

National Type Evaluation Program (NTEP) Measuring Sector Annual Meeting

October 3-4, 2014 Raleigh, NC

Meeting Agenda

DRAFT

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Glossary of Acronyms			
CC	Certificate of Conformance	OIML	International Organization of Legal Metrology
DMS	Division of Measurement Standards	OWM	Office of Weights and Measures (NIST)
ECR	Electronic Cash Register	PD	Positive Displacement
HB 44	NIST Handbook 44 “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices”	Pub 14	NCWM Publication 14
LMD	Liquid Measuring Devices	RMFD	Retail Motor-Fuel Dispenser
mA	milliamp	SI	International System of Units
NCWM	National Conference on Weights and Measures	S&T	Specifications and Tolerances
NIST	National Institute of Standards and Technology	VTM	Vehicle Tank Meter
NTEP	National Type Evaluation Program	W&M	Weights and Measures
NTETC	National Type Evaluation Technical Committee		
This glossary is meant to assist the reader in the identification of acronyms used in this agenda and does not imply that these terms are used solely to identify these organizations or technical topics.			

Carry-over Items:

1. Add Testing Criteria to NTEP Policy U “Evaluating Electronic Indicators Submitted Separate from a Measuring Element.”

Source:

California NTEP Lab

Recommendation:

The Measuring Sector is asked to review a draft checklist entitled, *Checklist for testing electronic digital indicators with simulated inputs* and consider recommending that it be added to NCWM Publication 14. The checklist, including editorial notes from the Work Group that developed the checklist is included in Appendix A; a “clean” copy is included in Appendix B.

Background/Discussion:

At its 2007 meeting, the Measuring Sector heard that Technical Policy U in Publication 14 allows for testing an indicator separate from a measuring element. However, specific test criteria had not been developed for this practice. The Sector heard a recommendation to develop and add specific criteria for testing an indicator separate from a measuring element.

From 2007 to 2010, the California NTEP laboratory worked to develop a checklist, but received limited input on the drafts. At its 2011 meeting, the Sector agreed that additional work is needed to finalize the checklist and established a work group to complete this task. Mr. Rich Miller (FMC) volunteered to serve as Chair of the Work Group and the NIST OWM Sector Technical Advisor, was to assist as needed and monitor progress of work.

At the 2012 Sector meeting, FMC reported that, due to a heavy backlog, the CA laboratory was not available to conduct an evaluation prior to the end of January 2013. However, plans are in place for the NC laboratory to conduct an evaluation sometime in December 2012. The Sector agreed to maintain the item on its agenda to allow this work to be completed.

In August 2013, Work Group Chairman, Rich Miller, informed the Technical Advisor that the NC laboratory used the checklist when conducting an evaluation on an FMC’s indicator. During the evaluation, Mr. Miller and the NC laboratory evaluators reviewed the checklist and identified some suggested areas for revision.

At its 2013 meeting, the Measuring Sector concluded that additional work is needed on the draft checklist and agreed to carry this item over to allow the Work Group to finalize it.

See the 2007 to 2013 NTEP Measuring Sector Meeting Summaries for additional details.

In July 2014, Clark Cooney (NIST OWM) Measuring Sector Technical Advisor, spoke with Rich Miller (FMC) and Allen Katalinic (NC) about the progress on this item. Mr. Miller stated that he received no additional feedback from any Sector members. He stated that he and Mr. Katalinic used the checklist on an evaluation and it appeared to work. He feels that it is ready to move forward to publish as written. Mr. Katalinic stated that there may still be some portions that need refinement; however, he also feels that it is ready to move forward. Consequently, the Sector is asked to recommend that the draft be added to the next edition of NCWM Publication 14 as described in the Recommendation above.

2. Identification of Certified Software.

Source:

NTEP Software Sector

Recommendation:

The Measuring Sector is asked to review and comment on the following updated proposal forwarded from an August 2014 joint Weighing/Software Sector meeting. The Sector is also asked to discuss any alternative proposals from manufacturers on how an inspector can confirm that the software operating in a software-based measuring device is the same as what was evaluated and approved by the NTEP laboratory.

Amend NIST Handbook 44: 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 devices~~ software;*
[Nonretroactive as of January 1, 1968]
(Amended 2003) (**Amended 20XX**)
 - (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 devices; **manufactured as of January 1, 2004 through December 31, 2015, and all software based devices or equipment manufactured as of January 1, 2016 2020;**
[Nonretroactive as of January 1, 2004]
(Added 2003) (**Amended 20XX**)
 - (1) *The version or revision identifier shall be:*
 - i. *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)

Note: If the equipment is capable of displaying the version or revision identifier but is unable to meet the formatting requirement, through the NTEP type evaluation process, other options may be deemed acceptable and described in the CC.

- ii. **directly linked to the software itself; and**
[Nonretroactive as of January 1, 2016 2020]
(Added 20XX)
- iii. **continuously displayed[±] or be accessible via the display menus. Instructions for displaying the version or revision identifier shall be described in the CC. As an exception, permanently marking the version or revision identifier shall be acceptable providing the device does not have an integral interface to communicate the version or revision identifier.**
[Nonretroactive as of January 1, 2016 2020]
(Added 20XX)

***The version or revision identifier shall be displayed continuously on software-based equipment with a digital display manufactured as of January 1, 20XX and all software based equipment with a digital display as of January 1, 20YY.**

- (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.). Prefix lettering may be initial capitals, all capitals, or all lowercase.
[Nonretroactive as of January 1, 2007]

(Added 2006)

- (e) an National Type Evaluation Program (NTEP) Certificate of Conformance (CC) number or a corresponding CC Addendum Number for devices that have a CC.

- (1) 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 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.”*

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 20XX**)

The Measuring Sector is asked to consider recommending the following text be added to NCWM Publication 14:

Identification of Certified Software:

Note: Manufacturers may choose to separate metrologically significant software from non-metrologically significant software. Separation would allow the revision of the non-metrological portion without the need for further evaluation. In addition, non-metrologically significant software may be updated on devices without breaking a seal, if so designed. Separation of software requires that all software modules (programs, subroutines, objects etc.) that perform metrologically significant functions or that contain metrologically significant data domains form the metrologically significant software part of a measuring instrument (device or sub-assembly). If the separation of the software is not possible or needed, then the software is metrologically significant as a whole. The conformity requirement applies to all parts and parts shall be marked according to Section G-S-X.X.

The manufacturer must describe and possibly demonstrate how the version or revision identifier is directly and inseparably linked to the metrologically significant software. Where the version revision identifier is comprised of more than one part, the manufacturer shall describe which portion represents the metrological significant software and which does not.

The Measuring Sector is also asked to review and comment on the following proposed definition developed by the joint Software Sector/Weighing Sector:

Software Based Device. – Any device utilizing metrologically significant software.

Background/Discussion:

This item originated as an attempt to answer the question “How does the field inspector know that the software running in a software-based weighing or measuring device is the same software evaluated and approved during an NTEP evaluation?” In previous meetings it was shown that the international community has already addressed this issue (both WELMEC and OIML).

At the 2012 NTETC Software Sector Meeting, there was some discussion as to where the terminology regarding inextricably linking the software version or revision to the software itself belonged. The Software Sector recommended proposed language to add to NCWM Publication 14. The proposed language was thoroughly discussed at the 2013 Measuring Sector meeting and rejected. The Measuring Sector manufacturers asked for additional time to consider the proposal and carry it back to their respective companies’ software engineers for input. The Sector agreed to carry this item over to its next meeting to allow the manufacturers time to study this issue and bring back alternative(s) to consider.

See the 2013 NTEP Measuring Sector Meeting Summaries for additional details.

The Software Sector and the Weighing Sector met August 27, 2014, to discuss this item. In September 2014, Mr. Truex asked that an alternative proposal for modifications to paragraphs G-S.1. and G.S.1.1 along with a proposed

addition to NCWM Publication 14 (both from the joint Software Sector and Weighing Sector meeting in August) be included with the 2014 Measuring Sector agenda for consideration. These proposed changes appear in the “Recommendation” above. The two Sectors also noted that the S&T Committee feels a definition is needed for “Software Based Device” and proposed a definition as shown in the Recommendation above.

The following discussion on this issue at the joint Software Sector/Weighing Sector meeting was provided by the NTEP Director:

There was concern about using the terminology “manufactured: in G-S.1.(d). Some manufacturers may still be building old designs.

Mr. Richard Harshman (NIST OWM) is of the opinion that the S&T Committee will be satisfied with progress we have made during this joint meeting. Mr. Harshman, Mr. Truex, and Mr. Darrell Flocken (NCWM, NTEP) are hopeful that it will become an Informational Item. It likely will not become Voting quite so soon.

Given the new revisions to G-S.1., do any revisions need to be made to G-S.1.1. as written in NIST Handbook 44? If the proposed revisions to G-S.1.1. are implemented, it would relax the requirement to hard-mark the CC on built-for-purpose devices. We should perhaps retain the strike-out of (d) in the proposed revision. If we do not, there will be a conflict in 2020. On the other hand, it may not be an issue. We are currently planning to leave the wording of G-S.1.1. as it stands in NIST Handbook 44.

G-S.1.(d)(i) may create a problem for some exiting built-for-purpose equipment that currently does not preface the version number with “V.” After much discussion, Mr. Jim Pettinato suggested that we craft a note outside of the meeting to address this particular exception (built-for-purpose devices with limited display capability) that can be reviewed on August 28, 2014.

At the end of August 27, 2014, Mr. Scott Henry proposed a change to G-S.1.(d)(i) and G-S.1.(d)(iii) to create a loophole for equipment that has difficulty meeting the display requirements, but is not completely incapable of doing so. We discussed it on August 28, 2014. His suggested wording was problematic, so Mr. Truex suggested, as an alternative, carving out a specific exception along the lines of, “If the device is incapable of prefacing the software version/revision with a “V” or “R,” then NTEP inspectors may agree to allow a different method of indication.”

We are not certain whether the “Note” after G-S.1.(d)(i) regarding corner cases is entirely necessary, but we would like feedback from the S&T Committee whether it is necessary and/or acceptable. This is a requirement that built-for-purpose software devices previously had not been bound by. Also, you are going to have to go to the CC anyway to find all the details.

3. Software Protection/Security

Source:

NTEP Software Sector

Recommendation:

The Measuring Sector is asked to discuss and consider the following proposal developed during an August 2014 joint Software Sector/Weighing Sector Meeting.

Add the following new paragraph to Section 1.10. General Code of NIST Handbook 44:

G-S.9. Metrologically Significant Software Updates. – A software update that changes the metrologically significant software shall be considered a sealable event.

[Nonretroactive as of January 2, 20XX]

(Added 20XX)

The Measuring Sector is also asked to discuss any alternative proposals from manufacturers to develop a checklist for NCWM Publication 14 on evaluating software protection and security.

Background/Discussion:

A draft checklist was proposed for NCWM Publication 14 to evaluate the protection and security of software. The proposal was thoroughly discussed and debated at the 2013 Measuring Sector meeting. The Sector rejected the proposal; however, manufacturers committed to studying the issue and bringing back alternative(s) to consider at the 2014 Sector meeting.

See the 2013 NTEP Measuring Sector Meeting Summaries for additional details.

The Software Sector and the Weighing Sector discussed this item in a joint meeting on August 27, 2014. In September 2014, Mr. Truex forwarded a recommendation from the joint Software Sector/Weighing Sector meeting to add a new section to NIST Handbook 44 as shown in the “Recommendation” above.

4. Software Maintenance and Reconfiguration

Source:

NTEP Software Sector

Recommendation:

The Measuring Sector is asked to discuss any alternative proposal(s) from manufactures to add language into NCWM Publication 14 on how to secure their software.

Background/Discussion:

After the software is completed, what do the manufacturers use to secure their software? At the 2013 Measuring Sector meeting, proposals were discussed and debated to address this issue. The Sector rejected the proposals; however, manufacturers committed to studying the issue and bringing back alternative(s) to the 2014 Sector meeting.

See Appendix C for the proposals that were discussed at the 2013 Measuring Sector meeting. Also see the 2013 NTEP Measuring Sector meeting summaries for additional details.

In July 2014, Mr. Jim Truex (NTEP Director) stated that he had not received any new information on this issue.

New Items:

5. Recommendations to Update NCWM Publication 14 to Reflect Changes to NIST Handbook 44.

Background/Discussion:

The 99th National Conference on Weights and Measures (NCWM) adopted the following items that will be reflected in the 2015 Edition of NIST Handbook 44 and NCWM Publication 14. These items are a part of the agenda to inform the Measuring Sector of the NCWM actions and recommend changes to NCWM Publication 14.

Source:

NCWM S&T Committee

A. N.4.2.4. Wholesale Devices, 2013 NCWM S&T Committee Item 330-3.

At the 2014 NCWM Annual Meeting, NIST Handbook 44, LMD Code, paragraph N.4.2.4.was amended as follows:

N.4.2.4. Wholesale Devices. – “Special” tests shall be made to develop the operating characteristics of a measuring system and any special associated or attached elements and accessories. “Special” tests shall include a test at or slightly above the slower of the following rates:

- (a) 20 % of the marked maximum discharge rate; or
- (b) the minimum discharge rate marked on the device.

In no case shall the test be performed at a flow rate less than the minimum discharge rate marked on the device.

(Amended 20XX)

Recommendation: The Measuring Sector is asked to review and, if acceptable, recommend to the NTEP Committee adoption of the following changes to NCWM Publication 14, Field Evaluation and Permanence Tests for Metering Systems, based upon changes to NIST Handbook 44:

D. Initial Evaluation and Permanence Tests for Wholesale Positive Displacement (PD) Meters

The following tests are considered to be appropriate for metering systems on Wholesale PD Meters:

1. Four test drafts at each of five flow rates.

1.1 “Special” tests shall include a test at or slightly above the slower of the following rates:

1.0.1. 20% of the marked maximum discharge rate; or

1.0.2. The minimum discharge rate marked on the device.

In no case shall the test be performed at a flow rate less than the minimum discharge rate marked on the device.

2. Only one meter is required for the initial test, after which the meter will be reevaluated for permanence. The minimum throughput criterion for these meters is the maximum rated flow in units per minute x 2000.
3. Following the period of use, the tests listed above are to be repeated. All results within the range of flow rates to be included on the Certificate of Conformance (CC) must be within the applicable tolerances. Extended flow range testing performed at the manufacturer's discretion may be included on the CC provided the results are within the acceptable tolerances.

Technical Advisor’s Note: At the 2014 NCWM Annual Meeting, the S&T Committee heard comments that the phrase, “slightly above” is ambiguous and suggested that the phrase be replaced with similar language to that contained in Measurement Canada’s Bulletin V-03 (rev. 4) seen below.

4.5.3. Slow Flow Rate: The slow flow test is performed at a flow rate greater than the minimum rated flow rate of the meter. To ensure the rate is above the minimum, the target flow rate should be determined by summing the following:

- For all meters other than dispensers and refuellers

(Minimum Approved Flow Rate) + (10 % of Minimum Approved Flow Rate)

The Measuring Sector may wish to discuss whether or not more specific guidance is needed during type evaluation.

B. G-S.5.6. Recorded Representations, 2014 NCWM Item 310-2

At the 2014 NCWM Annual Meeting, NIST Handbook 44 General Code was amended as follows:

G-S.5. Indicating and Recording Elements.

G-S.5.6. Recorded Representations. – Insofar as they are appropriate, the requirements for indicating and recording elements shall also apply to recorded representations. All recorded values shall be printed digitally. In applications where recorded representations are required, the customer may be given the option of not receiving the recorded representation. For systems equipped with the capability of issuing an electronic receipt, ticket, or other recorded representation, the customer may be given the option to receive any required information electronically (e.g., via cell phone, computer, etc.) in lieu of or in addition to a hard copy.

(Amended 1975 and 2014)

Recommendation:

The Measuring Sector is asked to review and, if acceptable, recommend to the NTEP Committee adoption of the following changes to NCWM Publication 14, Checklists and Test Procedures, based upon changes to NIST Handbook 44:

Code Reference: G-S.5.6. Recorded Representations

2.10. All recorded values shall be digital. *See also G-UR.3.3.* Yes No N/A

2.11. In applications where recorded representations are required, the customer may be given the option of not receiving the recorded representation. Yes No N/A

2.12. For systems equipped with the capability of issuing an electronic receipt, ticket, or other recorded representations, the customer may be given the option to receive any required information electronically (e.g., via cell phone, computer, etc.) in lieu of or in addition to a hard copy. Yes No N/A

The hard copy is provided:

2.12.1. In lieu of a hard copy of the recorded representation. Yes No N/A

2.12.2. In addition to a hard copy of the recorded representation. Yes No N/A

Describe the options provided:

2.12.3. Via Cell phone. Yes No N/A

2.12.4. Computer. Yes No N/A

2.12.5. Other (describe): _____. Yes No N/A

Renumber the subsequent paragraphs.

C. S.1.6.7. and S.1.6.8. Recorded Representations NCWM S&T 330-1.

At the 2014 NCWM Annual Meeting, NIST Handbook 44, Liquid-Measuring Devices code was amended as follows:

S.1.6.7. Recorded Representations. – Except for fleet sales and other price contract sales and for transactions where a post-delivery discount is provided, a printed receipt providing the following information shall be available through a built-in or separate recording element for all transactions conducted with point-of-sale systems or devices activated by debit cards, credit cards, and/or cash:

- (a) the total volume of the delivery;
- (b) the unit price;
- (c) the total computed price; and

- (d) the product identity by name, symbol, abbreviation, or code number.

~~For systems equipped with the capability to issue an electronic receipt, the customer may be given the option to receive the receipt electronically (e.g., via cell phone, computer, etc.)~~
~~[Nonretroactive as of January 1, 1986]~~

(Added 1985) (Amended 1997, 2012, and 2014)

and,

S.1.6.8. Recorded Representations for Transactions Where a Post-Delivery Discount(s) is Provided. – Except for fleet sales and other price contract sales, a printed receipt providing the following information shall be available through a built-in or separate recording element that is part of the system for transactions involving a post-delivery discount:

- (a) the product identity by name, symbol, abbreviation, or code number;
- (b) transaction information as shown on the dispenser at the end of the delivery and prior to any post-delivery discount(s), including the:
 - (1) total volume of the delivery;
 - (2) unit price; and
 - (3) total computed price of the fuel sale.
- (c) an itemization of the post-delivery discounts to the unit price; and
- (d) the final total price of the fuel sale after all post-delivery discounts are applied.

~~For systems equipped with the capability to issue an electronic receipt, the customer may be given the option to receive the receipt electronically (e.g., via cell phone, computer, etc.)~~

(Added 2012) (Amended 2014)

Recommendation:

The Measuring Sector is asked to review and, if acceptable, recommend to the NTEP Committee adoption of the following changes to NCWM Publication 14, Checklists and Test Procedures for Retail Motor Fuel Dispensers, based upon changes to NIST Handbook 44:

Code References: S.1.6.7. Recorded Representations and S.1.6.8. Recorded Representations for Transaction Where a Post-Delivery Discount(s) is Provided.

Except for fleet sales and other price contract sales, for transactions conducted with point-of-sale systems or devices activated by credit cards, debit cards, or cash, a printed receipt containing information about the transaction shall be available to the customer as outlined in the following items. A printed receipt must always be available to the customer upon request and printing of the receipt may be initiated at the option of the customer. In addition, some systems may be equipped with the capability to issue an electronic receipt; for those systems, the customer may be given the option to receive the receipt electronically (e.g., via cell phone, computer, etc.). See also NCWM Publication 14, Code Reference: G-S.5.6. Recorded Representations.

D. S.1.5.3. Recorded Representations, Point-of-Sale Systems.

At the 2014 NCWM Annual Meeting, NIST Handbook 44, Liquefied Petroleum Gas and Anhydrous Ammonia Liquid-Measuring Devices code was amended as follows:

S.1.5.3. Recorded Representations, Point-of-Sale Systems. – Except for fleet sales and other price contract sales, a printed receipt providing the following information shall be available through a built-in or separate recording element for all transactions conducted with point-of-sale systems or devices activated by debit cards, credit cards, and/or cash:

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

Recommendation: The Measuring Sector is asked to review and, if acceptable, recommend to the NTEP Committee adoption of the following changes to NCWM Publication 14, Checklists and Test Procedures for Liquefied Petroleum Gas (LPG) Liquid-Measuring Devices, based upon changes to NIST Handbook 44:

Code Reference: S.1.5.3. Recorded Representations, Point-of-Sale Systems

28.13. A printed receipt providing the following information is available through a built-in or separate recording element for all transactions conducted with point-of-sale systems or devices activated by debit cards, credit cards, and/or cash. This does not apply to fleet sales and other price contract sales. Yes No N/A

28.13.1. The total volume of the delivery printed. Yes No N/A

28.13.2. The unit price printed. Yes No N/A

28.13.3. The total computed price printed. Yes No N/A

28.13.4. The product identity by name, symbol, abbreviation, or code number. Yes No N/A

Renumber the subsequent paragraphs.

6. Add Instructions to NCWM Publication 14 Field Evaluation and Permanence Tests for Metering Systems, Paragraph B.

Source:

John Roach, California Department of Food and Agriculture (CDFA) Division of Measurement Standards (DMS).

Recommendation:

The NTEP Measuring Sector is asked to consider the following changes to NCWM Publication 14:

Based upon the test of a meter (or meters), meters larger and smaller than the meter(s) tested and meeting the following criteria may be covered by the CC:

E. Meter Sizes to be Included on a Certificate of Conformance (CC)

an the meter(s) tested and meeting the following criteria may be covered by the CC:

1. Meter sizes with rated maximum flow rates of 50% to 200% of the rated maximum flow rate of the meter tested; and
2. Meter sizes with rated minimum flow rates of 50% to 200% of the rated minimum flow rate of the meter tested.

3. The maximum flow rate achieved in an installation is considered to be 80% of the maximum flow rate to be listed on the CC.

In order to include additional meter sizes (on a new CC or a CC including previously evaluated meters) beyond these ranges, additional testing, including permanence testing, is required.

Modify the following sections of the “Field Evaluation and Permanence Testing for Metering Systems” portion of the Liquid-Measuring Devices Checklist as follows:

A. Field Evaluation and Permanence Test of New-Design Meters in Retail Motor Fuel Dispensers.

All new-design meters are subject to a permanence test. If a meter is the same as one in a previously tested dispenser, a permanence test is not required. NTEP National Type Evaluation Program reserves the right to require a permanence test based on the result of the initial examination.

...

Subsequent Examination

Following the period of use, the tests listed above are to be repeated. All results within the range of flow rates to be included on the Certificate of Conformance (CC) must be within the applicable tolerances. Extended flow range testing performed at the manufacturer's discretion may be included on the CC provided the results are within the acceptable tolerances **for both the initial and subsequent portion of the permanence test. See also Technical Policy Section E “Meter Sizes to be Included on a Certificate of Conformance (CC)” for requirements regarding the inclusion of additional meter sizes and flow rates.**

B. Field Evaluation Test of Previously Evaluated Components in ~~Retail Motor Fuel Dispensers~~ Metering Systems Using Different Previously Evaluated Meters.

Different Previously Evaluated Meter

Previously evaluated dispensers using a previously type evaluated meter and indicator (register) will be subject to **an** initial test. Based on the test results of the initial test, National Type Evaluation Program (NTEP) may require a permanence test.

In order to include additional meter sizes and/or flow rates for a system that uses a previously evaluated meter beyond the ranges listed on the original CC for the meter, additional testing, including permanence testing, is required.

Non-metrological Changes

A technical administrative review shall be conducted to issue a new Certificate of Conformance (CC) or amend an existing CC for previously evaluated devices because of non-metrological changes. Based on the results of the technical administrative review, NTEP may require additional tests.

C. Field Evaluation and Permanence Test for Vehicle-Tank; Except for LPG, Cryogenic and CO2 Meters.

...

Following the period of use, the tests listed above are to be repeated. All results within the range of flow rates to be included on the Certificate of Conformance (CC) must be within the applicable tolerances. Extended flow range testing performed at the manufacturer's discretion may be included

on the CC provided the results are within the acceptable **tolerances for both the initial and subsequent portion of the permanence test. See also Technical Policy Section E “Meter Sizes to be Included on a Certificate of Conformance (CC)” for requirements regarding the inclusion of additional meter sizes and flow rates.**

D. Initial Evaluation and Permanence Tests for Wholesale Positive Displacement (PD) Meters.

The following tests are considered to be appropriate for metering systems on Wholesale PD Meters:

1. Four test drafts at each of five flow rates.
2. Only one meter is required for the initial test, after which the meter will be reevaluated for permanence. The minimum throughput criterion for these meters is the maximum rated flow in units per minute x 2000.
3. Following the period of use, the tests listed above are to be repeated. All results within the range of flow rates to be included on the Certificate of Conformance (CC) must be within the applicable tolerances. Extended flow range testing performed at the manufacturer's discretion may be included on the CC provided the results are within the acceptable tolerances **for both the initial and subsequent portion of the permanence test. See also Technical Policy Section E “Meter Sizes to be Included on a Certificate of Conformance (CC)” for requirements regarding the inclusion of additional meter sizes and flow rates.**

E. Field Evaluation and Permanence Test for LPG and Cryogenic Meters.

...

Following the period of use, the tests listed above are to be repeated. All results within the range of flow rates to be included on the Certificate of Conformance (CC) must be within the applicable tolerances. Extended flow range testing performed at the manufacturer's discretion may be included on the CC provided the results are within the acceptable tolerances **for both the initial and subsequent portion of the permanence test. See also Technical Policy Section E “Meter Sizes to be Included on a Certificate of Conformance (CC)” for requirements regarding the inclusion of additional meter sizes and flow rates.**

F. Field Evaluation and Permanence Test for LPG Vapor Meters.

...

Following the period of use, the tests listed above are to be repeated. All results within the range of flow rates to be included on the Certificate of Conformance (CC) must be within the applicable tolerances. Extended flow range testing performed at the manufacturer's discretion may be included on the CC provided the results are within the acceptable tolerances **for both the initial and subsequent portion of the permanence test. See also Technical Policy Section E “Meter Sizes to be Included on a Certificate of Conformance (CC)” for requirements regarding the inclusion of additional meter sizes and flow rates.**

H. Field Evaluation and Permanence Test for Turbine Meters.

...

Following the period of use, the tests listed above are to be repeated. All results within the range of flow rates to be included on the Certificate of Conformance (CC) must be within the applicable

tolerances. Extended flow range testing performed at the manufacturers’ discretion may be included on the CC provided the results are within the acceptable tolerances **for both the initial and subsequent portion of the permanence test. See also Technical Policy Section E “Meter Sizes to be Included on a Certificate of Conformance (CC)” for requirements regarding the inclusion of additional meter sizes and flow rates.** Following evaluation of test data and analysis of the data presented by the manufacturer for meter performance over temperature and viscosity ranges, the evaluating laboratory may require additional testing prior to issuing a CC for the meter.

I. Field Evaluation and Permanence Tests for Mass Flow Meters.

...

Test Data

...

Following the initial test, the meters will be placed into service for the permanence test. The minimum throughput criterion recommended for these meters are 60 days, or $2000 \times$ maximum rated flow in units per minute. Following the period of use, the tests listed above are to be repeated. All results within the range of flow rates to be included on the certificate of conformance must be within the applicable tolerances. Extended flow range testing performed at the manufacturer’s discretion may be included on the certificate of conformance provided the results are within the acceptable tolerances **for both the initial and subsequent portion of the permanence test. See also Technical Policy Section E “Meter Sizes to be Included on a Certificate of Conformance (CC)” for requirements regarding the inclusion of additional meter sizes and flow rates.**

Background/Discussion:

This item is proposed to ensure that NTEP laboratories are consistent in determining performance and throughput requirements for extending flow rates beyond what is currently approved. Mr. John Roach (CDFA DMS) proposes that instructions be added to 2014 NCWM Publication 14 to clarify requirements for extending flow rates for systems that are incorporating a previously approved meter beyond what is currently covered on the CC for the meter. Mr. Roach provided several examples along with proposed testing requirements; these examples are included in Appendix D.

NCWM Publication 14 Liquid-Measuring Devices Checklist Technical Policy Section E. “Meter Sizes to be Included on a Certificate of Conformance (CC)” includes guidance on meter sizes and flow rates that can be included based on testing conducted on a meter. However it makes no reference to permanence test requirements. The changes in the Recommendation propose including a clear statement in Section E. that makes reference to permanence test requirements. Note that Section F. “New Product Applications for Meters” already includes such references.

Criteria for field evaluations, including permanence test criteria, are included in the “Field Evaluation and Permanence Tests for Metering Systems” portion of the checklist, and individual sections within that portion of the checklist may make reference to the “initial” testing and “permanence” testing. Section B. “Field Evaluation Test of Previously Evaluated Components in Retail Motor Fuel Dispensers Using Different Previously Evaluated Meters” provides some guidelines on what testing is required; however, this section does not adequately address some of the scenarios that are being posed to the NTEP Laboratories. Additional guidance is needed to ensure consistency among the NTEP Laboratories and to ensure that manufacturers have a clear understanding of what testing will be required. It is also suggested that the reference to “Retail Motor Fuel Dispensers” be replaced with “Metering Systems” since the principles in this section should be applicable to any metering system.

The following statement is found in multiple sections of the Field Evaluation and Permanence Tests for Metering Systems” section and was added based on Sector action in 2006: “Extended flow range testing performed at the

manufacturer's discretion may be included on the CC provided the results are within the acceptable tolerances.” Because this statement appears as part of the “Subsequent Examination” portion of these sections, questions have been raised about whether or not testing of an extended flow rate only needs to be done during the subsequent portion of the examination in order to cover the extended rates on the CC. To clarify the application of this statement, the Sector is asked to consider adding a statement that this applies to both the initial and subsequent portion of the permanence test and to also add a statement acknowledging additional criteria regarding the addition of flow rates and meter sizes in the Technical Policy section of Publication 14.

Other questions that the Sector is asked to discuss include questions about permanence requirements for mass flow meters relative to other meter technologies. For example, the performance of a positive displacement meter might be affected by repeated use and throughput, which might cause wear and tear on components in the system that can affect accuracy. Is this same premise true of a mass flow meter’s sensor, which has no moving parts? What would the effects be on a fixed orifice meter?

The Sector may also wish to consider adding additional text to these sections explaining the need for the holder of the CC for a previously evaluated meter to grant permission for the use of the test results as a means to eliminate permanence testing. While this practice may be well understood from an administrative perspective, a clear statement or reference in the checklist will improve consistency in its application and better understanding of the requirements by the manufacturers. While specific language is not suggested in the recommendation, the examples included in the accompanying Appendix include narrative that could be used.

7. Eliminate Permanence Testing for Point of Sale (POS) Systems.

Source:

Randy Moses, Wayne Fueling Systems, LLC.

Recommendation: The Measuring Sector is asked to consider the following proposed amendment to the section of the Liquid-Measuring Devices checklist of Publication 14 “Field Evaluation and Permanence Test for Metering Systems”:

Field Evaluation

Measuring systems, devices, and elements whose performance may change with use over time are generally subject to field evaluation and permanence tests.

The following types of devices and elements are subject to a subsequent field evaluation after the initial field or laboratory evaluation:

- Electronic Indicating Elements
- Consoles
- Recording Elements
- **Electronic Cash Registers**
- Data Processing Units

Field examination is conducted between 20 days and before 30 days of use in a normal installation. During this interval, the device must perform and function correctly and not be serviced. Permanence tests are conducted on equipment such as a complete measuring system or only a measuring element (meter.) **Only an initial evaluation is required for Electronic Cash Registers.**

Modify the Introduction section to the Electronic Cash Register Interfaced with Retail Motor Fuel Dispensers check list as follows:

Introduction

This checklist is intended for use when conducting general evaluations of new electronic cash registers (ECR) that are to interface with retail motor fuel dispensers. It is assumed that the dispenser was previously evaluated, if not, the Liquid Measuring Device checklist must be applied to the dispenser sale system. The ECR must interface with a dispenser to perform this evaluation. Specific criteria that apply to service station control consoles are in the checklist for retail motor fuel dispensers and must be applied if the cash register also serves as the service station controller. As a minimum, two dispensers from different manufacturers, each of which includes all of the features to be listed on the ECR Certificate of Conformance (CC), must be evaluated with the ECR in order to have the statement "equivalent and compatible equipment" appear on the CC.

For field evaluation and permanence test criteria, see the “Field Evaluation” section in the NTEP Liquid-Measuring Devices – Field Evaluation and Permanence Tests for Metering Systems checklist.

This checklist is designed in a logical sequence for the user to determine and record the conformance of the device with the elements of NIST Handbook 44. The user should make copies of the checklist to serve as worksheets and preserve the original for reference. In most cases, the results of evaluation for each element can be recorded by checking the appropriate response. In some cases, the user is required to record values, results, or comments. In those cases, space is provided.

Background/Discussion:

The submitter states that the 2014 NCWM Publication 14, page LMD-105, Paragraph A, *Field Evaluation and Permanence Test of New-Design Meters in Retail Motor Fuel Dispensers*, currently requires a permanence test to be performed on point of sale (POS) systems. The submitter feels that a permanence test needs to be performed on a device that is subject to wear. However, he feels that wear is not an issue with POS systems, thus, a permanence test should not be required. He acknowledges that there is the possibility that an electronic component may fail, but in this case, the test would be started over. The submitter feels that if that were to happen, it would likely pass the test the second time. He states that the tests should be limited to verifying the proper operation just one time.

In reviewing this item, the Technical Advisor noted that there is no reference to the field evaluation and permanence test criteria in the NTEP Electronic Cash Register Interfaced with Retail Motor Fuel Dispenser Checklists and Test Procedures. Consequently, the Sector may also wish to consider adding a statement to the Introduction section of the Electronic Cash Register checklists as shown in the recommendations.

8. NIST Handbook 44: Section 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices, N.3. Test Drafts; Section 3.37. Mass Flow Meters, N.3. Test Drafts.

Source:

Michael Keilty, Endress + Hauser Flowtec AG

Recommendation:

The Measuring Sector is asked to discuss and comment on two proposals that have been submitted to the four regional weights and measures associations (CWMA, NEWMA, SWMA, and WWMA). These proposals would amend NIST Handbook 44, LPG and Anhydrous Ammonia Liquid-Measuring Devices and Mass Flow Meters codes, Notes section, Test Drafts, to allow transfer standards (master meters) to test and place into service dispensers and delivery flow meters.

Background/Discussion:

The submitter of this item, Mr. Mike Keilty (Endress + Hauser Flowtec AG), noted that the use of transfer standards (master meters) are recognized in NIST Handbook 44, Sections 3.34. Cryogenic Liquid-Measuring Devices; 3.38. Carbon Dioxide Liquid-Measuring Devices; and 3.39. Hydrogen Gas-Measuring devices – Tentative Code. He stated that field evaluation of LPG meters, CNG dispensers, and LNG dispensers are very difficult using volumetric and gravimetric field standards and test methods. He also stated that the tolerances for these applications are such

that using transfer meter standards are more efficient and safer. In LPG, CNG, and LNG applications, the transfer standard meters are placed in-line with the delivery system as it used to deliver product to tanks and vehicles.

Section 3.37. Mass Flow Meters, UR.3.8. Return of Product to Storage, Retail Compressed Natural Gas Dispensers, requires, in essence, provisions to be made for returning the product to storage or disposing of the product in a safe and timely manner. Mr. Keilty states that: 1) this is difficult to do and most often is not complied with when the test vessel contents are released into the atmosphere; 2) the use of transfer standards eliminates return to storage issues; and 3) the use of transfer standards is easier and faster compared to traditional field standards and the cost of using and transporting transfer standards is much less than that of traditional field provers and standards. Recognition of transfer standards in these particular sections of NIST Handbook 44 will enable states to allow this equipment to place systems into service and for field enforcement.

Mr. Keilty notes that, in some applications, transfer standard meters are not more accurate than the meters being tested and for that reason, longer test drafts and possibly more tests need to be run. The State of California purportedly conducted a short study of master meters in the past, but the conclusion did not lead to wide adoption of the practice. However, California uses a mass flow meter as a master meter for carbon dioxide flowmeter enforcement. In addition, Colorado uses a master meter to test LPG truck-mounted meters and Nebraska has used a mass flow meter to test agricultural chemical meters.

The following two proposals have been submitted to the four regional weights and measures associations:

3.32. Liquefied Petroleum Gas and Anhydrous Ammonia Liquid-Measuring Devices.

N.3. Test Drafts.

N.3.1. Minimum Test. – Test drafts should be equal to at least the amount delivered by the device in one minute at its normal discharge rate.;

N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the test draft shall be equal to at least the amount delivered by the device in 2 minutes at its maximum discharge rate.

(Amended 1982 and 20XX)

3.37. Mass Flow Meters

N.3. Test Drafts.

N.3.1. Minimum Test – The minimum test shall be one test draft at the maximum flow rate of the installation and one test draft at the minimum flow rate. More tests may be performed at these or other flow rates. (Also see T.3. Repeatability.)

N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the test draft shall be equal to at least the amount delivered by the device in 2 minutes at its maximum discharge rate.

(Amended 20XX)

The submitter has also suggested that the S&T Committee might also consider amending Section 3.30. Liquid-Measuring Devices and Section 3.31. Vehicle-Tank Meters codes to allow transfer standard meters. However, no formal proposals have been submitted for such changes.

Additional Items as Time Allows:

If time permits, the NCWM S&T Committee and/or the NTEP Software Sector would appreciate input from the Measuring Sector on the measuring-related issues that are outlined in the remaining agenda items below. A copy of any regional association modifications or positions will be provided to the Sector when these are made available by the regions.

9. Appendix D – Definitions: Remote Configuration Capability, NCWM S&T Committee Item 360-2 (D).

Source:

2013 NCWM S&T Committee (2012 Grain Analyzer Sector Meeting Summary)

Recommendation:

This item is included in the 2014 Measuring Sector agenda to allow the Sector to provide any additional input. The Sector may be asked to review any updates provided by the weights and measures regional associations and/or that from NIST OWM.

Background/Discussion:

At its 2012 meeting, the Grain Analyzer Sector agreed to forward a proposal to amend the definition of “remote configuration capability” in NIST Handbook 44 to the S&T Committee for consideration. The following changes were proposed:

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~~ **may or may not** itself **be** necessary to the operation of the weighing or measuring device or ~~is not~~ **may or may not be** a permanent part of that device.[2.20, 2.21, 2.24, 3.30, 3.37, 5.56(a)]

(Added 1993, **Amended 20XX**)

During its Open Hearings at the 2013 NCWM Interim Meeting, the S&T Committee heard comments from NIST OWM that changes to this definition may affect other types of devices and ever emerging technologies.

Rather than the changes proposed, another option was offered to add onto the current definition of “remote configuration capability” as follows:

Devices which are programmed using removable media (such as SD cards, flash drives, etc.) that may or may not be required to remain with the device during normal operation are also considered to be remotely configured devices.

At the 2013 NCWM Annual meeting, OWM reiterated comments it made at the 2013 Interim Meeting suggesting that it may be appropriate to develop separate requirements to address new and future technologies which can be remotely configured with removable media. OWM indicated it plans to develop draft language and request input from the various sectors at their upcoming meetings. Two additional comments were made in support of possibly including requirements in the General Code of NIST Handbook 44 to address newer and emerging technologies.

This item was discussed at the 2013 Measuring Sector meeting and whether or not additional guidance might be needed on what is covered by each sealing category. However, the Sector concluded that the definitions are adequate as currently written.

At the 2014 NCWM Interim Meeting the SMA indicated that the language in the “Item Under Consideration” on the S&T agenda is acceptable. The Committee received comments from the Measuring Sector indicating opposition to the proposed language and suggesting that the current definition is adequate. The Committee also heard comments

from NIST OWM expressing concern that the proposed language does not clearly define when a device is considered “remotely configurable.” OWM noted that it is continuing to develop this issue and has approached the various NTEP sectors for additional input regarding the capabilities of new technology with regard to metrologically significant adjustments. During their 2013 meeting, the Weighing Sector asked its members to assist OWM in identifying the various types of removable storage media used in weighing equipment. The Committee acknowledged comments from OWM expressing concern that the issue be carefully considered to avoid unintentional consequences. The Committee agreed to maintain the Developing status of item in consideration of the ongoing work of OWM to further develop this item.

At the 2014 NCWM Annual Meeting, the S&T Committee heard several comments that this proposal should remain a “Developing Item” and they agreed to keep it designated as such.

NIST OWM feels that much further development of this item is required and needs to include other remote configuration technologies that may be used in other weighing and measuring devices. NIST OWM does not believe the proposed changes to the definition of “remote configuration capability” are appropriate, but it does not have an alternative to offer at this time. It plans to continue working on this item after the 2014 NCWM Annual Meeting.

Additional background information on NCWM S&T Item 360-2 is contained in the *2014 NCWM Publication 16* and is available at:

<http://www.ncwm.net/resources/dyn/files/1217541z1019c056/fn/4-ST-Pub16-2014-CORRECTED-06-12-2014.pdf>

10. N.4.2.5. Initial Verification and UR.2.5.1. Initial Verification Proving Reports, Wholesale Devices; NCWM Item 330-4 D.

Source:

Minnesota Weights and Measures Division (2014).

Recommendation:

This item is included on the Sector’s agenda to make members aware of this proposal to add new paragraphs to NIST Handbook 44, Liquid-Measuring Devices, Notes section and to ask for input from the Sector on the recommended changes. This item appeared on the 2014 NCWM S&T Committee agenda as a Developing item. NIST OWM is recommending the “Examples” in the proposal are more appropriately included in the EPO’s and training materials rather than in NIST Handbook 44.

Background/Discussion:

Ms. Julie Quinn (MN Weights and Measures Division) reported that a group of interested parties has been collaborating to discuss requirements for wholesale meter systems with the capability to be calibrated at different flow rates and for different products.

During the 2014 NCWM Annual Meeting, this group met and developed suggested language to address this issue. Ms. Quinn asked that the S&T Committee include the suggested language in this item for further review and comments by the regional associations and others in the fall. The following language, along with a change to the title of the item (in Publication 16), was suggested:

N.4.2.5. Initial Verification. - A wholesale liquid measuring device shall be tested at all flow rates and with all products for which a calibration factor has been electronically programmed prior to placing it into commercial service for the first time or after being repaired or replaced.

A wholesale liquid measuring device not equipped with means to electronically program its flow rates and calibration factors shall be tested at a low and high flow rate with all products delivered prior to placing it into commercial service for the first time or after being repaired or replaced.

Example: A meter is electronically programmed to deliver regular and premium gasoline at a startup/shutdown flow rate of 150 gpm, a normal operating flow rate of 650 gpm, and a fall-back rate of

450 gpm. The meter is to be tested with regular gasoline at 150 gpm, 450 gpm and 650 gpm; and with premium gasoline at 150 gpm, 450 gpm and 650 gpm.

The official with statutory authority has the discretion to determine the flow rates and products at which a meter will be tested on subsequent verifications.

UR.2.5.1. Initial Verification Proving Reports. - Initial verification proving reports for wholesale liquid measuring devices equipped with means to electronically program flow rates shall be attached to and sent with placed-in-service reports when the regulatory agency with statutory authority requires placed-in-service reports.

Members of this group have agreed to do a presentation at each of the 2014 fall regional meetings to explain this item and other related proposals.

11. N.4.6. Initial Verification and UR.1.5. Initial Verification Proving Reports; NCWM Item 331-1 D.

Source: Minnesota Weights and Measures Division (2014).

Recommendation:

This item is included on the Sector’s agenda to make members aware of this proposal to add new paragraphs to NIST Handbook 44, Vehicle-Tank Meters, Notes section and to ask for input from the Sector on the recommended changes. This item appeared on the 2014 NCWM S&T Committee agenda as a Developing item. NIST OWM is recommending the “Examples” in the proposal are more appropriately included in the EPO’s and training materials rather than in NIST Handbook 44.

Background/Discussion:

Ms. Julie Quinn (MN Weights and Measures Division) reported that a group of interested parties have been collaborating to discuss requirements for vehicle-tank meter systems with the capability to be calibrated at different flow rates and for different products.

During the 2014 NCWM Annual Meeting this group met and developed suggested language to address this issue. Ms. Quinn asked that the S&T Committee include the suggested language in this item for further review and comments by the regional associations and others in the fall. The following language, along with a change to the title of the item (in Publication 16), was suggested:

N.4.6. Initial Verification. - A vehicle tank meter shall be tested at all flow rates and with all products for which a calibration factor has been electronically programmed prior to placing it into commercial service for the first time or after being repaired or replaced.

A vehicle tank meter not equipped with means to electronically program its flow rates and calibration factors shall be tested at a low and high flow rate with all products delivered prior to placing it into commercial service for the first time or after being repaired or replaced.

Example: A vehicle tank meter is electronically programmed to deliver regular and premium gasoline at a startup/shutdown flow rate of 20 gpm, a normal operating flow rate of 100 gpm, and an intermediate rate of 65 gpm. The meter is to be tested with regular gasoline at 20 gpm, 65 gpm and 100 gpm; and with premium gasoline at 20 gpm, 65 gpm and 100 gpm.

The official with statutory authority has the discretion to determine the flow rates and products at which a vehicle tank meter will be tested on subsequent verifications.

UR.1.5. Initial Verification Proving Reports. - Initial verification proving reports for vehicle tank meters equipped with means to electronically program flow rates shall be attached to and sent with placed-in-service reports when the regulatory agency with statutory authority requires placed-in-service reports.

Members of this group have agreed to do a presentation at each of the 2014 fall regional meetings to explain this item and other related proposals.

12. 3.30 Liquid-Measuring Devices, N.4.1.3. Normal Tests on Wholesale Multi-Point Calibration Devices.

Source:

Multi-Point Calibration Group (MPCG) (2014).

Recommendation:

No action is asked of the Measuring Sector at this time. This update is being provided to make members of the Measuring Sector aware of this proposal to add new paragraphs to NIST Handbook 44, Liquid-Measuring Devices. A group of experts led by Julie Quinn (MN), referred to as the “Multiple Point Calibration Group (MPCG),” has developed a new proposal to establish the tests to be conducted on wholesale meters with multiple point calibration capability.

Background/Discussion:

The MPCG states that new technology makes it possible to use linearization factors to optimize accuracy at every speed for which a wholesale meter is programmed to deliver. A special tolerance has traditionally been applied to slow flow tests for various flow test on wholesale meters with mechanical single-point calibrators because accuracy could only be optimized at one flow rate. A wholesale meter programmed with multi-point calibration does not require a special tolerance at any flow rate since every flow rate can be adjusted as close to zero as the repeatability of the meter allows.

The MPCG proposes to add a new paragraph to section 3.30 LMD Code is as follows:

N.4.1.3. Normal Tests on Wholesale Multi-Point Calibration Devices. – The normal test of a wholesale liquid-measuring device with electronically programmed linearization factors for various flow rates shall be made at the maximum discharge rate developed by the installation. Any additional test conducted at flow rates down to and including the indicated minimum discharge flow rate shall be considered normal tests.

(Added 20XX)

13. 3.31. Vehicle-Tank Meters, N.4.1.4. Normal Tests on Multi-Point Calibration Devices.

Source:

Multi-Point Calibration Group (MPCG) (2014).

Recommendation:

No action is asked of the Measuring Sector at this time. This update is being provided to make members of the Measuring Sector aware of this proposal to add new paragraphs to NIST Handbook 44, Vehicle-Tank Meters. A group of experts led by Julie Quinn (MN), referred to as the “Multiple Point Calibration Group (MPCG),” has developed a new proposal to establish the tests to be conducted on vehicle-tank meters with multiple point calibration capability.

Background/Discussion:

The MPCG states that new technology makes it possible to use linearization factors to optimize accuracy at every speed for which a vehicle-tank meter is programmed to deliver. A special tolerance has traditionally been applied to slow flow tests on vehicle-tank meters with mechanical single-point calibrators because accuracy could only be optimized at one flow rate. A vehicle-tank meter programmed with multi-point calibration does not require a special tolerance at any flow rate since every flow rate can be adjusted as close to zero as the repeatability of the meter allows.

The MPCG proposes to add a new paragraph to section 3.31. VTM Code is as follows:

N.4.1.4. Normal Test on Multi-Point Calibration Devices. – The normal test of a vehicle-tank meter with electronically programmed linearization factors for various flow rates shall be made at the maximum discharge rate developed by the installation. Any additional tests conducted at flow rates down to and including the rated minimum discharge flow rate shall be considered normal tests.

(Added 20XX)

14. Appendix D – Definitions: Calibration Parameter and Multi-Point Calibrated Device.

Source:

Multi-Point Calibration Group (MPCG) (2014).

Recommendation:

No action is asked of the Measuring Sector at this time. This update is being provided to make members of the Measuring Sector aware of this proposal to amend NIST Handbook 44, Definitions. A group of experts led by Julie Quinn (MN), referred to as the “Multiple Point Calibration Group (MPCG),” has developed a new proposal to amend the existing definition of *calibration parameter* and to add a new definition for *Multi-point Calibrated Device*.

Background/Discussion:

The MPCG noted that in 2006, NIST Handbook 44 sections 3.31., 3.32., 3.34., and 3.35., were amended, and referenced calibration parameters. Consequently, the definition needs to be updated to include references to these sections.

The MPCG also noted that a definition for “Multi-point Calibrated Device” needs to be added to recognize new technology that makes it possible to use linearization factors to optimize accuracy at multiple measurement points on devices such as meters and scales. This new technology requires a term so that devices capable of being optimized at multiple measurement points can be distinguished from devices with single-point calibration.

The MPCG’s proposes the following amendments and addition to Appendix D – Definitions:

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 course zero adjustments. [2.20, 2.21, 2.24, 3.30, **3.31, 3.32, 3.34, 3.35**, 3.37, 5.56(a)]

(Added 1993) **(Amended 20XX)**

Multi-point Calibrated Device. – A device equipped with means to electronically program linearization factors at multiple measurement points.

(Added 20XX)

15. NCWM S&T Item 332-1 D – S.1.4.3. Provisions for Power Loss, S.1.5.1.1. Unit Price, S.1.5.1.2. Product Identity, S.1.6. For Retail Motor Fuel Dispensers Only, S.1.7. For Wholesale Devices Only, UR.2.7. Unit Price and Product Identity, and UR.2.8. Computing Device.

Source:

California Department of Food and Agriculture (CDFA), Division of Measurement Standards (DMS).

Recommendation:

The Measuring Sector is asked for their input on this item. This update is being provided to make members of the Measuring Sector aware of this proposal that appeared on the 2014 NCWM S&T Committee agenda as a Developing item to amend NIST Handbook 44, LPG and Anhydrous Ammonia Liquid-Measuring Device, Specification and User Requirement codes.

See Appendix E for the entire proposal along with NIST OWM’s comments as they appeared in the 2014 NCWM Publication 16.

Background/Discussion:

The purpose is to add similar Specifications and User Requirements of other retail motor-fuel devices to NIST Handbook 44 Section 3.32. Liquefied Petroleum Gas (LPG) and Anhydrous Liquid-Measuring Devices Code similar to those in Section 3.30. Liquid-Measuring Devices, Section 3.37. Mass flow Meters, and Section 3.39. Hydrogen-Gas Measuring Devices Tentative Code.

The NCWM S&T Committee supports the objective of making changes to align the LPG and the LMD Code with respect to requirements for retail motor-fuel dispensing applications.

During the 2014 NCWM Annual Meeting, the S&T Committee heard numerous comments that additional work on this item is needed. The Committee agreed to recommend this item remain Developmental.

16. Event Logger; Electronic Transfer of Information.

Source:

Gordon Johnson, Gilbarco (2014)

Recommendation:

This item is included on the Sector’s agenda to make members of the Measuring Sector aware of this proposal to amend NIST Handbook 44, 3.30. Liquid-Measuring Devices, *Table S.2.2. Categories of Device and Methods of Sealing*, and to allow the Sector opportunity to discuss and comment on the item.

Background/Discussion: This item has been submitted by Mr. Gordon Johnson (Gilbarco) to the 2014 Southern and Western Weights and Measures Association S&T Committees for their consideration. The intent of the proposal is to allow electronic means (e.g., a thumb drive, flash drive, laptop computer, e-mail, or cell phone) as an alternative to providing event logger information for Category 3 devices in hard copy form. The proposed amendment is as follows:

<i>Table S.2.2. Categories of Device and Methods of Sealing</i>	
<i>Categories of Device</i>	<i>Methods of Sealing</i>
<i>Category 1:</i> (No changes)	(No changes)
<i>Category 2:</i> (No changes)	(No changes)
<p><i>Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password). [Nonretroactive as of January 1, 1995]</i></p> <p><i>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. [Nonretroactive as of January 1, 2001]</i></p>	<p><i>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. <u>The use of an electronic means such as a thumb drive, flash drive, laptop computer, Email, cell phone may be used to receive the event logger information from a dispenser or another on-site device.</u> A printed copy of the information must be available through the device or through another on-site device <u>if the device is not equipped to offer an electronic means of supplying the information.</u> 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. (Note: Does not require 1000 changes to be stored for each parameter.)</i></p>

[Nonretroactive as of January 1, 1995]

(Table Added 1993) (Amended 1995, 1998, 1999, ~~and 2006~~, and 20XX)

17. S&T Committee Carryover Item 337-2 Equivalent Units for Natural Gas.

Recommendation: The NCWM S&T Committee is deliberating on proposed changes to NIST Handbook 44 to recognize “alternative units” for natural gas. The S&T Committee would value input from the Sector on this issue. The Sector is asked to review and provide comment to the S&T Committee on this issue.

The S&T Committee proposed the following changes to Appendix D. Definitions and Section 3.37. Mass Flow Meters Code at the 2014 NCWM Annual Meeting. The proposal did not receive sufficient support for adoption and was returned to the Committee for further consideration.

Amend NIST Handbook 44, Appendix D to include new definitions as follows:

diesel gallon equivalent (DGE). – means 6.384 pounds of compressed natural gas or 6.059 pounds of liquefied natural gas. [3.37]

diesel liter equivalent (DLE). – means 0.765 kilograms of compressed natural gas or 0.726 kilograms of liquefied natural gas. [3.37]

Amend NIST Handbook 44, Appendix D. Definitions as follows:

gasoline gallon equivalent (GGE). – Gasoline gallon equivalent (GGE) means 5.660 pounds of compressed natural gas.[3.37]

gasoline liter equivalent (GLE). – Gasoline liter equivalent (GLE) means 0.678 kilograms of compressed natural gas.[3.37]

(Added 1994)

Amend NIST Handbook 44 Mass Flow Meters Code paragraphs S.1.2., S.1.3.1.1., and UR.3.8.; delete paragraph S.5.2.; and add new paragraph S.1.3.1.2. as follows:

S.1.2. Compressed Natural Gas and Liquefied Natural Gas Dispensers. – Except for non-retail fleet sales and other price contract sales, a compressed natural gas **and liquefied natural gas** dispensers used to refuel vehicles shall be of the computing type and shall indicate the quantity, the unit price, and the total price of each delivery. The dispensers shall display the mass measured for each transaction either continuously on an external or internal display accessible during the inspection and test of the dispensers, or display the quantity in mass units by using controls on the device.

(Added 1994)

S.1.3. Units

S.1.3.1.1. Compressed Natural Gas Used as an Engine Fuel. – When compressed natural gas is dispensed as an engine fuel, the delivered quantity shall be **measured in mass and** indicated in “gasoline liter equivalent (GLE) units,” “gasoline gallon equivalent (GGE) units,” **diesel liter equivalent (DLE) units, or diesel gallon equivalent (DGE) units** (Also see definitions).

(Added 1994)

S.1.3.1.2. Liquefied Natural Gas Used as an Engine Fuel. – **When liquefied natural gas is dispensed as an engine fuel, the delivered quantity shall be measured in mass and indicated in “diesel liter equivalent (DLE) units” or “diesel gallon equivalent (DGE) units” (Also see definitions).**

~~**S.5.2. Marking of Gasoline Volume Equivalent Conversion Factor. — A device dispensing compressed natural gas shall have either the statement “1 Gasoline Liter Equivalent (GLE) is Equal to 0.678 kg of Natural Gas” or “1 Gasoline Gallon Equivalent (GGE) is Equal to 5.660 lb of Natural Gas” permanently and conspicuously marked on the face of the dispenser according to the method of sale used.**~~

~~(Added 1994)~~

UR.3.8. Return of Product to Storage, Retail Compressed Natural Gas and Liquefied Natural 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.

(Added 1998)

Background: The gasoline gallon equivalent (GGE) unit was defined by NCWM in 1994 to allow users of natural gas vehicles to readily compare costs and fuel economy of light-duty compressed natural gas vehicles with equivalent gasoline powered vehicles. More background on the efforts of NIST/NCWM is available in the Reports of the 78th and 79th NCWM in NIST Special Publication 854 and 870 (see pages 322 and 327, respectively). Natural gas is sold as a vehicle fuel as either Compressed Natural Gas (CNG) or Liquefied Natural Gas (LNG). For medium and heavy duty natural gas vehicles in widespread use today, there is a need to officially define a unit allowing a comparison of cost and fuel economy with diesel powered vehicles. The submitter stated that the official definition of a DLE and a DGE will likely provide justification for California, Wisconsin and many other states to permit retail sales of CNG for heavy-duty vehicles in these convenient units. The submitter has provided a mathematical justification for the specific quantity (mass) of compressed natural gas in a DLE and DGE which found in the S&T Committee’s 2014 Interim Report.

At the 2014 NCWM Annual Meeting, the Committee heard numerous comments in both opposition to and support of the proposal shown in the Item Under Consideration in NCWM Publication 16. These comments are summarized below:

Support:

- Numerous letters of support were received from U.S. Senators, Governors, with wide bipartisan support.
- Allows consumers who may be familiar with volumetric units to make value comparisons.
- Allows for cost comparison between multiple fuel types.
- The proposal is supported by those who build and supply the equipment, vehicle manufacturers, and producers and distributors of natural gas.
- If action isn’t taken, the decision will be taken out of the Weights and Measures jurisdictions’ hands at the state and local levels.
- The “GGE” has been in use and accepted for many years.
- If the primary method of sale is mass, it dictates price, sale, and advertising be in mass. Mass units are not consumer friendly. Consumers don’t understand price per kilogram or pound for fuel sales.
- Industry stated that equivalent units are what consumers want.
- At least one company reported that all of their business is built around the “DGE” and they would need to retrofit their dispensers if required to measure in mass.

- Natural gas retail dispensers measure in mass and are inspected and tested using mass units.

Opposition:

- Use of the word approximate.
- This is a marketing rather than technical issue.
- Will there be potential for proliferation of other equivalent units for other alternative fuels?
- There are questions concerning the validity of the conversion values and whether adequate research has been done to develop the values.
- Including more than one equivalent value could lead to consumer confusion.
- The proposal is not aligned with how natural gas is being sold in the rest of the world.
- A jurisdiction stated that consumers hadn't been asked how they want natural gas sold.
- Is there a need for ongoing value comparisons if a vehicle is dedicated to run on natural gas fuel?
- Measurement science needs to be based on traceable standards. Equivalent units are not traceable.
- Consumers may need to make comparisons with multiple different fuel types such as diesel, biodiesel, gasoline, fuel ethanol, electric, hydrogen, LNG, and others. What is the most appropriate means to provide sufficient information to customers attempting to make value comparisons?
- Equivalent units would be better provided as supplemental information rather than the basis for commercial transactions.

Other technical points that were raised include the following:

- NTEP certificates have already been issued for five LNG dispensers that measure and indicate in mass units only. How will the proposed changes affect this equipment?

The Committee received an alternative proposal from NIST OWM that would require dispensers to measure, indicate, and calculate the total selling price based on mass units (pounds or kilograms), but permit the posting of supplemental information regarding approximate equivalents to other fuels for use by consumers when making value comparisons or for use by tax agencies. Based upon multiple requests from the regional weights and measures association meetings during the 2014 NCWM Annual Meeting and the Committee's open hearings, the Committee agreed to include this proposal in its Final Report. These proposed changes to Section 3.37. Mass Flow Meters Code are shown in the following table.

Summary of Compromise Proposal:

This alternative proposal was offered as a compromise that would phase in requirements for natural gas vehicle dispensers to measure, indicate, and calculate the total selling price based on mass units (pounds or kilograms), but permit the posting of supplemental information regarding approximate equivalents to other fuels for use by consumers in making value comparisons or by tax agencies while preserving the integrity of the measurement process. With this approach, customers could still be provided with supplemental information through mechanisms such as pump toppers or other displays that provide information about estimated equivalent units of measurement for deliveries indicated in mass as well as information on web sites such as those that already provide information about fuel economy. This approach might also reduce complaints from some suppliers about the accuracy of

equivalent values relative to their product.

S.1. Indicating and Recording Elements.

...

S.1.2. ~~Compressed Natural Gas Dispensers.~~ – Except for fleet sales and other price contract sales, a ~~compressed~~ natural gas dispenser used to refuel vehicles shall be of the computing type and shall indicate the quantity, the unit price, and the total price of each delivery. ~~The dispenser shall display the mass measured for each transaction either continuously on an external or internal display accessible during the inspection and test of the dispenser, or display the quantity in mass units by using controls on the device.~~

(Added 1994)(Amended 2015)

S.1.3. Units.

S.1.3.1. Units of Measurement. – Deliveries shall be indicated and recorded in grams, kilograms, metric tons, pounds, tons, and/or liters, gallons, quarts, pints and decimal subdivisions thereof. The indication of a delivery shall be on the basis of apparent mass versus a density of 8.0 g/cm³. The volume indication shall be based on the mass measurement and an automatic means to determine and correct for changes in product density.

(Amended 1993 and 1997)

S.1.3.1.1. ~~Compressed Natural Gas Used as an Engine Fuel.~~ – When ~~compressed~~ natural gas is dispensed as an engine fuel, the delivered quantity shall be indicated as follows:

- (a) *Effective and Nonretroactive as of January 1, 2016, the delivered quantity shall be indicated in mass units in terms of kilograms or pounds and decimal subdivisions thereof.*

This paragraph will become retroactive on January 1, 2017.

(Added 2015)

- (b) **For dispensers manufactured prior to January 1, 2016, the dispenser shall display the mass measured for each transaction, either continuously on an external or internal display accessible during the inspection and test of the dispenser, or display the quantity in mass units by using controls on the device. The delivered quantity shall be indicated in mass or in “gasoline liter equivalent (GLE) units” or “gasoline gallon equivalent (GGE) units.” (Also see Definitions.)**

(Added 1994)(Amended 2015)

Paragraph S.1.3.1.1.(b) will be removed in the 2017 edition of NIST Handbook 44 when paragraph S.1.3.1.1.(a) becomes retroactive.

S.1.3.1.2. Natural Gas Used as an Engine Fuel, Supplemental Information. – **Dispensers of natural gas dispensed as an engine fuel may include supplemental information to assist consumers in making value comparisons with gasoline and diesel fuel and for use by taxation departments and other agencies that may need an approximation thereof. Supplemental information shall not appear adjacent or in close proximity to the primary display and shall be positioned far enough from that display so as to ensure that the quantity, unit price, and total price for the transaction are clear and easily understood.**

Supplemental units shall be clearly designated with the phrase “The following information is provided for comparison with other vehicle fuels and is not to be used as a basis for commercial transactions.”

Supplemental units shall be displayed using one or more of the following statements.

For compressed natural gas:

1 kg of Compressed Natural Gas is Equal to 1.4749 Gasoline Liter Equivalent (GLE)
1 kg of Compressed Natural Gas is Equal to 0.3896 Gasoline Gallon Equivalent (GGE)
1 kg of Compressed Natural Gas is Equal to 1.3072 Diesel Liter Equivalent (DLE)
1 kg of Compressed Natural Gas is Equal to 0.3455 Diesel Gallon Equivalent (DGE)

1 lb of Compressed Natural Gas is Equal to 0.669 Gasoline Liter Equivalent (GLE)
1 lb of Compressed Natural Gas is Equal to 0.177 Gasoline Gallon Equivalent (GGE)
1 lb of Compressed Natural Gas is Equal to 0.593 Diesel Liter Equivalent (DLE)
1 lb of Compressed Natural Gas is Equal to 0.157 Diesel Gallon Equivalent (DGE)

For liquefied natural gas:

1 kg of Liquefied Natural Gas is Equal to 1.3768 Diesel Liter Equivalent (DLE)
1 kg of Liquefied Natural Gas is Equal to 0.3638 Diesel Gallon Equivalent (DGE)

1 lb of Liquefied Natural Gas is Equal to 0.625 Diesel Liter Equivalent (DLE)
1 lb of Liquefied Natural Gas is Equal to 0.165 Diesel Gallon Equivalent (DGE)

...

S.1.3.3. Maximum Value of Quantity-Value Divisions.

- (a) **The maximum value of the quantity-value division for liquids shall not be greater than 0.2 % of the minimum measured quantity.**
- (b) *Effective and nonretroactive as of January 1, 2016, the maximum value of the mass division for dispensers of natural gas used to refuel vehicles shall not exceed 0.001 kg or 0.001 lb.*

Note: Paragraph S.1.3.3.(b) will become retroactive effective January 1, 2017.

- (c) For dispensers of ~~compressed~~ natural gas used to refuel vehicles **and manufactured prior to January 1, 2016**, the value of the division for the gasoline liter equivalent shall not exceed 0.01 GLE; the division for gasoline gallon equivalent (GGE) shall not exceed 0.001 GGE. The maximum value of the mass division shall not exceed 0.001 kg or 0.001 lb.

Note: Paragraph S.1.3.3.(c) will be removed in the 2017 edition of NIST Handbook 44 when Paragraph S.1.3.3.(b) becomes retroactive.

(Amended 1994 **and 2015**)

...

S.5. Markings. ...

S.5.2. Marking of Gasoline Volume Equivalent Conversion Factor. – ~~A device~~ **Dispensers manufactured prior to January 1, 2016 dispensing compressed natural gas shall have either the statement**

“1 Gasoline Liter Equivalent (GLE) is Equal to 0.678 kg of Natural Gas” or “1 Gasoline Gallon Equivalent (GGE) is Equal to 5.660 lb of Natural Gas” permanently and conspicuously marked on the face of the dispenser according to the method of sale used.

As of January 1, 2017 devices must indicate as specified in S.1.3.1.1.(a) and any information providing equivalent units may only be included as supplemental information as specified in S.1.3.1.2.

Paragraph S.5.2. will be removed from the 2017 edition of NIST Handbook 44 when paragraph S.1.3.1.1.(a) becomes retroactive.

(Added 1994)(**Amended 2015**)

UR.3. Use of Device.

...

UR.3.8. Return of Product to Storage, Retail Compressed Natural Gas and Liquefied Natural 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.

(Added 1998)(**Amended 2015**)

Because many of these issues are dependent upon defining the proper method of sale, the Committee met jointly with the L&R Committee to discuss the comments received on the S&T and L&R proposals on the issues relating to natural gas.

The S&T Committee identified the method of sale by mass versus equivalent volumetric units as the most significant concern based on comments heard on this proposal. In addition to support for this proposal, there were also concerns regarding the use of the word “approximately” for labeling purposes; “multiple equivalent units” labeled on the same dispenser; “tax issues;” and other less commonly expressed issues. It was decided to eliminate the labeling altogether and not delay the effective date, thereby, addressing all three concerns. Consequently, based upon the comments received and its deliberations, the Committee agreed to modify the Item Under Consideration shown in Publication 16. The revised version of the Committee’s proposal appears in the “Recommendation” above.