Appendix C

National Type Evaluation Technical Committee
Weighing Sector

September 23 - 25, 2008 – St. Louis, Missouri
Meeting Summary

Agenda Items

Table B
Appendices

Table C
Glossary of Acronyms

AWS	Automatic Weighing Systems	NTEP	National Type Evaluation Program
CC	NTEP Certificate of Conformance	NTETC	National Type Evaluation Technical Committee
CIM	Coupled-in-Motion (Railway Track Scales)	OIML	International Organization of Legal Metrology
CLC	Concentrated Load Capacity	S&T	NCWM Specifications and Tolerances Committee
DUT	Device Under Test	SWMA	Southern Weights and Measures Association
EPO	Examination Procedure Outline	W/LRE	Weighing/Load-receiving Element
GIPSA	Grain Inspection Packers and Stockyards Administration	WG	Work Group
NCWM	National Conference on Weights and Measures	WMD	NIST Weights and Measures Division
NIST	National Institute of Standards and Technology	WWMA	Western Weights and Measures Association

Unless otherwise stated:
- "Handbook 44" (HB 44) means the 2008 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 2008 Edition of NCWM Publication 14 – Weighing Devices – Technical Policy • Checklists • Test Procedures.
- "Sector" means the NTETC Weighing Sector.

Note: NIST does not imply that these acronyms are used solely to identify these organizations or technical topics.

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

Load Cell Items

1. Publication 14 Force Transducer (Load Cell) Family and Selection Criteria

Background: See the NTETC Weighing Sector 2007 Meeting Summary – Agenda Item 5 for additional background information and the reasons that the OIML Mutual Acceptance Arrangement (MAA) prompted the proposed changes to the selection criteria.

Discussion: The NTEP Director provided the Sector with an update to the status of this item. The main issue was to develop a policy for amendments to existing load cell Certificates of Conformance (CC). The policy would determine which load cell needs to be submitted to expand the CC based upon what has already been tested and what is being proposed for the selections criteria. The Sector discussed a suggestion from Stephen Langford that cut-off dates be established where an existing CC could no longer use the current selection criteria and that until then, an applicant be given a choice between the proposed and existing criteria to amend an existing CC. It was also stated that either selection criteria should be included with the test conditions of the CC. Kevin Fruchte stated that there should only be one selection criteria since having multiple selection criteria makes it difficult to design load cells based on the desires of the marketplace. The Sector responded favorably to a suggestion to just add a simple statement to indicate that a cell submitted under the MAA would follow the selection criteria of R 60.

Tom Bartel of the NIST force group reminded the Sector that the NIST and California NTEP laboratory testing capabilities do not cover test loads from 250 kg to 1000 kg and that that has to be kept in mind when selecting the load cell to be submitted for test. It was also noted that the Netherlands (NMI) has a similar gap in testing capabilities but at higher capacities. In both situations, alternate capacities of load cells were submitted based upon agreements by the applicants with either the NTEP Director for NTEP evaluation and the Netherland laboratory authorities or R 60 evaluations. Darrell Flocken suggested that adding language to Publication 14 to recognize that the deviations to the selection criteria are unavoidable due to test capability and manufacturing product line.

Discussion/Conclusion: The Sector agreed to recommend that Publication 14 Force Transducers Section D be amended to state that:

1. The selection criteria and family characteristics in R 60 will be used for any load cell submitted under the MAA including load cell test data used for subsequent applications to amend the CC.
2. The criteria (NTEP or OIML) will be listed on all future CCs and amendments.
3. The selection criteria will be based on the original load cell manufacturer's CC for load cell CCs issued under a private label CC.
4. A statement will be added to Publication 14 stating that the deviations to the selection criteria may be unavoidable due to test capability and manufacturing product line and that any such deviations may be approved by NTEP after consulting with the applicant.

Note: See Appendix A, Agenda Item 1 for the specific recommendation to amend Publication 14 Force Transducers Section D.

2. Load Cell Creep and Creep Tests and (Pub 14)

2.(a) Pub 14 Force Transducers Table 5. Loading Times, Reduction Factors, and Force Transducers Section II, Item 5

Source: Stephen Patoray, NTEP Director

Background: At the 2008 NCWM Annual Meeting, several industry members asked the S&T Committee to consider a priority item that relates to Section T.N.4.6 and T.N.4.7 of NIST Handbook 44 Section 2.20. Scales. They also mentioned related sections of NCWM Publication 14, load cells. The argument presented was that the items in the handbook failed to harmonize with international standards (OIML R 60) since the information in the handbook did not include instructions on the process or timing for the creep and creep return tests indicated in these two sections. It was further stated that the timing for the creep test in Pub 14, was not consistent with the international Recommendation R 60.

The three items that are currently different between the OIML Recommendation R 60 and Publication 14 Force Transducers requirements are loading times, reduction factors, and differences between the Pub 14 Section 5. test procedure and HB 44. I have only highlighted the differences between the two documents. **(Note:** Differences with Class III L in HB 44 or Pub 14 and OIML R 60 have not been included with this item.)

Item 2.(a), Part 1 – Loading Times

The issue was the load/unload plus stabilization time differences between OIML and Pub 14 was the focus of the request for a priority item at the 2008 Annual Meeting. OIML R 60 Section 5.2.3. states clearly that during the conduct of the tests, the initial reading shall be taken at a time interval after the initiation of loading or unloading, whichever is applicable, as specified in Table 6. In Section 5.3.2.1., the loading or unloading times shall be approximately half the time specified. The remaining time shall be utilized for stabilization. OIML R 60 does go on further in Section *5.2.3.2. Loading/unloading times impracticable* and indicates if this timing cannot be achieved that some consideration must be made in the specification. (This is currently limited to the unloading time in Subsection a.). It is not clear what to do if loading times cannot be achieved, other than record the actual times. The NIST FG performs the NTEP testing for load cells and reports that load and unload times are nearly instant, or less than 1 second, then they wait 20 seconds as per the written instruction in Pub 14 above. Currently the times in Pub 14 Table 5 are not used.

The submitter of this item requested that sector to consider:

1. Amend Table 5 in Pub 14 to match the capacity ranges and times in OIML R 60 Table 6,
2. Amend the wording regarding the timing for load and unload in Pub 14 to match the wording in R 60, and
3. Add the exception found in OIML R 60 for loading times that are impractical to Pub 14.

Discussion: This discussion of this part of the agenda was combined with agenda Item 2.(b) since they both address the same issues.

Item 2.(a), Part 2 – Reduction Factors for Creep (at load) tolerance (Class III only)

Currently **OIML R 60** has a requirement that Creep is 0.7 x mpe and mpe is defined as p_{lc} x 1.5 v (at 90 to 100 % capacity). Further p_{lc} for creep is defined as 0.7. Therefore, the tolerance for creep is (1.5 v) x (0.7) x (0.7) = 0.735 v. However, Publication 14 has a tolerance value which uses either a reduction factor of 1.0 (for multiple) or 0.7 (for single) x 1.5 v. Therefore the tolerance for creep is 1.5 x 1.0 = 1.5 v, or 1.5 x 0.7 = 1.05 v.

Discussion: This was presented as an information item and no further action is needed by the Sector at this time.

Item 2.(a), Part 3 – Differences Between Pub 14 Section 5. Test Procedures and HB 44:

Currently the procedure for conducting the minimum dead load output return (MDLOR) in OIML R 60 is different from the procedure for creep return in Pub 14. Also it appears that the method in Pub 14 is not consistent and may be in conflict with the information in NIST Handbook 44 T.N.4.7.

Discussion/Conclusion (Item 2.(a), Part 3): The Sector discussed this item and agreed to recommend that Publication 14 Forte Transducers Section be amended to delete the last sentence in Section L, II, paragraph 5a as shown in Appendix A, Agenda Item 2.

2.(b) Pub 14 Force Transducers Section II, Item 3 and Table 5. Loading Times

Source: Stephen Langford, Cardinal/Detecto

Background: Publication 14, in its current form does not address times allowed for unloading and stabilization for conducting creep and creep recovery tests. Only Table 5 is included in Publication 14 and that table deals only with loading times. In order to more closely harmonize NTEP evaluation tests of force transducers with those tests performed under OIML R 60, additional information regarding these times for load application and removal need to be added to Publication 14.

Discussion/Conclusion: The discussion of this item was combined with the first part of agenda Item 2.(a)-1 "Loading Times" submitted by Stephen Patoray since it addressed the same issue. After lengthy discussions and reviewing both proposals to add OIML Table 6 and applicable OIML language, the Sector developed a third proposal that seemed to be a suitable alternative to provide an exception for tests where the test load is removed too fast. Kevin Fruechte, Steven Cook, Tom Bartel, Kevin Chestnutwood, and Stephen Patoray agreed to develop a ballot item for consideration by the Sector on a conference call October 1, 2008. Additionally, the load cell manufacturers were requested to review their recent load cell test data for creep recovery to determine if the proposed variation to the tolerance is acceptable. Upon agreement on a suitable variation to the tolerance, the Sector requested that its recommendation be considered by the NTEP Committee as soon as possible due to the importance of this item to load cell manufacturers.

The result of the ballot was: Seven members voted in favor of the proposal, five members opposed the proposal and three members voted to abstain. In summary, the comments indicated that two public sector members (NTEP labs) supported the intent of the proposal, but voted negative since they had concerns regarding the clarity of the proposal. Two other members, who initially supported the recommendation during the Sector meeting, changed their position and voted negative on the ballot language. Those members (NIST and 1 private) stated that they believed that the intent of the proposal was to apply a "correction factor" to the creep recovery tolerance in HB 44 (and R 60) since the NIST test equipment loaded and unloaded weights faster than the procedures prescribed in OIML R 60. However, they became aware of additional information and test data after the Sector meeting that seemed to indicate that a few other international labs use similar equipment with similar loading and unloading characteristics and did not apply any correction factors. As a result of this information, those members believed that the proposed "correction factor" could be interpreted as a tolerance value, which conflicts with the creep recovery tolerance value in HB 44 and is different from the equivalent tolerance recommended in OIML R 60. A third private sector member voted negative and provided additional background information about the development of the R 60 requirements and test procedures and noted that the loading/unloading and stabilization times in R 60 were established to take into account existing test equipment without requiring significant modifications or replacement.

The result of the ballot and summary of all submitted comments were forwarded to the NTEP Committee. At its fall 2008 meeting, the NTEP Committee considered the ballot results and comments and decided not to accept the recommendation from the Sector. A copy of the proposed ballot language, voting results and comments can be found in Appendix B, Agenda Item 2.

In January 2009, a revised proposal was developed by the small work group that addressed the concern that the proposed correction factor could be interpreted as a tolerance that was not supported in HB 44. The originally proposed correction factor was replaced by the tolerances in the 2009 Edition of HB 44 Scales Code paragraph T.N.4.7. The revised proposal was sent to the Sector as a revised ballot item. The result of the ballot and

summary of all submitted comments (*12 affirmative, 0 negative and 1 abstain*) were forwarded to the NTEP Committee. The NTEP Committee considered the ballot results and comments during its meeting at the 2009 NCWM Interim Meeting and agreed to accept the recommendation. The recommended changes to Publication 14 and the revised ballot have been added to the previous recommendation in Appendix A, Agenda Item 2.

Carryover Items

3. In-Motion Railway Track Scale

Source: 2007 NTETC Weighing Sector Meeting Summary – Agenda Item 2

Background: During the 2007 Sector discussion of agenda Item 2 regarding the performance and permanence requirements for in-motion railway track scales, the Sector asked the NIST technical advisor to develop a Publication 14 definition of the term "in-motion" weighing device. The NIST technical advisor was to investigate the possibility of making the definition broad enough to include controllers for other "in-motion" weighing devices such as dynamic monorail scales. The proposed language will be voted on by the Sector in a letter ballot prior to the 2008 NCWM Interim Meeting.

The technical advisor did not have sufficient time to develop a proposed definition for "in-motion" weighing devices in time for consideration by the Sector prior to the 2008 NCWM Interim Meeting.

Discussion: The Sector reviewed the following proposed definition for "in-motion weighing device" developed by the technical advisor which is based on an international definition founding OIML R 51 for automatic weighing instruments.

> In-motion weighing device: A complete weighing system, separable indicating element, or controller that follows a predetermined program of automatic processes for objects while in motion without the intervention of an operator on the load-receptor of a complete weighing device or separable weighing/load-receiving element.

Mettler Toledo submitted the following alternate definition:

> In-motion weighing device: An instrument capable of weighing objects in motion without the intervention of an operator and follow a predetermined program of automatic process characteristics of the instrument. The instrument can be a complete weighing system, a separable controller or a separable weighing/load-receiving element.

Conclusion: The Sector recommended that the both versions be presented to the representative of the railroad weighing industry attending the fall meeting of AREMA Committee 34 and the SMA and that this item be placed on the Sector's 2009 agenda.

The members of AREMA Committee 34 reviewed the proposed definitions for Publication 14 and stated no preference for either recommendation. This item was also discussed by the SMA at their fall 2008 meeting where Darrell Flocken reported on discussions at the NTETC Weighing Sector meeting and that feedback on the In-Motion Railway Track Scales item is being requested. Any comments should be submitted to Darrell Flocken or Steve Cook by August 2009.

4. Recommended Changes to Publication 14 Based on Actions at the 2008 NCWM Annual Meeting

The NIST Technical Advisor, Steve Cook, has provided the Sector with specific recommendations for incorporating test procedures and checklist language based upon actions of the 2008 Annual Meeting of the 93rd NCWM. The Sector was asked to briefly discuss each item and, if appropriate, provide general input on the technical aspects of the issues.

4.(a) G-A.1. and Appendix D – Definition of Equipment

Source: See the Annual Report of the 2008 NCWM S&T Committee agenda Items 310-4 for additional background information to amend HB 44 General Code paragraph G-A.1. Commercial and Law Enforcement Equipment and definition of Equipment and the adopted language. During the Annual Meeting, the NCWM agreed to add a new definition of equipment and amend General Code paragraph G-A.

Discussion/Conclusion: The Sector reviewed the language adopted by the NCWM and agreed with the NIST technical advisor recommendation that no further action by the Sector is required since the revised paragraph and new definition is intended to provide clarification of commercial devices and does not impact type evaluation procedures and technical policies in NCWM Publication 14.

4.(b) Scales Code S.1.1.1.(b) Digital Indicating Elements

Background: See the Annual Report of the 2008 NCWM S&T Committee Agenda Items 320-1 for additional background information and the language adopted to amend S.1.1.1.(b) Digital Indicating Elements to clarify that the requirements for the operation of a center-of-zero indication applies to the gross and net load indication of zero.

Discussion/Conclusion: This item was submitted to the NCWM by the Sector to provide a HB 44 reference for Publication 14 DES Section 41. The Sector reviewed the language adopted by the NCWM and agreed with the NIST technical advisor recommendation that no additional action is required by the Sector.

4.(c) Scales Code S.1.2.1., S.2.3., T.N.2.1., and AWS Code S.1.1.1.

Background: See the Annual Report of the 2008 NCWM S&T Committee Agenda Items 320-2 and 324-1 for additional background information to amend HB 44 by:

1. Adding a note clarifying that the requirement that a net weight division on multiple range and multi-interval scales is not required to be expressed as 1, 2, or 5, or a decimal multiple or submultiples of 1, 2, or 5, where the scale division of the tare weight is different from the scale division of the gross weight,

2. Adding a similar exception to paragraph S.2.3., and

3. Adding language that clarifies that scale tolerances apply to net weight using any tare load.

Discussion/Conclusion: This item was submitted to the NCWM by the Sector to provide a HB 44 reference for Publication 14 DES Section 41. The Sector reviewed the language adopted by the NCWM and agreed with the NIST technical advisor recommendation to amend Publication 14 DES Sections 1.11., 31., and 32. This recommendation can be found in Appendix A, Agenda Item 4.(c).

The Sector also recommended that the NIST technical advisor develop similar amendments for Publication 14 for Automatic Weighing Systems, ballot the AWS work group on the proposed changes, and report the ballot results to the NTEP Committee.

4.(d) Scales Code S.2.1.5. Initial Zero-Setting Mechanism

Background: See the Annual Report of the 2008 NCWM S&T Committee agenda Items 320-4 for additional background information to amend S.2.1.5. to clarify IZSM for separable indicating elements.

Discussion/Conclusion: This item was submitted to the NCWM by the Sector to clarify HB 44 language as a result of amending Publication 14 DES Section 41.2. for the verification of IZSM requirements on separable electronic indicating elements in 2007. The Sector reviewed the language adopted by the NCWM and agreed with the NIST technical advisor recommendation that no additional action is required by the Sector.

4.(e) Scales Code S.2.4. Level-Indicating Means and S.2.4.1. Vehicle On-Board Weighing Systems

Background: See the Annual Report of the 2008 NCWM S&T Committee agenda Items 320-5 for additional background information and the specific language to amend S.2.4. and S.2.4.1. to clarify the requirements for level indication means.

Discussion/Conclusion: The Sector reviewed the language adopted by the NCWM and agreed with the NIST technical advisor recommendation to amend Publication 14 DES Sections 55. and 56. as shown in Appendix A, Agenda Item 4.(e).

5. Add New and Amended Tare Definitions and Tare Requirements

Source: NTEP Participating Laboratories (Carryover Item)

Background: See the Annual Report of the 2008 NCWM S&T Committee agenda Items 320-6 for additional background information.

During its 2008 Annual Meeting, the NCWM agreed with the comments that this item needed additional time for review and analysis and that the item be given "information" status. The NIST technical advisor will develop a one to two hour technical presentation on the proposed tare requirements that will be available to the regional weights and measures associations, and posted on the WMD website.

Discussion/Conclusion: The NIST technical advisor provided the Sector with an update on the status of the technical presentations and reported that this item is now on the NCWM agenda. Additionally, he reported that he has developed a one-hour presentation on this item and has written a series of articles for the WMD quarterly newsletter.

The Sector agreed with comments from the regional weights and measures association and recommended that the S&T Committee technical advisor split the agent item into three sub-proposals. The Sector offered that the item could be separated into the following three subjects:

1. Tare weighing/balancing with applicable definitions,
2. Tare requirements for multi-interval and multiple range scales, and
3. Preset tare with applicable definitions.

6. Minimum Size of Weight and Units Indications

Source: 2007 Weighing Sector Item 7 (Carryover Item)

Background: See the 2008 NCWM Specifications and Tolerance Committee Annual Report Developing Item Part 2, Item 1 "S.1.4.6. Height., Definition of Minimum Reading Distance, UR.2.10. Primary Indicating Elements Provided by the User and Definition of Primary Indications," and the 2006 Weighing Sector Summary Item 6 for additional background information.

At the 2008 NTEP Participating Laboratory Meeting in Ottawa Canada, the weighing laboratories discussed this item and recommended that the Sector consider amending the proposal as follows by deleting the proposed 2 mm minimum height for all units and descriptors in S.1.4.6.(e) and proposed user requirement paragraph UR.2.10. as follows since the labs believe that General Code paragraph G-UR. 3.3. Position of Equipment addresses the position of a device so that its indications can be accurately read.

Discussion: The Sector discussed the NTEP labs' recommended changes to the proposal along with the labs' recommendation to move forward with this proposal as a voting item for the S&T Committee. Darrell Flocken noted that the numbering of the proposed specification should be changed from S.1.4.6. since it appears that all of the S.1.4. paragraphs are applicable to mechanical indicators and that the proposed language is applicable to electronic scales with digital indication. It was also noted that the CWMA and WWMA recommended that the proposal be withdrawn unless it received additional support from the industry. Measurement Canada added that they do not have the 9.5 mm requirement in their laws and regulations.

Conclusion: During the discussions, a vote was held on whether to forward the NTEP labs' proposal to the S&T Committee. Seven members voted in favor and nine members voted against forwarding the NTEP lab alternate proposal to the S&T Committee. The results of the vote indicated that there is no consensus between the NTEP labs and device manufacturers. The Sector also recommended that the discussion and conclusion be forwarded to the WWMA and NCWM S&T Committees.

7. Hopper Scale Design Parameters – Technical Policy

Source: 2007 Weighing Sector (WS) Agenda Item 10 (Carryover Item)

Background: See the 2007 NTETC Weighing Sector Meeting Summary for additional background information. During the 2007 Weighing Sector meeting, the Sector could not come to a consensus on the questions raised on this item and suggested that a hopper scale work group be established to:

(1) Define a type, and
(2) Determine selection of device(s) to be submitted for evaluation, modifications that can be made to the type, and whether or not multiple types can be listed on a CC.

Stephen Patoray and Don Onwiler volunteered to develop a specific proposal to be considered by the Sector during the 2008 NTETC Weighing Sector Annual Meeting.

This item was further discussed during the 2008 NTEP Participating Laboratory meeting, including reviewing that the following definition of type is from the NCWM Publication 14 Administrative Policy definition section as it applies to hopper scales and other device types (A.19. Type).

There seems to be agreement among the labs on what constitutes type. However, variations to the type that might be considered as sub-types or OIML families have been put on the same CC. The weighing labs reviewed the OIML term and examples of types and families. The OIML R 76 terminology and definitions (T.3.4. Type and T.3.5. Family) tends to make sure that the type and families (sub-types) are sufficiently defined on the certificate.

Discussions included evaluating new features to be added on older electronic devices and whether the entire evaluation checklist should be reviewed when an amendment is requested to add or change a feature. Two NTEP lab sector members stated that they go through the entire checklist (except for influence factor testing) to verify that the change does not impact an unrelated feature, e.g., adding a lb/kg switch impacted the overcapacity blanking and accuracy in one of the units. MC is also concerned about older (10 year) certificates on electronic devices.

The labs also support the concept of adding multiple types on a single CC provided the content and clarity of the types are suitably defined on the CC. There are distinct models and tests for the different designs (hanging vs. compression).

At the end of the discussion:
- Ron Rigdon agreed to develop a template CC for hopper scales to be submitted to the Weighing Sector.
- Steve Patoray agreed to submit a recommendation to the NTEP Committee to amend the title of Pub 14 Admin Policy Section L. **What Constitutes a "Different" Type** since the subject of the title does not agree with the content of the subsections.
- Steve Cook and Steve Patoray will update the Weighing Sector on the position of the labs regarding the Weighing Sector carryover item on hopper scales.
- The NTEP participating laboratories will verify that a device submitted for evaluation to add a new feature or variation complies with the **entire** checklist. The exception to the evaluation would be influence factor and permanence testing unless requested by the applicant or required by NTEP (e.g., modifications to the load-sensing element, A/D converters, mechanical design changes to the load-receiving element, etc.).

After the lab meeting, Steve Cook noted the following list of device metrologically relevant features and functions in OIML R 76 that the Weighing Sector and NTEP may consider in making a determination of tests to be performed to update a CC.

- housings;
- temperature and humidity ranges;
- indications;
- n_{max};
- lowest input signal, μV/e (analog strain gauge load cells);
- temperature ranges;
- maximum size of load receptor, if significant;
- maximum number of indications;
- maximum number of implemented digital devices;
- several load receptors, if connectable to the indicator;
- load receptors;
- instrument functions;
- highest number of verification scale intervals,
- verification scale interval, e_{min};
- accuracy classes;
- single range, multiple range or multi-interval instrument;
- maximum number of instrument functions;
- maximum number of peripheral devices connected;
- maximum number of analog and digital interfaces;
- different types of power supply (mains and/or batteries);
- etc.

Discussion/Conclusion: The Sector reviewed the background information. The NTEP Director reported that there has been little agreement on what constitutes a different type or can be considered as a variation of the design and how many certificates are required.

The Sector recommended that this item be carried over for the 2009 NTEP lab and NTETC Weighing Sector meetings to allow for additional work and development of a proposal.

8. Method of Sealing – Setup and Verification of Calibration/Configuration Access

Source: NTEP Director

Background: The Sector was requested to review the report of the NTETC Weighing Sector Annual Meeting September 11 - 13, 2003 Fresno, California, FINAL Summary, Item 18. Physical Security Seals on Scales with External Calibration Capability regarding previous interpretations of HB 44 General Code paragraphs G-S.2. Facilitation of Fraud, G-S.8. Provision for Sealing Adjustable Components, and Scale Code paragraph S.1.11. Provision for Sealing.

It was reported that there is still disagreement among the NTEP labs on this topic. It was also noted that changes were made to the Publication 14 in 2004 in the anticipation of changes to HB 44; however, the changes to HB 44 did not happen and that there may be a problem with Pub 14 since the current procedures and type evaluation requirements are not fully supported by HB 44.

The discussion in 2003 was to address a specific deficiency that was found in several devices at that time. At least one device manufacturer attempted to address this deficiency with changes to the device function. This device was evaluated, and based on the input from the NTEP lab, the NTEP Committee Chair and the NTEP Director, it was determined that this device did meet the requirements. That is, the device would (upon command) display or print the external calibration status that was configured in the setup mode, (e.g., "not sealed," "not legal for trade," "HB 44," etc.). Currently several NTEP labs do not believe that this "fix" is acceptable.

The NTEP Director provided additional observations based on a series of e-mail exchanges on this item.

1. Such discussions are healthy for NTEP, as long as they are kept positive and productive and focus on objective facts.
2. Acknowledged the contributions from Andrea Buie in providing background information.
3. Restated that Publication 14 is not a standard or a regulation; it is a checklist to determine if a device is capable of meeting the applicable requirements of HB 44. It is also not design-based, it is performance-based.
4. In this particular case, Publication 14 was changed (with good intentions) in anticipation of similar changes being made to HB 44. In hindsight that was an error on the part of the Sector to recommend such a change. Currently Pub 14 is not in line with HB 44. Or, it is not being interpreted in line with HB 44.

Discussion/Conclusion: Darrell Flocken suggested that DES Section 10.12.9. should be deleted since it was not supported by HB 44. The Sector also discussed amending DES Section 10.12.4. to provide guidance to the evaluator to make sure that adjustments can not be made to sealable parameters. However the Sector could not come up with a consensus to amending DES Section 10.12.4.

The Sector agreed to recommend that DES Section 10.12.9. be removed from Publication 14 since the language is not supported by requirements in HB 44 as shown in Appendix A, Agenda Item 8. The Sector also recognized that additional language may need to be added at a later date pending action of the NCWM on a proposal to add new language to G-S.8.

9. S.1.1.(c) Zero Indication (Sleep/Screen Saver/Power Save Modes)

Source: Weighing Sector Carryover Agenda Item 4.(d)

Background: See the 2007 NTETC Weighing Sector Meeting Summary for additional background information. The NIST technical advisor revised the ballot proposal and submitted it to the NTEP Participating laboratories during the 2008 Annual Meeting. The labs agreed with the revised language. The NIST technical advisor developed a table for review by the Sector that compared the original and revised versions of the ballot language.

Discussion/Conclusion: The Sector reviewed the revised ballot language and agreed to recommend that Publication 14 be amended to clarify the evaluation procedures for verifying that "sleep/screen saver/power save" features comply with paragraph S.1.1.(c) and do not conflict with other HB 44 requirements. The recommended language can be viewed in Appendix A, Agenda Item 9.

10. Vehicle and Railway Track Scales

Source: 2007 Weighing Sector Carryover Agenda Item 3

Background: During the 2007 meeting of the Weighing Sector, the Sector agreed there is a loophole in the existing policies for RR track scales with a capacity greater than 200 000 lb. The SMA and AREMA Committee 34 volunteered to work on the testing requirements for vehicle and railway track scales with capacities greater than 200 000 lb and provide to the NTEP Director and NIST technical advisor an update on developing a proposal for consideration by the Weighing Sector prior to the 2008 NCWM Interim Meeting.

AREMA Committee 34 Adhoc Subcommittee submitted proposed changes to Publication 69 as shown below. However, the SMA was not able to address this item during their November meeting and therefore this item will be carried over to the 2008 meeting of the Weighing Sector.

Discussion/Conclusion: During the discussion on this item, the NTEP labs noted a couple of places where clarification may be needed regarding the terms used in the railroad industry. The labs believed that the referenced sections of the AAR handbook should be included in Publication 14 (with proper citation).

The Sector recommended that this item be carried over until the 2009 meeting of the Sector to await final approval by AREMA Committee 34.

At their October 2008 fall meeting, the Chairman of Committee 34 stated that Committee 34 could not further develop this item without specific input from the Weighing Sector. Additionally, permission to reprint sections of the AAR Handbook is possible by submitting a request in writing to Raphael Jimenez requesting the specific definitions and other language to be reprinted in Publication 14.

Edited by AREMA Committee 34 Adhoc Subcommittee on 11/27/07

69. Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically

*(**NOTE:** For combination vehicle/railway track scales, see also additional test considerations under "Test Considerations for Other Scales" in the application.)*

It is desirable, but not required that a new installation should be calibrated by a railroad test car after a representative of the railroad has inspected the installation for compliance with railroad design and construction specifications.

The Performance Test (69.1 thru 69.6) is conducted to determine compliance with the tolerances and, in the case of nonautomatic indicating scales, the sensitivity requirements specified in NIST Handbook 44. The tests described here apply primarily to the weighing/load-receiving 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 weighbeams, poses, dials, electronic digital indications, etc., must also be referenced. A 100 000 lb field standard weight cart, or a combination of field standard weights **safely** added to a field standard weight cart in 10 000 lb increments for a total of 100 000 lb will be used to conduct the Performance test.

The Permanence Test (69.7) shall not be conducted sooner than thirty (30) days after the Performance Test. If a 100 000 lb field standard weight cart, or a combination of field standard weights **safely** added to a field standard weight cart for a total of 100 000 lb, is not available for the Permanence Test a 100 000 lb Test Weight Railcar may be used.

***NOTE:** A field standard Test Weight Railcar and Test Weight Railcart shall have a footprint no greater than 7'. The Association of American Railroads, AAR Scale Handbook Section 1.5 "Specifications for Railway Track Scale Test Weight Loads" defines the requirements for test weight loads including Test Weight Railcarts and Test Weight Railcars. A standard railcar, as described in AAR Scale Handbook Section 1.5.7, is not suitable for use during NTEP evaluations.*

The following definitions from the AAR Safety and Operations Scale Handbook ©2009 Edition Section 1.5 Specifications for Railway Track Scale Test Weigh Cars and have been reprinted with the permission of the AAR.

1.5.5. TEST WEIGHT RAILCAR

Test weight load designed as a certified mass standard supported by two-axle trucks, built for AAR interchange service, with the following design characteristics:

a. All metal construction except ballast. Ballast material must be stable.
b. Loading points must not exceed 7ft (2.2 m) and have uniform load distribution.
c. No unnecessary equipment.
d. A minimum of ledges, cavities, or projections that hold dirt, water, or other foreign matter.
e. The calibration cavities, capable if holding at least 1,000 lb (500 kg), must be waterproof and sealable.
f. Operational controls functional from both sides of the railcar.
g. Drive system, when used, shall be adequate to propel the railcar on a 3% grade.
h. Smooth and sloped top to ensure drainage.
i. Accessibility of all parts for inspection.
j. Ruggedness and durability in order to minimize repairs,
k. Overall truck centers shall not exceed 50 ft (15 m).
l. Side-mounted hand brake accessible from the ground.
m. Fuel tank, when used, must be attached and not exceed 16 lb (7 kg) capacity or 2 gal (8 L).
n. Lifting system must be adequate to lift all wheels a minimum of 2 in. (5 cm) above the rail.
o. Hydraulic oil tank, when used, must be equipped with a sight gauge or other means to indicate proper amount of oil to

maintain calibration.

1.5.6. TEST WEIGHT RAILCART

Test weight load designed as a certified mass standard supported by two-axles on steel wheels, with the following design characteristics:

a. All metal construction.
b. Loading points must not exceed 7ft (2.2 m) and have uniform load distribution.
c. No unnecessary equipment.
d. A minimum of ledges, cavities, or projections that hold dirt, water, or other foreign matter.
e. The calibration cavities, capable if holding at least 1,000 lb (500 kg), must be waterproof and sealable.
f. Minimum surface area with smooth and sloped top to ensure drainage.
g. Accessibility of all parts for inspection.
h. Ruggedness and durability in order to minimize repairs,
i. Fuel tank, when used, must be attached and not exceed 16 lb (7 kg) capacity or 2 gal (8 L).
j. Hydraulic oil tank, when used, must be equipped with a sight gauge or other means to indicate the proper amount of oil to maintain calibration.
k. The weight cart, as well as the separable weights, must be traceable.

1.5.7. STANDARD RAIL CAR

Standard rail car converted to a certified mass standard supported by 2-axle trucks, built for AAR interchange service, with the following design characteristics.

a. All metal construction except ballast. Ballast material must be stable.
b. Load uniformly distributed over trucks.
c. No unnecessary equipment.
d. A minimum of ledges, cavities, or projections that hold dirt, water, or other foreign matter.
e. The calibration cavity must be waterproof and sealable.
f. Smooth and sloped top to ensure drainage.
g. Accessibility of all parts for inspection.
h. Ruggedness and durability in order to minimize repairs.

69.1. Influence Factors

If tests are necessary to determine compliance with influence factors, individual main elements and components tests must be conducted according to NTEP Policy that is outlined in NCWM Publication 14, Section B.1. Influence Factor Requirements.

69.2. Test Standards

A 100 000 lb field standard weight cart or a 100 000 lb combination of field standard weights safely added to a field standard weight cart shall be used for the Performance test. Weights must be incremented by 10 000 lb from 30 000 lb to 100 000 lb. A test weight railcar shall not be used for the Performance Test.

69.3. Sensitivity and Discrimination Tests

69.3.1. Weighbeams

The sensitivity test is conducted at zero load and at maximum load for mechanical railway track scales with non-automatic indicating elements. 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.

69.3.2. Automatic Digital Indicating Elements

The discrimination test is conducted at zero load and at maximum load for railway track scales with indicating elements (e.g., electronic digital indicating elements, mechanical dials). See also DES Section 54 regarding the specific procedures for the discrimination test. ***(Technical Advisor Note: The above language is recommended to match the title of DES Section 69.3.)***

69.4. Digital Indications

Width-of-zero, zone of uncertainty and, if so equipped, automatic-zero-setting mechanism tests shall be conducted as specified in other sections of NCWM Publication 14.

69.5. Increasing Load/Shift Tests

69.5.1. Conduct increasing load tests in 10 000 lb load increments up to 100 000 lb. Conduct shift tests over each section at 50 000 lb and 100 000 lb, testing all sections and midspans between sections in both directions with each load. The scale shall be capable of returning to a no-load indication within prescribed limits [3 d per 5 °C change in temperature]and within 15 minutes after increasing or shift test load is removed. Zero balance change is limited to acceptance tolerance (1/2 d). The indication may be re-zeroed before the start of any increasing load or shift test, but not during any sequence.

(a) Begin increasing-load test by placing 30 000 lb on one end section. Record error
(b) Remove test load and record balance change. Do not reset zero.
(c) Increase to 40 000 lb on end section and record error.
(d) Remove test load and record balance change. Do not reset zero.
(e) Repeat this process, incrementing to 50 000 lb.
(f) After 50 000 lb is removed and balance change is recorded, reset zero.
(g) Begin the shift test by loading one end section with 50 000 lb and record the error.
(h) Move the test load to the midspan and to the left and right of each section so that one set of the test cart wheels are spotted over the load cell or lever bearing points. Record errors at each test position. .
(i) Remove load from opposite end of scale. Record balance change and reset zero.
(j) Repeat shift test in opposite direction according to steps (g) through (i).
(k) Continue with increasing load test following the procedures in steps (a) through (e) for test loads from 60 000 lb to 100 000 lb.
(l) After 100 000 lb is removed and balance change is recorded, reset zero.
(m) Conduct shift test in each direction using 100 000 lb following the procedures in steps (g) through (j).

69.5.2. Results shall be within acceptance tolerance as specified in Handbook 44, Section 2.20. Scales Code, T.N.4.4.

69.6. Strain Load Tests

69.6.1 The minimum test for a strain load test for single-load receiving element scales greater than 35 feet and for multiple load receiving element scale systems designed to weigh railroad cars in a single draft is 200 000 lb, or if practicable, at least 80% of scale capacity.

(a) Load one end of the scale with a strain load.
(b) Record the “reference point” for the start of the strain load test.
(c) Add 100 000 lb of test weight to the opposite end of the scale. The target strain load is the sum of the unknown weight and the test weights.
(d) Record the indicated strain-load value after the maximum amount of test weights have been added and calculate the strain load test error. The scale shall perform within prescribed tolerances based upon tolerance for the known test weights.
(e) Remove the test weights from the end of the scale without conducting a decreasing load test.
(f) If a higher strain load value is desired, increase the strain load at this time before proceeding with next step.
(g) Record the new strain load reference value and reapply the test weights.
(h) Record the indicated strain load value and calculate the strain load test error. The scale shall perform within prescribed tolerances based upon the known test weights.

(i) Evaluate repeatability of results in test weight values obtained in step (d) and step (g) to agree within the absolute value of maintenance tolerances.
(j) Remove the strain load (railcar or material of unknown weight) from the scale, decreasing to 100 000 lb of known test weights.
(k) Record error based on a decreasing load test to 100 000 lb.
(l) Remove weights from scale.
(m) Record zero balance change.

69.6.2. The results of all observations shall be within acceptance tolerance.

69.7. Permanence Test

69.7.1. Minimum Use Requirements for the Field Permanence Test

69.7.1.1. There must be at least 300 weighing operations executed over the scale prior to conducting the type evaluation Permanence Test. The entire NTEP evaluation should be performed at a customer location to facilitate "normal" use during the permanence period.

69.7.1.2. There must be at least 30 days between the Performance Test and the Permanence Test. If the prescribed weighments have not been completed, the time between tests shall be extended. Acceptance tolerances apply regardless of the time between Performance Test and the Permanence Test.

69.7.1.3. Only loads, which reflect "normal" use, will be counted during the permanence-testing period.
- 100 percent of the loads must be above 20 percent of scale capacity; and
- 50 percent of the loads must be above 50 percent of scale capacity.

The scale may be used to weigh other loads, but only the loads specified above are counted as part of the Permanence Test.

69.7.2. Subsequent Type Evaluation (Field) Permanence Test

69.7.2.1. It is recommended that the Performance Test procedure as described above be repeated for the Permanence Test. However, if the original test equipment is not available, the test may be conducted to the extent possible with a Test Weight Railcar with at least a 100 000 lb capacity and a suitable and current calibration report.

69.7.2.2. Repeat width-of-zero, zone of uncertainty, sensitivity, and discrimination tests near zero (outside the range of the AZSM) and at or near capacity on the subsequent tests.

The results of these tests must be within acceptance tolerance. If the device does not meet these tolerance limits the scale will be rejected and the entire test must be repeated, including successful performance testing and a subsequent test after a minimum of 30 days.

New Items

11.(a) Publication 14 Clarification on Section 66.(c) Permanence Tests

Submitted by: Ed Luthy

Background: Current wording in Publication 14 Section 66.(c) is unclear as to whether "Subsequent Type Evaluation (Field) Permanence Tests" are required. It was understood at the time that the language was written that subsequent testing would be required and there has been at least one "double wide" feature added to an existing CC that included a subsequent test. However, the language that was added to Publication 14 did not clearly state that. As a result, manufacturer representatives and Sector members may not recall the specific discussions at the 2001

meeting of the Weighing Sector. Additionally, other applicants and new Sector members will have trouble concluding that a subsequent test is required since the language does not clearly state that the test needs to be repeated to add this option/feature to an existing CC. The NIST Technical Advisor recommends that the language be amended and clarified as shown in the following recommendation.

Discussion/Conclusion: The Sector reviewed the item in the agenda and agreed with the proposed changes to Publication 14 DES Section 66.(c) to clarify that subsequent permanence tests are required and suggested other editorial amendments and shown in Appendix A, Agenda Item 11.(a).

11.(b) Publication 14 Clarification on Section 66.(c) Waiving of Permanence Tests

Submitted by: Ed Luthy

Recommendation: During the 2008 meeting of the NTETC Weighing Sector, Ed Luthey requested that DES Section 66.(c) be deleted from Publication 14. He stated that in these applications individual weighing/load-receiving elements have already passed all applicable tests in order for the NTEP CC to be issued and that the added costs to repeat test for side-by-side applications is not justified.

Discussion: There was a lengthy discussion on this item. Section 66.(c) was originally added to Publication 14 in 2002 to address the concerns of the NTEP labs who stated that the original testing for a vehicle scale weighing/load-receiving element did not anticipate scales being used in side-by-side applications where the wheels of the vehicles would travel longitudinally down the center of the scales. The NTEP lab stated that they believed that many scales are not designed to accurately determine weight with heavy loads concentrated in the center portion of the scale. These concerns were repeated at this meeting. The Ohio NTEP laboratory related past failures of three different evaluations where the scales failed being tested with test loads applied down the middle of the scale or the scales failed the stain-load tests.

Several manufacturers supported deleting the permanence tests for side-by-side applications if the permanence test was conducted on the single weighing/load-receiving element. Another manufacturer stated that they have several extra wide and side side-by-side vehicle scale CCs and they have never questioned permanence test on a "new design." It the case of the side-by-side with a CC, this manufacturer believes that the permanence test should not required. This manufacturer added that they question the value of permanence testing on anything and that permanence is part of the quality of the scale.

Stephen Patoray noted that Publication 14 allows for some judgment in other areas of the publication. However, Section DES 66.(c) allows no variances. He suggested that the permanence test be waived depending upon the performance of the scale on the initial test. If, during the initial test, the scale demonstrated good repeatability and accuracy, then the permanence test should be waived. If it barely passes the initial test then the permanence test will be performed. In the past, the evaluator has consulted with the NTEP Director to confirm waiving the permanence test.

The Sector considered an example of such language in DES Section 63. Performance and Permanence Tests for Platform Scales with Less than Four Load Supports (63.7).

> "The results of all increasing-load, decreasing-load, and shift tests conducted during the initial tests must be within acceptance tolerances. If scale repeatability is very good, (e.g., 0.5 d) the fourth test may be waived."

The Sector also considered the following example in Publication 14 LMD Section F. where variations to the evaluation may be permitted:

"If the product being added is from a family of products that has been previously subjected to the permanence test, then the requirement for a permanence test may be waived provided the initial test of the product being added meets following conditions:

a) the results of the initial test were not questionable; and
b) multi-point calibration may not be used to add the new product."

Conclusion: The Sector supports adding the following note to DES Section 66.(c)4. to allow discretion if the initial test results are well within tolerance as shown in Appendix A, Agenda Item 11.(b).

12. Correction to Scale Tickets

Source: Maryland NTEP Lab

Background: At its 2008 NTEP Participating Laboratory meeting, the NTEP labs discussed a proposal from the Maryland NTEP lab to amend Section 35. which is for weigh in/out applications.

The proposal recommended amending DES Section 35. to specify the requirements for devices that print scale tickets with corrected weight information. Several of the labs believed that the subject may be more appropriate for Section 13. Recorded Representations and limited to indirect sale applications. Steve Cook was able to verify that HB 130 Weighmaster Regulations do not address correcting erroneous tickets similar to California Weighmaster Regulations.

After the meeting, Steve Cook reviewed the California Business and Professions Code, Weighmaster Law to investigate those requirements for voided and duplicate tickets in its weighmaster program. The California Law (B&P Code Section 12716.5) does not specify additional requirements for a correction or duplicate certificate.

Discussion/Conclusion: The Sector reviewed the item that was submitted to the NTEP labs. There were concerns that the proposal is intended to address the application described in Scales Code UR.3.9. However, other members of the Sector supported the intent for weigh-in/weigh-out vehicle scales applications. The Sector agrees that clarification of erroneous tickets is needed; however it could not come to a conclusion since the Sector did not have a developed recommendation to review. There were also discussions about the appropriate location for the requirements. For example, Section 35. applied to weigh-in/weigh-out applications where the publication states that manual weight entries are not permitted.

The Sector recommends that a specific recommendation be developed for this item and carried over until the 2009 meeting of the Weighing Sector.

13. Stored Tare for "Weigh-in/Weigh-out" Applications

Source: Ohio NTEP Lab

Background: At its 2008 NTEP Participating Laboratory meeting, the NTEP labs discussed another proposal to amend Section 35. for weigh-in/out applications and storing in lieu of printing the first weight in weigh-in/out application. The labs agreed that the scale first weight stored in a "temporary memory" that is automatically deleted from memory after the net weight is determined is not considered as a stored tare and suggested that DES Section 35. be further developed and submitted this to the Sector for additional discussion and recommendations.

Discussion/Conclusion: The Sector believes that the language from the NTEP lab meeting did not need additional development (except to change the word "tare" to "weighment" to address a potential conflict if the tare proposals are adopted by the NCWM) and recommends that DES Section 35. be amended as shown in Appendix A, Agenda Item 13.

14. Money Values in Other Than 1-Cent Intervals

Source: NTEP Participating Laboratories

Background: At its 2008 NTEP Participating Laboratory meeting, WMD stated that they received a phone inquiry from an inspector who came across a computing scale with total price indications with $0.05 increments. The inspector stated that the scale owner configured that scale this way in order not to deal with pennies. The inspector had no problem getting the owner to re-configure the scale to $0.01 increments according to General Code G-S.5.5. Money Values, Mathematical Agreement. (Note that exceptions are permitted for scales and retail motor fuel devices with analog indications.)

The labs discussed a proposal from Steve Cook to add "minimum value of currency" to the list if sealable parameters to all Pub 14 checklists since the feature could facilitate fraud if the minimum money value can be changed without an obvious indication to the customer. The labs recommended that Steve submit an item to the Weighing Sector to amend the table of sealable parameters by adding check boxes to the individual features to make it less likely to overlook a specific sealable parameter.

The labs agreed with WMD and agreed to submit a proposal to amend Publication 14 to the Sector.

Discussion/Conclusion: The Sector agreed with the proposed changes to Publication 14 DES Section 10.1. from the NIST technical advisor as shown in Appendix A, Agenda Item 14.

15. Suitability of Pressure Sensitive Security Seals

Source: Ohio Participating Laboratory

Background: At its 2008 NTEP Participating Laboratory meeting, the weighing labs reviewed a proposal to amend Publication 14 DES Section 10. The lab reported that the current evaluation procedures in Publication 14 Section 10.12.1. Physical Seals appears to be written only for wire lock security seals and not pressure sensitive seals. Pressure sensitive seals are acceptable under certain conditions. If they cover a hole (e.g., through which a "calibration enable" switch would be activated), that hole must be covered with a suitable rigid plug. Additionally;

1. The pressure sensitive seal must not bridge so as to leave cavities or air pockets under the seal,
2. Pressure sensitive seals are not to be used in an adverse environment (seal is destroyed by rain, cold, washdown etc.), and
3. Pressure sensitive seals must be durable (difficult to remove at all temperatures, and if tampered with must show void or be self destructive.

The labs reviewed the HB 44 definition of security seals and discussed the applications where pressure sensitive, self-destructive would and would not be suitable to seal weighing and measuring devices.

The labs agreed to forward this discussion and recommendation to amend Publication 14 Section 10.12. Physical seals to add new evaluation criteria and checkboxes specifically for pressure sensitive self-destructive security seals.

Discussion: The Sector reviewed and discussed the proposal to amend Publication 14 and whether or not these proposed requirements are needed. There was little support for the item for the following reasons:

- HB 44 only requires that provision be made to apply a security seal; the definition only defines a seal as being "sufficiently permanent."
- The proposed evaluation criteria would require that the states have to obtain different types of pressure sensitive seals that are suitable for different types of environments.
- A "NEMA 4 enclosure" was the only type of enclosure addressed in the proposal and is rarely used. Additionally, there are numerous types of other enclosures designed for different types of environments.

- The proposed evaluation criteria would create an additional test for devices evaluated under the U.S./Canada Mutual Recognition Agreement since Measurement Canada stated that they only request that the manufacturer provide samples demonstrating compliance with G-S.8.
- Standards for security seals would have to be established and test methods developed (or referenced if already developed by another standards development organization).
- Some states still do not accept pressure sensitive seals as a method of sealing.

The manufacturers do not agree with the proposal for the reasons listed in the discussion and stated that they are able to demonstrate that pressure sensitive seals are available that meet the durability requirements due to adverse environments. Additionally, the manufacturers have no control over the requirements the states and service agencies use in procuring these seals.

Conclusion: The Sector agreed with the concerns listed above from the manufactures and recommends that no action be taken on this item.

16. Identification of ECRS

Source: NTEP Participating Laboratories

Background: At its 2008 NTEP Participating Laboratory meeting discussion on marking requirements for self checkout ECRS systems, the Maryland NTEP lab stated that inconsistencies in marking requirements were found between the description of modular markings and the pictures of examples (page ECRS 4 and 8). Steve Cook and Stephen Patoray agreed to develop a Weighing Sector item addressing the differences and provide a proposal to clarify the differences.

Discussion/Conclusion: No revised proposal to amend the evaluation criteria for ECRS was received for the Sector to consider. The Sector recommends no further action be taken on this item until a specific proposal has been submitted to the Sector.

17. Automatic Zero-Tracking vs. Automatic Zero-Setting

Source: Stephen Patoray, NTEP Director

Background: This item relates to changes to NIST Handbook 44 in 2005. The agenda item is Item 320-4 from the 2005 NCWM Annual Report and is included below as reference.

Currently, HB 44 Scales Code and OIML R 76 for Nonautomatic Weighing Instruments (NAWI) are not harmonized regarding automatic zero-tracking mechanism and setting mechanisms.

- OIML R 76 uses the term zero-tracking **device**; HB 44 uses **automatic** zero-tracking **mechanism**.
- OIML R 76 uses the term automatic zero-setting device; there is no equivalent to this term in either HB 44 or NCWM Publication 14.

It has been reported that the operation of an automatic zero-setting device may be functional on a device installed in the United States since many devices are built for the global marketplace. Currently, NIST HB 44 does not define this function and NCWM Pub 14 has no test to determine if the device under test (DUT) has such a function, or if it is sealable.

In the past, several of the NTEP labs have stated that they have not accepted the automatic zero-setting mechanism because its operation is similar to an automatic zero-tracking mechanism and thus does not comply with the requirements specified in HB 44 paragraph S.2.1.1. Automatic Zero-Tracking Mechanism.

HB 44 does not clearly state that this function is not allowed and Scale Code paragraphs S.1.1.(c) and S.1.1.1.(b) could be interpreted to allow the automatic zero-setting device as described in OIML R 76. That may not be a universal interpretation.

Also (a minor point), Section 43. in NCWM Publication 14 Weighing Devices, Digital Electronic Scales needs its title corrected by replacing the word "setting" with the word "tracking."

Stephen Patoray recommends that the Sector review the information regarding automatic zero-tracking and automatic zero-setting. The items to be addressed in order are:

(a) Consensus that there is a problem that needs to be solved based on the current information or lack of information in NIST Handbook 44.
(b) Determine if there are or are not technical reasons why the feature automatic zero-setting as described in OIML R 76 should or should not be included in NIST Handbook 44.

In either case, language will need to be developed for NCWM Publication 14 to either test for the correct function of automatic zero-setting or test to determine that the device does not have automatic zero-setting and it is a sealable parameter.

Discussion: The Sector discussed the comments that an increasing number of scales submitted for NTEP evaluations include an **"automatic zero-setting**" feature, which is not addressed in HB 44. It has been noted that many devices are built for a global marketplace and that the operation of this **automatic zero-setting** device may be functional on the device when installed in the United States. Currently, HB 44 does not define this function. NCWM Pub 14 has no test to determine if the device submitted for evaluation has such a function, or if it is sealable. The automatic zero-setting mechanism on a scanner/scale submitted to NTEP could be enabled and disabled by means of a bar code read by the scanner.

In the past, several of the NTEP labs, when asked about this "feature," have indicated that since it does not meet the definition of **automatic zero-tracking** mechanism, it is not allowed. Additionally, the Sector agreed that HB 44 does not clearly state that this function is not allowed which may lead to inconsistent interpretations of Section 2.20. Scale paragraphs S.1.1.(c) (Zero Indication – ". . . return to a continuous zero indication") and S.1.1.1.(b) (Digital Indicating Elements – *"a device shall either automatically maintain a "center-of-zero" condition. . . ."* could be interpreted to allow the automatic zero-setting device as described in OIML R 76. That may not be a universal interpretation.

The Sector concluded that:

(a) There is a problem that needs to be solved, based on the current information or lack of information in HB 44.
(b) There are no technical reasons why the automatic zero-setting feature, as described in OIML R 76, should not be included in NIST Handbook 44.
(c) The feature may not be suitable for all applications (e.g., balancing off a stable partial load) if the feature can function with both positive and negative weight indications.
(d) Language will need to be developed for NCWM Publication 14 to either test for the correct function of automatic zero-setting or test to determine that the device does not have **automatic zero-setting** and it is a sealable parameter.

The Sector established a small work group (Scott Davidson, Scott Henry, Steve Cook, and Stephen Patoray) to develop language to be submitted the NCWM S&T Committee and make a recommendation addressing the suitability of scales with the capability to automatically set a positive weight indication to zero. Additionally, the Sector agreed to review the language developed by the work group to confirm its support of the proposed language. (Todd Lucas and Jim Truex also contributed to the discussions and subsequent proposal.)

In the process of developing the proposal, the WG considered the following points:

1. Making the proposal to add automatic zero-setting "retroactive" since the group is aware that the feature has been included on several scales for nearly 20 years and may not have been activated. The WG considered alternate retroactive dates, but felt that the proposed requirements for the feature should be applicable to all scales incorporating this feature. Additionally, NCWM Publication 14 NTEP technical

policies state that only the standard features and options that have been evaluated will be included on the CC. As a result, an NTEP applicant will have to submit an application to NTEP in order to have the automatic zero-setting feature listed on an existing CC.

2. The automatic zero-setting mechanism shall be limited to operating only when the scale indication is below zero. The group discussed allowing the feature to operate in both directions. Although there may be valid reasons for allowing it in the positive direction, the group felt that legitimate objects on a scale could be inadvertently (or intentionally) zeroed without an obvious indication to the customer or operator when the scale was indicating zero at the start of a transaction.
3. The automatic zero-setting mechanism should be considered as a "sealable parameter" since there are applications where is required to be disabled, and if the time, stability, and capacity parameters can be adjusted beyond the limitations in the proposal.
4. Publication 14 evaluation and field examination procedures should be amended to verify that the automatic zero-setting mechanism cannot set the scale to a zero indication in less that five seconds and that it can only operate if it complies with motion detection requirements and its effect is no larger that 4 % on the nominal scale capacity.
5. The automatic zero-setting mechanism is permitted for devices covered by Section 2.24. Automatic Weighing Systems.
6. The automatic zero-setting mechanism is prohibited for automatic bulk-weighing systems for the same reasons that zero-tracking is prohibited (unintentional and unobserved zeroing or tracking off material that may be retained in a hopper resulting in incorrect weight determinations).
7. The automatic zero-setting mechanism should be capable of being disabled for testing purposes for the same reasons that zero-tracking is capable of being disabled for Scales Code Class III L devices.
8. The group believes that the current definition for initial zero-setting mechanism is a type of zero-setting mechanism and should be included with the definition on zero-setting mechanism as shown in the recommendation.
9. The Sector should consider recommending changing the term "automatic zero-tracking" to "zero-tracking" throughout the weighing codes in order to reduce the confusion with the term "automatic zero-setting." The word "automatic" is redundant for zero-tacking since it is included in the definition of "automatic zero-tracking."

The WG did not have sufficient time to both develop the proposal and ballot the Sector prior to the November 1, 2008, cutoff date for submitting new items to the Committee. Therefore, the group agreed to submit the proposal to the Committee and ballot the Sector members. (Note: The ballot will also ask the Sector if it agrees with submitting a recommendation to the NTEP Committee that an existing CC may be amended upon a successful review on an application and documentation.) The results of the ballot and all comments will be summarized and forwarded to the Committee prior to the 2009 NCWM Interim Meeting.

Conclusion: Eight Sector members responded to the ballot of which six voted in favor of the proposed language. It should be noted that two of the affirmative votes stated that their vote was provisional provided the reference to the 4 % of scale capacity limitation is removed from the proposal. Two members opposed that item stating that the language should not be rushed through the S&T Committee and that the feature should operate with either negative or positive weight indications.

The NIST technical advisor has forwarded the ballot results and comments to the S&T Committee for its consideration at the 2009 NCWM Interim Meeting. A copy of the ballot summary can be viewed in Appendix C, attachment to agenda Item 17.

18. Capacity – Markings and Display

Source: Stephen Patoray, NTEP Director

Background: There has been a question asked by a current NTEP CC holder regarding marking of the capacity x division statement. This CC holder wished to use a dot matrix display on their device. This happens to be a Class II non-computing scale with prescription counting capabilities, but the question could apply to just about any type of indicating element or scale display.

This CC holder wants to mark the capacity by division using the dot matrix display. They stated that the device could display different units of weight (lb, kg, etc). They stated that only one capacity by division would be displayed, based on the unit that was selected. It would be clear from this marking what the unit of measure was and what the capacity by division was set to.

They also stated that since this device had the prescription counting feature, they request that the requirements for marking in NIST HB 44 2.20. Scales, S.6.6. Counting Feature, Minimum Piece Weight (MPW) and Minimum Sample Size (MSS) be allowed on the dot matrix display, whenever the device is in the counting mode.

When the four NTEP brick and mortar labs were polled on this question, two of the labs indicated that they would not allow the marking of the capacity by division, or the markings for counting on a scale display. One lab indicated that this would be an acceptable method since the language in NCWM Publication 14, Weighing Devices, Digital Electronic Scales, Section K. Subsection 1. Item 1.14. is significant in that it mentions a "video terminal." One lab did not respond. The Weighing Sector needs to discuss this issue and 1) clarify this issue for the NTEP labs, or 2) recommend a clarification in HB 44, so that labs can consistently interpret the information found in both HB 44 and NCWM Publication 14.

In 1992, the S&T Committee took on this topic and an Item (320-6) that was adopted by the NCWM. At that time, the Committee recommended that Tables S.6.3.a. and S.6.3.b. (note 3) be interpreted to permit the **required capacity and scale division markings** 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 d 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.

It should be noted that there is a difference in the language of the S&T agenda item and that of Pub 14. The Final S&T Report uses **"scale display"** with video terminal as an example; however, Pub 14 uses **"video terminal"** with no example. While this may seem trivial, the information in Pub 14 is what the two labs were basing their decisions on and did not consider a video terminal the same thing as a dot matrix scale display. The language in Pub 14 should reflect the position of the S&T Committee and to not limit the type of technology used for a scale display.

Part 1 – Capacity x Division, Multiple Units of Measure

With this information from 1992, the ability to display capacity by division on a dot matrix scale display should be allowed by this interpretation.

The next question is whether the capacity by division can change in relationship to the current unit of weight that the scale is using (instead of displaying all of the various capacity by divisions all at one time, (like on a sticker) no matter what unit of weight was in use).

It is submitter's position that the only useful information is that of the "unit of weight" that is in use at the time of the weighment, and that the other information for other units could add to confusion for everyone. The capacity by division statement is of no value and need not be displayed if the scale is in some other mode of operation (e.g. not a weighing mode).

Discussion/Conclusion (Part 1): The Sector supported the recommendation and agreed that NCWM Publication 14 DES Section 1.14. be clarified so that it is acceptable to display the capacity by division information for only the unit of weight that is currently in use and is only necessary for the capacity by division information to be displayed when the device is in the weighing mode as follows:

1.14. If the capacity by division statement is displayed **as part of the scale display (e.g., displayed on a video terminal or in a liquid crystal display)** ~~**on a video terminal**~~ with the weigh values, then the capacity by

division statement must be indicated in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator unless already apparent by the design of the device and displayed whenever the system is in the weighing mode.

Part 2 – Minimum Piece Weight and Sample Size

The marking requirements for prescription counting were added to HB 44 in 2003, long after the clarification of capacity by division on a scale display in 1992 by the S&T.

In the 2003 NCWM Annual Report, the S&T Committee in part stated in agenda Item 320-2 (which was adopted) that the Committee agreed that the proposal should clarify when special application marking requirements are not required on scales equipped with the counting feature.

Based on the previous information in ***Part 1*** regarding capacity by division that was clarified in 1992 by the S&T, and the statement in S.6.6. that the device has an operational counting feature, the Sector considered a proposal to allow the required markings of MSS and MPW to be displayed on the scale display, only when the device is in prescription counting mode.

Discussion/Conclusion (Part 2): The Sector discussed the proposal to clarify NCWM Publication 14 to state that it is acceptable to display the HB 44 required marking for the Minimum Piece Weight (MPW) and the Minimum Sample Size (MSS) on the scale display, only when the device is in prescription counting mode. The Sector agrees that clarification in NCWM Publication 14 is needed and recommended that specific language needs to be developed by Steve Patoray and Steve Cook, and that the recommended language will be presented to the NTEP Committee prior to its January 2009 meeting.

Next Sector Meeting

Discussion/Conclusion: The Sector discussed several possible options for the date and location for its 2008 meeting. Suggestions included holding the meeting at NCWM headquarters in Lincoln, Nebraska, the Ohio NTEP laboratory, or to tie the Sector meeting with the 2009 Annual Technical Conference for the Western Weights and Measures Association in New Mexico.

The Sector made no recommendation for a date and location for its 2009 meeting.

Appendix A – Recommendations for Amendments to Publication 14[1]

Agenda Item 1. Force Transducer (Load Cell) Family and Selection Criteria

Amend Publication 14 Force Transducers Section D. as follows:

D. Force Transducers (Load Cells) to be Submitted for Test[1]

~~***Editor's Note:*** *A modified Section D. is currently out for comment. This modification will attempt to align this section with OIML R 60 selection criteria. Additional work is needed by the Weighing Sector before this modification is completed.*~~

In 2006, NCWM signed the OIML Declaration of Mutual Confidence (DoMC) as a utilizing participant in R 60 Load Cells. As part of this agreement, NCWM will accept the Test Report and test data that is generated by the Issuing Participant and laboratory who have also signed the DoMC. The selection process for load cell samples will be that described in OIML R 60 2000 Section 7.3 Selection of Load Cells Within a Family. ~~*No amendments to NTEP CCs will be allowed under the DoMC will be issued an NTEP CC.*~~

- *The load cell(s) evaluated under the MAA will be issued a new NTEP CC.*
- *Subsequent applications to amend the MAA-generated CCs will also use the selection criteria and family characteristics in R 60.*
- *Amendments to NTEP CCs issued on or after XXXX XX, 2009, will use the family and selection criteria listed on the certificate.*
- *NTEP CCs issued earlier than XXXX XX, 2009, will use the Publication 14 family and selection criteria.*

Note: Use of either the NTEP or R 60 selection criteria will be listed in the CC test conditions.
(Effective with CCs issues after XXXX XX 2009)

Force transducers (load cells) with essentially the same design will be considered to be part of the same family on a CC. If force transducers (load cells) within a family are made from different materials, such as aluminum, alloy steel, or stainless steel, than all material types must be submitted for evaluation. The policy applies to all applications for new or amended Certificates of Conformance received after January 31, 2002. This policy is non-retroactive for Certificates issued prior to February 1, 2002.

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1. The manufacturer must provide the following information with a request for evaluation:

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2. The actual number of force transducers (load cells) and force transducer (load cell) capacities to be tested will be decided by NTEP in discussions with the manufacturer. The data are evaluated strictly on a pass/fail basis with respect to the NTEP requirements. However, if the test data is marginal, then NTEP may require that additional force transducers (load cells) be tested before an NTEP Certificate is issued. **NTEP recognizes that deviations to the selection criteria may be unavoidable due to test capability and manufacturing product line and that any such deviations may be approved by NTEP after consulting with the applicant.**

[1] Holders of NTEP CCs that have private label agreements with the original load cell manufacturers (OEM) shall comply with Publication 14 Administrative Policy Section G.1. Private Label. *(Editorial suggestion)*

[1] Recommended changes to Publication 14 are indicated in shaded, ~~strike out~~, and underlined text.

Agenda Item 2. Force Transducer

Amend Publication 14 Force Transducers Section L as follows:

L. Procedures

II. Determination of Creep and Creep Recovery, Test Procedure and Permissible Variations

1. - 3. ***(no change)***

4. **Test for Creep:**

   a. Apply a load equal to 90 percent to 100 percent of the maximum capacity of the force transducer (load cell)**. ~~and record the indication 20 seconds after reaching the load~~**. The time to load test weights **~~and read the indicator~~** shall be as short as possible**. ~~and shall not exceed the time specified in Table 5.~~ A portion of the time specified in Table 5 shall be used for loading. The remaining time specified in Table 5 shall be used for stabilization. The tests shall be conducted under constant conditions. Time shall be recorded in the test report in absolute (hh:mm:ss), not relative, units. The initial reading shall be taken at the applicable time indicated in Table 5.** With the load remaining on the load cell, continue to record indications periodically, thereafter at time intervals over a 30 minute period. **Be certain to obtain a reading at 20 minutes (8.b. below).**

5. **Test for Creep Recovery:**

   a. Remove a load equal to 90 percent to 100 percent of the maximum capacity of the force transducer (load cell) that has been applied for 30 minutes. **~~Record the indication after 20 seconds.~~**The time to unload test weights **~~and read the indicator~~** shall be as short as possible**. ~~and not exceed the time specified in Table 5.~~ A portion of the time specified in Table 5 shall be used for unloading. The remaining time specified in Table 5 shall be used for stabilization. The tests shall be conducted under constant conditions. Time shall be recorded in the test report in absolute (hh:mm:ss), not relative, units. The initial reading shall be taken at the applicable time indicated in Table 5. ~~Continue to record indications periodically thereafter at time intervals over a 30 minute period.~~**

6. - 8. ***(no change)***

9. **Permissible Variations of Reading for Creep Recovery**

   a. ***(no change)***

Table 5. ~~Loading~~Initial Reading Times		
Load		**Time**
Greater than	**To and including**	
0 kg	10 kg	10 seconds
10 kg	100 kg	~~15~~**20** seconds
100 kg	1000 kg	~~20~~**30** seconds
1000 kg	10 000 kg	~~30~~**40** seconds
10 000 kg	100 000kg	50 seconds
100 000 kg	----------	60 seconds

Table T.N.4.6. *(no changes)*

Agenda Item 4.(c) Scales Code Paragraphs S.1.2.1., S.2.3., and T.N.2.1. and AWS Code Paragraph S.1.1.1.

Recommendation 1: Amend Publication 14 DES Section 1.11. as follows:

11.1.	Except for batching scales, the value of the scale division in all available weight units for both indicating and recording elements must be in values of 1, 2, or 5 times 10k where k is an integer, e.g., 0.1, 0.2, or 0.5; 1, 2, or 5; 10, 20, or 50, etc. See additional exceptions in DES Sections 31. and 32. for multi-interval and multiple range scales.	Yes ☐ No ☐ N/A ☐

Recommendation 2: Amend Publication 14 DES Section 31. as follows:

In applying these principles, it is acceptable to:

- round the indicated and printed tare values to the nearest appropriate net weight scale division,

- or display net weight values in scale divisions other than the scale division used in the display of gross weight, as when the gross and tare weights are in different ranges of the device. For example, a scale indicating in 2-lb divisions in the lower range and 5-lb divisions in the next higher range may result in net values ending in three or eight in the higher range. For example, a multi-interval scale may indicate and record tare weights in a lower weighing segment (WS) and net weights in the higher weighing segment as follows:

55 kg	Gross Weight (WS2 d = 5 kg)	10.05 lb	Gross Weight (WS2 d = 0.05 lb)
– 4 kg	Tare Weight (WSR1 d = 2 kg)	– 0.06 lb	Tare Weight (WS1 d = 0.02 lb)
= 51 kg	the Mathematically Correct Net Weight	= 9.99 lb	the Mathematically Correct Net Weight

In every case, it is required to maintain the mathematically correct equation:

net = gross – tare

Recommendation 3: Amend Publication 14 DES Section 32. as follows:

Whenever gross and tare weights fall in different weighing ranges so that the scale divisions for the gross and tare weights differ, the net weight must agree mathematically with the gross and tare weights that are indicated or recorded (i.e., net = gross - tare).

A multiple range scale may indicate and record tare weights in a lower weighing range (WR) and net weights in the higher weighing range. ~~On a multiple range instrument,~~ Alternatively, a tare value may ~~only~~ be transferred from one weighing range to another one with a larger verification scale interval and shall then be rounded to the nearest scale division of the latter verification interval ~~For example:~~ when displayed and/or printed as follows: *

Capacity x d:	Displayed and/or Printed		
		Preferred	Acceptable
WR1 = 0 - 4 kg x 2 g			
WR2 = 4 - 10 kg x 5 g	Gross	13.380 kg	13.380 kg
WR3 = 10 - 20 kg x 10 g	Tare	-3.814 kg	-3.810* kg
	Net	9.566 kg	9.570 kg

* 3.814 tare in WR2 is rounded to the nearest scale division of WR3.

Recommendation 4: The NIST technical advisor recommends that the Sector consider developing equivalent amendments in the above recommendations to Publication 14 for AWS Sections 10., 19., and 20.

Agenda Item 4.(e) Amend Level-Indicating Means

Amend Publication 14 DES Sections 55. and 56. as follows:

55. Vehicle on-Board Weighing Systems
Code References: S.1.13., S.2.4.1., and N.1.3.7.

A vehicle on-board weighing system is defined as a weighing system designed as an integral part of or attached to the frame, chassis, lifting mechanism, or bed of a vehicle, trailer, industrial truck, industrial tractor, or forklift truck.

55.1. Verify that when the vehicle is in motion the on-board weighing system is either:

55.1.1. accurate or Yes ☐ No ☐ N/A ☐

55.1.2. the weighing operation is inhibited Yes ☐ No ☐ N/A ☐

55.2. The on-board weighing system operates within tolerance for out-of-level conditions up to and including 5 percent* ~~3 degrees~~. Yes ☐ No ☐ N/A ☐

55.2.1. A sensor detects and inhibits weighing when an out-of-level condition exists that will exceed the accuracy limits of the scale. Weighing is inhibited for out of level conditions of _____ degrees Yes ☐ No ☐ N/A ☐

55.2.2. The system is accurate for the shift test when the vehicle is both level and out-of-level. Yes ☐ No ☐ N/A ☐

***NOTE:** 5 percent refers to 5 percent rise over run.~~slope/grade~~*

56. Level-Indicating Means – Portable Scales
Code Reference: S.2.4.

Portable wheel-load weighers and portable axle-load scales intended for law enforcement must weigh accurately when placed out-of-level by 5 percent* ~~(approximately 3 degrees)~~.

A portable scale which is intended to be moved must either be equipped with a readily observable level-indicating means (typically a bubble level) or the scale must still weigh accurately when placed out-of-level by 5 percent* ~~(approximately 3 degrees)~~. Weighing accurately means that the results must be within acceptance tolerance.

The level-indicating means shall be rigidly mounted, located where it will be protected from damage but still be easily read in normal use, mounted so that its reference point for level will not change when pressure is applied to the level-indicator, and sensitive enough to indicate an out-of-tolerance condition that might affect the accuracy of the scale. A bubble level mounted on a swing-out bracket is not adequate. Portable floor scales (generally with capacities of more than 500 lb) shall have the level-indicating means visible without removing any scale parts.

***NOTE:** 5 percent refers to 5 percent rise over run.~~slope/grade~~*

56.1. Scales (other than wheel-load weighers and portable axle-load scales) must meet one of the following conditions:

56.1.1. The device is equipped with a level indicator as standard equipment, or? Yes ☐ No ☐ N/A ☐

56.1.2. the device complies with the provisions of S.2.4. The test procedure is given in "Performance Tests for Digital Counter (Bench) and Computing Scales". Yes ☐ No ☐ N/A ☐

56.2.	If the scale is equipped with a level-indicating means, it must be readily observable without mechanical disassembly that requires the use of tools. A bubble level placed under the scale platform of a portable floor scale mounted on wheels is not practical for the user of the scale.	Yes ☐ No ☐ N/A ☐
56.3.	The level-indicating means is rigidly mounted, easily read, protected from damage, will not change its reference for level, and sufficiently sensitive.	Yes ☐ No ☐ N/A ☐
56.4.	Wheel-load weighing and axle-load scales must weigh accurately when placed out-of-level by 5 percent* ~~(approximately 3 degrees)~~.	Yes ☐ No ☐ N/A ☐

Agenda Item 8. Method of Sealing

Delete DES Section 10.12.9. as follows:

~~10.12.9. *The scale shall clearly indicate it is in the set up (calibration or configuration) mode, such as indicators, error message, or other means of indication that can not be interpreted as legal weight values (Effective January 1, 2005).*~~

Agenda Item 9. S.1.1.(c) Zero Indication (Sleep/Screen Saver/Power Save Modes)

Amend Publication 14 – Digital Electronic Scales (DES) as follows:

Scale Features and Parameters *(in DES Section 10.)*	
Typical Scale Features to be Sealed	**Typical Scale Features and Parameters Not Required to be Sealed**
. . . Screen Saver/Sleep and/or Power Save mode ***not listed*** on the CC (enabled/disabled)	. . . Screen Saver/Sleep and/or Power Save mode ***listed*** on the CC (enabled/disabled)
NOTE: *The above examples of adjustments, parameters, and features to be sealed are to be considered "typical" or "normal." This list may not be all inclusive . . .*	

11.8.4. Does the scale or indicating element have a: ~~**Yes ☐ No ☐ N/A ☐**~~

- ☐ screen saver/sleep ~~or~~ mode, or
- ☐ power save mode?

Note for Editor: Proposal deletes existing Pub 14 language in the NOTE and Sections 11.8.4.1. and 11.8.4.2. to be replaced by the following:

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.

As used in Publication 14, the terms screen saver/sleep mode and power save mode are defined as follows:

screen saver/sleep mode. A function of a device that blanks the display or shows information other than weight indications after a defined period of non-use.

power save mode. A function of a device that automatically blanks indications and turns off or reduces power

to the electronics after a defined period of non-use in order to save line or battery power. Operator intervention is required to restore operation (e.g., return the scale to zero, turn on the scale, etc.).

Summary of Screen Saver/Sleep and Power Save Mode of Operation				
Mode	Display	Activated by	Exited by	Verified by
Screen Saver/Sleep	i.e., Scrolling or other non metrological information, blank, or annunciator	Period of time at gross load center of zero	Change in weight, i.e., no longer at gross load zero	***Accurate weights are displayed*** under all the following conditions when: - weight is added to the LRE, - weight is removed from the LRE, and - the LRE is disturbed by hand.
		Period of time with a non changing load on the scale	Deliberate operator action (remove load off scale and rezero if necessary)	***No weights are displayed*** under all the following conditions when: - weight is added to the LRE, - weight is removed from the LRE, and - the LRE is disturbed by hand.
Power Save	Off/Blank	Period of time with no activity on the LRE (loaded or unloaded)	**Return the scale to a zero-balance indication with the automatic zero tracking or semi-automatic zero-setting mechanisms,** or other deliberate operator action (e.g., turn on the scale, etc.)	***No weights are displayed*** under all the following conditions when: - weight is added to the LRE, - weight is removed from the LRE, - the LRE is disturbed by hand, and - **power is restored to the scale with weight on the LRE.**
				Accurate weights are ~~displayed~~ indicated or recorded according to Publication 14 Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2 **since power may have been turned off or reduced to the electronics and load cell while in the power save mode.**

11.8.4.1. If the scale can only enter a screen saver/sleep mode ***with no load on the LRE***, perform the following steps to verify that automatic means are provided to inhibit a weighing operation unless the scale is at zero. **Yes ☐ No ☐ N/A ☐**

1. Add a load plus 20 d to the LRE and rezero the scale.
2. Observe the scale while indicating zero and note the amount of time taken to enter the screen saver/sleep mode. _____
3. The scale shall exit the screen saver/sleep mode when the 20 d is removed from the scale.
   Yes ☐ No ☐
4. Observe the scale indication for the amount of time taken to enter the screen saver/sleep mode noted in Step 2. The scale complies if it does not reenter the screen saver/sleep mode.
   Yes ☐ No ☐
5. Rezero the scale and allow the scale to enter the screen saver/sleep mode.

6. The scale shall exit the screen saver/sleep mode when the 20 d is now added to the LRE.
Yes ☐ No ☐

7. Rezero the scale by removing the 20 d from the LRE to allow the scale to enter the screen saver/sleep mode.

8. The scale shall exit the screen saver/sleep mode when the LRE is momentarily disturbed by hand.
Yes ☐ No ☐

11.8.4.2. If the scale can enter a screen saver/sleep mode ***with a load on the LRE,*** verify that automatic means are provided to inhibit a weighing operation when the scale is in an out-of-balance condition. **Yes ☐ No ☐ N/A ☐**

While in the screen saver/sleep mode and with a load on the LRE, the scale ***shall not indicate a weight*** under all the following conditions when;

- ☐ an additional load is added to the LRE,
- ☐ a partial load is removed from the LRE, and
- ☐ the LRE is disturbed by hand.

The scale is permitted to return to a zero indication when the entire load is removed from the LRE (unloaded condition) or the operator is required to zero the scale.

11.8.4.3. Does the scale have a power save mode feature? **Yes ☐ No ☐ N/A ☐**
Yes ☐ No ☐

If yes, attempt to initiate a weighing transaction while the scale display is off or blank when:

- ☐ an additional load is added to the LRE,
- ☐ a partial load is removed from the LRE, ~~**and**~~
- ☐ a load on the LRE is disturbed by hand**, and**
- ☐ **power is restored to the scale with weight on the scale.**

Perform the tests described in Pub 14 Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2 as appropriate to verify the accuracy of the scale after its power has been lowered or turned off.

11.8.4.3. Verify that recording and printing functions are inhibited when the device is in screen saver/sleep or power save mode. **Yes ☐ No ☐ N/A ☐**

Publication 14 – Electronic Cash Registers Interfaced with Scales (ECRS) as follows:

1. Zero Indication

Code Reference: S.1.1., S.1.1.1., S.1.6.3., G-S.5.1.

A digital electronic scale must be capable of defining a zero-balance condition within 0.5 scale division (d) for all weight units and may be defined within ± 0.25 d. In ~~If~~ a point-of-sale system automatically monitors its zero balance condition ~~and inhibits scale operation when an out-of-zero-balance condition is detected~~, a continuous

digital zero balance indication is not required provided that automatic means is provided to inhibit a weighing operation or to return to a continuous digital indication when the scale is in an out-of-balance condition.

Manufacturers of scales and point-of-sale systems 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 and point-of-sale systems 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.

As used in Publication 14, the terms screen saver/sleep mode and power save mode are defined as follows:

screen saver/sleep mode. A function of a device that blanks the display or shows information other than weight indications after a defined period of non-use.

power save mode. A function of a device that automatically blanks indications and turns off or reduces power to the electronics after a defined period of non-use in order to save line or battery power. Operator intervention is required to restore operation (e.g., return the scale to zero, turn on the scale, etc.).

Summary of Screen Saver/Sleep and Power Save Mode of Operation

Mode	Display	Activated by	Exited by	Verified by
Screen Saver/Sleep	i.e., Scrolling or other non metrological information blank, or annunciator	Period of time at gross load center of zero	Change in weight, i.e., no longer at gross load zero	***Accurate weights are displayed*** under all the following conditions when: - weight is added to the LRE, - weight is removed from the LRE, and - the LRE is disturbed by hand.
		Period of time with a non changing load on the scale	Deliberate operator action (remove load off scale and rezero if necessary)	***No weights are displayed*** under all the following conditions when: - weight is added to the LRE, - weight is removed from the LRE, and - the LRE is disturbed by hand.
Power Save	Off/Blank	Period of time with no activity on the LRE (loaded or unloaded)	**Return the scale to a zero-balance indication with the automatic zero tracking or semi-automatic zero-setting mechanisms**, or	***No weights are displayed*** **under all the following conditions when:** **- weight is added to the LRE,** **- weight is removed from the LRE,** **- the LRE is disturbed by hand, and** **- power is restored to the scale with weight on the LRE.**

			other deliberate operator action (e.g., turn on the scale, etc.)	***Accurate weights are ~~displayed~~ indicated or recorded*** according to Publication 14 Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2 **since power may have been turned off or reduced to the electronics and load cell while in the power save mode.**

For all other systems, when an ECR is interfaced with a weighing/load receiving element, a continuous display of weight values and the digital zero balance indication must be provided. The continuous weight display must be visible to both the customer and cash register operator. A single weight display suffices so long as both the customer and cash register operator can easily see it. The operator's zero balance indication may be an annunciator on the cash register display that is illuminated when the scale is in a zero balance condition.

The weight display may be integrated into the scale, may be a remote weight display, or may be integral with the cash register. If the weight display is in the ECR, it must be separate from other displayed information.

1.1. ***(No change)*** **Yes ☐ No ☐ N/A ☐**

1.2. ***(No change)*** **Yes ☐ No ☐ N/A ☐**

1.3. If the point-of-sale system automatically monitors the zero-balance condition of the scale, the system shall automatically prohibit scale operation when an out-of-zero balance condition is detected, or return to a continuous digital indication when the POS scale is in an out-of-balance condition.

Does the scale or indicating element have a:
screen saver/sleep mode? **Yes ☐ No ☐**
power save mode? **Yes ☐ No ☐**

1.3.1. If the scale and point-of-sale system (POS) can only enter a screen saver/sleep mode ***with no load on the LRE***, perform the following steps to verify that automatic means are provided to inhibit a weighing operation unless the scale is at zero. **Yes ☐ No ☐ N/A ☐**

1. Add a load plus 20 d to the LRE and rezero the scale.
2. Observe the weight display while indicating zero and note the amount of time taken to enter the screen saver/sleep mode. _____
3. The scale or POS shall exit the screen saver/sleep mode when the 20 d is removed from the scale.
   Yes ☐ No ☐
4. Observe the weight indication for the amount of time taken to enter the screen saver/sleep mode noted in step 2. The scale complies if it does not reenter the screen saver/sleep mode.
   Yes ☐ No ☐
5. Rezero the scale and allow the scale to enter the screen saver/sleep mode.
6. The scale or POS shall exit the screen saver/sleep mode when the 20 d is now added to the LRE.

Yes ☐ No ☐

7. Rezero the scale by removing the 20 d from the LRE to allow the scale to enter the screen saver/sleep mode.

8. The scale or POS shall exit the screen saver/sleep mode when the LRE is momentarily disturbed by hand.

Yes ☐ No ☐

1.3.2. If the scale or POS can enter a screen saver/sleep mode ***with a load on the LRE*****,** verify that automatic means are provided to inhibit a weighing operation when the scale is in an out-of-balance condition. **Yes ☐ No ☐ N/A ☐**

While in the screen saver/sleep mode with a load on the LRE, the scale or POS ***shall not indicate a weight*** under all the following conditions when;

- ☐ an additional load is added to the LRE,
- ☐ a partial load is removed from the LRE, and
- ☐ the LRE is disturbed by hand.

The scale or POS is permitted to return to a zero indication when the entire load is removed from the LRE (unloaded condition) or the operator is required to zero the scale.

1.3.3. Does the scale or POS have a power save mode feature? **Yes ☐ No ☐ N/A ☐**

Yes ☐ No ☐

If yes, attempt to initiate a weighing transaction while the scale display is off or blank when:

- ☐ an additional load is added to the LRE,
- ☐ a partial load is removed from the LRE, ~~**and**~~
- ☐ a load on the LRE is disturbed by hand, **and**
- ☐ **power is restored to the scale with weight on the scale.**

Perform the tests described in Pub 14 DES Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2 as appropriate to verify the accuracy of the scale after its power has been lowered or turned off.

1.3.4. Verify that recording and printing functions are inhibited when the scale or POS is in screen saver/sleep or power save mode. **Yes ☐ No ☐ N/A ☐**

Agenda Item 11.(a) Clarification on Section 66.(c) Performance and Permanence Tests

Amend Publication 14 – Digital Electronic Scales (DES) Section 66.(c) as follows *(**Editor's Note:** Jim Truex and Steve Cook need to resolve conflict with minimum weight for subsequent test in Sections 66.(c)4.1. and 66.(c)6.6.)*:

Pub 14 Section 66.(c) (figures not included here)

Side-by-side scale vehicle applications are typically two 7- to 12-foot wide vehicle scales **(load-receiving elements**) placed side-by-side and may have a small area between each **load-receiving element (LRE).** Unless the "side-by-side" scale has a single CLC rating for the complete scale, the section test-load shall not be greater CLC (for the single side) x 2 when both sides of the "side-by-side" scale are tested simultaneously.

If the **load-receiving elements (LRE)** used in the "side-by-side" application do not have a CC, then at least one of

the load-receiving elements **shall be tested as a "single" scale** according to Section 66.(a) in addition to the following tests (CLC test load at least 90 percent).

If the **LRE** used for the "side-by-side" application are already covered by a CC for "single" scale applications, then only the following test loads and patterns need to be performed **including strain-load and subsequent evaluation (field) permanence tests.** If the "single" scale is too narrow for legal highway vehicles, testing as a "single" (one of the sides) scale does not have to be performed and the weighing/load-receiving element will be limited to "side-by-side" applications.

Side-by-side applications using **LREs** narrower than 8 ft wide should not be able to provide weight information from the individual scale since legal highway vehicles would always straddle both **LREs** to obtain a weight.

Section tests on "side-by-side" scales can be conducted with at least 75 percent CLC test loads in Prescribed Test Patterns (PTPs). Care shall be taken not to overload a Prescribed Test Pattern (PTP) during the strain-load test. Position tests will be conducted with loads no greater than 50 % CLC in a test pattern approximately 4 ft (L) x 4 ft to 5 ft (W).

The evaluator is reminded to be aware of potential safety hazards prior to and during the evaluation. When test carts are not available, care should be taken when stacking 1000-lb weights on a scale platform. Extreme caution must be used when stacking 1000-lb weights higher than three levels. If a fourth level of test weight is required to reach the desired test load, weights should not be placed on the outer edge of the weight stack. The evaluator may request the assistance of the applicant, service agency, or device owner to help with the stacking of weights and to verify that the weights are safely stacked without the risk of falling and injuring people, and damaging property (General Code Section 1.10. G-UR.2.3. Accessibility for Inspection, Testing, and Sealing Purposes).

66.(c)1. Indicator Tests . . .

Agenda Item 11.(b) Clarification of Section 66.(c) Waiving of Permanence Tests

Add the following note to DES Section 66.(c)4. as follows:

66.c.4. Subsequent Type Evaluation (Field) Permanence Tests

Note: *The subsequent permanence test may be waived if the scale passes the initial test without significant performance issues and the NTEP Administrator approves the waiver based upon the report of the NTEP evaluator.*

Agenda Item 13. Stored Tare for "Weigh-in/Weigh-out" Applications

Amend DES Section 35. as follows:

35. Weigh-In/Weigh-Out Systems

A weigh-in/weigh-out system is typically **used in ~~a~~** vehicle scale **and other applications that involve two weight determinations~~. in which an in-bound truck is weighed either loaded or empty; the inbound weight is stored; the truck is then emptied or loaded.~~** The ~~**outbound truck is weighed, and the**~~ larger of the two weights ~~**(outbound or stored weight)**~~ is printed as the gross weight. The other **weight is** printed as the tare weight and the difference computed as the net weight. ~~**In-bound**~~ Weights, recalled weight values, and gross, tare, and net weights must be identified to clearly document the transaction. The storage, recalling, and printing actions are limited so they do not facilitate fraud.

35.1. Any **weigh-in-~~bound~~** weight values shall be recorded and automatically identified as such. If **weigh-in-~~bound~~** weights are not printed at the time the weigh-in operation is performed, then the **weigh-in-~~bound~~** weight information shall not be lost during a power interruption. Yes ☐ No ☐ N/A ☐

35.8.	Keyboard tare entries **or stored tare** shall not be accepted into weigh-in/weigh-out memory. **A weight retained in memory that is automatically deleted from memory after the net weight is determined is not considered as a stored weighment.**	Yes ☐ No ☐ N/A ☐

Agenda Item 14. Money Values in Other Than 1-Cent Intervals

Amend DES Section 10.1. as follows:

10.1 **Verify that the following sealable parameters are secured by a Category method of sealing.**

10.1.1	Coarse zero	Yes ☐ No ☐ N/A ☐
10.1.2	Initial Zero-Setting Mechanism (IZSM) on separable indicating elements with limits that that can be adjusted more than 20 % beyond the maximum capacity of the load-receiving element	Yes ☐ No ☐ N/A ☐
10.1.3	Span	Yes ☐ No ☐ N/A ☐
10.1.4	Linearity correction values	Yes ☐ No ☐ N/A ☐
10.1.5	Motion detection (on/off)	Yes ☐ No ☐ N/A ☐
10.1.6	Motion detection (number of divisions and speed of operation)	Yes ☐ No ☐ N/A ☐
10.1.7	Number of samples averaged for weight readings	Yes ☐ No ☐ N/A ☐
10.1.8	Averaging time for weight indications	Yes ☐ No ☐ N/A ☐
10.1.9	Selection of measurement units (if internally switched and not automatically displayed on the indicator)	Yes ☐ No ☐ N/A ☐
10.1.10	Division value, d	Yes ☐ No ☐ N/A ☐
10.1.11	Number of scale divisions, n	Yes ☐ No ☐ N/A ☐
10.1.12	**Minimum money value on electronic computing devices ($ 0.01)**	**Yes ☐ No ☐ N/A ☐**
10.1.13	Range of over capacity indications (if it can be set to extend beyond regulatory limits)	Yes ☐ No ☐ N/A ☐
10.1.14	Automatic zero-tracking mechanism (on/off) for bulk-weighers hopper scales and all Class III L devices	Yes ☐ No ☐ N/A ☐
10.1.15	Automatic zero-tracking mechanism (range of a single step)	Yes ☐ No ☐ N/A ☐
10.1.16	¼ and ½ lb pricing capability or multiplier keys	Yes ☐ No ☐ N/A ☐
10.1.17	Weight Classifier mode (enabled/disabled)	Yes ☐ No ☐ N/A ☐
10.1.18	Manual Gross Weight Entries (enabled/disabled) for applications where this feature is not permitted in Handbook 44	Yes ☐ No ☐ N/A ☐

Other: Describe the parameter and provide justification according to the "Principles for Determining Features to be Sealed."

10.2~~1~~ ***(Renumber remaining sections)***

Agenda Item 18. Capacity – Markings and Display: ***Part 1 (Clarification of Cap x d):***

Amend DES Section 1.14. as follows:

1.14.	If the capacity by division statement is displayed **as part of the scale display (e.g., displayed on a video terminal or in a liquid crystal display)** ~~**on a video terminal**~~ with the weigh values, then the capacity by division statement must be indicated in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator unless already apparent by the design of the device and displayed whenever the system is in the weighing mode.

Agenda Item 18. Capacity – Markings and Display: *Part 2 (MSS and MPW):*

1.17. If a Class I or Class II prescription scale complies with paragraphs S.1.2.3., S.2.5.3., and S.6.6., it shall be:

1.17.1. marked, "Counting Feature for Prescription Filling Only" (see test procedure in Section 58.);

1.17.2. marked with the minimum piece weight and minimum number of pieces used to establish an individual piece count.

1.17.3. **If the minimum piece weight and/or minimum number of pieces is displayed with the count values on the counting display, then the minimum piece weight and minimum number of pieces must be indicated in a clear and conspicuous manner and be readily apparent when viewing the reading face of the counting indicator.**

Appendix B – Attachments

Attachment for Agenda Item 2

National Conference on Weights and Measures / National Type Evaluation Program

NTETC Weighing Sector Ballot Summary 94-01

INFORMATION AND INSTRUCTIONS

Item No.	Item	Affirm.	Negat.	Abst.
1	Approve the revised Publication 14 Force Transducers Section "II. Determination of Creep and Creep Recovery, Test Procedures and Permissible Variations" which replaces and amends the 2008 language with the amended language as shown in the underlined language on the following pages.	7	5	3
	Breakdown of votes →	6 private 1 public	2 private 3 public	3 private

Comments

Two negative votes from NTEP participating labs had the same comments stating that they agreed with the intent of the proposal. However, the language in the proposal was confusing and difficult to follow.

Justification for Negative Response: WMD was initially in favor of this item until additional data and information was received after the distribution of the ballot proposal. After reviewing the data provided by the NIST Force Group and information from Stephen Langford and Stephen Patoray, WMD votes **"negative"** on this item. The proposal has become a significant deviation from R 60 tolerances when taking into account the different interpretations for (un)loading and stabilization times from the OIML testing labs and data submitted by Tom Bartel, NIST FG and are summarized as follows.

Additionally, a scale's ability to maintain zero in actual field applications will be improved since the 0.5 v creep recovery tolerance for load cells (1.5 v for Class III L) is no larger than the scale specification for zero-tracking (0.5 d or 3 d for Class III L).

1. Stephen Langford and Steve Patoray contacted four OIML laboratories that perform type verifications on load cells according to the requirements on OIML R 60. They asked for information about their combined (un)load and stabilization times of their test equipment, how closely they complied with the times specified in OIML Table 6 (proposed Pub 14 Table 5), and their interpretations of the stabilizations times specified in R 60.

   Three of the four labs responded to the request and stated that their test equipment loads and unloads weights similar to the equipment used by the NIST FG. Therefore they stated that they use the full time allotted in R 60 Table 6 for (un)load and stabilization time before taking the initial reading.

   R 60 Table 6 indicates that the combination of (un)loading and stabilization is a certain time based on the change in the test load, for example 40 seconds for a load of 10 000 kg. So the described method in R 60 would allow for a loading time of 20 seconds. The stabilization time is then also 20 seconds. However, the labs responded that from the meaning of the test, the stabilization time would be the most important factor. In this case, they load in 2 seconds and then stabilize for 38 seconds to keep the combined time to 40 seconds. This also complies with R 60 clause 5.2.3.2.(b) by recording the actual times in the Test Report.

   The following is an overview of possible combinations at a combined (un)loading and stabilization time of 40 seconds:

(un)loading time	stabilization time
20 s	20 s
18 s	22 s
22 s	18 s
2 s	38 s
1 s	40 s

2. Tom Bartel, NIST Force Group provided a worksheet that summarizes the results of NIST creep recovery tests since October 1, 2007. According to Tom's report, the summary includes tests conducted earlier this month. All tests were conducted with a recovery reading taken 20 seconds after unloading the creep load (which takes about one second). Since additional recovery readings are taken at 40 seconds and 60 seconds after unloading, these readings may be used to obtain the creep recovery at any other time (e.g., 30 seconds) – which correspond to appropriate lines in the new proposed Table 5 of unloading times for Pub 14. (The reading at 30 seconds must be estimated by averaging the readings at 20 and 40 seconds, and likewise for the reading at 50 seconds.)

   The worksheet on the following page gives the recovery results obtained from NIST's tests, for both a fixed "delay time after unloading" of 20 seconds (as has been specified in Pub 14 until now), and for other "delay times after unloading" as given in the new proposed Table 5. In addition, the percentage of entries that "pass" is given, for Class III using a fixed time of 20 seconds, for both the current tolerance (0.5 v) and the proposed increased tolerance of 0.75 v.

   Tom reported "that while most load cells show a smaller recovery value for greater delay times, the difference is not enough to change the outcome of "pass" or "fail" for any of them. This is a bit surprising, but that is the way the numbers work out."

   Tom added that that occasionally a load cell shows a greater recovery value when using a longer delay time after unloading. This can occur if, for example, the creep recovery response curve makes an initial quick dip downward, then reverses sign and rises back toward its starting point. This behavior is not unusual. Tom has offered to show curves that illustrate this behavior if requested.

   WMD has modified Tom Bartel's worksheet to include the projected compliance rate of the submitted load cells if:
   1. they were classified as Class III load cells, and
   2. the compliance rate using the proposed exponential formula tolerance.

   A copy of this table in located on the last page of this summary.
   WMD has developed revised language based on the negative comments as a separate file to this summary.

From John Elengo (Consultant), October 28, 2008.

I have previously commented on the title in Table 5 of the proposal that is incorrect and the line that reads "Loading and Unloading Times" should be removed.

I believe the proposal is unacceptable in that it deviates significantly from R 60's intent.

The proposal introduces a Tolerance Multipler based upon a time constant relationship:

Where: $M = 1.65 \in^{-T}$

M = tolerance multipler $\quad T = \frac{load\,time}{Table\,5\,time}$

$\in$ = 2.7182818 = natural logarithm of 1 (ln 1)

M is dependent on the independent variable, time in Table 5, and the dependent variable, the time a load testing machine can load/unload a test load (that should be 90 % to 100 % of capacity). The value 1.65 is chosen to force M = 1 when the load/unload time is half of that in Table 5. The result is as follows:

Test Load -->	0 kg to 10 kg	10 kg to 100 kg	100 kg to 1 000 kg	1 000 kg to 10 000 kg	10 000 kg to 100 000 kg	Over 100 000 kg
Table 5, seconds -->	10	20	30	40	50	60

Load/Unload Time, seconds	Tolerance Multiplier					
Instantaneous	1.65	1.65	1.65	1.65	1.65	1.65
1	1.49	1.57	1.60	1.61	1.62	1.62
2	1.35	1.49	1.54	1.57	1.59	1.60
3	1.22	1.42	1.49	1.53	1.55	1.57
4	1.11	1.35	1.44	1.49	1.52	1.54
5	1.00	1.29	1.40	1.46	1.49	1.52
10	0.61	1.00	1.18	1.29	1.35	1.40
15	0.37	0.78	1.00	1.13	1.22	1.29
20	0.22	0.61	0.85	1.00	1.11	1.18
25	0.14	0.47	0.72	0.88	1.00	1.09
30	0.08	0.37	0.61	0.78	0.91	1.00
40	0.03	0.22	0.43	0.61	0.74	0.85
50	0.01	0.14	0.31	0.47	0.61	0.72
60		0.08	0.22	0.37	0.50	0.61
80		0.03	0.11	0.22	0.33	0.43
100		0.01	0.06	0.14	0.22	0.31
150			0.01	0.04	0.08	0.14
200				0.01	0.03	0.06
300						0.01

This relationship is analogous to the current versus time relationship when a voltage change is applied across a resistor and a capacitor that are connected in series. Specifically:

Where: $** i = \frac{E}{R} \in^{\frac{-t}{RC}}$

i = current E = voltage C = capacitance R = resistance t = time

RC = time constant $\in$ = 2.7182818 = natural logarithm of 1 (ln 1)

When a voltage is suddenly applied, the current will increase with time according to the above relationship until it reaches its final level. The rate at which the system responds is dependent on the time constant that a designer chooses by selection of appropriate resistance and capacitance values. The time constant is the amount of time that passes from the moment a step change in voltage is applied to the time transient component will have decayed to 36.8 % of its initial value.

Relating back to the proposal, the full time in Table 5 has been employed as the time constant. The factor 1.65 is employed to force the tolerance multiplier a value of 1.0 when the load/unload time is half that in Table 5. The interpretation that the tolerance should only be applicable at half the time in Table 5 has no basis. This was never discussed, nor intended, at the time the Table 5 values were established. Further, the tolerance was to apply when the load is changed relatively instantaneously. The times in Table 5 represent solely a consensus of lab machine capabilities at the time the table was developed. It was recognized that pragmatically one lab's capability might be more favorable to a device submitter than another lab's, but all would recognize the pass/fail result as sufficient. Further, the actual times are to be recorded in order to portray the basis for the conclusion.

While a time constant method of interpolation might be appropriate, the proposed equation is arbitrary; further, it

has shortcomings.

The weighing machine tolerance is based on that change in indication from the initial indication displayed once the load has been completely placed on the device or removed from it. There are no restrictions placed on the loading or unloading times and these times are set by the application conditions at the time of the device use.

The greatest change in indication with time occurs under the condition of a quick full step load change. If the load is changed in a more progressive manner, a lesser change in indication with time will occur from the time the load is fully applied. In the latter case, it might be appropriate to use a time constant relationship to reduce the allowable tolerance applied during a type evaluation, but in no case is an increase in tolerance justified.

Many scales are loaded or unloaded by directly placing or removing the load in one quick step. According to this proposal, a load cell that in turn is loaded or unloaded in one quick step during evaluation would be provided with a tolerance that is greater than the weighing machine's allowance and much greater than that applicable under the load cell's $p_{lc} = 0.7$ apportionment factor. Hence, this proposal is unacceptable.

I think the solution has to be a pragmatic one. We can't dictate that new testing machines be acquired nor old ones modified to achieve exact loading/unloading times. Besides the time probably cannot be exactly measured either and a few seconds one way or the other is likely "in the noise."

Again, it is ultimately the scale's response under the conditions of use that counts and a 30-minute test in the field is not that impractical and you can get a hint in five minutes whether or not to continue with a full 30-minute test.

A bit of history relative to Table 6 in R 60.

I clearly remember chairing the IWG discussion at which the table was born. We were facing an impasse because it was recognized that some labs needed more time than others to load a device than to simply place a full load on as a single dead weight of the proper value and that this could affect the measurement of creep. What to do?

In order to defuse the impasse, I went to the blackboard and canvassed the participants asking what times could they meet. As we went around it became evident that the times given were also dependent on the load capacities of their testers. I decided to see if these times might fit a scheme by categorizing them according to the load being applied.

I decided to use loads of 10 raised to the n^{th} power and wrote the columns 10, 100, 1000, 10 000, 100 000 kg on the board. I next organized the input received and the table began to take shape. We went around the room again and it fell into place and there was a comfortable feeling. We all recognized that a bit of "settling" time should be included before taking the initial reading so we decided on times in the table that were based on using half for loading and half for settling. It was clear that due to differing lab capabilities these times could not exactly be mandated, definitely a "should" and not "shall" basis, and that the competence of the evaluator should also be relied upon.

Comments from Stephen Patoray on Negative Vote: I originally supported this item as it was developed by the Weighing Sector in September 2008, however; there are six (6) main items that have made me change my mind and vote negative on this ballot.

1. Data was presented by the NIST Force Group after the Weighing Sector meeting which is not included with this ballot item. It shows clearly that the outcome (percentage of cells to pass) of the creep return test was NOT affected by increasing the time for the creep return value from 20 seconds to 40 seconds. All seventeen (17) load cells tested since October 1, 2007, were included in this analysis. Twenty-nine percent (29 %) passed at either 20 seconds or 40 seconds return. This is very strong evidence that the time at which this value is taken is not as critical as was originally believed (full data can be supplied if needed).

2. Responses from three OIML laboratories in Europe confirmed that they currently conduct tests for load cells with a nearly instant load/unload and they allow the remaining time in Table 6 of OIML R 60 for stabilization.

In addition, an OIML lab in the Pacific Rim also would allow data to be taken in this manner. Initially, it was thought that the additional stabilization time allowed by these labs would significantly affect the results of the evaluation. The information from NIST FG mentioned in item 1 above indicates that this is not apparently the case.

3. The addition of the proposed formula to NCWM Publication 14 would add significant complexity to the evaluation of data. It is not consistent or in harmony with other requirements of either HB 44 or Publication 14.

4. The proposed formula is not in harmony with the requirements of OIML R 60. While it is a less strict requirement, this would be moving in a direction away from harmonization, not toward it.

5. Currently NCWM is a signatory to the DoMC as a utilizing participant in the MAA for OIML R 60. While the addition of the proposed formula is not in conflict with the arrangement, it does not move NTEP closer to harmonization with OIML R 60.

6. Currently there have been several NTEP CCs issued with current requirements being met, in some cases with retesting taking place to get the device to meet the current requirements. This cost these companies both time and money. While a much looser tolerance of 0.80 v might be easier to meet, it would potentially be a disservice to the companies that have already passed the evaluation and received an NTEP CC.

I therefore do not support the proposed formula and additional language. It is my belief that the information in Table 6 of OIML R 60 be brought into NCWM Publication 14, and that it be clarified with examples that the load/unload times should be no more than approximately ½ the time listed in the table. If it is less than approximately ½ the time, then the remaining time is used for stabilization. This would align with the test methods currently in use by the OIML labs.

Load/unload	Stabilize	Table value
20	20	40
18	22	40
22	18	40
2	38	40
1	39	40

For times longer than those specified, OIML R 60 provides a special case. This could also be incorporated into Publication 14.

Additional Information and Comments from and Tom Bartel:

Sent October 22, 2008:

As requested, I have attached an Excel worksheet that summarizes the results of NIST creep recovery tests since October 1, 2007. It includes tests conducted earlier this month ***(see table on the last page of this summary)***. All tests were conducted with a recovery reading taken 20 seconds after unloading the creep load (which takes about one second). Since additional recovery readings are taken at 40 seconds and 60 seconds after unloading, these readings may be used to obtain the creep recovery at 30 seconds, 40 seconds, and 50 seconds – which correspond to appropriate lines in the new proposed Table 5 of unloading times for Pub 14. (The reading at 30 seconds may be estimated by averaging the readings at 20 and 40 seconds, and likewise for the reading at 50 seconds.)

The worksheet gives the recovery results obtained from NIST's tests, for both a fixed "delay time after unloading" of 20 seconds (as has been specified in Pub 14 until now), and for other "delay times after unloading" as given in the new Table 5. In addition, the percentage of entries that "pass" is given, for Class III using a fixed time of 20 seconds, for both the current tolerance (0.5 v) and an increased tolerance of 0.75 v.

While most load cells show a smaller recovery value for greater delay times, the difference is not enough to change the outcome of "pass" or "fail" for any of them. This is a bit surprising, but that is the way the numbers work out.

Note that occasionally a load cell shows a greater recovery value when using a longer delay time after unloading. This can occur if, for example, the creep recovery response curve makes an initial quick dip downward, then reverses sign and rises back toward its starting point. This behavior is not unusual. I can show curves that illustrate it if you like.

Sent October 23, 2008:

I vote "yes" on the ballot; seeing as, technically, I am not a voting member, you can use this for "informational purposes".

Let me make the following clarifications regarding the implementation of the language on the ballot.

1. The first sentence under II.4. reads "During the conduct of the tests, the initial reading shall be taken at a time interval after the initiation of loading or unloading, whichever is applicable, as specified in Table 5." Since it takes us about one second to unload our creep test load, this sentence means that, after the unloading is finished, we will wait an additional 19 seconds before taking the first reading for capacities from 10 kg to 100 kg; 29 seconds for capacities from 100 kg to 1000 kg; 39 seconds for capacities from 1000 kg to 10 000 kg; and 49 seconds beyond that.

   In other words, for a 2500 lb capacity load cell, our first reading would be 40 seconds after unloading begins, or, equivalently, 39 seconds after unloading is completed. For a 50 klb capacity load cell, we would wait 49 seconds after unloading is completed.

   If, on the other hand, you intend to keep constant the time to be utilized for stabilization (half the time given in Table 5), regardless of a laboratory's unloading time, then you would need to specify this in an explicit manner.

   Note that we can accomplish the new requirements at the present time without making any changes to our instrumentation or machine controls.

2. For load cells that we test at NIST, the formula of 4.1.(a) will give a multiplier, M, of 1.57 for the lower end of our range (100 kg and below) and 1.62 for the upper end of our range (above 10 000 kg), which puts the creep recovery tolerance for Class III at 0.78 v to 0.81 v, depending on capacity.

3. While longer unloading times do not apply to NIST, for a laboratory that does, for example, require 50 % more time to unload than required in Table 5, the formula gives a multiplier, M, of 0.78. In other words, for a load cell capacity of 10 kg to 100 kg, Table 5 gives a (total) time of 20 seconds, of which 10 seconds should be used for actual unloading. If a laboratory requires 15 seconds to unload (i.e., 50 % more time than specified), the time ratio T in the formula is 0.75, giving M = 0.78, thus giving a reduction in the tolerance to 78 % of the nominal value.

   Note that this is not nearly as severe as the requirement in OIML R 60, which states that "the time may be increased from 100 % to a limit of 150 % of the specified time provided that the permissible variation of the result is proportionally reduced from 100 % to 50 % of the allowable difference..."

4. The instructions in this ballot are applying the multiplier, M, to the creep tolerances as well as to the creep recovery tolerance. Note that, in OIML R 60, if the specified loading/unloading times cannot be achieved, an adjustment is made only to the tolerance for minimum dead load output return, not to the tolerances for creep. Since OIML's language is not entirely consistent here, this may be an oversight on their part. In that case, we are correctly not making the same oversight here in Pub 14.

5. I do assume, however, that you have inadvertently left out of the ballot wording the paragraph giving the tolerance for creep between 20 minutes and 30 minutes (which is 0.15 times the tolerance for the allowed creep over 30 minutes).

None of the five points listed above constitute objections on my part. I am merely pointing them out so that you can make sure that what you intend agrees with what you say.

Tom Bartel, NIST Mass and Force Group

Creep Recovery History and Tolerance Scenario

NIST Tests 10/1/2007 - 10/20/2008			Current Pub 14/NIST Method			Note 5	Current R 60 Method (inc. lab interpretations for stabilization times)			Note 6. Ballot Proposal	
NCWM Control No.	**Capacity**	**Classification**	**Delay Time (seconds)**	**Measured Recovery (v)**	**5000 v Outcome for Tolerance of 0.50 v**	**3000 v Outcome for Tolerance of 0.50 v**	**Approximate Delay Time (seconds)**	**Measured Recovery (v)**	**Outcome for Tolerance of 0.50 v**	**Proposed Exponential Formula Tolerance**	**5000 v Outcome**
	4 klb	III M 5000	20	1.19			40	1.09		0.8	
	4 klb	III M 5000	20	1.14			40	0.95		0.8	
	1000 kg	III M 5000	20	0.58		pass	30	0.51		0.8	pass
	1000 kg	III M 5000	20	0.83		pass	30	0.82		0.8	
	5 klb	III M 5000	20	1.55			40	1.56		0.8	
	5 klb	III M 5000	20	0.30	pass	pass	40	0.17	pass	0.8	pass
	2000 kg	III S 5000	20	0.26	pass	pass	40	0.39	pass	0.8	pass
	2000 kg	III S 5000	20	0.35	pass	pass	40	0.16	pass	0.8	pass
	5 klb	III S 5000	20	1.86			40	1.72		0.8	
	1000 kg	III S 5000	20	0.99			30	0.96		0.8	
	200 lb	III S 5000	20	1.51			20	1.51		0.8	
	1000 kg	III M 5000	20	0.53		pass	30	0.53		0.8	pass
	5 klb	III M 5000	20	0.77		pass	40	0.60		0.8	pass
	5 klb	III M 5000	20	0.48	pass	pass	40	0.39	pass	0.8	pass
	10 klb	III M 5000	20	0.86			40	0.66		0.8	pass
	4 klb	III M 5000	20	0.90			40	0.75		0.8	pass
	4.4 klb	III M 5000	20	0.48	pass	pass	40	0.42	pass	0.8	pass
			percent passing ==>		29 %	53 %	percent passing ==>		29 %		59 %
NCWM Control No.	**Capacity**	**Classification**	**Delay Time (seconds)**	**Measured Recovery (v)**	**Outcome for Tolerance of 1.50 v**		**Delay Time (seconds)**	**Measured Recovery (v)**	**Outcome for Tolerance of 1.50 v**		
	30 t	III L M 10000	20	0.56	pass		50	0.90	pass		
	30 t	III L M 10000	20	0.70	pass		50	0.80	pass		

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 unloading and taking the first (reference) reading.
Note 3: NIST sampling begins after a "delay time" of 20 seconds; subsequent readings are taken at 40 seconds and 60 seconds after unloading.
Note 4: Recovery values for "delay times" of 30, 40, or 50 seconds are derived from the most appropriate readings.
Note 5: Steve Cook added this column showing compliance if data were evaluated as a Class III (300 v) load cell.
Note 6: Steve Cook added these columns that include the tolerances from the proposed formula and the proposed increase in the stabilization times for the NIST test equipment.

Attachment for Agenda Item 17

National Conference on Weights and Measures/National Type Evaluation Program

NTETC Weighing Sector Ballot Summary 94-02

Item No.	Item	Affirm	Negat	Abst
1A	Agree that the proposed language **is sufficiently developed** and recommend that this item move forward as a voting item on the NCWM S&T 2009 agenda.	4		
NO COMMENTS				
1B	Agree that the proposed language **is not sufficiently developed** and recommend that this item be given "Information" status on the NCWM S&T 2009 agenda.	2		
COMMENTS 1. Does not believe that the proposed change is fair to the buyer and seller. If the device can zero out a negative weight, then it must be allowed to zero out a positive weight as well. 2. This item should be given **"developmental"** status instead of "informational." This feature appears on the surface to be OK in direct sale applications, but I would like to hear more discussion on the industrial/heavy capacity side. There is no need to rush this item into HB 44 and should be allowed additional time for the language to be further developed by the Weighing Sector.				
1C	**Agree (if amended)** that the proposed language is sufficiently developed and recommend this item move forward as a voting item on the NCWM S&T 2009 agenda. ***Please include your recommended changes with your ballot response.***	2		
COMMENTS 1. The maximum effect of automatic zero-setting should not be limited to 4 % of the nominal capacity since there are no limits on other zero-setting mechanisms in HB 44. 2. Same as above comment on 1C.				
2	Forward a recommendation to the NTEP Committee that an existing CC may be amended upon a successful review on an application and documentation if the proposal is adopted by the NCWM.	4	3	1

National Conference on Weights and Measures/National Type Evaluation Program

NTETC Weighing Sector Ballot Summary 94-02

Item No.	Item	Affirm	Negat	Abst
COMMENTS 1. The Weighing Sector should make the recommendation to the NTEP Committee after it has developed a consensus on the proposed requirements for automatic zero-setting. 2. The requirement of Pub 14 to list any standard feature or option on an NTEP CC is clearly stated. It indicates that an NTEP lab must evaluate any feature or option before it can be listed on an NTEP CC. The commenter voted negative for the following reasons. - There are metrological ramifications to how the automatic zero-setting mechanism must function. These metrological features MUST be evaluated by an NTEP lab to ensure the ASZM meets all the requirements. - Currently, there is no procedure developed in Pub 14 for evaluating AZSM. Therefore the NTEP Committee, the NTEP Committee chair, or the NTEP lab evaluators would not have uniform criteria to base their decision to amend an NTEP CC. - It is premature to begin amending NTEP CCs until all due process has run its course, and proper procedures have been developed and reviewed by the Weighing Sector and approved by the NTEP Committee. This is an item that will go before the NCWM S&T Committee. It may or may not be accepted, and, if accepted, may not resemble the original proposal. Additionally, it may or may not be approved by the NCWM representatives and delegates.				
3	Recommend including the following note to clarify the differences between automatic zero-tracking and automatic zero-setting in the definitions stating: **<u>Zero-tracking is functionally similar to automatic zero-setting. The differences are important in applying the applicable requirements to maintain and establish an accurate zero-balance condition.</u>** - **<u>Automatic zero-setting is activated by an event, such as after a programmed time interval or part of every weighing cycle in an automatic weighing system;</u>** - **<u>Automatic zero-tracking operates continuously (when the specified conditions are met) and is controlled by a rate of correction (e.g., 0.5 d/second) to prevent interaction with the normal weighing process.</u>**	5	3	0
COMMENTS 1. This proposed note should be reviewed and recommended by the Weighing Sector since the item was only discussed by the small work group and not the entire Sector. 2. It is not appropriate to include initial zero-setting mechanism under zero-setting mechanism. The feature is not intended to maintain the zero balance of a scale. It is intended to zero the scale upon power-up (of the device) with or without a load on the load-receiving element. 3. The commenter supports a definition of zero-tracking and automatic zero-setting (if adopted). The commenter understands the differences, but believes that the proposed language can be improved since there is little difference in wording between the two definitions.			

Appendix C – Attendees

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