 Technical Advisor Recommendation:** Submit or support a recommendation to the S&T Committee to amend Appendix A-Fundamental Considerations, Section 10. Rounding Off Numerical Values to state that intermediate values that occur during a calculation shall not be rounded. If intermediate values are to be rounded they should only be rounded so that the number of significant figures is equal to the least number of significant figures found in any one measurement or value in the equation.

**Part 3 Conclusion:** Mr. Cook, NIST Technical Advisor, stated that the proposal to develop language for HB 44 is not sufficiently developed. Therefore, the WS agreed to take no action at this time.

**7. HB 44 -2.10. T.N.4.5.1. Creep and Creep Recovery Requirements for Class III Scales with n > 4000 divisions.**

**Source:** Mr. Nigel Mills, Hobart

**Background:** During the 2010 Annual Conference, the NCWM voted to amend the language in T.N.4.5. as shown in agenda item 2(b). Hobart reports that the recent change to scale tolerances for time dependence in HB 44 are still not consistent with the intent to harmonize load cell and scale performance. In 2009, the WS addressed creep recovery on return to zero but there is still an extremely tight 0.5e (Scales Code paragraph T.N.4.5.1. (a)) requirement, which makes the recent changes to the scale zero return specification of minimal value since the amount of creep at capacity is related to a load cells ability to return to zero.

According to paragraph T.N.4.5.1. Time Dependence: Class II, III, and III Non-automatic Weighing Instruments: the change in the near capacity indication after 30 minutes for a complete device may not exceed 0.5e, while the load cell of the same rated increments is permitted a maximum permissible error (mpe) of 1.5e or even 2.5e.

Hobart proposed that the WS submit a proposal to the S&T Committee amending the language in bullet (a) of the 2011 HB 44 Scales Code Paragraph T.N.4.5.1. to provide specific tolerances for time dependence for the different accuracy classes of scales and maximum number of divisions.

**Discussion/Conclusions:** The WS agreed with the intent of the proposal and asked that Mr. Cook and Mr. Mills verify the time references in the proposal, and agreed to submit the following language to the NCWM S&T Committee and regional weights and measures associations as a proposal to amend HB 44 Scales Code paragraph T.N.4.5.1.(a) for by the NCWM during the 2011 NCWM Interim Meeting.

- (a) When any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 30 minutes shall not exceed ~~0.5 e~~:

- (i) **0.5 e for Class II and III devices;**
- (ii) **0.5 e for Class III devices with 4000 or fewer divisions; and**
- (iii) **0.83 e for Class III devices with more than 4000 divisions.**

However, the difference between the indication obtained at 15 minutes and the indication obtained at 30 minutes shall not exceed 0.2e.

**For multi-interval or multiple range instruments, when any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 30 minutes shall not exceed 0.83 e<sub>i</sub> (where e<sub>i</sub> is the interval of the weighing segment or range).**

If the conditions in (a) are not met, the difference between the indication obtained immediately after the load **is applied to** the instrument and the indication observed during the following 4 hours shall not exceed the absolute value of the maximum permissible error at the load applied.

*NIST Technical Advisor's Note.* Mr. Mills, Mr. Darrell Flocken, and Mr. Cook submitted the NCWM Form 15 Proposal to Amend Handbooks to Central Weights and Measures Association (CWMA), Western Weights and Measures Association (WWMA), Southern Weights and Measures Association (SWMA), and Northeastern Weights and Measures Association (NEWMA) in time for their fall meetings, and to the NCWM.

## **8. NTEP Policy Clarification on Adding a CIM Controller to a Static RR Track Scale.**

**Source:** Mr. Lou Straub, Fairbanks Scales, Inc.

**Background:** Fairbanks Scales was asked by a customer to add a Coupled-in-Motion (CIM) controller to a Static Railroad Track Scale. Both the scale and the CIM controller have current NTEP CCs. The State where the device was located would not approve this application because the static Railroad Track scale was not evaluated with the CIM controller. The State took the position that any static Railroad Track scale used with a CIM controller must be evaluated for in-motion weighing and this application must be included on an NTEP CC.

Fairbanks Scales believes that the state's perspective concerning a static weighbridge receiving NTEP approval for in-motion weighing is legitimate. However; after searching the NTEP database they could not find any railway weighbridges approved for in-motion weighing. The only two CCs addressing this issue are for the controller - and both (96-141 and 06-061) used a NTEP approved static weighbridge.

This item has been addressed in previous Weighing Sector Meetings; however, the published comments in the NTEP Weighing Sector Summaries, the changes made to NCWM Pub 14, or information supplied by the NTEP Administrator and NIST would not change the decision of the State.

The submitter reports that after discussing this issue with the NTEP Administrator and NIST Technical Advisor to the Weighing Sector, he believes the following bullets reflect the actions of the 2007 WS:

- The 2010 Edition of Pub 14 Section 70 only applies to the controllers, indicators and recording elements.
- Pub 14 Section 70 states that the in-motion controller performance tests are to be conducted with a railway track scale load-receiving element and without the use of simulation devices.
- Pub 14 Section 70 also states "It is assumed that the weighing/load-receiving element used during the test has already been examined and found to comply with applicable requirements in Section 71 (Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically)."

- The permanence test requirement was removed (starting with in the 2008 Edition of Publication 14).
- There is no section in Pub 14 for “Permanence and Performance Tests for Railway Track Scales Used to Weigh Dynamically (in-motion)”.
- Fairbanks Scales was unable to find any “stand-alone” CCs for in-motion railway track scale weighing/load-receiving elements.

The submitter asked the WS to review this issue and provide clarification that will be considered acceptable to all the states participating in NTEP. The submitter provided the following possible solutions:

1. Require NTEP CCs for CIM controllers be clarified to reflect the decisions of the 2007 Weighing Sector which specifically allow any NTEP approved static Railroad Track scale to be used with an NTEP approved CIM controller, or
2. Add permissive language to NIST HB 44

**Discussion:** Mr. Lou Straub, Fairbanks Scales, indicated that in spite of NTEP Technical Policy to the contrary, the particular state referenced above would only permit one manufacturer to sell a CIM in that state, since NTEP CCs do not state that a CIM system can be used with other compatible and NTEP certified static railway track scales.

Mr. Truex commented that it is a state’s right to fix the policy for the state and added that there are no CCs for railway track CIM weighing element. Darrell Flocken suggested amending existing railway track scale CCs by removing the words “static.”

**Conclusion:** The WS recommends that the NTEP Committee consider editorially amending existing active CCs for railway track scale weighing/load-receiving elements by removing the word “static” since static railway track scales are allowed to be used for in-motion weighing applications (e.g., “Application: For general purpose railway track scale weighing applications.”).

## 9. ECRS Section 8 - Power Failure

**Source:** NTEP Weighing Labs

**Background:** During the March 2010 NTEP Lab Meeting, held in Sacramento, California, the Weighing Labs were asked by Mr. Steve Patoray, (Weighing Labs Agenda Item 2) to explain how Section 8, paragraph 8.7.3. of Pub 14, ECRS could be met. The labs agreed that this item be forwarded to the WS for review and possible development of appropriate test criteria. The following is a copy of the 2010 Weighing Labs Agenda Item 2:

### *Weighing Labs Item 2 – ECRS Power Failure*

Source: Steve Patoray

Section 8 in ECRS has info on power loss for the ECRS.

Mr. Patoray asks how 8.7.3. can be met from what is stated in the Note below this section? Parts 1 and 2 of 8.7. are fairly clear, but in part 3, how does the ECR “continue to function and perform correctly” if it prevents indication or continuation of any transaction.

If part 3 is acceptable, what must occur after the card has been read in a card-activated system when the power has been restored? Some questions are:

- Does step 3 apply to such a system?
- Could the transaction be “canceled” in case of a power loss?
- No charges?

- Then the POS returns to normal operation, (with no transaction) once power is restored?

8.7. Power Interruptions. If a power interruption occurs via the switch, plug, or line fluctuation, the register must do one of the following:

- |        |   |     |    |     |
|--------|---|-----|----|-----|
| 8.7.1. | Continue to function and perform correctly (e.g., the ECR is equipped with an uninterruptible power supply).                              | Yes | No | N/A |
| 8.7.2. | Cease operation when power is interrupted and resume the transaction in process, at the time of the power failure when power is returned. | Yes | No | N/A |
| 8.7.3. | Prevent any indication or the continuation of any transaction initiated before a power interruption.                                      | Yes | No | N/A |

*NOTE: Either alternative is acceptable provided that the ECR continues to function and perform correctly. There are no requirements to indicate when a power failure or interruption has occurred. Test first with a power failure to the ECR alone, then power failure to the scale alone and finally by power failure to both components simultaneously.*

Also, the sentence underlined below, does not seem to fit with 8.7.3. either.

## 8. Indicating and Recording Elements – General

**Code Reference: G-S.5.1., G-S.2., S.1.1. and S.1.12.**

A point-of-sale system (POS) 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 and 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 gross or net weight entries are permitted only under specific conditions and shall be identified on the printed ticket or receipt. Manual, stored, or other predetermined tare entries do not have to be identified.
- Transaction information shall not be lost or unrecorded in the event of a power failure.

It would seem that with this criteria that every ECR/POS would need to have some type of battery back-up or UPS (for the 15 minute requirement) to continue with the transaction. Is this correct?

**Recommendation/Conclusion:** The WS reviewed existing test criteria in Section 8.7. and recommended changing Publication 14 to clarify how an ECR is to perform when power is restored after a power interruption. This recommendation can be found in Appendix A, Agenda Item 9.

## 10. Acceptable Symbols/Abbreviations to Display the CC Number via a Device's User Interface.

**Sources:** 2009 NTETC Software Sector Agenda Item 3 and 2010 S&T Item 310-3 G-S.1. Identification. (Software)

2010 Interim Report of the S&T Committee:

(<http://ts.nist.gov/WeightsAndMeasures/Publications/10-Pub16.cfm>)

2010 Software Sector summary:

([http://ncwm.net/sites/default/files/meetings/software/2010/10\\_Software\\_Summary.pdf](http://ncwm.net/sites/default/files/meetings/software/2010/10_Software_Summary.pdf))

**Background:** Local Weights and Measures inspectors need a means to determine whether equipment discovered in the field has been evaluated by NTEP. If so, the inspector needs to know at a minimum the CC number. From this

starting point, other required information can be ascertained. HB 44 currently includes three options for marking of the CC:

1. Permanent marking;
2. Continuous display; or
3. Recall using a special operation.

Makers of Purpose-built (known internationally as “Type P”) equipment often choose permanent marking. For Type Approved software executing on a Universal computer (internationally known as “Type U”), permanent marking is not very practical. The second option of continuous display is also undesirable, as the permanent display occupies valuable operator/customer screen area. As a result, most makers of software for Type U equipment opt for the special recall option. Unfortunately, HB 44 is somewhat vague about the specific means of recall. Software makers can be quite creative leaving the field inspector guesswork, frustration, and wasted time. If the inspector complains, the maker notes that the recall procedure is documented in the CC. But this is precisely the information that cannot be retrieved in the field, leading to a circular argument.

Compounding the problem, makers of sophisticated built-for-purpose equipment would also like the same flexibility currently afforded to makers of software for Type U equipment. The recall method is not available to the Type P maker today.

At its March 2010 meeting, the Software Sector, in response to comments heard during the 2010 Interim meeting, revised the proposed language changes described in the NCWM S&T Committee’s Interim Report Item 310-3. These revisions removed the differentiation between types of software (Type P and Type U) while still managing to achieve the Sector’s objective. The revised Item 310-3 proposal can be seen in the 2010 Software Sector Summary and is not included here for the sake of brevity.

In summary, for S&T Item 310-3 the Sector now suggests amending the current item under consideration. The Software Sector also initiated discussion on two new concepts, which may eventually result in additional recommendations to amend G-S.1. It should be noted that these new ideas are in the developmental stage, and are included here by request of the Sector, since comments from the regions and other interested parties would be appreciated by the Software Sector members.

First, the sector sees merit to requiring some “connection” between the software identifier (i.e., version/revision) and the software itself. The proposal was as follows (with the expectation that examples of acceptable means of implementing such a link would be included in Pub 14).

Add a new sub-subparagraph (3) to G-S.1.(d) to read as follows:

***The version or revision identifier shall be directly and inseparably linked to the software itself. The version or revision identifier may consist of more than one part, but at least one part shall be dedicated to the metrologically significant software.***

Second, it seems that at each meeting of the Sector, the states reiterate the problems they have in the field locating the basic information required when the CC number is marked via the rather general current HB 44 requirement of ‘accessible through an easily recognizable menu, and if necessary a sub-menu’ [G-S.1.1. (b)(3)]. The states have indicated that this is too vague and field inspectors often cannot find the certificate number on unfamiliar devices.

**Discussion:** The WS was requested to provide feedback on a brief initial list of menu text and icons intended to form a starting point for developing a complete list of acceptable options for accessing the required CC Number (if it is not hard-marked or continuously displayed) relating to the proposed G-S.1.1. subparagraph (b) and possible compromise solution as follows:

Proposed G-S.1.1.subparagraph (b):

(b) *The CC Number shall be:*

(3) *accessible through one or, at most, two levels of access.*

(i) *For menu-based systems, “Metrology”, “System Identification”, or “Help”.*

(ii) *For systems using icons, a metrology symbol (“M” or “SI”), or a help symbol (“?”, “I,” or an “i” within a magnifying glass).*

The software sector noted they are not suggesting the items in (i) and (ii) of the subparagraph be the final valid options and desired to have feedback specifically on additional menu text/icon images that should be considered acceptable. The software sector also noted that the number of acceptable options is less of an issue (within reason) than the fact that the list is finite.

#### **A Possible Compromise Solution:**

The Software Sector is asking if the restrictions for marking Type P equipment (allow the same options as for Type U) be relaxed in exchange for limiting the number of optional means for recalling the CC number when a recall sequence is required.

The proposed limitations on CC recall sequence are:

1. Recall shall not require more than two levels of operations. The CC recall method (trigger, command, etc.) may be present either on the main screen or one sub-menu/sub-screen down.
2. A limited number of menu text strings or icon shape choices are permitted for both the CC recall methods and the optional top level. (There is actually some validity to the argument this requirement is currently already implied by the term ‘readily identifiable menu’ used in HB 44 to describe the allowable means of recalling the CC.)

Of course, to affect this compromise a finite list of acceptable menu text/button icon options will have to be agreed upon and documented. Note that the states didn’t express much concern about the actual number of allowable selections included (though it should be reasonable); they are more concerned that there is simply a finite list of options which the NTEP labs can reference to validate the device’s implementation and that using that same list inspectors can locate the required information in the field.

Thus, the Software Sector developed the following brief initial list of ideas of menu text and icons which would form the starting point to developing the complete list of acceptable options for the readily identifiable menu.

Comments and additional suggestions for entries in the list are welcome.

<i>Permitted Menu Text examples</i>	<i>Permitted Icon shape examples</i>	<i>Essential characteristics</i>
Information Info		Top level menu text or icon <ul style="list-style-type: none"> <li>• Icon text is a lower case “i” with block serifs</li> <li>• Text color may be light or dark but must contrast with the background color</li> <li>• Icon may have a circular border</li> <li>• Activation of this menu text/icon may invoke a second level menu text/icon that recalls metrology information.</li> </ul>
Help ?		Top level menu text or icon <ul style="list-style-type: none"> <li>• Icon text is a question mark</li> <li>• Text color may be light or dark but must contrast with the background color</li> <li>• Icon may have a circular border</li> <li>• Activation of this menu text/icon may invoke a second level menu text/icon that recalls metrology information.</li> </ul>
Metrology Metrological Information		Top or second level menu text or icon <ul style="list-style-type: none"> <li>• Icon text is an upper case “M”</li> <li>• Text color may be light or dark but must contrast with the background color</li> <li>• Icon may have a rectangle or rounded rectangle border</li> <li>• If present, the activation of this menu text/icon must recall at a minimum the NTEP CC number. Other metrology information may optionally be displayed.</li> </ul>
SI S.I.		Top or second level menu text or icon <ul style="list-style-type: none"> <li>• Icon text is upper case “SI”</li> <li>• Text color may be light or dark but must contrast with the background color</li> <li>• Icon may have a rectangle or rounded rectangle border</li> <li>• If present, the activation of this menu item/icon must recall at a minimum the NTEP CC number. Other metrology information may optionally be displayed.</li> </ul>
NTEP Data N.T.E.P. Certificate		This one is debatable – what if the certificate is revoked? Does NTEP grant holders of CCs the right to display the logo on the device, or just in documentation?

Acceptable examples:

1. The “M” icon is available on the home screen. Activation displays a new screen containing the CC number and some additional metrology information including the software version/revision number(s).
2. The “SI” icon is available on the home screen. Touch screen activation displays a pop-up containing the CC number. Releasing the icon erases the pop-up.
3. The main screen contains the “i” icon (information). Activating this icon displays a screen of other icons including the “M” icon. Activating the “M” icon displays the NTEP CC.
4. The main menu includes a “Help” selection which in turn contains a “Metrology” selection. Activation of the Metrology selection displays a pop-up screen containing all global metrological approvals, including the NTEP CC number. The user manually dismisses the pop-up screen by pressing the [X] button.

5. The main menu includes an “Info” selection which in turn contains a “SI” selection. Activation of the SI selection displays a pop-up screen containing all global metrological approvals, including the NTEP CC number. The user manually dismisses the pop-up screen by pressing the [OK] button.

**Conclusion:** The WS reviewed the initial list of menu text and icons and provided the following comments:

- Mr. Flocken indicated that the green M is an EU metrology mark and for that reason should not be considered an acceptable icon.
- There was general consensus amongst WS members that the SI should not be considered acceptable since it is also used to identify the International System of Units.

### **Next Sector Meeting:**

**Conclusion:** The WS agreed to recommend that its annual meeting be held during the last week of August 2011 in Sacramento, California. The WS suggested Denver, Colorado, as an alternate location.

## Appendix A - Recommendations for Amendments to Publication 14

### Agenda Item 1.a.

#### DES Section 40. Zero-Load Adjustment - General

Code References: S.2.1.1. and S.2.1.2.

Indicate the zero load adjustment method provided.

- Tool operated zero-load adjustment. (Manual zero-setting mechanism)
- Semi-automatic zero-load adjustment. (Semi-automatic zero-setting mechanism)
- Power switch zero-load adjustment.
- Initial zero setting mechanism.(editorial)**

#### DES 43. Zero-Tracking Mechanism

Code Reference: S.2.1.3., S.2.1.3.1., S.2.1.3.2., and S.2.1.3.3.

A scale may be equipped with an automatic zero-tracking mechanism (AZT) capability to automatically correct for weight variations near zero within specified limits. To reduce the potential for weighing errors, the AZT may operate only under limited conditions as indicated in the specific type evaluation criteria. **Automatic zero-setting (setting the scale to zero without the intervention of the operator after 30 minutes) beyond the limits of AZT as defined in OIML R76 (Edition 2006) as an zero-setting mechanism is not permitted in HB 44 since there is no limit on the amount of zero adjustment in HB 44. Note that automatic zero setting is not the same as the initial zero-setting mechanism.**

- 43.1. This amount must comply with S.2.1.3. for the intended application. Yes  No  N/A
- 43.2. AZT shall not be operable on any hopper scale. Yes  No  N/A
- 43.3. For vehicle, axle-load, and railway track scales, and scales other than bench, counter, and livestock scales AZT may be operable only at a gross load zero. Yes  No  N/A
- 43.4. AZT shall not be operational when the scale is displaying a positive weight value greater than the maximum AZT quantity allowed. Yes  No  N/A
- 43.5. Hopper scales used in automatic bulk-weighing systems and all Class III L scales shall be equipped with a sealable means to enable/disable or set the AZT window to zero (0) for testing and inspection. Yes  No  N/A
- 43.6 Review documentation to verify whether the device has an automatic zero-setting mechanism. If yes, the feature shall be configured in the disabled position. This feature shall also be protected by the approved security mean in Pub 14 Section 10.** Yes  No  N/A

**If there is no reference to automatic zero-setting in the documentation, verify that the device does not automatically zero an amount greater than the limits of AZT.**

- 1) **Place a load of 1 to 3 d above the limits of AZT. After 30-minutes, observe the device to see if the indication automatically returned to a zero indication.**
- 2) **Place a load of 1 to 3 d above the limits of AZT. Zero the scale using the semiautomatic zero-setting mechanism. Remove the**



**25.3**

**Review documentation to determine if the device has an automatic zero-setting mechanism. If yes, the feature shall be configured in the disabled position. This feature shall also be protected by the approved security mean in Pub 14 Section 8.**

Yes  No  N/A

**If there is no reference to automatic zero-setting in the documentation, verify that the device does not automatically rezero an amount greater than the limits of AZT.**

- 1) **Place a load of 1 to 3 d above the limits of AZT. After 30-minutes, observe the device to see if the indication automatically returned to a zero indication.**
  
- 2) **Place a load of 1 to 3 d above the limits of AZT. Zero the scale using the semiautomatic zero-setting mechanism. Remove the test load. The device should maintain a negative weight indication or an error message or code that it is below zero. After 30-minutes, observe the device to see if the indication automatically returned to a zero indication.**

**The device does not comply if the indication automatically returns to zero.**

**Agenda Item 1.b.**

<b>TIME DEPENDENCE TEST FORM</b>																														
Code Reference: T.N.4.5.1., <b>and T.N.4.5.3.</b>																														
Control No.: _____				<table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 33%;"></td> <td style="width: 33%; text-align: center;">At start</td> <td style="width: 33%; text-align: center;">At max</td> <td style="width: 33%; text-align: center;">At end</td> <td></td> </tr> <tr> <td>Temp:</td> <td></td> <td></td> <td></td> <td>°C</td> </tr> <tr> <td>Rel. h:</td> <td></td> <td></td> <td></td> <td>%</td> </tr> <tr> <td>Time:</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Bar. Pres:</td> <td></td> <td></td> <td></td> <td>hPa</td> </tr> </table> <p>(Only Class I)</p>			At start	At max	At end		Temp:				°C	Rel. h:				%	Time:					Bar. Pres:				hPa
	At start	At max	At end																											
Temp:						°C																								
Rel. h:						%																								
Time:																														
Bar. Pres:				hPa																										
Pattern designation: _____																														
Date: _____																														
Observer: _____																														
Verification scale interval e: _____ :																														
Resolution during test (smaller than e): _____ :																														
Zero-tracking device is:																														
<input type="checkbox"/> Non-existent		<input type="checkbox"/> Not in operation		<input type="checkbox"/> Out of working range																										
$E = I + 0.5 e - \Delta L - L$																														
Load L	Time of Reading	Indication I	Add. Load $\Delta L$	Error	mpe																									
	Initial + 20 sec																													
	5 min																													
	15 min																													
	30 min																													
If the difference between the indication obtained at 15 minutes and that at 30 minutes exceeds 0.2 e, the difference between the indication obtained immediately after placing the load on the instrument and the indication observed during the following four hours shall not exceed the absolute value of the maximum permissible error at the load applied.																														
	1 hr																													
	2 hr																													
	3 hr																													
	4 hr																													
15 - 30 min	<input type="checkbox"/> Passed	<input type="checkbox"/> Failed																												
0 - 30 min	<input type="checkbox"/> Passed	<input type="checkbox"/> Failed																												
0 - 4 hr	<input type="checkbox"/> Passed	<input type="checkbox"/> Failed	<input type="checkbox"/> Not Applicable																											
<b>Time Dependence Zero Return</b>																														
Zero-tracking device is:																														
<input type="checkbox"/> Non-existent		<input type="checkbox"/> Not in operation		<input type="checkbox"/> Out of working range																										
$P = I + 0.5 e - \Delta L$																														
Time of Reading	Load $L_0$	Indication of zero $I_0$	Add. load $\Delta L$	P																										
After loading for 30 minutes		Load = _____		Meaning of symbols: I = Indication																										
Change of indication		$\Delta P =$ _____																												

<p><b><u>For single range scales:</u></b></p> <p>Check that <math> \Delta P  \leq  MPE </math> for Class III L devices</p> <p>Check that <math> \Delta P  \leq 0.5 e</math> for Class II, <del>III</del>, and IIII devices</p> <p><b><u>Check that <math> \Delta P  \leq 0.5 e</math> for Class III devices (<math>n \leq 4000 d</math>)</u></b></p> <p><b><u>Check that <math> \Delta P  \leq 0.83 e</math> for Class III devices (<math>n &gt; 4000 d</math>)</u></b></p> <p><b><u>For multi-interval scales:</u></b></p> <p><b><u>Check that <math> \Delta P  \leq 0.83 e</math> of the first weighing segment of the scale</u></b></p> <p><b><u>For multiple range scales:</u></b></p> <p><b><u>Check that <math> \Delta P  \leq 0.83 e</math> (interval of the weighing range under test)</u></b></p> <p><b><u>Check that after returning to zero from any load greater than <math>Max_1</math> and immediately after switching to the lowest weighing range, the indication near zero shall not vary by more than <math>e_1</math> during the next 5 minutes.</u></b></p> <p><input type="checkbox"/> Passed <span style="margin-left: 150px;"><input type="checkbox"/> Failed</span></p> <p>Remarks:</p>	<p><math>I_0</math> = Indication of no-load reference at the start of the test</p> <p>L = Load</p> <p><math>L_0</math> = Mass of no-load reference at the start of the test</p> <p>Add. load <math>\Delta L</math> = Additional load to next changeover point</p> <p>P = Digital indication prior to rounding = <math>I + 1/2 e - \Delta L</math></p> <p>E = Error = <math>I - L</math> or <math>P - L</math></p> <p><b><u><math>e_1</math> = interval of the first weighing range or segment</u></b></p> <p><b><u><math>Max_1</math> = capacity of the first weighing range or segment</u></b></p> <p>mpe = Maximum permissible error</p> <p>EUT = Equipment under test</p>
---	--

**Agenda Item 2.**

**10. Provision For Metrological Sealing of Adjustable Components or Audit Trail**

**Code References: G-S.8.1. and S.1.11.**

Due to the ease of adjusting the accuracy of electronic scales, all scales (except for Class I scales) must provide for a security seal that must be broken or provide an audit trail, before any adjustment that detrimentally affects the performance of the electronic device can be made. Only metrological parameters that can affect the measurement features that have a significant potential for fraud and features or parameters whose range extends beyond that appropriate for device compliance with NIST HB 44 or the suitability of equipment, shall be sealed.

For additional information on the proper design and operation of the different forms of audit trail, see Appendix B for the Requirements for Metrological Audit Trails.

The judgment of whether or not the method of access to an adjustment represents a “significant potential for fraud” and will normally require sealing for security will be made based upon the application of the *Philosophy for Sealing in Appendix A.*

**Sealing - General**

**In addition to satisfying the physical security sealing requirement; the presents of a physical seal shall clearly indicate that the setup or configuration mode (any mode permitting access to any or all sealable parameters based upon the application of the *Philosophy for Sealing in Publication 14*) of the device can not be accessed without additional actions (e.g., removal of a jumper, pressing a key or switch, etc.) only possible after the removal of the seal.**

**If the use of a physical seal is the only approved method of sealing,; it shall not be possible to apply the physical seal with the device in the setup or configuration mode (any mode permitting access to any or all sealable parameters based upon the application of the *Philosophy for Sealing in Publication 14*) unless the device has a clear indication that the device is in this mode. See the list of acceptable and unacceptable indications below.**

Technologist:				
Project number:				
<b>Applicable for Devices Using a Physical Seal</b>				
		Remarks:		
Date				
Time				
Temp °C				
RH (%)				
<b>Mechanism used to enter calibration / configuration</b>				
Jumper	Pushbutton (momentary switch)	Toggle / Slide Switch	Other (Describe in Remarks)	Meets requirements
Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
<b>Mechanism effective upon exit of calibration / configuration in Approved Mode, when mechanism is properly set according to manufacturer's specifications.</b>				
Jumper	Pushbutton (momentary switch)	Toggle / Slide Switch	Other (Describe in Remarks)	Meets requirements
Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>

**(Note: entering and exiting the calibration/configuration access mode shall be listed on the NTEP CC.)**

<b><u>Indications representing that the device is configured with the setup or configuration mode enabled (i.e., any mode permitting access to any or all sealable parameters)</u></b>	
<u>This list is not limiting or all-inclusive; other indications may be acceptable.</u>	
<b><u>Acceptable Clear Indications</u></b>	<b><u>Indications NOT Acceptably Clear</u></b>
<u>Unusable weight indications</u> Example: C100.05E	<u>C 100.05 lb</u>
<u>“not HB 44” annunciator</u>	<u>Any digit in the weight differentiated by size, shape, or color</u>
<u>“CAL” annunciator (single or mixed case)</u>	<u>Weights w/o units</u> Example. <u>100.05</u>
<u>“Set-up” annunciator (single or mixed case)</u>	<u>Flashing weight value</u>
<u>“Config” annunciator (single or mixed case)</u>	<u>Weight with no annunciators displayed</u>
	<u>Weight all annunciators displayed</u>

**Audit Trails – General**

10.1. Verify that... (The remainder of Section 10 is unchanged.)

**Agenda Item 5.**

**11. Indicating and Recording Elements - General**

Code References: G-S.2., G-S.5.1., G-S.5.2.2., and S.1.2.

There are several general requirements to facilitate the reading and interpretation of displayed weight values. Other requirements address the proper operation of indicating and recording elements. **The use of the dot as the decimal marker is customary in the U.S. and that the use of other types of decimal markers (e.g., comma or “.”) is not acceptable.**

**Agenda Item 6.**

**42. Zero-Load and Tare Adjustment - Monorail Scales**

Code References: S.2.1.4. and S.2.3.1.

Under the regulations of the Packers and Stockyards Administration, the rollers and hooks used on monorail scales within a facility are required to be nearly the same weight. Since monorail scales typically have scale divisions of 1 lb, a monorail scale must be capable of setting tare weights that are less than 5 percent of the scale capacity to a weight value less than the displayed scale division. This reduces the rounding error in the tare weight that would otherwise be present if the tare weight were rounded to the nearest displayed scale division.

42.1. Means must be provided for setting the zero-load balance and any tare value less than 5 percent of the scale capacity to within 0.02 percent of scale capacity. Yes  No  N/A

42.2. For an in-motion system, the conditions above must be automatically maintained. Yes  No  N/A

**42.3. Rounding is not performed until the last mathematical operation to reduce the uncertainty of the net weight calculation.** Yes  No  N/A

## Agenda Item 9

**8.7. Power Interruptions:** If a power interruption occurs via the switch, plug, or line fluctuation, the register must do one of the following:

8.7.1. Continue to function and perform correctly (e.g., the ECR is equipped with an uninterruptible power supply.); Yes  No  N/A

8.7.2. Cease operation when power is interrupted and resume the transaction in process, at the time of the power failure when power is returned; or Yes  No  N/A

8.7.3. Prevent any indication or the continuation of any transaction initiated before a power interruption when power is returned. Yes  No  N/A

*Note: ~~Either alternative is acceptable provided that the ECR continues to function and perform correctly.~~ There are no requirements to indicate when a power failure or interruption has occurred. Test first with a power failure to the ECR alone, then power failure to the scale alone, and finally by power failure to both components simultaneously.*

## Appendix B - List of Attendees

National Conference on Weights and Measures / National Type Evaluation Program

### Weighing Sector Final Attendee List

August 31, 2010 – September 2, 2010 / Columbus, Ohio



#### L. Cary Ainsworth

USDA Packers and Stockyards Program  
75 Spring Street, Suite 230  
Atlanta, GA 30303-3309  
P. (404) 562-5426  
E. l.cary.ainsworth@usda.gov

#### Adnan Alam

A&D Engineering, Inc.  
1756 Automation Parkway  
San Jose, CA 95131  
P. (408) 518-5112  
E. aalam@andonline.com

#### Luciano Burtini

Measurement Canada  
2008 Matera Avenue  
Kelowna, BC V1V1W9  
P. (250) 862-6557  
E. luciano.burtini@ic.gc.ca

#### Steven Cook

NIST Weights and Measures Division  
100 Bureau Drive  
Gaithersburg, MD 20899-2600  
P. (301) 975-4003  
E. stevenc@nist.gov

#### Scott Davidson

Mettler-Toledo, Inc.  
1150 Dearborn Drive  
Worthington, OH 43085  
P. (614) 438-4387  
E. scott.davidson@mt.com

#### Terry Davis

Kansas Department of Agriculture/W&M  
Division  
Forbes Field Building 282  
Topeka, KS 66619-0282  
P. (785) 479-2193  
E. terry.davis@kda.ks.gov

#### Fran Elson-Houston

Ohio Department of Agriculture  
8995 East Main Street  
Reynoldsburg, OH 43068  
P. (614) 728-6290  
E. houston@agri.ohio.gov

#### Thomas Fink

ITW Food Equipment/ Hobart  
701 Ridge Ave  
Troy, OH 45374  
P. (937) 332-3114  
E. tom.fink@hobartcorp.com

#### William Fishman

New York Dept. of Agriculture & Markets  
Building 7A 1220 Washington Avenue  
Albany, NY 12235  
P. (518)457-3452  
E. bill.fishman@agmkt.state.ny.us

#### Darrell Flocken

Mettler-Toledo, Inc.  
1150 Dearborn Drive  
Worthington, OH 43085  
P. (614) 438-4393  
E. darrell.flocken@mt.com

#### Kevin Fruechte

Avery Weigh-Tronix  
1000 Armstrong Drive  
Fairmont, MN 56031  
P. (507) 238-4461  
E. kfruechte@awtxglobal.com

#### Richard Harshman

NIST Weights and Measures Division  
100 Bureau Drive  
Gaithersburg, MD 20899-2600  
P. (301) 975-8107  
E. richard.harshman@nist.gov

**Ken Jones**

California Division of Measurement Services  
6790 Florin Perkins Road Suite 100  
Sacramento, CA 95828  
P. (916) 229-3052  
E. kjones@cdfa.ca.gov

**Thomas Jones**

Hobart Corporation  
401 W. Market  
Troy, OH 45374  
P. (937) 332-2427  
E. thomas.jones@hobartcorp.com

**Takashi Kawazoe**

New Brunswick International, Inc.  
76 Veronica Avenue  
Somerset, NJ 08873  
P. (732) 828-3633  
E. TKService@nbidigi.com

**Michael Kelley**

Ohio Department of Agriculture  
8995 East Main Street  
Reynoldsburg, OH 43068  
P. (614) 728-6290  
E. mkelley@agri.ohio.gov

**Stephen Langford**

Cardinal Scale Manufacturing Co.  
203 East Daugherty Street  
Webb City, MO 64870  
P. (417) 673-4631  
E. slangford@cardet.com

**Jean Lemay**

Measurement Canada  
151 Tunney's Pasture Drive  
Ottawa, Ontario K1A0C9  
P. (613) 952-0612  
E. jean.lemay@ic.gc.ca

**Paul Lewis**

Rice Lake Weighing Systems, Inc.  
230 West Coleman Street  
Rice Lake, WI 54868-2404  
P. (715) 434-5322  
E. plewis@ricelake.com

**L. Edward Luthy**

Stock Equipment  
108 Wade Drive  
Dover, OH 44622  
P. (440) 241-0194  
E. eluthy@gmail.com

**Earl Matthews**

Ohio Department of Agriculture  
8995 East Main Street Building 5  
Reynoldsburg, OH 43068  
P. (614) 728-6290  
E. matthews@agri.ohio.gov

**Nigel Mills**

Hobart Corporation  
701 South Ridge Avenue  
Troy, OH 45374-0001  
P. (937) 332-3205  
E. nigel.mills@hobartcorp.com

**Edward Payne**

Maryland Department of Agriculture  
50 Harry S. Truman Parkway  
Annapolis, MD 21401  
P. (410) 841-5790  
E. payneea@mda.state.md.us

**Samuel Sagarsee**

Emery Winslow Scale Co.  
613 Gardendale Road  
Terre Haute, IN 47803  
P. (812) 877-0126  
E. srsagarsee@winslowth.com

**Louis Straub**

Fairbanks Scales, Inc.  
3056 Irwin Drive S.E.  
Southport, NC 28461  
P. (910) 253-3250  
E. lstraub@fairbanks.com

**James Truex**

National Conference on Weights and Measures  
88 Carryback Drive  
Pataskala, OH 43062  
P. (740) 919-4350  
E. jim.truex@ncwm.net

**Attachments**

**Agenda Item 4. T.N.4.7. Amend Creep Recovery Tolerances for III L Load Cells**

Creep Recovery history and tolerance scenario					
NIST tests 10/1/2007 - 8/12/2010					
Class III L					
capacity	classification	delay time (seconds)	measured recovery (v)	outcome for tolerance of 1.50v	also listed for Class III
30 t	III L Mult 10000	50	0.90	pass	
30 t	III L Mult 10000	50	0.80	pass	
75 klb	III L Mult 10000	50	1.01	pass	
75 klb	III L Mult 10000	50	0.60	pass	
50 klb	III L Mult 10000	50	2.20		
50 klb	III L Mult 10000	50	1.60		
60 klb	III L Mult 10000	50	1.55		*
75 klb	III L Mult 10000	50	1.12	pass	
75 klb	III L Mult 10000	50	1.68		
2000 kg	III L Mult 10000	40	0.64	pass	*
2000 kg	III L Mult 10000	40	0.56	pass	*
60 klb	III L Mult 10000	50	1.41	pass	*
60 klb	III L Mult 10000	50	1.49	pass	*
65 klb	III L Mult 10000	50	1.33	pass	*
75 klb	III L Mult 10000	50	1.38	pass	
100 klb	III L Mult 10000	50	0.62	pass	*
30 t	III L Mult 10000	50	0.61	pass	*
			percent passing ==>	76%	
Note 1: actual time for NIST unloading is on the order of 1 second, regardless of capacity					
Note 2: "delay time" means the time between initiation of unloading and taking the first (reference) reading					
Note 3: prior to 2009, recovery values for "delay times" of 30 or 50 seconds were interpolated from measured readings at nearby points					
Note 4: since 1/1/2009, NIST sampling begins with a reading at the "delay time" required by the new Pub.14 Table 5					

NTEP Committee 2011 Final Report  
Appendix C – NTETC Weighing Sector - Attachments – Agenda Item 4

Creep Recovery history and tolerance scenario				
NIST tests 10/1/2007 - 8/12/2010				
Class III				
capacity	classification	delay time (seconds)	measured recovery (v)	outcome for tolerance of 0.83v
4 klb	III Mult 5000	40	1.09	
4 klb	III Mult 5000	40	0.95	
1000 kg	III Mult 5000	30	0.59	pass
1000 kg	III Mult 5000	30	0.82	pass
5 klb	III Mult 5000	40	1.56	
5 klb	III Mult 5000	40	0.17	pass
2000 kg	III Sing 5000	40	0.39	pass
2000 kg	III Sing 5000	40	0.16	pass
5 klb	III Sing 5000	40	1.72	
1000 kg	III Sing 5000	30	0.96	
200 lb	III Sing 5000	20	1.51	
1000 kg	III Mult 5000	30	0.48	pass
5 klb	III Mult 5000	40	0.60	pass
5 klb	III Mult 5000	40	0.39	pass
10 klb	III Mult 5000	40	0.66	pass
4 klb	III Mult 5000	40	0.75	pass
4.4 klb	III Mult 5000	40	0.42	pass
10 klb	III Mult 5000	40	1.22	
5 klb	III Sing 5000	40	1.03	
4 klb	III Mult 5000	40	0.28	pass
10 klb	III Mult 5000	40	0.93	
10 klb	III Mult 5000	40	1.25	
10 klb	III Mult 5000	40	0.93	
60 klb	III Mult 5000	50	0.77	pass
200 lb	III Sing 5000	20	0.48	pass
500 lb	III Sing 5000	30	0.50	pass
2000 kg	III Sing 5000	40	0.32	pass
2000 kg	III Sing 5000	40	0.28	pass
4000lb	III Mult 5000	40	0.80	pass
4000lb	III Mult 5000	40	0.18	pass
60 klb	III Mult 5000	50	0.70	pass
60 klb	III Mult 5000	50	0.74	pass
65 klb	III Mult 5000	50	0.66	pass
100 klb	III Mult 5000	50	0.31	pass
30 t	III Mult 5000	50	0.30	pass
		percent passing ==>		69%

THIS PAGE INTENTIONALLY LEFT BLANK