National Type Evaluation Technical Committee
Weighing Sector
August 25-27, 2009 – Columbus, Ohio
DRAFT Meeting Agenda

Glossary of Acronyms			
AWS	Automatic Weighing Systems	NTETC	National Type Evaluation Technical Committee
CC	NTEP Certificate of Conformance	OIML	International Organization of Legal Metrology
CIM	Coupled-in-Motion (Railway Track Scales)	S&T	NCWM Specifications and Tolerances Committee
CLC	Concentrated Load Capacity	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
NTEP	National Type Evaluation Program	WS	NTETC Weighing Sector

Unless Otherwise Stated:
- "Handbook 44" (HB 44) means the 2009 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 2009 Edition of NCWM Publication 14 - Weighing Devices - Technical Policy • Checklists • Test Procedures

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

Load Cell Items

1. Load Cell Creep Recovery

1 (a). Load Cell Creep Recovery (Recommended Changes to Publication 14 Based on Actions at the 2009 NCWM Annual Meeting)

Source: Steve Cook, NIST Technical Advisor

Background: See the Interim Report of the 2009 NCWM S&T Committee (Publication 16) Agenda Items 320-2 for additional background information to amend HB 44 Scales Code paragraph T.N.4.6. Time Dependence (Creep) for Load Cells during Type Evaluation (http://ts.nist.gov/WeightsAndMeasures/Publications/upload/11-ST-09-Pub16-FINAL.doc).

During the Annual Meeting, the S&T Committee considered the positions of the SMA, Consultants on Certification, Mettler-Toledo, and John Elengo (P.E., retired). The Committee concurred with the concerns in John Elengo's letter that loosening the creep recovery tolerance may open the U.S. market to dumping by other load cell manufacturers.

The S&T Committee is sensitive to statements from the load cell manufacturers stating that they did not recognize the full impact on load cell compliance during type evaluation testing based on the language that was adopted in 2006. The manufacturers have also stated that the current tolerance places new load cells at a competitive disadvantage with load cells that were evaluated prior to the adoption of this tolerance and are not required to be resubmitted for reevaluation to verify compliance with the new tolerances.

WMD and SMA restated their comments that there were no creep recovery requirements prior to 2006. The S&T Committee agreed that the proposed increase in the creep recovery tolerance is more acceptable than the load cell

manufacturers' 2008 request for an emergency item that would have removed the creep recovery tolerance from HB 44 for both scales and load cells.

WMD added that load cell test data used in the determination of compliance rates discussed in the Interim Report was collected by NIST, which is the laboratory utilized by NTEP to certify load cell compliance with performance requirements.

The S&T Committee agrees with the comments that the relaxation of tolerances may impact existing zero-tracking and creep recovery requirements for scales and may result in an increased rejection rate, unless the language is amended. The S&T Committee encourages the NTETC Weighing Sector or other interested parties to submit proposals that address areas affected by this change.

The S&T Committee amended the proposal to read as follows to incorporate the recommendation to limit the scope of the proposed change in creep recovery tolerances. The S&T Committee believes that the 4000 division breakpoint is technically correct since 4000 scale divisions is the point where HB 44 deviates from R76 and R60 tolerances.

This item was adopted as shown below.

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

(a) 0.5 times the value of the load cell verification interval **(**0.5 v) for Class I, II, and IIII load cells,

(b) 0.5 times the value of the load cell verification interval **(**0.5 v) for Class III **load cells with 4000 or fewer divisions**,

(c) 0.83 times the value of the load cell verification interval (0.83 v) for Class III load cells with more than 4000 divisions, or

(d) 1.5 times the value of the load cell verification interval (1.5 v) for Class III L load cells.

(Added 2006) **(Amended 2009)**

Recommendation 1(a). The NIST Technical Advisor recommends the following amendments to Publication 14 – Force Transducers Section: FT Section II-9 as follows:

9. Permissible Variations of Reading for Creep Recovery

a. The difference between the initial reading of the minimum load of the measuring range (D_{min}) and the reading after returning to minimum load subsequent to the maximum load (D_{max}) having been applied for 30 minutes shall not exceed:

(1) 0.5 times the value of the load cell verification interval (0.5 v) for Class I, II, ~~III~~, and IIII load cells, ~~or~~

(2) 0.5 times the value of the load cell verification interval (0.5 v) for Class III load cells with 4000 or fewer divisions,

(3) 0.83 times the value of the load cell verification interval (0.83 v) for Class III load cells with more than 4000 divisions, or

(4) 1.5 times the value of the load cell verification interval (1.5 v) for Class III L load cells.

1 (b). Load Cell Creep Recovery (Editorial Suggestions)

Source: Stephen Patoray, Consultants on Certification

Background: Stephen Patoray noted that the subject of Creep Recovery in Section 12 was inadvertently omitted in previous editions of Publication 14.

Recommendation 1 (b). Amend Publication 14 – Force Transducers Section: FT Section M-12 – Summary Table and Table 6 as follows:

12. Summary Table

A three-column table of the following critical test results, the corresponding limiting values of each quantity, and the ratio of each critical test result to the correspondence limiting value shall be provided. An example is given in Table 6.

a. **Force transducer (load cell) error** - The combined error due to non- linearity, hysteresis, and temperature effect on sensitivity.
b. **Repeatability error** - The greatest absolute value of non-repeatability in relation to the tolerance value for that test load.
c. **Temperature effect on minimum dead load output** - The greatest value of this effect for consecutive test temperatures.
d. **Creep** - The greatest differences between the initial reference output (**~~at 20 seconds~~ at the time specified in Table 5**) and any output recorded during the remaining period of the test.
e. Change in indications from 20 to 30 minutes – (per HB 44 T.N.4.6.)
f. Creep Recovery - The difference between the initial reading of the minimum load of the measuring range (Dmin) and the reading after returning to minimum load subsequent to the maximum load (Dmax).
g. Barometric pressure sensitivity.

Table 6
Example of a Summary Table for a Class III (S) 3000 Load Cell

Summary Table
(As requested in Item 12 of the force transducer (load cell) data format paper)

		Critical Result[1]	Tolerance[2]	Result/Tolerance
(a)	Force transducer (load cell) Error	0.68 v	0.7 v	0.97
(b)	Repeatability Error	0.19 v	0.35 v	0.55
(c)	Temperature Effect on MDLO	0.57 vmin/5 °C	0.7 vmin/5 °C	0.82
(d)	Creep (Time dependence)	0.98 v	1.5 v	0.65
(e)	**Δ Creep $= I_{20\ min} - I_{30\ min}$**	**0.09 v**	**0.15 x |mpe| = 0.225v**	**0.40**
(f)	**Creep Recovery**	**0.17 v**	**0.5 v**	**0.34**
(g)	Effect of Barometric Pressure	0.185 v_{min}/kPa	1.0 v_{min}/kPa	0.15

[1] The critical test result is the test result that gives the greatest ratio of result to tolerance. There may be other errors of greater absolute value but that give smaller ratios of result to tolerance.
[2] The tolerance is the value from the tolerance table of the NTEP procedure that corresponds to the critical test result.

Carry-over Items:

2. Recommended Changes to Publication 14 Based on Actions at the 2009 NCWM Annual Meeting

Source: The NIST Technical Advisor, Steve Cook, is providing the WS with specific recommendations for incorporating test procedures and checklist language based upon actions of the 2009 Annual Meeting of the 94rd NCWM. The WS is asked to briefly discuss each item and, if appropriate, provide general input on the technical aspects of the issues.

Background: See the Interim Report of the 2009 NCWM S&T Committee Agenda Item 310-4 for additional background information on the item to amend HB 44 General Code paragraph G-N.3. Verification of Testing Standards. (http://ts.nist.gov/WeightsAndMeasures/Publications/upload/11-ST-09-Pub16-FINAL.doc). During the Annual Meeting, the NCWM agreed to add a new test note and add General Code paragraph G-N.3. as shown below and deleted similar language in the 2.2X series of weighing device codes.

> **G-N.3. Testing Apparatus. – Testing apparatus, including field standards, used to verify compliance of weighing and measuring devices with National Institute of Standards and Technology (NIST) Handbook 44 will meet the specifications of the NIST Handbook 105-Series standards (or other suitable and designated standards). This section shall not preclude the use of additional field standards and/or equipment, as approved by the Director, for uniform evaluation of device performance. In all cases where the standard is used without correction, its combined error and uncertainty must be less than one-third of the applicable device tolerance. (See Appendix A, Fundamental Considerations)**
>
> **(Added 2009)**

Recommendation: The NIST Technical Advisor recommends that **no further action by the WS is required** since the new paragraph does not impact type evaluation procedures and technical policies in NCWM Publication 14.

3. In-Motion Railway Track Scales - Definition.

Source: 2008 NTETC Weighing Sector Meeting Summary – Agenda Item 3

Background: During the 2003 discussion of Agenda Item 3 – the WS reviewed the following proposed definitions for "in-motion weighing device."

> 1. 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. (*Source: OIML R51 for automatic weighing instruments*)
>
> 2. 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. (*Source: Mettler/Toledo*)

The WS 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 WS'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 suggestions and comments were to be submitted to Darrell Flocken or Steve Cook by August 2009.

Recommendation: The NIST Technical Advisor has not received any additional comments on this item. The WS is asked to review the following two proposed definitions from the 2008 NTETC Weighing Sector Summary and recommend which version should be added to Publication 14 DES Section 68.

4. Pub 14 Technical Policy - Hopper Scale Design Parameters

Source: **2008 WS Agenda Item 7**

- 2008 WS Summary - http://ts.nist.gov/WeightsAndMeasures/Publications/upload/13-NTEP-AppC-Pub16-FINAL.doc

Background: See the 2008 NTETC Weighing Sector Meeting Summary Agenda Item 7 for additional background information. During the 2008 WS meeting, 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 WS recommended that this item be carried over for the 2009 NTEP lab and NTETC Weighing WS meetings to allow for additional work and development of a proposal.

At its 2009 Annual Meeting, the NTEP labs did not discuss this item.

Recommendation: The WS is asked to review the background information from the 2007 and 2008 WS summaries. The WS should discuss the following issues regarding the existing technical policy in Publication 14 DES Section A.6.1 and A.6.2:

1. What are the allowable variations in the number of load supports for cylindrical and rectangular hopper/tank scales?
2. What are the allowable variations in the design and location of the load supports (hanging, compression, load supports attached to the upper, mid, or lower portion of the hopper or tank)?
3. Should volume of the tank be considered as a parameter along with capacity?
4. Depending on the answers to the above questions, can different “types” be included on one CC?

5. Pub 14 Section 69. - Railway Track Scales

Source: Weighing Sector Carryover Agenda Item 3 (2007) and Item 10 (2008)

- (2007) - http://ts.nist.gov/WeightsAndMeasures/Publications/upload/11-NTEP-AppC-Weighing-08-Annual-FINAL.doc
- (2008) - http://ts.nist.gov/WeightsAndMeasures/Publications/upload/13-NTEP-AppC-Pub16-FINAL.doc

Background: 2008 Weighing Sector Carryover Item 10.

During the 2007 meeting of the Weighing Sector, the WS 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. 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.

At its September 2008 meeting, the WS recommended that this item be carried over until the 2009 meeting of the Sector to await final approval by AREMA Committee 34.

At its October 2008 meeting, the Chairman of Committee 34 stated that Committee 34 could not further develop this item without specific input from the Weighing Sector. Permission to reprint sections of the 2009 AAR Handbook was granted to NTEP.

Recommendation: The following language appears to be acceptable AREMA Committee 34 and has not yet been reviewed by the SMA. The WS is asked to review the testing requirements proposed by AREMA Committee 34 and confirm that the problems identified in 2007 and 2008 have been satisfactorily addressed.

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 for discrimination 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.

6. Correction to Scale Tickets

Source: **2008 WS Item 12 - Maryland NTEP Lab**

- 2008 WS Summary - http://ts.nist.gov/WeightsAndMeasures/Publications/upload/13-NTEP-AppC-Pub16-FINAL.doc

Background: This item in provided as an update to the 2008 Weighing Sector Carryover Item 12.

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.

The WS 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 WS supported the intent for weigh-in/weigh-out vehicle scales applications. The WS agreed that clarification of erroneous tickets is needed; however it could not come to a conclusion since the WS 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 WS recommended that a specific recommendation be developed for this item and carried over until the 2009 meeting of the Weighing Sector. At its 2009 Spring Meeting, the NTEP labs did not discuss this item.

Recommendation: The NIST Technical Advisor has not received an update on the development of this item and suggests that the WS either agree to further develop this item or remove it from the agenda.

7. Update - Minimum Size of Weight and Units Proposals

Source: 2008 Weighing Sector Item 6

- 2009 S&T Committee Interim Report - http://ts.nist.gov/WeightsAndMeasures/Publications/upload/11-ST-09-Pub16-FINAL.doc
- 2008 WS Summary - http://ts.nist.gov/WeightsAndMeasures/Publications/upload/13-NTEP-AppC-Pub16-FINAL.doc

Background: See the 2009 NCWM Specifications and Tolerance Committee Interim 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 its 2008 meeting, the Weighing Sector voted on whether to forward the 2008 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.

Recommendation: The Technical Advisor reports that the regional weights and measures associations recommended that this item be withdrawn from the S&T Committee's Developing agenda based on the comments from the 2008 Weighing Sector and the SMA. **The Technical Advisor recommends that no further action be taken on this item.**

8. Update - Automatic Zero-Setting Proposal

***Source*: 2008 WS Agenda Item 17.**

- 2008 WS Summary - http://ts.nist.gov/WeightsAndMeasures/Publications/upload/13-NTEP-AppC-Pub16-FINAL.doc

Background: This item in provided as an update to the 2008 Weighing Sector Carryover Item 17.

This item relates to changes to NIST Handbook 44 in 2005. The agenda item is Item 320-4 from the 2005 NCWM Annual Report.

During its 2008 meeting WS 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 WS 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 WS 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 WS established a small work group (Scott Davidson, Scott Henry, Steve Cook, and Stephen Patoray) to develop a proposal to be submitted to 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 WS 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.)

The WG did not have sufficient time to both develop the proposal and ballot the WS 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 WS members. The results of the ballot and all comments were summarized and forwarded to the Committee prior to the 2009 NCWM Interim Meeting. Eight WS 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 forwarded the ballot results and comments to the S&T Committee for its consideration at the 2009 NCWM Interim Meeting.

Discussion: The NIST Technical Advisor is providing the WS with the following update on the status and additional discussions on this item since the 2009 Interim Meeting.

At the 2009 NCWM Annual Meeting, Committee considered the following comments that were received prior to the July 2009 NCWM Annual Meeting.

The SMA opposed this item at its 2009 SMA Spring Meeting and added that to be fair to the buyer and seller, the recommendation should include the ability to zero the indication in both a positive and negative direction.

At its 2009 Spring meeting, the CWMA recommended this item stay informational because of potential accidental zeroing of weight during an inspection. The CWMA heard comments from SMA in opposition of this item for the reasons stated above. Other comments indicated there is a potential to zero off a load intended to be weighed if the feature were allowed to be operate in the positive direction. In addition, a test weight may be inadvertently zeroed during a routine inspection. Therefore, the committee feels it needs to operate only in a negative condition or develop language that this feature is prohibited. The Committee recommends the item stay informational.

NEWMA supported continued review, comments, and development of this item and did not suggest any direction for continued development of this item.

During the open hearings at the Annual Meeting, the Committee heard comments stating that the it needs to take a position on this item, and additional comments from scale manufacturers restating the SMA position. If the Committee chooses to allow an automatic zero-setting feature, the language should be consistent with R76 in regards to the direction that only the negative weight indication may be automatically rezeroed. There is too great a potential for a load that is intended to be weighed to be unintentionally (or fraudulently) zeroed. Rarely does a scale indicate a negative condition with a load on the scale.

If the Committee chooses not to allow this feature, WMD recommends that the Committee develop a proposal that expressly prohibits the automatic zero-setting feature. If a scale can be configured with this feature, access to enable or disable the feature should be protected by an approved security means. Additionally, the NTETC Weighing Sector currently believes that it needs to be supported by HB 44 in order to evaluate the feature if a requirement is adopted, or verify that it can be disabled if the feature is not adopted.

The S&T Committee did not take a position on this item and recommended that the WS discuss the comments and suggestions from the Interim and Annual Meetings and provide additional feedback to the S&T Committee on the recommendation that either supports the proposal or recommends language for HB 44 to prohibit the feature.

Recommendation: The WS should develop a consensus position on this item and forward its conclusion to the S&T Committee. The following table lists the various proposals for review and discussion by the WS. The WS may also discuss developing possible alternate proposals.

Option 1 (Pub 16) 2008 WS Ballot allows feature to operate only when below zero with cap. limit.	**S.2.1.7. Automatic Zero-Setting Mechanism. –** If equipped, an automatic zero-setting mechanism shall operate only when the indication has remained; **(a)** stable according to S.2.5. Damping Means, and **(b)** below zero for at least 5 seconds. The maximum effect of automatic zero-setting mechanism is limited to 4 % of the nominal capacity of the scale and is a sealable parameter. (Added 201X)

Option 2 SMA Position allows feature to operate in either direction with no cap. limits	**S.2.1.7. Automatic Zero-Setting Mechanism.** – If equipped, an automatic zero-setting mechanism shall operate only when the indication has remained; **(a)** stable according to S.2.5. Damping Means, and **(b)** above or below zero for at least 5 seconds. The automatic zero-setting mechanism is a sealable parameter. (Added 201X)
Option 3. Prohibit Feature	**S.2.1.7. Automatic Zero-Setting Mechanism.** – If equipped, an automatic zero-setting mechanism (setting the scale to zero without the intervention of an operator) shall be disabled. (Added 201X)
Option 4. No changes to HB 44.	The WS may consider recommending that the S&T Agenda item be withdrawn and develop amendments to Publication 14 to detect the feature, and if equipped, citing **G-S.2. Facilitation of Fraud** in order to require that the feature be disabled in commercial applications.

The NIST Technical Advisor also recommends that the WS consider the following language for Publication14 for additional development that defines the feature, guidelines for detecting the feature, and procedures or actions if the feature is encountered (e.g., "feature shall be disabled for commercial applications and the switch that enables or disables the feature can not be changed without breaking a security seal or other means of providing security").

1. Amend Pub 14 by adding "automatic zero-setting mechanism" to the Table of Scale Features and Parameters as a sealable parameter.
2. Amend Pub 14 Section 40 to read as follows:

40. Zero-Load Adjustment - General

Code References: G-S.2., S.2.1.1. and S.2.1.2.

To prevent fraudulent or inappropriate adjustments of the zero setting mechanism, it shall either be operable or accessible only by a tool that is separate from the scale, enclosed in a cabinet, or is equipped with motion detection that limits its operation. (Motion detection is checked as part of section 52.) A motion detection capability is not required on the power-switch zero scales equipped with a "count down" or display checking feature, considered to be an adequate indication to a customer that something "different" is happening. To reduce the potential for weighing errors, a stored tare weight must not be cleared when the scale is zeroed unless the "clearing" of tare is distinctly indicated. For the same reason, a scale must zero the entire load on the scale, not just part of the load, when the zeroing operation is performed.

For devices equipped with an automatic zero-setting mechanism, (i.e., an automatic mechanism for setting the scale to zero without the intervention of an operator) this mechanism shall be disabled in commercial applications. See HB 44 General Code G-A.1. Commercial and Law Enforcement Equipment.). Note that that automatic zero-setting mechanism should not be confused with the automatic zero-tracking mechanism (i.e., an automatic means to maintain the zero-balance conditions, within limits, without the intervention of an operator).

Indicate the zero load adjustment method provided.

- ☐ Tool operated zero-load adjustment. (Manual zero-setting mechanism)
- ☐ Semi-automatic zero-load adjustment. (Semi-automatic zero-setting mechanism)
- ☐ **Automatic zero-load adjustment (Setting the scale to zero without the intervention of an operator).**
- ☐ Power switch zero-load adjustment.

40.1. The zero adjustment mechanism is operated by a tool or has motion detection. Yes ☐ No ☐ N/A ☐

40.2.	A stored tare weight value shall not be cleared when the scale is "zeroed" using a semi-automatic (push-button) zero key, unless there is a clear indication that the tare value has been cleared and any weight indication is not a net weight value (e.g., "net" and "tare" annunciators not lighted).	Yes ☐ No ☐ N/A ☐
40.3.	**If the device has an automatic zero-setting capability, conduct the following tests to determine if the device has an automatic zero-setting feature if it is not mentioned in the (configuration) manual or NTEP application.** **Check for AZSM in the positive direction:** **1. Place a 5 d load on the scale. Without adjusting the balance condition, observe the scale indications after one hour. The device is considered to have an automatic zero-setting feature if the scale indication has returned to zero.** **Check for AZSM in the negative direction:** **1. Place a 5 d load on the scale.** **2. Zero the device using the semi-automatic zero-setting mechanism.** **3. Remove the load and note the indication (e.g., ----, -1234, error, etc.)** **_____.** **Without adjusting the balance condition of the scale, observe the scale indications after one hour. The device is considered to have an automatic zero-setting feature if the scale indication has returned to zero.** **Check that the switch to enable/disable the AZSM is located by an approved security means. This can frequently be verified in the configuration adjustment mode along with the other configuration parameters that are required to be sealed.** **This feature will be listed on the CC with a statement such as:** **"This device has an automatic zero-setting mechanism (i.e., setting the scale to zero without the intervention of an operator). This mechanism shall be disabled in commercial applications. (See HB 44 General Code G-A.1. Commercial and Law Enforcement Equipment.)"**	**Yes ☐ No ☐ N/A ☐**

9. Update - New and Amended HB 44 Tare Proposals

Source: 2008 WS Agenda Item 5.

Background: This item is provided as an update to the 2008 Weighing Sector Carryover Item 5.

See the 2009 Interim Report of the 2009 NCWM S&T Committee agenda Items 320-1 and the Final Summary for the 2008 Meeting of the Weighing Sector Agenda Item 5 for additional background information.

- 2009 Interim Report - http://ts.nist.gov/WeightsAndMeasures/Publications/upload/11-ST-09-Pub16-FINAL.doc.

- 2008 WS Summary - http://ts.nist.gov/WeightsAndMeasures/Publications/upload/13-NTEP-AppC-Pub16-FINAL.doc

Discussion: The NIST Technical Advisor is providing the WS with the following update on the status and additional discussions on this item since the 2009 Interim Meeting.

The NCWM S&T Committee considered the following comments that were received prior to the July 2009 NCWM Annual Meeting.

At its 2009 Spring Meeting, the SMA recommended that the Tare items be withdrawn, and added that the SMA appreciates the work of the Tare Work Group and the additional efforts of the NIST Technical Advisor. The SMA provided the S&T committee with its rationale for its position and stated that this item began with a WS item dealing with the proper rounding of a tare value, on multiple range devices, when changing ranges. This discussion lead to the development of the "mathematically correct" item (320-2 in the 2008 S&T Agenda and subsequently adopted) and the creation of the Tare Work Group. The work group's focus was to determine if any similar situation exists in the handbook that would not be addressed with the "mathematically correct" agenda item. The work group expanded their efforts to include harmonization to OIML R76 requirements related to tare. SMA believes that these changes do not address any problem and can only lead to confusion in the current regulatory and product development fields.

During its 2009 Spring Meeting, the CWMA supported this as a "Voting" item. The CWMA also addressed comments stating that the Tare proposals are primarily directed to NTEP evaluations, and that HB 44 is primarily a field manual. The CWMA responded that the introduction in HB 44, Part S states, "Handbook 4 is designed to be a working tool for federal, state, and local weights and measures officials, the equipment manufacturers, installers and service agencies/agents." Therefore the proposal on Tare in the agenda would benefit the enforcement community and manufacturers by providing additional guidance in the design of these devices. For example, current paragraph S.2.1.6 does not specify that motion detection and zero setting requirements are applicable when using combined zero/tare key. Additionally the proposed amendment for "tare-balancing mechanism" clarifies that preset tares (manually entered or stored tare weights) is not a scale mechanism that is designed for determining tare.

During its 2009 Spring Meeting, NEWMA supported this item, but recognized that it is a complicated an important issue. It is important that HB 44 supports the testing being performed by the NTEP labs.

At the 2009 NCWM Annual Meeting open hearing, the S&T Committee heard from SMA restating their earlier position. WMD stated that it continues to support the tare proposals submitted by the Tare Work Group on the NTETC Weighing Sector and agrees that all proposals for tare and applicable definitions provide the following benefits:

- Ensures that tare operates in a manner that increases the accuracy of net weight determinations,
- Clarifies the definitions for the various terms that are currently used for tare,
- Identifies and formalizes the definitions for the different types of tare weight values whether they are determined at the time objects are weighed (i.e., tare) or prior to the time objects are weighed (i.e., preset tare),
- Reduces the possibility of multiple and incorrect interpretations of General Code paragraphs G-S.2 Facilitation of Fraud and G-S.5.1. General (which states " Primary indications and recorded representations shall be clear, definite, accurate, and easily read under any conditions of normal operations of the device") by clearly stating what information and values are permitted and required for indicated and recorded representations of net, tare, and preset tare weight, and
- Provides additional support in HB 44 for NTEP evaluations to verify the operation, indications, and recorded representation of tare, which are currently evaluated based on interpretations of General Code requirements and the 1980 NCWM S&T discussion on tare in its Final Report (S&T, 1980, p. 216).

During the voting session, the conference members **voted against the first two tare proposals** in the Scales Code. Consequently, the S&T Committee **"withdrew"** the two companion tare voting items in the Automatic Weighing Systems Code before they came up for a vote.

Recommendations:

1. The S&T Committee asks the WS for its position on the remaining informational agenda items for the Scales and Automatic Weighing Systems codes on Tare.

2. As a result of the SMA comments that the proposals for HB 44 are adequately verified during type evaluation, Steve Cook, NIST Technical Advisor believes that much of the background information reviewed and developed by the Tare Work Group is not easily accessible by NTEP evaluators and NTEP applicants. Steve is requesting that the WS or Tare Work Group review the information developed during this discussion on tare and determine if any evaluation criteria or technical policies can be recommended for Publication 14. For example, the sections on "Tare" could be grouped together and the 1980 NCWM S&T discussion on "Tare" could be updated and included as an appendix in Publication 14 (similar DES Section 73 – Appendix for the Audit Trail).

New Items:

10. Pub 14 - Maximum Platform Width Parameter Sections 8.1., 8.2., and 8.3.

Source: Stephen Langford, Cardinal Scale Mfg Co.

Background: Current NTEP policy as described in Publication 14, sections 8.1, 8.2, and 8.3 regarding acceptable range of platform widths on vehicle scales to be included on the CC is apparently unclear and may not be uniformly applied.

- Part c of 8.1 states that widths up to 120% of the device evaluated can be listed on the CC for vehicle scales up to 200 000 pounds of capacity. [3]
- Part c of 8.2 states that widths no greater than that of the device evaluated can be listed on the CC for vehicle scales with capacities greater than 200 000 pounds. [3]
- Part e of 8.3.2 for modular vehicle scales states that widths up to 120 percent of the device evaluated can be listed on the CC regardless of scale capacity. 5

[3&5] For scales with widths greater than 12 feet, this policy on range of widths may not be applied retroactively. Additional testing is required for devices with widths greater than 12 feet. Test procedures for scales wider than 12 feet will be addressed by NTEP management and the NTEP laboratories on a case-by-case basis.

Currently, it appears that the CC lists only the width of the device evaluated for modular vehicle scales of widths of 14 feet or more. Evaluations of 10 ft wide models allow 120 percent or 12 feet-wide models to be listed on the NTEP CC. This practice is not in compliance with the current NTEP policy as written and needs to be clarified.

The submitter recommends amending section 8.2 part c of Publication 14 to read;

c. **widths ~~no greater than~~ up to 120 percent** of the **width of the** platform tested;[3]

The submitter also included the following justification:

The following table summarizes the current restrictions on the maximum platform width that can be placed on the NTEP CC and highlights the difference criteria in 8.2.c for width parameters to be included on the CC.

Section	Device Type	CC Platform Width
8.1.c	Vehicle, Railway, Combination Vehicle/Railway and others over 30 000 and up to and including 200 000 lb	Up to 120% of the width of the platform tested
8.2.c	Vehicle, Railway, Combination Vehicle/Railway and others greater than 200 000 lb	No greater than the width of the platform tested
8.3.2.e	Modular Load-Cell Vehicle, Livestock or Railroad Track Scales	Up to 120% of the width of the platform tested

In each section the "12 feet" footnote adds the following information:

For scales with widths greater than 12 feet;

1. the policies on range of widths may not be applied retroactively,
2. additional testing is required, and
3. NTEP management and the NTEP laboratories will address the test procedures on a case-by-case basis.

Based on this information it is permissible to apply the 120 percent (width) multiplier to modular scales (in 8.3.2.c) and to other vehicle scales of not more than 200 000 pounds in capacity (in 8.1.c). There is no reason known to exclude vehicle scales of more than 200 000 pounds in capacity from being allowed to have widths up to 120 percent of the width of the device evaluated. Therefore part c of section 8.2 should be revised to reflect the same limits on platform width as listed in section 8.1.

There seems to be reluctance on the part of some examiners to allow platform widths of 120 percent of the platform width of the device evaluated for widths greater than 12 feet. This practice is against existing NTEP policy. The test protocol is the same for scales with platform widths greater than 12 feet and includes applying loads both down both sides of the platform and in the center. Because the test protocol used in the examination of platforms of more than 12 feet in width is the same regardless of whether the platform is 14, 15, or 16 feet in width, the existing policy is correct. The WS is urged to endorse the practice of allowing up to 120 percent of the width of the device evaluated for both modular and non-modular vehicle scales as is currently described in Publication 14.

For example, a 14-foot wide scale could be submitted and certified with the test procedures in DES Section 66 for extra wide and double wide vehicles scales (i.e., extra tests along the sides of the scale, etc.). Stephen Langford states that a 17-foot wide scale could be included on the CC without additional testing. (120 % * 14 = 16.8 rounded to 17) since the "additional testing" was conducted and verified on the 14-foot wide scale. This should also apply to scales greater than 200 000 lb in DES Section 8.2.c.

Recommendation: The Sector is asked to review and discuss the proposal and background information and make a recommendation to the NTEP Committee to amend Publication 14 if the Sector agrees with the submitter's suggested language.

11. Pub 14 - Minimum Platform Area (Section Lengths) Parameter Sections 8.1., 8.2., and 8.3.

Source: Ed Luthey, Brechbuhler Scales

Background: Brechbuler Scales is questioning why the minimum platform area on a vehicle scale is limited to 50 percent of the device that was tested. For example, a 70' x 10', 3-section vehicle scale was evaluated and passes type evaluation. The CC would then list the minimum platform size as 350 ft^2 or list the minimum L x W scales that would comply with the Pub 14 criteria. Under the Pub 14 language, the applicant would have to submit a smaller second scale if they wanted 10' x 10', 2-section scale listed on the CC.

The submitter of the item believes that there is no technical justification for the limitation.

Recommendation: Brechbuhler Scales recommends that the references be amended to eliminate the 50 percent minimum platform area restriction as shown in the recommendation below:

8.1. Additional criteria for vehicle scales, railway track scales, combination vehicle/railway track scales, and other platform scales over 30 000 lb and up to and including 200 000 lb.

A CC will apply to all models having:

a. **nominal capacities** up to 135 percent of evaluated capacity;
b. ~~**a platform area for any two section portion no less than 50 percent of smallest two section portion incorporated in the device evaluated**~~.
c. **widths** up to 120 percent of the width of the platform tested**;**
c. **lengths** 150 percent of the length of the platform tested**;**
d. a **span** between sections is not more than 20 percent greater than the equipment evaluated;

Discussion: Steve Cook, NIST Technical Advisor researched past Publication 14 language and WS discussions on this item. Steve noted that the language has been in Pub 14 since its earliest publication. Additionally, Steve found references to the current language as far back as 1983 in the notes of the National Type Approval work group. The National Type Evaluation work group included NIST, Weights and Measures Officials, scale manufacturers and load cell manufactures. Steve Cook has contacted some of the work group meeting attendees to inquire if they recall the justification for the accepted language and report any additional information during the WS meeting.

12. Auxiliary Reading Means when $e \neq d$.

Source: Steven Cook, NIST Technical Advisor

Background: WMD recently received and inquiry from the Ohio NTEP lab regarding an interpretation on Scales Code paragraph S.1.2.2.1. that may, in some circumstances conflict with the Table 3 footnote 1. ***(Technical Advisor Note:*** *There appears to be only two references to e≠ d in Publication 14, pages DES 17 for marking requirements and DES-19 in Table 3. Additionally, I was not able to find a checklist item that verifies compliance S.1.2.2.1.)*

Table 3. Parameters for Accuracy Classes – Footnote

[1] *For Class I and II devices equipped with auxiliary reading means (i.e., a rider, a vernier, or a least significant decimal differentiated by size, shape, or color), the value of the verification scale division "e" is the value of the scale division immediately preceding the auxiliary means.*

S.1.2.2.1. Class I and II Scales and Dynamic Monorail Scales. If e ≠ d, the verification scale interval "e" shall be determined by the expression:

$$d < e \leq 10\ d$$

If the displayed division (d) is less than the verification division (e), then the verification division shall be less than or equal to 10 times the displayed division.

The value of e must satisfy the relationship, $e = 10^k$ of the unit of measure, where k is a positive or negative whole number or zero.

This requirement does not apply to a Class I device with d < 1 mg where e = 1 mg. If e ≠ d, the value of "d" shall be a decimal submultiple of "e," and the ratio shall not be more than 10:1.

If e ≠ d, and both "e" and "d" are continuously displayed during normal operation, then "d" shall be differentiated from "e" by size, shape, color, etc. throughout the range of weights displayed as "d."

(Added 1999)

The initial question was could the value of "e" be something other than 10 d. WMD believes that the answer is yes and demonstrated in the following table (copied from R76).

The values of e, calculated following the d < e ≤ 10 d rule			
d =	0.1 g	0.2 g	0.5 g
e =	1 g	1 g	1 g
e =	10 d	5 d	2 d

Typically, NTEP applicants submit Class II devices where e = 10 d. However, an applicant has submitted a device with e = 5 d. The lab asked how are d and e going to be displayed when e = 5 and d = 0.1e or 0.2e. One possible solution is shown in the following example.

Max: 12 kg n_{max}: 12 000
e: 0.5 g Class II
d: 0.1 g

Example of possible indications?

3.0000 kg	e is displayed normally
3.0001 kg	d is differentiated
3.0002 kg	d is differentiated
3.0003 kg	d is differentiated
3.0004 kg	d is differentiated
3.0005 kg	e is displayed normally
3.0006 kg	d is differentiated

As you can see, "d" would occupy the same location in the display as "e" therefore; both "e" and "d" can't be continuously displayed in S.1.2.2.1. Additionally, Table 3 footnote one states that "e" precedes the auxiliary means.

The language in S.1.2.2.1. states that "d" shall be differentiated from "e" by size, shape, color, etc. throughout the range of weights displayed as "d" if both "e" and "d" are continuously displayed. However, HB 44 Table 3 footnote 1 states that the value of the verification scale division "e" is the value of the scale division immediately preceding the auxiliary means (to display d). (Note that there is a slight difference in the way "differentiation" is described between Table 3 and S.1.2.2.1. Language in Table 3 states "differentiated by size, shape, or color," whereas S.1.2.2.1. states "differentiated from "e" by size, shape, color, etc.")

The NIST Technical Advisor reviewed the discussion on the adoption of S.1.2.2.1. in 1999 NCWM Annual Report. There were two items on the Committee's agenda that year regarding S.1.2.2.1. and words "continuously displayed" was added as part of the proposal to include dynamic monorail scales.

> "If e ≠ d, and both "e" and "d" are continuously displayed during normal operation then "d" shall be differentiated from "e" by size, color, etc. throughout the range of weights displayed as "d."

Additionally, the discussion paragraphs of each item did not provide guidance on examples where e = 2d or 5d.

The NIST technical advisor also reviewed equivalent terminology, definitions and language in R76 for Nonautomatic Weighing Instruments (http://oiml.org/publications/R/R076-1-e06.pdf). R76 includes the following subtypes of auxiliary displaying devices in Terminology Clause T.2.5:

- verniers,
- complementary displaying devices (estimated values corresponding to the distance between graduations), and
- indicators with differentiated scale divisions,

Clause T.2.6. describes extended displaying indicators as a device for temporarily changing the displayed interval "d" to a value less than "e."

In R76, Clause 4.4.3, an extended indicating device shall not be used on an instrument with a differentiated scale division.

Additionally a scale fitted with an extended indicating device, can only provide an indication with a scale interval smaller than "e":

- while pressing a key, or
- for a period not exceeding 5 seconds after a manual command.

In all cases, printing shall not be possible while the extended indicating device is in operation.

Recommendation: The NIST Technical Advisor has not developed a proposal for this item and asks the WS to review the background information and discuss possible solutions (e.g., amending HB 44 S.1.2.2.1. by changing the language to read ". . .then the verification division shall be ~~**less than or**~~ equal to 10 times the displayed division.) Or, recognizing the extended indicating device as described in R76.)

13. Method of Sealing – G-S.8. Provisions for Sealing Adjustable Components

Source: NCWM S&T Committee

Background: During the open hearings at the July 2009 Annual Meeting, the S&T Committee received comments on its agenda item 310-1- G-S.8. Provisions for Sealing Adjustable Components, suggesting that no action may be needed and that the existing language in HB 44 is sufficient. Additional comments indicated that other proposals in the Committee's Interim Report (Publication 16) are overly complex. Oregon and Maryland believe that amended requirements for sealing are needed by the NTEP labs and field staff in order to consistently interpret and apply sealing requirements. The SMA amended its position at the Spring 2009 SMA Meeting and submitted the revised proposal to the Committee.

The Committee believes that all parties agree with the intent of the proposal. Both the WMD and SMA submitted similar proposals include language that either retains the existing language in G-S.8. (WMD essentially reformatted G-S.8. for clarification). Additionally, both proposals included new requirements for providing indications when a device is in adjustment mode. WMD included further language to address devices that may have more that one method of sealing.

The Committee suggests that the Weighing Sector and other interested parties consider breaking the proposal into two or three separate agenda items for consideration by the Conference.

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

- **2008 Final Report -** http://ts.nist.gov/WeightsAndMeasures/Publications/upload/09-ST-08-Annual-FINAL.doc

- **2009 Interim Report -** http://ts.nist.gov/WeightsAndMeasures/Publications/upload/11-ST-09-Pub16-FINAL.doc

The following table includes the revised SMA and WMD proposals described in the above background information for comparison:

SMA 2009 Spring Meeting	WMD proposal in Pub 16
G-S.8. Provision for Sealing Electronic Adjustable Components. – A device shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the	**G-S.8. Provision for Sealing Electronic Adjustable Components.** – A device shall be designed with provision(s) for: (a) applying a physical security seal that must be

time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism.	broken, or (b) using other approved means of providing security (e.g., data change audit trail available at the time of inspection) before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism.
G-S.8.2. Access to Calibration and Configuration modes. - A device shall be so designed that: (a) The application of the physical security seal shall ensure that the calibration and/or configuration modes are disabled, or (b) The calibration and/or configuration modes are protected by an approved method of sealing, and the device shall clearly and continuously indicate that it is in the calibration and/or configuration mode and record such message if capable of printing in this mode. During the calibration and configuration modes, electronic devices shall either; - not provide metrological indications that can be interpreted, or transmitted into memory, or printed as a correct measurement value, or - clearly and continuously indicate that it is in the calibration and/or configuration mode and record such message if capable of printing in this mode.	**G-S.8.X. Adjustment Mode Indications.** – During the calibration and configuration adjustment mode, the device shall: (a) Not provide metrological indications that can be interpreted, or transmitted into memory, or printed while it is in the calibration and/or configuration adjustment mode as a correct measurement value, or (b) Clearly and continuously indicate that it is in the calibration and/or configuration adjustment mode, and record such message if capable of printing in this mode.

Technical Advisor's Comment: Some of the regional weights and measures associations have asked what is meant by the terms "adjustment," "calibration, and configuration modes." The definitions for "adjustment" and "adjustment mode" are located in the NCWM white paper on Audit Trails and have been copied into Publication 14 as shown below. However, there are no published definitions for calibration and configuration modes.

Adjustment. A change in the value of any of a device's sealable calibration parameters or sealable configuration parameters.

Adjustment mode. An operational mode of a device which enables the user to make adjustments to sealable parameters, including changes to configuration parameters.

WMD suggested the following new paragraph to recognize that the minimum form of an audit trail can be a combination of physical seals **and** event counters instead of a physical seal **or** two event counters.

G S.8.X. Multiple Sealing Methods. – Weighing and measuring devices may be approved for use with multiple methods of sealing adjustable components such as physical seals for calibration adjustment (e.g., separable indicators, meters, etc.) and event counters or event logger for the configuration parameters (e.g., capacity, interval size, octane blend settings, etc.).

Recommendation: The WS is requested to discuss the comments from the S&T Committee and the background information in the NCWM 2008 Annual Report and 2009 Interim Report, and develop a recommendation or position for consideration by the Committee.

14. Publication 14 – Editorial Suggestions

Source: Stephen Patoray, Consultants on Certification

Background: The following is a summary of items that have been submitted to the NTEP Administrator and NIST Technical Advisor over the past few months.

Recommendation: The WS is asked to review these items and provide a recommendation to NTEP that these suggestions can be considered as editorial corrections to Publication 14.

14 (a).Publication 14 DES Section 58.

The way 58.1 is worded it seems to be opposite of the way section T.N.4.5.1. (a) is worded in HB 44, and code references are needed.

HB 44 **T.N.4.5.1. Time Dependence: Class II, III, and IIII Non-automatic Weighing Instruments. – . . .**	**Publication 14** **58. Time Dependence Test T.N.4.5., T.N.4.5.1.**
(a) When any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 30 minutes shall not exceed 0.5 e. However, the difference between the indication obtained at 15 minutes and the indication obtained at 30 minutes shall not exceed 0.2 e.	**58.1 ~~Load the instrument close to Max. Take one reading as soon as the indication has stabilized and then note the indication in one hour intervals while the load remains on the instrument for a period of four hours. During this test the temperature should not vary more than 2 °C.~~** **~~The test may be terminated after 30 minutes if the indication differs less than 0.5 e during the first 30 minutes and the difference between 15 and 30 minutes is less than 0.2 e.~~** **When any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 30 minutes shall not exceed 0.5 e. However, the difference between the indication obtained at 15 minutes and the indication obtained at 30 minutes shall not exceed 0.2 e.**
(b) If the conditions in (a) are not met, the difference between the indication obtained immediately after placing the load on the instrument and the indication observed during the following 4 hours shall not exceed the absolute value of the maximum permissible error at the load applied.	If these conditions are not met, the difference between the indication obtained immediately after placing a load on the instrument and the indication observed during the following four hours shall not exceed the absolute value of the maximum permissible error at the load applied.
(c) The deviation on returning to zero as soon as the indication has stabilized, after the removal of any load which has remained on the instrument for 30 minutes, shall not exceed 0.5 e.	**58.2. ~~The deviation in the zero indication before and after a period of loading with a load close to Max for half an hour, shall be determined. The reading shall be taken as soon as the indication has stabilized.~~** **The deviation on returning to zero as soon as the indication has stabilized, after the removal of any load which has remained on the instrument for 30 minutes, shall not exceed 0.5 e.**

14 (b). Publication 14 DES Section 40.

It would seem appropriate to change the title in Section 40 from Zero Load Adjustment to Zero Setting Mechanisms.

40. ~~Zero-Load Adjustment~~ Zero Setting Mechanisms - General
Code References: S.2.1.1. and S.2.1.2.

To prevent fraudulent or inappropriate adjustments of the zero setting mechanism, it shall either be operable or accessible only by a tool that is separate from the scale, enclosed in a cabinet, or is equipped with motion detection that limits its operation. (Motion detection is checked as part of section 52.) A motion detection capability is not required on the power-switch zero scales equipped with a "count down" or display checking feature, considered to be an adequate indication to a customer that something "different" is happening. To reduce the potential for weighing errors, a stored tare weight must not be cleared when the scale is zeroed unless the "clearing" of tare is distinctly indicated. For the same reason, a scale must zero the entire load on the scale, not just part of the load, when the zeroing operation is performed.

Indicate the zero load adjustment method provided.

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

14 (c). Publication 14 DES Section 43.

It would seem appropriate to change the Title of this section to Automatic Zero Tracking Mechanism

43. Automatic Zero ~~Setting~~ Tracking Mechanism ~~(Zero Tracking)~~
Code Reference: S.2.1.3., S.2.1.3.1., S.2.1.3.2., and S.2.1.3.3

14 (d). Publication 14 DES Section 15.1.

The Table is Section 15.1 has an error, the word should be “net” not “tare.”

15.1. Test Method 1 Yes ☐ No ☐ N/A ☐
Use this method when tare is taken to the internal resolution and the scale prints gross, tare, and net weight.

a.
b.
c.

Example of possible noncompliance: Capacity 120 000 x 20 lb	
Load perceived by the scale to the internal resolution	Recorded Value
45011 lb gross 20009 lb tare 25002 lb **~~tare~~ net**	45020 LB G 20000 LB T 25000 LB N

14 (e). Publication 14 FT Table 1.

Table 1 in Pub 14 FT needs corrected to show the correct loading capabilities of the CA NTEP lab.

Table 1. NTEP Participating Laboratory Force transducer (load cell) Test Capabilities				
Participating Laboratory	**Test Range**	**Minimum Dead Load**	**Test Machine Capacity**	**Direction of Loading**
NIST Force Group	200 - 555 lbf	10 lbf	500 lbf	Tension Compression
	4000 - 28 000 lbf	400 lbf	25 000 lbf	Tension Compression
	28 000 - 120 000 lbf	3000 lbf	112 000 lbf	Compression
California DMS	Less than 20 kg	0.5 kg	20 kg	Tension **Compression**
	20 - 110 kg	5 kg	110 kg	Tension **Compression**
	500 - 1000 lbf	*	*	*
* In special cases, force transducers (load cells) from 500 to 1000 lbf can be tested in a walk-in test chamber with special loading hardware provided by the manufacturer.				

14 (e). Publication 14 FT Section I-10.

There seems to be a word missing at the end of FT Section I step 10 in the test conditions and it appears that the number "1" was inadvertently deleted between the 2000 and 2002 editions of Publication 14.

2009 Publication 14.

I. Test Conditions

1. Measurement Standards: The combined measurement uncertainty of the load generating system and the indicating instrument used to observe the output of the force transducer (load cell) under test shall be less than one-third of the maximum permissible errors for the force transducer (load cell) under test.

10. Stability - Use an indicating instrument and a loading means which provide sufficient stability to permit readings within the limits specified in point.

2000 Publication 14.

I. Test Conditions

1. Measurement Standards: The combined measurement uncertainty of the load generating system and the indicating instrument used to observe the output of the load cell under test shall be less than one-third of the maximum permissible errors for the load cell under test.

2. . . .

10. Stability - Use an indicating instrument and a loading means which provide sufficient stability to permit readings within the limits specified in point 1.

Recommendation: Amend Publication 14 FT Section I-10 to read as follows:

10. Stability - Use an indicating instrument and a loading means which provide sufficient stability to permit readings within the limits specified in ~~**point**~~ **FT Section I point 1.**

Next Sector Meeting

Discussion/Recommendation:

Appendix A - Recommendations for Amendments to Publication 14[1] (to be included in the Sector report)

Appendix B - 2009 NTETC Weighing Sector Attendees (to be included in the Sector report)

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