National Type Evaluation Technical Committee
Weighing Sector
August 31 to September 2, 2010, Columbus, Ohio
DRAFT 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 2010 Edition of NIST Handbook 44, "Specifications Tolerances, and Other Technical Requirements for Weighing and Measuring Devices."

- "Handbook 130" (HB-130) means the 2009 Edition of NIST Handbook 130, "Uniform Laws and Regulations in the areas of legal metrology and fuel quality." - "Publication 14" (Pub. 14) means the 2010 Edition of NCWM Publication 14 - Weighing Devices - Technical Policy - Checklists - Test Procedures.
Note: NIST does not imply that these acronyms are used solely to identify these organizations or technical topics.

Carry-over Items:

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

Source: The NIST Technical Advisor, Steve Cook, has provided the Sector with specific recommendations for incorporating test procedures and checklist language based upon actions of the 2010 Annual Meeting of the 95th NCWM. The Sector is asked to briefly discuss each item and, if appropriate, provide general input on the technical aspects of the issues.

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

Background: See the 2009 Summary of the WS agenda item 8 and the Interim Report of the 2010 NCWM S&T Committee agenda items 320-2, 322-1, and 324-1 for the adopted language and additional background information on the item to amend HB-44 Scales Code paragraph S.2.1.1. General (Zero-Load Adjustment). At the 2009 Sector Summary, the sector reached a consensus among the attendees that this feature does not have any value and at times will facilitate inaccurate weight determinations either against the buyer or seller. The NCWM considered the recommendations of the WS and additional comment at the NCWM Interim and Annual meetings and agreed to amend Scales and AWS codes to clarify that automatic zero adjustments beyond the AZT limits are not permitted to read as follows:

2.20. Scales Code:

S.2.1.1. General. – A scale shall be equipped with means by which the zero-load balance may be adjusted. Any loose material used for this purpose shall be enclosed so that it cannot shift in position and alter the balance condition of the scale.

Except for an initial zero-setting mechanism, an automatic zero adjustment outside the limits specified in S.2.1.3. Scales Equipped with an Automatic Zero-Tracking Mechanism for an automatic zero-tracking mechanism is prohibited.
(Amended 2010)

2.22. ABWS Code:

S.2.1. Zero-Load Adjustment. – The weighing system shall be equipped with manual or semiautomatic means by which the zero-load balance or no-load reference value indication may be adjusted. Automatic zero-tracking **and automatic zero-setting** mechanisms are prohibited.

(Amended 2010)

2.24. AWS Code:

S.2.1.1. Automatic Zero-Tracking Mechanism. – Except for automatic checkweighers, under normal operating conditions the maximum load that can be "rezeroed," when either placed on or removed from the platform all at once, shall be 1.0 scale division.

Except for an initial zero-setting mechanism, an automatic zero adjustment outside these limits is prohibited.
(Amended 2004 **and 2010)**

Appendix D- Definitions

automatic zero-setting mechanism (AZSM). Automatic means provided to set the zero-balance indication without the intervention of an operator.[2.22]
(Added 2010)

The background information may be obtained online at:
2009 WS: http://ncwm.net/sites/default/files/meetings/weighing/2009/09_Weighing_Summary.pdf
2010 S&T Interim Report: http://www.ncwm.net/sites/default/files/meetings/annual/2010/10_Pub_16_ST.pdf

Recommendation: The NIST Technical Advisor recommends that Publication 14 DES Sections 40 and 43, ABWS Section 8, and AWS Sections 16 and 25 be amended as follows:

DES Section 40. Zero-Load Adjustment - General
Code References: S.2.1.1. and S.2.1.2.
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Indicate the zero load adjustment method provided.

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

DES 43. Zero-Tracking Mechanism
Code Reference: S.2.1.3., S.2.1.3.1., S.2.1.3.2., and S.2.1.3.3

A scale may be equipped with an automatic zero-tracking mechanism (AZT) capability to automatically correct for weight variations near zero within specified limits. To reduce the potential for weighing errors, the AZT may operate only under limited conditions as indicated in the specific type evaluation criteria. **Automatic zero-setting (setting the scale to zero without the intervention of the operator after a period of time) beyond the limits of AZT as defined in OIML R76 as an automatic zero-setting mechanism is not permitted in HB-44 since there is no limit on the amount of zero adjustment in HB-44. Note that automatic zero setting is not the same as the initial zero-setting mechanism.**
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43.1.	This amount must comply with S.2.1.3. for the intended application.	Yes ☐ No ☐ N/A ☐
43.2.	AZT shall not be operable on any hopper scale.	Yes ☐ No ☐ N/A ☐
43.3.	For vehicle, axle-load, and railway track scales, and scales other than bench, counter, and livestock scales AZT may be operable only at a gross load zero.	Yes ☐ No ☐ N/A ☐
43.4.	AZT shall not be operational when the scale is displaying a positive weight value greater than the maximum AZT quantity allowed.	Yes ☐ No ☐ N/A ☐
43.5.	Hopper scales used in automatic bulk-weighing systems and all Class III L scales shall be equipped with a sealable means to enable/disable or set the AZT window to zero (0) for testing and inspection.	Yes ☐ No ☐ N/A ☐

43.6 **Review documentation to verify whether the device has an automatic zero-setting mechanism. If yes, the feature shall be configured in the disabled position. This feature shall also be protected by the approved security mean in Pub 14 Section 10.** **Yes ☐ No ☐ N/A ☐**

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

1) Place a load just above the limits of AZT. After 30-minutes, observe the device to see if the indication automatically returned to a zero indication.

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

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

ABWS Section 8
Code Reference: S.2.1., S.2.1.1., S.2.1.2.

The weighing system shall be equipped with manual or semiautomatic means by which the zero-balance or no-load reference value may be adjusted. An automatic zero setting mechanism **(AZSM) and an automatic zero tracking (AZT) mechanism as defined in Appendix D of HB-44 are** ~~is~~ prohibited.

AWS Section 16. 16. Zero Indication – General
Code Reference: G-S.5.1.

Any of the following methods may be used to indicate a negative balance condition.
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16.3. Display of a symbol which cannot be interpreted as a quantity value, (e.g., -, ---, EEEE, E S-1). However, the display of complements are not acceptable, and flashing zeros or a minus sign preceding a zero or zeros cannot be used. Yes ☐ No ☐ N/A ☐

An automatic zero adjustment beyond the limits of automatic zero-tracking (AZT), as defined in HB-44, is prohibited.

AWS Section 25. Automatic Zero-~~Setting~~ Tracking Mechanism ~~(Zero Tracking)~~ (AZT)

Code Reference: S.2.1.1.

A scale may be equipped with an AZT capability to automatically correct for weight variations near zero within specified limits. To reduce the potential for weighing errors, the AZT may operate only under limited conditions. **Automatic zero-setting (setting the scale to zero without the intervention of the operator after a period of time) beyond the limits of AZT as defined in HB-44 for the intended application is prohibited. Note that automatic zero setting is not the same as an initial zero-setting mechanism.**

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If the device has an AZT capability, record the maximum amount (in scale divisions) that can be zeroed at one time.
AVOIRDUPOIS: d
METRIC: d
OTHER UNITS: Specify unit ; d

25.1.	This amount must comply with S.2.1.3. **(Scales Code)** for the intended application. For devices falling under S.2.1.3. (a), that is, bench or counter, AZT may be operable with the device at a gross load zero, at a net load zero or at a negative net weight indication resulting from a tare weight entry having been made with the scale at zero gross load.	Yes ☐ No ☐ N/A ☐
	Indicate where AZT is operational.	
	Gross Zero	Yes ☐ No ☐ N/A ☐
	Net Zero	Yes ☐ No ☐ N/A ☐
	Negative with Tare	Yes ☐ No ☐ N/A ☐
25.2.	AZT shall not be operational when the scale is displaying a positive weight value greater than the maximum AZT quantity allowed.	Yes ☐ No ☐ N/A ☐
25.3	**Review documentation to determine if the device has an automatic zero-setting mechanism. If yes, the feature shall be configured in the disabled position. This feature shall also be protected by the approved security mean in Pub 14 Section 8.** **If there is no reference to automatic zero-setting in the documentation, verify that the device does not automatically rezero an amount greater than the limits of AZT.** **1) Place a load just above the limits of AZT. After 30-minutes, observe the device to see if the indication automatically returned to a zero indication.** **2) Place a load just above the limits of AZT. Zero the scale using the semiautomatic zero-setting mechanism. Remove the test load. The device should maintain a negative weight indication or an error message or code that it is below zero. After 30-minutes, observe the device to see if the indication automatically returned to a zero indication.** **The device does not comply if the indication automatically returns to zero.**	**Yes ☐ No ☐ N/A ☐**

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

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

T.N.4.5.3. Zero Load Return: Non-automatic Weighing Instruments. – A non-automatic weighing instrument shall meet the following requirements at constant test conditions. During type evaluation, this test shall be conducted at 20 °C ± 2 °C (68 °F ± 4 °F). 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:

(a) 0.5 e for Class II and IIII devices,

(b) 0.5 e for Class III devices with 4000 or fewer divisions,

(c) 0.83 e for Class III devices with more than 4000 divisions, or

(d) one-half of the absolute value of the applicable tolerance for the applied load for Class III L devices.

For a multi-interval instrument, the deviation shall not exceed 0.83 e_1 (where e_1 is the interval of the first partial weighing range or segment of the scale).

On a multiple range instrument, the deviation on returning to zero from Max_i (load in the applicable weighing range) shall not exceed 0.83 e_i (interval of the weighing segment). Furthermore, after returning to zero from any load greater than Max_1 (capacity of the first weighing range) and immediately after switching to the lowest weighing range, the indication near zero shall not vary by more than e_1 (interval of the first weighing range) during the following 5 minutes.
(Added 2010)

Recommendation: The NIST Technical Advisor recommends that the Time Dependence Test Form in Publication 14, DES Section 58 be amended to reflect changes made to Scales Code paragraphs T.N.4.5.1 and T.N.4.5.2 and the addition of new paragraph T.N.4.5.3. as follows:

TIME DEPENDENCE TEST FORM

Code Reference: T.N.4.5.1., **and T.N.4.5.3.**

Control No.: _____
Pattern designation: _____
Date: _____
Observer: _____
Verification scale interval e: _____:
Resolution during test (smaller than e): _____:

	At start	At max	At end	
Temp:				°C
Rel. h:				%
Time:				
Bar. Pres: (Only Class I)				hPa

Zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range

E = I + 0.5 e - Δ L – L

Load L	Time of Reading	Indication I	Add. Load Δ L	Error	mpe
	Initial + 20 sec				
	5 min				
	15 min				
	30 min				
If the difference between the indication obtained at 15 minutes and that at 30 minutes exceeds 0.2 e, the difference between the indication obtained immediately after placing the load on the instrument and the indication observed during the following four hours shall not exceed the absolute value of the maximum permissible error at the load applied.					
	1 hr				

	2 hr				
	3 hr				
	4 hr				

15 - 30 min ☐ Passed ☐ Failed
0 - 30 min ☐ Passed ☐ Failed
0 – 4 hr ☐ Passed ☐ Failed ☐ Not Applicable

Time Dependence Zero Return

Zero-tracking device is:

☐ Non-existent ☐ Not in operation ☐ Out of working range

$P = I + 0.5\ e - \Delta L$

Time of Reading	Load L_0	Indication of zero I_0	Add. load ΔL	P
After loading for 30 minutes Load = _____				

Change of indication ΔP = _____

For single range scales:

Check that $|\Delta P| \leq |MPE|$ for Class III L devices

Check that $|\Delta P| \leq 0.5\ e$ for Class II~~, III,~~ and IIII devices

Check that $|\Delta P| \leq 0.5\ e$ for Class III devices ($n \leq 4000$ d)

Check that $|\Delta P| \leq 0.83\ e$ for Class III devices ($n > 4000$ d)

For multi-interval scales:

Check that $|\Delta P| \leq 0.83\ e$ of the first weighing range or segment of the scale

For multiple range scales:

Check that $|\Delta P| \leq 0.83\ e$ (interval of the weighing segment under test)

Check that after returning to zero from any load greater than Max_1 and immediately after switching to the lowest weighing range, the indication near zero shall not vary by more than e_1 during the next 5 minutes.

☐ Passed ☐ Failed

Remarks:

Meaning of symbols:
I = Indication
I_0 = Indication of no-load reference at the start of the test
L = Load
L_0 = Mass of no-load reference at the start of the test
Add. load Δ L = Additional load to next changeover point
P = Digital indication prior to rounding = I + 1/2 e - Δ L
E = Error = I - L or P – L
e_1 = interval of the first weighing range
Max_1 = capacity of the first weighing range
mpe = Maximum permissible error
EUT = Equipment under test

1.c. UR.2.6. Approaches

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

UR.2.6.1. Vehicle Scales. – On the entrance and exit end(s) of a vehicle scale ~~installed in any one location for a period of 6 months or more~~, there shall be a straight approach as follows:

(a) the width at least the width of the platform,

(b) the length at least one-half the length of the platform but not required to be more than 12 m (40 ft), and

(c) not less than 3 m (10 ft) of any approach adjacent to the platform shall be constructed ~~of concrete or similar durable material to ensure that this portion remains smooth and level and in the~~ in the same plane as the platform. ~~However, grating of sufficient strength to withstand all loads equal to the concentrated load capacity of the scale may be installed in this portion.~~ Any slope in the remaining portion of the approach shall ensure (1) ease of vehicle access, (2) ease for testing purposes, and (3) drainage away from the scale.

In addition to (a), (b), and (c), scales installed in any one location for a period of 6 months or more shall have not less than 3 m (10 feet) of any approach adjacent to the platform constructed of concrete or similar durable material to ensure that this portion remains smooth and level and in the same plane as the platform; however, grating of sufficient strength to withstand all loads equal to the concentrated load capacity of the scale may be installed in this portion.
[Nonretroactive as of January 1, 1976]
(Amended 1977, 1983, 1993, ~~and~~ 2006, and 2010)

Recommendation: The NIST Technical Advisor does not recommend any changes to Publication 14 as a result of this new language being adopted.

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

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

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

1. provision(s) for applying a physical security seal that must be broken before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism, or

2. other approved means of providing security to document any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism (e.g., data change audit trail available at the time of inspection.

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

At its October 2009 meeting, the NTETC Measuring Sector provided the Committee with the following comments:

The Sector stated that measuring devices with NTEP CCs have been evaluated to either:

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

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

During the 2010 Annual Meeting, the SMA stated that it believes that the current wording in the 2010 Interim Report is a step back from previous proposals. The SMA continues to support the recommendation from the 2009 Weighing and Measuring Sectors stating that no change to HB 44 is required as the wording of paragraphs G-S.2. Facilitation of Fraud and G-S.8 Provisions for Sealing Electrical Adjustable Components is sufficient.

WMD suggested that the Committee consider that withdrawing the item might be appropriate. In its comments to the Conference in 2008, WMD stated that its interpretation of G-S.8. and S.1.11. Provision for Sealing, in the Scales Code, clearly does not allow a device to be "sealed" in a mode that allows a change that detrimentally affects the metrological integrity of the device without breaking that "seal." WMD suggested that the Publication 14 procedures for evaluating the method of sealing in the checklist for electronic scales be amended to more closely align it with the procedures in the liquid-measuring devices checklist section 9 which states:

> "Measuring elements shall be designed with adequate provisions to prevent changes from being made to the measuring element or the flow rate control (if the flow rate control affects the accuracy of deliveries) without evidence of the change being made. These provisions can be an approved means of security (e.g., data change audit trail) or physically applying a security seal which must be broken before adjustments can be made. When applicable, the adjusting mechanism shall be readily accessible for the purposes of affixing a security seal."

The Committee agreed that the current language in paragraph G-S.8. requires that a security seal be broken before a metrological change can be made to a device (or other approved means of security is provided such as an audit trail). Thus, once a security seal is applied, for example, it should not be possible to make a metrological change to the device without breaking that seal. Since this philosophy addresses provisions for protecting access to metrological adjustment, the philosophy should be applied consistently to all device types.

The Committee is concerned about a device which could be sealed in a "mode" that would allow access to calibration or configuration changes without breaking a seal. Since the NTEP tests and procedures are based on interpretations of HB 44, the Committee supports the efforts of the Weighing Sector and is recommending that this item remain informational until Publication 14 type evaluation procedures to verify compliance with G-S.8. are consistent with the Committee's interpretation of G-S.8. stated in the previous paragraph.

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

- 2008 Final Report - http://ts.nist.gov/WeightsAndMeasures/Publications/SP1080.cfm
- 2009 Final Report - http://ts.nist.gov/WeightsAndMeasures/Publications/sp1099.cfm
- 2010 Interim Report - http://ts.nist.gov/WeightsAndMeasures/Publications/10-Pub16.cfm

Discussion: The NIST Technical advisor recommends that the sector review the sealing procedures in Publication 14 DES, ABWS, and AWS type evaluations procedures and checklists to confirm that existing language is aligned with the Committee's interpretation. A copy of HB 44 language on sealing in the General, Scales, and LMD Codes, including the Publication 14 Liquid-Measuring Devices type evaluations procedures on sealing are provided for additional background information.

General Code G-S.8. (nonretroactive)	Scales Code paragraph S.1.11 (nonretroactive)	LMD Code paragraph S.2.2.
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 time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism. [Nonretroactive as of January 1, 1990] A device may be fitted with an automatic or a semi-automatic calibration mechanism. This mechanism shall be incorporated inside the device. After sealing, neither the mechanism nor the calibration process shall facilitate fraud. (Added 1985) (Amended 1989 and 1993)	**S.1.11. Provision for Sealing.** (a) Except on Class I scales, provision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of an electronic device. *[Nonretroactive as of January 1, 1979]* (b) Except on Class I scales, 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 time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism. *[Nonretroactive as of January 1, 1990]* (c) Except on Class I scales, audit trails shall use the format set forth in Table S.1.11. *[Nonretroactive as of January 1, 1995]*	**S.2.2. Provision for Sealing.** – Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange can be made of: (a) any measuring or indicating element; (b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries; and (c) any metrological parameter that will affect the metrological integrity of the device or system. When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal. *[Audit trails shall use the format set forth in Table S.2.2.]** *[*Nonretroactive and enforceable as of January 1, 1995]* (Amended 1991, 1993, 1995, and 2006)

Pub. 14 LMD – Section 9. Measuring Elements

Code Reference: S.2.2. Provision for Sealing

Measuring elements shall be designed with adequate provisions to prevent changes from being made to the measuring element or the flow rate control (if the flow rate control affects the accuracy of deliveries) without evidence of the change being made. These provisions can be an approved means of security (e.g., data change audit trail) or physically applying a security seal which must be broken before adjustments can be made. When applicable, the adjusting mechanism shall be readily accessible for the purposes of affixing a security seal.

9.1.	A measuring element shall have provisions for either:	
9.1.1.	applying a physical security seal, or	Yes☐ No ☐ N/A ☐
9.1.2.	an approved means of security (e.g., data change audit trail) so that no changes may be made to its adjustable components.	Yes☐ No ☐ N/A ☐
9.2.	Any adjustable element controlling the delivery rate shall provide for sealing or other approved means of security (e.g., data audit trail) if the flow rate affects the accuracy of deliveries.	Yes☐ No ☐ N/A ☐
9.3.	When applicable, the adjusting mechanism shall be readily accessible for the purposes of affixing a security seal.	Yes☐ No ☐ N/A ☐

9.4.	Audit trails shall use the format set forth in the Common and General Code Criteria section of this checklist (Code Reference G-S.8) and in Appendix A, Audit Trail Checklist for Liquid-Measuring Devices.	Yes☐ No ☐ N/A ☐
9.5.	Retail motor-fuel dispensers with remote configuration capabilities shall be sealed according to Table S.2.2. in Appendix A, Minimum Requirements for Audit Trails for Liquid-Measuring Devices and under the "Common and General Code Criteria" section of this checklist.	Yes☐ No ☐ N/A ☐

Code Reference: S.2.2.1. Multiple Measuring Devices with a Single Provision for Sealing

9.6	A change to the adjustment of any measuring element shall be individually identified.	Yes☐ No ☐ N/A ☐

Note: Examples of acceptable identification of a change to the adjustment of a measuring element include but are not limited to:

a. a broken, missing, or replaced physical seal on an individual measuring element,

b. a change in a calibration factor for each measuring element,

c. display of the date of or the number of days since the last calibration event for each measuring element or,

d. a counter indicating the number of calibration events per measuring element.

Note: S.2.2.1. will be removed in the 2010 edition of Handbook 44 when General Code paragraph G-S.8.1. Multiple Weighing or Measuring Elements with a Single Provision for Sealing becomes effective.

Pub. 14 LMD – Section 26. Measuring Element

Code Reference: S.2.2. Provision for Sealing

Measuring elements shall be designed with a provision for sealing such that an adjustment to the measuring element or the flow rate control (if the flow rate affects the accuracy of deliveries) cannot be made without breaking the security seal. These provisions can be an approved means of security (e.g., data change audit trail) or physically applying a security seal which must be broken before adjustments can be made. When applicable, the adjusting mechanism shall be readily accessible for the purposes of affixing a security seal.

26.1.	A measuring element shall have provision for sealing its adjustable components.	Yes☐ No ☐ N/A ☐
26.2.	Any adjustable element controlling the delivery rate shall provide for sealing if the flow rate affects the accuracy of deliveries.	Yes☐ No ☐ N/A ☐
26.3.	The adjusting mechanism shall be readily accessible to affix a security seal.	Yes☐ No ☐ N/A ☐

Pub. 14 LMD – Section 31. Measuring Element

Code Reference: S.2.2. Provision for Sealing

Measuring elements shall be designed with a provision for sealing such that an adjustment to the measuring element or the flow rate control (if the flow rate affects the accuracy of deliveries) cannot be made without breaking the security seal. These provisions can be an approved means of security (e.g., data change audit trail) or physically applying a security seal which must be broken before adjustments can be made. When applicable, the adjusting mechanism shall be readily accessible for the purposes of affixing a security seal.

31.1.	A measuring element shall provide for sealing its adjustable components.	Yes☐ No ☐ N/A ☐
31.2.	Any adjustable element controlling the delivery rate shall provide for sealing if the flow rate affects the accuracy of deliveries.	Yes☐ No ☐ N/A ☐
31.3.	The adjusting mechanism shall be readily accessible to affix a security seal.	Yes☐ No ☐ N/A ☐

Recommendation: A small WG was formed to develop more detailed procedures for determining the compliance of the methods for sealing and request the sector to consider the following recommendations for Publication 14 DES 10.

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

Code References: G-S.8.1. and S.1.11
Due to the ease of adjusting the accuracy of electronic scales, all scales (except for Class I scales) must provide for a security seal that must be broken or provide an audit trail, before any adjustment that detrimentally affects the performance of the electronic device can be made. Only metrological parameters that can affect the measurement features that have a significant potential for fraud and features or parameters whose range extends beyond that appropriate for device compliance with NIST Handbook 44 or the suitability of equipment, shall be sealed.

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

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

Sealing - General

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

If the use of a physical seal is the only approved method of sealing,; it shall not be possible to apply the physical seal with the device in the setup or configuration mode (any mode permitting access to any or all sealable parameters based upon the application of the *Philosophy for Sealing in Appendix A)* unless the device has a form of indication clearly stating that the device is in this mode.

Technologist:		
Project number:		
Category 1 & 2 Sealing - Physical Seal		
		Remarks:
Date		
Time		
Temp ºC		
RH (%)		

Mechanism used to enter calibration / configuration				
Jumper	**Pushbutton (momentary switch)**	**Toggle / Slide Switch**	**Other (Describe in Remarks)**	**Meets requirements**
Yes☐ No ☐ N/A ☐	Yes☐ No ☐ N/A ☐	Yes☐ No ☐ N/A ☐	Yes☐ No ☐ N/A ☐	Yes☐ No ☐ N/A ☐

Mechanism effective upon exit of calibration / configuration in Approved Mode, when mechanism is properly set according to manufacturers specifications.				
Jumper	**Pushbutton (momentary switch)**	**Toggle / Slide Switch**	**Other (Describe in Remarks)**	**Meets requirements**
Yes☐ No ☐ N/A ☐	Yes☐ No ☐ N/A ☐	Yes☐ No ☐ N/A ☐	Yes☐ No ☐ N/A ☐	Yes☐ No ☐ N/A ☐

Audit Trails – General

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

3. DES Section 66 (c) – Remove.

Source: Mr. Ed Luthy, Brechbuhler. – 2009 WS agenda item 15

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

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

Discussion/Recommendation: The NIST Technical Advisor is not aware of any activity from the small work group on the item.

New Items:

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

Source: Kevin Fruechte, Avery Weigh-Tronix

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

Prior to the 2009 changes to T.N.4.7 creep recovery tolerances, Class III L 10 000 division load cell tolerances were 3 times the Class III (n > 4000) for creep recovery.

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

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

The Class III creep recovery tolerance is 0.83v (0.83v x 10 lb/v = 8.3 lb)
The Class III L creep recovery tolerance is 1.5v (1.5v x 5 lb/v = 7.5 lb)
The proposed Class III L creep recovery tolerance is 1.5v v 5/3 = 2.5v (2.5v x 5 lb/v = 12.5 lb)

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

The NIST Technical Advisor has requested a summary of creep recovery test results from past evaluations of Class III L load cells from the NIST Force Group for review by the sector to verify that proposed multiplier is appropriate in the event the sector agrees to submit a proposal to the S&T Committee. See Attachment for Agenda Item 4.

Recommendation: Avery Weigh-Tronix recommends that the sector review the above information and submit a proposal to the S&T Committee to amend T.N.4.7 as follows:

> **T.N.4.7. Creep Recovery for Load Cells During Type Evaluation.** – The difference between the initial reading of the minimum load of the measuring range (D_{min}) and the reading after returning to minimum load subsequent to the maximum load (D_{max}) having been applied for 30 minutes shall not exceed:
>
> (a) 0.5 times the value of the load cell verification interval (0.5 v) for Class II and 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) **2.5** ~~**1.5**~~ times the value of the load cell verification interval (**2.5** ~~**1.5**~~ v) for Class III L load cells.
>
> (Added 2006) (Amended 2009 **and 201X**)

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

Source: Steven Cook, NIST WMD

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

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

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

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

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

U.S. Government Printing Office Style Manual

> 12.27. Fractions (¼, ½, ¾,⅜, ⅝, ⅞, ½954) or full -sized figures with the shilling mark (1/4, 1/2954) may be used only when either is specifically requested. A comma should not be used in any part of a built-up fraction of four or more digits or in decimals. (See rule 12.9e.)
>
> 12.9. e. Use spaces to separate groups of three digits in a decimal fraction.
> (See rule 12.27.) 0.123 456 789; but 0.1234

Extract from NIST Tech Beat by Carol Hockert Nov. 2006

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

Extract from the NIST Monthly Highlights February 2004

> 22nd CGPM Unanimously Adopts Decimal Marker Resolution
>
> The 22nd General Conference on Weights and Measures (CGPM), at its meeting in Paris on Oct. 13-17, 2003, unanimously adopted a resolution initiated by NIST declaring that "the symbol for the decimal marker shall be either the point on the line or the comma on the line," thereby giving full equality to the two symbols. In the same resolution the 22nd CGPM reaffirmed that "Numbers may be divided in groups of three in order to facilitate reading; neither dots nor commas are ever inserted in the spaces between groups."
>
> In the International System of Units (SI), which is the modern metric system, values of quantities are normally expressed as a number times an SI unit. Often the number contains multiple digits with an integral part and a decimal part. The symbol that separates the integral part from the decimal part is called the decimal marker. The established custom in English, as well as in many other languages, is to use the point on the line as the decimal marker, while in other languages, including French, the comma is used.
>
> Despite these long-standing customs, some international bodies employ the comma as the decimal marker in their English language publications, and two of the world's most influential international standardizing bodies specify that the comma shall be the symbol for the decimal marker in all languages. Clearly, the specification of the comma as the decimal marker is in many languages in conflict with customary usage and could lead to much confusion if followed.
>
> To address this issue, the 22nd CGPM unanimously adopted the NIST-initiated resolution. NIST will now work with international standardizing bodies, such as ISO and IEC, to bring the documentary standards of such bodies into agreement with the resolution.

Recommendation: Amend Publication 14 DES Section 11 Indicating and Recording Elements- General to read as follows:

> **11. Indicating and Recording Elements - General**
> **Code References: G-S.2., G-S.5.1., G-S.5.2.2., and S.1.2.**

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

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

Source: Steven Cook, NIST WMD

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

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

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

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

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

B.7.2 Rounding converted numerical values of quantities

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

Example: To express the value l = 36 ft in meters, use the factor 3.048 E−01 from Sec. B.8 or Sec. B.9 and write

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

Rounding guidelines found on the internet:

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

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

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

   42. Zero-Load and Tare Adjustment - Monorail Scales
   Code References: S.2.1.4. and S.2.3.1.

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

42.1.	Means must be provided for setting the zero-load balance and any tare value less than 5 percent of the scale capacity to within 0.02 percent of scale capacity.	Yes ☐ No ☐ N/A ☐
42.2.	For an in-motion system, the conditions above must be automatically maintained.	Yes ☐ No ☐ N/A ☐
42.3.	**Rounding is not performed until the last mathematical operation to reduce the uncertainty of the net weight determination.**	**Yes ☐ No ☐ N/A ☐**

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

3. Submit or support a recommendation to the S&T Committee to amend Appendix A-Fundamental Considerations, Section 10. Rounding Off Numerical Values to state that intermediate values that occur during a calculation shall not be rounded. Then round the answer so that the number of significant figures is equal to the least number of significant figures found in any one measurement or value in the equation.

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

Source: Nigel Mills, Hobart

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

> **T.N.4.5.1. Time Dependence: Class II, III, and IIII Non-automatic Weighing Instruments.** – A non-automatic weighing instrument of Classes II, III, and IIII shall meet the following requirements at constant test conditions. During type evaluation, this test shall be conducted at 20 °C ± 2 °C (68 °F

± 4 °F):

(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.

(b) . .
(Added 2005) (Amended 2006 and 2010)

According to this paragraph, the change in time dependence indication in 30 minutes for a complete device may not exceed 0.5e while the load cell of the same rated increments is permitted a mpe of 1.5e or even 2.5e.

Recommendation/Discussion: Hobart proposes that the sector should submit a proposal to the S&T Committee amending the language in bullet (a) of the 2011 HB-44 Scales Code Paragraph T.N.4.5.1. to read as follows:

(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**~~**:**

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

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

For multi-interval or multiple range instruments, when any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 3 minutes shall not exceed 0.83e.

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

Source: Lou Straub, Fairbanks Scales, Inc.

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

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

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

NTETC Weighing Sector DRAFT 2007 Summary

2. In-Motion Railway Track Scale Performance and Permanence - Technical Policy (Carryover)

Source: 2007 NTETC Weighing Sector Agenda Item 15

Background: See 2006 Weighing Sector Agenda Item 15 (a) for additional background information on an NTEP appeal to the permanence testing requirements for evaluation of a separable in-motion indicator interfaced to railway track scale with an active CC.. The Sector was unable to come to a consensus on whether to agree with the NTEP Committee or propose any changes to the permanence test requirements at its 2006 meeting. The Sector chairman asked for a vote to see if the Sector agrees with the NTEP Committee decision to waive permanence testing for indicators and controllers used in coupled-in-motion (CIM) railway track scale type evaluations.
- 8 Sector members voted *to support* the NTEP Committee decision.
- 9 Sector members voted *not to support* the NTEP Committee decision.
- 1 Sector member *abstained* from voting.

The Sector made no recommendation on this item since Don Onwiler reported that the NTEP Committee would reconsider its decision during their October 2006 meeting.
During the 2006 Fall meeting of the NCWM Board of Directors, the NTEP Committee (a subset of the board members) offered the Sector several options in its response to the 2006 Sector discussion on this item. A copy of the NTEP Committee's response was provided to 2007 NTEP Participating Laboratory meeting and to the full NTETC Weighing Sector. The NTEP Committee requested the Weighing Sector revisit this subject to review and discuss NCWM Publication 14, Digital Electronic Scales (DES) Section 68, Performance and Permanence Tests for Railway Track Scales Used to Weigh In-Motion, including the opening paragraph that states:
"Performance tests are conducted to determine compliance with the tolerances. The tests described here apply primarily to the indicating element. It is assumed that the weighing/load-receiving element used during the test has already been examined and been found to comply with applicable requirements. If the design and performance of the weighing/load-receiving element is to be determined during the same test, the applicable requirements for Railway Scales Used to Weigh Statically must also be referenced."
The NTEP Committee also suggested the Sector come to one of the following conclusions, or develop an alternate proposal:

1. The Sector may agree with the implication of this opening paragraph that a CIM controller may be used in conjunction with any weighing/load-receiving element that is NTEP certified for static weighing. If so, the NTEP Committee recommends Section 68 be modified to eliminate reference to permanence testing.

2. The Sector may determine that NTEP certification of a weighing/load-receiving element as a static scale is not sufficient for its use in commerce in a CIM weighing system. If so, the NTEP Committee recommends a new checklist be developed explicitly for the performance and permanence testing of a CIM weighing/load-receiving element and another checklist be developed explicitly for the performance evaluation of the CIM controller.

3. The Sector may determine that the NTEP certification for CIM weighing should be on an entire system, limiting use of the CIM controller only in connection with the weighing/load-receiving element(s) with which it underwent type approval . If so, the NTEP Committee recommends this clarification be provided. Existing certificates would be amended providing this limitation of use and additional testing may be required to correctly identify and certify these system requirements.

At the May 2007 NTEP Laboratory meeting, the NTEP "field" labs met separately and reviewed the NTEP Committee's recommendation to the Weighing Sector. The "field" labs agreed with the NTEP Committee's first suggestion and provided a recommendation to modify Publication 14 DES, Section 68. The proposal makes Section 68 a checklist for the evaluation of a CIM controller. It recognizes that any weighing/load-receiving element with an NTEP certificate as a static railway track scale may be used in conjunction with the controller. The permanence testing of the weighing/load-receiving element will be verified when the checklist in Section 69 is completed. The "field" labs forwarded their recommendation to the Sector and also recommended that a definition for an "in-motion controller" be developed.

Discussion: The first part of the discussion was on the possible directions/options suggested by the NTEP Committee.

Steve Beitzel, System Associates, stated that in-motion devices should be NTEP evaluated and certified as a system.

However, he does not agree with suggested option No. 3 from the NTEP Committee. Under option No. 3 nearly all installations would need to be evaluated since it requires the system be limited to the metrological elements approved during the evaluation and would not permit the mixing and matching of compatible elements unless they were listed on the certificate for the system. Darrell Flocken, Mettler Toledo, agreed that this option does not give the applicant flexibility to use compatible elements and suggested the Sector consider NTEP Committee options 1 and 2 or develop an alternative 4th option. Stephen Patoray, NTEP director, stated that a CC for a system is specific for the components or elements that were evaluated as part of the system. He asked what the purpose of the NTEP evaluation of a complete system is if it is determined that a previously certified static WLRE is allowed to be substituted with other certified static WLREs.

The Sector discussed Option No. 2 in great detail. Following are the salient points of the discussion regarding tests/verifications in the controller and W/LRE checklists:

1. An in-motion system can be very long, and the controller has to resolve varying parameters (e.g., speed, direction, etc). The permanence test provides confidence the system (installation) can perform over a period of time.
2. Does the permanence test apply to the in-motion controller, WLRE, and the entire system?
3. The permanence test should apply to just the controller since it must be able to compensate for both metrological and non-metrological signals from the WLRE and other inputs from the installation in order for the controller to determine the proper time to establish a weight.
4. Track settling issues:
    a. Parts of the track may have settled or loosened causing unwanted signals that are received and compensated for by the in-motion controller;
    b. Could NTEP evaluate 20 – 30 days after installation? Too costly since the railroads would have to pay for an extra "placed-in-service" test in addition to the subsequent test or tests performed by NTEP (GIPSA);
    c. NTEP should consider verifying the approach foundation is installed according to the manufacturer's (and/or railroad's) recommendations;
    d. Performance problems cannot be resolved by recalibration; problems are typically caused by poor/inappropriate installation;
    e. Installation problems where the open track interfaces with the track supported by the concrete foundations are also a source of performance problems;
    f. The in-motion controller checklist would have to include testing to verify it can compensate or filter out unwanted signals. Can unwanted signals be simulated?

A straw poll of the Sector indicated the majority of the Sector agreed with option No. 1 of the NTEP Committee, though WMD representatives supported option No. 3 since it is a more complete evaluation. As a result of the straw poll, the Sector proceeded to discuss the NTEP "field" labs' proposal on the agenda.

Conclusion: The Sector agreed with the proposal from the NTEP 'field" labs to eliminate the permanence test requirements in Publication 14 Section 68 and to limit the evaluation to "in-motion" controllers since the WLRE is required to be evaluated as a static railway track scale in Publication 14 Section 69. Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically. The Sector agreed to change the term "coupled in-motion" systems to "in-motion" systems since the type evaluation requirements apply to both coupled and uncoupled in-motion railway track scale controllers.

The Sector also asked the NIST technical advisor to develop a Publication 14 definition of the term "in-motion controller." The NIST technical advisor will investigate the possibility on 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 Sector suggested minor changes to the NTEP "field" labs' proposed amendment to Section 68 as shown in Appendix A – Recommendations to Publication 14 – Agenda Item 2 and recommended the changes be incorporated into Publication 14.

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

- The 2010 Edition of Pub 14 Section 70 only applies to the controllers, indicators and recording elements.
- Pub 14 Section 70 states that the in-motion controller performance tests are to be conducted with a railway track scale load-receiving element and without the use of simulation devices.
- Pub 14 Section 70 also states "It is assumed that the weighing/load-receiving element used during the test has already been examined and found to comply with applicable requirements in Section 71." (Performance and Permanence Tests for Railway Track Scales Used to Weigh Statically)
- The permanence test requirement was removed (starting with in the 2008 Edition of Publication 14).
- There is no section in Pub 14 for "Permanence and Performance Tests for Railway Track Scales Used to Weigh Dynamically (in-motion)".
- Fairbanks Scales was unable to find any "stand-alone" CCs for in-motion railway track scale weighing/load-receiving elements.

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

1) Require NTEP CC's for CIM controllers be clarified to reflect the decisions of the 2007 Weighing Sector which specifically allow any NTEP approved static Railroad Track scale to be used with an NTEP approved CIM controller, or

2) Add permissive language to NIST HB-44

9. ECRS Section 8 - Power Failure

Source: NTEP Weighing Labs

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

Weighing Labs Item 2 – ECRS Power Failure

Source: Steve Patoray
Section 8 in ECRS has info on power loss for the ECRS.

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

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

- Does step 3 apply to such a system?
- Could the transaction be "canceled" in case of a power loss?
- No charges?
- Then the POS returns to normal operation, (with no transaction) once power is restored?

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

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

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

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

8. Indicating and Recording Elements – General

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

A point-of-sale system (POS) shall be designed to provide clear, definite, and adequate indications.

- Its features and operations shall be designed so that they minimize the potential of both intentional and unintentional errors.
- The price-look-up (PLU) capability shall prevent the interaction of weight and nonweight PLUs, (e.g., weight-related PLUs must require a weight input and nonweight PLUs shall not respond to weight input).
- Manual gross or net weight entries are permitted only under specific conditions and shall be identified on the printed ticket or receipt. Manual, stored, or other predetermined tare entries do not have to be identified.
- Transaction information shall not be lost or unrecorded in the event of a power failure.

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

Recommendation: The sector is asked to review existing test criteria in Section 8. and provide clarification on how an ECRS is to comply under 8.7.3. The labs considered amending the Note in 8.7 since the language used in the Note is contradictory to 8.7.2. and 8.7.3. in that the words "continue to function and perform correctly" only appear in 8.7.1.

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

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

Note: ~~Either alternative is acceptable provided that the ECR continues to function and perform correctly.~~ There are no requirements to indicate when a power failure or interruption has occurred. Test first with a power failure to the

ECR alone, then power failure to the scale alone, and finally by power failure to both components simultaneously.

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

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

2010 Interim Report of the S&T Committee:
(http://ts.nist.gov/WeightsAndMeasures/Publications/10-Pub16.cfm)
2010 Software Sector summary:
(http://ncwm.net/sites/default/files/meetings/software/2010/10_Software_Summary.pdf)

Background: Local Weights and Measures inspectors need a means to determine whether equipment discovered in the field has been evaluated by NTEP. If so, the inspector needs to know at a minimum the CC number. From this starting point, other required information can be ascertained. HB 44 currently includes three options for marking of the CC:

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

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

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

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

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

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

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

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

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

Recommendation/Discussion: The Software Sector would like feedback on the proposal to specify a limited number of menu items/icons for accessing the CC number (it is not hard-marked or continuously displayed) in proposed G-S.1.1. subparagpraph (b) as follows:

(b) The CC Number shall be:

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

(i) For menu-based systems, "Metrology", "System Identification", or "Help".

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

Note that this is not suggested to be the final list of valid options; the Sector would like to have feedback specifically on additional menu text/icon images that should be considered acceptable. The Sector feels that the number of acceptable options is less of an issue (within reason) than the fact that the list is finite. The sector realizes this may affect manufacturers so feedback from associate members and representative groups is appreciated as well.

A Possible Compromise Solution:

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

The proposed limitations on CC recall sequence are:

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

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

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

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

Permitted Menu Text examples	*Permitted Icon shape examples*	*Essential characteristics*
Information Info		Top level menu text or icon • Icon text is a lower case “i” with block serifs • Text color may be light or dark but must contrast with the background color • Icon may have a circular border • Activation of this menu text/icon may invoke a second level menu text/icon that recalls metrology information.
Help **?**		Top level menu text or icon • Icon text is a question mark • Text color may be light or dark but must contrast with the background color • Icon may have a circular border • Activation of this menu text/icon may invoke a second level menu text/icon that recalls metrology information.
Metrology Metrological Information		Top or second level menu text or icon • Icon text is an upper case “M” • Text color may be light or dark but must contrast with the background color • Icon may have a rectangle or rounded rectangle border • If present, the activation of this menu text/icon must recall at a minimum the NTEP CC number. Other metrology information may optionally be displayed.
SI S.I.		Top or second level menu text or icon • Icon text is upper case “SI” • Text color may be light or dark but must contrast with the background color • Icon may have a rectangle or rounded rectangle border • If present, the activation of this menu item/icon must recall at a minimum the NTEP CC number. Other metrology information may optionally be displayed.
NTEP Data N.T.E.P. Certificate		This one is debatable – what if the certificate is revoked? Does NTEP grant holders of CCs the right to display the logo on the device, or just in documentation?

Acceptable examples:

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

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

Next Sector Meeting:

Appendix A - Recommendations for Amendments to Publication 14 (to be included in the meeting summary)

Appendix B - List of Attendees (to be included in the meeting summary)

Attachments

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

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

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