National Type Evaluation Technical Committee
Weighing Sector
September 23-25, 2008, St. Louis, MO
Meeting Agenda

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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		

Unless Otherwise Stated:
- "Handbook 44" (HB 44) means the 2008 Edition of NIST Handbook 44 "Specifications Tolerances, and Other Technical Requirements for Weighing and Measuring Devices"
- "Handbook 130" (HB 130) means the 2008 Edition of NIST Handbook 130 "Uniform Laws and Regulations in the areas of legal metrology and fuel quality."
- "Publication 14" (Pub. 14) means the 2008 Edition of NCWM Publication 14 - Weighing Devices - Technical Policy • Checklists • Test Procedures
- "Sector" means the NTETC Weighing Sector.

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

Load Cell Items

1. Publication 14 Force Transducer (Load Cell) Family and Selection Criteria – Report of the Load Cell Work Group (WG) (Carry-over)

Background: See the NTETC Weighing Sector 2007 Meeting Summary - Agenda Item 5 for additional background information.

The following is the a copy of the discussions and conclusion of the 2007 meeting of the NTETC Weighing Sector:

Discussion/Conclusion: The NTEP Director provided the Sector with an update to the status of this item. He reported that he had not received any objections or alternate recommendations on the proposed OIML R 60-based selection criteria (see Appendix C – Attachment to Agenda Item 5 for a copy of the OIML R 60-based load cell selection criteria) and that NTEP will soon receive load cell applications requesting NTEP CCs based on the evaluation of test data from international government laboratories certified to issue test data under the Mutual Acceptance Arrangement (MAA). Additionally, the Publication 14 language on the "selection of load cells" was not identified as an additional national requirement during the "Committee on Participation Review" process since the language in R 60 was developed by the United States; therefore, the load cells submitted for evaluation by the international laboratories will be selected using selection criteria in OIML R 60.

The Sector discussed options for establishing different load cell selection criteria for U.S. and international manufacturers (Publication 14–based criteria for U.S. manufacturers and OIML R 60-based criteria for international manufacturers). However, it was pointed out that this proposal would not be compatible with an existing load cell CC when there is a request to amend the CC. There was also a suggestion for a five-year "phase-in period" after which time existing CCs could no longer be updated using the 2007 Publication 14-based criteria.

Since there were only two load cell manufacturers at the Sector meeting, Darrell Flocken and Stephen Langford stated they would bring this issue before the SMA technical committee during their November 2007 meeting to discuss possible recommendations. Additionally, they will provide the NTEP director and NTEP Committee a report of the discussion and possible recommendation prior to the January 2008 NCWM Interim Meeting.

Discussion: The NTEP Director will provide the Sector with an update to the status of this item.

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

2 (a) Pub 14, FT Table 5 - Loading Times, Reduction Factors, and FT Section II - Item 5

Source: Stephen Patoray, NTEP Director

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

To clarify, I submit for the review
- the main section of OIML R 60,
- the main section of NCWM Publication 14 that apply directly to this item, and
- the following comment from load cell intercomparison Published in 1989:

> d. Of the 28 load cell verification tests that were performed, the load cell classification (n_{max}) was limited by the minimum dead load output return in 13 cases and by the mean combined error in 10 cases (see Tables 1 through 6). This is an indication of the relative importance of the measurement of these two characteristics in determining the classification of a load cell.

Information will follow after those sections as well as recommendations for changes to Pub 14 and OIML R 60. I wish to recognize and thank John Elengo and Steve Cook for their research and input on this topic.

(Note: The following text that is highlighted in green, cyan, and yellow is currently different between the OIML Recommendation R 60 and Publication 14 Force Transducers requirements and are discussed in depth following the background language in R 60 and Publication 14.)

From OIML R 60.
Table 5 Maximum permissible errors (mpe) on pattern evaluation

mpe	Load, m			
	Class A	Class B	Class C	Class D
p_{LC} x 0.5 v	0 ≤ m ≤ 50 000 v	0 ≤ m ≤ 5 000 v	0 ≤ m ≤ 500 v	0 ≤ m ≤ 50 v
p_{LC} x 1.0 v	50 000 v < m ≤ 200 000 v	5 000 v < m ≤20 000 v	500 v < m ≤ 2 000 v	50 v < m ≤ 200 v
p_{LC} x 1.5 v	200 000 v < m	20 000 v < m ≤100 000 v	2 000 v < m ≤10 000 v	200 v < m ≤ 1 000 v

5.2.3 Initial readings

During the conduct of the tests, the initial reading shall be taken at a time interval after the initiation of loading or unloading, whichever is applicable, as specified in Table 6.

Table 6 Combined loading and stabilization times to be achieved prior to reading

Change in load		Time
Greater than	Up to and including	
0 kg	10 kg	10 seconds
10 kg	100 kg	20 seconds
100 kg	1 000 kg	30 seconds
1 000 kg	10 000 kg	40 seconds
10 000 kg	100 000 kg	50 seconds
100 000 kg		60 seconds

5.2.3.1 Loading/unloading times
The loading or unloading times shall be approximately half the time specified. The remaining time shall be utilized for stabilization. The tests shall be conducted under constant conditions. Time shall be recorded in the test report in absolute, not relative, units.

5.2.3.2 Loading/unloading times impracticable
When the specified loading or unloading times cannot be achieved, the following shall apply:

a) in the case of the minimum dead load output return test, the time may be increased from 100 % to a limit of 150 % of the specified time provided that the permissible variation of the result is proportionally reduced from 100 % to 50 % of the allowable difference between the initial reading of the minimum load output upon unloading and the reading before loading; and

b) in other cases, the actual times shall be recorded in the Test Report.

5.3 Permissible variation of results

5.3.1 Creep
With a constant maximum load, Dmax, between 90 % and 100 % of Emax, applied to the load cell, the difference between the initial reading and any reading obtained during the next 30 minutes shall not exceed 0.7 times the absolute value of the mpe (see 5.3.1.1) for the applied load. The difference between the reading obtained at 20 minutes and the reading obtained at 30 minutes shall not exceed 0.15 times the absolute value of the mpe (see 5.3.1.1).

5.3.1.1 Maximum permissible error for creep
Regardless of the value declared by the manufacturer for the apportionment factor, p_{LC}, the mpe for creep shall be determined from Table 5 using the apportionment factor, $p_{LC} = 0.7$.

5.3.2 Minimum dead load output return
The difference between the initial reading of the minimum load output and the reading after returning to minimum load, Dmin, subsequent to the maximum load, Dmax, between 90 % and 100 % of Emax, having been applied for 30 minutes, shall not exceed half the value of the load cell verification interval (0.5 v).

From Pub 14:

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

1. At 20 °C ambient, insert the force transducer (load cell) into the force generating system and load to the minimum dead load. If Procedure I. (which includes increasing and decreasing load tests) has just been completed, wait 1 hour. If a separate creep test is being conducted, exercise the force transducer (load cell) as in Procedure I.5 and then wait 1 hour.

2. If the indicating element for the force transducer (load cell) is provided with a convenient means for checking itself, conduct the self-test at this time.

3. Monitor minimum load output until stable.

4. **Test for Creep:**

   a. Apply a load equal to 90 percent to 100 percent of the maximum capacity of the force transducer (load cell) and record the indication 20 seconds after reaching the load. The time to load test weights and read the indicator shall be as short as possible and shall not exceed the time specified in Table 5. With the load remaining on the load cell, continue to record indications periodically, thereafter at time intervals over a 30 minute period.

5. **Test for Creep Recovery:**

   a. Remove a load equal to 90 percent to 100 percent of the maximum capacity of the force transducer (load cell) that has been applied for 30 minutes. Record the indication after 20 seconds. The time to unload test weights and read the indicator shall be as short as possible and not exceed the time specified in Table 5. Continue to record indications periodically thereafter at time intervals over a 30 minute period.

6. Repeat the operations described in steps 2 through 5 at the high and low temperature limits for the accuracy class. If the manufacturer has specified a smaller or a larger range, repeat operations at the limits marked on the cell, provided the temperature range is at least the range required for the accuracy class.

7. With the resulting data, and accounting for the effect of barometric pressure changes, determine the magnitude of the creep and compare it to the tolerance in NIST Handbook 44 Scales Code Table T.N.4.6.

8. **Permissible Variations of Readings for Creep**

   a. With a constant maximum load for the measuring range (D_{max}) between 90 % and 100 % of maximum capacity (E_{max}), applied to the load cell, the difference between the initial reading and any reading obtained during the next 30 minutes shall not exceed the absolute value of the maximum permissible error (mpe) for the applied load (see Table T.N.4.6. Maximum Permissible Error (mpe) for Load Cells During Type Evaluation).

   b. The difference between the reading obtained at 20 minutes and the reading obtained at 30 minutes shall not exceed 0.15 times the absolute value of the mpe (see Table T.N.4.6. Maximum Permissible Error (mpe) for Load Cells During Type Evaluation).

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

(Pub 14) Table 5 Loading Times		
Load		Time
Greater than	To and including	
0 kg	10 kg	10 seconds
10 kg	100 kg	15 seconds
100 kg	1000 kg	20 seconds
1000 kg	10 000 kg	30 seconds
10 000 kg	100 000kg	50 seconds
100 000 kg	----------	60 seconds

Table T.N.4.6.
Maximum Permissible Error (mpe) * for Load Cells
During Type Evaluation

mpe in Load Cell Verifications Divisions (v) = p_{LC} x Basic Tolerance in v			
Class	p_{LC} x 0.5 v	p_{LC} x 1.0 v	p_{LC} x 1.5 v
I	0 - 50 000 v	50 001 v - 200 000 v	200 001 v +
II	0 - 5000 v	5 001 v - 20 000 v	20 001 v +
III	0 - 500 v	501 v - 2 000 v	2001 v +
IIII	0 - 50 v	51 v - 200 v	201 v +
III L	0 - 500 v	501 v - 1 000 v	(Add 0.5 v to the basic tolerance for each additional 500 v or fraction thereof up to a maximum load of 10 000 v)

v represents the load cell verification interval
p_{LC} represents the apportionment factors applied to the basic tolerance
p_{LC} = 0.7 for load cells marked with S (single load cell applications)
p_{LC} = 1.0 for load cells marked with M (multiple load cell applications)
p_{LC} = 0.5 for Class III L load cells marked with S or M
* mpe = p_{LC} x Basic Tolerance in load cell verifications divisions (v)

Further discussion on this item

There are three items that are currently different between the OIML Recommendation R 60 and Publication 14 Force Transducers requirements. These are highlighted in:

- green for a discussion on loading times,
- cyan for a discussion on reduction factors, and
- yellow for a discussion on the differences between the Pub 14 Section 5 test procedure and HB44. I have only highlighted the differences, as I see them, between the two documents.

I have not included differences with Class III L in HB 44 or Pub 14 and OIML R 60.

FIRST ITEM – Loading Times:

The following language highlighted in green was, as I heard it, the focus of the request for a priority item at the 2008 Annual Meeting. The issue was the load/unload plus stabilization time differences between OIML and Pub 14.

OIML R 60 section 5.2.3. states clearly that:

During the conduct of the tests, the initial reading shall be taken at a time interval after the initiation of loading or unloading, whichever is applicable, as specified in Table 6.

And that in section 5.3.2.1

The loading or unloading times shall be approximately half the time specified. The remaining time shall be utilized for stabilization.

OIML R 60 does go on further in section *5.2.3.2 Loading/unloading times impracticable*
and indicates if this timing cannot be achieved that some consideration must be made in the specification. This is currently limited to the unloading time in subsection a) it is not clear to me what to do if loading times cannot be achieved, other than record the actual times. I am currently looking through notes for information in an attempt to answer this question.

Currently, **Pub 14 section II. "Determination of Creep and Creep Recovery, Test Procedure and Permissible Variations" states that**:

4. **Test for Creep:**

   a. Apply a load equal to 90 percent to 100 percent of the maximum capacity of the force transducer (load cell) and record the indication 20 seconds after reaching the load. The time to load test weights and read the indicator shall be as short as possible and shall not exceed the time specified in Table 5. With the load remaining on the load cell, continue to record indications periodically, thereafter at time intervals over a 30 minute period.

5. **Test for Creep Recovery:**

   a. Remove a load equal to 90 percent to 100 percent of the maximum capacity of the force transducer (load cell) that has been applied for 30 minutes. Record the indication after 20 seconds. The time to unload test weights and read the indicator shall be as short as possible and not exceed the time specified in Table 5. Continue to record indications periodically thereafter at time intervals over a 30 minute period.

What actually happens, as I understand it at NIST FG, is that load and unload times are nearly instant, or less than 1 second, then they wait 20 seconds as per the written instruction in Pub 14 above. Currently the times in Pub 14 Table 5 are not used.

Proposal/Recommendation*:*

1. Change Table 5 in Pub 14 to match the capacity ranges and times in OIML R 60 Table 6.

2. Change the wording regarding the timing for load and unload in Pub 14 to match the wording in OIML R 60

   e.g. During the conduct of the tests, the initial reading shall be taken at a time interval after the initiation of loading or unloading, whichever is applicable, as specified in Table 6.

   And that

   The loading or unloading times shall *(note sap: or possibly should)* be approximately half the time specified. The remaining time shall be utilized for stabilization.

3. The exception found in OIML R 60 for loading times that are impractical needs to be added to the Pub. With the proper numbering and formatting and with one addition for the special case of NIST FG having load and unload times near zero time.

   Loading/unloading times impracticable

   When the specified loading or unloading times cannot be achieved, the following shall apply:

a) in the case of **the creep and** the minimum dead load output return test, the time **specified for loading or unloading** may be increased from 100 % to a limit of 150 % of the specified time provided that the permissible variation of the result is proportionally reduced from 100 % to 50 % of the allowable difference. ~~**between the initial reading of the minimum load output upon unloading and the reading before loading;**~~

b)in the case that the test load is applied or removed in a three seconds or less time, the allowable stabilization time shall not exceed one-half the time specified in table 5.

c) in other cases, the actual times shall be recorded in the Test Report.

NEW TABLE 5 for Pub 14:

Change in load		Time	Time for NIST FG stabilization
Greater than	Up to and including		
0 kg	10 kg	10 seconds	5 seconds
10 kg	100 kg	20 seconds	10 seconds
100 kg	1 000 kg	30 seconds	15 seconds
1 000 kg	10 000 kg	40 seconds	20 seconds
10 000 kg	100 000 kg	50 seconds	25 seconds
100 000 kg		60 seconds	30 seconds

Alternative New Table 5 for Pub 14 if the word "should" is used instead of "shall" above:

Change in load		Time for loading or unloading	Time for stabilization
Greater than	Up to and including	No greater than	No greater than
0 kg	10 kg	5 seconds	5 seconds
10 kg	100 kg	10 seconds	10 seconds
100 kg	1 000 kg	15 seconds	15 seconds
1 000 kg	10 000 kg	20 seconds	20 seconds
10 000 kg	100 000 kg	25 seconds	25 seconds
100 000 kg		30 seconds	30 seconds

I will also make the following recommendation to amend R 60 to match the information in Publication 14, when that document is opened for revision.

Change to OIML R 60:

a) in the case of **the creep and** the minimum dead load output return test, the time **specified for loading or unloading** may be increased from 100 % to a limit of 150 % of the specified time provided that the permissible variation of the result is proportionally reduced from 100 % to 50 % of the allowable difference. ~~**between the initial reading of the minimum load output upon unloading and the reading before loading;**~~

b) in the case that the test load is applied or removed in a few seconds or less time, the allowable stabilization time shall not exceed one-half the time specified in table 5.

c) *remains the same, note sap*

The alternative table would also be introduced.

Once this is accomplished then the two procedures will be aligned. In the mean time, NIST FG does not conduct any evaluations for under OIML R 60.

SECOND ITEM – Reduction Factors:

Creep (at load) tolerance. Class III only (ignore Class III L and also ignore single and multiple)

Currently **OIML R 60** has a requirement that Creep is 0.7 x mpe and mpe is defined as p_{lc} x 1.5 v (at 90 to 100% capacity). Further p_{lc} for creep is defined as 0.7. Therefore the tolerance for creep is (1.5 v) x (0.7) x (0.7) = 0.735 v.

However, **Publication 14** has a tolerance value which uses either a reduction factor of 1.0 (for multiple) or 0.7 (for single) x 1.5 v. Therefore the tolerance for creep is 1.5 x 1.0 = 1.5 v, or 1.5 x 0.7 = 1.05 v.

From OIML R 60 section 5.3.1.

The difference between the initial reading and any reading obtained during the next 30 minutes shall not exceed 0.7 times the absolute value of the mpe (see 5.3.1.1) for the applied load.

From Pub 14

The difference between the initial reading and any reading obtained during the next 30 minutes shall not exceed the absolute value of the maximum permissible error (mpe) for the applied load (see Table T.N.4.6.

I do not have a simple recommendation for changes to this section; however, this group should begin to determine how these differences could be harmonized. This is neither a single or multiple sub-class or a Class III L issue, it is a fundamental difference in the method to determine the tolerance value, with the additional 0.7 reduction for creep found in OIML R 60.

I have and will continue to gather information from the archives on how this was determined by OIML and will present any of that information, if found, to the group.

Proposal/Recommendation: Form a small Work Group of load cell manufacturers to develop a proposal to closer align HB44 and OIML R 60 for the additional 0.7 reduction factor found in OIML R60.

THIRD ITEM – Differences between Pub 14 Section 5 test procedures and HB44:

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

OIML R 60

5.3.2 Minimum dead load output return
The difference between the initial reading of the minimum load output and the reading after returning to minimum load, Dmin, subsequent to the maximum load, Dmax, between 90 % and 100 % of Emax, having been applied for 30 minutes, shall not exceed half the value of the load cell verification interval (0.5 v).

NCWM Pub 14

5. **Test for Creep Recovery:**

   a. Remove a load equal to 90 percent to 100 percent of the maximum capacity of the force transducer (load cell) that has been applied for 30 minutes. Record the indication after 20 seconds. The time to unload test weights and read the indicator shall be as short as possible and not exceed the time

specified in Table 5. Continue to record indications periodically thereafter at time intervals over a 30 minute period. ***(Note: The last sentence in this paragraph is not consistent with subsection 9. in Pub 14 or T.N.4.7. in HB 44 and is not in OIML R60 section 5.3.2.)***

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

a. **T**he 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) 1.5 times the value of the load cell verification interval (1.5 v) for Class III L.

From NIST Handbook 44

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, III, and IIII load cells, or

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

Proposal/Recommendation: Correct the information in Pub 14 Item 5. Test procedure for creep recovery to match the information already in Pub 14 Section 9, Handbook 44 Scales Code paragraph T.N.4.7., and OIML R 60 section 5.3.2. This will also reduce the time required to conduct these test by approx. 90 minutes.

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

Source: Stephen Langford, Cardinal/Detecto

Background: Publication 14, in its current form does not address times allowed for unloading and stabilization for conducting creep and creep recovery tests. Only Table 5 is included which deals only with loading times. In order to more closely harmonize NTEP evaluation tests of force transducers with those performed under OIML R60, additional information regarding these times for load application and removal need to be added to Publication 14.

Recommendation: Amend paragraph 3 and Table 5, Determination of Creep as follows:

3. Monitor minimum load output until stable.

~~a. 4.~~ **Test for Creep**: Apply a load equal to 90 percent to 100 percent of the maximum capacity of the force transducer (load cell), wait for the stabilization time listed in Table 5, then record the indication ~~and record the indication 20 seconds after reaching the load.~~ The time to load test weights and read the indicator shall be as shown in Table 5 ~~short as possible and shall not exceed the time specified in Table 5.~~ With the load remaining on the force transducer (load cell), continue to record indications periodically thereafter for a period of 30. ~~minutes at time intervals over a 30 minute period.~~

b. ~~5.~~ **Test for Creep Recovery**: Remove a load equal to 90 percent to 100 percent of the maximum capacity of the force transducer (load cell) that has been applied for a minimum of 30 minutes. Record the indication after waiting for the stabilization time specified in Table 5. ~~after 20 seconds.~~ The time to unload test weights and read the indicator shall be as shown in Table 5. ~~short as~~

~~possible and not to exceed the time specified in Table 5.~~ Continue to read indications periodically thereafter for a period of 30 minutes. ~~at time intervals over a 30 minute period.~~

c. **Loading and Unloading Times**: The loading and unloading times shall be approximately half the time specified in Table 5. The remaining time shall be sued for stabilization.

Table 5
Loading and Unloading Times

Change in Load		Time
Greater than	Up to and including	
0 kg	10 kg	10 seconds
10 kg	100 kg	20 seconds
100 kg	1 000 kg	30 seconds
1 000 kg	10 000 kg	40 seconds
10 000 kg	100 000 kg	50 seconds
100 000 kg		60 seconds

Carry-over Items:

3. In-Motion Railway Track Scale - (Carry-over)

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

Background: During the 2007 discussion of Agenda Item 2 – regarding the performance and permanence requirements for in-motion railway track scales, the sector asked the NIST technical advisor to develop a Publication 14 definition of the term "in-motion" weighing device. The NIST technical advisor was to investigate the possibility 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 Technical Advisor did not have sufficient time to develop a proposed definition for "in motion" weighing devices in time for consideration by the sector prior to the 2008 NCWM Interim Meeting.

Recommendation/Discussion: The sector is asked to review and discuss the following proposed definition for "in-motion weighing device" to be incorporated in NCWM Publication 14 Section 68.

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.

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

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

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

Source: See the Interim Report of the 2008 NCWM S&T Committee Agenda Items 310-4 for additional background information to amend HB 44 General Code paragraph G-A.1. Commercial and Law Enforcement

Equipment and definition of Equipment. During the Annual Meeting, the NCWM agreed to add a new definition of equipment and amend General Code paragraph G-A.1 as follows:.

G-A.1. Commercial and Law-Enforcement Equipment. – These specifications, tolerances, and other technical requirements apply as follows:

(a) To commercial weighing and measuring equipment; that is, to weights and measures and weighing and measuring devices commercially used or employed in establishing the size, quantity, extent, area, **meat and poultry composition, grain constituent value,** or measurement of quantities, things, produce, or articles for distribution or consumption, purchased, offered, or submitted for sale, hire, or award, or in computing any basic charge or payment for services rendered on the basis of weight or measure. **(Amended 2008)**

Appendix D

equipment, commercial. Weights, measures, and weighing and measuring devices, instruments, elements, and systems or portion thereof, used or employed in establishing the measurement or in computing any basic charge or payment for services rendered on the basis of weight or measure. As used in this definition, measurement includes the determination of size, quantity, value, extent, area, meat and poultry composition, grain constituent value, or measurement of quantities, things, produce, or articles for distribution or consumption, purchased, offered, or submitted for sale, hire, or award. [1.10, 2.20, 2.21, 2.22, 2.24, 3.30, 3.31, 3.32, 3.33, 3.34, 3.35, 3.38, 4.40, 5.51, 5.56.(a), 5.56.(b), 5.57, 5.58, 5.59]

commercial equipment, See equipment

During the deliberations of the item prior to it being adopted, the S&T Committee agreed with comments that the words "composition" and "constituent" need better definitions to make sure that the additional words do not broaden the scope of HB 44. The cementers were concerned that the language in the Interim Report could be interpreted to include devices such as weighing and measuring devices used to determine quantities of ingredient to produce a product (i.e., concrete, cake mixes, etc.) where the net quantity of the product is verified or determined by other devices or means (volumetric verification, package verification, or other tested and sealed commercial devices). The Committee amended the proposal by adding the words "meat and poultry" in front of "composition" and "grain" in from of "constituent value" and amended the proposal to read as shown above.

Recommendation: The NIST Technical Advisor that no further action by the sector is required since the revised paragraph and new definition is intended to provide clarification of commercial devices and does not impact type evaluation procedures and technical policies in NCWM Publication 14.

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

***Background*:** See the Interim Report of the 2008 NCWM S&T Committee Agenda Items 320-1 for additional background information to amend S.1.1.1.(b) Digital Indicating Elements as follows:

S.1.1.1. Digital Indicating Elements.

(b) A digital indicating device shall either automatically maintain a "center-of-zero" condition to ± ¼ scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero balance condition to ± ¼ of a scale division or less. ***A "center-of-zero" indication may operate when zero is indicated for gross or net mode.***
[Nonretroactive as of January 1, 1993]

Recommendation: This item was submitted to the NCWM by the sector to provide a HB44 reference for Publication 14 DES Section 41.

"The center of zero requirements applies to the gross load zero, but the center of zero indication may also be operational at the net load zero."

The NIST Technical Advisor recommends that no additional action is required by the sector.

4.(c) Amend Scales Code Paragraph S.1.2.1. Weight Units, S.2.3. Tare, and T.N.2.1. General and AWS Code Paragraph S.1.1.1. Digital Indicating Elements

***Background*:** See the Interim Report of the 2008 NCWM S&T Committee Agenda Items 320-2 and 324-1 for additional background information to amend HB 44 by adding a note clarifying that:

1. The requirement that a net weight division on multiple range and multi-interval scales does is not required to be expresses as 1, 2, or 5, or a decimal multiple or submultiples of 1, 2, or 5, where the scale division of the tare weight is different than the scale division of the gross weight,

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

3. Add language that clarifies that scale tolerances apply to net weigh using any tare load.

During its 2007 Annual Meeting, the NCWM adopted the proposed language in 320-2 as follows (similar language was adopted in 324-1 and is not repeated here):

S.1.2.1. Weight Units. *– Except for postal scales, a digital-indicating scale shall indicate weight values using only a single unit of measure. Weight values shall be presented in a decimal format with the value of the scale division expressed as 1, 2, or 5, or a decimal multiple or sub-multiple of 1, 2, or 5.*
[Nonretroactive as of January 1, 1989]

Note: The requirement that the value of the scale division be expressed only as 1, 2, or 5, or a decimal multiple or submultiples of only 1, 2, or 5 does not apply to net weight indications and recorded representations that are calculated from gross and tare weight indications where the scale division of the gross weight is different from the scale division of the tare weight(s) on multi-interval or multiple range scales.

For example, a multiple range or multi-interval scale may indicate and record tare weights in a lower weighing range (WR) or segment (WS) and net weights in the higher weighing range or segment as follows:

55 kg	Gross Weight (WR 2 d = 5 kg)	10.05 lb	Gross Weight (WS2 d = 0.05 lb)
– 4 kg	Tare Weight (WR 1 d = 2 kg)	– 0.06 lb	Tare Weight (WS1 d = 0.02 lb)
= 51 kg	the Mathematically Correct Net Weight	= 9.99 lb	the Mathematically Correct Net Weight

(Added 1987) **(Amended 2008)**

S.2.3. Tare. *– On any scale (except a monorail scale equipped with digital indications **and multi-interval scales or multiple range scales when the value of tare is determined in a lower range or segment)**, the value of the tare division shall be equal to the value of the scale division.** The tare mechanism shall operate only in a backward direction (that is, in a direction of underregistration) with respect to the zero-load balance condition of the scale. *A device designed to automatically clear any tare value shall also be designed to prevent the automatic clearing of tare until a complete transaction has been indicated.**

*[**Note**: On a computing scale, this requires the input of a unit price, the display of the unit price, and a computed positive total price at a readable equilibrium. Other devices require a complete weighing operation, including tare, net, and gross weight determination]**
*[*Nonretroactive as of January 1, 1983]*
(Amended 1985 **and 2008**)

T.N.2.1. General. – The tolerance values are positive (+) and negative (-) with the weighing device adjusted to zero at no load. When tare is in use, the tolerance values are applied from the tare zero reference **(zero net indication)**; the tolerance values apply to **the net weight indication for any possible tare load using** certified test loads~~only~~.
(Amended 2008)

Recommendation 1: The NIST Technical Advisor recommends that the Sector consider by amending Publication 14 DES Section 1.11. as follows:

11.1. Except for batching scales, the value of the scale division in all available weight units for both indicating and recording elements must be in values of 1, 2, or 5 times 10k where k is an integer, e.g., 0.1, 0.2, or 0.5; 1, 2, or 5; 10, 20, or 50, etc.
See additional exceptions in DES Sections 31 and 32 for multi-interval and multiple range scales.

Yes ☐ No ☐ N/A ☐

Recommendation 2: The NIST Technical Advisor recommends that the Sector consider by amending Publication 14 DES Section 31. as follows:

In applying these principles, it is acceptable to:

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

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

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

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

net = gross – tare

Recommendation 3: The NIST Technical Advisor recommends that the Sector consider by amending Publication 14 DES Section 32. as follows:

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

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

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

Net	9.566 kg	9.570 kg

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

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

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

Background: See the Interim Report of the 2008 NCWM S&T Committee Agenda Items 320-4 for additional background information to amend S.1.1.1.(b) Digital Indicating Elements as follows:

S.2.1.5. Initial Zero-Setting Mechanism. – ~~(a)~~ Scales of accuracy Classes I, II, and III may be equipped with an initial zero-setting device.

(a~~b~~) For weighing, load-receiving, and indicating elements in the same housing or covered on the same CC. An initial zero-setting mechanism shall not zero a load in excess of 20 % of the maximum capacity of the scale unless tests show that the scale meets all applicable tolerances for any amount of initial load compensated by this device within the specified range.

(b) *For indicating elements not permanently attached to weighing and load-receiving elements covered on a separate CC, the maximum initial zero-setting mechanism range of electronic indicators shall not exceed 20 % of the configured capacity.*
[Nonretroactive as of January 1, 2009]
(Added 2008)

Recommendation: This item was submitted to the NCWM by the sector to clarify HB44 language as a result of amending Publication 14 DES Section 41.2 for the verification of IZSM requirements on separable electronic indicating elements. The NIST Technical Advisor recommends that no additional action is required by the sector.

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

Background: See the Interim Report of the 2008 NCWM S&T Committee Agenda Items 320-5 for additional background information to amend S.2.4. and S.2.4.1. as follows:

S.2.4. Level-Indicating Means. – Except for portable wheel-load weighers and portable axle-load scales, a portable scale shall be equipped with level-indicating means if its weighing performance is changed by an amount greater than the appropriate acceptance tolerance when it is tilted up to and including 5 % in any direction from a level position and rebalanced. ~~moved from a level position and rebalanced in a position that is out of level in any upright direction by 5 % (approximately three degrees).~~ The level-indicating means shall be readable without removing any scale parts requiring a tool.

[This requirement in nonretroactive as of January 1, 1986, for prescription, jewelers', and dairy-product-test scales, and scales marked I and II.]

[Note: Portable wheel-load weighers and portable axle-load scales shall be accurate when tilted up to and including 5 % in any direction from a level position and rebalanced. ~~placed out of level up to and including 5 % (approximately three degrees).~~]
(Amended 1991 and 2008)

S.2.4.1. Vehicle On-Board Weighing Systems. – A vehicle on-board weighing system shall operate within tolerance when the weighing system is tilted up to and including 5 % in any direction from a level position and rebalanced. ~~out of level up to three degrees or 5 %.~~ If the accuracy of the system is affected

by out-of-level conditions normal to the use of the device, the system shall be equipped with an out-of-level sensor that inhibits the weighing operation when the system is out of level to the extent that the accuracy limits are exceeded.
(Added 1992) (Amended 2008)

Recommendation: The NIST Technical Advisor recommends amending DES Sections 55 and 56 as follows:

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

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

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

55.1.1. accurate or — Yes ☐ No ☐ N/A ☐

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

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

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

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

***NOTE:** 5 percent refers to 5 percent slope/grade*

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

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

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

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

***NOTE:** 5 percent refers to 5 percent slope/grade*

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

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

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

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

5. Add New and Amended Tare Definitions and Tare Requirements

Source: NTEP Participating Laboratories (Carryover Item):

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

During its 2008 Annual Meeting, the NCWM agreed with the comments that this item needed additional time for review and analysis and that the item be given "information" status. The NIST technical advisor will develop a 1-2 hour technical presentation on the proposed tare requirements that will be available to the regional weights and measures associations, and posted on the WMD website.

Discussion: The NIST Technical Advisor will provide the Sector with an update on the status of the technical presentations.

6. Minimum Size of Weight and Units Indications

Source: 2007 Weighing Sector Item 7 (Carryover Item)

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

S.1.4. Indicators.

S.1.4.6. Direct Sale Primary Indications – Size and Character. Scales designed for direct sale applications with a capacity of 100 kg (200 lb) or less shall comply with the following:

a. All indications shall be indicated clearly and simultaneously.

b. All indications and associated descriptive markings (e.g., lb, kg, gross, tare, net, etc.) shall be presented in such a style of type or lettering as to be boldly, clearly, and conspicuously presented with respect to other type, lettering, or graphics ~~and shall be at least 2 mm (3/32 in) high~~.

c. All indications and associated descriptive markings shall be in a color or shade that contrasts conspicuously with its background.

d. All primary numeric indications displayed to the customer shall be at least 9.5 mm (0.4 in) high.

~~***e. All units and descriptors shall be at least 2 mm (5/32 in) high.***~~

[Nonretroactive as of January 1, 200X]
(Added 200X)

~~**UR.2. Installation Requirements.**~~

~~**UR.2.10. Primary Indicating Elements Provided by the User. – Primary indicating elements that are not the same as the primary indicating elements provided by the original equipment manufacturer (e.g., video display monitors) shall comply with the following:**~~

~~**(a) On digital devices that display primary indications during direct sales to the customer, the numerical figures displayed to the customer shall be at least 9.5 mm (0.4 in) high.**~~

~~**(b) The units of mass and other descriptive information, such as gross, tare, net, etc., shall be displayed or marked on the device and shall be at least 2 mm (0.08 in) high.**~~
~~**(Added 200X)**~~

~~**UR.2.11. Minimum Reading Distance – On digital devices that display primary indications, the height of the numbers expressed in millimeters should be not less than three times the minimum reading distance expressed in meters, without being less than 2 mm (0.08 in). (Example: If the height of the primary indications is 10 mm, then the minimum reading distance should not be greater than 30 m).**~~
(Added 200X)

7. Hopper Scale Design Parameters - Technical Policy

Source: **2007 WS Agenda Item 10** (Carryover Item)

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

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

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

This item was further discussed during the 2008 NTEP Participating Laboratory meeting included the reviewing the following definition of type is from the NCWM Publication 14 Administrative Policy definition section as it applies to hopper scales **and** other device types.

A.19. Type. - A model or models of a particular measurement system, instrument, element or a field standard that positively identifies the design. A specific type may vary in its measurement ranges, size, performance, and operating characteristics as **specified in the Certificate of Conformance.**

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

T.3.4 Type

Definitive model of a weighing instrument or module (including a family of instruments or modules) of which all of the elements affecting its metrological properties are suitably defined.

T.3.5 Family *[adapted from OIML B 3: 2003, 2.3]*

Identifiable group of weighing instruments or modules belonging to the same manufactured type that have the same design features and metrological principles for measurement (for example the same type of indicator, the same type of design of load cell and load transmitting device) but which may differ in some metrological and technical performance characteristics (e.g. Max, Min, *e*, *d*, accuracy class, etc.).

The concept of a "family" primarily aims to reduce the testing required at type examination. It does not preclude the possibility of listing more than one family in one Certificate.

Discussions included evaluating new features to be added on older electronic devices and if the entire checklist be reviewed when an amendment is requested to add or change a feature. Two labs go through the entire checklist (does not do IF testing) to verify that the change does not impact an unrelated feature, e.g., adding a lb/kg switch impacted the overcapacity blanking and accuracy in one of the units. MC is also concerned about older (10 year) certificates on electronic devices.

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

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

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

- housings;
- load receptors;
- temperature and humidity ranges;
- instrument functions;
- indications;
- highest number of verification scale intervals,
- n_{max};
- verification scale interval, e_{min};
- lowest input signal, µV/e (when using analog strain gauge load cells);
- accuracy classes;
- temperature ranges;
- single range, multiple range or multi-interval instrument;
- maximum size of load receptor, if significant;
- maximum number of instrument functions;
- maximum number of indications;
- maximum number of peripheral devices connected;
- maximum number of implemented digital devices;

- maximum number of analog and digital interfaces;
- several load receptors, if connectable to the indicator;
- different types of power supply (mains and/or batteries);
- etc.

Discussion: The Sector is asked to review the background information and the information from the NTEP labs to determine the next course of action.

8. Method of Sealing – Set-up and Verification of Calibration/Configuration Access

Source: NTEP Director

Background: It is requested that the Sector review the following item from the NTETC Weighing Sector Annual Meeting September 11-13, 2003 Fresno, California FINAL Summary, Item 18. Physical Security Seals on Scales with External Calibration Capability.

18. Physical Security Seals on Scales with External Calibration Capability.

Source: NTEP Participating Laboratories

Background: At the 2003 NTEP Participating Laboratory Meeting, the participating labs reported they have come across examples where a device could be sealed with a physical security seal while the device had been configured with access to external means to change calibration and configuration parameters. The labs have been using Handbook 44 General Code paragraph G-S.2. Facilitation of Fraud to require the applicant to correct this problem.

One laboratory reported that it had to accept this because the applicant stated that "if the operator had followed the operating instructions, this would not happen." Furthermore, the applicant cited Handbook 44 General Code paragraph G-UR.3.1 Method of Operation that states:

> **G-UR.3.1 Method of Operation.** - Equipment shall be operated in the manner that is obviously indicated by its construction or that is indicated by instructions on the equipment.

It was pointed out that Handbook 44 General Code paragraph G-S.8. Provision for Sealing Adjustable Components. and Scale Code paragraph S.1.11. Provision for Sealing. state that provisions 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**. The participating laboratories believe that external access to the calibration or configuration parameters without breaking a security seal or advancing the event counters does not comply with Handbook 44 regardless of the operator instruction manuals.

Some labs stated that there should be something in Publication 14 that tells the evaluator to look for ways to access the calibration or configuration parameters without breaking a security seal or advancing the event counters. Alternatively, Handbook 44 could be amended to make it clear that the device provide an indication that it is in the calibration mode.

This was considered an appropriate subject for the joint LMD and Weighing Sectors discussion since it involves all devices.

It was also noted that Publication 14, Section 10.10 - Category 1 Devices does not go into detail regarding compliance with Handbook 44 references. Existing language only asks if the device is sealable with a physical seal (Y/N/NA) or equipped with two event counters. Publication 14 does not ask the evaluator to verify if the physical seal is effective (reference G.S.8. and S.1.11.a.).

The NTEP weighing laboratories recommended a proposal be developed and submitted to the NCWM S&T Committee to amend the language for Category 1 devices to require a device to clearly indicate it is in the calibration mode and record such message if capable of printing in this mode (similar to the requirement for

Category 2 devices). The language should be consistent with the language used for Category 2 devices. Additionally, the laboratories developed language changing the "notes" on physical seals into a checklist format and suggested additional language requiring the physical seal be "effective." The laboratories further recommended the Sector review and recommended checklist language be added to Publication 14, paragraphs 10.10 to assure NTEP evaluations physical seals are verifiably effective.

Discussion: The Weighing Sector discussed the amendments to Publication 14 recommended by the participating laboratories. The manufacturers present were concerned the term "effective" in proposed paragraph 10.14 is vague and should be more definitive. There was also discussion that the new language in proposed paragraph 10.14 be effective one year after its incorporation into Publication 14. There was also a suggestion to amend Handbook 44 Method of Sealing for Category 1 weighing devices to require the device to clearly indicate when it is in the "set-up mode." It was reported that there was a commitment from Will Wotthlie (Maryland Measuring Sector laboratory) to submit a proposal to the Southern Weights and Measures Association at its 2003 annual meeting.

Conclusion: The Sector supports the interpretation of Handbook 44 General Code paragraphs G-S.2 Facilitation of Fraud, G-S.8. Provision for Sealing Adjustable Components, and Scale Code paragraph S.1.11. Provision for Sealing that provisions 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 regardless of instructions provided in the instruction/service manual for the device. The Sector further agreed to support the concept of the proposal to amend Handbook 44 Category 1 Method of Sealing to require a device clearly indicate that it is in the set-up mode.

The Sector also recommended the following amendments to Publication 14, section 10. The language proposed by the laboratories and amended by the Sector was given a 2005 effective date to allow NTEP applicants not in attendance sufficient time to comply with the new checklist requirements.

(See Publication 14 Sections 10.11 through 10.19 for the language recommended by the Weighing Sector.)

There is disagreement among the NTEP labs on this topic. If you review the previous item from the Sector, changes were made to Pub 14 in the anticipation of changes to HB 44. The changes to HB 44 did not happen. There may be a problem with Pub 14 since the current procedures and type evaluation requirements are not fully supported by HB44.

The discussion in 2003 was to address a specific deficiency that was found in several devices at that time. At least one device manufacturer attempted to address this deficiency with changes to the device function. This device was evaluated and based on the input from the NTEP lab, the NTEP Committee Chair and the NTEP Director, it was determined that this device did meet the requirements. Currently several NTEP labs do not believe that this "fix" is acceptable.

It is requested that this item be reviewed and discussed by the sector and assist the NTEP Director and the NTEP labs resolve this issue.

The NTEP Director has provided additional the following observations based on a series of email exchanges on this item.

As some of you may know, I have been out of the office since June 1, some of the email exchanges on this item came in before that time, but most after. I will now contribute to the conversation.

First off, I would like to say that such discussions are healthy for NTEP, as long as they are kept positive and productive and focus on objective facts.

Andrea provided a good background on this item from the Sector Meeting of 2003, item 18. Also, Todd provided some email exchanges on this topic from that same time frame.

Pub 14 is not a standard or a regulation; it is a checklist to determine if a device is capable of meeting the applicable

requirements of NIST Handbook 44. It is also not design based, it is performance based.

In this particular case, Pub 14 was changed in anticipation of similar changes being made to HB44. In hindsight that was an error on the part of the Sector to recommend such a change. Currently Pub 14 is not in line with HB44. Or, it is not being interpreted in line with HB 44.

9. S.1.1.(c) Zero Indication (Sleep/screen saver/power save Modes)

Source: WS Agenda Carryover Item 4.(d)

Background: See the 2007 NTETC Weighing Sector Meeting Summary for additional background information. The NIST Technical Advisor revised the ballot proposal and submitted to the NTEP Participating laboratories during in 2008 annual meeting. The labs agreed with the revised language. The NIST Technical Advisor developed a table that compares the original and revised versions of the ballot language with the revised language highlighted in yellow.

Discussion: The sector is asked to review the following revised ballot language and discuss recommending that Publication 14 be amended to clarify the evaluation procedures for verifying that "sleep/screen saver/power save features comply with paragraph S.1.1.(c) and do not conflict with other HB44 requirements.

Original Ballot Language

Publication 14 – Digital Electronic Scales (DES)

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

11.8.4. Does the scale or indicating element have a: ~~Yes ☐ No ☐ N/A~~
- ☐ screen saver/sleep ~~or~~ mode, or ☐
- ☐ power save mode?

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

Manufacturers have been adding screen savers and sleep modes to scales for the purpose of prolonging the useful life of displays or provide promotional or other information on displays during periods of scale inactivity.

Additionally, some scales have automatic shut-off, or power (battery) save modes. These features promote energy conservation or prolong battery life in battery-operated scales. This feature either automatically turns off the scale after a period of inactivity or only turns off the display. If the power or battery save mode only turns off the display to save power, the feature is considered to be a sleep mode and should be evaluated using the screen saver/sleep mode criteria.

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

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

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

Summary of Screen Saver/Sleep and Power Save Mode of Operation				
Mode	Display	Activated by	Exited by	Verified by

Revised Ballot Language (Revisions are indicated in highlighted text)

Publication 14 – Digital Electronic Scales (DES)

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

11.8.4. Does the scale or indicating element have a: ~~Yes ☐ No ☐ N/A~~
- ☐ screen saver/sleep ~~or~~ mode, or ☐
- ☐ power save mode?

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

Manufacturers have been adding screen savers and sleep modes to scales for the purpose of prolonging the useful life of displays or provide promotional or other information on displays during periods of scale inactivity.

Additionally, some scales have automatic shut-off, or power (battery) save modes. These features promote energy conservation or prolong battery life in battery-operated scales. This feature either automatically turns off the scale after a period of inactivity or only turns off the display. If the power or battery save mode only turns off the display to save power, the feature is considered to be a sleep mode and should be evaluated using the screen saver/sleep mode criteria.

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

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

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

Summary of Screen Saver/Sleep and Power Save Mode of Operation				
Mode	Display	Activated by	Exited by	Verified by

Original Ballot Language				
Screen Saver/Sleep	i.e., Scrolling or other non metrological information, blank, or annunciator	Period of time at gross load center of zero	Change in weight, i.e., no longer at gross load zero	***Accurate weights are displayed*** under all the following conditions when: - weight is added to the LRE, - weight is removed from the LRE, and - the LRE is disturbed by hand.
		Period of time with a non changing load on the scale	Deliberate operator action (remove load off scale and rezero if necessary)	***No weights are displayed*** under all the following conditions when: - weight is added to the LRE, - weight is removed from the LRE, and - the LRE is disturbed by hand .
Power Save	Off/Blank	Period of time with no activity on the LRE (loaded or unloaded)	Pressing a button, or other deliberate operator action (e.g., turn on the scale, etc.)	***Accurate weights are ~~displayed~~ indicated or recorded*** according to Publication 14 Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2.

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

Original Ballot Language	*Revised Ballot Language (Revisions are indicated in highlighted text)*
11.8.4.1. If the scale can only enter a screen saver/sleep mode ***with no load on the LRE***, perform the following steps to verify that automatic means are provided to inhibit a weighing operation unless the scale is at zero. **Yes ☐ No ☐ N/A ☐** 1. Add a load plus 20 d to the LRE and rezero the scale. 2. Observe the scale while indicating zero and note the amount of time taken to enter the screen saver/sleep mode. _____ 3. The scale shall exit the screen saver/sleep mode when the 20 d is removed from the scale. **Yes ☐ No ☐** 4. Observe the scale indication for the amount of time taken to enter the screen saver/sleep mode noted in Step 2. The scale complies if it does not reenter the screen saver/sleep mode. **Yes ☐ No ☐** 5. Rezero the scale and allow the scale to enter the screen saver/sleep mode. 6. The scale shall exit the screen saver/sleep mode when the 20 d is now added to the LRE. **Yes ☐ No ☐** 7. Rezero the scale by removing the 20 d from the LRE to allow the scale to enter the screen saver/sleep mode. 8. The scale shall exit the screen saver/sleep mode when the LRE is momentarily disturbed by hand. **Yes ☐ No ☐**	11.8.4.1. If the scale can only enter a screen saver/sleep mode ***with no load on the LRE***, perform the following steps to verify that automatic means are provided to inhibit a weighing operation unless the scale is at zero. 1. Add a load plus 20 d to the LRE and rezero the scale. 2. Observe the scale while indicating zero and note the amount of time taken to enter the screen saver/sleep mode. _____ 3. The scale shall exit the screen saver/sleep mode when the 20 d is removed from the scale. **Yes ☐ No ☐** 4. Observe the scale indication for the amount of time taken to enter the screen saver/sleep mode noted in Step 2. The scale complies if it does not reenter the screen saver/sleep mode. **Yes ☐ No ☐** 5. Rezero the scale and allow the scale to enter the screen saver/sleep mode. 6. The scale shall exit the screen saver/sleep mode when the 20 d is now added to the LRE. **Yes ☐ No ☐** 7. Rezero the scale by removing the 20 d from the LRE to allow the scale to enter the screen saver/sleep mode. 8. The scale shall exit the screen saver/sleep mode when the LRE is momentarily disturbed by hand. **Yes ☐ No ☐**

Original Ballot Language	*Revised Ballot Language (Revisions are indicated in highlighted text)*
11.8.4.2. If the scale can enter a screen saver/sleep mode ***with a load on the LRE,*** verify that automatic means are provided to inhibit a weighing operation when the scale is in an out-of-balance condition. While in the screen saver/sleep mode and with a load on the LRE, the scale ***shall not indicate a weight*** under all the following conditions when; ☐ an additional load is added to the LRE, ☐ a partial load is removed from the LRE, and ☐ the LRE is disturbed by hand. The scale is permitted to return to a zero indication when the entire load is removed from the LRE (unloaded condition) or the operator is required to zero the scale. **Yes ☐ No ☐ N/A ☐**	11.8.4.2. If the scale can enter a screen saver/sleep mode ***with a load on the LRE,*** verify that automatic means are provided to inhibit a weighing operation when the scale is in an out-of-balance condition. While in the screen saver/sleep mode and with a load on the LRE, the scale ***shall not indicate a weight*** under all the following conditions when; ☐ an additional load is added to the LRE, ☐ a partial load is removed from the LRE, and ☐ the LRE is disturbed by hand. The scale is permitted to return to a zero indication when the entire load is removed from the LRE (unloaded condition) or the operator is required to zero the scale. **Yes ☐ No ☐ N/A ☐**
11.8.4.3. Does the scale have a power save mode feature? **Yes ☐ No ☐** If Yes, Attempt to initiate a weighing transaction while the scale display is off or blank when: ☐ an additional load is added to the LRE, ☐ a partial load is removed from the LRE, and ☐ a load on the LRE is disturbed by hand. Perform the tests described in Pub 14 Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2 as appropriate to verify the accuracy of the scale after its power has been lowered or turned off. ~~**If Yes**, Perform the tests described in Pub 14 Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2 as appropriate to verify the accuracy of the scale after its power has been lowered or turned off.~~ **Yes ☐ No ☐ N/A ☐**	11.8.4.3. Does the scale have a power save mode feature? **Yes ☐ No ☐** If Yes, Attempt to initiate a weighing transaction while the scale display is off or blank when: ☐ an additional load is added to the LRE, ☐ a partial load is removed from the LRE, ~~**and**~~ ☐ a load on the LRE is disturbed by hand**, and** ☐ **power is restored to the scale with weight on the scale.** Perform the tests described in Pub 14 Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2 as appropriate to verify the accuracy of the scale after its power has been lowered or turned off. ~~**If Yes**, Perform the tests described in Pub 14 Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2 as appropriate to verify the accuracy of the scale after its power has been lowered or turned off.~~ **Yes ☐ No ☐ N/A ☐**
11.8.4.3. Verify that recording and printing functions are inhibited when the device is in screen saver/sleep or power save mode. **Yes ☐ No ☐ N/A ☐**	11.8.4.3. Verify that recording and printing functions are inhibited when the device is in screen saver/sleep or power save mode. **Yes ☐ No ☐ N/A ☐**
Publication 14 – Electronic Cash Registers Interfaced with Scales	***Publication 14 – Electronic Cash Registers Interfaced with Scales***

Original Ballot Language	*Revised Ballot Language (Revisions are indicated in highlighted text)*

(ECRS)

1. Zero Indication

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

A digital electronic scale must be capable of defining a zero-balance condition within 0.5 scale division (d) for all weight units and may be defined within ± 0.25d. In ~~If~~ a point-of-sale system automatically monitors its zero balance condition ~~and inhibits scale operation when an out-of-zero-balance condition is detected~~, a continuous digital zero balance indication is not required provided that automatic means is provided to inhibit a weighing operation or to return to a continuous digital indication when the scale is in an out-of-balance condition.

Manufacturers of scales and point-of-sale systems have been adding screen savers and sleep modes to scales for the purpose of prolonging the useful life of displays or provide promotional or other information on displays during periods of scale inactivity.

Additionally, some scales and point-of-sale systems have automatic shut-off, or power (battery) save modes. These features promote energy conservation or prolong battery life in battery-operated scales. This feature either automatically turns off the scale after a period of inactivity or only turns off the display. If the power or battery save mode only turns off the display to save power, the feature is considered to be a sleep mode and should be evaluated using the screen saver/sleep mode criteria.

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

> **screen saver/sleep mode.** A function of a device that blanks the display or shows information other than weight indications after a defined period of non use.
>
> **power save mode.** A function of a device that automatically blanks indications and turns off or reduces power to the electronics after a defined period of non use in order to save line or battery power. Operator intervention is required to restore operation (e.g., return the scale to zero, turn on the scale, etc.).

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

Mode	Display	Activated by	Exited by	Verified by
Screen Saver/Sleep	i.e., Scrolling or other non metrological information blank, or annunciator	Period of time at gross load center of zero	Change in weight, i.e., no longer at gross load zero	***Accurate weights are displayed*** under all the following conditions when: - weight is added to the LRE, - weight is removed from the LRE, and - the LRE is disturbed by hand.
		Period of time with a non changing load on the scale	Deliberate operator action (remove load off scale and rezero if	***No weights are displayed*** under all the following conditions when: - weight is added to the LRE, - weight is removed from the

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

Mode	Display	Activated by	Exited by	Verified by
Screen Saver/Sleep	i.e., Scrolling or other non metrological information blank, or annunciator	Period of time at gross load center of zero	Change in weight, i.e., no longer at gross load zero	***Accurate weights are displayed*** under all the following conditions when: - weight is added to the LRE, - weight is removed from the LRE, and - the LRE is disturbed by hand.
		Period of time with a non changing load on the scale	Deliberate operator action (remove load off scale and rezero if	***No weights are displayed*** under all the following conditions when: - weight is added to the LRE, - weight is removed from the

Original Ballot Language				
			necessary)	LRE, and - the LRE is disturbed by hand.
Power Save	Off/Blank	Period of time with no activity on the LRE (loaded or unloaded)	Pressing a button, or other deliberate operator action (e.g., turn on the scale, etc.)	***Accurate weights are displayed*** according to Publication 14 Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2.

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

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

1.1. Unless the point-of-sale system automatically monitors the zero-balance condition, the scale or cash register shall have a continuous weight display to indicate zero-balance and weight values. **Yes ☐ No ☐ N/A ☐**

1.2. The weight display must be visible to both the customer and the operator. **Yes ☐ No ☐ N/A ☐**

Indicate the type of weight display that is provided:

☐ Remote weight display
☐ Integral with scale
☐ Integral with ECR

*Revised Ballot Language (Revisions are indicated in **highlighted** text)*				
			necessary)	LRE, and - the LRE is disturbed by hand.
Power Save	Off/Blank	Period of time with no activity on the LRE (loaded or unloaded)	**Return the scale to a zero-balance indication with the automatic zero tracking or semi-automatic zero-setting mechanisms**, or other deliberate operator action (e.g., turn on the scale, etc.)	***No weights are displayed*** **under all the following conditions when:** **- weight is added to the LRE,** **- weight is removed from the LRE, and** **- the LRE is disturbed by hand.** **- power is restored to the scale with weight on the LRE.** ***Accurate weights are ~~displayed~~ indicated or recorded*** according to Publication 14 Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2 **since power may have been turned off or reduced to the electronics and load cell while in the power save mode.**

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

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

1.1. Unless the point-of-sale system automatically monitors the zero-balance condition, the scale or cash register shall have a continuous weight display to indicate zero-balance and weight values. **Yes ☐ No ☐ N/A ☐**

1.2. The weight display must be visible to both the customer and the operator. **Yes ☐ No ☐ N/A ☐**

Indicate the type of weight display that is provided:

☐ Remote weight display
☐ Integral with scale
☐ Integral with ECR

Original Ballot Language	*Revised Ballot Language (Revisions are indicated in highlighted text)*
1.3. If the point-of-sale system automatically monitors the zero-balance condition of the scale, the system shall automatically prohibit scale operation when an out-of-zero balance condition is detected, or return to a continuous digital indication when the POS scale is in an out-of-balance condition. Does the scale or indicating element have a: screen saver/sleep mode, **Yes ☐ No ☐** power save mode? **Yes ☐ No ☐**	1.3. If the point-of-sale system automatically monitors the zero-balance condition of the scale, the system shall automatically prohibit scale operation when an out-of-zero balance condition is detected, or return to a continuous digital indication when the POS scale is in an out-of-balance condition. Does the scale or indicating element have a: screen saver/sleep mode, **Yes ☐ No ☐** power save mode? **Yes ☐ No ☐**
1.3.1. If the scale and point-of-sale system (POS) can only enter a screen saver/sleep mode ***with no load on the LRE***, perform the following steps to verify that automatic means are provided to inhibit a weighing operation unless the scale is at zero. **Yes ☐ No ☐ N/A ☐** 1. Add a load plus 20 d to the LRE and rezero the scale. 2. Observe the weight display while indicating zero and note the amount of time taken to enter the screen saver/sleep mode. _____ 3. The scale or POS shall exit the screen saver/sleep mode when the 20 d is removed from the scale. **Yes ☐ No ☐** 4. Observe the weight indication for the amount of time taken to enter the screen saver/sleep mode noted in Step 2. The scale complies if it does not reenter the screen saver/sleep mode. **Yes ☐ No ☐** 5. Rezero the scale and allow the scale to enter the screen saver/sleep mode. 6. The scale or POS shall exit the screen saver/sleep mode when the 20 d is now added to the LRE. **Yes ☐ No ☐** 7. Rezero the scale by removing the 20 d from the LRE to allow the scale to enter the screen saver/sleep mode. 8. The scale or POS shall exit the screen saver/sleep mode when the LRE is momentarily disturbed by hand. **Yes ☐ No ☐**	1.3.1. If the scale and point-of-sale system (POS) can only enter a screen saver/sleep mode ***with no load on the LRE***, perform the following steps to verify that automatic means are provided to inhibit a weighing operation unless the scale is at zero. **Yes ☐ No ☐ N/A ☐** 1. Add a load plus 20 d to the LRE and rezero the scale. 2. Observe the weight display while indicating zero and note the amount of time taken to enter the screen saver/sleep mode. _____ 3. The scale or POS shall exit the screen saver/sleep mode when the 20 d is removed from the scale. **Yes ☐ No ☐** 4. Observe the weight indication for the amount of time taken to enter the screen saver/sleep mode noted in Step 2. The scale complies if it does not reenter the screen saver/sleep mode. **Yes ☐ No ☐** 5. Rezero the scale and allow the scale to enter the screen saver/sleep mode. 6. The scale or POS shall exit the screen saver/sleep mode when the 20 d is now added to the LRE. **Yes ☐ No ☐** 7. Rezero the scale by removing the 20 d from the LRE to allow the scale to enter the screen saver/sleep mode. 8. The scale or POS shall exit the screen saver/sleep mode when the LRE is momentarily disturbed by hand. **Yes ☐ No ☐**

Original Ballot Language			*Revised Ballot Language (Revisions are indicated in highlighted text)*		
1.3.2.	If the scale or POS can enter a screen saver/sleep mode ***with a load on the LRE,*** verify that automatic means are provided to inhibit a weighing operation when the scale is in an out-of-balance condition. While in the screen saver/sleep mode with a load on the LRE, the scale or POS ***shall not indicate a weight*** under all the following conditions when; ☐ an additional load is added to the LRE, ☐ a partial load is removed from the LRE, and ☐ the LRE is disturbed by hand. The scale or POS is permitted to return to a zero indication when the entire load is removed from the LRE (unloaded condition) or the operator is required to zero the scale.	**Yes ☐ No ☐ N/A ☐**	1.3.2.	If the scale or POS can enter a screen saver/sleep mode ***with a load on the LRE,*** verify that automatic means are provided to inhibit a weighing operation when the scale is in an out-of-balance condition. While in the screen saver/sleep mode with a load on the LRE, the scale or POS ***shall not indicate a weight*** under all the following conditions when; ☐ an additional load is added to the LRE, ☐ a partial load is removed from the LRE, and ☐ the LRE is disturbed by hand. The scale or POS is permitted to return to a zero indication when the entire load is removed from the LRE (unloaded condition) or the operator is required to zero the scale.	**Yes ☐ No ☐ N/A ☐**
1.3.3.	Does the scale or POS have a power save mode feature? **Yes ☐ No ☐** **If Yes**, perform the tests described in Pub 14 DES Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2 as appropriate to verify the accuracy of the scale after its power has been lowered or turned off.	**Yes ☐ No ☐ N/A ☐**	1.3.3.	Does the scale or POS have a power save mode feature? **Yes ☐ No ☐** If Yes, Attempt to initiate a weighing transaction while the scale display is off or blank when: ☐ an additional load is added to the LRE, ☐ a partial load is removed from the LRE, ~~**and**~~ ☐ a load on the LRE is disturbed by hand, **and** ☐ **power is restored to the scale with weight on the scale.** ~~**If Yes,**~~ Perform the tests described in Pub 14 DES Section 53. Values Displayed, Temperature Conditions (Warm-up) Test Procedure 1 or 2 as appropriate to verify the accuracy of the scale after its power has been lowered or turned off.	**Yes ☐ No ☐ N/A ☐**
1.3.4.	Verify that recording and printing functions are inhibited when the scale or POS is in screen saver/sleep or power save mode.	**Yes ☐ No ☐ N/A ☐**	1.3.4.	Verify that recording and printing functions are inhibited when the scale or POS is in screen saver/sleep or power save mode.	**Yes ☐ No ☐ N/A ☐**

10. Vehicle and Railway Track Scales

Submitted by: 2007 Weighing Sector Carryover Agenda Item 3.

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

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

Edited by AREMA Committee 34 Adhoc Subcommittee on 11/27/07 (Note to reader. Select "Final Showing Markup" to view or print changes.)

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.*

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. 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.

69.4. 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 [3d 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.

At its 2008 meeting, the NTEP participated laboratories reviewed the proposed revisions form AREMA Committee 34 Adhoc subcommittee. During the discussion on this item, Steve Patoray and Ron Rigdon (MN) noted a couple of

places where clarification may be needed. Additionally, the labs believed that the referenced sections of the AAR handbook should be included in Publication 14 (with proper citation).

Discussion: The SMA and Stephen Patoray or Ron Rigdon will update the sector on developing suggestions to accept or improve that language in the proposed changes developed by the AREMA Committee 34 Adhoc subcommittee. Additionally, the Sector is asked to discuss including applicable language and definitions from the AAR Scale Handbook.

11. Minimum Size of Weight and Units Indications

Submitted by: 2007 Weighing Sector Carryover item No: 7.

Background: See the 2008 NCWM Specifications and Tolerance Committee Interim Report Item 360-2: Developing Items Part 1, Item 1 Scales "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 2007 Weighing Sector Summary Item 7 for additional background information.

At its 2008 NTEP Participating Laboratory meeting, the NTEP labs discussed the item sent back to the Sector by the S&T Committee along with their comments and recommends that the Weighing Sector delete the language highlighted in yellow. The deleted language would have been in addition to the requirements in OIML R76 and Measurement Canada. The labs recognize that, although it would be beneficial to include minimum size requirements for values and associated descriptive markings, General Code paragraphs G-S.5.1. General, G-S.5.2.3. Size and Character, and G-S. 5.2.4. Values will have to be considered in determining the readability of indications of associated values and markings. Additionally, the labs believe that G-UR. 3.3. Position of Equipment addresses the position of a device so that its indications can be accurately read and recommends that the proposed user requirements in UR.2.10. Primary Indicating Elements be deleted in the developing item. No comments were made regarding the proposed new definition for primary indicating element.

S.1.4. Indicators.

S.1.4.6. Direct Sale Primary Indications – Size and Character. Scales designed for direct sale applications with a capacity of 100 kg (200 lb) or less shall comply with the following:

a. All indications shall be indicated clearly and simultaneously.

b. All indications and associated descriptive markings (e.g., lb, kg, gross, tare, net, etc.) shall be presented in such a style of type or lettering as to be boldly, clearly, and conspicuously presented with respect to other type, lettering, or graphics ~~***and shall be at least 2 mm (3/32 in) high.***~~

c. All indications and associated descriptive markings shall be in a color or shade that contrasts conspicuously with its background.

d. All primary numeric indications displayed to the customer shall be at least 9.5 mm (0.4 in) high.

~~***e. All units and descriptors shall be at least 2 mm (3/32 in) high.***~~

[Nonretroactive as of January 1, 200X]
(Added 200X)

Discussion: The Sector is asked to review and discuss the recommendation from the NTEP lab

New Items

12. Publication 14 Clarification on Section 66(c). Performance and Permanence Tests for "Side-by-Side" Modular and Non-Modular Vehicle Scales.

Submitted by:

Background: Current wording in Pub 14 Section 66(c) is unclear if "Subsequent Type Evaluation (Field) Permanence Tests" are required. It was understood at the time that the language was written that subsequent testing would be required and there has been at least one "double wide" feature added to an existing CC that included a subsequent test. However, the language that was accepted did not clearly state that. As a result, manufacturer representatives and sector members may not recall the specific discussions at the 2001 meeting of the Weighing Sector. Additionally, other applicants and new sector members will have trouble concluding that a subsequent test is required since the language does not clearly state that the test needs to be repeated to add this option/feature to an existing CC. The NIST Technical Advisor recommends that the language be amended and clarified as shown in the following recommendation.

Recommendation/Discussion: The sector is asked to review and comment on the following proposed changed to Publication 14 DES Section 66c.

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

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

If the **load-receiving elements (LRE)** used in the "side-by-side" application do not have a CC, then at least one of the load-receiving elements **shall be tested as a "single" scale** according to Section 66(a) in addition to the following tests (CLC test load at least 90 percent).

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

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

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

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

66c.1. Indicator Tests
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13. Correction to Scale Tickets

Submitted by: Maryland NTEP Lab

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

The submitted proposal was to amend Section 35 which is for weigh in/out applications. Several of the labs believed that the subject may be more appropriate for section 13 Recorded Representations and limited to indirect sale applications. Steve Cook was able to verify that HB130 Weighmaster Regulation do not address correcting erroneous tickets similar to California Weighmaster Regulations.

After the meeting, Steve Cook reviewed the California Business and Professions Code, Weighmaster Law to investigate those requirements for voided and duplicate tickets in their weighmaster program. The California Law below does not specify additional requirements for a correction or duplicate certificate.

> 12716.5. A certificate on which a weight, measure, or count error is discovered after issuance shall be corrected by issuing a correction certificate to all parties who were issued the original certificate.
>
> The word "INCORRECT" shall be written across the face of the original certificate. The original certificate number and reason for the correction shall be recorded on the correction certificate.

Maryland was asked to revise and submit the proposal by to amend Pub 14 Section 13 the Sector for consideration.

Discussion/Conclusion: **No proposal has been received**

14. Stored tare for "Weigh-in/Weigh-out Applications

Submitted by: Ohio NTEP Lab

Background: At its 2008 NTEP Participating Laboratory meeting, the NTEP labs discussed a proposal from the Ohio NTEP lab to amend Section 35 which is for weigh in/out applications. The labs agreed that metrological weights stored in a "temporary memory" that is automatically deleted from memory after the net weight is determined is not considered as a stored tare and suggested that the following be further developed and submitted this to the sector for additional discussion and recommendations.

Ohio was asked to revise and submit the following proposal by to amend Pub 14 Section 35 for consideration by the sector.

35. Weigh-In/Weigh-Out Systems

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

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

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

Discussion/Conclusion: **No revised proposal has been received**

14. Money Values In Other Than 1 Cent Intervals

Submitted by: NTEP Participating Laboratories

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

Will Whottlie added that HB 44 LMD paragraph S.1.6.5 Money-Value Computations is subject to different interpretations during field verifications. The existing language does not specify that the values have to be continuously displayed. Will believes that the type evaluation requirements in Publication 14 LMD section is not carried over into field evaluations. The reference H44 paragraph should be amended as follows to be made clearer.

S.1.6.5. Money-Value Computations.

(a) A computing device shall compute ***and continuously display*** *the total sales price at any single-purchase unit price (i.e., excluding fleet sales, other price contract sales, and truck stop dispensers used only to refuel trucks) for which the product being measured is offered for sale at any delivery possible within either the measurement range of the device or the range of the computing elements, whichever is less.*
[Effective and nonretroactive as of January 1, 1991]

(b) The analog sales price indicated for any delivered quantity shall not differ from a mathematically computed price (quantity x unit price = total sales price) by an amount greater than the value in Table 1.
(Amended 1984, 1989, and 1993)

The labs discussed a proposal from Steve Cook to add "minimum value of currency" to the list if sealable parameters to all Pub 14 checklists since the feature could facilitate fraud if the minimum money value can be changes without an obvious indication to the customer. Additionally, agreed to submit and item to the WS amend the table of sealable parameters by adding check boxes to the individual features to make it less likely to overlook a specific parameter as shown below.

The labs agreed with WMD. Steve Cook and developed the following recommendation and agreed to submit it to the sector.

Will Whottlie also agreed to develop language to amend HB44 Section 3.30 paragraph S.1.6.5. and submit the proposal to the SWMA.

10.22	**Verify that the following sealable parameters are secured by a Category method of sealing.**	
	Coarse zero	Yes ☐ No ☐ N/A ☐
	Initial Zero-Setting Mechanism (IZSM) on separable indicating elements with limits that that can be adjusted more than 20% beyond the maximum capacity of	Yes ☐ No ☐ N/A ☐

the load-receiving element	
Span	Yes ☐ No ☐ N/A ☐
Linearity correction values	Yes ☐ No ☐ N/A ☐
Motion detection (on/off)	Yes ☐ No ☐ N/A ☐
Motion detection (number of divisions and speed of operation)	Yes ☐ No ☐ N/A ☐
Number of samples averaged for weight readings	Yes ☐ No ☐ N/A ☐
Averaging time for weight indications	Yes ☐ No ☐ N/A ☐
Selection of measurement units (if internally switched and not automatically displayed on the indicator)	Yes ☐ No ☐ N/A ☐
Division value, d	Yes ☐ No ☐ N/A ☐
Number of scale divisions, n	Yes ☐ No ☐ N/A ☐
Minimum money value on electronic computing devices ($ 0.01)	**Yes ☐ No ☐ N/A ☐**
Range of over capacity indications (if it can be set to extend beyond regulatory limits)	Yes ☐ No ☐ N/A ☐
Automatic zero-tracking mechanism (on/off) for bulk-weighers hopper scales and all Class III L devices	Yes ☐ No ☐ N/A ☐
Automatic zero-tracking mechanism (range of a single step)	Yes ☐ No ☐ N/A ☐
1/4 and 1/2 lb pricing capability or multiplier keys	Yes ☐ No ☐ N/A ☐
Weight Classifier mode (enabled/disabled)	Yes ☐ No ☐ N/A ☐
Manual Gross Weight Entries (enabled/disabled) for applications where this feature is not permitted in Handbook 44	Yes ☐ No ☐ N/A ☐
Other: Describe the parameter and provide justification according to the "Principles for Determining Features to be Sealed."	**Yes ☐ No ☐ N/A ☐**

15. Suitability of Pressure Sensitive Security Seals

Submitted by: Ohio Participating Laboratory

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

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

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

Handbook 44 Appendix D definition of Security seal states:

> **security seal.** A uniquely identifiable physical seal, such as a lead-and-wire seal or other type of locking seal, a pressure sensitive seal sufficiently permanent to reveal its removal, or similar apparatus attached to a weighing or measuring device for protection against or indication of access to adjustment.

Pressure sensitive seals are acceptable under the following conditions:

- The access hole (if applicable) to the metrological adjustments (e.g., through which a "calibration enable" switch would be activated), must be covered with a suitable rigid plug or cap.
- The location for the access to the metrological adjustments must not bridge the cover so as to leave cavities or air pockets under the seal.
- Devices intended to be installed in outdoor or adverse environments (washdown, etc.) or with NEMA 4 enclosures are not suitable for pressure sensitive seals.

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

Physical Seals – General

(Note: For devices intended to be installed in outdoor or adverse environments (wash down, etc.) or with NEMA 4 enclosures are not suitable for pressure sensitive seals since they are not considered durable for the intended environment unless the location of the access to the sealable parameters is protected from the environmental conditions. If a physical seal is used, the device shall be designed to accept a wire and lock security seal.)

10.12.1. The provision for sealing must be located such that a security seal can be applied without disassembly that exposes electronics. Any disassembly must be simple and not require excessive effort, for example, removing a protective cover plate to seal a junction box is acceptable. In general, it is desirable to be able to seal a device without the need for disassembly. Yes ☐ No ☐ N/A ☐

10.12.9. **Pressure sensitive seals are acceptable under the following conditions:** **Yes ☐ No ☐ N/A ☐**

- ☐ **The access hole (if applicable) to the metrological adjustments (e.g., through which a "calibration enable" switch would be activated), must be covered with a suitable rigid plug or cap, and**
- ☐ **The location for the access to the metrological adjustments must not bridge the cover so as to leave cavities or air pockets under the seal.**

~~10.12.9.~~ **10.12.10.** ***The scale shall clearly indicate it is in the set-up (calibration or configuration) mode, such as indicators, error message, or other means of indication that can not be interpreted as legal weight values (Effective January 1, 2005).*** Yes ☐ No ☐ N/A ☐

Discussion: The Sector is asked to review and discuss the above proposal to amend Publication 14 and recommend whether or not the requirements for physical seals are needed.

16. Identification of ECRS

Submitted by: NTEP Participating Laboratories

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

Discussion/Conclusion: **No revised proposal has been received**

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

Submitted by: Stephen Patoray, NTEP Director

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

Currently, HB 44 2.20 Scales and OIML R 76 NAWI are not harmonized regarding automatic zero-tracking mechanism and setting mechanisms.

OIML R 76 uses the term zero-tracking device; HB 44 uses automatic zero-tracking mechanism.

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

Therein lays the **Problem.**

Briefly: OIML R 76 defines Automatic zero-setting device as follows:

4.5.6 Automatic zero-setting devices (AZSD)

An automatic zero-setting device shall operate only when:

- the equilibrium is stable; and
- the indication has remained stable below zero for at least 5 seconds.

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

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.

It is my belief that HB 44 does not clearly state that this function is not allowed. If ones reviews Section 2.20 Scale subsection S.1.1 (c) and S.1.1.1. (b) (shown in red below) it could be interpreted to allow the automatic zero setting device as described in OIML R 76. That may not be a universal interpretation.

Also (a minor point) Section 43 in NCWM Publication 14 Weighing Devices, Digital Electronic Scales needs its title corrected.

Proposal: It is my proposal to this technical committee to review the information regarding automatic zero-tracking and automatic zero-setting. The items to be addressed in order are:

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

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

Additional background information, including applicable references to language in H44 (including Appendix D) and R76, and past NCWM S&T Committee discussions can be found in Weighing Sector Agenda Appendix C Attachment for Agenda Item 17.

18. Capacity - Markings and Display

Submitted by: Stephen Patoray, NTEP Director

Background:

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

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

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

When the four NTEP brick and mortar labs were polled on this question, two of the labs indicated that they would not allow the marking of the capacity by division, or the markings for counting on a scale display. One lab indicated that this would be an acceptable method. One lab did not respond.

The Weighing Sector needs to discuss this issue and either clarify this issue for the NTEP labs or recommend a clarification in HB 44, so that labs can consistently interpret the information found in both HB 44 and NCWM Pub 14.

The language in NCWM Publication 14, Weighing Devices, Digital Electronic Scales, Section K. Subsection 1. Item 1.14 is significant in that it mentions a “video terminal”. The NTEP labs were not clear on what a video terminal might be. Please review the following sections of Pub 14, then continue on.

1.11.	The nominal capacity by minimum division shall be marked in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator unless already apparent by the design of the device. This applies to mechanical scales, such as portable platform scales, with removable counterpoise weights marked since; 1) the markings on the weights are not readily apparent by viewing the reading face of the scale, 2) the additional weights are not a permanent part of the scale, and 3) additional weights can be added to the scales to incorrectly increase the capacity of the scale.	Yes ☐ No ☐ N/A ☐
1.12.	The capacity by division size shall be marked for all weight units that can be displayed such as in both pounds and kilograms.	Yes ☐ No ☐ N/A ☐

1.13.	If equipped with variable resolution, the scale shall be marked with the weight ranges and corresponding scale division sizes. Example: 0-3 kg (6 lb) x 1 g (0.002 lb) 0-6 lb x 0.002 lb 3-6 kg (15 lb) x 2 g (0.005 lb) or 6-15 lb x 0.005 lb 6-15 kg (33 lb) x 5 g (0.01 lb) 15-33 lb x 0.01 lb	Yes ☐ No ☐ N/A ☐
1.14.	If the capacity by division statement is displayed on a video terminal with the weigh values, then the capacity by division statement must be indicated in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator unless already apparent by the design of the device and displayed whenever the system is in the weighing mode.	Yes ☐ No ☐ N/A ☐

The following examples represent capacity and value markings that are conspicuous and readily apparent when viewing the reading face. Each scale division value or weight unit shall be marked on multiple range or multi-interval scales.

(scale drawings not included here)

The capacity by value markings are not required if they are already apparent by the design of the device such as the largest weight value that is defined on a single revolution scale, fan scale, and beam scales and balances.

The following examples are types of scales where the capacity by scale division is readily apparent since the graduations, and beam capacities are marked with their respective values.

(scale drawings not included here)

1.15.	Scales designed for special applications must be conspicuously marked to limit their use. Special marking used:	Yes ☐ No ☐ N/A ☐
1.16.	If a scale has an operational counting feature, it must be marked on both the operator and customer side with the statement, "The counting feature is not legal for trade." ***NOTE**: Not applicable to prescription scales meeting paragraph 1.19 below.*	Yes ☐ No ☐ N/A ☐
1.17.	If a Class I or Class II prescription scale complies with paragraphs S.1.2.3., S.2.5.3., and S.6.6., it shall be:	
1.17.1.	marked, “Counting Feature for Prescription Filling Only” (see test procedure in Section 58);	Yes ☐ No ☐ N/A ☐
1.17.2.	marked with the minimum piece weight and minimum number of pieces used to establish an individual piece count.	Yes ☐ No ☐ N/A ☐
1.18.	All markings must be clear and easily readable.	Yes ☐ No ☐ N/A ☐
1.19.	The lettering for all markings must be permanent. Record the grade for the permanence of markings:	Yes ☐ No ☐ N/A ☐
1.20.	If the markings for other than device identification required by G-S.1. is placed on badge or decal, then the badge or decal must be durable (difficult to remove at all temperatures).	Yes ☐ No ☐ N/A ☐

In 1992 the S&T Committee took on this topic and an item that was adopted by the NCWM at that time stated that:

320-6 VC S.6.3. Marking Requirements; Capacity by Division

(This item **was adopted** as part of the consent calendar.)

Recommendation: The Committee recommends that Tables S.6.3.a. and S.6.3.b. (note 3) be interpreted to permit the **required capacity and scale division markings** to be presented as part of the **scale display (e.g., displayed on a video terminal or in a liquid crystal display)**, rather than be physically marked on the device. As part of the current language in the tables and this interpretation, the capacity by division statement must be adjacent to the weight display and continuously displayed when in the weighing mode. However, if the weighing mode of the scale permits different menus for selecting operations to be displayed, the weight information and capacity by d continuously displayed if this display is the customer's only display. These requirements apply to all of the weighing modes that may be selected for commercial transactions. The statement does not have to be displayed when the indicating element operates in modes other than the weighing mode. This does not require a change to Handbook 44. This interpretation will be included in NCWM Publication 14 and NCWM Publication.

Discussion: The current interpretation of the marking requirement is that the capacity by scale division and the weight unit must be physically marked on the device to be visible at all times, whether or not the device is turned on.

Adoption of this recommended interpretation would permit the capacity by scale division statement to be visible only when the weight display is turned on.

The statement that the capacity by scale division is not required to be displayed when in modes other the weighing mode refers to situations where the scale is in the supervisor's mode and manager functions are being performed. Similarly, if the indicating element for the scale is a computer monitor, then, when the computer is running software other than the scale software, the weight display and capacity statement are not required to be indicated.

Although the Committee has had similar requests to permit scale model and serial numbers to be part of the display, the Committee is not making any changes regarding the marking of the serial number or model number. Further study of the impact of such an action is needed before action is considered. Consequently, the display of software serial numbers and model numbers does not replace the required physical markings, and the Committee does not plan to explore this point further at this time.

Please note the difference in the language of the S&T agenda item and that of Pub 14. The Final S&T Report uses **"scale display"** with video terminal as an example; however, Pub 14 uses **"video terminal"** with no example. While this may seem trivial, the information in Pub 14 is what the two labs were basing their decision on, they did not consider a video terminal the same thing as dot matrix scale display. Also, I would have to do some research on this, however, I do not believe that dot matrix displays were all that common in 1992. This should not be limited to the type of technology used for a scale display.

Part 1 - Capacity x Division, Multiple Units of Measure

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

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

It is my belief that the only useful information is that of the unit of weight that is in use at the time of the weighment, and that the other information for other units of weight could add to confusion for everyone. If the scale is in some other mode of operation (e.g. not a weighing mode) then the capacity by division statement is of no value and should not be displayed.

Part 1 Recommendation: Clarify in NCWM Publication 14 that it is acceptable to display the capacity by division information for only the unit of weight that is currently in use and is only necessary for the capacity by division information to be displayed when the device is in the weighing mode.

Part 2 – Minimum Piece Weight and Sample Size

Now comes the question regarding the markings for prescription counting. This was added to HB 44 in 2003, long after the clarification of capacity by division on a scale display in 1992 by the S&T.

In 2003 NCWM annual report in part it states in agenda item 320-2, which was adopted:

> The Committee agreed that the proposal should clarify when special application marking requirements are not required on scales equipped with the counting feature. The Committee modified Table S.6.3.b. Note 13 to include an exception to the marking requirements when a prescription scale meets the operating, indicating, and marking requirements proposed in paragraphs S.1.2.3., S.2.5.3., and S.6.6.

The items from HB 44 are noted below for convenience.

Footnote 13 from S.6.3.b.

*A scale designed for a special application rather than general use shall be conspicuously marked with suitable words, visible to the operator and to the customer, restricting its use to that application, e.g., postal scale, prepack scale, weight classifier, etc.** When a scale is installed with an operational counting feature, the scale shall be marked on both the operator and customer sides with the statement "The counting feature is not legal for trade," except when a Class I or Class II prescription scale complies with all Handbook 44 requirements applicable to counting features.

*[*Nonretroactive as of 1986]* (Amended 1994 and 2003)

S.1.2.3. Prescription Scale with a Counting Feature. - A Class I or Class II prescription scale with an operational counting feature shall not calculate a piece weight or total count unless the sample used to determine the individual piece weight meets the following conditions:

(a) minimum individual piece weight is greater than or equal to 3 e; and

(b) minimum sample piece count is greater than or equal to 10 pieces.

(Added 2003)

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

~~(Added 2003)~~

S.6.6. Counting Feature, Minimum Individual Piece Weight and Minimum Sample Piece Count - A Class I or Class II prescription scale with an operational counting feature shall be marked with the minimum individual piece weight and minimum number of pieces used in the sample to establish an individual piece weight.

(Added 2003)

Based on the previous information regarding capacity by division that was clarified in 1992 by the S&T, and the statement in S.6.6. that the device has an operational counting feature, I make the following proposal for marking of counting.

Proposal 2. Clarify in NCWM Publication 14, that it is acceptable to display the HB 44 required marking for the Minimum Piece Weight (MPW) and the Minimum Sample Size (MSS) on the scale display, only when the device is in prescription counting mode.

Alternative Considered: Based on the language of HB 44, I cannot determine an acceptable alternative, without changing the language in HB 44 to indicate that the above conclusion and proposals are not acceptable.

Next Sector Meeting

Discussion/Recommendation:

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

Appendix B - 2008 NTETC Weighing Sector Attendees (to be included in the sector report)

Appendix C - Attachments

Attachment for Agenda Item 1

D. Force Transducers (load cells) to be Submitted for Evaluation

Force transducers (load cells) of essentially the same design may be considered to form a family that can be listed on an NTEP CC. If force transducers (load cells) within a family are made from different materials, such as aluminum, alloy steel, or stainless steel, then all material types must be submitted for evaluation. If the force transducers (load cells) within a family are available in either a 4-wire or 6-wire version, then at least one 4-wire version and one 6-wire version must be evaluated. This policy applies to all applications for new or amended NTEP Certificates of Conformance received after January 31, 2007. This policy is non-retroactive for NTEP Certificates of Conformance issued prior to February 1, 2007.

Under the Mutual Acceptance Arrangement (MAA) for the International Organization of Legal Metrology (OIML), it is possible to obtain either an NTEP CC or an OIML R 60 Certificate or both with a single evaluation. NCWM is a utilizing participant under the MAA and as such will accept test data from issuing participants within the MAA. Evaluations performed by NTEP laboratories can only result in an NTEP CC. These certificates can cover a family of force transducers (load cells) based on the evaluation of representative samples from the family. In order to determine which specific models of force transducers (load cells) are to be used for evaluation, the following selection criterion shall be used:

1. *Evaluation of New Force Transducers (load cells) for NTEP Certificates Only*

Required Information

The following information is required from the manufacturer for review and selection of sample force transducers (load cells):

a. Properly completed request for evaluation

b. Drawing of each capacity force transducer (load cell) within the family to substantiate that they are of the same basic design

c. Quality or accuracy class

d. Maximum number of scale divisions requested (n-max)

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

e. Minimum verification scale division requested (V-min)

f. Force transducer (load cell) capacities

g. The type(s) of material from which the force transducers (load cells) are made

h. As applicable, outline dimensions and general description illustration of any special equipment (loading fixtures, interconnection boxes, etc.) that are intended to accompany the force transducers (load cells) submitted

i. A complete set of test data on the force transducers (load cells) submitted for evaluation. (Test data is only required for those force transducers (load cells) submitted for type evaluation; test data for each capacity model in the family is not required.)

j. The technology employed by the force transducer (load cell); e.g. strain gage (analog or digital), hydraulic, vibrating wire, piezoelectric, or other. Applicants for analog strain gage force transducers (load cells) must indicate on the application whether 4-wire or 6-wire (or both) design force transducers (load cells) are included in the family.

Note: The manufacturer may market force transducers (load cells) with a smaller number of scale divisions (n-max) and/or with a larger V-min value than those listed on the approval certificate; however, the force transducer (load cell) or accompanying documentation must be marked with the appropriate n-max and V-min for which the force transducer (load cell) may be used.

Selection Criteria

A. Selection of force transducers (load cells) from the family shall be based on the following considerations:

1. The selection of force transducers (load cells) shall be such that the number of force transducers (load cells) to be evaluated is minimized.

2. Where force transducers (load cells) of the same capacity belong to different groups within the family, approval of the force transducer (load cell) with the best metrological characteristics (greatest n-max, smallest V-min) implies approval of the force transducers (load cells) with the lesser metrological characteristics. When a choice exists, the force transducers (load cells) with the best metrological characteristics shall be selected for the evaluation.

3. Force transducers (load cells) with a capacity in between the capacities evaluated, as well as those with a capacity greater than the largest capacity model tested, but not over five times the largest capacity evaluated, are deemed to be certified.

4. For any family of force transducers (load cells), the model with a capacity nearest the center of the range of capacities and with the best metrological characteristics shall be selected for evaluation. When the ratio of the largest capacity force transducer (load cell) within the group or family to the smallest capacity force transducer in the same group or family is 10:1 or less, a cell with a capacity nearest the center of the range shall be selected. The capacity of the selected cell shall not have a ratio greater than 5:1 in regard to the capacity of the force transducers (load cells) at the each extreme of the capacity range. If this is not possible, a second force transducer (load cell) must be selected for evaluation (see Item 5 below). If the selected mid-range capacity cell cannot be evaluated due to laboratory limitations, the NTEP representative should be contacted to select the specific model for evaluation.

5. When the ratio of the largest capacity force transducer (load cell) within the group to the smallest capacity force transducer (load cell) within the same group or family significantly exceeds 10:1, then another force transducer (load cell) shall be selected for evaluation. The selected force transducer (load cell) shall have a capacity between 5 and 10 times that of the first force transducer (load cell) that was selected for evaluation. When no capacity meets this criteria, the selected force transducer (load cell) shall be that having the smallest capacity that exceeds 10 times that of the nearest smaller capacity force transducer

(load cell) that has been selected for evaluation. Should the capacity of the selected cell exceed the capacity of the greatest capacity model in the family or group by a ratio greater than 10:1, an additional model must be selected for evaluation.

6. If both 4-wire and 6-wire designs of force transducers (load cells) are included in the family, then at least one of the selected models for evaluation shall be of the 4-wire design and at least one of the remaining models shall be of the 6-wire design.

7. If the family of force transducers (load cells) includes two or more types of material used for construction of the device, then at least one of the selected models for evaluation shall be of each type of material used for construction.

8. If the family of force transducers (load cells) includes two or more means of environmental sealing (potting, welded cups, etc.) then at least one model using each sealing means shall be selected for evaluation.

9. If the family of force transducers (load cells) includes two or more output levels (2 or 3 mV/V), then at least one model with each output level shall be selected for evaluation.

B. Examples of force transducer (load cell) model selection for evaluation:

a. Force Transducer (load cell) Family A characteristics
   1. Both stainless steel and alloy steel models
   2. 2 mV/V and 3 mV/V outputs
   3. Bending beams in smaller capacities and shear beam in larger
   4. 4-wire and 6-wire designs
   5. n-max is 5000 on all models
   6. Potting or welded metal cup sealing variations
   7. All V-min values equal to 0.015 % of cell capacity
   8. All capacities in pounds:
      500, 1000, 2000, 2500, 4000, 5000, 7500, 10 000, 15 000, 20 000

The following cell models would be selected for evaluation:

- One - 500 lb stainless steel, potted, 3 mV/V, 4-wire bending beam cell
- One - 2500 lb alloy steel, potted, 2 mV/V, 4-wire shear beam cell
- One - 15 000 lb stainless steel, welded, 3 mV/V, 6-wire shear beam cell

Note that Item 2 in Part A above is not applicable in this situation since the metrological characteristics (n-max and V-min) for all of the models are equivalent.

Note that Item 3 in Part A above is met since the 20 000 lb model is less than five times the capacity of the greatest capacity model selected for evaluation (15 000 lb).

Note that Item 4 in Part A above is met since the 2500 lb capacity model of force transducer (load cell) is the closest to the center and is able to meet the requirements in both Item 4 and 5 and therefore was selected for evaluation.

Note that Item 5 in Part A above is met since the ratio between the capacities of the models selected for evaluation does not exceed five.

Note that Item 6 in Part A above is met by having at least one of the models selected of a 4-wire design and at least one of the models selected of a 6-wire design.

Note that Item 7 in Part A above is met by having at least one of the models constructed from each type of materials used.

Note that Item 8 in Part A above is met by having at least one of the selected models with each environmental sealing method employed within the family.

Note that Item 9 in Part A above is met by having at least one of the selected models with a 3 mV/V output and at least one with a 2 mV/V output.

b. Force Transducer (load cell) Family B characteristics
   1. Compression cells constructed from either alloy steel or stainless steel
   2. All cells are Class III L
   3. Cells from 10 000 lb to 75 000 lb have an n-max of 7500 and cells from 50 000 lb to 200 000 lb have an n-max of 10 000
   4. All cells are 2 mV/V
   5. All cells have the same environmental sealing
   6. All cells have V-min values equal to 0.018 % of their capacity
   7. All cells are of 6-wire design
   8. Cell capacities are:
      10 000; 25 000; 50 000; 75 000; 100 000; 200 000

The following models would be submitted for evaluation:

- One - 50 000 lb with an n-max of 10 000 in stainless steel
- One - 10 000 lb in alloy steel

Note that Item 2 in Part A above is met with the selection of the 50 000 lb model with an n-max of 10 000 since it has the best metrological characteristics.

Note that Item 3 in Part A above is met with the selection of the 10 000 lb model. Selection of the 200 000 lb model could have taken place but the 10 000 lb model was chosen because of the ease of testing.
Note that Item 4 in Part A above is met with the selection of the 10 000 lb model since it is within the 5:1 capacity ratio of the 50 000 lb model initially selected.

Note that Item 5 in Part A above is met with the selection of the 10 000 lb model since the ratio of its capacity to that of the 50 000 lb model does not exceed 5:1.

Note that Item 6 in Part A above does not apply since all models are of 6-wire design.

Note that Item 7 in Part A above is met with the selection of the 10 000 lb model in stainless steel and the 50 000 lb model in alloy steel thus covering both types of material used for construction of the force transducers (load cells) in the family.

Note that Item 8 in Part A above does not apply since all models use the same means of environmental sealing.

Note that Item 9 in Part A above does not apply since all models use the same output level of 2 mV/V.

2. *Evaluation of New Force Transducers (load cells) for OIML R 60 Certificate or OIML R 60 Certificate and NTEP Certificate of Conformance under the DoMC*

Required Information

The information needed for an OIML R 60 evaluation is listed in OIML Recommendation 60. If the manufacturer is seeking an NTEP Certificate of Conformance for the force transducer (load cell) family or individual model, the information shown in Section 1 above shall also be provided along with a properly completed application for NTEP evaluation. All NTEP requirements are to be met in this type of evaluation. The manufacturer must make certain that the issuing participant selected for the evaluation of the force transducer(s) (load cell(s)) is aware that the submittal is for both NTEP and OIML R 60. A completed application and copies of all submitted data must be sent to NTEP. Once the evaluation has been successfully completed, the issuing authority will provide an OIML

Evaluation Report that may then be used to secure an OIML R 60 Certificate. This report is also sent to NTEP. NTEP will evaluate the OIML Evaluation Report and issue an NTEP Certificate of Conformance based on this evaluation. Note that issuance of an NTEP Certificate of Conformance may require the conduct of other tests not performed by the issuing participant. If this happens, the costs of these tests are the responsibility of the applicant.

Note: Should the force transducers (load cells) submitted fail to comply with all OIML R 60 requirements and the manufacturer then seeks to secure an NTEP Certificate of Conformance based on the OIML Evaluation Report, additional testing may be required in order to fully determine compliance of the device(s) with NTEP requirements. The costs for any additional testing deemed necessary for completion of the NTEP review will be the responsibility of the applicant.

Selection Criteria

Selection of the force transducers (load cells) for evaluation shall be based on the OIML R 60 selection criteria as described in OIML Recommendation 60.

3. *Amendment of an Existing NTEP Certificate of Conformance to Add Capacities and/or Change Metrological Characteristics in Conjunction with an OIML R 60 Evaluation Under the DoMC*

Required Information

The information needed for an OIML R 60 evaluation is listed in OIML Recommendation 60. If the manufacturer is seeking to amend an existing NTEP Certificate of Conformance for the force transducer (load cell) family or individual model, the information shown in Section 1 above shall also be provided along with a properly completed application for NTEP evaluation. All NTEP requirements are to be met in this type of evaluation.

Successfully completed, this type of evaluation will result in a test report and test certificate that may be used to secure an amended OIML R 60 Certificate. The test report will be reviewed by the NTEP and if the appropriate criteria are met a NEW NTEP Certificate of Conformance will be issued. Note that the original NTEP Certificate of Conformance will remain active and will not be amended. The new NTEP Certificate of Conformance resulting from this evaluation will list the new capacities added and/or the change in metrological characteristics. Note that the appropriate NTEP Certificate of Conformance number must be marked on the device in compliance with G-S.1. Marking Requirements of NIST Handbook 44.

Note: Should the force transducers (load cells) submitted fail to comply with all OIML R 60 requirements and the manufacturer then seeks to only amend the existing NTEP Certificate of Conformance based on the test report, additional testing may be required in order to fully determine compliance of the device(s) with NTEP requirements. The costs for any additional testing deemed necessary for completion of the NTEP review will be the responsibility of the applicant.

Selection Criteria

The proper models for evaluation will depend upon the nature of the change or addition to be made. Because of this, NTEP personnel shall be contacted and shall determine which model or models of force transducer (load cell) are to be submitted.

4. *Amendment of an Existing NTEP Certificate of Conformance ONLY*

Required Information

The required information will depend upon the nature of the change being made. If additional models of force transducers (load cells) are being added to a family, then the same information and selection criteria as listed in Section 1 above apply. If the change is to add another version of the force transducer (load cell) listed on the current NTEP Certificate of Conformance the nature of the change or addition must be fully disclosed in the application.

Selection Criteria

The necessity of an evaluation to implement the requested change will depend upon the nature of the change. In general, addition of new models of force transducers (load cells) with capacities outside the 5:1 ratio of those previously evaluated will require additional evaluation. Addition of a 4-wire design with no change in capacity will require an evaluation while the addition of a 6-wire design with no change in capacity will not. The addition of models constructed from a different material will require the evaluation of at least one model constructed of the new material. NTEP personnel will inform you of what models, if any, require evaluation after review of the application.

Attachment for Agenda Item 10

Problem: Current wording in Pub 14 Section 66(c) is unclear if "Subsequent Type Evaluation (Field) Permanence Tests" are required. It was understood at the time that the language was written that subsequent testing would be required and there has been at least one "double wide" feature added to an existing CC that included a subsequent test. However, the language that was accepted did not clearly state that. As a result, manufacturer representatives and sector members may not recall the specific discussions at the 2001 meeting of the Weighing Sector. Additionally, other applicants and new sector members will have trouble concluding that a subsequent test is required since the language does not clearly state that the test needs to be repeated to add this option/feature to an existing CC. The NIST Technical Advisor recommends that the language be amended and clarified as follows:

66(c). Performance and Permanence Tests for "Side-by-Side" Modular and Non-Modular Vehicle Scales (full electronic or electromechanical)

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See Figure in Pub 14 Section 66(c)

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

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If the load-receiving elements (LRE) used in the "side-by-side" application do not have a CC, then at least one of the load-receiving elements shall be tested as a "single" scale according to Section 66(a) in addition to the following tests (CLC test load at least 90 percent).

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

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

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

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

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See Figure in Pub 14 Section 66(c)

66c.1. Indicator Tests

Attachment for Agenda Item 17

Current HB 44 Wording:

Highlights are there to help me keep track of the differences and different terms, you may remove them if they are not useful to you.

S.1. Design of Indicating and Recording Elements and of Recorded Representations

S.1.1. Zero Indication.

(a) On a scale equipped with indicating or recording elements, provision shall be made to either indicate or record a zero-balance condition.

(b) On an automatic-indicating scale or balance indicator, provision shall be made to indicate or record an out-of-balance condition on both sides of zero.

(c) A zero-balance condition may be indicated by other than a continuous digital zero indication, provided that an effective automatic means is provided to inhibit a weighing operation or to return to a continuous digital indication when the scale is in an out-of-balance condition.
(Added 1987) (Amended 1993)
(Amended 1987)

S.1.1.1. Digital Indicating Elements.

(a) A digital zero indication shall represent a balance condition that is within ± ½ the value of the scale division.

(b) A digital indicating device shall either automatically maintain a "center-of-zero" condition to ± ¼ scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero-balance condition to ± ¼ of a scale division or less.
[Nonretroactive as of January 1, 1993]
~~(Amended 1992)~~

S.2.1.2. Scales used in Direct Sales. - A manual zero-setting mechanism (except on a digital scale with an analog zero-adjustment mechanism with a range of not greater than one scale division) shall be operable or accessible only by a tool outside of and entirely separate from this mechanism, or it shall be enclosed in a cabinet. Except on Class I or II scales, a balance ball shall either meet this requirement or not itself be rotatable.

A semiautomatic zero-setting mechanism shall be operable or accessible only by a tool outside of and separate from this mechanism or it shall be enclosed in a cabinet, or it shall be operable only when the indication is stable within:

(a) plus or minus 3.0 scale divisions for scales of more than 2000 kg (5000 lb) capacity in service prior to January 1, 1981, and for all axle load, railway track, and vehicle scales; or

(b) plus or minus 1.0 scale division for all other scales.

S.2.1.3. Scales Equipped with an Automatic Zero-Tracking Mechanism.

S.2.1.3.1. Automatic Zero-Tracking Mechanism for Scales Manufactured Between January 1, 1981, and January 1, 2007. - The maximum load that can be "rezeroed," when either placed on or removed from the platform all at once under normal operating conditions, shall be:

(a) for bench, counter, and livestock scales: 0.6 scale division;

(b) for vehicle, axle-load, and railway track scales: 3.0 scale divisions; and

(c) for all other scales: 1.0 scale division.
(Amended 2005)

S.2.1.3.2. Automatic Zero-Tracking Mechanism for Scales Manufactured on or after January 1, 2007. - The maximum load that can be "rezeroed," when either placed on or removed from the platform all at once under normal operating conditions, shall be:

(a) for vehicle, axle-load, and railway track scales: 3.0 scale divisions; and

(b) for all other scales: 0.5 scale division.
(Added 2005)

S.2.1.3.3. Means to Disable Automatic Zero-Tracking Mechanism on Class III L Devices. - *Class III L devices equipped with an automatic zero-tracking mechanism shall be designed with a sealable means that would allow zero tracking to be disabled during the inspection and test of the device. [Nonretroactive as of January 1, 2001]*
(Added 1999) (Amended 2005)

From OIML R 76 NAWI

4.5 Zero-setting and zero-tracking devices

An instrument may have one or more zero-setting devices and shall have not more than one zero-tracking device.

4.5.1 Maximum effect

The effect of any zero-setting device shall not alter the maximum weighing capacity of the instrument.
The overall effect of zero-setting and zero-tracking devices shall be not more than 4 %, and of the initial zero-setting device not more than 20 %, of the maximum capacity. This does not affect an instrument of class IIII, except if it is used for commercial transactions.

A wider range is possible for the initial zero-setting device if the instrument complies with 3.5, 3.6, 3.8 and 3.9 for any load compensated by this device within the specified range.

4.5.2 Accuracy

After zero setting the effect of zero deviation on the result of the weighing shall be not more than ± 0.25 *e*.

4.5.3 Multiple range instruments

Zero setting in any weighing range shall be effective also in the greater weighing ranges, if switching to a greater weighing range is possible while the instrument is loaded.

4.5.4 Control of the zero-setting device

An instrument - except an instrument according to 4.13 and 4.14 - whether or not equipped with an initial zero-setting device, may have a combined semi-automatic zero-setting and semi-automatic tare-balancing device operated by the same key.

If an instrument has a zero-setting device and a tare-weighing device the control of the zero-setting device shall be separate from that of the tare-weighing device.

A semi-automatic zero-setting device shall function only:

- when the instrument is in stable equilibrium; and
- it cancels any previous tare operation.

4.5.5 Zero indicating devices on an instrument with digital indication

An instrument with digital indication shall have a device that displays a special signal when the deviation from zero is not more than ± 0.25 *e*. This device may also work when zero is indicated after a tare operation.

This device is not mandatory on an instrument that has an auxiliary indicating or a zero-tracking device provided that the rate of zero-tracking is not less than 0.25 *d*/second.

4.5.6 Automatic zero-setting devices

An automatic zero-setting device shall operate only when:

- the equilibrium is stable; and
- the indication has remained stable below zero for at least 5 seconds.

4.5.7 Zero-tracking devices

A zero-tracking device shall operate only when:

- the indication is at zero, or at a negative net value equivalent to gross zero;
- the equilibrium is stable; and
- the corrections are not more than 0.5 *d*/second.

When zero is indicated after a tare operation, the zero-tracking device may operate within a range of 4 % of Max around the actual zero value.

Index of 2.20 Scales

Automatic zero-tracking mechanism 10, 13, 22

Appendix D HB 44

automatic zero-setting mechanism (belt-conveyor scale). A zero setting device that operates automatically without intervention of the operator after the belt has been running empty.[2.21]
(Added 2002)

automatic zero-tracking mechanism. See "automatic zero-tracking mechanism" under “zero-setting mechanism.”[2.20, 2.22, 2.24]

zero-setting mechanism. Means provided to attain a zero balance indication with no load on the load-receiving element. Three types of these mechanisms are:[2.20]

automatic zero-tracking mechanism. Automatic means provided to maintain the zero balance indication, within certain limits, without the intervention of an operator.[2.20, 2.22, 2.24]

manual zero-setting mechanism. Nonautomatic means provided to attain a zero balance indication by the direct operation of a control.[2.20]

semiautomatic zero-setting mechanism. Automatic means provided to attain a direct zero balance indication requiring a single initiation by an operator.[2.20]

zero-setting mechanism (belt-conveyor scale). A mechanism enabling zero totalization to be obtained over a whole number of belt revolutions.[2.21, 2.23]
(Added 2002)

zero-tracking mechanism. Automatic means provided to maintain zero balance indication without the intervention of an operator.[2.20]

Find uses of "Zero-Setting" in HB 44

S.1.7. Capacity Indication, Weight Ranges, and Unit Weights. -

(a) Gross Capacity. An indicating or recording element shall not display nor record any values when the gross load (not counting the initial dead load that has been canceled by an initial zero-setting mechanism) is in excess of 105 % of scale capacity.

S.2.1.2. Scales used in Direct Sales. - A manual zero-setting mechanism (except on a digital scale with an analog zero-adjustment mechanism with a range of not greater than one scale division) shall be operable or accessible only by a tool outside of and entirely separate from this mechanism, or it shall be enclosed in a cabinet. Except on Class I or II scales, a balance ball shall either meet this requirement or not itself be rotatable.

A semiautomatic zero-setting mechanism shall be operable or accessible only by a tool outside of and separate from this mechanism or it shall be enclosed in a cabinet, or it shall be operable only when the indication is stable within:

(a) plus or minus 3.0 scale divisions for scales of more than 2000 kg (5000 lb) capacity in service prior to January 1, 1981, and for all axle load, railway track, and vehicle scales; or

(b) plus or minus 1.0 scale division for all other scales.

S.2.1.5. Initial Zero-Setting Mechanism.

(a) Scales of accuracy Classes I, II, and III may be equipped with an initial zero-setting device.

(b) An initial zero-setting mechanism shall not zero a load in excess of 20 % of the maximum capacity of the scale unless tests show that the scale meets all applicable tolerances for any amount of initial load compensated by this device within the specified range.
~~(Added 1990)~~

Information from NIST on changes to Appendix D

There were no S&T Items to amend the definitions. However, there were editorial changes to the terms zero-setting to zero-tracking to match the titles of the paragraphs in S.2.1.3. in the 2005 S&T Agenda Item 320-4.

> In the 2006 H44 (Table of (2005) Editorial changes, Appendix D for the term "automatic zero-setting mechanism" on page D-2, **"zero-tracking"** was added to be consistent with the amendments to the scale code.
>
> In the 2007 H44 Table of (2006) Editorial changes, Appendix D for "automatic zero-setting mechanism," "See zero-tracking mechanism" on page D-2, the definition was replaces with **See "zero-tracking mechanism."**
>
> In the 2008 H44 Table of (2007) Editorial changes, Appendix D for "zero-setting mechanism" on page D-23, the language was changed in the sub definition of "**automatic zero-tracking mechanism**" to eliminate the potential that the term "**automatic zero-setting mechanism**" could be confused with the OIML term and definition of "automatic zero-setting device."

Hopefully, we will clear this up editorially in the 2009 H44.

> **automatic zero-tracking mechanism.** See "automatic zero-tracking mechanism" under zero-setting mechanism.[2.20, 2.22, 2.24]
>
> **zero-setting mechanism.** Means provided to attain a zero balance indication with no load on the load receiving element. Three types of these mechanisms are:[2.20]
>
> > **automatic zero-tracking mechanism.** Automatic means provided to maintain the zero balance indication, within certain limits, without the intervention of an operator.[2.20, 2.22, 2.24]
> >
> > **manual zero-setting mechanism.** Nonautomatic means provided to attain a zero balance indication by the direct operation of a control.[2.20]
> >
> > **semiautomatic zero-setting mechanism.** Automatic means provided to attain a direct zero balance indication requiring a single initiation by an operator.[2.20]
>
> **zero-setting mechanism (belt-conveyor scale).** A mechanism enabling zero totalization to be obtained over a whole number of belt revolutions.[2.21, 2.23]
> (Added 2002)
>
> **zero-tracking mechanism. ~~See automatic zero-tracking mechanism.[2.20]~~ See "automatic zero-tracking mechanism" under zero-setting mechanism.[2.20, 2.22, 2.24]**

Agenda item from 2005 Annual Report

320-4 VC S.2.1.3. Scales Equipped with an Automatic Zero-Setting Mechanism (Zero Tracking), S.2.1.3.1. For Scales Manufactured Between January 1, 2007; Maximum Load Rezeroed, S.2.1.3.2. For Scales Manufactured On or After January 1, 2007; Maximum Load Rezeroed, and S.2.1.3.3. Automatic Zero-Setting Mechanism (Zero Tracking) on Class III L Devices

(This item was adopted.)

Source: National Type Evaluation Technical Committee (NTETC) Weighing Sector

Recommendation: Modify paragraphs S.2.1.3. and S.2.1.3.1. and add new paragraphs S.2.1.3.2.and S.2.1.3.3.as follows:

S.2.1.3. Scales Equipped with an Automatic Zero-Setting Mechanism (Zero Tracking). - Under normal operating conditions

S.2.1.3.1. Zero-Tracking for Scales manufactured Between January 1, 1981 and January 1, 2007. - T*he maximum load that can be "rezeroed," when either placed on or removed from the platform all at once* ***under normal operating conditions****, shall be:*

(a) for bench, counter, and livestock scales: 0.6 scale division;
(b) for vehicle, axle-load, and railway track scales: 3.0 scale divisions; and
(c) for all other scales: 1.0 scale division.
(Amended 2005)

S.2.1.3.2. Zero-Tracking for Scales manufactured On or After January 1, 2007. - The maximum load that can be "rezeroed," when either placed on or removed from the platform all at once under normal operating conditions, shall be:
(a) for vehicle, axle-load, and railway track scales: 3.0 scale divisions; and
(b) for all other scales: 0.5 scale division.
(Added 2005)

S.2.1.3.13. **Automatic Zero-Setting Mechanism** ***Means to Disable Zero-Tracking on Class III L Devices*** *- Class III L devices equipped with automatic zero setting mechanisms shall be designed with a sealable means to allow the automatic zero setting to be disabled during the inspection and test of the device.*
[Nonretroactive as of January 1, 2001]
(Added 1999) **(Amended 2005)**

Discussion: This issue revisits the 2003 Weighing Sector's concerns about holding a device to different AZSM requirements based solely on whether or not it is located on a counter or floor. The confusion over how to apply AZSM requirements is compounded when a family of scales covered on an NTEP Certificate of Conformance includes both bench/counter scales and other platform-type scales. Currently, paragraph S.2.1.3. specifies a different maximum load that can be rezeroed under normal operating conditions for bench/counter scales (0.6 scale division) from that for all other scales (1.0 scale division).

The proposal is also intended to partially align the automatic zero tracking requirements in paragraph S.2.1.3. with those of Measurement Canada and OIML R76 "Non-automatic Weighing Instruments." AZSM requirements for Class III L vehicle, axle-load, and railway track scales will remain unchanged.

The Weighing Sector asked that the proposal be a developing item on the NCWM S&T Agenda while the regional weights and measures associations consider its effect on field evaluations. The Sector's public members questioned how field officials will determine the date of manufacture and whether training is needed. The Weighing Sector's industry members requested a delayed enforcement date to allow sufficient time for changes to be made to devices nearing the end of their production cycle.

The Western Weights and Measures Association (WWMA) believed there is sufficient time between September 2004 and July 2005 to gather data to determine if there will be enforcement issues. The WWMA agreed that while input from field officials is necessary the proposal should move forward as a voting item.

The Central Weights and Measures Association received no comments on the proposal and recommended it move forward as a voting item.

The Southern Weights and Measures Association agreed with the concern stated by public members of the Sector that it is difficult for field officials to determine when a device was manufactured and recommended the proposal be an information item.

NIST Weights and Measures Division (WMD) believes field officials will have no difficulty with enforcing the proposal based on the equipment manufacture date since officials already successfully establish that criteria when enforcing other nonretroactive requirements.

The Scale Manufacturers Association (SMA) believes the proposal has no technical merit and is only an attempt to harmonize United States and OIML requirements. SMA is concerned about the potential for unnecessarily increasing evaluation costs. However, the SMA supported this effort toward harmonization provided NTEP does not require reevaluation of devices already covered by NTEP Certificates of Conformance.

At the 2005 NCWM Interim Meeting, the Committee agreed that the proposal is a good move in the direction of harmonization of standards and should not lose momentum. The Committee concluded that sufficient data could be easily gathered by July 2005 on new production lots of existing products to demonstrate if a January 1, 2006, effective date was appropriate. The Committee encouraged manufacturers, officials, and Participating NTEP Laboratories to gather data since it is easy for each group to verify if bench, counter, livestock scales, and scales classified as other types can meet the proposed ASZM requirement during their regular duties. The Committee indicated it is willing to modify the date to January 1, 2007, if any group submitted data at the July 2005 NCWM Annual Meeting to support extending the period in which manufacturers have to comply. The Committee agreed with WMD's assessment that jurisdictions continually prove their ability to determine manufacture dates when devices are subject to nonretroactive requirements. The Committee indicated its full support of an NTEP policy that does not require additional evaluation for existing equipment since the proposal appears to have little effect on most bench or counter scales. Consequently, the Committee agreed the proposal was ready for a vote at the 2005 NCWM Annual Meeting.

During the July 2005 NCWM Annual Meeting, the Committee acknowledged that officials may experience delays during inspections if they have to verify the date that a device was manufactured. However, it believes these delays are manageable and are no different than those experienced when verifying compliance with other nonretroactive requirements. Typically, date of manufacture information is readily available from the manufacturer. The Committee heard opposition to an alternate SMA proposal that based the enforcement date on the Certificate of Conformance (CC) issue date. A CC can be updated or revised for any number of reasons consequently there are variations in subsequent CC numbers and model features that would require even more investigative work by officials. The Committee did not support the alternate proposal since it would also set a precedent for enforcing Handbook 44 nonretroactive requirements based on the CC issue date rather than the manufacture date. The Committee also recognized that there may be some models nearing the end of their production life, where it may not be economically practicable to modify them to meet the proposed maximum 0.5 d load requirement. The Committee heard from industry that most equipment is already designed to operate to the proposed standard and that large numbers of devices are not built in advance; however, additional time is necessary for existing field devices to reach the end of their life cycle. Consequently, the Committee modified the proposal to extend the enforcement date to January 1, 2007.