

## Report of the Specifications and Tolerances Committee

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Reference  
Key Number

### 300 INTRODUCTION

This is the final report of the Committee on Specifications and Tolerances (S&T) (hereinafter referred to as the “Committee”) for the 95<sup>th</sup> Annual Meeting of the National Conference on Weights and Measures (NCWM). The report is based on the Interim Report offered in the NCWM Publication 16, “Committee Reports,” testimony at public hearings, comments received from the regional weights and measures associations and other parties, the addendum sheets issued at the Annual Meeting, and actions taken by the membership at the voting session of the Annual Meeting.

Table A identifies the agenda items in the report by Reference Key Number, Item Title, and Page Number. The item numbers are those assigned in the Interim Meeting agenda. Voting items are indicated with a “V,” or if the item was part of the Voting Consent calendar by the suffix “VC” after the item number. Items marked with an “I” after the Reference Key Numbers are Information items. Items marked with a “D” after the Key Numbers are Developing items. The Developing designation indicates that an item, while it has merit, may not be adequately developed for action at the national level. Items marked “W” have been withdrawn from consideration. Items marked with a “W” will generally be referred to the regional weights and measures associations because they either need additional development, analysis, and input or did not have sufficient Committee support to bring them before the NCWM. Table B lists the appendices to the report, Table C identifies the acronyms for organizations and technical terms used throughout the report, and Table D provides a summary of the results of the voting on the Committee’s items and the report in its entirety.

This report contains recommendations to amend the National Institute of Standards and Technology (NIST) Handbook 44, 2010 Edition, “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices.” Proposed revisions to the handbook are shown in **bold face print** by ~~striking out~~ information to be deleted and underlining information to be added. New items proposed for the handbook are designated as such and shown in **bold face print**.

**Note:** The policy of NIST is to use metric units of measurement in all of its publications; however, recommendations received by the NCWM technical committees have been printed in this publication as submitted. Therefore, the report may contain references to inch-pound units.

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**Table C**  
**Glossary of Acronyms**

AWS	Automatic Weighing Systems	NCWM	National Conference on Weights and Measures, Inc.
AWWA	American Water Works Association	NEWMA	Northeastern Weights and Measures Association
BCS	Belt-Conveyor Scales	NIST	National Institute of Standards and Technology
CC	Certificate of Conformance	NTEP	National Type Evaluation Program
CWMA	Central Weights and Measures Association	NTETC	National Type Evaluation Technical Committee
EPO	Examination Procedure Outline	NW&SA	National Weighing and Sampling Association
GS	NTETC Grain Analyzer Sector	OEM	Original Equipment Manufacturer
GIPSA	Grain Inspection Packers & Stockyards Administration	Pub 14	NCWM Publication 14
GMM	Grain Moisture Meters	RMFD	Retail Motor-Fuel Dispenser
GPMA	Gasoline Pump Manufacturers Association	SI	International System of Units
HB 44	NIST Handbook 44	SMA	Scale Manufacturers Association
HB 130	NIST Handbook 130	SWMA	Southern Weights and Measures Association
LMD	Liquid-Measuring Device	WG	Work Group
LPG	Liquefied Petroleum Gas	WMD	NIST Weights and Measures Division
MDMD	Multiple Dimension Measuring Devices	WS	NTETC Weighing Sector
MFM	Mass Flow Meter	WWMA	Western Weights and Measures Association
MMA	Meter Manufacturers Association	USNWG	NIST/OIML U.S. National Working Group
MS	NTETC Measuring Sector	VTM	Vehicle-tank Meters
<p>“Handbook 44” (HB 44) means the 2010 Edition of NIST Handbook 44, “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices”</p> <p>“Handbook 130” (HB 130) means the 2009 Edition of NIST Handbook 130 (including subsequent amendments), “Uniform Laws and Regulations in the Areas of Legal Metrology and Fuel Quality”</p> <p><b>Note:</b> NIST does not imply that these acronyms are used solely to identify these organizations or technical topics.</p>			

**Table D**  
**Voting Results**

Reference Key Number	House of State Representatives		House of Delegates		Results
	Yeas	Nays	Yeas	Nays	
Consent Calendar: 320-4,331-1, 336-2, 336-3	33	0	46	0	Adopted
320-2	34	0	48	0	Adopted
320-3	34	0	48	0	Adopted
322-1	34	0	47	0	Adopted
324-1	34	0	46	0	Adopted
360-1	33	0	45	0	Adopted
300 (To Accept the Report on its Entirety)	Voice Vote				Adopted

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**Details of All Items  
(In Order by Reference Key Number)**

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**310 GENERAL CODE**

**310-1 I G-S.8. Provision for Sealing Electronic Adjustable Components, G-S.8.1. Adjustment Mode Indication, and Definitions for Adjustment and Adjustment Mode**

**Source:** 2009 Carryover Item 310-1. This item originated from the Southern Weights and Measures Association (SWMA) Committee and first appeared on the Committee's 2008 agenda.

**Purpose:** The purpose of the proposed changes is to clarify what is considered an effective method of sealing metrological feature, and what information is required to be indicated and recorded when a device is in a metrological adjustment mode.

**Item Under Consideration:**

Amend General Code paragraph G-S.8. and subsequent subparagraphs as follows:

***G-S.8. Provision for Sealing Electronic Adjustable Components.** - A device shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism. That is:*

- (a) It shall not be possible to apply a physical security seal to the device while it is in the calibration and/or configuration mode nor to access the calibration and/or configuration (adjustment) mode when sealed, or***
- (b) The calibration and/or configuration adjustments are protected by an approved method for providing security (e.g. data change audit trail).***

A device may be fitted with an automatic or a semi-automatic calibration mechanism. This mechanism shall be incorporated inside the device. After sealing, neither the mechanism nor the calibration process shall facilitate fraud.

***During any mode of operation in which adjustments can be made, devices shall not provide indications that can be interpreted, transmitted into memory, or printed as a usable (legal) measurement value. \****

(Added 1985) (Amended 1989, ~~and~~ 1993, ~~and~~ 201X)

[Nonretroactive as of January 1, 1990]

\*[Nonretroactive as of January 1, 201X]

***G-S.8.1. Adjustment Mode Indication. For electronic devices protected by an approved means for providing security (e.g. data change audit trail), the device shall clearly and continuously indicate and print, if equipped with a printer, that the calibration and configuration adjustment modes are enabled.***  
[Nonretroactive as of January 1, 201X]

Renumber subsequent paragraphs.

Add applicable definitions to Appendix D from a white paper on the "Metrological Requirements for Audit Trails" adopted by the NCWM in July 1993.

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

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

**Background/Discussion:** At its fall 2007 meeting, the SWMA received a proposal to address inconsistent application of the requirements in paragraph G-S.8. by the National Type Evaluation Program (NTEP) weighing labs by modifying paragraph G-S.8. to ensure that: (1) a device could not be sealed in the configuration mode and continue to operate normally; and (2) to either:

- clearly indicate (and print when interfaced with a printer) that it is in an adjustment mode;
- not operate (present usable measurement values); or
- exit the adjustment mode after 60 minutes.

The proposal, as submitted in the Committee's 2008 Interim Agenda, only required that a device continuously indicate when access to the set-up mode was enabled.

At the 2008 Interim Meeting, the Committee received comments during the open hearing supporting the intent of the proposed language. However, some expressed concern that automatically exiting the adjustment(s) mode after 60 minutes is not a workable solution due to numerous examples where either it could be used fraudulently during the 60 minute period or the 60 minute period was not enough time to complete necessary adjustments during calibration.

The Committee agreed that, to comply with paragraph G-S.8. Provision for Sealing Electronic Adjustable Components, a device must be equipped with an approved audit trail or that a physical seal is required to be broken before any metrological adjustments can be made.

The Committee also believed that an indication that the adjustment mode is in operation is only necessary for devices with approved electronic methods of sealing. Additionally, the adjustment mode indicator should not be operable during normal weighing or measuring operations. The Committee agreed that if a device designed for commercial applications is capable of being "sealed" and still allows external or remote access to the calibration or configuration mode, then that device is clearly in violation of the current provisions in G-S.8. Provision for Sealing Electronic Adjustable Components and G-S.2. Facilitation of Fraud and, therefore, no change to the existing language in paragraph G-S.8. is needed.

In 2008, the Committee amended the proposal due to continuing concerns raised about inconsistent interpretations of G-S.8. by NTEP participating laboratories.

At the 2008 Annual Meeting, the Committee heard comments from the Weights and Measures Division (WMD) that noting that the alternate language submitted by SMA would require that *all* devices provide the operator with indications that a device is in the calibration mode. This would encompass mechanical and electronic devices and devices that use Category 1 physical seals. Additionally, WMD suggested the Committee consider that a device does not need indications that it is in a calibration or configuration mode if it is incapable of providing indications that can be interpreted, printed, or transmitted to a memory device as a correct measurement value.

The Committee agreed with comments from the 2008 CWMA Annual Meeting and from WMD and amended paragraph G-S.8.1. to:

- delete the references to the sealing categories since they are not consistently referenced in all codes;
- clarify printing requirements; and
- include an option that the device not operate or provide metrological indications that can be interpreted or transmitted into memory or to recording elements while in the adjustment mode.

Just prior to the 2008 voting session, the Committee noted that the revised language in G-S.8.1.(a) was inadvertently changed to where it could be literally read that the physical seal itself disabled access to the adjustment mechanisms, instead of preventing access to the mechanism. Consequently, the Committee changed the status of the item from Voting to Information. The Committee believed that the intent of the recommendation is to ensure that the access to the calibration and configuration modes is disabled.

The Committee redrafted the language in paragraph G-S.8.1. in an attempt to clarify the intent of the proposal and submitted the revised draft to the regional Weights and Measures associations and other interested parties for further review and consideration.

During the 2009 NCWM Interim Meeting, the Committee reviewed comments from the fall 2008 WWMA, CWMA, and NEWMA meetings that supported the language submitted to the regional Weights and Measures associations and other interested parties. At its fall 2008 Annual Meeting, the SWMA recommended that: (1) additional work is needed before the item is ready for a vote; (2) the NCWM S&T Committee may wish to consider at least incorporating interpretations and guidelines for the existing language in its reports; and (3) this item should remain an Information item on the NCWM S&T agenda. After considering these comments, the Committee recommended that this item move forward as an Information item to allow further review, comments, and recommendations.

WMD added that it had received comments questioning how the application of a physical seal (as recommended by the manufacturer and listed on the Certificate of Conformance [CC]) ensures that the calibration and configuration modes are disabled. Specifically, what does that presence of the physical seal (pressure sensitive or lock and wire) do to the device that disables the calibration and configuration modes?

In considering these comments, WMD suggested that the Committee consider the following changes:

- Modify G-S.8. Provision for Sealing Electronic Adjustable Components to reduce the potential for misinterpreting the paragraph by outlining the different requirements between physical seals and electronic seals (audit trails);
- Add new specifications for externally and remotely configurable devices since remotely configurable devices are required to have an audit trail in several codes;
- Amend G-UR.4.5. Security Seal to require the user to verify that the device is correctly configured to disable the external configuration feature to deter service agents from leaving a device configured with external access to the adjustments;
- Add definitions from the white paper on the “Metrological Requirements for Audit Trails” adopted by the NCWM in July 1993 since there is some confusion on the meaning of “adjustment” and “adjustment mode;” and
- Add a new definition for “externally configurable (external and on the device)” to distinguish it from “remotely configurable (external but not located on the device).”

Mr. Steve Patoray, Consultants on Certification LLC (CoC), expressed concerns that the language proposed in the 2009 Interim Agenda would require a manufacturer to design a device where the application of the physical seal (e.g., lock and wire, pressure sensitive, etc.) would disable external access to the configuration mode. He believes that the language in the proposal would force the manufacturer to redesign access covers to devices so that the cover disables the external adjustment capability. Consequently, the application of the security seal secures the cover in place and then, if broken, provides an indication that the device may have been adjusted.

The Committee also received a comment from Mr. Will Wothlie, Maryland, stating that he was concerned with the language that requires that the physical seal “shall ensure” that external access to the configuration mode is disabled. He provided examples of mechanical automatic temperature compensation (ATC) elements where a specially designed sealing pin had to be installed before the physical seal could be applied and where electronic motor-fuel devices have a specially designed cover plate where the closing of the cover plate disables the electronic

configuration. The manufacturer has the option under this proposal to either specially design the device with a physical seal as a method of sealing (e.g., a specially designed sealing pin on the aforementioned mechanical ATC element) or design the device with an electronic method of sealing (i.e., an approved audit trail).

Several manufacturers stated that this proposal was not ready and that designs for the method of providing security to the metrological adjustments should be left to the manufacturers. Mr. Darrell Flocken, Mettler-Toledo, added that the intent of the proposal is that the manufacturer can either design a device so that a security seal cannot be applied without placing the device into the proper mode *or* design the device so that it has an approved audit trail.

The Committee agreed with the comments that the proposal is not ready to become a Voting item and suggested that further development to the proposal address the following subjects:

1. Avoid language that allows the indication of usable metrological values while a device is in the adjustment mode for devices that do not have an event logger.
2. Recognize that more than one method of sealing is acceptable on a single device; for example, using a lock and wire seal for the mechanical adjustments and an audit trail for electronic adjustments.
3. Delete or modify references to specific “categories of devices” since the sealing category criteria differ among the specific codes and not all HB 44 codes have such criteria.
4. Require an obvious indication when a device is being adjusted if its method of sealing is a physical security seal.
5. Clarify that the application of a physical security seal to a specially designed and sealable plate or cover that disables external access to the configuration and adjustment mode is not the only method to seal adjustable components.

At its spring 2009 meeting, the CWMA received a comment from the SMA along with a revised version of its previous recommendation that removed the word “adjustment” where appropriate; added the word “modes;” and removed the reference to “Category 1, 2, and 3” in G-S.8.1.(b). The CWMA supported the intent of the SMA proposed language from its 2009 spring meeting and believed that the specific wording should be thoroughly reviewed and that the terms “calibration and configurations modes” are not widely understood. The CWMA suggested that the definitions for the word “adjustment” and “adjustment mode” from the 1993 white paper on Audit Trails be included in HB 44 so that the proposed SMA language might read “. . . the calibration and/or configuration adjustment modes . . .”

Mr. Patoray, CoC, submitted comments to the NCWM and NEWMA S&T Committees providing additional background information on how some devices can have external access to the adjustment mode after the application of a physical seal (and not equipped with an audit trail). In his May 2009 letter to the Committees, he added that the NTEP labs were, and still are, in a bad position because (in the opinion of some of the lab evaluators) the labs have no clear method or description in HB 44 to prohibit a design as described above. However, all lab evaluators believe that the method described above does not provide a truly “effective method of sealing.” Mr. Patoray stated there may be nothing wrong with the current G-S.8. wording as part of the general code and this issue does need to be addressed in each of the individual or specific codes. There may be several solutions for newly designed devices, but it is not the role of HB 44 to attempt to actually put design constraints on manufacturers, only to place requirements that must be met by some type of design solution.

At its spring 2009 meeting, NEWMA supported the intent of this item. However, NEWMA is concerned that this item is getting over-complicated and asks the Committee to consider requiring a simple enunciator indicating the device is in “cal mode.” NEWMA also reviewed comments from the SMA 2009 spring meeting supporting the intent of the item submitted in its revised proposal to the Committee.

During the 2009 NCWM Annual Meeting, the Committee received comments during the open hearing that no action may be needed and that the existing language in HB 44 is sufficient. Oregon and Maryland believe that requirements for sealing are needed by the NTEP labs and field officials in order to consistently interpret and apply

sealing requirements.

The Committee believes that all parties agree with the intent of the proposal, which is to prevent metrological adjustments to weighing and measuring devices without breaking a physical seal, or indicate through other approved means (e.g., audit trail) that adjustments have been made while providing flexibility for manufacturers. Both the WMD and SMA proposals included language that restates the existing language in G-S.8., but is essentially reformatted for clarification. Additionally, both proposals included new requirements for providing indications when a device is in adjustment mode. WMD included further language to address devices that may have more than one method of sealing.

After assessing the comments and discussing the issue, the Committee agreed that the proposal *was not ready* for a vote and, consequently, did not include proposed language in its Interim and Final Reports. However, the Committee agreed to keep this item on its agenda as an Information item with the expectation that proposed language will be submitted for the 2010 Interim Meeting.

At its 2009 meeting, the NTETC Weighing Sector (WS) reviewed the comments from the S&T Committee, the background information in the NCWM 2008 Final 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. The WS has amended its evaluation procedures so that a physical seal will not be accepted as the means to secure metrological adjustments if the scale allows external access to the adjustment mode after an adjustment has been accepted by the device. In these cases, the device must be designed with a data change audit trail. The WS amended Publication 14 for digital electronic scales to require that devices be equipped with:

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

At its fall 2009 meeting, the CWMA commented that the Committee's redrafted language in the 2009 NCWM Interim Report still had some contradictory language. However, the CWMA did not define what is considered "a clear indication" of a device's calibration or configuration status. The CWMA recommended this item remain an Information item in 2010, and amended the NCWM Committee's recommendation by limiting the indication that the device is in the adjustment mode only to devices with approved electronic method of sealing (e.g., audit trails). Devices with an effective security seal would not have to indicate or print that it was in the adjustment mode.

During the fall 2009 WWMA Technical Conference, Mr. Flocken, Mettler-Toledo, speaking as chairman of the WS, reported the Sector's position as stated above, and noted that the Sector can develop additional guidance in the NCWM Publication 14 to ensure uniform interpretation of the requirement during type evaluation. Mr. Lou Straub, Fairbanks, representing SMA, stated that SMA supported the intent of the proposed changes, but had presented specific suggestions for modifying the language to the NCWM S&T Committee as noted in the 2009 CWMA Annual Meeting discussions. Mr. Straub noted that SMA had not met since prior to the 2009 NCWM Annual Meeting, so SMA would need to reconsider any additional thoughts presented during that meeting and the August 2009 WS meeting.

The WWMA reviewed this issue and expressed concerns about a device which could be sealed in a mode that would allow access to calibration or configuration changes without breaking a seal. The WWMA agreed with the position of the NCWM S&T Committee that the current language in paragraph G-S.8. requires that a security seal be broken before a metrological change can be made to a device (or other approved means of security, such as an audit trail provided). Thus, once a security seal is applied, for example, it should not be possible to make a metrological change to the device without breaking that seal. Since this philosophy addresses provisions for protecting access to metrological adjustment, the philosophy should be applied consistently to all device types. Therefore, the Committee recommends this remain an Information item.

At its October 2009 meeting, the NTETC Measuring Sector agreed that Measuring Devices with NTEP CCs have been evaluated to either:

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

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

At its fall 2009 Annual Meeting, the SWMA recommended that this proposal be made an Information item. The SWMA agreed that a device should be designed so that it can either not operate or not be capable of indications that might be interpreted as a valid measurement while it is in the calibration or configuration mode. The SWMA S&T Committee is concerned that a device left to operate while in this mode may facilitate fraud since adjustments might be inadvertently or intentionally made to metrologically significant features.

The SWMA is interested in the input the NCWM S&T Committee receives from the fall 2009 Technical, Industry, and Regional Weights and Measures Association meetings on this issue for the 2010 NCWM Interim Meeting. The SWMA S&T Committee recommended that the final modifications to the General Code ensure that the intent of the requirement is clear and is uniformly interpreted.

NEWMA supported this item remaining as an Information item at its fall 2009 meeting.

At the 2010 NCWM Interim Meeting, the Committee received testimony from the SMA restating its November 2009 position that supported the conclusions of the 2009 Weighing and Measuring Sectors recommending that no change to HB 44 is required, as the wording of G-S.2. and G-S.8. is sufficient. WMD states that it remains concerned about devices which could be sealed while allowing access to calibration or configuration changes without breaking that seal. WMD agreed with the position of the NCWM S&T Committee that the current language in paragraph G-S.8. requires that a security seal be broken before a metrological change can be made to a device (or other approved means of security such as an audit trail provided). Thus, once a security seal is applied, it should not be possible to make a metrological change to the device without breaking that seal. Since this philosophy addresses provisions for protecting access to any metrological adjustment, the philosophy should be applied consistently to all device types. WMD encouraged the Committee to reiterate in its Interim and Final Reports the correct interpretation of G-S.8. as the Committee and the MS have done in the past, and as demonstrated in more recent actions by the WS.

The Committee agreed with comments that no changes are needed to paragraph G-S.8. and that type evaluation procedures have been amended in applicable sections of the NCWM Publication 14 to address the issues of incorrectly applying the requirements in G-S.8. The Committee also noted that there was some confusion regarding the meaning of the terms “adjustment” and “adjustment mode” in the CWMA Annual Meeting reports.

The Committee received no comments addressing potential inconsistent interpretations of the requirements by field officials, requirements for adjustment mode indications, and limitations on metrological indications while in the adjustment mode in any proposals. Consequently, the Committee developed a revised proposal that:

1. did not change the existing text in G-S.8.;
2. added language that restates the intent of G-S.8.;
3. added language to address metrological (legal for trade) measurements while in an adjustment mode;
4. added a new paragraph G-S.8.1. that requires an indication and recorded representations (if equipped with a printer) while in the adjustment mode (if equipped with a printer); and

5. added new definitions for “adjustment” and “adjustment mode” from the white paper on the “Metrological Requirements for Audit Trails” adopted by the NCWM in July 1993 to facilitate a common understanding of the terms.

The Committee also recommended that the amended proposal be designated as an Information item to allow interested parties sufficient time to analyze and comment on the most recent language that appears in the “Item Under Consideration.”

**Key Points Considered by the Committee:**

- All agree that the intent of the proposal is that metrological adjustments shall be secured with: 1) physical seals that must be broken to access metrological adjustments; or 2) other approved means (e.g., data change audit trail) that indicate that metrological adjustments have been made.
- Devices must be equipped with either an approved audit trail or designed such that a physical seal is required to be broken before performing metrological adjustments.
- For devices with approved *electronic method* of sealing, an indication that the adjustment mode is in operation is necessary unless the device does not operate or provide metrological indications that can be interpreted or transmitted into memory or to recording elements.
- Devices that use physical seals to secure metrological adjustments are clearly in violation of G-S.8. if they allow external or remote access to metrological adjustment modes without breaking a physical seal.
- Any changes to General Code paragraph G-S.8. should ensure that the intent of the requirement is clear and is uniformly interpreted.

At NEWMA’s May 2010 Annual Meeting open hearing, Mr. Flocken, speaking as chairman of the NTETC Weighing Sector (WS), stated that the Sector concluded at its August 2009 meeting that existing language in HB 44 is sufficient and that the Sector has established a small work group to review existing type evaluation criteria to suggest procedures in Publication 14 to verify that devices are designed with effective means to ensure compliance with HB 44. Consequently, NEWMA stated that it will await the WS recommendations for changes to Publication 14 before taking a position on this item.

At its spring 2010 Annual Meeting, the CWMA agreed with a proposal from Mr. Paul Lewis, Rice Lake Weighing, to delete the subparagraph (a) in the item under consideration since it restates the language in G-S.8.

At the Committee’s 2010 NCWM Annual Meeting open hearings, Mr. Flocken, Mettler Toledo, speaking as chairman of the NTETC Weighing Sector restated his report from the spring 2010 NEWMA Meeting. Mr. Straub, Fairbanks Scales, speaking on behalf of the SMA, stated that SMA opposes this item and recommends that this item be Withdrawn. The SMA believes that the current wording is a step back from previous proposals. The SMA continues to support the recommendation from the 2009 Weighing and Measuring Sectors stating that no change to HB 44 is required because the wording of G-S.2. and G-S.8. is sufficient.

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

Measuring elements shall be designed with adequate provisions to prevent changes from being made to the measuring element or the flow rate control (if the flow rate control affects the accuracy of deliveries) without evidence of the change being made. These provisions can be an approved means of security (e.g., data change audit trail) or physically applying a security seal

which must be broken before adjustments can be made. When applicable, the adjusting mechanism shall be readily accessible for the purposes of affixing a security seal.

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

The Committee is concerned about a device which could be sealed in a “mode” that would allow access to calibration or configuration changes without breaking a seal. Since the NTEP tests and procedures are based on interpretations of HB 44, the Committee supports the efforts of the Weighing Sector and is recommending that this item remain and Information item until the WS can review and revise (as needed) Publication 14 type evaluation procedures to verify compliance with G-S.8. provisions for sealing consistent with the Committee’s interpretation of G-S.8. stated in the previous paragraph.

See the 2008 and 2009 NCWM Final Reports for additional background information.

### **310-2 W Appendix D – Definition of Electronic Devices, Software-Based and Built-For-Purpose Device**

(This item was withdrawn.)

**Source:** 2009 Carryover Item 310-2. This item originated from the NTETC Software Sector and first appeared on the Committee’s 2007 agenda as Developing Item Part 1, Item 2.

**Purpose:** This proposal deletes the current term and definition of “built-for-purpose device” and replaces them with the term and definition for “software-based electronic devices.” The definitions proposed by the NTETC Software Sector are intended to develop a clear understanding of the use of software in today’s weighing and measuring instruments by:

1. clarifying that all electronic weighing and measuring devices include software;
2. providing a common understanding of software terminology; and
3. classifying the types of software to assist officials in determining applicable inspection procedures and tests when the examination is based on the way the software is installed or modified.

**Item Under Consideration:** Delete the current definition of built-for-purpose device as follows:

~~**built for purpose device. Any main device or element which was manufactured with the intent that it be used as, or part of, a weighing or measuring device or system. [1-10]**~~

~~(Added 2003)~~

Add a new definition and a cross-reference to Appendix D in HB 44 for “Electronic devices, software-based” as follows to replace the current definition of “built-for-purpose device”:

**electronic devices, software-based. – Weighing and measuring devices or systems that use metrological software to facilitate compliance with HB 44. This includes:**

**(a) Embedded software devices (Type P), aka built-for-purpose. – A device or element with software used in a fixed hardware and software environment that cannot be modified or uploaded via any interface without breaking a security seal or other approved means for providing security and will be called a “P,” or**

**(b) Programmable or loadable metrological software devices (Type U), aka not-built-for-purpose. – A personal computer or other device and/or element with PC components with programmable or**

**loadable metrological software and will be called “U.” A “U” is assumed if the conditions for embedded software devices are not met.**

**software-based devices – See Electronic devices, software-based.**

**Background/Discussion:** In 2005, the NTEP Committee established an NTETC Software Sector. The scope of the Software Sector, as documented by the NTEP Committee in its 2006 Final Report, is to develop:

1. A clear understanding of the use of software in today’s weighing and measuring instruments;
2. HB 44 specifications and requirements, as needed, for software incorporated into weighing and measuring devices, which may include, tools for field verification, security requirements, identification, etc.;
3. The NCWM Publication evaluation criteria; and
4. Training guidelines for Weights and Measures officials.

At the Software Sector’s October 2007 Meeting, it was initially suggested that the term “not-built-for-purpose” be removed from the wording in NIST HB 44 paragraph G-S.1.1. since there is no definition for a not-built-for-purpose device in HB 44. After a lengthy discussion related to the terms “built-for-purpose” and “not-built-for-purpose,” the Sector agreed these terms were not clear and should be replaced with the terminology proposed in the “Item Under Consideration” section above. The proposed definitions are based on the revision of OIML R 76 Non-automatic weighing instruments Subsections 5.5.1. (Type P) and 5.5.2. (Type U).

During the 2009 NCWM Annual Meeting, the Committee considered the comments from the SMA on the language in the Committee’s Interim Report, a report from Mr. Patoray, and an article on software in the spring 2009 NCWM newsletter. The Committee agreed to keep this item as an Information item to allow updated comments from the regional Weights and Measures associations and other interested parties based on the discussions and recommendations in the summary of the March 2009 Meeting of the Software Sector.

At its fall 2009 meeting, the CWMA received comments that the proposal was sufficiently developed and recommended moving this item forward as a Voting item on the Committee’s agenda.

At its fall 2009 Technical Conference, the WWMA received comments from SMA, indicating that it continues to oppose this item, noting that requirements should apply equally to the two different device types described in the definitions (e.g., “embedded” and “programmable” software devices). The WWMA received no other input on this item and recommended this item remain an Information item until the Software Sector has had an opportunity to review comments from the 2009 NCWM Annual Meeting and any comments made at subsequent regional weights and measures association meetings.

At their fall 2009 regional Weights and Measures Association Meetings, the SWMA, and NEWMA recommended keeping the status of this proposal as an Information item and agreed that the Software Sector should continue to work on the proposal until it arrives at some final language.

At the 2010 NCWM Interim Meeting, the Committee received comments from SMA, reiterating its opposition to any requirements for software that are different between “types of devices” described in the definitions (e.g., “embedded” and “programmable” software devices) and that this item be Withdrawn from the Committee’s agenda. SMA added that its comments are based on the proposed “Item Under Consideration” in the Interim Agenda. Mr. Ross Andersen, New York Weights and Measures, asked the Committee to state the reasons why there is a need for two definitions for software. Mr. Jim Pettinato, FMC Technologies and Chairman of the Software Sector, replied that the mission of the Sector is, among other objectives; to develop a clear understanding of the use of software in today’s weighing and measuring instruments and to develop HB 44 specifications and requirements, as needed, for software incorporated into weighing and measuring devices. The Sector considered terms and definitions already developed by OIML and the European Community recognizing that software can influence an instrument’s measurement, computations, and operation (controlling). Additionally, the Sector agreed that the terms “built-for-purpose” and “not-built-for-purpose” were not clear and should be replaced with the terminology proposed in this

item. The Committee also received comments from the regional associations and during the 2010 open hearing that the definitions are not needed and that this item should be Withdrawn.

WMD asked the Committee to consider combining related software agenda Items 310-2 and 310-3. These items were originally submitted as separate items, but now both are sufficiently developed to be considered as one item. Originally, the Sector requested that the software definitions and terms in Item 310-2 be placed on the agenda to promote consistent understanding of metrological software. The Sector's recommendation for the identification of software in Item 310-3 was not yet sufficiently developed. WMD inquired if there may be cases where devices contain both Type P (embedded) and/or Type U (universal or programmable) software. In this case, software may need each type of software application identification (e.g., devices with both embedded and downloadable software, or more than one downloadable software module). How might this be addressed or identified?

The Committee understands that software can be used in fixed hardware applications in environments such as stand-alone scales and stand-alone retail-motor fuel devices and is not subject to interfaces that can change the metrological software. In these cases, a physical seal may be a suitable method of sealing. Alternatively, devices with software that is readily changeable without breaking a seal may need to be evaluated or scrutinized differently in areas such as sealing (seals or audit trail), methods of software changes (chip replacement or downloads), and verification (performance testing or checksums). It seems reasonable to the Committee that a distinction between the type of software environment may be necessary to determine appropriate sealing and verification procedures.

The Committee decided not to combine the two agenda items at this time since the Software Sector may recommend withdrawing this proposal as a result of the comments during the 2010 Interim Meeting. The Committee agreed that the status of this item should remain an Information item and asks for additional input from the Software Sector after it has reviewed these and other comments since its last meeting. The Committee will reevaluate the status of this item and the WMD suggestion to combine Items 310-2 and 310-3 during the July 2010 NCWM Annual Meeting.

Additional background information on this item can be reviewed in the 2007, 2008, and 2009 Final Reports of the Committee.

At its March 2010 meeting, the Software Sector recommended withdrawing the proposed definitions after the Sector suggested minor revisions to the proposed identification language in agenda Item 310-3, while managing to achieve the Sector's objective. The revised language no longer references the terms Type U and P software and, therefore, no longer requires a reference to the proposed definitions in the "Items under Consideration" above. The proposed definitions may be revised and resubmitted in the future if further work indicates that the terms will be referenced in HB 44.

During their 2010 spring meetings, NEWMA and the CWMA stated support of the Software Sector's March 2010 recommendation to Withdraw this item

At the 2010 NCWM Annual Meeting open hearing, the SMA stated that it opposes this item and added that there is no longer a technological basis for making this distinction in device types. The SMA supports the recommendation from the March 2010 Software Sector Meeting to Withdraw this item. The Committee agreed with the recommendation from the Software Sector and comments it received since the 2010 NCWM Interim Meeting and withdrew the item.

### **310-3 I G-S.1. Identification. – (Software)**

**Source:** 2009 Carryover Item 310-3. This item originated from the NTETC Software Sector and first appeared on the Committee's 2007 agenda as Developing Item Part 1, Item 1.

**Purpose:** This proposal is intended to amend the identification marking requirements for all electronic devices manufactured after a specified date by requiring that metrological software version or revision information be identified. Additionally, the proposal proposes to list methods, other than "permanently marked," for providing the required information.

**Item Under Consideration:** Amend G-S.1. Identification and G-S.1.1. Location of Marking Information for Not-Built for-Purpose, Software-Based Devices as follows:

**G-S.1. Identification.** – All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification with the following information:

- (a) the name, initials, or trademark of the manufacturer or distributor;
- (b) a model identifier that positively identifies the pattern or design of the device;
  - (1) *The model identifier shall be prefaced by the word “Model,” “Type,” or “Pattern.” These terms may be followed by the word “Number” or an abbreviation of that word. The abbreviation for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., No or No.). The abbreviation for the word “Model” shall be “Mod” or “Mod.” Prefix lettering may be initial capitals, all capitals, or all lowercase.*  
[Nonretroactive as of January 1, 2003]  
(Added 2000) (Amended 2001)
- (c) *a nonrepetitive serial number, except for equipment with no moving or electronic component parts ~~and not built for purpose software-based software device;~~*  
[Nonretroactive as of January 1, 1968]  
(Amended 2003)
  - (1) *The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number.*  
[Nonretroactive as of January 1, 1986]
  - (2) *Abbreviations for the word “Serial” shall, as a minimum, begin with the letter “S,” and abbreviations for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., S/N, SN, Ser. No., and S. No.).*  
[Nonretroactive as of January 1, 2001]
- (d) *the current software version or revision identifier for ~~not built for purpose~~ software-based electronic devices;*  
[Nonretroactive as of January 1, 2004]  
(Added 2003) (**Amended 201X**)
  - (1) *The version or revision identifier shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision.*  
[Nonretroactive as of January 1, 2007]  
(Added 2006)
  - (2) *Abbreviations for the word “Version” shall, as a minimum, begin with the letter “V” and may be followed by the word “Number.” Abbreviations for the word “Revision” shall, as a minimum, begin with the letter “R” and may be followed by the word “Number.” The abbreviation for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., No or No.).*  
[Nonretroactive as of January 1, 2007]  
(Added 2006)
- (e) *an NTEP CC number or a corresponding CC Addendum Number for devices that have a CC. The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms “NTEP CC,” “CC,” or “Approval.” These terms may be followed by the word “Number” or an abbreviation of that*

word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.)  
 [Nonretroactive as of January 1, 2003]

The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.

(Amended 1985, 1991, 1999, 2000, 2001, 2003, ~~and~~, 2006 and 201X)

**G-S.1.1. Location of Marking Information for ~~Not Built For Purpose~~ all Software-Based Devices.** – For ~~not built for purpose~~, software-based devices, either:

(a) The required information in G-S.1. Identification. ~~(a), (b), (d), and (e)~~ shall be permanently marked or continuously displayed on the device; or

(b) The CC Number shall be:

(1) permanently marked on the device;

(2) continuously displayed; or

(3) accessible through one or, at most, two levels of access. ~~an easily recognized menu and, if necessary, a submenu. Examples of menu and submenu identification include, but are not limited to, "Help," "System Identification," "G-S.1. Identification," or "Weights and Measures Identification."~~

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

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

**Note:** For (b), clear instructions for accessing the information required in G-S.1. (a), (b), and (d) shall be listed on the CC, including information necessary to identify that the software in the device is the same type that was evaluated.

[Nonretroactive as of January 1, 2004]

(Added 2003) (Amended 2006 and 201X)

**Background/Discussion:** In 2005, the Board of Directors established an NTETC Software Sector. One of the Sector's tasks, as reported in related agenda Item 310-2, is to recommend HB 44 specifications and requirements, as needed, for software incorporated into weighing and measuring devices, which may include, tools used for software identification.

During its October 2007 meeting, the Sector discussed the value and merits of required markings for software. This included the possible differences in some types of software-based devices and methods of marking requirements. After hearing several proposals, the Sector agreed to the following technical requirements applicable to the marking of software:

1. The NTEP CC Number must be continuously displayed or hard-marked;
2. The version must be software-generated and shall not be hard-marked;
3. The version is required for embedded (Type P) software;
4. Printing the required identification information can be an option;

5. Command or operator action can be considered as an option in lieu of a continuous display of the required information; and
6. Devices with Type P (embedded) software must display or hard-mark make, model, and serial number to comply with G-S.1. Identification.

After the 2008 NCWM Annual Meeting, the Committee received the Software Sector's Proposal to amend G-S.1. Identification and/or G-S.1.1. Location of Marking Information for Not-Built-for-Purpose, Software-Based Devices in the Committee's 2008 Interim Report. The proposal listed "acceptable" and "not acceptable" methods for presenting:

NTEP CC number	Serial Number
Make	Software Version/Revision Number
Model	

At the 2009 NCWM Interim Meeting, SMA commented that it has consistently opposed having different requirements between embedded and downloadable/programmable software-based devices and added that it continues to support the intent of the proposal and will continue to participate in the Software Sector discussions to develop alternate proposals for the marking of software-based devices. Several Weights and Measures officials expressed concerns that the proposed language does not specify how the identification information is to be retrieved if it is not continuously displayed, noting this could result in several ways to access the information (e.g., passwords, display checks, dropdown menus). SMA added that the identification location information on the NTEP CC will become outdated anytime a manufacturer changes the way the information can be retrieved. SMA suggested that a limited number of methods to access the identification information be developed and specified as the only acceptable methods to retrieve identification information. This would make it easier for the inspector to verify the required identification information.

WMD noted that in 1992, the NCWM adopted S&T Committee agenda Item 320-6, S.6.3. Marking Requirements; Capacity by Division and recommended that Tables S.6.3.a. and S.6.3.b. (Note 3) be interpreted to permit the required capacity and scale division markings to be presented as part of the scale display (e.g., displayed on a video terminal or in a liquid crystal display), rather than be physically marked on the device. WMD agrees with the interpretation and suggested that this interpretation could be expanded to other marking requirements (e.g., flow rates, capacity, interval, etc.) and codes on a case-by-case basis, and that specific language (based on the above interpretation) be added to the applicable sections in HB 44.

Software Sector Co-chairman Mr. Pettinato, FMC Technologies, stated that the Software Sector recommended that this remain an Information item to allow conference members to further study the proposal in order to develop a consensus on the format for Table G-S.1. Identification in its 2009 meeting summary.

At its spring 2009 meeting, NEWMA received similar comments from SMA and the Software Sector and took no position on this item pending its member review of the Software Sector's report.

At the 2009 NCWM Annual Meeting, the Committee reviewed the following recommendations and comments, which may be reviewed in greater detail in the 2009 NCWM Final Report:

- the 2009 meeting of the Software Sector;
- a report of the spring 2009 SMA Meeting opposing the marking requirement differences for Type P and Type U devices;
- comments from Mr. Patoray, CoC, supporting the Software Sector's position with his suggested changes in his April 2009 letter to the Committee; and
- comments from WMD on the Software Sector's proposed "Table G-S.1. Identification."

Consequently, the Committee agreed that this remain an Information item and that the regional Weights and Measures associations review the above information and provides the Committee with comments and recommendations.

At its fall 2009 meeting, the CWMA had lengthy discussions about providing the required identification information in a single uniform method. Some of the topics addressed were:

- A single operation or button is needed to view all software version information.
- Use a single function key to access or continuously display software version information.
- Electronic data for both Type U and Type P devices could be hard marked, continuously displayed or accessed by command (operator action).
- The data is useless if it is not easy to access in the field.
- Concern about the cost of requiring a single designated button to access software version information.

The CWMA recommended this remain an Information item with changes to the Committee's recommendations in its 2009 Interim Report as shown in the 2009 NCWM S&T Committee's Final Report and summarized as follows:

1. In proposed paragraph G-S.1.1.(a), add "or accessed by a command (operator action)" **and** delete subparagraph G-S.1.1.(b) (3). to read as follows:

***G-S.1.1. Location of Marking Information for Type U (Not-Built-For-Purpose), Software-Based Devices. – For Type U—~~not-built-for-purpose,~~ software-based devices manufactured prior to January 1, 201X, either:***

- (a) *The required information in G-S.1. Identification. (a), (b), (d), and (e) shall be permanently marked or continuously displayed on the device; **or accessed by a command (operator action);***
  - (b) *The CC Number shall be:*
    - (1) *permanently marked on the device; **or***
    - (2) *continuously displayed.*
2. Delete Note 8 in "Table G-S.1. Notes on Identification."
  3. Amend "Table G-S.1. Identification . . ." by deleting the three references to "via menu display," "Print Option (8)," adding "by command (operator action)," and deleting the language at the bottom of the table.

During the open hearings at the fall 2009 WWMA Technical Conference, Mr. Straub, speaking on behalf of SMA, indicated SMA continues to oppose this item, referring to comments made in conjunction with Item 310-2. He also noted that even if the designations of Type U and Type P were adopted, SMA would continue to oppose the proposed changes to G-S.1., noting that requirements should apply equally to the two different device types described. The WWMA also heard from Mr. Gordon Johnson, Gilbarco, who agreed with SMA's assessment. He also indicated that it would be desirable to have the option of using a menu to provide information, citing increasingly limited space in which to provide marking information, and noted it would be virtually impossible for their company to provide a full time display.

Based on the comments received and its position relative to corresponding definitions for the device types developed by the Software Sector, the WWMA recommended that this remain an Information item until the Software Sector has had an opportunity to review comments from the 2009 NCWM Annual Meeting and any comments made at subsequent regional Weights and Measures association meetings.

At its fall 2009 meeting, the SWMA agreed that the Software Sector should continue to work on the proposal until it arrives at some final language for amending paragraphs G-S.1. Identification and G-S.1.1. Location of Marking Information for Not-Built-For Purpose, Software-Based Devices. The Software Sector should work with manufacturers in its development of the requirement, and any table or other tools should provide further clarity on the intent of the marking requirements.

During its fall 2009 meeting, NEWMA stated that it supports the Committee's decision to keep this as an Information item to have sufficient time to consider the most recent comments from the regional Weights and Measures associations and other interested parties.

At the 2010 NCWM Interim Meeting, the Committee received comments from Mr. Straub, speaking on behalf of the SMA, reiterating SMA's spring 2009 position opposing any requirements for software that are different between types of devices and recommending that this item be Withdrawn from the Committee's agenda. Mr. Straub added that SMA comments are based on the proposed "Item Under Consideration" in the Interim Agenda and not the alternate proposal submitted by the Software Sector after its 2009 spring meeting. Mr. Lewis, Rice Lake Weighing, stated that metrologically significant software should have the same version number marking requirements in Type P (fixed hardware and software) devices or in Type U software (not built-for-purpose) devices. The Software Sector chairman responded that the only difference in the Sector's proposed language is that software identification requires version numbers and not serial numbers. In addition to the comments regarding the "hard marked" terminology presented at the 2009 Annual Meeting, WMD noted that devices with only Type U software are not required to have serial numbers. However, WMD asks the Sector to clarify its position on marking devices with both Type U and Type P software. Are devices required to have a serial number if it uses both Type P and Type U software?

Mr. Jim Truex, NTEP Administrator, asked the members of the NCWM to provide direction to the Software Sector and the Committee for what is needed during field verification of software-based devices in order to determine that the software used in weighing and measuring devices represents the devices that were certified during type evaluation. What does a field inspector need to know about the software version in vehicle scales, electronic indicators, electronic cash registers interfaced with weighing and/or measuring devices, controllers with metrological software, etc.

Ms. Julie Quinn, Minnesota, reported that the state has problems because its officials find software versions that appear to be older than the version listed on the CC. Ms. Quinn added that NTEP evaluates software in these devices to verify that the accuracy of the first indication of the final measurement and the security of metrological adjustments.

Mr. Bryce Wilke, GIPSA, stated that most of the livestock investigations and other regulatory issues most commonly involve software that has not been developed by the original device manufacturer. He noted that any language in HB 44 and NTEP Publication 14 will help GISPA.

Mr. Andersen, New York, stated that there is still some confusion about where the scope of NTEP ends and Weights and Measures' jurisdiction ends. He cited an example on a vehicle scale where a typewriter is used to issue the printed ticket. Weights and measures still has the authority to regulate the way that measurement is used to accurately or inaccurately represent the transaction. Weights and measures authority still exists when the measurement takes place in one jurisdiction and is recorded and subsequently invoiced through a software system in a different jurisdiction.

Ms. Judy Cardin, Wisconsin, stated that NTEP is required if the software can change the measurement result and NTEP should evaluate software up to the point that the first indication of the final weight is presented.

Mr. Steve Malone, Nebraska, added that every electronic weighing and measuring device evaluated by NTEP has software and that the software is needed to make the device work. The problem is that the field inspector has no way of determining if the software in the device is the same as the software evaluated by NTEP without having to carry a hard copy of the CC with them. Nebraska and other states within the CWMA would like to see a simple and standardized method an inspector could use to obtain the relevant software identification and version information.

Mr. Truex thanked the members who commented and reminded them that the Software Sector is not proposing to reopen the “first final” discussion, but to develop recommendations to help field officials to verify that software in a weighing or measuring device represents the type of software covered by an NTEP CC. The Committee concurs with Mr. Truex’s comments. The Committee agreed to replace the agenda language in the “Item Under Consideration” with the Software Sector’s 2009 proposed language in the Committee’s Interim Report. The Committee appreciates the work of the Sector and asks that it review the discussions on this item from the reports from regional Weights and Measures associations as well as comments in writing from interested parties and from the open hearing during the 2010 Interim Meeting.

The Committee agreed that the status of this should remain as an Information item and asks for additional input from the Software Sector after it has reviewed these and other comments received since its last meeting.

Additional background information on this item can be reviewed in the Committee’s 2008 and 2009 Final Reports.

At its March 2010 meeting, the Software Sector, in response to comments heard during the 2010 Interim Meeting, revised the proposed language as described in Item 310-3. These revisions removed the differentiation between device types while still managing to achieve the Sector’s objective.

In summary, for S&T Item 310-3 the Sector recommended amending the 2010 item under consideration by removing the proposed words “**and manufactured after January 1, 201X**” from the first sentence in paragraph G-S.1. and added that the remainder of the proposal remains unchanged. The Sector agreed that the added words are not necessary since the current proposal to amend G-S.1. includes applicable nonretroactive dates for the amended subparagraphs.

The Software Sector also initiated discussion on two new concepts, which may eventually result in additional recommendations to amend G-S.1. It should be noted that these new ideas are in the developmental stage, and are included here by request of the Sector, since comments from the regions and other interested parties would be appreciated by the Software Sector members.

First, the Sector sees merit to requiring some “connection” between the software identifier (i.e., version/revision) and the software itself. The proposal was to add a new sub-subparagraph (3) to G-S.1.(d) to read as follows (with the expectation that examples of acceptable means of implementing such a link would be included in Pub 14).

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

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

The Sector would like feedback on the proposal to specify a limited number of menu items/icons for accessing the CC number (it is not hard-marked or continuously displayed) in subparagraph (c) as follows:

(b) *The Certificate of Conformance (CC) Number shall be:*

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

(i) *For menu-based systems, “Metrology”, “System Identification”, or “Help”.*

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

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

At its spring 2010 meeting, NEWMA recommended leaving this as an Information item to allow review of the software Sector's newly proposed language from its March 2010 meeting.

During the 2010 NCWM Annual Meeting, the SMA stated that the proposal from the Software Sector addresses one of SMA's concerns dealing with the use of the term "not built for purpose;" however, it still has concerns with the requirement in G-S.1 stating that the software version or revision identifier must be clearly and permanently marked. The SMA recommends that the Software Sector and the S&T Committee review and correct what appears to be conflicting requirements as stated in G-S.1. and G-S.1.1. dealing with the marking requirement.

The Committee also received a summary of the 2010 meeting of the NTETC laboratories where some of the NTEP evaluators were concerned that the revised language could be interpreted such that no markings are required on a device. These evaluators expressed concern that an inspector would have to guess which of the eight methods recommended in the Software Sector Summary is to be used to find the CC number and questioned whether this would mean that a weighing or measuring device might not be marked with any identifier markings including the manufacturer.

The Committee agreed to amend the item under consideration based on the recommendations of the Software Sector at its March 2010 meeting. The Committee agreed to clarify and document the SMA concerns with the requirements in G-S.1. where it states that states that "all equipment . . . shall be permanently marked . ." and G-S.1.1. that allows alternate methods, other than "permanently marked," to identify software-based devices. Consequently, the Committee will revise the first paragraph of G-S.1. to read as follows in the 2011 NCWM Interim Agenda:

**G-S.1. Identification.** – All equipment, except weights, ~~and~~ separate parts necessary to the measurement process but not having any metrological effect, and software-based devices covered in G-S.1.1. Location of Marking Information,\* shall be clearly and permanently marked for the purposes of identification with the following information:

[\*Nonretroactive as of January 1, 201X]

...

#### **310-4 I G-A.6. Nonretroactive Requirements (Remanufactured Equipment)**

**Source:** WWMA and SWMA

**Purpose:** Clarify the intent of the 2001 NCWM position on the application of nonretroactive requirements to devices which have been determined to have been "remanufactured."

**Item Under Consideration:** Amend HB 44 General Code paragraph G-A.6. Nonretroactive Requirements by amending subparagraphs (a) and (b) as follows:

**G-A.6. Nonretroactive Requirements.** – "Nonretroactive" requirements are enforceable after the effective date for:

- (a) devices manufactured and remanufactured within a state after the effective date;
- (b) both new, ~~and~~ used, and remanufactured devices brought into a state after the effective date; and
- (c) devices used in noncommercial applications which are placed into commercial use after the effective date.

Nonretroactive requirements are not enforceable with respect to devices that are in commercial service in the state as of the effective date or to new equipment in the stock of a manufacturer or a dealer in the state as of the effective date.

*[Nonretroactive requirements are printed in italic type.]*

(Amended 1989 **and 201X**)

**Background/Discussion:** WMD received an inquiry from a state Weights and Measures Director regarding whether or not a nonretroactive paragraph in the Liquid-Measuring Devices Code of HB 44 would apply to a remanufactured device. In researching this inquiry, WMD discovered an unintended gap in the General Code requirements relative to remanufactured equipment.

- Paragraph G-S.1.2. Remanufactured Devices and Remanufactured Main Elements is a nonretroactive requirement for marking a device with the remanufacturer's information and was enforceable as of January 1, 2002. WMD believes that this paragraph was intended to apply to remanufactured devices and remanufactured main elements that have been placed into commercial service as of the effective date of the requirement, which was January 1, 2002.
- Paragraph G-A.6. Nonretroactive Requirements. (which provides the various conditions in which nonretroactive requirements apply) does not include references to "remanufactured devices" or "remanufactured main elements." Subparagraph (a) (of G-A.6.) references and applies to "manufactured" devices within a state. Appendix D of HB 44 defines a "manufactured" device as any commercial weighing or measuring device shipped as new from the original equipment manufacturer (OEM). Subparagraph (b) could be applied to remanufactured devices that are brought into a state, but could not be applied to those devices installed by a remanufacturer or distributor operating within the state. Subparagraph (c) applies to devices placed into commercial service that had previously been used in noncommercial applications.

Research into past NCWM Conference Reports indicates that a proposal to change the HB 44 definition of "manufactured device" was adopted by the NCWM in 2001. The definition was amended and new definitions for "remanufactured" and "repaired" devices were added; these changes were made based on the recommendations of the NCWM Remanufactured Devices Task Force to provide a recommendation to distinguish remanufactured devices from repaired devices and, thus, give the field official tools to determine what requirements apply to both types of devices. The previous definition, shown below and identified as the "2001 HB 44 definition," included text that WMD believes was intended to include remanufactured devices. The new definition deleted the text "new device or any other device" to the extent that the definition from 2002 forward only applies to devices shipped as new from the OEM.

#### **2001 HB 44 Definition**

**manufactured device.** – Any new device or any other device that has been removed from service and substantially altered or rebuilt.

#### **2002 HB 44 definition**

**manufactured device.** – Any commercial weighing or measuring device shipped as new from the original equipment manufacturer.

It should be noted that the definitions for repaired and remanufactured devices were also adopted to provide guidance to officials to determine if a device has been remanufactured to "be made to operate like a new device of the same type" or repaired to bring it "back into proper operating condition" (see the 86<sup>th</sup> NCWM Final Report, S&T Item 310-1, page S&T - 5).

Since paragraph G-A.6. is silent with respect to remanufactured devices and remanufactured main elements, G-S.1.2., in WMD's opinion, cannot be applied. This was clearly not the intent since, as indicated by its title, it was designed to apply to "remanufactured" equipment.

Because remanufactured devices compete with newly manufactured devices, WMD believes the intent of G-A.6. Nonretroactive Requirements is intended to include such equipment in the scope of the paragraph. That is, remanufactured devices and remanufactured main elements should have to comply with the most current nonretroactive requirements in effect as of the date the devices or elements are remanufactured.

A change is needed to G-A.6. to clarify the application of G-S.1.2. and other nonretroactive requirements, which WMD believes should apply to remanufactured devices and remanufactured main elements.

An additional reason to adopt the proposed language is that the proposed modification to G-A.6. would clearly support their actions in the event that Weights and Measures officials are challenged regarding the application of G-S.1.2. or other nonretroactive paragraphs.

It should be noted that device owners and remanufacturers may experience difficulty in complying with applicable nonretroactive requirements in instances where states have not previously applied them to remanufactured equipment. The extent to which this has occurred may become more evident as this issue is discussed within the regional Weights and Measures and industry associations and alternatives to alleviate this burden on existing equipment could be considered.

While developing this proposal, WMD contacted two retail motor fuel dispenser (RMFD) original equipment manufacturers and representatives from those companies both indicated that remanufactured RMFD's should comply with the most recent HB 44 nonretroactive requirements in effect as of the date they are remanufactured.

WMD also contacted the chairman of the Remanufactured Device Task Force that was formed by the NCWM BOD in 1999. The chairman indicated that to the best of his recollection, there was no conscious discussion from the task force of how nonretroactive requirements were to apply to remanufactured equipment. He believes that different states may be enforcing nonretroactive requirements differently with respect to remanufactured equipment.

The following is a brief history of paragraph *G-S.1.2. Remanufactured Devices and Remanufactured Main Elements*:

- 1997 – A proposal to add a new paragraph addressing the required marking on RMFD's that had been resold for placement into service first appeared as an Information item on the NCWM Specifications and Tolerances Committee agenda.
- 1999 – The NCWM appoints a task force to examine the required marking issues of remanufactured equipment. The primary responsibility of the task force was to develop a marking requirement proposal for the NCWM consideration.
- 2001 – The task force proposed to add several new definitions and a General Code requirement (G-S.1.2.) to HB 44. They also proposed changing the existing HB 44 definition of “manufactured device.” Of importance, the task force proposal removed language from the definition that linked devices that had been substantially altered or rebuilt to G-A.6.
- 2002 – This was the first year the marking requirement for remanufactured devices and remanufactured main elements appeared in HB 44 along with new definitions for “remanufactured devices (and elements)” and “repaired devices (and elements).”

The proposed change in the “Item Under Consideration” will clarify how nonretroactive paragraphs apply to remanufactured equipment.

WMD notes that the issue of applying paragraph G-A.6. to remanufactured equipment is separate from that of determining when a device or element has been “remanufactured.” Definitions found in Appendix D of HB 44 along with guidance developed by the NCWM Remanufactured Equipment Task Force can be used to assist jurisdictions in determining when a device or main element has been “remanufactured.” The proposed change does

not suggest changing these tools or their application. The proposed change is only to clarify the application of G-A.6. to devices that have been determined to have been “remanufactured.”

Even if the proposed direction of solving this problem is not supported as written, WMD believes that some alternate language needs to be added to G-A.6. to clarify its application to remanufactured equipment.

At its fall 2009 meeting, the CWMA suggested that this item be given Developmental status. The CWMA requested that the following questions need to be addressed prior to considering this as an Information item.

1. How would the remanufacture date be verified?
2. Is there enough of a metrological change to a device to warrant a new CC?
3. Are the current definitions for remanufactured devices in HB 44 adequate to support this proposal?
4. Would the device be out of service pending a possible NTEP approval?

During their fall 2009 meetings, the WWMA and SWMA agreed that nonretroactive requirements are applicable to remanufactured equipment that is remanufactured after the effective date. The WWMA believed these devices are competing with new and used devices and should, therefore, be subject to the same requirements. The WWMA and SWMA supported the original language proposed by NIST WMD, but asked the Committee to consider the alternate language proposed by the WWMA by adding the words “and remanufactured” to G-A.6. subparagraphs (b) and (c) and deleting proposed subparagraph (d). The WWMA and SWMA recommended the proposal be included as a Voting item on the Committee’s 2010 Agenda.

At its fall 2009 meeting, NEWMA stated it does not support this proposal because it is not clear what problem the proposal is trying to solve. Additionally, NEWMA stated that this proposal is redundant, since a remanufactured device is considered a new device with its own CC and, therefore, already has to meet code requirements.

At the 2010 NCWM Interim Meeting, the Committee received comments from Mr. Straub, Fairbanks, speaking on behalf of the SMA, who supported the item as proposed in the WWMA recommendation. Some other industry members, including at least one device remanufacturer testified that they have not had sufficient time to review and analyze the impact of the proposal which is intended to clarify existing language. Others stated remanufactured devices need to be treated as new and that they compete with new devices manufactured after the nonretroactive date of new and amended requirements in effect after the device was remanufactured. Mr. Andersen, New York, stated that this proposal should not be part of “Application” paragraphs.

The Committee agreed that the proposed amendment is supported by the intent of the NCWM Remanufactured Devices Task Force when it recommended making a distinction between repaired and remanufactured devices since such a distinction may impact applicable tolerances, NTEP status, and fair competition when a remanufactured device is represented as “good as new.” The Committee also believes that many of the questions raised by the CWMA are answered in the 2000 Report of the NCWM Remanufactured Device Task Force in Appendix A of the 86<sup>th</sup> NCWM Final Report page S&T - 58 through S&T - 69. The Committee also noted that not all remanufactured devices are required to have a new CC and are still traceable to the original CC as noted in the “List of Examples” in the task force report in pages S&T - 64 through S&T - 66.

The Committee recommended that this item, as amended by the WWMA, move forward as a Voting item.

At its 2010 Annual Meeting, NEWMA recommended that this remain an Information item until questions raised during the discussion at its open hearing have been addressed.

At its spring 2010 Annual Meeting, the CWMA recommended that the nonretroactive requirements should be applicable to all new devices. That is, the requirement would apply to remanufactured devices defined in HB 44 as being made to operate like a new device of the same type (i.e., work done to a device or element to the extent that it is required to be marked as “remanufactured” in the Remanufactured Task Force table of scenarios). The CWMA further recommends that this be made an Information item to address some of the concerns raised by manufacturers

and to review the Task Force guidelines. The CWMA also recommended that the list be posted on the NCWM and/or WMD websites according to the recommendation in the 2002 NCWM Final Report.

At the 2010 NCWM Annual Meeting, the Committee received several comments from remanufacturers requesting the item be made an Information item to give the device remanufacturers additional time to evaluate the impact of the proposed amendment to G-A.6.

The Committee also received a letter from Mr. Thomas McGee, PMP Corporation, stating that he disagrees with WMD that the proposed changes to G-A.6. is a clarification of the intent of the Remanufactured Devices Task Force. As it currently reads in the 2010 version of HB 44, G-A.6 Nonretroactive Requirements applies to new devices based on the "Original Manufacturing Date" as compared to the effective date of a requirement. Therefore, a device originally manufactured in January 2002 and remanufactured January 2007 would need to meet all nonretroactive requirements added to the handbook up to and including January 2007. In his letter, Mr. McGee provided an example of a retail motor-fuel dispenser removed from an installation and remanufactured. The dispenser was disassembled and checked for wear, and a new mechanical computer and new outer skins were installed. The dispenser was checked for accuracy and everything checked out per HB 44. Because this dispenser was out of production prior to the adding of the nonretroactive marking requirement specifying that the CC number be clearly marked on the dispenser, it could be rejected by a state and not allowed to be installed.

Mr. McGee added that, as stated in the discussion of the item, NIST makes a direct comparison between a new device and a remanufactured device indicating they directly compete with each other. This is true as far as competing in the same market as a whole, but not if you factor in technology, features, warranty, etc. Sometime in the 1990s the Remanufactured Task Force recognized that Remanufacturing has been going on for a long time and is just part of the business. The remanufactured devices do not directly compete with new devices, but they do fill a void. A smaller low volume operation can buy remanufactured devices at a reduced price, which keeps them competitive with the large volume operations. It provides a means to extend the life of equipment that maybe has gone out of production but is still very accurate and reliable. Mr. McGee recommended that this be moved back to an Information item or removed from the agenda. If made an Information item, it would give all of those companies that could be impacted by the change to review and comment on this issue. He added that this is not just a clarification. It is clearly a change in the philosophy of applying Nonretroactive Requirements. A complete copy of Mr. McGee's letter (less extracts of HB 44 and above background information) can be viewed in Appendix A of this Report.

Mr. Don Graff, Graffco Inc., submitted a list of remanufacturers of liquid-measuring devices that may be impacted by the enforcement of nonretroactive requirements on remanufactured devices and requested that this be designated as an Information item. A complete copy of Mr. Graff's letter can be viewed in Appendix A of this Report.

The Committee also received a letter of support for this item from Mr. R. Michael Carlson, President, Dresser Wayne North America. Mr. Carlson expressed his company's concerns about a growing trend to extend that lifecycle by refurbishing or "remanufacturing" the equipment after its removal from the original site and then placing it back into the stream of commerce without first bringing it into compliance with current NTEP standards. This failure to meet applicable NTEP certification standards increases the chances of errors, misuse, and fraud and puts consumers as well as station owners at risk. The current practice of extending the usable life of fuel dispensers without a system of checks and balances to help ensure that, at the time of sale, such used and remanufactured equipment meets current NTEP standards results in inconsistency in the marketplace and an unacceptable risk of error.

Mr. Carlson added that the consistency and accuracy of fuel-dispensing equipment is an issue of critical and growing importance. For decades the industry has been able to safely and reliably operate within a fueling and payment infrastructure that remained relatively stable. However, the last few years have brought significant changes to the marketplace, including the following:

- Payment security including:
  - Increasing threats of fraud through sophisticated fuel and identity-theft schemes;

- Credit card industry mandates for increasingly rigorous payment-security standards; and
- Dispenser manufacturers have enhanced fuel-meter technology and associated electronics to deter tampering with measurement and calibration.
- Fuel evolution including:
  - Ultra-low-sulfur diesel (ULSD) and diesel exhaust fluid (DEF) have taxed the capabilities of dispensers' hydraulic systems; and
  - Higher levels of ethanol in today's fuels require specially fabricated seals and components.
- Communications interface (and security) including:
  - Download of dispenser software from remote sources; and
  - The potential for automatic meter-calibration.

As such, Dresser Wayne supports maintaining Item 301-4 G-A.6. as a Voting item at the National Conference on Weights and Measures on July 11-15, 2010. It is in the best interest of the general public, station owners and the fuel-dispensing industry in general. A complete copy of Mr. Carlson's letter can be viewed in Appendix A of this Report.

Mr. Andersen (New York) stated that one of the primary issues that led to the marking requirements was original manufacturers' concern over warranty and liability concerns when devices were remanufactured with unauthorized parts. Mr. Lewis, Rice Lake Weighing, expressed concern about a remanufacturer's ability to remanufacture a device without the original manufacturer's blueprints and parts lists. Additionally, Mr. Lewis stated that VCAP should also be applicable to remanufacturers that work on devices subject to testing for influence factors.

The SMA stated its support for this item during the open hearings. WMD reiterated that the current issue was proposed because paragraph G-A.6. does not specifically reference "remanufactured" devices and elements and that WMD has received questions on how or if nonretroactive requirements are to be applied to "remanufactured" devices and elements. WMD believes that it was the intent of the 2001 and 2002 Committees that remanufactured devices would be subject to nonretroactive requirements according to the definition for "remanufactured devices" in Appendix D. Other original equipment manufacturers have also stated that they remanufacture their own devices and typically to the current applicable nonretroactive devices.

WMD also provided the Committee with the following "real life" examples outlining when a device is considered as "repaired" or "remanufactured."

### **Weighing Devices**

**Example 1:** A scale service agency replaces all of the load cells of a vehicle scale's weighing/load-receiving element with load cells of a different manufacture that are metrological equivalent cells and of the same basic type. The replacement cells have been issued an NTEP CC and are replaced without any modification to the load cell mounting assembly.

The associated guideline adopted by the NCWM in 2002 is "Guideline Item" 9-W, Section I Examples of Repaired Devices/Repaired Elements (no metrological change).

*According to the guideline, this is an example of a repaired device. The weighing/load-receiving element would still be traceable to the original NTEP CC and would not be required to comply with the most recent nonretroactive requirements.*

**Example 2:** A scale service agency completely rebuilds a used retail-computing scale that they acquired from a grocery store that had had it in service for over 15 years. The scale is completely disassembled, parts inspected for wear, and all worn parts replaced with remanufactured parts that are not OEM, but are the same design. The

load cell, found to still be functioning satisfactorily, is not replaced. The scale is then reassembled and sold to a delicatessen located within the same state as the service agency.

The associated guideline adopted by the NCWM in 2002 is “Guideline Item” 3-W, Section II Examples of Remanufactured Devices/Remanufactured Elements (no metrological change).

*According to the guideline, this is an example of a remanufactured device. The scale would still be traceable to the original NTEP CC, but would need to be marked in accordance with paragraph G-S.1.2. Remanufactured Devices and Remanufactured Main Elements and also would be required to comply with the most recent HB-44 nonretroactive requirements in effect as of the date the scale is installed in its new location. For example, if the remanufactured scale were installed July 1, 2010, it would need to comply with paragraph G-S.1., bullet (e) which requires an NTEP Certificate of Conformance (CC) or CC Addendum Number for devices that have a CC be permanently marked. This particular requirement is nonretroactive as of January 1, 2007.*

## Measuring Devices

**Example 1:** A used equipment dealer replaces a meter that cannot be brought into proper calibration with a used meter of the same model taken from a used dispenser. This work is performed at the used equipment dealer’s shop. The replacement meter is recalibrated after installation and then placed back into service.

The associated guideline adopted by the NCWM in 2002 is “Guideline Item” 8-M, Section I Examples of Repaired Devices/Repaired Elements (no metrological change).

*According to the guideline, this is an example of a repaired device. The device is still traceable to the original NTEP CC and would not be required to comply with the most recent nonretroactive requirements in effect as of the time this work was completed.*

**Example 2:** A remanufacturer of dispensers completely disassembles a retail motor fuel dispenser and replaces the meter with the same model meter remanufactured by another firm. They then fix and replace all other parts as needed, reassemble the dispenser, and offer it for sale as a “remanufactured” dispenser.

The associated guideline adopted by the NCWM in 2002 is “Guideline Item” 6-M, Section II - Examples of Remanufactured Devices/Remanufactured Elements (no metrological change).

*According to the guideline, this is an example of a remanufactured device. It would need to be marked in accordance with paragraph G-S.1.2. Remanufactured Devices and Remanufactured Main Elements and also would be required to comply with the most recent HB-44 nonretroactive requirements in effect as of the date the dispenser is installed into commercial service. For example, if a 15 year old dispenser were remanufactured and returned to service on July 1, 2010, it would need to comply with Liquid-Measuring Devices Code, paragraph S.4.4.2. Location of Marking Information; Retail Motor-Fuel Dispensers, which is nonretroactive as of January 1, 2003.*

Significant points considered by the Committee are:

- If it was not the intent of the NCWM in adopting the definitions and marking requirements for “remanufactured” devices and elements to subject remanufactured devices to Nonretroactive requirements, then how should G-S.1.2. be applied since the “remanufactured” marking requirement in G-S.1.2. was adopted as a nonretroactive requirement?
- The terms “manufactured” and “remanufactured” have distinct definitions in that manufactured devices are shipped as new and remanufactured devices are made to operate as new as defined in Appendix D.
- Paragraph G-A.6. is currently silent with respect to remanufactured devices and elements.
- There is a lot of misunderstanding of the original findings and recommendations of the original task force.

- The report of the Remanufactured Task Force and table of scenarios is not readily available outside of the 2001 NCWM Final Report.

After considering these points and the comments received on this issue, the Committee agreed to designate this as an Information item to allow interested parties to review the report of the Remanufactured Task Force and associated table of scenarios. The Committee also requested that the NIST Technical Advisor contact the NTEP Administrator to discuss the potential impact of VCAP on remanufacturers with regard to how these guidelines would be integrated into the VCAP system.

## 320 SCALES

### 320-1A W S.2.3.4. through S.2.3.7. Value of Tare Indication and Recorded Representations, and Appendix D. Definitions for Gross Weight Value, Net Weight Value, Net Weight, Tare, and Tare Weight Value

(This item was withdrawn.)

**Source:** 2009 Carryover Item 320-1C. (This item originated from the NTETC WS and first appeared on the Committee's 2007 agenda.)

**Purpose:** The tare proposals and proposed definitions were intended to: (1) promote uniform application of tare requirements during field inspections; and (2) provide additional support for the requirements that may apply to the operation of tare and preset tare and to the indications and recorded representation of tare. To address the subject of "Tare," NTEP has relied only on the interpretations of General Code requirements and the NCWM Report of the 65<sup>th</sup> (1980) Committee on Specifications and Tolerances, agenda Item 301-3 Tare (Pages 216 - 218).

**Item Under Consideration:** This recommendation was intended to clarify the requirements for tare by adding new paragraphs S.2.3.2. through S.2.3.6., and adding new definitions to Appendix D for "gross weight," "net weight," "net weight value," "tare," and "tare weight value."

(The proposed language and definitions may be reviewed in the Committee's 2009 Final Report.)

**Background/Discussion:** Additional background information on this item can be found in the Background/Discussion paragraphs on agenda Item 320-1A in the Committee's 2009 Final Report.

During the 2009 Annual Meeting, the Committee received no additional comments on this proposal. However, Tare Items 320-1A and 320-1B on the 2009 Committee's agenda were not adopted. Consequently, the Committee recommended that the WS discuss and provide the Committee with an update on the WS position on this and all other remaining tare proposals carried over to the Committee's 2010 Interim Agenda.

At its August 2009 Annual Meeting, the WS reviewed the background information regarding comments and actions on these issues during the 2009 NCWM Annual Meeting. The WS recommended that the remaining tare items (Items: 320-1A, 320-1B, 324-2A, 324-2B, and 324-C on the Committee's 2009 agenda) be Withdrawn from the 2010 S&T Committee Agenda since the NCWM agreed with the SMA position that the tare proposals are not needed for HB 44.

Based upon comments received during the 2009 NCWM Annual Meeting and their respective fall 2009 meetings, the CWMA, WWMA, SWMA, and NEWMA recommended the remaining tare items be Withdrawn from the NCWM S&T Committee's 2010 Interim Agenda.

At the 2010 NCWM Interim Meeting, the Committee agreed that there was no longer any support for the proposal and withdrew this item from its agenda.

**320-1B W S.2.4. Preset Tare Mechanism and Appendix D – Definitions for Preset Tare**

(This item was withdrawn.)

**Source:** 2009 Carryover Item 320-1D. (This item originated from the NTETC WS and first appeared on the Committee's 2007 agenda.)

**Purpose:** The tare proposals and proposed definitions were intended to: (1) promote uniform application of tare requirements during field inspections; (2) allow the identification and printing of preset tares with the abbreviation "PT;" and (3) provide additional support for the requirements that apply to the operation of tare and preset tare and to the indications and recorded representation of tare. NTEP has relied only on the interpretations of HB 44 General Code requirements and Final Report of the 65th NCWM Committee on Specifications and Tolerances, agenda Item 301-3, Tare (Pages 216-218) to address the subject of tare.

**Items Under Consideration:** Add a new paragraph S.2.4. and new preset tare definitions.

(The proposed language and definitions may be reviewed in the Committee's 2009 Final Report.)

**Background/Discussion:** Additional background information on this item can be found in the Background/Discussion paragraphs on agenda Item 320-1A in the Committee's 2009 Final Report.

During the 2009 Annual Meeting, the Committee received no additional comments on this proposal. However, Tare Items 320-1A and 320-1B on the Committee's 2009 agenda were not adopted and, consequently, the Committee recommended that the WS provide the Committee with an update on the WS position on the remaining tare proposals carried over to the Committee's 2010 Interim Agenda.

At its August 2009 Annual Meeting, the NTETC WS reviewed the background information regarding comments and actions during the 2009 NCWM Annual Meeting. Since the NCWM agreed with the SMA position that the tare proposals are not needed for HB 44, the WS recommended that the remaining tare Items (320-1A, 320-1B, 324-2A, 324-2B, and 324-2C in the Committee's 2009 agenda) be Withdrawn from the Committee's agenda.

Based upon comments received during the 2009 NCWM Annual Meeting and their respective fall 2009 meetings, the CWMA, WWMA, SWMA, and NEWMA recommended the remaining tare items be Withdrawn from the NCWM S&T Committee's agenda.

At the 2010 NCWM Interim Meeting, the Committee agreed that there was no longer any support for the proposal and withdrew this item from its agenda.

**320-2 V S.2.1.1. General (Zero) and Appendix D Definitions for Initial Zero-Setting Mechanism and Automatic Zero-Tracking Mechanism**

(This item was adopted.)

**Source:** 2009 Carryover Item 320-3. This item originated from the NTETC WS and the S&T Committee and first appeared on the Committee's 2009 Interim Agenda as a proposal to add a new definition to Appendix D - Automatic Zero-Setting Mechanism and amend paragraph S.2.1.1. to specifically prohibit the feature.

**Purpose:** Many scales throughout the world are equipped with an automatic zero-setting feature that is typically disabled for the U.S. marketplace. This feature is not addressed or defined in HB 44 and is not listed on NTEP CCs.

**Item Under Consideration:** Amend paragraph S.2.1.1. as follows:

### S.2.1. Zero-Load Adjustment.

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

**Except for an Initial Zero-Setting Mechanism, an automatic zero adjustment outside the limits specified in S.2.1.3. for an automatic zero-tracking mechanism is prohibited.**

**(Amended 2010)**

Amend the Appendix D. definition of “automatic zero-tracking mechanism” (including incorporating the SMA suggestions to retain the word “automatic”) and amend the definition for “initial zero-setting mechanism” as follows:

**automatic zero-tracking (AZT) mechanism.** – **Automatic means provided to maintain the zero balance indication, within specified limits, without the intervention of an operator.** ~~See “automatic zero-tracking mechanism” under “zero-setting mechanism.”~~ [2.20, 2.22, 2.24]

**(Amended 2010)** (HB 44 [2010] on page D-2)

**initial zero-setting mechanism.** – ~~See “initial zero-setting mechanism” under “zero-setting mechanism.”~~ ~~Automatic means provided to set the indication to zero at the time the instrument is switched on and before it is ready for use.~~ [2.20]

(Added 1990) **(Amended 2010)** (HB 44 [2010] on page D-10)

**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] (HB 44 [2010] on pages D-25 &26)

~~**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]~~

**initial zero-setting mechanism.** – **Automatic means provided to set the indication to zero at the time the instrument is switched on and before it is ready for use.**[2.20]

**(Added 1990)**

**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]

**(Amended 2010)**

**Background/Discussion:** At its 2008 Annual Meeting, the NTETC WS discussed the fact that an increasing number of scales submitted for NTEP evaluations include an automatic zero-setting feature, which is not addressed in NIST 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 a device when installed in the United States. Currently, HB 44 does not define this function and the NCWM Publication 14 has no test to determine if the device submitted for evaluation has such a function or if it is sealable. Additionally, NTEP reported that, on a scanner/scale that had been submitted for NTEP evaluation, the automatic zero-setting feature was discovered and found to work in both the positive and negative directions. Additionally, the feature could be activated or deactivated without breaking a security seal or changing the audit trail information. NTEP also found that the operation of the feature in the positive direction does not even comply with OIML R 76. Competitors have also commented to NTEP that they had to disable this feature because it was not allowed by other NTEP weighing labs.

In the past, several of the NTEP labs, when asked about this feature, have indicated that since it does not meet the definition of an “automatic zero-tracking mechanism,” it is not allowed. Additionally, the NTETC WS agreed that

HB 44 does not clearly state that this function is not allowed. This led to incorrect interpretations of Section 2.20. Scales paragraphs S.1.1.(c) (Zero Indication – “. . . return to a continuous zero indication”) and S.1.1.1.(b) (Digital Indicating Elements – “*a device shall either automatically maintain a “center-of-zero” condition. . .*”) and could also be interpreted to allow the automatic zero-setting device as described in OIML R 76. This interpretation was not the intent of the HB 44 requirements referenced above.

In its initial assessment of this issue, the WS concluded the following:

1. There is a problem that needs to be solved regarding the operation of an “automatic zero-setting” feature, based on the current information or lack of information in HB 44.
2. There are no technical reasons why the automatic zero-setting feature as described in OIML R 76 should not be included in NIST HB 44.
3. The feature may not be suitable for all applications if it is allowed to function with both positive and negative weight indications.
4. Language will need to be developed for the 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 WG to develop language to be submitted to the NCWM S&T Committee and to make a recommendation addressing the suitability of scales with the capability of automatically setting a positive weight indication to zero. The WG developed a proposal to add a retroactive requirement for the automatic zero-setting feature. The group is aware that the feature has been included on several scales for nearly 20 years although it may not have been activated. The group amended Appendix D to include a new definition for “automatic zero-setting mechanism” and to modify term “automatic zero-tracking mechanism” to eliminate any redundancy in its definition. The original WG proposal can be reviewed in the Committee’s 2009 Final Report.

The WG did not have sufficient time to both develop the proposal and ballot the NTETC WS prior to the cutoff date for submitting items to the 2009 Committee. The responses to the ballot indicated that 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 on the basis that the reference to the 4 % of scale capacity limitation be 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.

At the 2009 NCWM Interim Meeting, the Committee reviewed the WS ballot results and comments it received during the open hearing. The Committee agreed that there was no clear consensus among the WS members and recommended that this proposal remain an Information item. The Committee agreed with the suggestion made by Mr. Flocken, Mettler-Toledo, to move the definition of “automatic zero-tracking.” The Committee also asked that the NTEP labs and the WS further discuss this item, develop a consensus position, forward its recommendations to the Committee, and consider the suggestion from Mr. Steve Cook, NIST WMD, Committee Technical Advisor, to amend the term automatic-zero tracking.

During the Committee’s open hearing at the 2009 NCWM Annual Meeting, support for the SMA position on this item was reiterated by several scale manufacturers who stated that the feature should be allowed to operate with either a negative or a positive weight indication. WMD stated that if the Committee chooses to allow the automatic zero-setting feature, the language should be consistent with OIML R 76 in regards to the stipulation that only the negative weight indication be permitted to automatically rezero and added that there is too great a potential for a load that is intended to be weighed to be unintentionally (or fraudulently) zeroed. Should the Committee choose to prohibit this feature, WMD recommended that the Committee develop a proposal that expressly prohibits the automatic zero-setting feature. In either case, access to enable or disable the feature should be protected by an approved security means on any scale that can be configured with this feature. Additionally, the Committee agreed that the WS needs support from HB 44 in order to evaluate the feature if the requirement is adopted or verify that it can be disabled if the feature is to be prohibited on weighing devices.

The Committee agreed to leave this proposal on the agenda as an Information item and requested that the NTETC WS discuss the comments and suggestions from the 2009 Interim and Annual Meetings and provide additional feedback to the Committee on the recommendation that either supports the proposal or recommends language for HB 44 prohibiting the feature.

At the August 2009 NTETC WS Meeting, the NIST Technical Advisor provided the WS with an update on the status of this item and outlined the Committee's request. The WS was asked to develop a consensus position on this item and then forward its conclusion to the 2010 S&T Committee. The WS discussed the possible positions it might forward to the S&T Committee (see agenda Item 320-2).

The WS discussed the options in great detail and reached a consensus among the attendees that this feature does not have any value in the U.S. marketplace and can potentially facilitate inaccurate weight determinations against either the buyer or the seller. The WS changed its 2008 position and now recommends that no changes are needed in to address this feature in HB 44.

At its fall 2009 meeting, the CWMA recommended that this remain an Information item. The CWMA added that this feature should be disallowed and recounted comments from its 2009 Annual Meeting about the accidental zeroing of weights during an inspection. The CWMA believes that the potential for this to happen still exists.

During the open hearings at the fall 2009 WWMA Annual Technical Conference, SMA indicated it opposes this item, noting that a scale should be able to zero off loads in both positive and negative directions. WS Chairman Mr. Flocken, Mettler-Toledo, speaking on behalf of the WS, indicated that the WS originally proposed this issue to address a situation in which one company's device was permitted to automatically re-zero unlimited amounts of weight from the scale after a programmable period of time. While the WS was not comfortable with the operation of this feature when it was ultimately brought to light, they made an attempt to propose the addition of language to NIST HB 44 to recognize the feature in order to avoid putting other manufacturers at a competitive disadvantage. After much discussion and hearing many comments on this issue, the WS has since reconsidered its position and believes that its original inclination to oppose the recognition of the feature was correct. The WS indicated that all devices will be appropriately addressed through the type evaluation process and believes that the proposed changes to HB 44 are no longer necessary.

Based upon the comments received during this meeting and the 2009 NCWM Annual Meeting, the WWMA recommended this item and corresponding agenda Items 322-1 and 324-1 be Withdrawn from the NCWM S&T Committee's 2010 Interim Agenda.

At its 2009 Annual Meeting, the SWMA recommended making the proposal to add a new paragraph S.2.1.7. and associated definition for automatic zero-setting mechanism as an Information item. The SWMA heard the feature conflicts with the current operation of zero-tracking and the feature is not clearly defined. Furthermore, one manufacturer has configured the feature to operate with both positive and negative weight indications, thus conflicting with OIML R 76 requirements. If the NCWM S&T Committee agrees to address this feature, the language should harmonize with OIML R 76.

During its 2009 Interim Meeting, NEWMA agreed with the comments and recommendations from the WWMA and recommends this item be Withdrawn.

At the 2010 NCWM Interim Meeting, the Committee received input echoing comments from the WS, SMA, and the regional weights and measures associations. The Committee agreed that the proposal to allow the feature and to add a new device specification paragraph that aligns HB 44 with a similar recommendation in OIML R 76 as written in the 2010 Interim Agenda does not have sufficient support to pass. The Committee did agree with WMD comments that the feature should be defined and prohibited since there was little support for the proposal. Therefore, the Committee recommends that the definition and alternative retroactive language prohibiting the feature developed by WMD move forward as a Voting item as shown in the "Item Under Consideration" above.

The Committee also recommended that this item be considered in conjunction with similar proposals in agenda Items 322-1 and 324-1 since the proposals provide the same prohibitions in all three codes.

At its 2010 Annual Meeting, NEWMA stated its support for the intent of this item and suggested moving the sentence **“An automatic zero-setting mechanism is prohibited.”** to the end of the paragraph to clarify the potential confusion caused by the order of the language in the item under consideration.

At its 2010 Annual Meeting, the CWMA stated its support for this item and suggested that the Committee consider the SMA alternate language.

At the open hearing during the CWMA, NEWMA, and the NCWM Annual Meetings, the SMA stated its support for the intent of prohibiting the use of an automatic zero-setting mechanism and proposed that the current recommendation in S.2.1.1. and definition of automatic zero setting mechanism be replaced with the following.

**S.2.1.1. General.** – A scale shall be equipped with means by which the zero-load balance may be adjusted. Automatic zero adjustment outside the limits of automatic zero-tracking (S.2.1.3.) (sometimes referred to as automatic zero setting) is prohibited. Any loose material used for this purpose shall be enclosed so that it cannot shift in position and alter the balance condition of the scale.  
(Amended 201X)

automatic zero-setting mechanism. – Automatic means provided to set the zero-balance indication without the intervention of the operator.

SMA added that it opposes the removal of the word “automatic” in the term “automatic zero-tracking mechanism.” and noted that its removal would lead to confusion in other locations in HB 44 and existing inspector training material.

WMD believes that the language in the “item under consideration” and the SMA and NEWMA alternate language satisfy the intent of the proposal. WMD suggests that the Committee consider SMA’s suggested language for S.2.1.1. since the term automatic zero-setting mechanism (AZSM) was changed to automatic zero-tracking (AZT) in 2007. WMD believes that many officials still use the term “AZSM” when they mean “AZT.”

Additionally, WMD has received questions regarding the differences between AZT and AZSM. WMD agrees that the AZT is similar to, but not the same as the AZSM. The differences in applying the AZT requirements include:

- AZT may operate continuously to a maximum limit of correction (i.e., 0.5d, or 3d) to prevent interaction with the normal weighing process; and
- AZSM is activated by an event without limits (e.g., scale capacity) without the intervention of an operator, such as part of every automatic weighing cycle (AWS code, automatic bulk-weighing systems or after a programmed time interval).

The Committee agreed to amend the item under consideration with the SMA and NEWMA editorial suggestions in S.2.1.1. to read as shown in the “Item Under Consideration.”

**320-3 V T.N.4.5.1. Time Dependence: Class II, III, and IIII, T.N.4.5.2. Time Dependence: Class III L, and T.N.4.5.3. Zero Load Return: Non-automatic Weighing Instruments**

(This item was adopted.)

**Source:** NTETC-WS

**Purpose:** This proposal is intended to align creep recovery tolerances on scales with the equivalent creep recovery tolerances for load cells that were adopted at the 2009 NCWM Annual Meeting.

**Item Under Consideration:** Amend HB 44 Section 2.20 Scales Code paragraphs T.N.4.5.1. Time Dependence: Class II, III, and IIII Non-Automatic Weighing Instruments, and T.N.4.5.2. Time Dependence: Class III L Non-

Automatic Weighing Instruments, and add new paragraph T.N.4.5.3. Zero-Load Return - Non- Automatic Weighing Instruments as follows:

**T.N.4.5.1. Time Dependence: Class II, III, and III Non-automatic Weighing Instruments.** – A non-automatic weighing instrument of Classes II, III, and III 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  $0.5\text{ }e$ . However, the difference between the indication obtained at 15 minutes and the indication obtained at 30 minutes shall not exceed  $0.2\text{ }e$ .
- (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  $0.5\text{ }e$ .~~

~~For a multi-interval instrument, the deviation shall not exceed  $0.5\text{ }e_1$  (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  $\text{Max}_1$  (load in the applicable weighing range) shall not exceed  $0.5\text{ }e_1$  (interval of the weighing segment). Furthermore, after returning to zero from any load greater than  $\text{Max}_1$  (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  $1.5\text{ }e$ . However, the difference between the indication obtained at 15 minutes and the indication obtained at 30 minutes shall not exceed  $0.6\text{ }e$ .
- (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  $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$  ( $68\text{ }^{\circ}\text{F} \pm 4\text{ }^{\circ}\text{F}$ ). 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)  $0.5\text{ }e$  for Class II and III devices;**
- (b)  $0.5\text{ }e$  for Class III devices with 4000 or fewer divisions;**

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

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

**For a multi-interval instrument, the deviation shall not exceed 0.83 e<sub>1</sub> (where e<sub>1</sub> 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<sub>2</sub> (load in the applicable weighing range) shall not exceed 0.83 e<sub>2</sub> (interval of the weighing segment). Furthermore, after returning to zero from any load greater than Max<sub>1</sub> (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<sub>1</sub> (interval of the first weighing range) during the following 5 minutes.**

**(Added 20XX)**

**Background/Discussion:** During the 2009 NCWM Annual Meeting, the Committee agreed with comments from the WS that the relaxation of tolerances may impact existing zero-tracking and creep recovery requirements for scales and may result in increased rejection rates unless the language is amended. The Committee encouraged the NTETC WS and other interested parties to submit proposals that address areas affected by the proposed relaxation of tolerances.

The recently adopted changes to zero-load return tolerance for load cells created a technical inconsistency between load cells and scales that incorporate these load cells (i.e., in some cases, the tolerance is larger for the load cell than the equivalent tolerance for the scale). This proposal will correct the inconsistencies to ensure that scales will not fail creep recovery due to the increased tolerance applicable to a suitable and appropriate load cell installed in the scale.

At its 2009 meeting, the NTETC WS reviewed the report of the S&T Committee and the language adopted by the NCWM. The WS noted that the Committee discussion included comments that there is a relationship between load creep recovery and a scale's ability to return to a zero-balance condition after a load had been on the load-receiving element over a period of time. The Committee also recommended that the WS review the zero-tracking requirements and creep recovery tolerances for scales.

The WS agreed that HB 44 Scales Code paragraph T.N.4.5.1. should be amended to coincide with the changes to T.N.4.6. Mr. Nigel Mills, Hobart, submitted a proposal to the WS 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 and requested that Mr. Cook, NIST, and Mr. Scott Davidson, Mettler-Toledo, submit the proposal to the Committee.

The WS considered the Committee's comments on the impact of the amended load cell creep recovery tolerance and agreed with comments from scale manufacturers that this proposal has little impact on zero-tracking requirements. The manufacturers stated that they typically design scales and separable weighing/load-receiving elements with load cell capacities that are larger than the scale capacities. Additionally, the Committee believes that loading a scale for 30-minutes rarely occurs in most Class III applications. Note that NTEP verifies compliance with requirements by performing creep and creep recovery tests according to the current T.N.4.5.1. These tests are performed with the zero-tracking mechanism either disabled or with a load near zero load and beyond the zero-tracking effect.

At the 2009 NCWM Interim Meeting, the Committee received comments supporting this item. The Committee agreed with the SMA suggestion to remove the reference to "Class I" devices that was inadvertently included in the proposal and recommend the proposal move forward as a Voting item as amended in the "Item Under Consideration" above.

At their respective Annual Meetings, NEWMA and the CWMA stated their support for the intent of the item and agreed with the changes made to the "item under consideration" by the Committee after the 2010 NCWM Interim Meeting.

At the 2010 NCWM Annual Meeting, the SMA recommended deleting the reference to Class I scales paragraph T.N.4.5.3. WMD confirmed that the Class I reference was inadvertently left in the proposed language and agreed that it should be removed.

The Committee agreed with the comments since the 2010 Interim Meeting and deleted the “Class I” reference from paragraph T.N.4.5.3 in the “Item Under Consideration.”

### 320-4 VC UR.2.6. Approaches

(This item was adopted.)

**Source:** Western Weights and Measures Association

**Purpose:** This proposal is intended to provide clear guidelines for the width and length and a level plane for approaches at temporary vehicle scales installed for a period of six months or less.

**Item Under Consideration:** Amend Scales Code paragraph UR.2.6.1. as follows:

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

- (a) *the width at least the width of the platform,*
- (b) *the length at least one-half the length of the platform but not required to be more than 12 m (40 ft), and*
- (c) *not less than 3 m (10 ft) of any approach adjacent to the platform shall be constructed ~~of concrete or similar durable material to ensure that this portion remains smooth and level and in the in the~~ same plane as the platform. ~~However, grating of sufficient strength to withstand all loads equal to the concentrated load capacity of the scale may be installed in this portion.~~ Any slope in the remaining portion of the approach shall ensure (1) ease of vehicle access, (2) ease for testing purposes, and (3) drainage away from the scale.*

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

*[Nonretroactive as of January 1, 1976]*

(Amended 1977, 1983, 1993, ~~and~~ 2006, **and 201X**)

**Background/Discussion:** At the 2009 WWMA Annual Technical Conference, Mr. Doug Deiman, Alaska Department of Transportation, submitted the above proposal, stating that this amendment to Scales Code paragraph UR.2.6.1. will clarify design requirements and instructions for installing approaches at vehicle scales temporarily located at a site for less than six months. Currently, HB 44 leaves approaches for temporary vehicle scales unregulated and does not address: a) safety; b) access to testing; and c) scale maintenance/perseveration issues that were originally considered when UR.2.6.1. was adopted in 1975. Mr. Deiman added that discussions with two scale manufacturers have indicated that there would be universal agreement to this addition to the scale code. Although costs to scale owners were not part of the analysis, typical manufacturers’ approach installation instructions are usually more stringent than this proposed change. The benefits will be measured in greater scale longevity, reduced maintenance costs, greater safety for employees, and better access for calibration and testing.

The WWMA agreed to request that the NCWM S&T Committee recommend for a vote the above proposal to amend Scales Code paragraph UR.2.6.1. Vehicle Scales, to provide clear guidelines for installing approaches at temporary vehicle scale installations.

At the 2010 NCWM Interim Meeting, Mr. Deiman described examples of temporary vehicle scale installations in Alaska that were not installed with level approaches. He stated that vehicle scales are subjected to enormous amounts of stresses when vehicles are not smoothly rolled on to the scale deck. Vehicles struggling to climb curved and steeply ramped approaches tend to shock-load the ends of the scale and violently push the deck into the bumper bolts or checking mechanisms (i.e., methods to limit scale deck movement). Similar forces affect the scale deck in the same direction when the vehicle pulls (downhill) off the scale. Alaska has documented several instances where “bumper bolts” and other mechanical checking mechanisms were damaged and broken. There were other instances where load cells became displaced from the load cell mounts.

Not only does lack of good approaches reduce Weights and Measures officials’ confidence that the scale will maintain accuracy for the duration of the installation, it also impacts safety and ease of testing. Mr. Deiman cited a safety incident where an inspector was injured at a temporary scale installation. This incident occurred when an inspector became pinned between the test truck and test cart that were parked on a steeply ramped approach. This lost-time crushing injury could have been prevented by specifying level approach surfaces in the first 10 feet of all scale installations.

Mr. Andersen, New York, noted that the format of the proposal language makes it unclear what part of the language applies only to temporary installations. Mr. Deiman provided the Committee with revised language to clarify the intent of the proposal. Mr. Richard Suiter, Richard Suiter Consulting, suggested amending the existing language in HB 44 by deleting “installed in any one location for a period of six months or more,” eliminating any differences between temporary and permanent installations.

The Committee considered the comments and agreed with the WWMA that the requirements for vehicle scales installed for six months or less need to be clarified. The Committee believes that concrete approaches significantly improve scale longevity, reduce maintenance costs, provide greater safety for employees, and allow better access for calibration and testing for permanent scale installations. However, the Committee does not believe installing concrete approaches on temporary scale installations provides significant enough benefits to warrant the additional installation expense, provided the installation does not conflict with the manufacturer’s installation instructions (See paragraph G-UR.2.1.). The Committee notes that the user is still required to maintain the straight approach requirements in the proposed amendments to UR.2.6.1. subparagraphs (a), (b), and (c).

The Committee recommended that the proposal move forward as a Voting item as amended by the Committee in the “Item Under Consideration” above.

NEWMA stated its support for the intent of the item at its 2010 Annual Meeting and agreed with the changes made to the “item under consideration” by the Committee after the 2010 NCWM Interim Meeting.

The CWMA supported this item at its 2010 Annual Meeting and recommended that additional guidance be provided to clarify what material(s) other than concrete can be considered as “similar durable material” and suggested that “(e.g., steel plates)” be added following the words “similar durable material.”

At the 2010 NCWM Annual Meeting, the SMA stated its support for this item. WMD acknowledged the position of the CWMA at its 2010 Annual Meeting regarding the phrase “similar durable material” as being subjective in the 2010 HB 44. WMD believes that the language in UR.2.6.1.(c) was adopted to include asphalt as a “similar durable material” as long as that portion of the approach remains smooth and level and in the same plane as the platform. WMD also made reference to the Report of the 73<sup>rd</sup> National Conference on Weights and Measures – 1977 (pages 168-170). In that report, the S&T Committee stated that “It is the view of the committee that: (a) grating in an approach is certainly acceptable if it is so constructed that test weights can be moved across it; (b) bituminous material is adequate providing it is maintained in such a manner that the approaches are smooth and level; (c) a slope in the approach for drainage is proper; and (d) it is not necessary to amend the code to provide for directional signs, since any jurisdiction experiencing problems may so require.” WMD added that it believes that the use of asphalt (solid or semisolid mixture of bitumens) will likely require more effort to maintain approaches with smooth and level planes than concrete that uses cement as the binding material.

The Committee agreed with the comments from WMD and recommended no changes to the item under consideration.

## 321 BELT-CONVEYOR SCALE SYSTEMS

### 321-1 I N.3.1.3. Check for Consistency of the Conveyor Belt Along Its Entire Length

**Source:** 2009 Carryover Item 321-2. This item originated from the 2008 Western Weights and Measures Association (WWMA) Meeting. (This item first appeared on the 2008 Committee's Developing Items Section of its agenda as Item 360-2, Part 3, Item 2. This paragraph was renumbered from N.3.1.4. to N.3.1.3. in the HB 44 2010 Edition based on the adoption of the recommendation to combine paragraphs N.3.1.1. and N.3.1.2. in 2009.)

**Purpose:** The BCS Work Group agrees that the existing language in N.3.1.3. results in an excessive allowance for the variation in the totalizers for a belt with larger minimum division sizes. Conversely, the three division requirement can impose an excessively narrow restriction for belt-conveyor scales with smaller minimum divisions. The proposed amendment corrects the issue and makes the allowable variation independent of division size.

**Item Under Consideration:** Amend NIST HB 44, Section 2.21. Belt-Conveyor Scales (BCS) Systems Code, paragraph N.3.1.4. as follows:

**N.3.1.3. Check for Consistency of the Conveyor Belt Along Its Entire Length. – During a zero-load test, the total change indicated in the totalizer during one revolution of the belt shall not exceed 0.18 % of the load that would be totalized at scale capacity for the duration of the test. The end value of the zero-load test must meet the  $\pm 0.06$  % requirement of paragraph N.3.1.2. Test for Zero Stability. After a zero-load test with flow rate filtering disabled, the totalizer shall not change more than plus or minus ( $\pm 3 \sigma$ ) 3.0 scale divisions from its initial indication during one complete belt revolution.**

(Added 2002) (Amended 2004 and 201X)

**Background/Discussion:** At its fall 2007 Annual Technical Conference, the WWMA received a proposal from the Belt-Conveyor Scale Work Group (BCS WG) to amend paragraph N.3.1.3. The BCS WG stated that existing language in N.3.1.3. results in an excessive allowance for the variation in a belt. However, for belt-conveyor scales that can benefit from a smaller minimum division, the three division requirement can impose an excessively narrow restriction. It should be noted that variations in belt weight tend to be sinusoidal. In other words, the error caused by belt variations would be canceled if the material test were conducted using complete revolutions. The maximum belt variation would occur at 0.5, 1.5., 2.5, etc., revolutions. However, material tests are rarely conducted using complete revolutions of the belt.

During the 2009 NCWM Interim Meeting, the Committee heard a comment from Mr. Bill Ripka, Thermo Ramsey, supporting the proposal as written in the Committee's recommendation and adding that the current language in HB 44 stating the current three scale interval deviation from an initial indication can lead to significant errors in scale accuracy. The Committee agreed with the comments from Mr. Ripka and recommended this item move forward as a Voting item.

At the 2009 NCWM Annual Meeting, the Committee received comments and recommendations from the February 2009 meeting of the BCS WG. The members of the WG came to general agreement that, with regard to these systems, the conveyor belt needs to be uniform (minimum variations in the weight per unit of length of the belt), but the proposal as it exists in the Committee's Interim Report is not well understood. The variation during a revolution of the belt is most important and will exhibit the most impact for BCS applications that may use a portion of a belt revolution to deliver a weighment (e.g., 2.5 belt revolutions). This could occur when loading individual trucks or railcars, or in some cases, with the quantity of material used for material tests. For larger quantities, such as loading a unit train, the error becomes insignificant.

The BCS WG reported that, after their meeting adjourned, an extended session of the meeting took place with a smaller group. The smaller group developed an amended proposal. However, the smaller group recommended that this item not go forward as a Voting item, but be designated as an Information item to allow more time to consider developing a revised proposal and to conduct additional research on the appropriate tolerance. The entire BCS WG was polled on the smaller group's recommendation on the amended proposal and its proposed status. The majority

of the responses agreed with the recommendation that this item needs further review and development and its status should be an Information item.

During its open hearing at the 2009 NCWM Annual Meeting, the Committee received comments from Mr. Ripka, Thermo Ramsey and NIST WMD supporting the recommendation from the BCS WG. The Committee agreed with the WG that more time is needed to conduct additional research on this item to determine the appropriate tolerance and revise the proposal. The Committee agreed to keep this on its agenda as an Information item.

At the 2010 NCWM Interim Meeting, the SMA submitted a comment supporting the intent of this item and encouraged additional research to determine the correct allowable value to verify suitable belt consistency. The Committee agreed to keep this item on its agenda as an Information item.

At its February 2010 meeting, the UNSWG on Belt-conveyor Scales discussed this item. There was much discussion on the original purpose of the existing language that was added to HB 44 in 1985 as part of the revised Belt-Conveyor Scale Systems Code (developed by the Belt-Conveyor Scale Task Force). The WG did not reach a consensus on this item and will continue its work to develop a consensus position.

At the 2010 NCWM Annual Meeting, Mr. Ripka provided the Committee with a letter regarding the status of the USNWG. Based on the progress of the sub-committee on this issue, and the pending receipt of actual field information as it relates to belt consistency, the sub-committee of the USNWG requests the National S&T committee to consider moving the proposal from Information to Developing. The sub-committee expects to have data ready for the fall 2010 regional conferences, or if data is slow in being provided, by the NCWM interim meeting in January, 2011. A complete copy of Mr. Ripka's letter can be viewed in Appendix A of this Report.

The Committee agreed with the recommendation to give this item Developmental status and move it to the list of Developing items on the Committee's 2011 Interim Agenda.

(See also the Committee's 2008 Final Report for additional background information in Developing Item 360-2, Part 3, Item 2.)

## **322 AUTOMATIC BULK-WEIGHING SYSTEMS**

### **322-1 VC S.2.1. Zero-Load Adjustment**

(This item was adopted.)

**Source:** 2009 Carryover Item 322-1. This item originated from the NTETC Weighing Sector and S&T Committee and first appeared on the Committee's 2009 Interim Agenda.

**Purpose:** This proposal is intended to prohibit the automatic zero-setting mechanism for the same reasons that zero-tracking is prohibited (incorrect net weight determinations may occur when unintentional and unobserved zeroing or tracking off of material retained in a hopper).

**Item Under Consideration:** Amend HB 44 Section 2.22. Automatic Bulk-Weighing Systems by amending paragraph S.2.1. as follows:

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

**(Amended 2010)**

**Background/Discussion:** At its 2008 Annual Meeting, the NTETC WS discussed the fact that an increasing number of scales submitted for NTEP evaluations include an automatic zero-setting feature, which is not addressed in NIST HB 44. Additional background information prohibiting the feature includes the actions and

recommendations from a WG formed by the WS in 2008 to address automatic zero-setting mechanism encountered during field inspections and type evaluations; this background information may be reviewed in agenda Item 320-2 (Scales Code paragraph S.2.1.1. General (Zero) and Appendix D Definitions for Automatic Zero Setting Mechanism and Automatic Zero-Tracking Mechanism).

In the process of developing the original proposal for agenda Item 320-2 to establish requirements for an “automatic zero-setting” feature, the WG recommended that the automatic zero-setting mechanism be prohibited for devices covered by Section 2.22. Automatic Bulk-Weighing Systems for the same reasons that zero-tracking is prohibited for that device type (incorrect net weight determinations may occur when unintentional and unobserved zeroing or tracking off of material retained in a hopper occurs between drafts).

Based upon the comments received at the fall 2009 WWMA Annual Technical Conference and the 2009 NCWM Annual Meeting, the WWMA recommended this item and corresponding items in Item 320-2 and Item 324-1 be Withdrawn from the NCWM S&T Committee’s agenda.

At its fall 2009 Interim Meeting, the CWMA supported the language as shown above and recommended this move forward as a Voting item.

During its fall 2009 Interim Meeting, NEWMA agreed with the comments and recommendations from the WWMA and recommended this item be Withdrawn.

At the 2010 NCWM Interim Meeting, the Committee received a comment from the SMA supporting this item as written. The Committee recommended that this item be considered in conjunction with a similar proposals in agenda Items 320-2 and 324-1 since the proposals provide the same prohibitions in all three codes. Based on its assessment as outlined in Item 320-2, the Committee recommended this item forward as a retroactive Voting item as shown in the “Item Under Consideration” above.

There was no additional discussion or comments on this item at the 2010 NCWM Annual Meeting.

## **324 AUTOMATIC WEIGHING SYSTEMS**

### **324-1 V S.2.1.1. Automatic Zero-Tracking Mechanism**

(This item was adopted.)

**Source:** 2009 Carryover Item 324-1. This item originated from the NTETC Weighing Sector and S&T Committee and first appeared on the Committee’s 2009 Interim Agenda as a proposal to add a new paragraph S.2.1.3. Automatic Zero-Setting Mechanism.

**Purpose:** An automatic zero-setting mechanism is a feature used in many scales throughout the world. This feature is not addressed or defined in HB 44 nor is it listed on NTEP CCs. The intent of this amended proposal is to retroactively prohibit the use of this feature.

**Item Under Consideration:** Amend HB 44 Section 2.24. Automatic Weighing Systems by amending paragraph S.2.1.1. as follows:

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

**Except for an initial zero-setting mechanism, an automatic zero adjustment outside these limits is prohibited.**

(Amended 2004 **and 2010**)

**Background/Discussion:** At its 2008 Annual Meeting, the NTETC WS discussed the fact that an increasing number of scales submitted for NTEP evaluations include an automatic zero-setting feature, which is not addressed in NIST HB 44. Additional background information concerning prohibiting the feature includes the actions and recommendations from the WG formed by the WS in 2008 to address automatic zero-setting mechanism encountered during field inspections and type evaluations. This information may be reviewed in agenda Item 320-2 (Scales Code paragraph S.2.1.1. General (Zero) and Appendix D. Definitions for Automatic Zero-Setting Mechanism and Automatic Zero-Tracking Mechanism).

In the process of developing the original proposal for agenda Item 320-2 to establish requirements for an automatic zero-setting feature, the WG recommended that the automatic zero-setting mechanism should be permitted for devices covered by Section 2.24. Automatic Weighing Systems since equivalent requirements can be found in OIML R 51 Recommendation for Automatic Catchweighing Instruments.

The Committee agreed that this item should remain as an Information item pending the development of the proposal to add the term “automatic zero-setting mechanism” in agenda Item 320-2.

At the August 2009 NTETC WS Meeting, the NIST Technical Advisor provided the WS with an update on the status of this item and outlined the Committee’s request. The WS discussed the possible positions it might take on this item in great detail. The WS reached a consensus among the attendees that this feature does not have any value in the U.S. marketplace and can potentially facilitate inaccurate weight determinations against either the buyer or the seller. Consequently, the WS changed its 2008 position and recommended that no changes be made to address this feature in HB 44.

Based upon the comments received at the 2009 NCWM Annual Meeting and its fall 2009 Annual Technical Conference, the WWMA recommended this item and corresponding items in Item 320-2 and Item 322-1 be Withdrawn from the NCWM S&T Committee’s agenda.

During its 2009 Interim Meeting, NEWMA agreed with the comments and recommendations from the WWMA and recommended this item be Withdrawn.

At the 2010 NCWM Interim Meeting, the Committee received input echoing comments from the WS, SMA, and regional Weights and Measures associations. The Committee agreed that that the proposal to allow the feature and to add a new device specification paragraph that aligns HB 44 with a similar recommendation in OIML R 51 as written in the 2010 Interim Agenda does not have sufficient support to pass. However, the Committee did agree with WMD comments that the feature should be defined and prohibited since there was little support for the proposal. Therefore, the Committee recommends that the definition and alternative retroactive language prohibiting the feature developed by WMD move forward as a Voting item as shown in the “Item Under Consideration” above.

The Committee recommended that this item be considered in conjunction with similar proposals in agenda items 320-2 and 322-1 since the proposals provide the same prohibitions in all three codes.

During their 2010 Annual Meetings, both NEWMA and the CWMA stated their support of this item.

During the open hearing at the 2010 NCWM Annual Meeting, the SMA stated its support for this item. The Committee noted that the proposed term and definition of “automatic zero-setting mechanism” in Appendix D were no longer used in corresponding agenda Items 320-2 and 324-1 and agreed to move the proposal for the term and definition of “Automatic zero-setting mechanism” in Appendix D to agenda Item 322-1. To be consistent with the SMA proposed changes to Item 320-2, WMD suggested the Committee amend the proposal by adding language S.2.1.1. and withdraw the proposed language to add new paragraph S.2.1.3. The Committee agreed with the WMD and SMA suggestions and amended this item as shown in the “Item Under Consideration” as a Voting item.

**324-2A W S.2.2.4. Visibility of Operation and S.2.2.5. Subtractive Tare Mechanism**

(This item was withdrawn.)

**Source:** 2009 Carryover Item 324-2C. (This item originated from the S&T Committee and first appeared on the Committee's 2007 agenda.)

**Purpose:** The tare proposals and proposed definitions were intended to: (1) promote uniform application of tare requirements during field inspections; and (2) provide additional support for the requirements that may apply to the operation of tare and preset tare and to the indications and recorded representation of tare. NTEP has relied only on interpretations of General Code requirements and the NCWM Report of the 65<sup>th</sup> (1980) Committee on Specifications and Tolerances agenda Item 301-3 Tare (Pages 216-218) to address the subject of Tare.

**Item Under Consideration:** This recommendation was intended to clarify the requirements for tare by adding new paragraphs S.2.2.4. and S.2.2.5. that provide new requirements for visibility and subtractive tare (i.e., balancing off tare objects does not increase the nominal scale capacity).

(The proposed language to add new paragraphs S.2.2.4. and S.2.2.5. may be reviewed in the Committee's 2009 Final Report .)

**Background/Discussion:** Additional background information on this item can be found in the Background/Discussion paragraphs on agenda Item 320-1A in the Committee's 2009 Final Report.

During the 2009 NCWM Annual Meeting, the Committee received no additional comments on this proposal. However, related Tare Items 320-1A and 320-1B were not adopted. Consequently, the Committee withdrew the corresponding items in 324 Series Voting items and recommended that the NTETC WS discuss and provide the Committee with an update on the WS position on this and all other remaining tare proposals carried over to the Committee's 2010 Interim Agenda.

At its August 2009 Annual Meeting, the WS reviewed the background information regarding comments and actions on these issues during the 2009 NCWM Annual Meeting. The WS recommended that the remaining tare items (Items: 324-2A, 324-2B, and 324-C on the Committee's 2009 agenda) be Withdrawn from the Committee's agenda since the NCWM agreed with the SMA position that the tare proposals are not needed for HB 44.

Based upon comments received during the 2009 NCWM Annual Meeting and their respective fall 2009 association meetings, the CWMA, WWMA, SWMA, and NEWMA recommended the remaining tare items be Withdrawn from the Committee's agenda.

At the 2010 NCWM Interim Meeting, the Committee agreed that there was no longer any support for the proposal and withdrew this item from its agenda.

**324-2B W S.2.2.6. Consecutive Tare Operations and S.2.2.7. Indication and Printing of Weighing Results**

(This item was withdrawn.)

**Source:** 2009 Carryover Item 324-2D. (This item originated from the S&T Committee and first appeared on the Committee's 2007 agenda.)

**Purpose:** The tare proposals and proposed definitions were intended to: (1) promote uniform application of tare requirements during field inspections; and (2) provide additional support for the requirements that may apply to the operation of tare and preset tare and to the indications and recorded representation of tare. NTEP has relied only on interpretations of General Code requirements and the NCWM Report of the 65<sup>th</sup> (1980) Committee on Specifications and Tolerances, agenda Item 301-3, Tare (Pages 216-218), to address the subject of "Tare."

**Item Under Consideration:** This item was considered jointly with Item 320-1A. and was intended to clarify the requirements for tare by adding new paragraphs S.2.2.6. and S.2.2.7. that specify the requirements for transactions that use multiple tare, tare mechanisms, and the indications and recording of weighing results.

(The proposed language to add new paragraphs S.2.2.6. and S.2.2.7. may be reviewed in the Committee's 2009 Final Report.)

**Background/Discussion:** Additional background information on this item can be found in the Background/Discussion paragraphs on agenda Item 320-1A in the Committee's 2009 Final Report.

During the 2009 Annual Meeting, the Committee received no additional comments on this proposal. However, related Tare Items 320-1A and 320-1B were not adopted. Consequently, the Committee "Withdrew" the corresponding items in 324 Series "Voting items" and recommended that the NTETC WS discuss and provide the Committee with an update on the WS position on this and all other remaining Tare proposals carried over to the Committee's 2010 Interim Agenda.

At its August 2009 Annual Meeting, the WS reviewed the background information regarding comments and actions on these issues during the 2009 NCWM Annual Meeting. The WS recommended that the remaining tare items (Items: 324-2A, 324-2B, and 324-2C in the Committee's 2009 agenda) should be Withdrawn from the 2010 S&T Committee Agenda since the NCWM agreed with the SMA position that the tare proposals are not needed for HB 44.

Based upon comments received during the 2009 NCWM Annual Meeting and their respective fall 2009 association meetings, the CWMA, WWMA, SWMA, and NEWMA recommended the remaining tare items be Withdrawn from the NCWM S&T Committee's 2010 Interim Agenda.

At the 2010 NCWM Interim Meeting, the Committee agreed that there was no longer any support for the proposal withdrew this item from its agenda.

### **324-2C W      S.2.3. Preset Tare Mechanism and S.2.3.1. Indication of Operation**

(This item was withdrawn.)

**Source:** 2009 Carryover Item 324-2E. (This item originated from the S&T Committee and first appeared on the Committee's 2007 agenda.)

**Purpose:** The tare proposals and proposed definitions were intended to: (1) promote uniform application of tare requirements during field inspections; (2) allow the identification and printing of preset tares with the abbreviation "PT;" and (3) provide additional support for the requirements that apply to for the operation of tare and preset tare and to the indications and recorded representation of tare. NTEP has relied only on the interpretations of General Code requirements and NCWM Report of the 65th Committee on Specifications and Tolerances agenda Item 301-3 Tare (Pages 216 - 218) to address the subject of Tare.

**Item Under Consideration:** (NOTE: This item was considered jointly with Item 320-1B.) This recommendation was intended to clarify the requirements for tare by adding new paragraphs S.2.3. and S.2.3.1. that provide new requirements for metrological tare (e.g., tare objects weighed or balanced off at the time of the transaction), tare accuracy, operating range, visibility, and preset tares (e.g., manually entered or stored tares for multiple transactions).

(The proposed language to add new paragraphs S.2.3. and S.2.3.1. may be reviewed in the Committee's 2009 Final Report.)

**Background/Discussion:** Background information on this item can be found in the Background/Discussion paragraphs on agenda Item 320-1A in the Committee's 2009 Final Report.

During the 2009 Annual Meeting, the Committee received no additional comments on this proposal. However, related Tare Items 320-1A and 320-1B were not adopted. Consequently, the Committee “Withdrew” the corresponding items in 324 Series Voting items and recommended that the NTETC WS discuss and provide the Committee with an update on the WS position on this and all other remaining are proposals carried over to the Committee’s 2010 Interim.

At its August 2009 Annual Meeting, the WS reviewed the background information regarding comments and actions during the 2009 NCWM Annual Meeting. The WS recommended that the remaining tare items (Items: 324-2A, 324-2B, and 324-2C in the Committee’s 2009 agenda) be Withdrawn from the Committee’s agenda since the NCWM agreed with the SMA position that the tare proposals are not needed for HB 44.

Based upon comments received during the 2009 NCWM Annual Meeting and their respective fall 2009 association meetings, the CWMA, WWMA, SWMA, and NEWMA recommended the remaining tare items be Withdrawn from the NCWM S&T Committee’s 2010 Interim Agenda.

At the 2010 NCWM Interim Meeting, the Committee agreed that there was no longer any support for the proposal and withdrew this item from its agenda.

### **330 LIQUID-MEASURING DEVICES**

#### **330-1 W Temperature Compensation for Liquid-Measuring Devices Code**

(This item was withdrawn.)

**Source:** 2009 Carryover Item 330-1. This item originated from the NCWM S&T Committee and first appeared on the Committee’s 2007 agenda.

**Purpose:** The intent of this proposal was to establish specifications, tolerances, and other technical requirements that can be uniformly applied to retail liquid-measuring devices equipped with temperature compensation. The proposed changes were based on similar requirements for wholesale liquid-measuring devices.

**Item Considered:** The Committee considered a number of proposed modifications to Section 3.30. Liquid-Measuring Devices (LMD) Code to recognize temperature compensation for retail devices. Proposed modifications considered by the Committee can be viewed in the Committee’s 2009 Interim and Final Reports.

#### **Key Points:**

- The Committee has heard numerous comments in opposition to this proposal from both industry and the regulatory community.
- Industry expressed concern that the lack of uniform method of sale requirements will lead to mixed methods of sale (Automatic Temperature Compensation (ATC) and non-ATC) and result in consumer confusion.
- Jurisdictions that do not prohibit temperature compensated sales at the retail level can develop their own requirements relative to retail motor-fuel devices equipped with ATC systems.
- The proposed changes, along with past Committee background information and discussions, can serve as a basis for jurisdictions wishing to adopt their own requirements.
- Even if a model method of sale regulation were adopted, it remains up to each individual Weights and Measures authority to determine whether or not temperature compensation is permitted on a retail motor-fuel dispenser in that jurisdiction.

**Background/Discussion:** Prior to the 2007 NCWM Interim Meeting, the Committee recognized, via reports from the regional L&R Committees and other sources, that there was increasing support within the Weights and Measures community to address temperature compensation features for the retail sale of petroleum products in the Liquid-Measuring Devices Code. The Committee developed a proposal to provide design, performance requirements, and testing criteria for retail metering systems that incorporate temperature compensation capability in response to these concerns and to encourage uniformity in applications where temperature compensation is being used. The Committee was also concerned that retail motor-fuel devices could be placed in service with no guidelines in NIST HB 44 for type approval and field testing if the language proposed by the L&R Committee for the Method of Sale of Commodities in NIST HB 130 was adopted. The language proposed at the time by the L&R Committee at that time would permit the temperature-compensated sale of petroleum products at all levels of distribution. Note: The L&R Committee ultimately withdrew that proposal from its agenda in 2009.

At the 2007 Interim Meeting, the Committee considered moving the proposal forward as a priority Voting item. However, the Board instructed the Committee to retain this as Information item and established a steering committee to provide the S&T and L&R Committees with guidance on temperature compensation issues.

In 2008, the Committee heard comments in both support of and opposition to the proposed changes. The Committee continued to make revisions to the proposed changes based on specific technical comments from the ATC Steering Committee as well as other stakeholders.

At the 2009 Interim Meeting, the Committee discussed whether or not this item was ready to be recommended for a vote at the 2009 Annual Meeting. The Committee recognized the need for standards to be in place to encourage uniform evaluation of RMFDs equipped with ATC, and acknowledged that some jurisdictions are already facing the imminent possibility of such equipment in their jurisdictions. While the Committee believes that these standards are necessary whether or not the issue of a model method sale regulation has been resolved, the Committee took the position that the item should be retained as an Information item until the changes outlined in the proposal have been studied by interested stakeholders based on the number of comments received on the proposed changes to the LMD code. The Committee also acknowledged that the General Code paragraph G-A.3. Special and Unclassified Equipment coupled with relevant provisions in existing code paragraphs can be used by jurisdictions to address equipment with ATC features in the meantime. The Committee also does not believe that delaying the revisions to the LMD code should delay a decision on the method of sale item before the L&R Committee.

Based on comments heard from the floor at the 2009 NCWM Annual Meeting, the Committee acknowledged that additional work may be needed to specific sections of the proposed changes to the code to address various technical points (detailed in the Committee's 2009 Interim and Final Reports). The Committee decided to keep the status of this item as an Information item and again acknowledged that some jurisdictions are already facing the imminent possibility of such equipment in their jurisdictions. The Committee believes that these standards are necessary whether or not the issue of a model method sale regulation is adopted in NIST Handbook 130 since Weights and Measures jurisdictions may decide to permit this equipment based upon their individual State laws or regulations.

*See the 2007, 2008, and 2009 NCWM S&T Final Reports for additional details and background information.*

At their fall 2009 meeting, the CWMA, NEWMA, and the SWMA agreed to recommend that this item be Withdrawn from the Committee's 2010 agenda. The CWMA heard no comments in support of this item, but numerous comments in opposition. The SWMA indicated that it considered the NTETC Measuring Sector's need for procedures to evaluate temperature compensated retail devices, but concluded that it is highly unlikely such devices will be submitted for evaluation. The SWMA notes that the proposal was discussed at length during the past three NCWM sessions and appears no closer to resolution. The SWMA also cites the conclusion in the report issued by the California Energy Commission that there is no economic advantage to temperature compensation at the retail dispenser.

At its fall 2009 meeting, the WWMA heard comments suggesting that: 1) this item be Withdrawn; 2) states should regulate temperature compensation individually; and 3) there is a need for a better definition distinguishing between wholesale and retail. There was concern about the display of temperature and display of net and gross, whether it needed to be deactivated and how this deviates from the Vehicle-Tank Meters code. Another comment heard was that there is confusion regarding the condition of use and the term "invoice" in UR.3.6.1.2. Further work is needed

to clarify how paragraph UR.3.6.1.2. would apply in businesses locations that sell wholesale and retail from the same device.

The WWMA reported receiving the following written comments from Ms. Andrea Martincic, Executive Director of the Arizona Petroleum Marketers Association. At the request of Ms. Martincic, these comments were entered directly into the WWMA final report as submitted.

- 1) Item should be Withdrawn given the NCWM's Annual Meeting outcome on ATC as a legal method of sale from L&R. Conflict for states that automatically adopt Handbook 44.
- 2) If an individual jurisdiction decides to allow the use of an ATC device, they should accept responsibility for the regulation of that equipment.
- 3) Would like better explanation for wholesale transactions using a liquid measuring device. Should there be a differentiation between a wholesale transaction made from a liquid measuring device versus a vehicle tank meter. Most background discussion and discussion on this issue seems to mostly reference retail.
- 4) 2.7.2 Display of temperature for testing: .2 degrees (This is the same tolerance being advocated for a mechanical ATC device for VTMs under 331-1.) Would like to hear W&M debate on why this is the appropriate tolerance.
- 5) 2.7.3 Display net & gross for testing. Can this occur? Have not heard from the US manufacturers of this potential ATC device.
- 6) 3.6.1.2 Condition of use- At a business location all pumps and all fuel must be sold ATC---would this be problematic for E-85 or other alt. fuels.
- 7) 3.6.1.3 Recorded Representatives (Invoices, Receipts and BOL's) Retail transactions result in receipts for customers, on the wholesale side they result in Invoices for customers. BOL's are between a shipper on the pipeline and the distributor/jobber picking up the fuel at the rack.

The WWMA also forwarded the following written comments from Mr. Jay McKeeman, Vice President, Government Relations and Communications, California Independent Oil Marketers Association (CIOMA). These comments are included as written in the submission.

- We strongly recommend that the WWMA withdraw additional discussion of ATC requirement development. It has become even clearer in these recent discussions that development of ATC requirements in Handbook 44 will legitimize the potential of dual distribution requirements in states where a permissive ATC condition is authorized or permitted. Having two distribution systems (gross and ATC) in place at the same time is the worse-case scenario for the distributing industry, the customer and the weights and measures officials. It creates confusion, competitive disadvantage, dual inspection and accuracy measurements and will sweep away the years of hard work and good efforts instilling consumer and industry confidence that there is a level, honest playing field in the purchase of motor fuels.
- States, such as California, are perfectly capable of issuing regulations if an ATC system, type-certified by the state, is put in place. We have had a long-standing offer to work with DMS and local agencies in the development of such regulations, but have not seen that offer taken up. Trying to take California's situation (CIOMA strongly believes state law prohibits ATC at retail) of a possible permissive condition and use it as justification for national standards is inappropriate and unwarranted.

- We strongly believe, based upon statements made in open session and during the S&T Committee deliberations that the national consensus will be to withdraw further discussion of ATC requirements in Handbook 44.
- We believe a table or matrix needs to be devised that better articulates the various Handbook 44 provisions related to petroleum sales ATC, with organization by transaction type (wholesale, retail), area of governance (accuracy testing, labeling, signage, conditions of use, invoice requirements, etc.) and which provides insight into stationary location vs. mobile fueling device requirements. This would be a useful guide for the regulated community, as well as a place where a state could determine what regulations might be needed to cover any gaps, if they needed to do their own regulations.

The WWMA acknowledged that this item needs further work and recommended that it be maintained as an Information item on the NCWM S&T Committee's 2010 agenda. This recommendation is based on comments heard at the NCWM Annual Meeting and at the WWMA open hearings stressing that jurisdictions and manufacturers need criteria in HB 44 in order to ensure uniformity in instances where needed.

At the 2010 NCWM Interim Meeting, the Committee heard numerous comments from both industry and regulators in opposition to this item. Additionally, industry expressed concerns that, if adopted, the proposed changes would permit mixed methods of sale for petroleum products within the same jurisdiction. The Committee also heard an additional technical comment, noting concern that some electronic indicators are not able to simultaneously display gross and net. Based on the continued opposition to the item, the Committee decided to Withdraw the item from its agenda. With regard to the Committee's concerns over uniformity, the Committee noted that the information in the discussions and recommendations in the Committee's 2007 through 2009 Final Reports may be considered by and serve as a resource to jurisdictions seeking guidance in developing their own regulations for ATC.

**330-2 D Price Posting and Computing Capability and Requirements for a Retail Motor-Fuel Dispenser (RMFD) --- Moved to Section 360-3, Item 3.30, Part 1**

At the 2010 Interim Meeting, the Committee concluded that this item required further development and this would best be accomplished in a small S&T work group. NIST agreed to reallocate resources to this effort and will work with the Committee to re-form the work group originally established in 2008. As a result of this decision, this item has been moved to the Developing Items agenda under Item 360-3; see Item, Part 3.30 – Item 1 in Appendix C for additional details.

## **331 VEHICLE-TANK METERS**

### **331-1 VC T.2.1. Automatic Temperature-Compensating Systems**

(This item was adopted.)

**Source:** 2009 Carryover Item 331-1. This item originated from the WWMA and first appeared on the Committee's 2008 agenda.

**Purpose:** To reduce tolerances applicable to comparisons of test results for compensated and non-compensated test runs to better reflect the performance of these systems.

**Item Under Consideration:** Amend paragraph T.2.1. as follows:

**T.2.1. Automatic Temperature-Compensating Systems.** – The difference between the meter error (expressed as a percentage) for results determined with and without the automatic temperature-compensating system activated shall not exceed:

- (a) ~~0.40.2~~ % for mechanical automatic temperature-compensating systems; and
- (b) ~~0.20.1~~ % for electronic automatic temperature-compensating systems.

The delivered quantities for each test shall be approximately the same size. The results of each test shall be within the applicable acceptance or maintenance tolerance.

(Added 2002) (~~Amended 201X~~)

**Key Points Considered by the Committee:**

- The proposed change may result in a test that better reflects meter condition and operation.
- The same size and type of meter is currently treated differently in a stationary location than when vehicle-mounted.
- The proposed change would align the related ATC tolerances in the LMD and VTM codes that compare TC results with and without ATC enabled.
- Only a limited amount of data has been collected to support the change.
- Data collected in routine field tests supports the proposed change.
- No data has been submitted in opposition of the proposed change.
- Manufacturers' concerns about the proposal focus primarily on associated test procedures and test equipment.
- NIST WMD has agreed to expand on associated Examination Procedure Outlines and equipment guidelines to encourage consistency.

**Background/Discussion:** For more than 13 years (and before the adoption of T.2.1.), Alaska has been testing mechanical and electronic temperature-compensating vehicle-tank meters with flow rates ranging from 100 gpm to 300 gpm. They have applied the tolerances of 0.2 % for mechanical and 0.1 % for electronic wholesale meters as specified in the LMD Code, and have found that the devices are fully capable of meeting these tolerances. When devices are found out of tolerance, it is usually because of a broken cable at the probe for the mechanical devices, an electrical fault at the probe on electronic devices, or an incorrect API setting. By keeping the current tolerances that are double the equivalent tolerances in the LMD Code, there is a risk these problems will be missed.

To illustrate how the current tolerances may mask problems, such as broken temperature probes or incorrect settings, consider the following example:

1000 gal prover  
 Diesel #2  
 API 34.5  
 Temperature 60 °F  
 Mechanical compensated VTM

- A net test draw is run and the result is + 2.0 gal or + 0.2 %. This meets the maintenance tolerance of 0.3 % or 3.0 gal.

- A gross draw is run and the result is  $-2.0$  gal or  $-0.2$  %. This still meets the tolerance and the difference between the two runs is  $0.4$  %.
- With the temperature of the fuel at  $60$  °F, both of these runs should have been equal.
- If an inspector used the system indication of temperature rather than using a certified thermometer in the meter temperature well, calculations show that the current tolerance of  $0.4$  % for a mechanical automatic temperature-compensating system could allow a system malfunction that provided a temperature error of up to  $9$  °F difference from the actual temperature taken in the prover and not be recognized as being caused by a faulty system.

At its fall 2007 meeting, the WWMA recommended that the item move forward for a Vote and cited a letter from a manufacturer in support of the proposal as a means to align the LMD and VTM code requirements. Current NIST HB 44 language will require this manufacturer to produce different stationary and vehicle-mounted meters; the proposed change will align the United States with Canada and OIML, who currently do not have different standards for these meters.

In 2008 and 2009, the Committee heard mixed comments on this item. The MMA, some individual meter manufacturers, and some Weights and Measures officials opposed the proposal. While being comfortable with a tighter tolerance for type evaluation applications, they were generally uncomfortable with applying the tighter tolerances applied to routine field examinations, citing greater uncertainties in field testing and expressing concern over the consistency and adequacy of test equipment used in some field tests. Several regional associations expressed the opinion that additional data is needed in order to better evaluate the proposal, with the CWMA and the WWMA noting that if no more information is received by the 2009 Interim Meeting, the item should move forward for a vote in 2009. NIST WMD supported the collection of additional data and suggested that the Committee re-examine and compare the tolerances for stationary and vehicle-mounted meters to ensure consistency across codes for the same meter type as part of this effort. NIST also highlighted comments made by some manufacturers and Weights and Measures officials regarding the importance of using NIST Handbook 105-compliant and traceable standards (e.g., thermometers) and following appropriate test procedures for assessing compliance with ATC tolerances.

The Committee repeatedly requested additional data in support of the proposal, as well as data from those who oppose the proposal indicating why the proposed change is inappropriate. The NIST Technical Advisor contacted multiple states (including the majority of those along the northern U.S. border) for possible input, but found that many jurisdictions are not finding equipment with activated ATC systems in use on VTMs.

During the 2009 NCWM Annual Meeting, the Committee reported receiving additional VTM test data from the State of Maine which supported the proposed change to the tolerance. The Committee reiterated its request for additional data, including input from equipment manufacturers.

At its spring 2009 meeting, the CWMA requested more data to support the item, noting that if none was received the CWMA would recommend the item move to a Voting item. Hearing no further comments at its fall 2009 meeting, the CWMA recommended that this proposal move forward as a Voting item.

At its fall 2009 meeting, NEWMA recommended that this remain an Information item, noting that New York has offered to provide alternative proposed tolerances and offering the following additional comments:

- Tolerances should be based on the expansion coefficient of the product being tested.
- The higher the expansion coefficient, the more accurate the thermometer must be.
- The tolerance should be based on temperature (e.g.,  $\pm 2$  °F) of the given product's expansion coefficient.

At its fall 2009 meeting, the WWMA reiterated its 2008 position, the item should be moved forward for a vote, noting that only data supporting the proposed change has been received in response to repeated requests for data.

The WWMA received written comments from Ms. Martincic as follows:

Petroleum tankers and tank wagons do not have VTMs equipped with ATC—why is there a tolerance change being proposed for VTMs? Again seems to be a problem for 2 states. What products are being delivered by VTMs ATC? Is this to address an issue with heating oil?

The SWMA received no input on this item at its 2009 Annual Meeting and, therefore, took no position, recommending that this remain an Information item.

At the 2010 Interim Meeting, the Committee heard comments from Mr. Dmitri Karimov, Liquid Controls, speaking on behalf of the MMA, indicating that they have no data to provide, suggesting that the proposed tolerance is not appropriate; therefore, they can no longer oppose the item.

Mr. Deiman, Alaska, reiterated his jurisdiction's experience with testing VTMs equipped with ATC and how the current requirements may mask underlying problems with the equipment, as outlined at the beginning of this discussion. Mr. Deiman provided a written copy of his comments to the Committee for reference during the Committee's review of the item. He also noted that he does not believe much more data is available; thus, if there is insufficient support for the item without additional data, then the only other recourse would be to withdraw it.

Ms. Martincic, Arizona Petroleum Marketers Association, again suggested that the issue is a local problem and questioned why it couldn't be addressed locally rather than in HB 44.

NIST WMD commented that the amount of data provided to support the proposed change is somewhat limited; however, attempts to collect additional data either in support of or in opposition to the proposal have been unsuccessful. Comments from manufacturers opposing the change have been primarily focused on concerns surrounding whether or not inspectors will use suitable equipment and follow consistent, appropriate test procedures. In an effort to address these concerns, WMD plans to make further revisions to its EPOs for VTMs to include more detailed test procedures relative to temperature compensators and accessories as well as guidance regarding the use of equipment complying with relevant NIST Handbook 105 criteria.

The Committee noted that manufacturers' concerns were focused not so much on the ability of the equipment to meet the proposed tolerance, but rather on the impact of associated procedures and equipment used by field officials when applying the tolerance. The Committee recognized that the data provided does support the proposed change and it was collected during field inspections by more than one jurisdiction, suggesting that, if proper procedures are followed, the tighter tolerance is achievable. The Committee had some remaining concern about the limited amount of data provided while recognizing that the proposed tolerance is identical to that which currently applies to meters covered under the Liquid-Measuring Devices Code. At present, the same design and size of meter would be treated differently depending on whether it were mounted on a vehicle (in which case the VTM Code applies) or installed in a stationary location (in which case the LMD Code applies). Moving forward with the proposed change would align the requirements in the two codes, resulting in a more consistent treatment of similar and even identical equipment.

After considering these points, the positions of the regional Weights and Measures associations, and the comments heard during its open hearings, the Committee agreed to recommend this item for a Vote.

At their spring 2010 meetings, the CWMA and NEWMA both supported this proposal, noting that their members have seen no data that suggests that the devices are not capable of meeting the proposed tolerances. NEWMA further added that it looks forward to an update to the EPOs that provide guidance for the use of suitable test equipment (e.g., thermometers). NEWMA also reported hearing comments questioning whether the tolerances should be based on a percentage because of different coefficients of expansion for different products in both the LMD and VTM codes. These comments indicated that tolerances will not be equal from one product density to another and suggested that tolerances should be tied to product coefficient of expansions; however, it was noted that this approach would have to apply to all affected codes, so it would be more appropriate to develop such a proposal at a later date rather than attempt to incorporate it with the proposal under consideration in this item.

At the 2010 NCWM Annual Meeting, WMD reported to the Committee that it has accomplished the following to facilitate consistent inspection and testing of VTMs equipped with ATCS:

1. Developed revisions to its EPOs for VTMs to include more detailed test procedures relative to VTM's equipped with temperature compensators and accessories;
2. Updated the NIST training materials to include guidance regarding the testing of VTMs equipped with ATCS and the use of equipment complying with relevant NIST Handbook 105 criteria; and
3. Developed suggested report forms for VTMs to reflect procedures for testing VTMs equipped with ATC.

Since making the revisions, one class has been taught and feedback from the class incorporated into subsequent revisions. This information will be posted on the NIST web site. WMD is looking for continued feedback on the report form and procedure.

During the voting session at the 2010 Annual Meeting, the Committee noted that it plans to submit a proposal for consideration by the regional weights and measures associations to non-retroactively require provisions (e.g., a thermometer well) for determining the temperature of the product at the meter for all vehicle-tank meters. This would reduce uncertainties in the test process and enable the inspector or service company to correct for any changes in volume resulting from differences in liquid temperatures between the time of passage at the meter and the time of volumetric determination in the prover, as required by VTM Code paragraph N.5. There is already a similar provision for all wholesale meters (not just those equipped with ATCS) in the Liquid-Measuring Devices Code.

#### **331-2 W UR.2.5.2.1. Automatic Temperature Compensation for Refined Petroleum Products**

(This item was withdrawn.)

**Source:** 2009 Carryover Item 331-3. This item originated as a companion proposal to 2009 Interim Agenda Item 331-2.

**Purpose:** Add a user requirement to address continual use of a compensator and consistent use of automatic temperature compensation equipment for all fuel products in a single business location.

**Item Considered:** Add the following subparagraphs to the Vehicle-Tank Meters Code:

**UR.2.5.1.3. Condition of Use. – At a business location which offers fuel products for sale on the basis of a temperature-compensated volume, all vehicle-tank meters shall have active automatic temperature compensation and all fuel products offered for sale shall be dispensed on the basis of temperature-compensated volume.**

#### **Key Points Considered by the Committee:**

- The proposed language was intended to prevent a device owner from selectively using Automatic Temperature Compensation (ATC) to an advantage.
- VTMs serve retail consumers who are not generally familiar with the distinction between compensated and non-compensated deliveries; thus, the selective use of ATC may not be readily apparent.
- Proponents of the proposal have indicated that the variations of the proposed paragraph considered thus far do not yet adequately address their concerns.
- Variations of the proposed paragraph considered thus far are viewed as too restrictive when considering special instances such as VTMs dedicated to serving a single customer.

- The language needs to clarify how devices used in multiple jurisdictions (e.g., across state lines) would be addressed.
- Terminology such as “business location” need to be further defined in order to ensure consistent use and interpretation.
- Application of the requirement to all fuel products sold by a single company is viewed by some as overly restrictive.
- Further development is needed before the item is ready for action at the national level.
- The Committee is willing to reconsider this issue if it is further developed and resubmitted.

**Background/Discussion:** Currently, there are no published guidelines for how a company has to use or operate their VTM with or without temperature compensation. Companies could choose to operate only part of their fleet with ATC or use ATC only part of the year when it is to their benefit. They may choose to use ATC only for certain products or deliveries, such as home heating oil, and not use ATC with diesel, kerosene, or gasoline.

The Committee was originally asked by the SWMA to consider adding two paragraphs intended to help (1) eliminate the potential for facilitation of fraud with ATC; and (2) eliminate consumer confusion regarding why certain products are currently sold using ATC and others are not. The Committee was able to reach agreement on a proposal to address the “Period of Use” and put forward a proposal as outlined in Item 331-2 in the Committee’s 2009 Interim and Final Reports. Under that item, the NCWM ultimately adopted the following changes at the 2009 Annual Meeting: (1) Proposed changes to UR.2.5.1. When to Be Used to require continual use of an automatic temperature compensator; and (2) the addition of a new UR.2.5.2. Period of Use to require year-round use of temperature compensation unless otherwise agreed to in writing by the buyer and the seller.

In discussing the larger issue of ATC use on VTMs in January 2009, the Committee was not able to reach agreement on the “Conditions of Use” for ATC systems; that is, criteria for stipulating how ATC is used to sell similar products within a single company. Consequently, the Committee created this item at the 2009 Interim Meeting as a companion to 2008 Item 331-2 to enable further review and discussion of the proposed criteria for the condition of use.

In reaching this decision, the Committee considered comments received during the 2008 Interim and Annual Meetings, as well as comments from the regional associations regarding “condition of use.” See the Committee’s 2008 Final Report for details.

At the 2009 Interim and Annual Meeting, the Committee heard concerns indicating that the alternative changes to the code considered thus far are considered overly restrictive by some and insufficient by others. See Item 331-2 in the Committee’s 2009 Interim and Final Reports for additional background information.

At their spring 2009 meetings, the CWMA and NEWMA, and SWMA at its fall 2009 meeting, heard no comments on the item; these regions did not take a position on the item and recommended it remain an Information item. At its fall 2009 meeting, the CWMA heard a comment from one jurisdiction in opposition of the item, but no other comments. At its fall 2009 meeting, NEWMA offered the following additional comments:

- A problem exists where businesses deliver gross/net from the same vehicle (e.g., different states with different requirements).
- This item is device focused but should be customer focused.

At its fall 2009 meeting, the WWMA also recommended this remain an Information item, commenting that use of an ATC device should be linked to the customer, not the business location, because it appears that the way the

section is currently written, all customers would be required to receive compensated deliveries where ATC is not required or desired.

The WWMA also received written comments from Andrea Martincic, Executive Director of the Arizona Petroleum Marketers Association. At the request of Ms. Martincic, these comments were entered directly into the WWMA final report as submitted:

“Still presents a problem for jobbers/distributors operating in multiple states. Could S&T somehow tie it to the customer—so there must be consistency of ATC usage for those customers sold product ATC through VTMs?”

The WWMA heard comments reiterating concerns about how the current proposed language in paragraph UR.2.5.2.1. would apply in instances where a single VTM is used to make both retail and wholesale deliveries, both in jurisdictions where ATC is permitted and in jurisdictions where ATC is prohibited.

The WWMA believes this language is not yet ready for adoption and encourages further refinement to address the concerns noted above.

At its 2010 Interim Meeting, the Committee continued to hear comments both in opposition and support of proposed changes; however, even those in support of proposed changes agreed that additional work is needed to develop acceptable language. Mr. Andersen, New York, commented that the user requirement should be “customer driven” rather than “device driven.” Mr. Tim Tyson, Kansas, opposed the proposed language, noting that they have instances where owners dedicate a device to serving a single customer. Others questioned how the language would apply to devices used in multiple jurisdictions. Mr. Keilty, Endress and Hauser, expressed support for the item. The use of the term “business location” was questioned, with some suggesting that a definition is needed to clarify instances such as businesses having different branches. NIST WMD commented that additional work is needed to develop language that provides jurisdictions with a tool to control inappropriate use, but does not unnecessarily restrict businesses. Ms. Martinsic, Arizona Petroleum Marketers, noted that there is already a prohibition from switching from ATC to non-ATC when the seasons change and perhaps those provisions in paragraphs UR.2.5.1. and UR.2.5.2. would address the concerns raised in conjunction with this item.

The Committee has heard multiple variations of proposed language; however, none of the proposals appears to be close to solving the problems originally identified (see the initial paragraph of this Background/Discussion). The Committee believes that further development is needed before this issue is ready for action at the national level. This item was originally part of a larger item addressing the use of ATC on VTMs. Since this item was created by the Committee following deliberations on a larger issue, the Committee did not think it appropriate to return it to a particular regional Weights and Measures association. Consequently, the Committee is Withdrawing this item, but is receptive to reconsidering the issue if it is further developed. If the proposal is to be resubmitted, the Committee suggests for future reference that the following points (based on comments heard by the Committee on this issue) be considered and addressed in any proposed language before resubmitting the item:

- Include a definition of “business location.” For example, how does the term apply to a business with multiple locations? A business with a service station and VTMs and loading racks?
- Consider how any proposed language will apply to businesses that operate in multiple jurisdictions.
- Consider whether exceptions should be made to the requirement. For example, should a business be permitted to dedicate a VTM not using ATC to servicing a single customer, while allowing its other VTMs to operate with ATC? If so, what restrictions should apply such as approval by the Weights and Measures authority? What other conditions would apply to the exception?
- Consider whether any proposed language could be directed to the seller (and/or user) instead of the device.

In discussing this issue during its work session, the Committee developed the following language. The Committee was not confident that this alternative would address the range of comments heard and believes additional work is

still needed; however, the Committee is including it along with the above suggestions as a possible starting point for further development.

**UR.2.5.1.3. Condition of Use. – When a person offers a specific fuel product(s) for sale on the basis of a temperature-compensated volume, all vehicle-tank meters dispensing that product(s) shall have active automatic temperature compensation and all fuel products offered for sale shall be dispensed on the basis of temperature-compensated volume.**

**Exceptions to this requirement are permitted through written agreements between the specific buyer(s) and person(s) offering the product for sale with the approval of the jurisdiction with statutory authority.**

## 336 WATER METERS

### 336-1 W N.3. Test Drafts and N.4. Testing Procedures

(This item was withdrawn.)

**Source:** 2009 Carryover Item 336-3. This item originated from the Southern and Western Weights and Measures Associations (SWMA and WWMA).

**Purpose:** To increase the test draft size for water meters to reduce the impact of uncertainties contributed by the test process.

**Item Considered:** The proposed language to modify requirements for test draft size may be viewed in the Committee's 2009 Interim and Final Reports.

#### **Key Points Considered by the Committee:**

- The WWMA forwarded several proposals (see Items 336-2 and 336-3) to the Committee as alternatives to consider.
- Water meter manufacturers and regionals agree that this item should be Withdrawn in favor of those alternatives.

**Background/Discussion:** At its fall 2007 meeting, the SWMA received a proposal from a meter manufacturer with two options for modifying Section 3.36. The proposals were intended to address concerns regarding the impact of uncertainties contributed by the test process during repeatability testing by increasing the test draft size specified in the code.

Many in the community expressed support for modifying the test draft criteria in some fashion and industry and Weights and Measures officials submitted data to support some change; however, the Committee was unable to get agreement for the specific changes suggested in the proposal during its review of the proposal in 2007, 2008, and 2009.

During the Committee's 2009 Annual Meeting work session, Ms. Kristin Macey, representing CA DMS, and the water meter manufacturers present agreed to work to further review requirements for water meter testing with the goal of identifying changes or modifications to the scope of this item (336-1) in time for review by one or more of the fall 2009 regional Weights and Measures associations.

See the 2007, 2008, and 2009 S&T Committee Final Reports for additional details and background information on this issue.

At its fall 2009 meeting, the WWMA heard comments from Mr. Ed Williams, Director, CA DMS, regarding water meter compliance in California and referencing testing that has been conducted at the State and county level. Mr. Williams reported that the compliance level for both type evaluation testing and routine field testing at the county

level has been comparatively high, even after the addition of the specific repeatability tolerance to the Water Meters Code. Mr. Williams provided a written copy of these comments to the WWMA; that document is included in Appendix A to this agenda.

The WWMA heard from Mr. George DeJarlais on behalf of five water meter manufacturers including Badger Meter, Neptune Technology Group, Master Meter, Elster-AMCO, and Sensus Metering Systems that there is an inadequate draft size in HB 44 for 1½ in and 2 in size meters and there is inequity in test draft sizes in Table N.4.2. between the 5 gal and corresponding one cubic foot drafts. Since the 2008 WWMA Meeting, significant data has been submitted by the device manufacturers and CA DMS. In light of this data, Mr. DeJarlais stated that eight new proposals were submitted to the WWMA that represent alternatives to the proposals in Item 336-1, several of which would incorporate the changes proposed in this item. Mr. DeJarlais also stated that the type evaluation compliance rate was somewhat misleading because it involves only four meter product lines that have passed type evaluation since 2002. In the meantime, some manufacturers have deferred submitting meters for evaluation until some of the HB 44 issues are resolved.

The WWMA S&T Committee was advised by Mr. DeJarlais that the eight new proposals were submitted as multiple alternatives for solving the three concerns identified by the water meter manufacturers: (1) accuracy test drafts for 1½ in and 2 in meters; (2) gallon test drafts for meters 1 in size; and (3) accuracy test drafts with respect to repeatability requirements. After reviewing all eight proposals and considering the original proposal in this item (336-1), the WWMA recommended that this item be Withdrawn and forwarded two new proposals (as outlined in Items 336-2 and 336-3 of this agenda) to the NCWM S&T Committee for consideration.

At its fall 2009 meeting, the CWMA requested comments on this item; however, hearing none, the CWMA recommended that the item remain an Information item.

At its fall 2009 meeting, NEWMA recommended withdrawing this item until a solid proposal can be made.

At its fall 2009 meeting, the SWMA recommended withdrawing this proposal in favor of supporting two alternate related proposals, developed at the September 2009 WWMA Meeting (outlined in Items 336-2 and 336-3 in this agenda).

At the 2010 NCWM Interim Meeting, the Committee heard support from Mr. Jeff Humphreys, Los Angeles County California; Mr. DeJarlais (representing five water meter manufacturers); and NIST WMD for withdrawing this item in favor of alternative proposals presented in Items 336-2 and 336-3. Consequently, the Committee decided to Withdraw this item from its agenda.

### **336-2 VC N.4.2 Special Tests.**

(This item was adopted.)

**Source:** WWMA

**Purpose:** To reduce the impact of uncertainties contributed by the test process by increasing the test draft size for special tests of Utility Type Water meters.

**Item Under Consideration:** Modify paragraph N.4.2. Special Tests and Table N.4.2. and add a new table N.4.2.b. as follows:

**N.4.2. Special Tests.** – Special tests to develop the operating characteristics of meters may be made according to the rates and quantities shown in Table N.4.2.a. Flow Rate and Draft Size for Water Meters Special Tests **and Table N.4.2.b. Flow Rate and Draft Size for Utility Type Water Meters Special Tests.**

(Amended 2003 **and 2010**)

<b>Table N.4.2.a.</b>						
<b>Flow Rate and Draft Size for Batching Water Meters Special Tests</b>						
<b>Meter Size (inches)</b>	<b>Intermediate Rate</b>			<b>Minimum Rate</b>		
	<b>Rate of Flow (gal/min)</b>	<b>Meter Indication/Test Draft</b>		<b>Rate of Flow (gal/min)</b>	<b>Meter Indication/Test Draft</b>	
		<b>gal</b>	<b>ft<sup>3</sup></b>		<b>gal</b>	<b>ft<sup>3</sup></b>
<b>Less than or equal to <math>\frac{5}{8}</math></b>	<b>2</b>	<b>10</b>	<b>1</b>	$\frac{1}{4}$	<b>5</b>	<b>1</b>
$\frac{3}{4}$	<b>3</b>	<b>10</b>	<b>1</b>	$\frac{1}{2}$	<b>5</b>	<b>1</b>
<b>1</b>	<b>4</b>	<b>10</b>	<b>1</b>	$\frac{3}{4}$	<b>5</b>	<b>1</b>
<b>1½</b>	<b>8</b>	<b>50</b>	<b>5</b>	<b>1½</b>	<b>10</b>	<b>1</b>
<b>2</b>	<b>15</b>	<b>50</b>	<b>5</b>	<b>2</b>	<b>10</b>	<b>1</b>
<b>3</b>	<b>20</b>	<b>50</b>	<b>5</b>	<b>4</b>	<b>10</b>	<b>1</b>
<b>4</b>	<b>40</b>	<b>100</b>	<b>10</b>	<b>7</b>	<b>50</b>	<b>5</b>
<b>6</b>	<b>60</b>	<b>100</b>	<b>10</b>	<b>12</b>	<b>50</b>	<b>5</b>

(Table Added 2003) (Amended 2010)

<b>Table N.4.2.b.</b>						
<b>Flow Rate and Draft Size for Utility Type Water Meters Special Tests</b>						
<b>Meter Size (inches)</b>	<b>Intermediate Rate</b>			<b>Minimum Rate</b>		
	<b>Rate of Flow (gal/min)</b>	<b>Meter Indication/Test Draft</b>		<b>Rate of Flow (gal/min)</b>	<b>Meter Indication/Test Draft</b>	
		<b>gal</b>	<b>ft<sup>3</sup></b>		<b>gal</b>	<b>ft<sup>3</sup></b>
<b>Less than <math>\frac{5}{8}</math></b>	<u><b>2</b></u>	<u><b>10</b></u>	<u><b>1</b></u>	$\frac{1}{4}$	<u><b>5</b></u>	<u><b>1</b></u>
$\frac{5}{8}$	<u><b>2</b></u>	<u><b>10</b></u>	<u><b>1</b></u>	$\frac{1}{4}$	<u><b>5</b></u>	<u><b>1</b></u>
$\frac{5}{8} \times \frac{3}{4}$	<u><b>2</b></u>	<u><b>10</b></u>	<u><b>1</b></u>	$\frac{1}{4}$	<u><b>5</b></u>	<u><b>1</b></u>
$\frac{3}{4}$	<u><b>3</b></u>	<u><b>10</b></u>	<u><b>1</b></u>	$\frac{1}{2}$	<u><b>5</b></u>	<u><b>1</b></u>
<b>1</b>	<u><b>4</b></u>	<u><b>10</b></u>	<u><b>1</b></u>	$\frac{3}{4}$	<u><b>5</b></u>	<u><b>1</b></u>
<b>1½</b>	<u><b>8</b></u>	<u><b>100</b></u>	<u><b>10</b></u>	<b>1½</b>	<u><b>100</b></u>	<u><b>10</b></u>
<u><b>2</b></u>	<u><b>15</b></u>	<u><b>100</b></u>	<u><b>10</b></u>	<u><b>2</b></u>	<u><b>100</b></u>	<u><b>10</b></u>

(Table Added 2010)

**Key Points Considered by the Committee:**

- Test draft sizes currently specified in paragraph N.4.2. are equal to less than one complete revolution on the meter indicator for certain types of meters, which may introduce additional uncertainty into the test process.
- Manufacturers are concerned that the additional uncertainty contributed to the test process is resulting in a high number of meter failures, particularly when repeatability testing is conducted.
- Five water meter manufacturers submitted test data to illustrate their concerns (see S&T Final Reports 2007 - 2009).
- Possible approaches to address this gap are to increase the test draft size to ensure a full revolution, modify the minimum increment of the indicator, and/or modify the tolerances.
- The increased test draft size for the 1½ in and 2 in meters are not expected to significantly impact routine field testing since most jurisdictions routinely using the code only test smaller meters.
- The State of California and a number of California county jurisdictions worked to collect data to validate the proposed changes.

**Background/Discussion:** The WWMA heard from Mr. Andre Noel, Neptune Technology Group, representing five water meter manufacturers. The meter manufacturers state that meters 1½ in and 2 in size are guaranteed to fail type evaluation “N.4.2. Special Tests” because of inadequate test draft sizes. The test draft size only represents ten graduations on the proving indicator, which is only one-tenth of a revolution on proving indicators found on most water meters with analog dial type indicators. This results in larger meter uncertainties.

The WWMA heard that field testing to verify compliance with “N.4.2. Special Test” requirements of 1½ in and 2 in meters seldom occur in California. However, these tests are performed on meters submitted for evaluation by the California Type Evaluation Program laboratory resulting in frequent failures. The WWMA recognizes that the current draft sizes are inadequate to obtain valid test results. Increasing the test draft size in this case would not create undue hardship during field testing, since field tests are not being conducted on a routine basis.

The WWMA also received a comment regarding the consistent use of words describing non-utility, batch-type, and batching type meters. The WWMA suggests that the term “batching meters” be used throughout this code. The WWMA also recognized the need for including the 5/8 in x 3/4 in size meter, which is commonly found in commercial sub-metering applications.

The WWMA recommended this item be forwarded to the S&T Committee for a vote and recognized that this item and Item 336-3 represent alternative proposals to Item 336-1.

At its fall 2009 meeting, the CWMA heard no comments on this item and recommended it be maintained as an Information item.

At its fall 2009 meeting, the SWMA supported the WWMA in its proposed modifications to Table N.4.2. to address the flow rates and test draft sizes for special tests of batching meters. The SWMA also supported the WWMA’s including a new “Special Test” to address the flow rates and test draft sizes for special tests of utility type water meters. The SWMA acknowledged the change in flow rates and test drafts for special tests of utility type water meters are needed to address the operating characteristics of these meters. Since tests are conducted on an infrequent basis, the increase in the test draft sizes as proposed in new “Special Test” Table would not create undue hardship for a jurisdiction. The SWMA also recognizes the proposed new “Special Test” Table now addresses meter sizes in actual use that were not previously addressed in the code. The SWMA relies on the experience and expertise of the WWMA in the regulation this technology. Consequently, the SWMA recommends this proposal be included as a Voting item on the NCWM S&T’s 2010 agenda.

At the 2010 Interim Meeting, the Committee heard support for this item from Mr. Noel, Neptune Technologies, on behalf of five water meter manufacturers. Mr. Ed Williams, California, also supported the item. The Committee modified the proposal to: (1) correctly reference the original and the proposed new table in paragraph N.4.2.; and (2) change the title of the two tables to Table N.4.2.a. and N.4.2.b. to correspond to the referring paragraph.

Hearing no opposition to the proposed changes, the Committee recommended that this item move forward as a Voting item with the changes to the titles of the table noted above.

During the open hearing at the 2010 NCWM Annual Meeting, the Committee received support from water meter manufacturers Badger, Sensus, Neptune, Elster Amco, and Master Meter. Mr. Williams, California, also supported this item. The Committee heard no comments opposing the item.

### **336-3 VC T.1.1. Repeatability.**

(This item was adopted.)

**Source:** WWMA

**Purpose:** To return the tolerances for repeatability tests of water meters to the values specified prior to 2003 for water meters (and many other measuring devices) in the General Code in an effort to reduce the impact of uncertainties contributed by the test process.

**Item Under Consideration:** Modify paragraph T.1.1. Repeatability as follows:

**T.1.1. Repeatability.** - When multiple tests are conducted at approximately the same flow rate, ~~the range of the test results shall not exceed 0.6 % for tests performed at the normal and intermediate flow rates, and 1.3 % for tests performed at the minimum flow rate, and~~ each test shall be within the applicable tolerances and the range of test results shall not exceed the following values:

	<u>Batching Meters</u>	<u>Utility-Type Meters</u>
<u>Normal Flow Rates</u>	<u>0.6 %</u>	<u>0.6 %</u>
<u>Intermediate Flow Rates</u>	<u>0.6 %</u>	<u>2.0 %</u>
<u>Minimum Flow Rate</u>	<u>1.3 %</u>	<u>4.0 %</u>

(Added 2002) (Amended 2011)

**Key Points Considered by the Committee:**

- Prior to 2003, water meters were held to repeatability requirements specified in the General Code paragraph G-S.5.4. Repeatability of Indications “. . . repeating within prescribed tolerances. . . .”
- In 2003, requirements were added to multiple measuring codes to require that measuring devices repeat to within 40 % of the absolute value of maintenance tolerance. For the water meters code, the tolerance for the range of results was calculated and expressed as a percent value (0.6 %).
- The impact of how the 2003 changes would impact water meters may not have been fully analyzed.
- Testing to the 2003 requirements resulted in test draft sizes that are less than a full revolution of the meter indicator, thus contributing additional uncertainty to the test process.
- Manufacturers report that the higher degree of uncertainty results in overly restrictive tolerances, particularly at the intermediate and minimum flow rates, and they submitted test data to illustrate their concerns (see S&T Final Reports 2007 - 2009).
- Alternatives to overcome this problem are to return the repeatability tolerances to the pre-2003 levels and/or increase the test draft size to minimize uncertainties in the test process.
- Some suggested restricting repeatability requirements to only type evaluation. However, this would eliminate a key tool for Weights and Measures officials to use in assessing the condition of a meter and its continued suitability for a given field application.
- The tolerances proposed in this recommendation are more closely in alignment with pre-2003 tolerances.
- The State of California and a number of California county jurisdictions worked to collect data to validate the proposed changes.

**Background/Discussion:** This item and Item 336-2 represent an alternative proposal to Withdrawn Item 336-1. The WWMA heard from Mr. DeJarlais, with Badger Meter, representing a group of five water meter manufacturers. One of the primary concerns of the manufacturers is the inability of meters to pass repeatability requirements during type evaluation testing. Based upon the data collected by the State of California and multiple California counties, the WWMA noted that three separate ranges of repeatability are appropriate for the maximum, intermediate, and minimum flow rates when current HB 44 test draft sizes are used. The WWMA also noted that an increase to the accuracy range of the test results performed at the intermediate and minimum flow was warranted, notwithstanding the requirement for each test to be within the applicable tolerance. The WWMA recommended this item be forwarded to the S&T Committee for a vote.

At its fall 2009 meeting, the CWMA heard no comments on this item and recommended it be maintained as an Information item.

At its fall 2009 meeting, the SWMA heard from Mr. Andre Noel (Neptune Technology) about the primary concerns of the manufacturers over the inability of meters to pass repeatability requirements during type evaluation testing. Mr. Noel indicated that the data collected by the State of California and multiple California counties support the proposed new ranges of repeatability tolerances for the maximum, intermediate, and minimum flow rates when current HB 44 test draft sizes are used. The SWMA relies on the experience and expertise of the WWMA in the regulation this technology. Consequently, the SWMA recommended this proposal be included as a Voting item on the NCWM S&T's 2010 agenda.

At the 2010 Interim Meeting, the Committee heard comments from industry and regulatory officials supporting this item and, consequently, recommended that it move forward as a Voting item.

During the open hearing at the 2010 NCWM Annual Meeting, the Committee received support from water meter manufacturers Badger, Sensus, Neptune, Elster Amco, and Master Meter. Mr. Williams, California, also supported this item. Mr. Henry Oppermann, W&M Consulting, submitted a preliminary analysis on the data collected by California and noted large variations in some of the test results. Mr. Oppermann noted no objection to the proposed change; however, he believes a better understanding is needed of the source of variations, particularly the relatively large variation in test results among weights and measures officials' tests. The source of the variations may be a result of more than just resolution and test draft size. NIST WMD reported hearing some concerns expressed regarding the use of wide-neck proving equipment on some water meter test benches, noting that such provers can provide much larger variability in the test results than the narrow neck provers. The Committee heard no comments opposing the item.

## **360 OTHER ITEMS**

### **360-1 V Tentative Code for Hydrogen Gas-Measuring Devices.**

(This item was adopted.)

**Source:** WWMA and SWMA

**Purpose:** To provide the U.S. Weights and Measures community (manufacturers, users, and Weights and Measures officials) with legal metrology requirements to address gaseous hydrogen refueling dispensers already in operation in 24 states.

**Item Under Consideration:** Adopt the proposed Section 3.39. Hydrogen Gas-Measuring Devices Code outlined in Appendix B as a tentative code in HB 44.

#### **Key Points Considered by the Committee:**

- The USNWG for the Development of Commercial Hydrogen Measurement Standards (USNWG) (which developed and submitted the draft code to the regional Weights and Measures associations) is comprised of key stakeholders and experts in commercial hydrogen measurement, including manufacturers and users of commercial hydrogen measuring equipment, suppliers of hydrogen, and regulatory officials.
- The proposed tentative status of the code is expected to allow valuable feedback on how well the draft meets the needs of the measurement community in a broader number of applications.
- Additional changes can be proposed to the code prior to the time that it is recommended for "permanent" status.

- The proposed tolerances are recommended based on an assessment of the range of accuracy levels reported thus far, but will require additional validation.
- Additional work is needed to define additional testing approaches, although the USNWG has a draft test procedure for one of three test methods and is confident that additional procedures will follow.
- NIST WMD is working to conduct uncertainty analyses of the various testing methods being considered to provide the USNWG with information regarding the feasibility of each. NIST anticipates that this information will also be useful in assessing the feasibility of the proposed tolerances.

**Background/Discussion:** The USNWG for the Development of Commercial Hydrogen Measurement Standards recommends changing the status of the NCWM S&T Committee Developing Item proposing a new hydrogen gas code from Developing to Voting. Draft 5.0 of the proposed new NIST HB 44 Section 3.39. Hydrogen Gas-Measuring Devices Code was distributed to the four regional Weights and Measures associations in September 2009 for consideration. Note that a corresponding recommendation that proposes including hydrogen fuel quality and method of sale requirements in NIST HB 130 “Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality” (HB 130) was also submitted to the four regional Weights and Measures association Laws and Regulations (L&R) Committees.

The USNWG made the recommendation to upgrade the status of the proposal as a result of 22 months of work to ready the draft code language for national approval and adoption. The USNWG will be collecting additional data in the coming months to confirm that the proposed tolerances are adequate and fair given today’s hydrogen technology and the test equipment available. These tolerances are derived from performance requirements in use for similar compressed gas applications in HB 44 and OIML R 139 “Compressed gaseous fuel measuring systems for vehicles.” The USNWG will update the Weights and Measures community on its findings in the event that the proposed tolerances for these systems require further refinement.

As additional justification, the USNWG notes that the proposed new hydrogen code provides the U.S. Weights and Measures community with legal metrology requirements to address gaseous hydrogen refueling dispensers already in operation in twenty-four states. Thirty additional stationary and mobile refueling systems are in the planning stages. Existing requirements for other compressed gas refueling applications, primarily compressed natural gas (CNG), were the starting point for many hydrogen standards. CNG requirements are not entirely suitable for some of the unique features of hydrogen gas dispensers (e.g., product density). While some jurisdictions feel it is premature for hydrogen requirements because there are limited refueling stations, the USNWG feels that this is the ideal time to set the stage for Weights and Measures requirements. The hydrogen community is looking to the Weights and Measures community for their expertise, and this is the opportunity to be involved in the early stages of the development of commercial measurement standards that was not possible with CNG.

The United States has the largest number of hydrogen refueling dispensers worldwide. By taking the lead in developing appropriate requirements for this growing alternative fuel technology, the United States can fill a critical gap in the hydrogen infrastructure and can move closer to its goal for a clean fuel source and independence from imported energy.

The USNWG members represent: 1) federal and state government; 2) dispenser, meter, and related component manufacturers; 3) fuel providers; 4) fuel partnerships; 5) fuel quality administrators; 6) related standards organizations; and 7) type evaluation and research and development laboratories. The USNWG is recommending design, performance, installation, and use requirements for hydrogen dispensers based on its experience with compressed gas delivery systems and hydrogen’s properties and measurement technology. The draft code is the first phase of a five-year project, which starts with a tentative code. The tentative code is necessary for providing guidelines to device manufacturers and, once finalized, will be the basis for test procedures, type evaluation criteria, and eventual training of industry and field officials.

The ongoing work to develop the hydrogen code has been documented and is under review through posting on the websites:

1. <http://www.fuelcellstandards.com/> tracks over 200 hydrogen and fuel cell standards;

2. <http://ts.nist.gov/WeightsAndMeasures/Developing-Commercial-Hydrogen-Measurement-Standards.cfm> a NIST WMD outreach project providing the latest updates on work to develop legal metrology requirements for hydrogen measurement; and
3. <http://www.hydrogenandfuelcellsafety.info/> lists updates on the latest USNWG work reported to the National Hydrogen Fuel Cell Codes and Standards Coordinating Committee (NHFCCSCC). The committee is sponsored by U.S. Department of Energy (DOE), U.S. Fuel Cell Council, and National Hydrogen Association and is chartered with coordinating the development of hydrogen codes and standards to harmonize national and international codes. The NHFCCSCC fosters this collaborative effort between industry and government to encourage sharing of information, avoiding duplication, and to ensure all essential elements are in place for a safe, cost effective, and viable commercial program.

The USNWG work on these requirements has been reported in detail in multiple outreach projects such as the:

1. Weights and Measures Quarterly news article series on “Hydrogen, What's Next?” a NIST WMD technical news publication distributed to the Weights and Measures community.
2. Open hearings of the 2008 and 2009 meetings of the National Conference on Weights and Measures, S&T and L&R Committees, and Meter Manufacturers Association Meetings.
3. Three U.S. Weights and Measures Administrators’ Workshops on Commercial Hydrogen Measurement.
4. Two regional Weights and Measures association technical training seminars on Commercial Hydrogen Measurement, which like the workshop, were sponsored in part by the DOE and NIST to familiarize Weights and Measures officials with the latest developments in the operation, performance, and safety of hydrogen refueling technology.

The work to fully develop the new hydrogen infrastructure included representation and input from affected sectors, including Weights and Measures officials and equipment manufacturers and operators. This is an opportunity to influence the direction of the work prior to commercialization of this application. This work represents a unique and collaborative effort.

The USNWG initially focused its efforts on the development of requirements for retail refueling dispensers. As discussions and work progressed, the USNWG discussed at what point to address wholesale applications. The USNWG is aware that other measuring device codes address wholesale applications, but does not agree, as some have suggested, that the code should wait until some later date to address wholesale applications. The USNWG agreed that retail dispensers have the more immediate need for marketplace standards. The USNWG has begun to consider code language to address both retail and wholesale devices.

The USNWG reported working to provide guidance documents and training that are necessary for the start-up and implementation of a hydrogen device inspection and test program. The USNWG is examining the resources necessary to test hydrogen refueling equipment and has, with the assistance of California's Division of Measurement Standards, created an equipment list with an estimated average cost for a test standard of \$111,000.

Jurisdictions may rely on the provisions of HB 44 General Code paragraph G-UR.4.4. Assistance in Testing Operations to ensure suitable test equipment is available. The USNWG is also considering the incorporation of User Requirements which would provide more specific equipment and assistance requirements that apply to the official test, such as those specified in paragraph UR.3.8. Return of Product to Storage, Retail Compressed Natural Gas Dispensers in the Mass Flow Meters Code. It should be noted that the USNWG and CSA/HGV 4.3 Temperature Compensation Devices for Hydrogen Gas Dispensing Systems Work Group are exploring the advantages of cost sharing a single test standard for use to test for over pressurization and over-heating as well as for the accuracy of the delivery system.

The USNWG anticipates input from both the Weights and Measures and hydrogen communities in support of the proposed code during the regional fall meetings.

At the fall 2009 meeting, the CWMA recommended changing the status of the Developing Item on the S&T Committee's agenda to a Voting item, proposing the adoption of a tentative code in HB 44 to address gaseous hydrogen refueling applications.

At its fall 2009 meeting, NEWMA stated that, if an EPO has been developed and all safety considerations have been addressed then NEWMA supports as Voting. Otherwise, NEWMA supports the proposal as an Information item. NEWMA offered the following additional points and questions to address in considering this proposal:

- Is there an urgency to move this from developing to Voting? Why not move to Information first?
- An EPO should be developed before this goes for a vote.
- What equipment will be necessary for testing?
- Are there any safety considerations?
- This is very new for Weights and Measures inspectors.
- Should a hydrogen specification chart be included as part of the code or in the EPO?

At its fall 2009 meeting, the WWMA heard from Ms. Macey, California DMS, and Chair of the USNWG on Hydrogen Device Standards Subcommittee, about the necessity for a tentative hydrogen gas-measuring device code to further the development of a retail infrastructure for commercial hydrogen as a motor fuel. There are eighteen states where hydrogen stations are under current operations. Ms. Macey urged state directors at the WWMA meeting to visit and learn more about these sites and provide written and/or oral support at upcoming NCWM meetings. The WWMA recommends this as a Voting item and also encourages the collection of data in the coming months to validate the proposed tolerances and test notes.

At its fall 2009 meeting, the SWMA supported the USNWG's proposal for a new Section 3.39 Hydrogen Gas-Measuring Devices Code and recommends the proposal move forward for adoption as a tentative code. The SWMA S&T Committee recommends the USNWG consider the comments made during its open hearing session and all other comments made at the fall 2009 regional Weights and Measures association meetings as it prepares the final draft of the hydrogen code for consideration at the January 2010 NCWM.

The USNWG met December 15, 2009, and January 13, 2010, to review and develop a position on the comments it received on the draft code. The USNWG responses to those comments and any updates to the draft code are posted on the website <http://ts.nist.gov/WeightsAndMeasures/Developing-Commercial-Hydrogen-Measurement-Standards.cfm> and made available to all interested parties. The USNWG notes that the WG agreed in October 2007 to simultaneously develop a device code and corresponding test procedures. Currently, the USNWG has a draft examination procedure outline (EPO 29) under review for the gravimetric test method to include safety guidelines.

At the 2010 Interim Meeting, Ms. Juana Williams, NIST WMD, provided the Committee with an update on the progress of the USNWG. She noted some editorial corrections to eliminate strikethrough in a few places. She also expressed appreciation to the DOE for supporting the work of the USNWG. Ms. Williams also commented that, if adopted as a tentative code, this would allow the United States, which leads the world in the number of hydrogen refueling stations, to move ahead with full implementation. She also provided the committee with a copy of her comments in writing for reference during the Committee's review of the item.

Mr. Keilty, Endress and Hauser, a USNWG member, also expressed support for this item, noting that it is important for the code to move ahead and indicating that the various interests represented on the work group are working together to finalize any outstanding issues.

Mr. Williams, California DMS, also expressed support for recommending the code for a vote as a tentative code.

The Committee agreed to recommend that this item move forward for a Vote based on the input heard at its open hearings and information from the USNWG indicating that work on several outstanding points is anticipated to be finalized by the July 2010 meeting.

At their spring 2010 Annual Meetings, NEWMA and the CWMA supported the adoption of the tentative code.

At the July 2010 NCWM Annual Meeting, NIST WMD suggested that in considering adoption of the tentative code, the Committee consider the addition of a new paragraph A.4. Type Evaluation to the tentative code. WMD also noted that a new paragraph might be added to the Mass Flow Meters Code to refer hydrogen gas-measuring devices to the new Hydrogen-Gas Measuring Devices Code.

The Committee also received recommendations from the USNWG for the Development of Commercial Hydrogen Measurement Standards to consider for a vote its latest draft of the tentative code, Draft 6.0, which represents USNWG modifications to the code since January 2010.

The USNWG met in January, April, May, June, and July 2010 to work through comments received on the draft code from the U.S. regional weights and measures associations and USNWG members. At the 2010 NCWM, the USNWG provided the Committee and NCWM members with a summary of its responses to 21 of 25 comments on the code to include: 1) a single page identifying recent modifications to the code; 2) Draft 6.0 of the hydrogen code (July 2010 version); 3) Draft Guideline for the Gravimetric Test Method; and 4) Draft Test Report for the Gravimetric Test Method. The Committee also agreed to further modifications to proposed Draft 6.0 of the code based on recommendations submitted from NIST WMD and Mr. Keilty (Endress-Hausser) during the July 2010 Annual Meeting. The Committee incorporated all of the modifications shown below into a final proposal of the Hydrogen Gas-Measuring Devices Code.

The USNWG noted that a tentative code is needed as a starting point for inspection and test procedures of these devices in the 2011 edition of HB44. These requirements are designed for study prior to the development and adoption of a final code. Rapid commercialization of hydrogen gas dispensers (stationary and mobile) may be anticipated before the USNWG has completed its work in 2012.

During the July 2010 open hearing session, the Committee received support for the proposed code from California's Division of Measurement Standards, Micro Motion, Inc., and NIST WMD (with modifications noted below). The Committee also received correspondence in support of the code from the U.S. Fuel Cell Council, Van Putten-Blue Energy Observatories Inc., the California Fuel Cell Partnership, Daimler, and Endress Hauser (with modifications noted below). The Committee recommended that this final draft (which includes the changes outlined below) as shown in Appendix B, move forward for a vote and adoption as a tentative code.

The USNWG and Committee modifications along with rationale for the changes proposed by the Committee are shown in the following two tables.

Draft 5.0 Proposed Hydrogen Gas-Measuring Devices - Tentative Code	Draft 6.0 Proposed Hydrogen Gas-Measuring Devices - Tentative Code
<b>Rationale for Code Modification</b>	
<p><b>A.2.</b> This code does not apply to:</p> <p>(a) devices used solely for dispensing a product in connection with operations in which the amount dispensed does not affect customer charges.</p> <p>(b) the wholesale delivery of hydrogen gas</p>	<p><b>A.2.</b> This code does not apply to:</p> <p>(a).....</p> <p>(b).....</p> <p><b><u>(c) Devices used for dispensing a hydrogen gas with a hydrogen fuel index lower than 99.97 percent and concentrations of specified impurities that exceed level limits.</u></b></p>
<p>The Committee discussed the USNWG's decision to revisit its earlier decision to remove from paragraph S.3.4. examples of factors that affect changes in density. Eliminating the examples in this paragraph resulted in some</p>	

Draft 5.0 Proposed Hydrogen Gas-Measuring Devices - Tentative Code	Draft 6.0 Proposed Hydrogen Gas-Measuring Devices - Tentative Code
<b>Rationale for Code Modification</b>	
inconsistencies with corresponding requirements in NIST HB 44 3.37 Mass Flow Meters Code for volume-measuring devices that indicate in mass.	
The USNWG recognized that the factors that affect measurement accuracy vary across technologies. However, hydrogen gas used for fuel cell vehicle refueling is limited to 300 ppm impurities. Similar to the product applications addressed in 3.34 Cryogenic Code, this code is intended to apply to homogeneous products and it should not be applied to deliveries of hydrogen blended products where automatic correction for variations in composition are required. Consequently, the USNWG included a new subparagraph (c) which specifies that the product application for these systems are intended to measure. The Committee agreed this modification should move forward for adoption.	
<b>S.1.3.2. Numerical Value of Quantity-Value Divisions.</b> - The value of a scale interval shall be equal to:	<b>S.1.3.2. Numerical Value of Quantity-Value Divisions.</b> - The value of an <u>scale</u> interval ( <u>i.e., increment or scale division</u> ) shall be equal to:
The Committee agreed with the USNWG's decision to modify paragraph S.1.3.2. in response to a request for clarification of the term "scale interval." The term "scale" was deleted from the text and examples were added to paragraph S.1.3.2. to clarify that the value of an "interval" shall have a numerical value that is the difference between two successive mass units (indicated or recorded).	
<b>S.2.3. Nonresettable Indicator.</b> - A device may also be equipped with a nonresettable indicator if the indicated values cannot be construed to be the indicated values of the resettable indicator for a delivered quantity.	<del><b>S.2.3. Nonresettable Indicator.</b> - A device may also be equipped with a nonresettable indicator if the indicated values cannot be construed to be the indicated values of the resettable indicator for a delivered quantity.</del>  Renumber subsequent paragraph S.2.4. through S.2.8. to S.2.3. through S.2.7.
The Committee agreed with the USNWG's decision to delete paragraph S.2.3. because of the confusion with paragraph S.7. which is the requirement for a nonresettable totalizer.	
<b>T.4. Tolerance Application.</b>  <b>T.4.1. Type Evaluation Examinations for Devices.</b> - For type evaluation examinations, the tolerance values shall apply under the following conditions:  (a) at any temperature and pressure within the operating range of the device; and  (b) for all quantities greater than the minimum measured quantity.  <b>T.4.2 Transfer Standard Test Method.</b> - To the basic tolerance values that would otherwise be applied, there shall be added an amount equal to two times the standard deviation of the applicable transfer standard when compared to a basic reference standard.	<del><b>T.4. Tolerance Application.</b></del>  <del><b>T.4.1.5 Tolerance Application in Type Evaluation Examinations for Devices.</b></del> - For type evaluation examinations, the tolerance values shall apply under the following conditions:  (a) at any temperature and pressure within the operating range of the device; and  (b) for all quantities greater than the minimum measured quantity.  <del><b>T.4.2. Tolerance Application on Test Using the Transfer Standard Test Method.</b></del> - To the basic tolerance values that would otherwise be applied, there shall be added an amount equal to two times the standard deviation of the applicable transfer standard when compared to a basic reference standard.

Draft 5.0 Proposed Hydrogen Gas-Measuring Devices - Tentative Code	Draft 6.0 Proposed Hydrogen Gas-Measuring Devices - Tentative Code
<b>Rationale for Code Modification</b>	
The Committee agreed with the USNWG's modification to rework paragraphs, T.4., T.4.1., and T.4.2. to clarify which requirements apply to type evaluation.	
<p><b>UR.3. Use of Device.</b></p> <p><b>UR.3.1. Unit Price and Product Identity for Retail Dispensers.</b> - The unit price at which the dispenser is set to compute shall be conspicuously displayed or posted on the face of a retail dispenser used in direct sale.</p> <p><b>UR.3.2. Ticket Printer; Customer Ticket.</b> - Vehicle-mounted measuring systems shall be equipped with a ticket printer which shall be used for all sales where product is delivered through the device. A copy of the ticket issued by the device shall be left with the customer at the time of delivery or as otherwise specified by the customer.</p> <p><b>UR.3.3. Printed Ticket.</b> - The total price, the total quantity of the delivery, and the price per unit shall be printed on any ticket issued by a device of the computing type and containing any one of these values.</p> <p><b>UR.3.4. Ticket in Printing Device, Vehicle-Mounted Measuring Systems.</b> - A ticket shall not be inserted into a device equipped with a ticket printer until immediately before a delivery is begun, and in no case shall a ticket be in the device when the vehicle is in motion while on a public street, highway, or thoroughfare.</p> <p><b>UR.3.5. Steps After Dispensing.</b> - ...</p> <p>.</p> <p>.</p> <p>.</p> <p><b>UR.3.8. Conversion Factors.</b> ...</p>	<p><b>UR.3. Use of Device.</b></p> <p><b>UR.3.1. Unit Price and Product Identity for Retail Dispensers.</b> - The unit price at which the dispenser is set to compute shall be conspicuously displayed or posted on the face of a retail dispenser used in direct sale.</p> <p><b>UR.3.2. <del>Ticket Printer; Customer Ticket.</del> Vehicle-mounted <del>m</del>Measuring <del>s</del>Systems <u>Ticket Printer.</u></b></p> <p><b><u>UR.3.2.1. Customer Ticket. – Vehicle-mounted measuring systems</u></b> shall be equipped with a ticket printer which shall be used for all sales where product is delivered through the device. A copy of the ticket issued by the device shall be left with the customer at the time of delivery or as otherwise specified by the customer.</p> <p><b><u>UR.3.2.2. Ticket in Printing Device. - A ticket shall not be inserted into a device equipped with a ticket printer until immediately before a delivery is begun, and in no case shall a ticket be in the device when the vehicle is in motion while on a public street, highway, or thoroughfare.</u></b></p> <p><b>UR.3.3. Printed Ticket.</b> - The total price, the total quantity of the delivery, and the price per unit shall be printed on any ticket issued by a device of the computing type and containing any one of these values.</p> <p><b><del>UR.3.4. Ticket in Printing Device, Vehicle-Mounted Measuring Systems. – A ticket shall not be inserted into a device equipped with a ticket printer until immediately before a delivery is begun, and in no case shall a ticket be in the device when the vehicle is in motion while on a public street, highway, or thoroughfare.</del></b></p> <p>Renumber subsequent paragraph UR.3.5. through UR.3.8. to UR.3.4. through UR.3.7.</p>
The Committee agreed with the USNWG's modifications to paragraphs UR.3.5. through UR.3.8. which were regrouped and subsequently renumbered to include like requirements for vehicle-mounted measuring systems' ticket printers under the same paragraph designation.	

Modifications the Committee made to Draft 6.0 of the proposed code based on recommendations received from NIST WMD and Mr. Keilty are shown below:

Draft 6.0 of the Proposed Hydrogen Gas-Measuring Devices - Tentative Code	July 2010 S&T Committee Changes Made to Draft 6.0 of the Proposed Hydrogen Gas-Measuring Devices -Tentative Code
<b>Rationale for Code Modification</b>	
No Code Paragraph Existed	<b>Recommendation from WMD:</b> <u>A.4. Type Evaluation.</u> – NTEP will accept for type evaluation only those devices that comply with all requirements of this code.
The Committee agreed with the NIST WMD recommendation to include a new paragraph in the draft code to recognize systems submitted for type evaluation.	
<b>A.2.</b> This code does not apply to:  (a) devices used solely for dispensing a product in connection with operations in which the amount dispensed does not affect customer charges.  (b) the wholesale delivery of hydrogen gas  (c) <i>(This a newly proposed paragraph shown in the previous table in the right column.)</i>	<b>Recommendation from Mr. Keilty:</b> <b>A.2.</b> This code does not apply to: (a).....  (b).....  (c).....  <u>(d) Systems that measure pressure, volume, and temperature with a calculating device to determine the mass of gas accumulated in or discharged from a tank of known volume.</u>
The Committee agreed with Mr. Keilty that a modification was needed to the USNWG’s proposal for a new paragraph A.2.(d) to exclude pressure-volume-temperature (PVT) retail applications from the draft code. This new paragraph was included to specify that the code is not intended to address the uncertainties associated with PVT systems achieving temperature equilibrium. The Committee concurs with the USNWG that at some point the code can be revisited to recognize this technology when OEMs are ready to enter the marketplace and operate in commercial applications. In the interim period until the code includes appropriate requirements for PVT systems, officials should consider General Code paragraph G-A.3. Special and Unclassified Equipment when testing these systems.	
The Committee received and agreed with a recommendation from Mr. Keilty, Endress-Hausser, to further modify proposed new paragraph A.2.(d) to include the text “pressure, volume, and temperature with a calculating device to determine” to clarify the methodology that is used in PVT systems.	
<b>S.3.4. Automatic Density Correction.</b> - An automatic means to determine and correct for changes in product density shall be incorporated in any hydrogen gas-measuring system where measurements are affected by changes in the density of the product being measured.	<b>S.3.4. Automatic Density Correction.</b>  (a) An automatic means to determine and correct for changes in product density shall be incorporated in any hydrogen gas-measuring system where measurements are affected by changes in the density of the product being measured.  (b) <u>Volume-measuring devices with automatic temperature compensation used to measure hydrogen gas as a vehicle fuel shall be equipped with an automatic means to</u>

<b>Draft 6.0 of the Proposed Hydrogen Gas-Measuring Devices - Tentative Code</b>	<b>July 2010 S&amp;T Committee Changes Made to Draft 6.0 of the Proposed Hydrogen Gas-Measuring Devices - Tentative Code</b>
<b>Rationale for Code Modification</b>	
	<u><b>determine and correct for changes in product density due to changes in the temperature, pressure, and composition of the product.</b></u>
The Committee agreed with a recommendation from Mr. Keilty, Endress Hauser, to add a new subparagraph S.3.4.(b) to specify the factors that can influence measurements in volume-measuring devices used to measure hydrogen gas. The Committee made one additional modification to Mr. Keilty's recommendation to delete the word "engine" because these devices are used to fuel both fuel cell and internal combustion engine vehicles.	

### 360-2 I International Organization of Legal Metrology (OIML) Report

Many issues before the OIML, the Asian-Pacific Legal Metrology Forum (APLMF), and other international groups are within the purview of the Committee. Additional information on OIML activities will appear in the Board of Directors agenda and Interim and Final Reports and on the OIML website at <http://www.oiml.org>. NIST WMD staff will provide the latest updates on OIML activities during the open hearing sessions at NCWM Meetings. For more information on specific OIML-related device activities, contact the WMD staff listed in the table below. The OIML projects listed below represent only currently active projects. For additional information on other OIML device activities that involve WMD staff, please contact WMD using the information listed below:

<b>NIST Weights and Measures Division (WMD) Contact List for International Activities</b>	
<b>Contact Information</b>	<b>Responsibilities</b>
<b>Postal Mail and Fax for All Contacts:</b>	NIST WMD 100 Bureau Drive MS 2600 Gaithersburg, MD 20899-2600 Tel: (301) 975-4004 Fax: (301) 975-8091
Mr. John Barton (LMDG) (301) 975-4002 john.barton@nist.gov	<ul style="list-style-type: none"> <li>•R 21 "Taximeters"</li> <li>•R 50 "Continuous Totalizing Automatic Weighing Instruments (Belt Weighers)"</li> <li>•R 60 "Metrological Regulations for Load Cells" (jointly with Ken Butcher)</li> <li>•R 106 "Automatic Rail-weighbridges"</li> </ul>
Mr. Kenneth Butcher (LMG) (301) 975-4859 kenneth.butcher@nist.gov	<ul style="list-style-type: none"> <li>•D 1 "Elements for a Law on Metrology"</li> <li>•TC 3 "Metrological Control"</li> <li>•TC 3/SC 1 "Pattern Approval and Verification"</li> <li>•TC 3/SC 2 "Metrological Supervision"</li> <li>•TC 6 "Prepackaged Products"</li> <li>•R 60 "Metrological Regulations for Load Cells" (jointly with John Barton)</li> </ul>
Mr. Steven Cook (LMDG) (301) 975-4003 steven.cook@nist.gov	<ul style="list-style-type: none"> <li>•R 76 "Non-automatic Weighing Instruments"</li> </ul>

<b>NIST Weights and Measures Division (WMD) Contact List for International Activities</b>	
<b>Contact Information</b>	<b>Responsibilities</b>
Dr. Charles Ehrlich (ILMG) (301) 975-4834 charles.ehrlich@nist.gov	<ul style="list-style-type: none"> <li>•CIML Member for the United States</li> <li>•V1 “International vocabulary of terms in legal metrology (VIML)”</li> <li>•V2 “International vocabulary of basic and general terms in metrology (VIM)”</li> <li>•B3 “OIML Certificate System for Measuring Instruments”</li> <li>•B6 “OIML Directives for the Technical Work”</li> <li>•B 10 “Framework for a Mutual Acceptance Arrangement (MAA) on OIML Type Evaluations”</li> <li>•TC 3/SC 5 “Expression of Uncertainty in Measurement in Legal Metrology Applications,” “Guidelines for the Application of ISO/IEC 17025 to the Assessment of Laboratories Performing Type Evaluation Tests”</li> <li>•TC 3 “Metrological Control”</li> <li>•ISO/IEC Guide to the Expression of Uncertainty in Measurement”</li> </ul>
Mr. Richard Harshman (LMDG) (301) 975-8107 richard.harshman@nist.gov	<ul style="list-style-type: none"> <li>•R 51 “Automatic Catchweighing Instruments”</li> <li>•R 61 “Automatic Gravimetric Filling Instruments”</li> <li>•R 107 “Discontinuous Totalizing Automatic Weighing Instruments” (totalizing hopper weighers)</li> <li>•R 134 “Automatic Instruments for Weighing Road Vehicles In-Motion and Measuring Axle Loads”</li> </ul>
Ms. Diane Lee (LMDG) (301) 975-4405 diane.lee@nist.gov	<ul style="list-style-type: none"> <li>•R 59 “Moisture Meters for Cereal Grains and Oilseeds”</li> <li>•R 92 “Wood Moisture Meters – Verification Methods and Equipment”</li> <li>•R 121 “The Scale of Relative Humidity of Air Certified Against Saturated Salt Solution”</li> <li>•TC 17/SC 8 “Measuring Instruments for Protein Determination in Grains”</li> </ul>
Mr. Ralph Richter (ILMG) (301) 975-3997 ralph.richter@nist.gov	<ul style="list-style-type: none"> <li>•D 11 “General Requirements for Electronic Measuring Instruments”</li> <li>•R 35 “Material Measures of Length for General Use”</li> <li>•R 49 “Water Meters” (Cold Potable Water &amp; Hot Water Meters)</li> <li>•R 71 “Fixed Storage Tanks”</li> <li>•R 80 “Road and Rail Tankers” (static measurement)</li> <li>•R 85 “Automatic Level Gauges for Measuring the Level of Liquid in Fixed Storage Tanks”</li> <li>•R 95 “Ship’s Tanks”</li> <li>•R 117 “Measuring Systems for Liquids Other Than Water” (all measuring technologies)</li> <li>•R 118 “Testing Procedures and Test Report Format for Pattern Examination of Fuel Dispensers for Motor Vehicles”</li> <li>•TC 3/SC 4 “Verification Period of Utility Meters Using Sampling Inspections”</li> <li>•R 137 “Gas Meters” (all measuring technologies)</li> <li>•R 140 “Measuring Systems for Gaseous Fuel” (i.e., large pipelines)</li> <li>•ISO TC 30/SC 7 “Water Meters”</li> </ul>
Dr. Ambler Thompson (ILMG) (301) 975-2333 ambler@nist.gov	<ul style="list-style-type: none"> <li>•D 11 “General Requirements for Electronic Measuring Instruments”</li> <li>•D 16 “Principles of Assurance of Metrological Control”</li> <li>•D 19 “Pattern Evaluation and Pattern Approval”</li> <li>•D 20 “Initial and Subsequent Verification of Measuring Instruments and Processes”</li> <li>•D 27 “Initial Verification of Measuring Instruments Using the Manufacturer’s Quality Management System”</li> <li>•D 31 “General requirements for software controlled measuring instruments”</li> <li>•R 34 “Accuracy Classes of Measuring Instruments”</li> <li>•R 46 “Active Electrical Energy Meters for Direct Connection of Class 2”</li> </ul>

<b>NIST Weights and Measures Division (WMD) Contact List for International Activities</b>			
<b>Contact Information</b>		<b>Responsibilities</b>	
Ms. Juana Williams (LMDG) (301) 975-3989 juana.williams@nist.gov		<ul style="list-style-type: none"> <li>•R 81 “Dynamic Measuring Devices and Systems for Cryogenic Liquids”</li> <li>•R 139 “Compressed Gaseous Fuels Measuring Systems for Vehicles”</li> </ul>	
<b>LIST OF ACRONYMS</b>			
B	Basic Publication	LMDG	Legal Metrology Devices Group
CIML	International Committee of Legal Metrology	P	Project
D	Document	R	Recommendation
ILMG	International Legal Metrology Group	SC	Subcommittee
LMG	Laws and Metrics Group	TC	Technical Committee

The WWMA and the SWMA support these issues and the related device activities as an Information item.

### **360-3 D Developing Items**

The NCWM established a category of items called Developing items as a mechanism to share information about emerging issues which have merit and are of national interest, but have not received sufficient review by all parties affected by the proposal or that may be insufficiently developed to warrant review by the Committee. The items in this section have been designated as Developing items by the submitter and/or the Committee based on an assessment of their relative stage of development. The Developing items are currently under review by at least one regional association, technical committee, or organization.

Developing items are listed in Appendix C according to the specific HB 44 code section under which they fall (e.g., a scale-related item appears in part 2.20 which corresponds to NIST HB 44 Section 2.20 Scales Code). Periodically, a proposal will be removed from the Developing item agenda without further action because the submitter recommends it be Withdrawn. Any remaining proposals will be renumbered accordingly.

The Committee encourages interested parties to examine the proposals included in Appendix C and send their comments to the contact listed in each item. The Committee asks that the regional associations and NTETC sectors continue their work to develop each proposal fully. Should an Association or Sector decide to discontinue work on an item, the Committee asks that it be notified.

In future Committee reports, the Committee plans to include only a brief summary and point of contact for each Developing item in this section and will post any additional details on the item on the Committee’s web page on the NCWM web site.

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Mr. Brett Saum, San Luis Obispo County, California, Chairman

Mr. Steve Giguere, Maine

Mr. Kenneth Ramsburg, Maryland

Mr. Paul Moyer, Nebraska

Mr. Doug Deiman, Alaska

Mr. Ted Kingsbury, Measurement Canada, Technical Advisor

Mr. Steven Cook, NIST, Technical Advisor

Ms. Tina Butcher, NIST, Technical Advisor

### **Specifications and Tolerances Committee**

## Appendix A - Attachments

Letter from Mr. Ed Williams, Director, California Department of Agriculture Division of Measurement Standards, submitted to the 2009 WWMA Annual Meeting (see NCWM 2010 Interim Agenda Item 336-1).

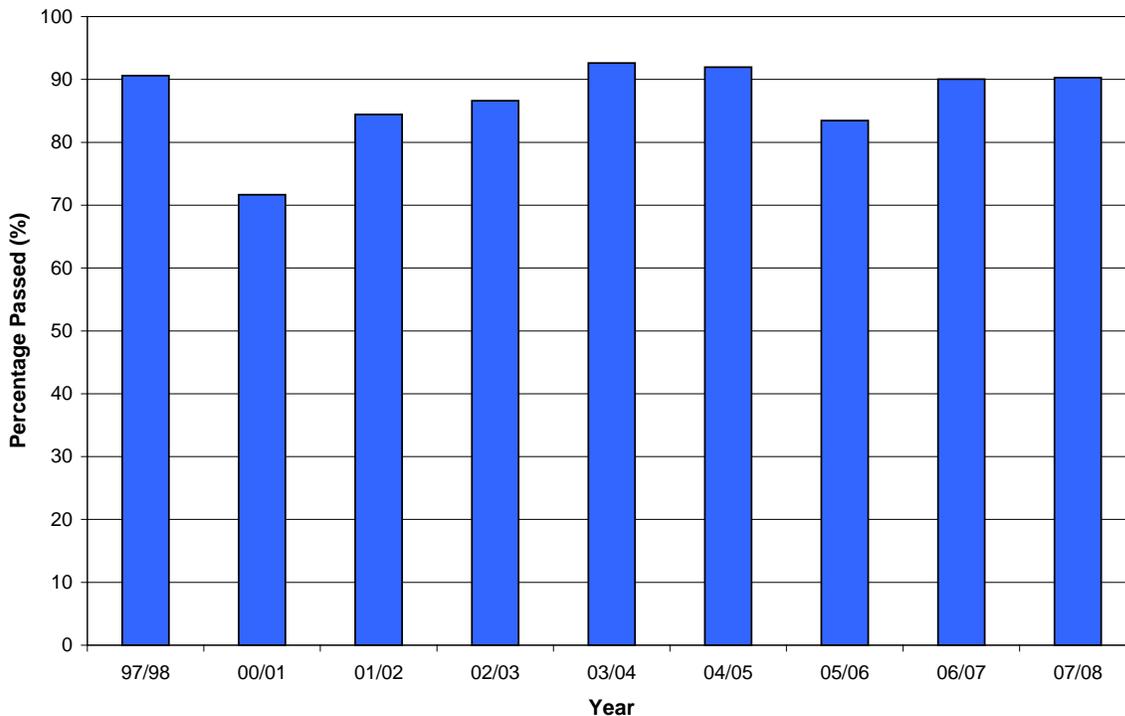
### Water Meter Compliance in California - 1998 to 2008

The compliance rate of water meters submitted for **type evaluation** has risen in the last ten years. Before the repeatability requirements were added to Handbook 44 in 2003 the percentage of devices passing evaluation was 60%. After this date the percentage rose to 66%, with only one failure for repeatability alone. Of the five meter manufacturers submitting proposals and claiming high failure rates, two have not submitted meters for testing since the introduction of the repeatability requirements.

Compliance of water meters submitted to **county** officials has been comparatively high. In 1997/98 the compliance rate was 90% however in 2000/2001 this dropped to the low 70% presumably because one meter manufacturer was not submitting complete meters; registers only were submitted and county officials installed these into a preexisting body. After the manufacturer was instructed to submit only complete meters compliance gradually improved.

Compliance has been above 90% for five of the last ten years

#### County Annual Reports-Water Meter Initial Inspections



#### Type Approval

##### Before Repeatability Requirements

10 applications, 6 certificates issued

Compliance **60 %**

##### After Repeatability Requirements

9 applications, 6 certificates issued

Compliance **66 %**

This does not support the meter manufacturers' claim that they experienced a high failure rate. After the

Letter from Mr. Ed Williams, Director, California Department of Agriculture Division of Measurement Standards, submitted to the 2009 WWMA Annual Meeting (see NCWM 2010 Interim Agenda Item 336-1).

introduction of repeatability requirements compliance actually increased; only one failure was for repeatability alone, the others failed tolerance.

Two of the five meter manufacturers did not submit a meter for testing; they could not have experienced any failure.

### **County Testing**

Five years; 98, 04, 05, 07, and 08 compliance was above **90%**

Three years; 02, 03, and 06 compliance was above **80%**

Only in 01 was compliance in the low **70%**

This does not support the claim of a high rejection rate by county officials

Attachment for S&T Agenda Item 310-4 Remanufactured Devices and Elements  
Letter from Mr. Thomas McGee, President PMP Corporation, submitted to the 2010 NCWM Annual Meeting

PMP CORPORATION

Petroleum Meter & Pump

May 4, 2010

Steve Giguere

Maine Department of Agriculture State House Station 28 Augusta, ME 04333

Dear Steve,

The National conference on Weights and Measures has on its agenda for 2010 a voting item which could have a dramatic effect on the Remanufacturing Industry and on low volume retail fuel outlets. Item 310-4 (See Supplement I) was proposed at the 2009 WNMA and SWMA Regional Meetings but was originally submitted by the NIST office of Weights and Measures. It was based on an inquiry NIST received from a State Director, asking if the Nonretroactive Requirements apply to Remanufactured Devices. It is stated that the change is needed to clarify the application of intent for the Nonretroactive Clause in Handbook 44, G-A.6.

To say that this change is just a clarification is an understatement. It changes the overall interpretation and scope of the Nonretroactive requirement. The change will add requirements to remanufactured devices that were added to the Handbook after the device was originally manufactured. It ultimately could eliminate or severely impact the practice and business of Remanufacturing and of low volume retail fuel outlets.

If you review G-A.6 as it currently reads in the 2010 version of Handbook 44, Nonretroactive Requirements apply to New Devices based on the "Original Manufacturing Date" compared to effective date of a requirement. Adding "Remanufactured" to the requirement will establish a new point in time (Remanufactured Date) to apply requirements. So in short a device originally manufactured in January of 2002 and remanufactured January of 2007 would need to meet all nonretroactive requirements added to the handbook up to and including January of 2007.

A good example of this would be if a Tokheim 1200 series dispenser was removed from the island and remanufactured. Let say the dispenser was disassembled checked for wear and a new mechanical computer and new outer skins were installed. The dispenser was checked for accuracy and everything checked out per handbook 44. Because this dispenser was out of production prior to the adding of the nonretroactive marking requirement specifying that the CC number be clearly marked on the dispenser, it could be rejected by a state and not allowed to be installed. These dispensers are very accurate, and proven to be very reliable and especially suitable for low volume retail outlets in rural areas. There is a vast difference in the cost per gallon for equipment that is passed on to the consumer from a retail location that sells 250,000 gallons per month versus the location that sells 30,000 gallons per month. The same issues apply to scales such as a deli scale that is removed from one grocery store location to the store's shop where it is rebuilt and moved to another grocery store.

As stated in the discussion of the item NIST wants to make a direct comparison between a new device and a remanufactured device indicating they directly compete with each other. This is true as far as competing in the same market as a whole but not if you factor in technology, features, warranty, etc. Some time back the Remanufactured Task Force recognized that Remanufacturing has been going on for a long time and is just part of the business. The remanufactured devices do not directly compete with new devices but they do fill a void. A smaller low volume operation can buy remanufactured devices at a

reduced price which keeps them competitive with the large volume operations. It provides a means to extend the life of equipment that maybe has gone out of production but is still very accurate and reliable.

NIST has also stated they do not want to reopen the whole remanufactured discussion. However to fully understand the ramification of the change and to determine if the change is even needed, one has to go back and review the current handbook requirements, and definitions for remanufactured devices and repaired devices. Simply said there are very subtle differences between the definitions or repaired and remanufactured. More importantly, the handbook under the nonretroactive requirements already defines application for "used" devices which includes remanufactured devices.

This item should be moved back to an informational item or removed for the agenda. If made informational it would give all of those companies that could be impacted by the change to review and comment on this issue. This is not just a clarification. It is clearly a change in the philosophy of applying Nonretroactive Requirements.

Please feel free to contact me at 1 (800) 243-6628 if you have any questions or need further information.

Sincerely,

Thomas McGee  
President

**S&T Agenda Item 310-3: Stakeholders Letter from Graffco**

Letter from Dan Graff, President, Graffco Inc. submitted to the 2010 NCWM Annual Meeting

July 2, 2010

Tina G. Butcher (NIST Tech Advisor)  
NIST, Weights & Measures Division  
100 Bureau Drive, MS 2600  
Gaithersburg, MD 20899-2600

Ms. Butcher:

We write to you as stakeholders in the community that works to recondition-or, as coined in Handbook 44, "remanufacture" - used gas pumps for sale in the United States. It has come to our attention that a provision currently viewed as a "technical correction" is proposed as a voting item at the National Conference of Weights and Measures in July; the item is 310-4 of the 2010 Publication 15, entitled "Nonretroactive Requirements (Remanufactured Equipment)." This "correction," however, could have a major and lasting impact on the market for reconditioned or remanufactured gas pumps and has not been adequately discussed by the Weights and Measures community or by the remanufacturing community.

This letter is to urge you to support moving the 310-4 G-A6 amendment from "voting" to an "informational item," so that a task force, like the Remanufacturing Task Force formed in the early 2000s, can adequately discuss the ramifications of the change and the resulting impact on the process of reconditioning gas pumps.

**S&T Agenda Item 310-3: Stakeholders Letter from Graffco**

Letter from Dan Graff, President, Graffco Inc. submitted to the 2010 NCWM Annual Meeting

We realize that there has been continued debate on how exactly to treat reconditioned or remanufactured gas pumps, and the need for conformity throughout the Weights and Measures community. This item, 310-4, however, is likely to exacerbate the problem and lead to further confusion in the remanufacturing community on the appropriate procedure for compliance with Handbook 44. For this reason, both the Northeast Weights and Measures Association and the Central Weights and Measures Association have recommended that the item be moved to "informational" status at the National conference.

For the last decade, "gas pump remanufacturers," equipment distributors, oil companies, and convenience store operators have been reconditioning gas pumps to meet the specifications of the original Certificate of Compliance (CC). The proposal for revised language in 310-4, however, could be interpreted as requiring these reconditioned gas pumps (and possibly even gas pumps repaired on site, but taken off the island) to be treated as if they were newly manufactured gas pumps. This change would drastically increase the costs associated with reconditioning used gas pumps, and potentially ending the practice in the industry, leaving only new gas pumps available in an already depressed market and used pumps sitting as potential hazards in local landfills.

This change would not only harm those that recondition gas pumps, but also the industries that rely on selling used gas pumps, or retailers that seek access to reconditioned pumps as a way to reduce costs in an economically strained market. This letter has been signed by stakeholders with the hope that this issue can be better discussed if there is no change in July. Item 310-4 needs to remain an informational item.

We appreciate all the work that you do on behalf of the Weights and Measures community and look forward to continued discussion on this topic. Please feel free to contact any of us with questions regarding our position on Item 310-4.

Sincerely,

GRAFFCO, INC.  
Dan Graff President  
13957 Lake Drive Forest Lake,  
MN 55025

651-464-1079

**S&T Agenda Item 310-3: Stakeholders Letter from Graffco**

Letter from Dan Graff, President, Graffco Inc. submitted to the 2010 NCWM Annual Meeting

Letter from Remanufacturing Stakeholders July 2, 2010  
Page 2

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Letter from Remanufacturing Stakeholders July 2, 2010  
Page 3

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Letter from Remanufacturing Stakeholders July 2, 2010  
Page 4

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Attachment for S&T Agenda Item 310-4 Remanufactured Devices and Elements  
Letter from Mr. R. Michael Carlson President, Dresser Wayne North America Dresser, Inc., submitted to the 2010 NCWM Annual Meeting

## DRESSER Wayne

July 7, 2010

Executive Secretary

National Conference on Weights and Measures

National Institute of Standards and Technology 100 Bureau Drive, Stop 2600

Gaithersburg, MD 20899-2600

ATTN: Specifications and Tolerances Committee

RE: Item 310-4. G-A.6. Nonretroactive Requirements (Remanufactured Equipment)

Dear Mr. Saum and the Specifications and Tolerances Committee:

As one of the leading manufacturers of fuel dispensers in the United States, Dresser Wayne takes great care in providing products in which fuel retailers can place their confidence and can rest assured that their equipment will be safe for and fair to the general public. To that end, we put considerable effort into maintaining Certificates of Conformance for each of our dispensers to ensure that they meet all current NTEP requirements. Dresser Wayne understands that changes to the NTEP standards are not arbitrary: they are put into place to meet the changing needs of the marketplace and to help protect consumers and retailers alike.

Under ordinary circumstances, retailers replace their fuel dispensers with new equipment at the end of the normal lifecycle, a practice that helps ensure that their dispensers always meet the most current standards. However, there is a growing trend to extend that lifecycle by refurbishing or "remanufacturing" the equipment after its removal from the original site, and then placing it back into the stream of commerce without first bringing it into compliance with current NTEP standards. This failure to meet applicable NTEP certification standards increases the chances of errors, misuse, and fraud, and puts consumers as well as station owners at risk.

The purpose of the NTEP standards is to promulgate consistency and fairness in the dispensing of fuel to the public. Dresser Wayne believes that those standards should apply equally to every company selling fuel dispensers, whether the equipment is new, used or remanufactured. The current practice of extending the usable life of fuel dispensers without a system of checks and balances to help ensure that, at the time of sale, such used and remanufactured equipment meets current NTEP standards results in inconsistency in the marketplace, and an unacceptable risk of error. All dispenser suppliers should have an obligation to help keep the public protected, and to see to it that customers at the pump are getting exactly what they pay for.

The consistency and accuracy of fuel-dispensing equipment is an issue of critical and growing importance. For decades the industry has been able to safely and reliably operate within a fueling and payment infrastructure that remained relatively stable. However, the last few years have brought significant changes to the marketplace including:

- **Payment security.** Higher fuel prices and sophisticated identity-theft schemes both have exposed dispensing equipment to increasing threats of fraud - manifested by the theft of fuel as well as customers' personal and financial data. As such, the credit card industry has mandated increasingly rigorous payment-security standards, and dispenser manufacturers have enhanced fuel-meter technology and associated electronics to deter tampering with measurement and calibration.
- **Fuel evolution.** The last few years have brought unprecedented changes in the country's fuel supply based on national energy policy and environmental initiatives. The introduction of ultra-low-sulfur diesel (ULSD) and diesel exhaust fluid (DEF) have taxed the capabilities of dispensers' hydraulic systems. In

Attachment for S&T Agenda Item 310-4 Remanufactured Devices and Elements  
Letter from Mr. R. Michael Carlson President, Dresser Wayne North America Dresser, Inc., submitted to the 2010 NCWM Annual Meeting

addition, higher levels of ethanol in today's fuels require specially fabricated seals and components. Manufacturers must adapt quickly and skillfully to these changes, not only to meet environmental standards, but also to maintain the integrity of the metrological function.

- **Communications interface.** Although current dispenser communications are via serial interface, the recent introduction of Ethernet communication to the forecourt portends both the download of dispenser software from remote sources as well as the potential for automatic meter-calibration based on real-time statistical reconciliation. These emerging technological advances may well require updated sealing methods and robust audit requirements achievable only with adherence to the latest industry standards.

It is critical that such developments in a rapidly evolving industry be built upon an infrastructure that does not compromise when it comes to fairness. As such, Dresser Wayne supports maintaining item 301-4 G-A.6 as a voting item at the National Conference of Weights and Measures on July 11-15, 2010. It is in the best interest of the general public, station owners and the fuel-dispensing industry in general.

Sincerely,



R. Michael Carlson  
President, Dresser Wayne North America  
Dresser, Inc.

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Attachment for S&T Agenda Item 321-1 Check for (Belt) Consistency  
Letter from Mr. Bill Ripka, Thermo Fisher Scientific, submitted to the 2010 NCWM Annual Meeting

**ThermoFisher**  
S C I E N T I F I C

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Minneapolis, MN 55433

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www.thermofisher.

Memo to:  
National Conference on Weights and Measures  
Specifications and Tolerances Committee

20 June 2010

A sub-committee of the Belt Conveyor Scale Working Group has held conference calls on over the past several months to discuss NCWM informational item 321-1 regarding the consistency of the conveyor belt.

The existing wording in HB-44 is:

**N.3.1.3. Check for Consistency of the Conveyor Belt Along Its Entire Length. – After a zero load test with flow rate filtering disabled, the totalizer shall not change more than plus or minus (+/- 3d) 3.0 scale divisions from its initial indication during one complete revolution.**

The current proposal (321-1) reads:

**N.3.1.3. Check for Consistency of the Conveyor Belt Along Its Entire Length. – During a zero-load test, the total change indicated in the totalizer during one revolution of the belt shall not exceed 0.18% of the load that would be totalized at scale capacity for the duration of the test. The end value of the zero-load test must meet the +/-0.06% requirement of paragraphs N.3.1.2. Initial Stable Zero and N.3.1.3 Test for Zero Stability.**

The sub-committee has agreed that the final proposal must include reference to disabling the flow rate filtering (low flow cutoff, dead band, flow rate damping, etc.). The committee also has agreed that the allowable error should be based on the maximum load that can be delivered in one revolution of the belt operated at maximum capacity. The effects of significant variations in the belt carcass could effect the delivered load if the delivered load requires less than complete revolutions of the belt (it is uncommon for a load to be equal to an exact belt revolution or multiples thereof). The committee has also agreed that the allowable error should be expressed in percentage, not in scale divisions. We have also noted that it is not necessary to refer to a different paragraph in the handbook, as each section should be capable of being enforced individually.

In order to determine the current % of belt consistency variance, the team has distributed a brief survey to several manufacturers and scale service companies to obtain data on current installations, both commercial and non-commercial use. Use of current conditions in the majority of installations will be used to establish the final proposed allowable consistency variance.

While not yet fully defined, the committee's version of the revised proposal will be similar to:

**N.3.1.4.3. Check for Consistency of the Conveyor Belt Along Its Entire Length. – Prior to performing a materials test, the consistency of the conveyor belt shall be verified as follows:**

- a. Flow rate filtering and no flow cut-off shall be disabled.
- b. The belt shall be marked in order to verify one complete revolution.
- c. Run the empty belt.
- d. The total variance in weight accumulation during one complete revolution of the belt shall not exceed x% (tbd) of the load delivered when operated at maximum capacity for one revolution of the belt.

Attachment for S&T Agenda Item 321-1 Check for (Belt) Consistency

Letter from Mr. Bill Ripka, Thermo Fisher Scientific, submitted to the 2010 NCWM Annual Meeting

**(example: If the capacity is 2500 TPH and 1 belt revolution takes = 260 seconds, the load delivered in one revolution at maximum capacity = 180.55 Tons. The total variance of < 0.12% (total +/- accumulation) cannot exceed 0.216 tons.)**

Based on the progress of the sub-committee, and the pending receipt of actual field information as it relates to belt consistency, the sub-committee of the National Belt Conveyor Scale Working Group requests the National S&T committee to consider moving the Belt Consistency proposal from informational to developing. The sub-committee expects to have data ready for the fall 2010 regional conferences, or if data is slow in being provided, by the NCWM interim meeting in January, 2011.

Respectfully submitted,

Bill Ripka – sub-committee lead

Sub-Committee Members:

Peter Sirrico – Thayer Scale

Phil Carpentier – PTC Consulting

Al Page – independent

James Hale – Southern Company Services

John Barton – NIST

Rick Harshman – NIST

Jim Dietrich – Kaskaskia Valley Scale

## Appendix B

### Item 360-1: New NIST Handbook 44 Section 3.39. Hydrogen Gas-Measuring Devices Code Final

#### Section 3.39. Hydrogen Gas-Measuring Devices – Tentative Code

This tentative code has only a trial or experimental status and is not intended to be enforced. The requirements are designed for study prior to the development and adoption of a final code. Requirements that apply to wholesale applications are under study and development by the U.S. National Work Group for the Development of Commercial Hydrogen Measurement Standards. Officials wanting to conduct an official examination of a device or system are advised to see paragraph G-A.3. Special and Unclassified Equipment.

(Tentative Code Added 2010)

#### A. Application

**A.1. General.** – This code applies to devices that are used for the measurement of hydrogen gas in the vapor state used as a vehicle fuel.

**A.2. Exceptions.** – This code does not apply to:

- (a) Devices used solely for dispensing a product in connection with operations in which the amount dispensed does not affect customer charges.
- (b) The wholesale delivery of hydrogen gas.
- (c) Devices used for dispensing a hydrogen gas with a hydrogen fuel index lower than 99.97 % and concentrations of specified impurities that exceed level limits.
- (d) Systems that measure pressure, volume, and temperature with a calculating device to determine the mass of gas accumulated in or discharged from a tank of known volume.

**A.3. Additional Code Requirements.** – In addition to the requirements of this code, Hydrogen Gas-Measuring Devices shall meet the requirements of Section 1.10. General Code.

**A.4. Type Evaluation.** – The National Type Evaluation Program (NTEP) will accept for type evaluation only those devices that comply with all requirements of this code.

#### S. Specifications

##### S.1. Indicating and Recording Elements.

**S.1.1. Indicating Elements.** – A measuring assembly shall include an indicating element that continuously displays measurement results relative to quantity and total price. Indications shall be clear, definite, accurate, and easily read under normal conditions of operation of the device.

**S.1.2. Vehicle Fuel Dispensers.** – A hydrogen gas dispenser used to fuel vehicles shall be of the computing type and shall indicate the mass, the unit price, and the total price of each delivery.

**S.1.3. Units.**

**S.1.3.1. Units of Measurement.** – Deliveries shall be indicated and recorded in kilograms and decimal subdivisions thereof.

**S.1.3.2. Numerical Value of Quantity-Value Divisions.** – The value of an interval (i.e., increment or scale division) shall be equal to:

~~(a) 1, 2, or 5; or~~

(b) a decimal multiple of submultiple of 1, 2, or 5.

Examples: quantity-value divisions may be 10, 20, 50, 100; or 0.01, 0.02, 0.05; or 0.1, 0.2, or 0.5 etc.

**S.1.3.3. Maximum Value of Quantity-Value Divisions.** – The maximum value of the quantity-value division shall be not greater than 0.5% of the minimum measured quantity.

**S.1.3.4. Values Defined.** – Indicated values shall be adequately defined by a sufficient number of figures, words, symbols, or combinations thereof. A display of “zero” shall be a zero digit for all displayed digits to the right of the decimal mark and at least one to the left.

**S.1.4. Value of Smallest Unit.** – The value of the smallest unit of indicated delivery, and recorded delivery if the device is equipped to record, shall not exceed the equivalent of:

(a) 0.001 kg on devices with a marked maximum flow rated of 30 kg/min or less; or

(b) 0.01 kg on devices with a marked maximum flow rate of more than 30 kg/min.

## **S.2. Operating Requirements.**

### **S.2.1. Return to Zero.**

(a) The primary indicating and the primary recording elements, if the device is equipped to record, shall be provided with a means for readily returning the indication to zero either automatically or manually.

(b) It shall not be possible to return primary indicating elements, or primary recording elements, beyond the correct zero position.

**S.2.2. Indicator Reset Mechanism.** – The reset mechanism for the indicating element shall not be operable during a delivery. Once the zeroing operation has begun, it shall not be possible to indicate a value other than the latest measurement, or “zeros” when the zeroing operation has been completed.

### **S.2.3. Provision for Power Loss.**

**S.2.3.1. Transaction Information.** – In the event of a power loss, the information needed to complete any transaction in progress at the time of the power loss (such as the quantity and unit price, or sales price) shall be determinable for at least 15 minutes at the dispenser or at the console if the console is accessible to the customer.

**S.2.3.2. User Information.** – The device memory shall retain information on the quantity of fuel dispensed and the sales price totals during power loss.

### **S.2.4. Display of Unit Price and Product Identity.**

**S.2.4.1. Unit Price.** – A computing or money-operated device shall be able to display on each face the unit price at which the device is set to compute or to dispense.

**S.2.4.2. Product Identity.** – A device shall be able to conspicuously display on each side the identity of the product being dispensed.

**S.2.4.3. Selection of Unit Price.** – When a product is offered for sale at more than one unit price through a computing device, the selection of the unit price shall be made prior to delivery using controls on the device or other customer-activated controls. A system shall not permit a change to the unit price during delivery of a product.

**S.2.4.4. Agreement Between Indications.** – All quantity, unit price, and total price indications within a measuring system shall agree for each transaction.

**S.2.5. Money-Value Computations.** – A computing device shall compute the total sales price at any single-purchase unit price 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.

**S.2.5.1. Auxiliary Elements.** – If a system is equipped with auxiliary indications, all indicated money value and quantity divisions of the auxiliary element shall be identical with those of the primary element.

**S.2.5.2. Display of Quantity and Total Price.** – When a delivery is completed, the total price and quantity for that transaction shall be displayed on the face of the dispenser for at least 5 minutes or until the next transaction is initiated by using controls on the device or other user-activated controls.

**S.2.6. Recorded Representations, Point of Sale Systems.** – A printed receipt shall be available through a built-in or separate recording element for transactions conducted with point-of-sale systems or devices activated by debit cards, credit cards, and/or cash. The printed receipt shall contain the following information for products delivered by the dispenser:

- (a) the total mass of the delivery;
- (b) the unit price;
- (c) the total computed price; and
- (d) the product identity by name, symbol, abbreviation, or code number.

**S.2.7. Indication of Delivery.** – The device shall automatically show on its face the initial zero condition and the quantity delivered (up to the nominal capacity).

### **S.3. Design of Measuring Elements and Measuring Systems.**

**S.3.1. Maximum and Minimum Flow-Rates.** – The ratio of the maximum to minimum flow-rates specified by the manufacturer for devices measuring gases shall be 10:1 or greater.

**S.3.2. Adjustment Means.** – An assembly shall be provided with means to change the ratio between the indicated quantity and the quantity of gas measured by the assembly. A bypass on the measuring assembly shall not be used for these means.

**S.3.2.1. Discontinuous Adjusting Means.** – When the adjusting means changes ratio between the indicated quantity and the quantity of measured gas in a discontinuous manner, the consecutive values of the ratio shall not differ by more than 0.1 %.

**S.3.3. Provision for Sealing.** – Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that no adjustment may be made of:

- (a) each individual measurement element;
- (b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries;
- (c) the zero adjustment mechanism; and
- (d) any metrological parameter that detrimentally affects the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal. Audit trails shall use the format set forth in Table S.3.3. Categories of Device and Methods of Sealing.

<b>Table S.3.3. Categories of Device and Methods of Sealing</b>	
<b>Categories of Device</b>	<b>Method of Sealing</b>
<p><b>Category 1:</b> No remote configuration capability.</p>	<p>Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.</p>
<p><b>Category 2:</b> Remote configuration capability, but access is controlled by physical hardware.</p> <p>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</p>	<p>The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are located in the system controller rather than at the individual device, means must be provided to generate a hard copy of the information through an on-site device.</p>
<p><b>Category 3:</b> Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</p> <p>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</p>	<p>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1000 records are required. (<b>Note:</b> Does not require 1000 changes to be stored for each parameter.)</p>

**S.3.4. Automatic Density Correction.**

- (a) An automatic means to determine and correct for changes in product density shall be incorporated in any hydrogen gas-measuring system where measurements are affected by changes in the density of the product being measured.
- (b) Volume-measuring devices with automatic temperature compensation used to measure hydrogen gas as a vehicle fuel shall be equipped with an automatic means to determine and correct for changes in product density due to changes in the temperature, pressure, and composition of the product.

**S.3.5. Pressurizing the Discharge Hose.** – The discharge hose for hydrogen gas shall automatically pressurize to a pressure equal to or greater than the receiving vessel prior to the device beginning to register the delivery. The indications shall not advance as a result of the initial pressurization or the purging/bleeding of the discharge hose.

**S.3.6. Zero-Set-Back Interlock, Retail Vehicle Fuel Devices.**

- (a) A device shall be constructed so that:
  - (1) when the device is shut-off at the end of a delivery an automatic interlock prevents a subsequent delivery until the indicating element and recording elements, if the device is equipped and activated to record, have been returned to their zero positions; and
  - (2) it shall not be possible to return the discharge nozzle to its start position unless the zero set back interlock is engaged or becomes engaged.
- (b) For systems with more than one:
  - (1) dispenser supplied by a single measuring element, an effective automatic control valve in each dispenser prevents product from being delivered until the indicating elements on that dispenser are in a correct zero position; or
  - (2) hose supplied by a single measuring element, effective automatic means must be provided to prevent product from being delivered until the indicating element(s) corresponding to each hose are in a correct zero position.

#### **S.4. Discharge Lines and Valves.**

**S.4.1. Diversion of Measured Product.** – No means shall be provided by which any measured product can be diverted from the measuring device.

**S.4.2. Directional Flow Valves.** – If a reversal of flow could result in errors that exceed the tolerance for the minimum measured quantity, a valve or valves or other effective means, automatic in operation (and equipped with a pressure limiting device, if necessary) to prevent the reversal of flow shall be properly installed in the system. (See N.1. Minimum Measured Quantity)

**S.4.3. Other Valves.** – Check valves and closing mechanisms that are not used to define the measured quantity shall have relief valves (if necessary) to dissipate any abnormally high pressure that may arise in the measuring assembly.

**S.5. Markings.** – A measuring system shall be conspicuously, legibly, and indelibly marked with the following information:

- (a) pattern approval mark (i.e., type approval number);
- (b) name and address of the manufacturer or his trademark and, if required by the weights and measures authority, the manufacturer's identification mark in addition to the trademark;
- (c) model designation or product name selected by the manufacturer;
- (d) nonrepetitive serial number;
- (e) the accuracy class of the device as specified by the manufacturer consistent with Table T.2. Accuracy Classes and Tolerances for Hydrogen-Gas Measuring Devices;
- (f) maximum and minimum flow rates in kilograms per unit of time;
- (g) maximum working pressure;
- (h) applicable range of ambient temperature if other than  $-10\text{ }^{\circ}\text{C}$  to  $+50\text{ }^{\circ}\text{C}$ ;
- (i) minimum measured quantity; and

(j) product limitations (such as fuel quality), if applicable.

**S.5.1. Location of Marking Information; Hydrogen-Fuel Dispensers.** – The marking information required in General Code, paragraph G S.1. Identification shall appear as follows:

- (a) within 60 cm (24 in) to 150 cm (60 in) from the base of the dispenser;
- (b) either internally and/or externally provided the information is permanent and easily read; and accessible for inspection; and
- (c) on a portion of the device that cannot be readily removed or interchanged (i.e., not on a service access panel).

**Note:** The use of a dispenser key or tool to access internal marking information is permitted for retail hydrogen-measuring devices.

**S.6. Printer.** – When an assembly is equipped with means for printing the measured quantity, the printed information must agree with the indications on the dispenser for the transaction and the printed values shall be clearly defined.

**S.6.1. Printed Receipt.** – Any delivered, printed quantity shall include an identification number, the time and date, and the name of the seller. This information may be printed by the device or pre-printed on the ticket.

**S.7. Totalizers for Vehicle Fuel Dispensers.** – Vehicle fuel dispensers shall be equipped with a nonresettable totalizer for the quantity delivered through each separate measuring device.

**S.8. Minimum Measured Quantity.** – The minimum measured quantity shall satisfy the conditions of use of the measuring system as follows:

- (a) Measuring systems having a maximum flow rate less than or equal to 4 kg/min shall have a minimum measured quantity not exceeding 0.5 kg.
- (b) Measuring systems having a maximum flow rate greater than 4 kg/min but not greater than 12 kg/min shall have a minimum measured quantity not exceeding 1.0 kg.

## **N. Notes**

**N.1. Minimum Measured Quantity.** – The minimum measured quantity shall be specified by the manufacturer.

**N.2. Test Medium.** – The device shall be tested with the product commercially measured except that, in a type evaluation examination, hydrogen gas as specified in NIST Handbook 130 shall be used.

**Note:** Corresponding requirements are under development and this paragraph will be revisited.

**N.3. Test Drafts.** – The minimum test shall be one test draft at the declared minimum measured quantity and one test draft at approximately ten times the minimum measured quantity or 1 kg, whichever is greater. More tests may be performed over the range of normal quantities dispensed. (See T.3. Repeatability)

The test draft shall be made at flows representative of that during normal delivery. The pressure drop between the dispenser and the proving system shall not be greater than that for normal deliveries. The control of the flow (e.g., pipework or valve(s) size, etc.) shall be such that the flow of the measuring system is maintained within the range specified by the manufacturer.

## **N.4. Tests.**

**N.4.1. Master Meter (Transfer) Standard Test.** – When comparing a measuring system with a calibrated transfer standard, the minimum test shall be one test draft at the declared minimum measured quantity and one

test draft at approximately ten times the minimum measured quantity or 1 kg, whichever is greater. More tests may be performed over the range of normal quantities dispensed.

**N.4.1.1. Verification of Master Metering Systems.** – A master metering system used to verify a hydrogen gas-measuring device shall be verified before and after the verification process. A master metering system used to calibrate a hydrogen gas-measuring device shall be verified before starting the calibration and after the calibration process.

**N.4.2. Gravimetric Tests.** – The weight of the test drafts shall be equal to at least the amount delivered by the device at the declared minimum measured quantity and one test draft at approximately ten times the minimum measured quantity or 1 kg, whichever is greater. More tests may be performed over the range of normal quantities dispensed.

**N.4.3. PVT Pressure Volume Temperature Test.** – The minimum test with a calibrated volumetric standard shall be one test draft at the declared minimum measured quantity and one test draft at approximately ten times the minimum measured quantity or 1 kg, whichever is greater. More tests may be performed over the range of normal quantities dispensed.

**N.5. Minimum Measured Quantity.** – The device shall be tested for a delivery equal to the declared minimum measured quantity when the device is likely to be used to make deliveries on the order of the declared minimum measured quantity.

## **N.6. Testing Procedures.**

**N.6.1. General.** – The device or system shall be tested under normal operating conditions of the dispenser.

The test draft shall be made at flows representative of that during normal delivery. The pressure drop between the dispenser and the proving system shall not be greater than that for normal deliveries. The control of the flow (e.g., pipework or valve(s) size, etc.) shall be such that the flow of the measuring system is maintained within the range specified by the manufacturer.

**N.6.1.1. Repeatability Tests.** – Tests for repeatability should include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors are reduced to minimize the effect on the results obtained.

**N.7. Density.** – Temperature and pressure of hydrogen gas shall be measured during the test for the determination of density or volume correction factors when applicable. For the thermophysical properties of hydrogen the following publications shall apply: for density calculations at temperatures above 255 K and pressures up to 120 MPa, a simple relationship may be used that is given in the publication of Lemmon et al., J. Res. NIST, 2008. Calculations for a wider range of conditions and additional thermophysical properties of hydrogen are available free of charge online at the “NIST Chemistry WebBook” <http://webbook.nist.gov/chemistry>, or available for purchase from NIST as the computer program NIST Standard Reference Database 23 “NIST Reference Fluid Thermodynamic and Transport Properties Database (REFPROP): Version 8.0” <http://www.nist.gov/srd/nist23.htm>. These calculations are based on the reference Leachman, J.W., Jacobsen, R.T, Lemmon, E.W., and Penoncello, S.G. “Fundamental Equations of State for Parahydrogen, Normal Hydrogen, and Orthohydrogen” to be published in the Journal of Physical and Chemical Reference Data. More information may be obtained from NIST online at <http://www.boulder.nist.gov/div838/Hydrogen/Index.htm>.

## **T. Tolerances**

### **T.1. Tolerances, General.**

- (a) The tolerances apply equally to errors of underregistration and errors of overregistration.
- (b) The tolerances apply to all products at all temperatures measured at any flow rate within the rated measuring range of the device.

**T.2. Tolerances.** – The tolerances for hydrogen gas measuring devices are listed in Table T.2. Accuracy Classes and Tolerances for Hydrogen Gas-Measuring Devices. (Proposed tolerance values are based on previous work with compressed gas products and will be confirmed based on performance data evaluated by the U.S. National Work Group.)

<b>Table T.2. Accuracy Classes and Tolerances for Hydrogen Gas-Measuring Devices</b>			
<b>Accuracy Class</b>	<b>Application or Commodity Being Measured</b>	<b>Acceptance Tolerance</b>	<b>Maintenance Tolerance</b>
2.0	Hydrogen gas as a vehicle fuel	1.5 %	2.0 %

**T.3. Repeatability.** – When multiple tests are conducted at approximately the same flow rate and draft size, the range of the test results for the flow rate shall not exceed 40 % of the absolute value of the maintenance tolerance and the results of each test shall be within the applicable tolerance. See also N.6.1.1. Repeatability Tests.

**T.4. Tolerance Application on Test Using Transfer Standard Test Method.** – To the basic tolerance values that would otherwise be applied, there shall be added an amount equal to two times the standard deviation of the applicable transfer standard when compared to a basic reference standard.

**T.5. Tolerance Application in Type Evaluation Examinations for Devices.** – For type evaluation examinations, the tolerance values shall apply under the following conditions:

- (a) at any temperature and pressure within the operating range of the device; and
- (b) for all quantities greater than the minimum measured quantity.

**UR. User Requirements**

**UR.1. Selection Requirements.**

**UR.1.1. Computing-Type Device; Retail Dispenser.** – A hydrogen gas dispenser used to refuel vehicles shall be of the computing type and shall indicate the mass, the unit price, and the total price of each delivery.

**UR.1.2. Discharge Hose-Length.** – The length of the discharge hose on a retail fuel dispenser:

- (a) shall not exceed 4.6 m (15 ft) unless it can be demonstrated that a longer hose is essential to permit deliveries to be made to receiving vehicles or vessels;
- (b) shall be measured from its housing or outlet of the discharge line to the inlet of the discharge nozzle; and
- (c) shall be measured with the hose fully extended if it is coiled or otherwise retained or connected inside a housing.

An unnecessarily remote location of a device shall not be accepted as justification for an abnormally long hose.

**UR.1.3. Minimum Measured Quantity.**

- (a) The minimum measured quantity shall be specified by the manufacturer.

- (b) The minimum measured quantity appropriate for a transaction may be specified by the weights and measures authority. A device may have a declared minimum measured quantity smaller than that specified by the weights and measures authority; however, the device must perform within the performance requirements for the declared or specified minimum measured quantity up to deliveries at the maximum measurement range.
- (c) The minimum measured quantity shall satisfy the conditions of use of the measuring system as follows:
  - (1) Measuring systems having a maximum flow rate less than or equal to 4 kg/min shall have a minimum measured quantity not exceeding 0.5 kg.
  - (2) Measuring systems having a maximum flow rate greater than 4 kg/min, but not greater than 12 kg/min shall have a minimum measured quantity not exceeding 1.0 kg.

## **UR.2. Installation Requirements.**

**UR.2.1. Manufacturer's Instructions.** – A device shall be installed in accordance with the manufacturer's instructions, and the installation shall be sufficiently secure and rigid to maintain this condition.

**UR.2.2. Discharge Rate.** – A device shall be installed so that after initial equalization the actual maximum discharge rate will not exceed the rated maximum discharge rate. Automatic means of flow regulation shall be incorporated in the installation if necessary.

**UR.2.3. Low-Flow Cut-Off Valve.** – If a measuring system is equipped with a programmable or adjustable "low-flow cut-off" feature:

- (a) the low-flow cut-off value shall not be set at flow rates lower than the minimum operating flow rate specified by the manufacturer on the measuring device; and
- (b) the system shall be equipped with flow control valves which prevent the flow of product and stop the indicator from registering product flow whenever the product flow rate is less than the low-flow cut-off value.

## **UR.3. Use of Device.**

**UR.3.1. Unit Price and Product Identity for Retail Dispensers.** – The unit price at which the dispenser is set to compute shall be conspicuously displayed or posted on the face of a retail dispenser used in direct sale.

### **UR.3.2. Vehicle-mounted Measuring Systems Ticket Printer.**

**UR.3.2.1. Customer Ticket.** – Vehicle-mounted measuring systems shall be equipped with a ticket printer which shall be used for all sales where product is delivered through the device. A copy of the ticket issued by the device shall be left with the customer at the time of delivery or as otherwise specified by the customer.

**UR.3.2.2. Ticket in Printing Device.** – A ticket shall not be inserted into a device equipped with a ticket printer until immediately before a delivery is begun, and in no case shall a ticket be in the device when the vehicle is in motion while on a public street, highway, or thoroughfare.

**UR.3.3. Printed Ticket.** – The total price, the total quantity of the delivery, and the price per unit shall be printed on any ticket issued by a device of the computing type and containing any one of these values.

**UR.3.4. Steps After Dispensing.** – After delivery to a customer from a retail dispenser:

- (a) the device shall be shut-off at the end of a delivery, through an automatic interlock that prevents a subsequent delivery until the indicating elements and recording elements, if the device is equipped and activated to record, have been returned to their zero positions; and
- (b) the discharge nozzle shall not be returned to its start position unless the zero set-back interlock is engaged or becomes engaged by the act of disconnecting the nozzle or the act of returning the discharge nozzle.

**UR.3.5. Return of Indicating and Recording Elements to Zero.** – The primary indicating elements (visual), and the primary recording elements shall be returned to zero immediately before each delivery.

**UR.3.6. Return of Product to Storage, Retail Hydrogen Gas Dispensers.** – Provisions at the site shall be made for returning product to storage or disposing of the product in a safe and timely manner during or following testing operations. Such provisions may include return lines, or cylinders adequate in size and number to permit this procedure.

**UR.3.7. Conversion Factors.** – Established correction values (see references in N.7. Density.) shall be used whenever measured hydrogen gas is billed. All sales shall be based on kilograms.

#### Appendix D. Definitions

The specific code to which the definition applies is shown in [brackets] at the end of the definition. Definitions for the General Code [1.10] apply to all codes in Handbook 44.

#### A

**audit trail.** – An electronic count and/or information record of the changes to the values of the calibration or configuration parameters of a device.[1.10, 2.20, 2.21, 2.24, 3.30, 3.37, 3.39, 5.56(a)]

**automatic temperature or density compensation.** – The use of integrated or ancillary equipment to obtain from the output of a volumetric meter an equivalent mass, or an equivalent liquid volume at the assigned reference temperature below and a pressure of 14.696 lb/in<sup>2</sup> absolute.

Cryogenic liquids	21 °C (70 °F) [3.34]
Hydrocarbon gas vapor	15 °C (60 °F) [3.33]
Hydrogen gas	21 °C (70 °F) [3.39]
Liquid carbon dioxide	21 °C (70 °F) [3.38]
Liquefied petroleum gas (LPG) and Anhydrous ammonia	15 °C (60 °F) [3.32]
Petroleum liquid fuels and lubricants	15 °C (60 °F) [3.30]

#### C

**calibration parameter.** – Any adjustable parameter that can affect measurement or performance accuracy and, due to its nature, needs to be updated on an ongoing basis to maintain device accuracy (e.g., span adjustments, linearization factors, and coarse zero adjustments).[2.20, 2.21, 2.24, 3.30, 3.37, 3.39, 5.56(a)]

#### D

**discharge hose.** – A flexible hose connected to the discharge outlet of a measuring device or its discharge line.[3.30, 3.31, 3.32, 3.34, 3.37, 3.38, 3.39]

**discharge line.** – A rigid pipe connected to the outlet of a measuring device.[3.30, 3.31, 3.32, 3.34, 3.37, 3.39]

#### E

**event counter.** – A nonresettable counter that increments once each time the mode that permits changes to sealable parameters is entered and one or more changes are made to sealable calibration or configuration parameters of a device.[2.20, 2.21, 3.30, 3.37, 3.39, 5.54, 5.56(a), 5.56(b), 5.57]

**event logger.** – A form of audit trail containing a series of records where each record contains the number from the event counter corresponding to the change to a sealable parameter, the identification of the parameter that was changed, the time and date when the parameter was changed, and the new value of the parameter.[2.20, 2.21, 3.30, 3.37, 3.39, 5.54, 5.56(a), 5.56(b), 5.57]

## I

**indicating element.** – An element incorporated in a weighing or measuring device by means of which its performance relative to quantity or money value is "read" from the device itself as, for example, an index-and-graduated-scale combination, a weighbeam-and-poise combination, a digital indicator, and the like. (Also see "primary indicating or recording element.") [1.10]

## M

**minimum measured quantity (MMQ).** – The smallest quantity delivered for which the measurement is to within the applicable tolerances for that system.[3.37, 3.39]

## N

**nonresettable totalizer.** – An element interfaced with the measuring or weighing element that indicates the cumulative registration of the measured quantity with no means to return to zero.[3.30, 3.37, 3.39]

## P

**point-of-sale system.** – An assembly of elements including a weighing or measuring element, an indicating element, and a recording element (and may also be equipped with a "scanner") used to complete a direct sales transaction.[2.20, 3.30, 3.32, 3.37, 3.39]

## R

**remote configuration capability.** – The ability to adjust a weighing or measuring device or change its sealable parameters from or through some other device that is not itself necessary to the operation of the weighing or measuring device or is not a permanent part of that device.[2.20, 2.21, 2.24, 3.30, 3.37, 3.39, 5.56(a)]

**retail device.** – A measuring device primarily used to measure product for the purpose of sale to the end user.[3.30, 3.32, 3.37, 3.39]

## W

**wet hose.** – A discharge hose intended to be full of product at all times. (See "wet-hose type.") [3.30, 3.31, 3.38, 3.39]

**wet-hose type.** – A type of device designed to be operated with the discharge hose full of product at all times. (See "wet hose.") [3.30, 3.32, 3.34, 3.37, 3.38, 3.39]

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## Appendix C

### Item 360-3: Developing Items

In future Committee reports, the Committee plans to include only a brief summary and point of contact for each Developing item in this section and will post any additional details on the item on the Committee's web page on the NCWM web site.

#### **Part 3.30, Liquid-Measuring Devices - Item 1: Price Posting and Computing Capability and Requirements for a Retail Motor-Fuel Dispenser (RMFD)**

**Source:** 2009 Carryover Item 330-3. This item originated from WMD and the regional associations and first appeared on the Committee's 2007 agenda.

**Purpose:** To review and update criteria in the LMD Code related to price posting and computing capability on RMFDs to reflect current market practices.

**Item Under Consideration:** The Committee was asked to consider a proposal to make modifications to Section 3.30. Liquid-Measuring Devices (LMD) Code to address price posting and computing capability for retail motor-fuel dispensers. Full details of the recommendation are found in the Committee's 2009 Interim and Final Reports. The Committee believes that changes are needed to the LMD Code; however, based on comments received it does not believe these proposed changes adequately address people's concerns.

#### **Key Points:**

- Current LMD Code requirements relative to unit price posting and selection and total price computation were developed to address marketing practices in place in the early 1990s; primarily cash/credit/debit forms of payment.
- Marketing practices have changed since the 1990s, and the LMD Code does not adequately address these changes with regard to the display, posting, and selection of unit price information or total price information at various points in a transaction.
- There appears to be general agreement in the Weights and Measures community that changes are needed to the LMD Code in HB 44 to better reflect current market practices.
- Comments indicate the current proposal being considered by the Committee does not adequately address concerns, particularly on the parts of Weights and Measures officials.
- Weights and Measures officials are concerned that customers be given adequate information at all points of the transaction, not just at the end.
- Regional Weights and Measures associations and industry comments indicate support for a work group to further develop this issue.
- The S&T agreed to establish a work group to further develop this issue and present an alternative recommendation for the S&T to consider.

**Background/Discussion:** In the early 1990s, various sections of the Liquid-Measuring Devices Code in HB 44 (including paragraphs S.1.6.4. Display of Unit Price and Product Identity, S.1.6.5.4. Selection of Unit Price, UR.3.2. Unit Price and Product Identity, and UR.3.3. Computing Device) were modified to address multi-tier pricing applications, such as cash or credit in instances where the same product is offered at different unit prices based on the method of payment or other conditions of the sale. Since that time, marketing practices have evolved to include the addition of new practices, such as frequent shopper discounts and club member discounts. Numerous questions have been posed to WMD and Weights and Measures officials regarding the requirements for posting unit prices,

calculation of total price, customer-operated controls, and other related topics, such as the definitions for associated terminology.

It is clear from these questions that changes are needed to HB 44 to ensure the requirements adequately address current marketplace conditions and practices. WMD has raised this issue with the Committee, and has also discussed a variety of pricing practices with individual state and local Weights and Measures jurisdictions.

The WMD reviewed the existing requirements and their application to current market practices and collected information on a number of scenarios, including the following:

- |  |  |
|--|--|
| (1) Frequent shopper discounts   | (8) Full service   |
| (2) Club member discounts  | (9) Self service   |
| (3) Discount for prepaying cash (to prevent “drive-offs”)                    | (10) Progressive discounts based on volume of motor-fuel purchased |
| (4) Prepay at the cashier for credit sales                                   | (11) Coupons for discounts on immediate or future purchases        |
| (5) Discounts for purchasing store products                                  | (12) Rebates (e.g., use of oil company credit card)                |
| (6) Discounts for purchasing a service (e.g., carwash)                       | (13) Day of the week discounts                                     |
| (7) Targeted group discounts (e.g., Tuesday – ladies 5 cents off per gallon) |  |

**Note:** The conditions under some of these scenarios may not typically fall under the authority of Weights and Measures jurisdictions.

The WMD expressed an interest in receiving input from the Weights and Measures community about the various practices and pricing structures in use, and indicated it welcomed opportunities to discuss this item at regional Weights and Measures associations to ensure the item is adequately addressed.

The regional Weights and Measures associations agreed that changes are needed and encouraged WMD to continue development of the issue. At the 2008 NCWM Interim Meeting, Ohio Weights and Measures submitted a proposal to modify various sections of the LMD Code to the Committee. With a specific proposal to consider, the Committee elevated the item to an Information status for further review and input.

In 2008 and 2009, the Committee heard comments from all of the regional Weights and Measures associations (including the CWMA), industry, and individual NCWM members that, while changes are needed to the LMD Code, the changes proposed through the CWMA do not meet the needs of the marketplace (see the Committee’s 2008 and 2009 Final Reports for details of specific concerns). A key concern raised by Weights and Measures officials was the importance for consumers to have full information about the purchase price of the product before they dispense the fuel and to be able to follow all aspects of the transaction.

The CWMA recommended establishment of a small work group to further develop the issue and encouraged consideration of points such as the following:

1. discounts calculated at the pump and others at the counter;
2. level of consumer responsibility;
3. can the dispensers do tier pricing;
4. competitors complaining about non-uniformity of enforcement;
5. discounts should be done electronically; and
6. all is okay as long as the receipt explains the transaction.

NIST WMD agreed to form a small work group to further study this issue and held an initial meeting of interested parties in July 2008. A reduction of staff at NIST prevented subsequent work on this issue. The S&T Committee

continued to hear requests from the regional associations and industry regarding the importance that this work be continued and urging that NIST allocate resources to the project. Mr. John Eichberger, National Association of Convenience Stores, offered to coordinate assistance from some of the association's interested members at the point where work would resume. See the Committee's 2008 and 2009 Final Reports for additional details on this effort.

At its fall 2009 meeting, the CWMA recommended that this remain an Information item and urged resources be committed to its further development. The CWMA members commented that price posting continues to be a problem, noting that the current language in NIST HB 44 does not reflect current market practices and the language needs to be either fixed or removed from the Handbook. The CWMA also requested that the NCWM sponsor a WG to address this issue.

At its fall 2009 meeting, NEWMA agreed that this is a priority item and wants to encourage the formation of a WG as soon as possible. NEWMA further noted comments heard during its meeting:

- As long as terms and conditions are made clear prior to sale, the transaction should be allowed.
- Businesses should purchase the correct equipment (according to HB 44) for their marketing strategy.
- This item needs to move forward as a priority.
- We need to find some remedy for businesses that have older equipment.
- It is very difficult to take a hard line (follow HB 44 exactly) on this item.
- We must enforce equally and provide a level playing field.
- HB 44 is antiquated and should be revised.

At its fall 2009 meeting, the SWMA recommended that NIST WMD resume working on this proposal as soon as resources are available. NIST should include Mr. Eichberger and other sectors that are interested in the work and any stakeholders impacted by proposals to modify the LMD code relative to price posting and computing for RMFDs.

Prior to the 2010 Interim Meeting, NIST reallocated additional resources to work on this issue and announced that Ms. Williams, NIST WMD, would lead the effort to renew the work group. Working in collaboration with the S&T Committee, Ms. Williams held an informal meeting during the 2010 Interim Meeting to allow interested parties to further discuss the issue, share thoughts about next steps, and indicate interest in participating in the work group. That meeting was well attended with 29 NCWM members participating and a number of useful comments were made. Prior to the open hearings, Ms. Williams gave the Committee an overview of the informal meeting and an update on the plan to renew the work group.

At its open hearings, the S&T Committee received positive comments regarding NIST's reallocation of resources to this project and agreed that reviewing and revising current requirements is important. The Committee continues to strongly support the intent of the proposal and recognizes that significant additional development is needed. The Committee believes that this can best be done through an S&T WG, and decided to give this item Developing status until the WG develops a proposal for consideration by the Conference. After collaborating with NCWM Chairman, Randy Jennings, the Committee Chair indicated that the work group should be chaired by an NCWM voting member under the technical direction of NIST. The Committee asks that Ms. Williams collaborate with the Chair regarding possible candidates for the chair based on those who have indicated an interest in serving on the WG. The Committee asks that the WG provide frequent updates on its progress to the Committee and to the regional Weights and Measures associations. The Committee also asks that the WG communicate a work plan and time line after its first official meeting.

Anyone interested in participating in this work group or with questions about this issue is asked to contact NIST WMD Technical Advisor Ms. Juana Williams by e-mail at [juana.williams@nist.gov](mailto:juana.williams@nist.gov), by telephone at (301) 975-3989, or in writing at NIST 100 Bureau Drive, Stop 2600, Gaithersburg, MD 20899-2600.

The Retail Motor-Fuel Dispenser Price Posting and Computing Capability USN WG wishes to express its thanks to its sponsor the NCWM S&T Committee and also to NCWM members for their contributions to the meeting discussions at the 2010 NCWM Annual Meeting.

The WG offered this abbreviated summary on the direction it will take, based on the task it was given by the S&T Committee and input received at the meeting. The WG is tasked with reviewing the current NIST Handbook 44 Section 3.30 Liquid Measuring Devices Code to determine if the code requirements address rapidly changing practices for marketing retail motor-fuels to the general public. The WG is also tasked with developing proposals for modifying those codes that need changing and preparing them for a review by the S&T Committee.

The WG has laid out several next steps to establish a work plan to achieve this goal:

- (1) The WG will work using a teleconference and web conference meeting format to maximize its resources. The WG has a 1.5 hour meeting tentatively scheduled for mid August 2010 to begin its development of the work plan;
- (2) The WG will establish a tentative timeline for completing this task and will submit that timeline by e-mail to the S&T Committee for its consideration to determine if that time frame meets with the approval of the Committee;
- (3) To better manage this task and ensure input from all groups of stakeholders affected by these marketing practices the Work Group will consist of approximately 12 to 15 individuals who represent at least each of the following organizations/agencies/associations:

CWMA	API
NEWMA	Convenience Store Associations
SWMA	Petroleum Marketers Associations
WWMA	RMFD Manufacturers
Consumer Groups	

The WG is seeking input from any stakeholders that might have been overlooked and should be part of this effort. The Work Group will contact representatives from each group who expressed interest in the work to fill the positions on the WG.

The WG is also seeking additional information to ensure that it does not reinvent code that already works to address marketing practices. Therefore, the WG requests copies of any recent legislation or policies enacted to address these marketing scenarios be forwarded to its Chair by August 31, 2010. The WG wishes to examine various examples of marketing practices to establish some general categories for classifying these marketing practices and analyzing if a practice is adequately addressed by any codes it might develop. The WG will develop a form for stakeholders to provide information on marketing practices they regularly encounter which are either 1) not addressed in the code; 2) result in non-uniform interpretation of the application of code sections; or 3) are difficult to enforce because of conflicting codes that apply to the equipment's design and use.

**Part 3.31, Vehicle-Tank Meters - Item 1: T.4. Product Depletion Test**

**Source:** Northeast Weights and Measures Association (NEWMA)

**Purpose:** Modify the VTM code to base the product depletion test tolerances on the meter’s maximum flow rate (a required marking on all meters), rather than the meter size. This will enable more consistent application of the tolerances for older meters, which are not required to be marked with the meter size, and address an unintentional gap which allows an unreasonably large tolerance for smaller meters.

**Item Under Consideration:** Amend paragraph T.4. as follows:

**T.4. Product Depletion Test.** – The difference between the test result for any normal test and the product depletion test shall not exceed one-half (0.5 %) percent of the volume delivered in one minute at the maximum flow rate marked on the meter. Tolerances for typical meters are tolerance–shown in Table T.4. Test drafts shall be of the same size and run at approximately the same flow rate.

[**Note:** The result of the product depletion test may fall outside of the applicable test tolerance as specified in Table 1.]

<b>Table T.4. Tolerances for <u>Typical Vehicle-Tank Meter</u>son Product Depletion Tests, Except Milk Meters <u>Refer to T.4. for meters with maximum flow rates not listed.</u></b>	
<b>Meter-Size <u>Maximum Flow Rate</u></b>	<b>Maintenance and Acceptance Tolerances</b>
<b>Up to, but not including, 50 mm (2 in) <u>114 Lpm (30 gpm)</u></b>	<b><u>1.70 L (104 in<sup>3</sup>)<sup>1</sup></u> <u>0.57 L (0.15 gal) (34.6 in<sup>3</sup>)<sup>1</sup></u></b>
<b>From 50 mm (2 in) up to, but not including, 75 mm (3 in) <u>225 Lpm (60 gpm)</u></b>	<b><u>2.25 L (137 in<sup>3</sup>)<sup>1</sup></u> <u>1.1 L (0.30 gal) (69.3 in<sup>3</sup>)<sup>1</sup></u></b>
<b>75 mm (3 in) or larger <u>378 Lpm (100 gpm)</u></b>	<b><u>3.75 L (229 in<sup>3</sup>)<sup>1</sup></u> <u>1.9 L (0.5 gal) (115 in<sup>3</sup>)<sup>1</sup></u></b>
<b><u>758 Lpm (200 gpm)</u></b>	<b><u>3.8 L (1.0 gal) (231 in<sup>3</sup>)<sup>1</sup></u></b>

<sup>1</sup> Based on a test volume of at least the amount specified in N.3.

(Table Added 2005) (Amended 201X)

Alternative language for T.4. with larger tolerance for smaller meters.

**T.4. Product Depletion Test.** – The difference between the test result for any normal test and the product depletion test shall not exceed one-half (0.5 %) percent of the volume delivered in one minute at the maximum flow rate marked on the meter for meters rated higher than 378 Lpm (100 gpm), or six-tenths (0.6 %) percent of the volume delivered in one minute at the maximum flow rate marked on the meter for meters rated 378 Lpm (100 gpm) or lower. Tolerances for typical meters are tolerance–shown in Table T.4. Test drafts shall be of the same size and run at approximately the same flow rate.

[**Note:** The result of the product depletion test may fall outside of the applicable test tolerance as specified in Table 1.]

<b>Table T.4. Tolerances for <u>Typical</u> Vehicle-Tank Meters on Product Depletion Tests, Except Milk Meters Refer to T.4 for meters with flow rates not listed.</b>	
<b>Meter-Size <u>Maximum Flow Rate</u></b>	<b>Maintenance and Acceptance Tolerances</b>
<b>Up to, but not including, 50 mm (2 in) <u>114 Lpm (30 gpm)</u></b>	<b>1.70 L (104 in<sup>3</sup>)<sup>1</sup> <u>0.57 L (0.18 gal) (41.6 in<sup>3</sup>)<sup>1</sup></u></b>
<b>From 50 mm (2 in) up to, but not including, 75 mm (3 in) <u>225 Lpm (60 gpm)</u></b>	<b>2.25 L (137 in<sup>3</sup>)<sup>1</sup> <u>1.1 L (0.36 gal) (83.2 in<sup>3</sup>)<sup>1</sup></u></b>
<b>75 mm (3 in) or larger <u>378 Lpm (100 gpm)</u></b>	<b>3.75 L (229 in<sup>3</sup>)<sup>1</sup> <u>1.9 L (0.6 gal) (139 in<sup>3</sup>)<sup>1</sup></u></b>
<b><u>758 Lpm (200 gpm)</u></b>	<b><u>3.8 L (1.0 gal) (231 in<sup>3</sup>)<sup>1</sup></u></b>

<sup>1</sup> Based on a test volume of at least the amount specified in N.3.

(Table Added 2005) (Amended 201X)

**Background/Discussion:** This item was submitted to NEWMA at its 2008 Interim Meeting as an alternative to Item 331-1 (S.5.7. Meter Size) in 2008 Publication 16. It would base the tolerances for the product depletion test on a percentage of the maximum flow rate rather than meter size. Justification provided to NEWMA by the submitter is as follows:

The NCWM S&T Committee received a proposal in 2008 to add new marking requirements to provide inspectors with a basis on which to assess tolerances since the meter size in inches is not currently marked on meters used in VTM systems. This solution would add a new marking requirement non-retroactively, which will not solve the problem until the entire fleet of meters presently in use are replaced with new meters. This could take a very long time, since VTMs can see many years of service. In addition, the compromise made when this item originally passed did not address the possibility that smaller meters, (e.g., down to ¼ in) could be mounted on a vehicle and thus, subject to these tolerances. Allowing the smallest current tolerance (104 in<sup>3</sup>) on a ¼ in meter delivering 2 gpm would be 22.5 % relative error for one minute of flow due to air passing through the meter. Even at 20 gpm for a 1 in meter, the relative error only drops to 2.25 %. That seems unconscionable. New York recommends going back to the 0.5 % of 1 minute of flow at the maximum rated flow rate for the meter that was part of the original proposal. The max flow rate must be marked on every meter under current HB 44 requirements, thus, the inspector will have the information necessary to correctly apply the tolerance. It is further recommended that the table provide tolerances for the common meter sizes which will handle most cases encountered in the field (i.e., 1¼-, 1½-, 2- and 3-inch meters with 30, 60, 100 and 200 gpm, respectively).

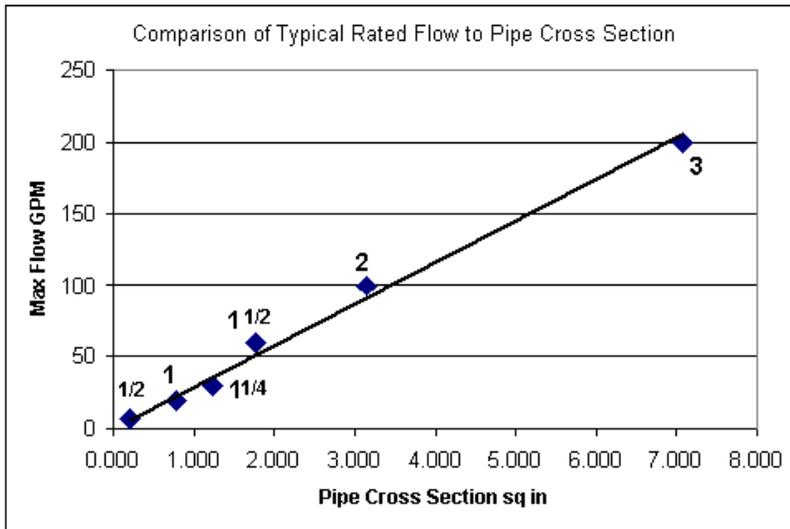
There may be concern that users will move to larger meter sizes to take advantage of the larger tolerances. It is not thought that this will happen since these systems cannot deliver much over 100 gpm without damaging storage tanks. In fact, most systems we have seen delivering heating oil are actually delivering at less than 80 gpm. If they move to a 200 gpm, 3-inch meter, rated at 40 to 200 gpm, they will then have to meet acceptance tolerances all the way down to 60 gpm which it is not believed that they can do on a consistent basis. We believe the typical 2-inch system will remain the mainstay of the industry.

Graphs of the relationship of typical meter ratings to pipe cross section area show that positive displacement flow rates are clearly a function of pipe size. Any tolerance that does not reflect that relationship is fundamentally flawed in our view. For comparison, we have included a graphic comparison of the proposed tolerances.

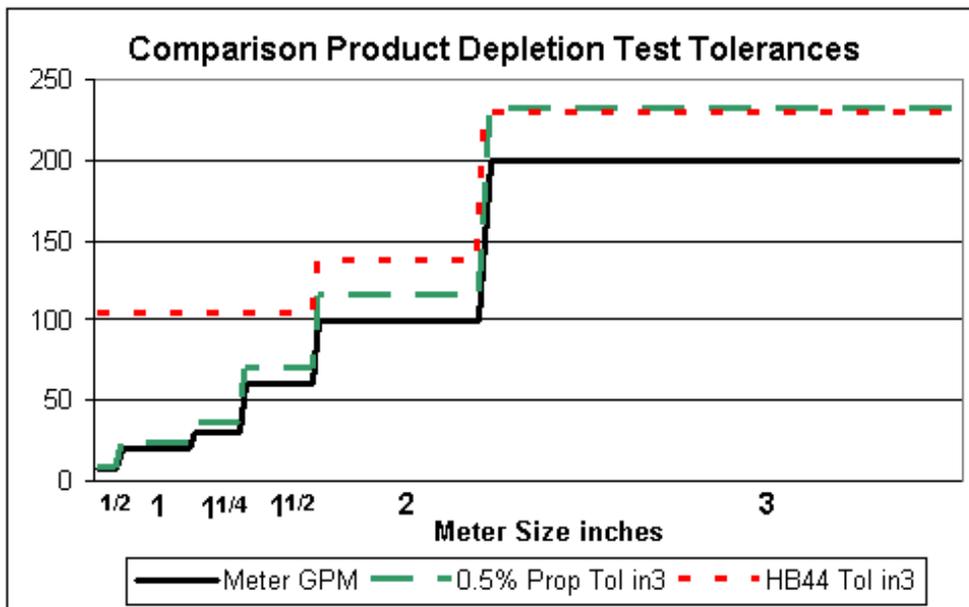
The submitter also noted the following:

We recognize that the tolerances proposed will reduce the tolerances for meter sizes 2 inch and under. We could support some compromise to recognize diminishing returns on smaller meters, thus allowing a slightly larger tolerance (e.g., 0.6 %) at or below 100 gpm rated flow rate. At 0.6 % for a 2 inch (100 gpm) meter, the tolerance would be 139 in<sup>3</sup>, virtually identical to the existing tolerance.

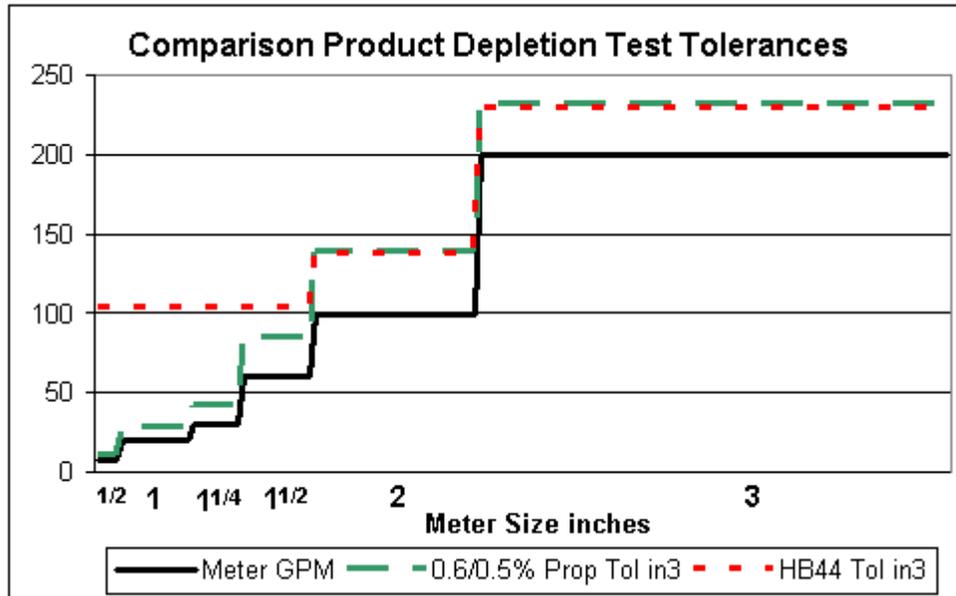
The submitter also provided the following supporting graphics:



Option 1 – 0.5 % across the board:



Option 2 – 0.6 % up to and including 100 gpm and 0.5 % thereafter:



In reviewing this item at its 2008 Interim Meeting, some NEWMA members felt that what is currently in HB 44 is sufficient and did not feel there was a problem determining meter size. Until NEWMA hears further about problems determining meter size from other states, it recommends this be made an Information item.

At the 2010 NCWM Annual Meeting, the Committee heard comments from Mr. Andersen, New York, reiterating NEWMA's request to place this item on the Committee's 2011 Interim Agenda.

The Committee agreed to NEWMA's request and will include this item with the list of carryover items that will be submitted to the fall regional weights and measures association meetings.

#### Part 4.42, Farm Milk Tanks - Item 1: N.5.1. Verification of Master Metering Systems

**Source:** Central Weights and Measures Association (CWMA)

**Purpose:** Eliminate unnecessary verification testing for master meters capable of operating within a prescribed percent of the applicable tolerance.

**Item Under Consideration:** Amend paragraph N.5.1. as follows:

**N.5.1. Verification of Master Metering Systems.** – A master metering system used to gauge a milk tank shall be verified before and after the gauging process. A master metering system used to calibrate a milk tank shall be verified before starting the calibration and re-verified every quarter of the tank capacity or every 2000 L (500 gal), whichever is greater. A master metering system capable of operating within 25 % of the applicable tolerance in T.3. Basic Tolerance Values needs only be verified before and after the gauging process.

(Added 201X)

**Background/Discussion:** The CWMA received a proposal at its fall 2008 Interim Meeting to modify paragraph N.5.1. Verification of Master Metering Systems in NIST HB 44 Section 4.42. Farm Milk Tanks. USDA provided data suggesting that mass flow meters currently used to test milk tanks would not have to be verified every quarter of the tank capacity, or every 2000 L (500 gal), whichever is greater. The CWMA does not have data that supports that all mass flow meters will perform to the same standard. Based on this information the CWMA

recommends this proposal be made an Information item and is considering the proposal outlined in the recommendation above.

At its fall 2008 meeting, NEWMA recommended this proposal be made an Information item. NEWMA forwarded the following additional justification for the proposed change from Mr. Richard Koeberle, Federal Milk Market Administrator:

The use of a mass flow meter has eliminated the variations seen in other types of meters used to calibrate or check farm bulk milk tanks. The reverification of the meter at every quarter of tank capacity adds time and potentially introduces errors by requiring the hose or valves to be moved before the tank is totally filled. This proposal originated by Mr. Tom MacNish, from the Cleveland Market Administrator, and was presented to the CWMA in September [2008]. Mass flow meters have been used extensively in their market with excellent results.

Data submitted with this item is posted on the S&T Committee's web page on the Members Only section of the NCWM website at: [www.ncwm.net/content/members-only](http://www.ncwm.net/content/members-only).

At the 2010 NCWM Annual Meeting, the Committee heard comments from Mr. Andersen, New York, reiterating NEWMA's request to place this item on the Committee's 2011 Interim Agenda.

The Committee agreed to NEWMA's request and will include this item with the list of carryover items that will be submitted to the fall regional weights and measures association meetings.

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