

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

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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	WS	NTETC Weighing Sector
Unless Otherwise Stated: - “Handbook 44” (HB 44) means the 2009 Edition of NIST Handbook 44 “Specifications Tolerances, and Other Technical Requirements for Weighing and Measuring Devices” - “Handbook 130” (HB 130) means the 2009 Edition of NIST Handbook 130 “Uniform Laws and Regulations in the areas of legal metrology and fuel quality.” - “Publication 14” (Pub. 14) means the 2009 Edition of NCWM Publication 14 - Weighing Devices - Technical Policy • Checklists • Test Procedures			
Note: NIST does not imply that these acronyms are used solely to identify these organizations or technical topics.			

Load Cell Items

1. Load Cell Creep Recovery

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

Source: Steve Cook, NIST Technical Advisor

Background: See the Final Report of the 2009 NCWM S&T Committee (Agenda Item 320-2 for additional background information to amend HB 44 Scales Code paragraph T.N.4.6. Time Dependence (Creep) for Load Cells during Type Evaluation. During the 2009 Annual Meeting, the S&T Committee adopted a proposal to amend HB 44 Scales Code paragraph T.N.4.7. to relax creep recovery tolerances on Class III load cells with more the 4000 division ($n_{max} > 4000$).

At the 2009 Annual Meeting of the NTETC-WS, the NIST Technical Advisor recommended amendments to Publication 14 – Force Transducers Section: FT Section II-9 as follows for consideration by the WS.

Discussion/Conclusion: The WS reviewed the language adopted by the NCWM and agreed with the NIST technical advisor recommendation to amend Publication 14 FT Section 9. This recommendation can be found in Appendix A, Agenda Item 1.(a).

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

Source: Stephen Patoray, Consultants on Certification

Background: Stephen Patoray noted that the subject of Creep Recovery in Section 12 was inadvertently omitted in previous editions of Publication 14 and proposed a recommendation to amend Publication 14 – Force Transducers Section: FT Section M-12 – Summary Table and Table 6.

Discussion/Conclusion: The WS reviewed and agreed with the recommendation to amend Publication 14 FT Section 12 and Table 6. The WS added additional language to the proposed subsection 12 (f) to include the reference to the times specified for the initial reading in FT Table 5. This recommendation can be found in Appendix A, Agenda Item 1.(b).

Carry-over Items:

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

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

Background: See the Final Report of the 2009 NCWM S&T Committee Agenda Item 310-4 for the adopted language and additional background information on the item to amend HB 44 General Code paragraph G-N.3. Verification of Testing Standards. The NCWM agreed to add a new test note and add General Code paragraph G-N.3. and deleted similar language in the 2.2X series of weighing device codes.

Discussion/Conclusion: The WS reviewed the language adopted by the NCWM and agreed with the NIST technical advisor recommendation that no further action by the Sector is required since the new paragraph is nearly identical to the 2009 Scales Code paragraph N.2. Verification of Standards, which has not been referenced in NCWM Publication 14.

3. In-Motion Railway Track Scales - Definition.

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

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

1. In-motion weighing device: A complete weighing system, separable indicating element, or controller that follows a predetermined program of automatic processes for objects while in motion without the intervention of an operator on the load-receptor of a complete weighing device or separable weighing/load-receiving element. (Source: OIML R51 for automatic weighing instruments)

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

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

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

Discussion: The NIST Technical Advisor asked the WS to review the two proposed definitions in the background information from the 2008 NTETC Weighing Sector Summary and recommend which version should be added to Publication 14 DES Section 68.

The WS discussed the word “object” in the proposed language and was concerned that it would include all types of in motion devices. This item started out for railway track scales and weighing modules that weigh in motion, where the weighing modules were evaluated statically and if the modules could be used in dynamic weighing applications. Steve Beitzel of Systems Associates and Chairman of AREMA Committee 34 proposed amending the Mettler-Toledo language to limit the scope of the definition to railcars and delete the added language that described the characteristics of a controller. A couple of the members of the WS asked if the definition is still needed and questioned whether the definition will add value if it is added to Publication 14. The WS agreed that there is little added benefit to add the definition.

Discussion/Conclusion: The Sector concluded that the definition is not required as it adds no benefit to NCWM Publication 14 - DES Section 68.

4. Pub 14 Technical Policy - Hopper Scale Design Parameters

Source: 2008 WS Agenda Item 7

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

Background: See the 2008 NTETC Weighing Sector Meeting Summary Agenda Item 7 for additional background information. During the 2008 WS meeting, The NTEP Director reported that there has been little agreement on what constitutes a different type or can be considered as a variation of the design and how many certificates are required. The WS recommended that this item be carried over for the 2009 NTEP lab and NTETC WS meetings to allow for additional work and development of a proposal. The NIST Technical Advisor stated that the NTEP labs did not discuss this item at its 2009 Spring Meeting.

Discussion: The WS reviewed the background information from the 2007 and 2008 WS summaries. The WS also discussed the following issues regarding the existing technical policy in Publication 14 DES Section A.6.1 and A.6.2:

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

Darrell Flocken (Mettler-Toledo and Sector Chairman) discussed the history of this item, and asked what parameters define the type. Stephen Patoray (Consultants on Certifications) added that Publication 14 lists the types that had to be tested, but does not include all that could go on a CC. The WS continued to discuss the various parameters and topics including:

Parameter/Topics	Comment
Number of hopper/tank supports.	- If 3 are adequate, then more should be allowed.
Number of load cell.	- If 3 are adequate, then more should be allowed.

Parameter/Topics	Comment
	- Maximum number limited by v_{min} .
Location of hopper/tank supports.	- Supported from the top of tank. - Supports located between top and bottom of tank. - Supported from bottom of tank. - Supported on corners of a weighbridge.
Variations in the shapes of the hopper/tanks.	- Cylindrical - Square - Rectangular - Combination of above
Past allowed variations in the dimensions of lever systems	- Some pre-NTEP CCs were issued for a large range of capacities and dimensions based on state approvals and past performance.
Structural integrity of the tank/hopper	- Deflection of tank/hopper may have impact on the way the load is applied to the load cells. - However, this could be deducted in the proper application and amount of test load.
Application of test weights	- Safety issue. - Could also cause unwanted deflection in the hopper/tank that is not representative of deflection during normal weighing.
Uncertainty in test methods	- Excessive number on drafts during a strain test increases uncertainty beyond 1/3 acceptance tolerance.
Include material tests (for automatic systems).	- Has merit since it better simulates actual use with associate equipment (e.g., dust suppression, gates, etc.). - Study may be needed to discover this is necessary considering the cost involved with modifying conveyor systems to pre or post weigh material.

Todd Lucas, Ohio NTEP Lab suggested that a WG be assembled to address the above items. A vote was taken to determine if the WS should establish a hopper scale WG. The result of the vote indicated that there was little support to establish the WG (2 in favor and 6 opposed).

However, the WS did agree that additional guidance is needed in Publication 14 technical policies that address the number of supports that can be allowed based on an evaluation. Several sector members stated that increasing the number of load supports beyond what was tested during type evaluations would strengthen the support structure. Conversely, decreasing the number of supports may weaken the design of the support structure and that additional testing should be required to amend a hopper scale CC to include “type” variations with fewer supports. Stephen Patoray recommended that changes should be allowed retroactively to amend existing active CCs since there are no proposed changes to the current type evaluation test procedures.

Conclusion: The WS agreed to recommend changes to Publication 14 DES Section B.6 (Certificate of Conformance Parameters) for hopper scales by adding “a CC shall apply to all models having number of load supports equal to or greater than the number of supports in the device submitted for evaluation.” This recommendation can be found in Appendix A - Agenda Item 4.

The WS also agreed that existing active CCs can be amended to coincide with the proposed changes since there is no difference in test procedures based on the number of load supports. The WS added that other proposals to amend Publication 14 hopper scale technical policies based should be addressed by the WS as separate agenda items.

5. Pub 14 Section 69. - Railway Track Scales

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

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

Background: 2008 Weighing Sector Carryover Item 10.

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

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

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

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

Recommendation/Conclusion: The language appears to be acceptable to AREMA Committee 34 and has not yet been reviewed by the SMA. The WS reviewed the testing requirements proposed by AREMA Committee 34 and recommends adding the proposed language as amended by the WS.

This recommendation can be found in Appendix A - Agenda Item 5.

6. Correction to Scale Tickets

Source: 2008 WS Item 12 - Maryland NTEP Lab

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

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

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

The proposal recommended amending DES Section 35. to specify the requirements for devices that print scale tickets with corrected weight information. Several of the labs believed that the subject may be more appropriate for Section 13. Recorded Representations and limited to indirect sale applications.

The WS reviewed the item that was submitted to the NTEP labs. There were concerns that the proposal is intended to address the application described in Scales Code UR.3.9. However, other members of the WS supported the intent for weigh-in/weigh-out vehicle scales applications. The WS agreed that clarification of erroneous tickets is needed; however it could not come to a conclusion since the WS did not have a developed recommendation to review. There were also discussions about the appropriate location for the requirements. For example, Section 35. applied to weigh-in/weigh-out applications where the publication states that manual weight entries are not permitted. The WS recommended that a specific recommendation be developed for this item and carried over until the 2009 meeting of the Weighing Sector. At its 2009 Spring Meeting, the NTEP labs did not discuss this item.

Discussion: The NIST Technical Advisor reported that he has not received an update on the development of this item. WS Chairman Darrell Flocken provided additional background information.

Ken Jones, California NTEP Lab stated that the traditional method of correcting ticket in California is typically handled outside the weighing system by the CA Weighmaster Laws and Regulations. The first ticket is; 1) voided

by handwriting or printing “VOID” across the ticket, 2) retained for auditing purposes, and 3) a second ticket is manually created with the words “corrected ticket” with a note referencing the original voided ticket.

Stephen Patoray stated that entering manual weights to correct erroneous tickets in the normal weighing mode of operations is impractical for many truck scale (direct sales to the customer) applications since manual weights can only be entered with the scale at zero according to DES Section 17.2. He added that the user is no longer conducting a weigh-in/weigh-out transaction to correct a weigh-in/weigh-out ticket and that corrected tickets may be generated in a different mode of operation.

Bill Fishman, NY NTEP Lab expressed his concern that some systems simply use a different program to issue a corrected ticket and the potential for fraud. Jim Truex responded that Scales Code paragraph “UR.3.9. Use of Manual Weight Entries” still applies to the user and suggested that it may be appropriate to add language to DES section “35. Weigh-In/Weigh-Out Systems” using language from DES section 36.9.7 (“Manual gross weight entries are permitted to correct tickets issued in error provided the following conditions are met:”). Other WS members suggested that a reference to DES Section 17 Manual Weight Entries be added to DES Section.

Conclusion: The WS agreed that a footnote should be added to DES Section 35 referring to DES Section 17 Manual Weight Entries. This recommendation can be found in Appendix A, Agenda Item 6.

7. Update - Minimum Size of Weight and Units Proposals

Source: 2008 Weighing Sector Item 6

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

Background: See the 2009 NCWM Specifications and Tolerance Committee Annual Report Developing Item Part 2, Item 1 “S.1.4.6. Height., Definition of Minimum Reading Distance, UR.2.10. Primary Indicating Elements Provided by the User and Definition of Primary Indications,” and the 2006 Weighing Sector Summary Item 6 for additional background information.

At its 2008 meeting, the Weighing Sector voted on whether to forward the 2008 NTEP labs’ proposal to the S&T Committee. Seven members voted in favor and nine members voted against forwarding the NTEP lab alternate proposal to the S&T Committee. The results of the vote indicated that there is no consensus between the NTEP labs and device manufacturers. The Sector also recommended that the discussion and conclusion be forwarded to the WWMA and NCWM S&T Committees. The Technical Advisor reported that the regional weights and measures associations recommended that this item be withdrawn from the S&T Committee’s Developing agenda based on the comments from the 2008 Weighing Sector and the SMA.

Discussion/Conclusion: Bill Fishman believes that the problem still exists and that evaluators will have to make their best judgment. Darrell Flocken reminded the WS that the OIML R 76 9.5 mm requirement applies to both buyer and seller displays for scales up to 100 kg and that the main objection to the proposal was the requirement that it applies to all applicable devices manufactured after the effective date and that changing production would be cost prohibitive to amend NTEP and other approvals (e.g., FCC, UL, etc.).

The WS believes that no progress can be made on this item and this item be withdrawn from the WS agenda.

8. Update - Automatic Zero-Setting Proposal

Source: 2008 WS Agenda Item 17.

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

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

During its 2008 meeting WS discussed the comments that an increasing number of scales submitted for NTEP evaluations include an “**automatic zero-setting**” feature, which is not addressed in HB 44. It has been noted that many devices are built for a global marketplace and that the operation of this **automatic zero-setting** device may be functional on the device when installed in the United States. Currently, HB 44 does not define this function. NCWM Pub 14 has no test to determine if the device submitted for evaluation has such a function, or if it is sealable. The automatic zero-setting mechanism on a scanner/scale submitted to NTEP could be enabled and disabled by means of a bar code read by the scanner.

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

In 2008, the WS concluded that:

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

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

The WG did not have sufficient time to both develop the proposal and ballot the WS prior to the November 1, 2008, cutoff date for submitting new items to the Committee. Therefore, the group agreed to submit the proposal to the Committee and ballot the WS members. The results of the ballot and all comments were summarized and forwarded to the Committee prior to the 2009 NCWM Interim Meeting. Eight WS members responded to the ballot of which six voted in favor of the proposed language. It should be noted that two of the affirmative votes stated that their vote was provisional provided the reference to the 4 % of scale capacity limitation is removed from the proposal. Two members opposed that item stating that the language should not be rushed through the S&T Committee and that the feature should operate with either negative or positive weight indications.

The NIST technical advisor forwarded the ballot results and comments to the S&T Committee for its consideration at the 2009 NCWM Interim Meeting.

Discussion: The NIST Technical Advisor provided the WS with an update on the status and additional discussions on this item since the 2009 Interim Meeting, and can be reviewed in the 2009 NCWM Annual Report as S&T Committee Item 320-3. The NIST Technical Advisor suggested that the WS develop a consensus position on this item and forward its conclusion to the S&T Committee. The WS discussed the following possible positions to forward to the S&T Committee:

1. Allow feature to operate only when below zero with capacity limit (as shown in 2009 NCWM Annual Report Committee Recommendation).
2. Consider the Spring 2009 SMA position to allow the feature to operate in either direction with no capacity limit.
3. Consider HB 44 language to prohibit the feature
4. No changes to HB 44.

The NIST Technical Advisor also developed language for Publication 14 for additional development that:

1. Defines the feature,
2. Tests that could be used to detect the feature,
3. Procedures or actions if the feature is encountered (e.g., “feature shall be disabled for commercial applications and the switch that enables or disables the feature can not be changed without breaking a security seal or other means of providing security”).
4. Amend Pub 14 by adding “automatic zero-setting mechanism” to the Table of Scale Features and Parameters as a sealable parameter.

Representatives from Measurement Canada stated that Canada allows the feature for direct sale and that it only automatically rezero the scale when indicating negative gross weigh values. Darrell Flocken asked if the WS should consider making a recommendation to the S&T Committee to consider differences in operations for direct vs. indirect sale applications. Nigel Mills and Paul Lewis supported the 4th option and added that existing Scales Code paragraph UR.4.1. Balance condition is sufficient. Richard Harshman stated his support for the 3rd option.

Darrell Flocken commented that one justification for the feature citing actual examples where coupons are scanned and placed one at a time on a scanner/scale resulting in the individual coupons be zero off using the automatic zero-tracking feature. All the coupons would then be removed from the scale in one action placing a scale in a below zero condition beyond the zero-tracking range. Without the automatic zero-setting feature, the store will be giving away product until the operator takes deliberate action to rezero that scale. Scott Henry from NCR was unable to attend the meeting. However he did provide the following in an email that was presented to the WS supporting that the item with OIML language.

August 5, 2009

Hi All,

Although I will not be able to attend the upcoming Weighing Sector Meeting, I would like to provide some input to the AZSM issue.

As for bench counter scales I foresee problems allowing for Zeroing (outside of normal Zero Tracking Range) in the positive direction.

Here is a prime example:

Cashier leaves pen on scale top plate... (AZSM) scale zeros the weight of the pen... cashier places item to be weighed on scale top plate then realizes that the pen is on the top plate and removes the pen.... now the item will be short weighed.

This is one of many examples, cashiers are always using the scale top plate as desk space (typically due to limited counter space).

Items typically left on scale for an extended period of time include coupons, money, sales adds, PLU sheets, and even shelf items (either not wanted by customer or waiting to be bagged).

Given the numerous chances that the POSITIVE side AZSM would have to zero unintentional items left on the scale would lead to numerous errors.

NCR would like to use the AZSM as stated in OIML 4.5.6:

Operate only when the equilibrium is stable and the indication has remained stable below zero for at least 5 seconds.

If the positive direction of AZSM can be harmlessly used by other classes of scales then maybe the Weighing Sector can propose adding AZSM Negative only for Bench Counter Scales and in both directions for other classes of scales.

Please keep me in the loop and Best Regards,

Scott Henry
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The NIST Technical Advisor suggested a compromise position to limit the feature to Point-of-Sale systems interfaced with scales.

Jim Truex added that there are already devices that are tagged for this feature. Stephen Patoray believes that doing nothing according to the 4th option would but may present enforcement problems due to the inconsistent interpretations when citing HB 44 paragraph G-S.2. Facilitation of Fraud. He added that most scales are designed for the international marketplace with features that can be enabled or disabled. In this option, there is very little in HB 44 to guide field officials.

Darrell Flocken and Stephen Patoray stated the incident that prompted the issue before the WS. A field official was performing an inspection on a Point-of-Sale scanner/scale. A test weight was place and left undisturbed on the scale for 20 seconds when the inspector noticed that the scale automatically reset to rezeroed. Further investigation indicated that the weight display would automatically rezero with either positive or negative weight indication. Additionally, configuration of the feature could be changed by passing a specific barcode across the scanner portion of the scanner/scale without breaking a security seal or updating audit trail information. Additionally, this created competitive disadvantage to at least one other manufacturer that was told that the feature was not allowed.

Additional comments addressed properly trained operators, potential benefits or harm to the buyer and seller, minimum positive weight indications, negative net weight indication, and confusion regarding the differences between automatic zero-tracking and automatic zero-setting.

Conclusion: The Sector discussed this in great detail and reached a consensus among the attendees that this feature does not have any value and at times will facilitate inaccurate weight determinations either against the buyer or seller. The NIST Technical Advisor will forward the sector discussions (above) to the S&T Committee.

9. Update - New and Amended HB 44 Tare Proposals

Source: 2008 WS Agenda Item 5.

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

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

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

Discussion: The NIST Technical Advisor provided the WS with following update on the status and additional discussions on this item since the 2009 Interim Meeting. This information can be found in the 2009 Annual Report of the 94th NCWM S&T Committee Final Report.

The NIST Technical Advisor also reported that the S&T Committee asked the WS for its position on the remaining informational agenda items for the Scales and Automatic Weighing Systems codes on Tare.

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

The WS also reviewed Publication 14 list of acceptable indications and recorded representations to verify that "PT" is an acceptable abbreviation for keyboard and stored tare.

Conclusions:

1. **The WS agreed that there may be some merit to Steve Cook's recommendation to include language from the 1980 NCWM S&T discussion on "Tare" and recommended that a developed recommendation be submitted to the next meeting of the WS in 2010.**
2. **The WS also agreed that the remaining Informational tare items should be withdrawn from the S&T Committee Agenda.**
3. **The Sector also agreed to include the "PT" for preset tares since "PT" has been accepted by some of the NTEP labs. This recommendation can be found in Appendix A - Agenda Item 9.**

New Items:

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

Source: Stephen Langford, Cardinal Scale Mfg Co.

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

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

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

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

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

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

The submitter also included the following justification:

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

Section	Device Type	CC Platform Width
8.1.c	Vehicle, Railway, Combination Vehicle/Railway and others over 30 000 and up to and including 200 000 lb	Up to 120% of the width of the platform tested
8.2.c	Vehicle, Railway, Combination Vehicle/Railway and others greater than 200 000 lb ³	No greater than the width of the platform tested
8.3.2.e	Modular Load-Cell Vehicle, Livestock or Railroad Track Scales ⁵	Up to 120% of the width of the platform tested

In each section the “12 feet” footnote adds the following information:

For scales with widths greater than 12 feet;

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

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

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

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

Discussion: The WS reviewed and discuss the proposal and background information. Lou Straub asked if this propose technical policy change be allowed retroactively on active CCs for devices that were tested with the “wide” test procedures. Stephen Langford believes that this should be allowed retroactively since the testing for scales wider that 12 feet is more stringent since it includes applying test load between pairs of load supports and other locations that simulate actual usage for both highway and extra wide vehicles. Jim Truex expressed concerns about deflections of the load-receiving element when the widths of the platform load bearing points are changed. Darrell Flocken replied that manufacturers typically (proportionally) increase the distance between the load supports for wider scales and believes that the existing 20% allowable width increase for scales 12-foot wide or less adequately limits increasing the width of scales greater than 12feet. For example, a 14’ wide scale submitted and tested for evaluation under the criteria in DES 66 b or 66 c may have additional widths listed on the CC up to and including 17’ without additional testing.

There was support from the other manufactures attending the WS meeting and no additional comments from the NTEP labs. Note that there was no recommendation to change the footnote statement that test procedures for scales wider than 12 feet will be addressed by NTEP management and the NTEP laboratories on a case-by-case basis.

Conclusion: The Sector agreed to amend the criteria in DES Technical Policy 8.2.c³ to be consistent with 8.3.2.e⁵. This recommendation can be found in Appendix A, Agenda Item 10.

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

Source: Ed Luthey, Brechbuhler Scales

Background: Brechbuhler Scales is questioning why the minimum platform area on a vehicle scale is limited to 50 percent of the device that was tested. For example, a 70' x 10', 3-section vehicle scale was evaluated and passes type evaluation. The CC would then list the minimum platform size as 350 ft² or list the minimum L x W scales that would comply with the Pub 14 criteria. Under the Pub 14 language, the applicant would have to submit a smaller second scale if they wanted 10' x 10', 2-section scale listed on the CC.

The submitter of the item believes that there is no technical justification for the limitation. Brechbuhler Scales submitted a proposal to eliminate the 50 percent minimum platform area restriction as shown in the recommendation below:

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

A CC will apply to all models having:

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

Discussion: Steve Cook, NIST Technical Advisor reported on past Publication 14 language and WS discussions on this item. Steve noted that the above referenced language has been in Publication 14 since its earliest publication. Additionally, Steve found references to the current language as far back as 1983 in the notes of the National Type Approval work group. The National Type Evaluation work group included NIST, Weights and Measures Officials, scale manufacturers and load cell manufactures. Steve Cook contacted some of the work group participants (Richard Suiter and Henry Oppermann) to inquire if they recall the justification for the accepted language and report any additional information during the WS meeting. They recalled that it was agreed that a lower limit was needed and that the selections of the 50% lower limit was not based on any technical justifications. Jim Truex was concerned that completely eliminating the lower limit for platform area may result in variations in sizes that may be used in unsuitable applications (e.g., a small Class III L vehicle scale used in a Class III platform scale application.). The WS agreed with Stephen Langford's suggestion of 7 foot minimum length.

Conclusion: The Sector agreed to amend the criteria in DES Technical Policy 8.1.b and c by deleting 8.1.b. and adding "**lengths no shorter than 7'**" . . ." to 8.1.c. since the platform area is deleted. This recommendation can be found in Appendix A - Agenda Item 11.

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

Source: Steven Cook, NIST Technical Advisor

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

Table 3. Parameters for Accuracy Classes – Footnote

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

S.1.2.2.1. Class I and II Scales and Dynamic Monorail Scales. If $e \neq d$, the verification scale interval “e” shall be determined by the expression:

$$d < e < 10 d$$

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

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

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

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

(Added 1999)

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

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

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

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

Example of possible indications?

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

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

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

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

“If $e \neq d$, and both “e” and “d” are continuously displayed during normal operation then “d” shall be differentiated from “e” by size, color, etc. throughout the range of weights displayed as “d.”

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

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

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

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

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

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

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

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

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

Discussion/Conclusion: The WS reviewed the background information and agreed that *the example in the background information is unacceptable since both “e” and “d” are not continuously displayed and “e” does not precede the auxiliary means.* The WS also agreed that in nearly all cases, $e = 10 d$. However, there are combinations of $e < 10 d$ that are acceptable when the “e” value and “d” value would be displayed in separate columns on the display as shown below as shown in the following example, or if there is a separate display for “d”. The WS believes that there is no further action is needed for this item.

Max: 12 kg	n _{max} : 12 000
e: 1 g d: 0.2 g	Class II
Example of possible indications	
3.001 ₀ kg	d is differentiated by size and shading
3.001 ₂ kg	d is differentiated by size and shading
3.001 ₄ kg	d is differentiated by size and shading
3.001 ₆ kg	d is differentiated by size and shading
3.001 ₈ kg	d is differentiated by size and shading

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

Source: NCWM S&T Committee

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

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

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

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

- **2008 Final Report** - <http://ts.nist.gov/WeightsAndMeasures/Publications/upload/09-ST-08-Annual-FINAL.doc>
- **2009 Interim Report** - <http://ts.nist.gov/WeightsAndMeasures/Publications/upload/11-ST-09-Pub16-FINAL.doc>

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

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

The NIST Technical Advisor will forward the WS recommendation on the proposal to amend General Code paragraph G-S.8. Provisions for Sealing Adjustable Components the 2010 S&T Committee.

14. Publication 14 – Editorial Suggestions

Source: Stephen Patoray, Consultants on Certification

Background: Stephen Patoray submitted six (6) items that have been submitted to the NTEP Administrator and NIST Technical Advisor. The WS was asked to review these items and provide a recommendation to NTEP that these suggestions be considered editorial corrections to Publication 14.

14 (a).Publication 14 DES Section 58.

Discussion/Conclusion: It was noted that the way 58.1 is worded seems to be opposite of the way paragraph T.N.4.5.1. (a) is worded in HB 44, and code references are needed. The WS supports the recommended changes as shown in Appendix A - Agenda Item 14 (a).

14 (b). Publication 14 DES Section 40.

Discussion/Conclusion: Stephen Patoray recommended changing the title in Section 40 from Zero Load Adjustment to Zero Setting Mechanisms to match the terminology and definitions in HB 44. The WS suggested some minor changes and supports the recommended changes as shown in Appendix A - Agenda Item 14 (b).

14 (c). Publication 14 DES Section 43.

Discussion/Conclusion: Stephen Patoray recommended changing the title in Section 43 from Automatic Zero-Setting Mechanism to Zero-Tracking Mechanism. No Actions is required since the recommended changes were incorporated into the 2009 Edition of Publication 14.

14 (d). Publication 14 DES Section 15.1.

Discussion/Conclusion: Stephen Patoray noted that the Table in Section 15.1 has an error, the word should be “net” not “tare.” The WS supports the recommended changes as shown in Appendix A - Agenda Item 14 (d).

14 (e). Publication 14 FT Table 1.

Discussion/Conclusion: Stephen Patoray noted that Table 1 in Pub 14 FT needs corrected to show the correct loading capabilities of the CA NTEP lab. The WS supports the recommended changes as shown in Appendix A - Agenda Item 14 (e).

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

Discussion/Conclusion: Stephen Patoray noted that there seems to be a word missing at the end of FT Section I step 10 in the test conditions and it appears that the number “1” was inadvertently deleted between the 2000 and 2002 editions of Publication 14. The WS supports the recommended changes as shown in Appendix A - Agenda Item 14 (f).

15. Delete DES Section 66 (c).

Source: Ed Luthy, Brechbuhler.

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

Discussion/Conclusion. The NIST Technical Advisor stated that the WS worked on the development of the type evaluation procedures in DES Sections 66 (b) and 66 (c) for Extra Wide and Double-wide scales in 1998, (WS Agenda Item 2), 2000 (WS Agenda Item1), and 2001 (WS Agenda Item2).

The Sector is not in favor of removing the section. The goal of the proposal is to reduce the expense of type evaluation on these devices. The scale manufacturers in attendance volunteered to form a small work group to review the existing procedures and develop proposals to amend existing language for a possible abbreviated test procedure.

This item will be carried over until the 2010 WS meeting.

16. Creep Recovery for Complete Scales.

Source: NTETC Weighing Sector

Background: During the discussion of WS Agenda Item 1, Creep recovery for load cells, the WS reviewed the report of the S&T Committee and the language adopted by the NCWM. There was support for the proposal to amend Publication 14 to agree with the adopted language in HB 44.

Discussion: The WS noted that the S&T Committee discussion included comments that there is a relationship between load creep recovery and a scales ability to return to a zero-balance condition after a load had been on the load-receiving element over a period of time and that the WS should review the zero-tracking requirements and creep recovery tolerances for scales. Stephen Patoray stated that the adopted language may impact a scales ability to comply with Scales Code paragraph “N.1.9 Zero Balance Change” if the value of creep recovery in field applications exceeds the zero-tracking requirements in S.2.3.1.2. A “zero balance change,” greater than 0.5 d, will not be set to zero by the zero-tracking mechanism after a load has been resting on a scale for an extended period of time. However, because near capacity loads are rarely left on scales for 30-minutes in actual use it is unlikely that there will be problems in the field.

Conclusion: The WS stated it believes that:

1. There will be little impact on zero-tracking requirements due to manufacturers designing scales and separable weighing/load-receiving elements with load cell capacities that are typically larger than the scale capacities, and that loading a scale to 90% capacity for 30-minutes (a test conducted during type evaluation) rarely occurs in most Class III applications.
2. HB 44 Scales Code paragraph T.N.4.1. should be amended to coincide with the changes to T.N.4.6.

Nigel Mills (Hobart) submitted a proposal to amend creep recovery requirements for scales to coincide with the creep recovery tolerance adopted for load cells. The WS agreed with the proposed language. Steve Cook (NIST) and Scott Davidson (Mettler-Toledo) volunteered to further develop the proposal as shown below and submit the Form 15 to the NCWM S&T Committee and to fall regional weights and measures association meetings.

T.N.4.5.1. Time Dependence: Class II, III, and IIII Non-automatic Weighing Instruments. – A non-automatic weighing instrument of Classes II, III, and IIII shall meet the following requirements at constant test conditions. During type evaluation, this test shall be conducted at $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ ($68\text{ }^{\circ}\text{F} \pm 4\text{ }^{\circ}\text{F}$):

- (a) When any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 30 minutes shall not exceed 0.5 e. However, the difference between the indication obtained at 15 minutes and the indication obtained at 30 minutes shall not exceed 0.2 e.
- (b) If the conditions in (a) are not met, the difference between the indication obtained immediately after placing the load on the instrument and the indication observed during the following 4 hours shall not exceed the absolute value of the maximum permissible error at the load applied.
- (c) ~~The deviation on returning to zero as soon as the indication has stabilized, after the removal of any load which has remained on the instrument for 30 minutes, shall not exceed 0.5 e.~~

~~For a multi-interval instrument, the deviation shall not exceed $0.5 e_1$ (where e_1 is the interval of the first partial weighing range or segment of the scale).~~

~~On a multiple range instrument, the deviation on returning to zero from Max_1 (load in the applicable weighing range) shall not exceed $0.5 e_1$ (interval of the weighing segment). Furthermore, after returning to zero from any load greater than Max_1 (capacity of the first weighing range) and immediately after switching to the lowest weighing range, the indication near zero shall not vary by more than e_1 (interval of the first weighing range) during the following 5 minutes.~~

(Added 2005) (Amended 2006 and 2010)

T.N.4.5.2. Time Dependence: Class III L Non-automatic Weighing Instruments. – A non-automatic weighing instrument of Class III L shall meet the following requirements:

- (a) When any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 30 minutes shall not exceed 1.5 e. However, the difference between the indication obtained at 15 minutes and the indication obtained at 30 minutes shall not exceed 0.6 e.
- (b) If the conditions in (a) are not met, the difference between the indication obtained immediately after placing the load on the instrument and the indication observed during the following 4 hours shall not exceed the absolute value of the maximum permissible error at the load applied.
- (c) ~~The deviation on returning to zero as soon as the indication has stabilized, after the removal of any load which has remained on the instrument for 30 minutes, shall not exceed one-half of the absolute value of the applicable tolerance for the applied load for Class III L devices.~~

(Added 2005) (Amended 2010)

T.N.4.5.3. Zero Load Return: Non-automatic Weighing Instruments. – **A non-automatic weighing instrument shall meet the following requirements at constant test conditions. During type evaluation, this test shall be conducted at 20 °C ± 2 °C (68 °F ± 4 °F). The deviation on returning to zero as soon as the indication has stabilized, after the removal of any load which has remained on the instrument for 30 minutes shall not exceed:**

- (a) 0.5 e for Class I, II, and III devices,**
- (b) 0.5 e for Class III devices with 4000 or fewer divisions,**
- (c) 0.83 e for Class III devices with more than 4000 divisions, or**
- (d) one-half of the absolute value of the applicable tolerance for the applied load for Class III L devices.**

For a multi-interval instrument, the deviation shall not exceed 0.83 e₁ (where e₁ is the interval of the first partial weighing range or segment of the scale).

On a multiple range instrument, the deviation on returning to zero from Max_i (load in the applicable weighing range) shall not exceed 0.83 e_i (interval of the weighing segment). Furthermore, after returning to zero from any load greater than Max_i (capacity of the first weighing range) and immediately after switching to the lowest weighing range, the indication near zero shall not vary by more than e₁ (interval of the first weighing range) during the following 5 minutes.

(Added 20XX)

Next Sector Meeting:

Discussion: Next in the rotation for lab and WS meetings is Sacramento, CA for 2010. The WS believes that late August (24 -27) 2010 is acceptable. The WS second choice is the OH NTEP Lab.

Conclusion: The NCWM Board members reviewed and discussed the WS discussion and recommendations. The Board considered a number of other of other factors and agreed that the next WS meeting is scheduled for August 31 – September 2, 2010 in Columbus, OH.

Appendix A - Recommendations for Amendments to Publication 14¹

Agenda Item 1.(a).

<p>9. Permissible Variations of Reading for Creep Recovery</p> <p>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:</p> <p>(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</p> <p>(2) 0.5 times the value of the load cell verification interval (0.5 v) for Class III load cells with 4000 or fewer divisions,</p> <p>(3) 0.83 times the value of the load cell verification interval (0.83 v) for Class III load cells with more than 4000 divisions, or</p> <p>(4) 1.5 times the value of the load cell verification interval (1.5 v) for Class III L load cells.</p>

Agenda Item 1.(b).

<p>12. Summary Table</p> <p>A three-column table of the following critical test results, the corresponding limiting values of each quantity, and the ratio of each critical test result to the correspondence limiting value shall be provided. An example is given in Table 6.</p> <p>a. Force transducer (load cell) error - The combined error due to non- linearity, hysteresis, and temperature effect on sensitivity.</p> <p>b. Repeatability error - The greatest absolute value of non-repeatability in relation to the tolerance value for that test load.</p> <p>c. Temperature effect on minimum dead load output - The greatest value of this effect for consecutive test temperatures.</p> <p>d. Creep - The greatest differences between the initial reference output (at 20 seconds at the time specified in Table 5) and any output recorded during the remaining period of the test.</p> <p>e. Change in indications from 20 to 30 minutes – (per HB 44 T.N.4.6.)</p> <p>f. Creep Recovery - 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}) (at the time specified for initial reading in Table 5).</p> <p>g. Barometric pressure sensitivity.</p>								
<p style="text-align: center;">Table 6 Example of a Summary Table for a Class III 3000 Single Load Cell</p> <p style="text-align: center;">Summary Table (As requested in Item 12 of the force transducer (load cell) data format paper)</p> <table border="1"> <thead> <tr> <th></th> <th>Critical Result¹</th> <th>Tolerance²</th> <th>Result/Tolerance</th> </tr> </thead> <tbody> <tr> <td>(a) Force transducer (load</td> <td>0.68 v</td> <td>0.7 v</td> <td>0.97</td> </tr> </tbody> </table>		Critical Result ¹	Tolerance ²	Result/Tolerance	(a) Force transducer (load	0.68 v	0.7 v	0.97
	Critical Result ¹	Tolerance ²	Result/Tolerance					
(a) Force transducer (load	0.68 v	0.7 v	0.97					

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

	cell) Error			
(b)	Repeatability Error	0.19 v	0.35 v	0.55
(c)	Temperature Effect on MDLO	0.57 v _{min} /5 °C	0.7 v _{min} /5 °C	0.82
(d)	Creep (Time dependence)	0.98 v	1.5 v	0.65
(e)	$\Delta \text{Creep} = I_{20 \text{ min}} - I_{30 \text{ min}}$	0.09 v	0.15 x mpe = 0.225v	0.40
(f)	Creep Recovery	0.17 v	0.5 v	0.34
(g)	Effect of Barometric Pressure	0.185 v _{min} /kPa	1.0 v _{min} /kPa	0.15
<p>¹ The critical test result is the test result that gives the greatest ratio of result to tolerance. There may be other errors of greater absolute value but that give smaller ratios of result to tolerance.</p> <p>² The tolerance is the value from the tolerance table of the NTEP procedure that corresponds to the critical test result.</p>				

Agenda Item 4.

<p>B. Certificate of Conformance Parameters</p> <p>6. Weighing Systems Using a Tank or Hopper Load-receiving Element</p> <p>6.1. For a cylindrical cone bottom tank or hopper a CC will apply to all models having:</p> <ul style="list-style-type: none"> a. weighing capacities from 20 percent to 125 percent (approximately a 6:1 ratio) of the evaluated capacity; b. tank or hopper height from 50 percent to 125 percent of the height of the evaluated device; c. tank or hopper diameter from 50 percent to 110 percent of the diameter of the evaluated device; d. tank or hopper construction and materials similar to that of the equipment evaluated; (see also section titled "Platform Material" below); e. scale division values equal to or greater than the value of the scale division used in the scale evaluated; f. n_{max} equal to or less than the value of the n_{max} used in the scale evaluated g. number of load supports equal to or greater than the number of supports in the device submitted for evaluation. <p>6.2. For a rectangular tank or hopper a CC will apply to all models having:</p> <ul style="list-style-type: none"> a. weighing capacities from 20 percent to 125 percent (approximately a 6:1 ratio) of the evaluated capacity; b. tank or hopper height from 50 percent to 125 percent of the height of the evaluated device; c. tank or hopper length from 50 percent to 110 percent of the length of the evaluated device; d. tank or hopper width from 50 percent to 110 percent of the width of the evaluated device; e. tank or hopper construction and materials similar to that of the equipment evaluated; f. scale division values equal to or greater than the value of the scale division used in the scale evaluated; g. n_{max} equal to or less than the value of the n_{max} used in the scale evaluated. h. number of load supports equal to or greater than the number of supports in the device submitted for evaluation.
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Agenda Item 5.

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” or “Test Weight Railcart” 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 Railcars” and “Test Weight Railcarts.” A “Standard Rail Car”, as described in AAR Scale Handbook Section 1.5.7, is not suitable for use during NTEP evaluations.

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

1.5.5. TEST WEIGHT RAILCAR

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

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

1.5.6. TEST WEIGHT RAILCART

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

- a. All metal construction.
- b. Loading points must not exceed 7ft (2.2 m) and have uniform load distribution.

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

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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 test load for mechanical railway track scales with non-automatic indicating elements. The sensitivity test is conducted by determining the actual test weight value necessary to bring the beam from a rest point at the center of the trig loop to rest points at the top and bottom of the trig loop. The maximum load at which the sensitivity test is conducted need not be comprised of known test weight.

69.3.2. Automatic Digital Indicating Elements

The discrimination test is conducted at zero load and at maximum load for railway track scales with indicating elements (e.g., electronic digital indicating elements, mechanical dials). See also DES Section 54 regarding the specific procedures for the discrimination test.

69.4. Digital Indications

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

69.5. Increasing Load/Shift Tests

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

- (a) Begin increasing-load test by placing 30 000 lb on one end section. Record error
- (b) Remove test load and record balance change. Do not reset zero.

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

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

69.6. Strain Load Tests

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

- (a) Load one end of the scale with a strain load.
- (b) Record the “reference point” for the start of the strain load test.
- (c) Add 100 000 lb of test weight to the opposite end of the scale. The target strain load is the sum of the unknown weight and the test weights.
- (d) Record the indicated strain-load value after the maximum amount of test weights have been added and calculate the strain load test error. The scale shall perform within prescribed tolerances based upon tolerance for the known test weights.
- (e) Remove the test weights from the end of the scale without conducting a decreasing load test.
- (f) If a higher strain load value is desired, increase the strain load at this time before proceeding with next step.
- (g) Record the new strain load reference value and reapply the test weights.
- (h) Record the indicated strain load value and calculate the strain load test error. The scale shall perform within prescribed tolerances based upon the known test weights.
- (i) Evaluate repeatability of results in test weight values obtained in step (d) and step (g) to agree within the absolute value of maintenance tolerances.
- (j) Remove the strain load (railcar or material of unknown weight) from the scale, decreasing to 100 000 lb of known test weights.
- (k) Record error based on a decreasing load test to 100 000 lb.
- (l) Remove weights from scale.
- (m) Record zero balance change.

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

69.7. Permanence Test

69.7.1. Minimum Use Requirements for the Field Permanence Test

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

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

69.7.1.3. Only loads, which reflect “normal” use, will be counted during the permanence-testing period.

- 100 percent of the loads must be above 20 percent of scale capacity; and
- 50 percent of the loads must be above 50 percent of scale capacity.

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

69.7.2. Subsequent Type Evaluation (Field) Permanence Test

69.7.2.1. It is recommended that the Performance Test procedure as described above be repeated for the Permanence Test. However, if the original test equipment is not available, the test may be conducted to the extent possible with a “Test Weight Railcar” or “ Test Weight Railcart” 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.

Agenda Item 6.

35. Weigh-In/Weigh-Out Systems

A weigh-in/weigh-out system is typically used in vehicle scale and other applications that involve two weight determinations. The larger of the two weights is printed as the gross weight. The other weight is printed as the tare weight and the difference computed as the net weight. 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.

NOTE: Manual weight entries are only permitted to correct erroneous tickets printed in error provided the conditions in DES Section “17. Manual Weight Entries” are met.

S. Cook: During the drafting of the summary for this item, the NIST Technical Advisor suggests that the NTEP Committee include a checklist item for DES Section 35 to document if “manual weight” capability was verified as not applicable or complied with applicable requirements as shown below:

35.10. The data processing system performing the weigh-in/weigh-out operation will only accept weight values when the scale indicator is in the gross mode or give an error signal. Yes No N/A

35.11. Manual weight entries are only permitted to correct erroneous tickets printed in error provided the conditions in DES Section “17. Manual Weight Entries” are met. Yes No N/A

Agenda Item 9.

Device Application	Term	Acceptable	Not Acceptable
General:	<u>Semiautomatic (pushbutton)</u> tare	tare, T, TA	
	<u>Keyboard, programmable, and stored tare</u>	<u>tare, T, TA, or PT</u>	
	net	net, N, NT	

Agenda Item 10.

8.2c Widths up to 120% of the width of the platform tested no greater than that of the device tested;³

^{3&5} For scales with widths greater than 12 feet, this policy on range of widths may not be applied retroactively unless the criteria in DES 66 b or 66 c have been performed. Additional testing is required for devices with widths greater than 12 feet. Test procedures for scales wider than 12 feet will be addressed by NTEP management and the NTEP laboratories on a case-by-case basis.

Agenda Item 11.

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

A CC will apply to all models having:

- a. nominal capacities up to 135 percent of evaluated capacity;
- ~~b. a platform area for any two section portion no less than 50 percent of smallest two section portion incorporated in the device evaluated.~~
- be. widths up to 120 percent of the width of the platform tested;
- cd. lengths no shorter than 7' and up to 150 percent of the length of the platform tested;
- de. a span between sections is not more than 20 percent greater than the equipment evaluated;

Agenda Item 14 (a).

Publication 14 DES Section 58.

Publication 14

Time Dependence Test T.N.4.5., T.N.4.5.1.

~~58.1 Load the instrument close to Max. Take one reading as soon as the indication has stabilized and then note the indication in one hour intervals while the load remains on the instrument for a period of four hours. During this test the temperature should not vary more than 2 °C.~~

~~The test may be terminated after 30 minutes if the indication differs less than 0.5 e during the first 30 minutes and the difference between 15 and 30 minutes is less than 0.2 e.~~

When any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 30 minutes shall not exceed 0.5 e. However,

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

If these conditions are not met, the difference between the indication obtained immediately after placing a load on the instrument and the indication observed during the following four hours shall not exceed the absolute value of the maximum permissible error at the load applied.

58.2. The deviation in the zero indication before and after a period of loading with a load close to Max for half an hour, shall be determined. The reading shall be taken as soon as the indication has stabilized.

The deviation on returning to zero as soon as the indication has stabilized, after the removal of any load which has remained on the instrument for 30 minutes, shall not exceed 0.5 e.

Agenda Item 14 (b).

40. Zero Load Adjustment (Zero-Setting Mechanisms) - General

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

To prevent fraudulent or inappropriate adjustments of the zero setting mechanism . . .

-
-

Indicate the zero load adjustment method provided.

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

Agenda Item 14 (d).

15.1. Test Method 1 Yes No N/A

Use this method when tare is taken to the internal resolution and the scale prints gross, tare, and net weight.

- a.
- b.
- c.

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

Agenda Item 14 (e).

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

Agenda Item 14 (f).

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

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

Appendix B - 2009 NTETC Weighing Sector Attendees

National Conference on Weights and Measures / National Type Evaluation Program

Weighing Sector Final Attendee List
August 25-27, 2009 / Columbus, Ohio



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National Conference on Weights and Measures / National Type Evaluation Program

Weighing Sector Final Attendee List
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