

# National Type Evaluation Program (NTEP) Measuring Sector

**Annual Meeting**  
**September 25-26, 2018 Baltimore, MD**

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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
EVFS	Electric Vehicle Fueling Systems	Pub 14	NCWM Publication 14
HB 44	NIST Handbook 44 “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices”	RMFD	Retail Motor-Fuel Dispenser
LMD	Liquid Measuring Devices	SI	International System of Units
mA	milliamp	S&T	Specifications and Tolerances
NCWM	National Conference on Weights and Measures	TG	Task Group
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. Laboratory and Field Evaluation – Clarification of Language

**Source:** NTEP Laboratories

**Background Information:** The NTEP evaluators have experienced confusion when interpreting the “Laboratory or Field Evaluation” section of the LMD checklist (see Page LMD-111). At its 2018 meeting, the Sector reviewed proposed changes from the NTEP laboratories to clarify the information in this section. The Sector agreed there are multiple points in this section that are confusing. Sector Technical Advisor, Tina Butcher noted that the original section was intended to cover multiple applications. Over time, permanence test criteria were changed or deleted for certain device types and there appears to be residual language that needs to be moved or deleted. NTEP Director, Jim Truex noted that there have been arguments from manufacturers over the requirements for permanence testing and modifying the language as proposed is intended to help eliminate these instances.

After discussing the proposed changes at length, the Sector agreed that the proposed changes from the laboratories will help with some of the confusion, but more work is needed. The Sector agreed that additional clarifications to the first part of this section would be helpful; this will be a carryover item for next year. Tina Butcher agreed to rework the section based on the Sector’s discussions and past decisions and circulate those proposed revisions to the labs, Rich Miller, and Dmitri Karimov and bring it back next year for the Sector to review.

**Recommendation:** The Sector will be asked to review proposed changes to the “Laboratory or Field Evaluation” section of the LMD checklist to be distributed prior to the Sector Meeting.

### 2. Diesel Exhaust Fluid (DEF) - Testing Criteria to Include DEF on an NTEP CC

**Source:** NTEP Laboratories

**Background Information:** NTEP evaluators are routinely asked what testing is necessary to cover DEF on NTEP certificates. Another common question is what testing is necessary to get a family of meters certified for DEF and what other products will be included.

The current policy has been questioned at times by applicants. For example, a client stated that DEF is 67% water and 32% Urea. Mag Flow conductance for Urea is 5000 micro siemens/centimeter and that for water is 725 (see page LMD-7 in Pub 14 for both products). Plus, they are in different families.

NTEP tested the product with DEF. NTEP concluded that each family (water and fertilizer) should be tested to establish conductivity. Our thoughts were that we would simply give the product DEF (the product actually tested) on the CC since we are not really establishing conductivity for the family table for either water or fertilizer. In this case, after discussion, NTEP let the client know that they had a couple of choices.

1. Test only DEF and only get DEF with no conductance range
2. Test water and Urea which would establish conductivity for both water and fertilizer families.

Prior to the 2017 Sector Meeting, DEF was and had been considered fertilizer due to the Urea content. DEF is prevalent enough now to justify its own category listing. The Sector considered a recommendation to establish a separate product category for diesel exhaust fluid (DEF).

NTEP Director, Jim Truex introduced the item on behalf of the NTEP Laboratories, noting the proposal arose from discussions among the laboratories who need more specific criteria to address DEF. He clarified that the criteria are intended to apply to all meter types. Some Sector members asked if the proposed change, if adopted, would affect the status of current NTEP Certificates of Conformance (CCs) and Mr. Truex noted that NTEP would not require

companies to resubmit CCs for evaluation. Some questioned whether not having the reference on a current CC might not create a disadvantage compared with companies getting new CCs with the listing on the CC.

Mr. Truex noted that DEF is becoming prevalent enough that people want this to be specifically listed on their CCs and giving DEF its own category might help answer some of the questions and clear up some current confusion. The Sector acknowledged that the Family of Products Table does not provide an exhaustive listing of specific products; these are just examples of products and their characteristics that might be measured with a given meter type and a classification of how they would be treated regarding NTEP testing.

There was some additional discussion about the nature of DEF and some commented on the fact that there can be different percentages of water used in the mixture. The Sector spent some time discussing possible ranges to list in the table. The Sector finally agreed that more research is needed and concluded that this task would be better completed outside of the meeting.

The group discussed this item at length, including proposed parameters for DEF and Urea. The proposed changes are more complex than can be resolved at the meeting and the Sector wants to see a final, marked-up draft of the changes to the Product Family Table before making a decision.

Michael Keilty agreed to lead a small group of volunteers consisting of the following to work on this item:

- Michael Keilty (Endress + Hauser)
- Rich Miller (FMC)
- Craig Cavanaugh (Tuthill Transfer System)
- Robin Parsons (Parafour Innovations)

The group was to develop and circulate a proposal to the remainder of the Sector in a ballot to add DEF as a separate line item for each meter type in the Product Family Table. In addition, the group was to further review the listings for Urea to ensure the references are accurate.

**Recommendation:** No action is asked of the Sector on this item. This item is included on the Sector’s agenda to report on the actions taken following the last Sector meeting.

The group assigned to this task completed its work. Sector Chairman, Michael Keilty, balloted the Sector initially in ballot 17-01 and in a subsequent ballot 17-02. Sector reached a consensus on the changes proposed and Mr. Keilty summarized the results of the ballot in an email to the Sector dated 11/21/17. The results are repeated below for reference. The changes adopted are shown in Appendix A to this Agenda.

<b>Summary of Ballot Results</b>	
<b>Ballot 17-01</b>	<b>Ballot 17-02</b>
<i>(Prior to change recommended by D. Karimov)</i>	
3 yes	<i>9 yes</i>
2 no	<i>0 no</i>
1 abstain	<i>0 abstain</i>
<i>(After recommended change by D. Karimov)</i>	
4 yes – with the changes and no others	
<b>Summary Totals:</b> 7 yes; 2 no; 1 abstain	<b>Summary Totals:</b> 9 yes; 0 no; 0 abstain
<b>Public Members:</b> 2 yes; 1 no	<b>Public Members:</b> 3 yes; 0 no
<b>Private Members:</b> 5 yes; 1 no; 1 abstain	<b>Private Members:</b> 6 yes; 0 no

**New Items:**

**3. Recommendations to Update NCWM Pub 14 to Reflect Changes to NIST HB 44 and Other Proposed Changes.**

**Source:** NCWM S&T Committee

**Background:**

At its 103rd Annual Meeting, the National Conference on Weights and Measures (NCWM) adopted the following items that will be reflected in the 2019 Edition of NIST Handbook 44. These items were included on the Sector's agenda to inform the Measuring Sector of the NCWM actions and to recommend corresponding changes to NCWM Publication 14. For additional details on these items, refer to the NCWM S&T Committee's 2018 Interim Report and its accompanying appendix along with the addendum sheets issued by the S&T Committee during the 2018 NCWM Annual Meeting, all of which can be found on the NCWM's web site at:

<http://www.ncwm.net/meetings/annual/publication-16>

**A. Vehicle-Tank Meters Code - Manifold Flush Systems - Paragraph S.3.1. Diversion of Measured Liquid**

**Background:** At the 2018 NCWM Annual Meeting, the NCWM adopted the following changes to the Vehicle-Tanks Meters Code to specify requirements for "manifold flush systems" used to flush product on metering systems with multiple compartments delivering multiple products through a single discharge hose. For reference, see Block 1 on the 2018 S&T Committee's Agenda, which includes GEN-1 and VTM-1.

Modify paragraph S.3.1. as follows:

**S.3.1. Diversion of Measured Liquid. – ~~Except on equipment used exclusively for fueling aircraft, n~~o means shall be provided by which any measured liquid can be diverted from the measuring chamber of the meter or the discharge line thereof. However, two or more delivery outlets may be installed if means are provided to ~~insure~~ ensure that:**

- (a) liquid can flow from only one such outlet at one time; and
- (b) the direction of flow for which the mechanism may be set at any time is definitely and conspicuously indicated.

**This paragraph does not apply to the following:**

- 1) **Equipment used exclusively for fueling aircraft.**
- 2) **Multiple-product, single discharge hose metering systems that are equipped with systems designed to flush the discharge hose, provided the flushing system complies with the provisions of paragraph S.3.1.1.**

Add a new paragraph S.3.1.1. as follows:

**S.3.1.1. Means for Clearing the Discharge Hose. Metering systems may be equipped with systems specifically designed to facilitate clearing of the discharge hose prior to delivery to avoid product contamination. In such systems, a valve to temporarily divert product from the measuring chamber of the meter to a storage tank, shall be installed only if:**

- (a) **The discharge hose remains of the wet hose type; and**

- (b) the valve and associated piping are approved by the weights and measures authority having jurisdiction over the device prior to commercial use; and
- (c) the valve is permanently marked with its purpose (e.g., flush valve); and
- (d) the valve is installed in a conspicuous manner and as far from the hose reel as practical; and
- (e) the system clearly and automatically indicates the direction of product flow during operation of the flush system; and
- (f) clear means, such as an indicator light or audible alarm, is used to identify when the valve is in use; and
- (g) no hoses or piping are connected to the inlet when it is not in use.  
(Added 20XX)

Add a new paragraph heading UR.2.6. and new paragraph UR.2.6.1. as follows:

**UR.2.6. Clearing the Discharge Hose**

**UR.2.6.1. Records. Whenever, prior to delivery, a different product is pumped through the discharge hose to avoid contamination, a record including the date, time, original product, new product and gallons pumped shall be maintained. These records shall be kept and available for inspection by weights and measures for a period of 12 months**  
(Added 20XX)

**Recommendation:** The Sector is asked to consider recommending modifications to NCWM Publication 14 to correspond with the changes to Handbook 44 relative to “manifold flush systems” that were adopted by the NCWM in July 2018. Proposed changes are outlined in Appendix B to this Agenda.

**B. Vapor Elimination – Multiple Measuring Codes**

**Background:** At the 2018 NCWM Annual Meeting, the NCWM adopted the following changes to the LPG & Anhydrous Ammonia Liquid-Measuring Devices Code; Cryogenic Liquid-Measuring Devices Code; and Carbon Dioxide Liquid-Measuring Devices Code to align requirements for air/vapor elimination. For reference, see the block of items under S&T Block 6, including LPG-1, CLM-3, and CDL-3.

**LPG & Anhydrous Ammonia LMD Code:**

**S.2.1. Air/Vapor Elimination.** - A ~~device~~ measuring system shall be equipped with an effective air/vapor eliminator or other automatic means to prevent the passage of air/vapor through the meter. Vent lines from the air/vapor eliminator shall be made of appropriate non-collapsible material.  
(Amended 2016 and 2018)

**Cryogenic Liquid-Measuring Devices Code:**

**S.2.1. Vapor Elimination.** – A measuring system shall be equipped with an effective air/vapor eliminator or other effective automatic means to prevent the ~~measurement of vapor that will cause errors in excess of the applicable tolerances~~ passage of air/vapor through the meter.

**Vent lines from the air/vapor eliminator shall be made of appropriate non-collapsible material.**

(Also see Section T. Tolerances.)

**(Amended 2018)**

**Carbon Dioxide Liquid-Measuring Devices Code:**

**S.2.1. Air/Vapor Elimination.**

**(a)** A **device measuring system** shall be equipped with an effective **air/vapor eliminator or other** automatic means to prevent the passage of **air/vapor** through the meter.

**(b)** Vent lines from the **air/vapor** eliminator shall be made of appropriate non-collapsible material.

(Amended 2016 **and** 2018)

**Recommendation:** The Sector is asked to recommending modifications to NCWM Publication 14 to reflect the changes to the three HB44 codes described in the “Background” section above. Proposed changes are outlined in Appendix C to this Agenda.

**C. Recorded Representations – 2018 S&T Item LMD-2: S.1.6.7. Recorded Representations; S.1.6.8. Recorded Representations for Transactions Where a Post-Delivery Discount(s) is Provided; and UR.3.4. Printed Ticket.**

**Background:** At the 2018 NCWM Annual Meeting, the NCWM adopted the following changes to the Liquid-Measuring Devices Code to specify requirements for including information to identify the dispenser used in a transaction on recorded representations issued by retail motor-fuel dispensing systems. For reference, see Item LMD-2 on the S&T Committee’s Agenda.

**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. **\* and**
- (e) **the dispenser designation by either an alpha or numerical description. \*\***

**\*[Nonretroactive as of January 1, 1986] \*\*[Nonretroactive as of January 1, 2021]**

(Added 1985) (Amended 1997, 2012, ~~and~~ 2014 **and** 2018)

**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, **and**

**(e) The dispenser designation by either an alpha or numeric description.**

(Added 2012) (Amended 2014 **and 2018**) [**Nonretroactive as of January 1, 2021**]

**UR.3.4. Printed Ticket.** - The total price, the total volume of the delivery, ~~and~~ the price per liter or gallon, **and a corresponding alpha or numeric dispenser designation\*** shall be shown, either printed by the device or in clear hand script, on any printed ticket issued by a device and containing any one of these values.

(Amended 2001 **and 2019**) \***(Nonretroactive as of January 1, 2021)**

**Recommendation:** The Sector is asked to recommending modifications to NCWM Publication 14 to reflect the changes to the Liquid-Measuring Devices Code in NIST Handbook 44 relative to including information to identify the dispenser used in a transaction on recorded representations issued by retail motor-fuel dispensers. Proposed changes are outlined in Appendix D to this Agenda.

#### **D. WTR- Water Meters – Paragraph S.2.1. Provision for Sealing**

**Background:** At the 2018 NCWM Annual Meeting, the NCWM adopted the following changes to the Water Meters Code to add specific criteria for sealing water meters and to align the sealing requirements with that of other measuring device codes in HB44. For reference, see S&T Item WTR-2.

<u>Table S.2.1.</u> <u>Categories of Device and Methods of Sealing</u>	
<u>Categories of Device</u>	<u>Methods of Sealing</u>
<u>Category 1: No remote configuration capability.</u>	<u>Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.</u>
<u>Category 2: Remote configuration capability, but access is controlled by physical hardware.</u>  <u>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.</u>	<u>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.</u>
<u>Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</u>  <u>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.</u>	<u>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 on demand through the device or through another on-site device. The information may also be available electronically. 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.)</u>

[Nonretroactive as of January 1, 2019]  
(Added 2018)

**Recommendation:** The Sector is asked to recommending modifications to NCWM Publication 14 to reflect the changes to the Water Meters Code described in the “Background” section above. Proposed changes are outlined in Appendix E to this Agenda.

#### **E. Power Loss on Retail Motor-Fuel Dispensing Systems – Alignment of Pub 14 with HB 44**

**Background:** In the process of researching a technical question, the Technical Advisor, Tina Butcher, noted a discrepancy between language in NCWM Publication 14 and that of NIST Handbook 44 with regard to power loss requirements for retail motor-fuel dispensers.

NIST Handbook 44 paragraph S.1.6.2. Provisions for Power Loss requires that transaction information needed to complete a transaction in progress at the time of a power loss be retained in the system for at least 15 minutes as follows:

### **S.1.6.2. Provisions for Power Loss.**

**S.1.6.2.1. 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.*  
[Nonretroactive as of January 1, 1983]

**S.1.6.2.2. User Information.** – *The device memory shall retain information on the quantity of fuel dispensed and the sales price totals during power loss.*  
[Nonretroactive as of January 1, 1983]

Paragraph S.1.6.2.1. Transaction Information gives examples of “quantity and unit price” or “quantity and sales price” as examples of the required information; however, the multiple corresponding code references to these paragraphs in Pub 14 specifies “quantity” and “total sale” values must be recallable.

**Recommendation:** The Sector is asked to consider recommending modifications to the power loss requirements in Pub 14 to align with HB44 (or suggest a change to HB44 to align with Pub 14). Proposed changes are outlined in Appendix F to this Agenda, which includes excerpts from the following portions of the LMD Checklist:

- **Retail Motor-Fuel Dispensers (RMFDs)** – Code References S.1.6.2.1. and S.1.6.2.2. Provisions for Power Loss – Page LMD-37
- **Cash-Activated RMFDs** - S.1.6.2. Provisions for Power Loss – Page LMD-47
- **Liquefied Petroleum Gas (LPG) Liquid Measuring Devices** – Code Reference S.1.5.6. - Page LMD-68
- **Mass Flow Meters** - Code References S.2.4.1. and S.2.4.2. on Page LMD-76
- **Hydrogen Gas Measuring Devices** - Code Reference S.2.3. on Page LMD-100 and LMD-106
- **Field Evaluation & Permanence Tests - CNG Devices** - Code References S.2.4.1. and S.2.4.2. on Page LMD-123

### **Additional Items as Time Allows:**

If time permits, the NCWM S&T Committee and/or other groups and individuals 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. For each item in this section, the Sector is asked to review the item and consider providing input that might assist the S&T Committee and other groups and individuals in their deliberations. For items included on the S&T Agenda, the content in this agenda is limited to a brief synopsis along with the current proposal. Full background information on these items can be found in the NCWM S&T Committee’s Interim Report and Carryover Agenda. The Interim Report is available at the following web address; the carryover agenda will be posted after September 1 when it is distributed to the Regional Weights and Measures Associations.

## **4. Limiting Flow Rate During Field Testing of LPG Retail Motor-Fuel Systems**

**Source:** Robin Parsons, Parafour

**Recommendation/Item Under Consideration:** The Sector is asked to review and discuss the following proposal to modify NIST Handbook 44 LPG and Anhydrous Ammonia Liquid-Measuring Devices Code Paragraph N.4.1. Normal Tests and provide input to assist the submitter and the S&T Committee in considering this proposal.

Modify N.4.1. as follows to clarify the need to test the unit at the maximum discharge flow rate that the system is capable of in the application for which it was designed:

**N.4.1. Normal Tests.** – The “normal” test of a device shall be made at the maximum discharge flow rate developed under the conditions of the installation. Any additional tests conducted at flow rates down to and including one-half the sum of the maximum discharge flow rate and the rated minimum discharge flow rate shall be considered normal tests. **Adjustments of the inlet valve of the proving device to limit the maximum flow of the device, as designed for and capable of in normal use (and as marked on the data plate as indicated on the device COC), shall be permitted.**

(Amended 1998 **and 20XX**)

An alternative to changing the wording, and possibly warranted even IF changing the wording, would be to send a clarification statement to all state metrology enforcement divisions, explaining that the control of flow when testing a lower flow device with a high flow prover which could exceed the metrological rating of the device being tested, is both permitted and required.

Optionally, wording could be added to require the use of a proving device with a flow path diameter no greater than that of the device being tested, e.g., 3/4” metering device – uses 3/4” prover or 18 gpm max flow rate metering device uses an 18 gpm max flow rate prover.

**Background:** The current market for LPG powered vehicles uses a liquid injection system, which causes an elevated temperature in the vehicle storage tank. In order to fill these vehicles, the LPG station must use a “High Differential Pressure” pump. These pumps typically have flow rates in the range of 20 to 30 GPM. Most LPG Autogas vehicle fueling dispensers, have meters with a maximum flow rate of 12 to 18 gpm. In normal operation, there is NO commercial/retail dispensing application where the receiving tank will take flow greater than 15 gpm, due to the design of the tank fill valve circuit, which has a maximum nominal flow path equal to +/1 1/2”. However, most calibration inspectors use a 100-gallon volumetric prover, which has a 1-1/2” inlet valve. Thus, when performing a calibration verification draft, it is possible to exceed the maximum NTEP rated flow rate of the meter/dispenser due to the high capacity of the prover fill circuit (which is designed to be used for calibration of 3/4” to 2” size meters) which could never be seen in the actual applications for which the dispenser is designed. Many prover operators/inspectors interpret HB44 section N4 Testing Procedures, N4.1 Normal tests, to mean that they are forbidden to adjust or “throttle” the volumetric prover inlet valve to be within the range of the NTEP documented min/max flow rate, which is greater than the possible in-use for application flow rate. Therefore, when they run the draft at the maximum flow the dispensing system is capable of when attached to a high flow prover, they are substantially exceeding the maximum design flow rate of the dispenser, and the actual maximum flow rate it can ever achieve in any typical metering activity. Sometimes they red-tag the unit and tell the customer they need a higher capacity meter, and sometimes they adjust the calibration to be within tolerance with the meter over-speeding, which of course results in the meter being out of tolerance when used in normal operations for which it is designed.

## **5. Development of Infrastructure to Validate the Use of “Master Meters”**

**Source:** NIST OWM

**Background Information:** Over the past few years, weights and measures jurisdictions and industry have expressed an interest in using “master meters” to conduct testing of compressed natural gas metering systems and other types of measuring systems. OWM concurs that the use of master meters has merit and may offer a safer, more cost effective, and time efficient method of testing for some types of measuring systems than other test methods. The Measuring Sector has also worked to identify criteria to allow the use of “master meters” in type evaluation testing using criteria provided by NIST regarding “essential elements of traceability.”

As mentioned in its comments on this general subject on related issues before the NCWM S&T Committee over the past few years, OWM has pointed out that ensuring traceability of measurements and compliance with the Fundamental Considerations of NIST Handbook 44 is critical to ensuring credibility and support of any test method for use in official testing. OWM has been repeatedly asked by regulatory officials and industry for assistance and guidance in putting this infrastructure in place. In order to assist regulators and industry in this endeavor, OWM is devoting resources to working with industry and officials to assist in the development of a framework that will facilitate the validation of this test method.

OWM is in the process of purchasing six Coriolis meters for the purpose of collecting and analyzing data obtained from field testing using this method. NIST OWM will purchase the following Coriolis meters:

- Two ½ inch
- One 1-inch
- Two 1 ½ inch and
- One 3-inch, and
- ½ inch meter, specific for testing CNG.

**Recommendation:** This item is included on the Sector’s agenda to allow OWM to provide an update on this project if time allows. No action is asked of the Sector; however, input is welcome.

## **6. S&T 2018 Carryover Item VTM-1B – S.3.1.1. Diversion of Measured Liquid and UR.2.6. Clearing the Discharge Hose**

**Source:** New York and NIST OWM (2018)

**Purpose:** Provide specifications and user requirements for manifold flush systems to help ensure their design and use does not facilitate fraud. Recognize that there is a balance between a mechanism that provides an important safety benefit but also, if used incorrectly, facilitates fraud. Ensure that VTM owners understand their responsibilities when installing such a system and ensure uniformity in enforcement throughout the country.

**Items Under Consideration:** See Appendix F to this Agenda.

**Background:** At its 2018 Annual Meeting, the NCWM adopted modifications to Paragraph S.3.1. Diversion of Measured Liquid and added new Paragraphs S.3.1.1. Means for Clearing the Discharge Hose and UR.2.6. Clearing the Discharge Hose. Additional changes to these paragraphs were considered at that meeting, but they could not be acted upon without delaying the original proposal. The S&T Committee agreed to carryover a portion of that item as outlined in the “Items Under Consideration” above to allow the submitter and OWM to propose additional changes to help ensure these flush systems are designed and used in such a way so as to minimize the facilitation of fraud.

For full details on this issue, including the submitter’s justification and recommendations and other background information, please see Appendix A, Page S&T – A5 in the S&T Committee’s 2018 Interim Report found at: <http://www.ncwm.net/resources/e30d:p74t7a-2qg/files/76035627zccf278df/fn/4-ST-Web.pdf>

## **7. S&T 2018 Carryover Items in Block 4 – Terminology for Testing Standards**

**Source:** NIST OWM (2018)

**Purpose:** To remove the current limited definition and use of the term “Transfer Standard” and eliminate terms “Testing Standards”, “Verification (Testing) Standards”, and instead use the term Field Standard, consistent with its reference in Handbook 44, Appendix A, Fundamental Considerations and its use in several sections of Handbook 44. To correct the broad use of the term Transfer Standard and instead replace its use with the term Field Standard. To update all use of the term “standard” to use the term “Field Standard.” To remove the current limited definition of Transfer Standard and instead use the term Field Standard.

**Item Under Consideration:** See Appendix F to this Agenda.

**Background:** A review of terminology used to describe standards used in field testing indicate a number of inconsistencies in both NIST Handbook 44 as well as in common usage. For example, the term “transfer standard” is used in the Cryogenic Liquid-Measuring Devices Code and defined in Appendix D of Handbook 44; however, the

definition is limiting in scope and may be better termed simply a “field standard.” All instruments/devices used as a Field Standard in the testing of Weighing and Measuring Devices, regardless of nomenclature, must comply with the requirements of HB 44, Appendix A, Fundamental Considerations Associated with the Enforcement of Handbook 44 Codes, paragraph 3.2 Testing Apparatus, Adequacy. Using the term transfer standard as it is recently being applied in no way negates this requirement of adequacy and confuses the user as to the nature of the field standard being used. Likewise, the term “standard” to describe a field standard can also cause confusion since there are multiple meanings associated with the word “standard.”

There are also multiple definitions pertaining to various types of “standards” in NIST Handbook 130 that may be confusing relative to the terminology used in Handbook 44. OWM identified proposed changes in multiple areas of Handbook 44 (as shown in the Item Under Consideration in Appendix F to this Agenda) in an attempt to improve the consistency among the various references in Handbook 44. Although OWM heard support for the proposed changes to the Metering Codes from MMA, others recommended “Developing” status. Some of the comments received included whether or not current standards referred to as “transfer standards” should be considered “field standards” and if these standards were intended or can meet the fundamental considerations that state “when the standard is used without correction its combined error and uncertainty must be less than one-third of the applicable tolerance.” Based on comments received and those made at the 2018 Interim and Annual Meetings, it is clear this issue is more complex than originally envisioned and OWM concurs that additional development is needed.

During the S&T Committee’s work session at the 2018 NCWM Annual Meeting, the Committee agreed to recommend that the entire block of items move forward as “Developing.” The Committee also concluded that all of the block 5 items, as well as LPG-4, and MFM-2 are related to the Block 4 items due to terminology, and that the submitter of the Block 4 items (OWM) provide detail of their developing language to the submitter of the related items (Endress & Hauser Flowtec AG USA) to prevent conflicting terms as they are considered during future meetings.

For full details on this issue, including the submitter’s justification and recommendations and other background information, please see Appendix A, Page S&T – A17 in the S&T Committee’s 2018 Interim Report found at: <http://www.ncwm.net/resources/e30d:p74t7a-2qg/files/76035627zccf278df/fn/4-ST-Web.pdf>

**Recommendation:** This item is still under development. OWM has received a number of comments on this proposal and is continuing to work on revisions to the proposal in response to those comments. This item is included to keep the Sector apprised of the work and OWM continues to welcome comments to assist in further developing changes to various HB44 codes and sections that will improve understanding and consistency relative to references to test standards.

## 8. S&T 2018 Carryover Items in Block 5 – Define Field Reference Standard

**Source:** Endress+Hauser Flowtec AG (2018)

**Purpose:** Add definition for field reference standard meter to HB44. Delete transfer standard definition. Change terms in sections 3.34, 3.38, and 3.39.

**Item under Consideration:** Amend paragraphs in multiple codes as follows. See Appendix F to this agenda for the specific proposed changes.

B5: CLM-2	D	N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards
B5: CDL-2	D	N.3.2. Transfer Standard Test and T.3. On Tests Using Transfer Standards
B5: HGM-2	D	N.4.1. Master Meter (Transfer) Standard Test and T.4. Tolerance Application on Test Using Transfer Standard Test Method
B5: OTH-4	D	Appendix D – Definitions: field reference standard meter and transfer standard

**Background:** During S&T open hearings discussion in July 2017 it was pointed out that the term transfer standard which is used in the proposal to amend HB44 3.37 N.3 and 3.32 N.3 Test Drafts is incorrect. The statement made also suggested that the use of transfer standard is incorrectly used in HB44 code sections 3.34, 3.38 and 3.39. It was

suggested that a more appropriate term to use is field reference standard or field reference standard meter. There is no definition in OIML G18 which supports the use of the term transfer standard. There is suggestive basis to support reference standard as it is used textually in OIML G18.

NIST has no procedural documents in place to justify the revision with a definition. The definition of transfer standard is used in code sections 3.34, 3.38 and 3.39 and that those sections do not need to change.

During the 2018 NCWM Interim Meeting, open hearings, the Committee heard comments from Mr. Michael Keilty (Endress & Hauser Flowtec AG USA), submitter of this block of items. Mr. Keilty reported he had developed this proposal with help from Mr. Henry Oppermann (Weights and Measures Consulting, LLC). In written comments to the Committee by Mr. Oppermann, on another item. Mr. Oppermann opposed the term "Transfer Standard" in that it is a temporary measurement reference. Mr. Keilty stated that he agrees with this interpretation and states that what he is proposing is for a "field reference standard meter" term and recommends that the items move forward (he did not specify to what status).

Mr. Henry Oppermann (Weights and Measures Consulting, LLC) provided comments for Stand Alone Items LPG-4 and MFM-2. Mr. Oppermann agrees with Mr. Keilty that these are field standards, however, the terminology "field reference standard meter" should just be "field standard". Anything that meets the 1/3 requirement should be accepted, but currently, there is no data to prove that these can meet the 1/3 requirement. He stated that this proposal specifies that the size of the test draft be in two minutes but has no explanation for the size, and it conflicts with the previous proposal that said that larger test drafts were needed. He also stated that the definition for "field reference standard meter" is vague and insufficient, the requirements for accuracy and repeatability are not defined. He commented that a NIST 105 series handbook is not yet established for these and that there are currently no test procedures or parameters for performance requirements to demonstrate these systems can meet the requirements. The definition would apply to all codes and more study and assessment is needed. He commented that more data is needed before this is moved forward, and that the items should be given a "Developing" status.

Mr. Constantine Cotsoradis (Flint Hills Resources) provided comments, at this time, intending to address item MFM-2 (see Item MFM-2 for comments).

Mr. Michael Keilty (Endress & Hauser Flowtec AG USA), asked the Committee that it be noted that the 2 previous commenters, Mr. Oppermann and Mr. Cotsoradis, were speaking to Stand Alone Items LPG-4 and MFM-2 and not only Block-5.

Mr. Dmitri Karimov (Liquid Controls), speaking on behalf of the MMA, reported that while the MMA supports Block 4, the terminology in Block 5 conflicts with those in Block 4 and therefore recommends that the items be "Developing."

Mr. Ross Andersen (NY- retired) commented that all standards are a transfer standard, transferred from one measurement to another. He stated that what is needed is to make sure that the standard we use is accurate to 1/3 of the applied tolerance. In regard to the data that has been discussed, he asks where is the data for what we use now? There is none. It was just selected. He stated that what we need is one test method as the "referee standard" and that whatever test method is used, that it can agree with the reference.

During the Committee's work session, the members considered the comments heard on this block of items. The Committee agreed to recommend that this block of items move forward as "Developing." The Committee also agreed that all the Block 5 items, as well as LPG-4, and MFM-2 items are related to the Block 4 items due to terminology and that the submitter of Block 4 (OWM) provide detail of their developing language to the submitter of the related items (Endress & Hauser Flowtec AG USA) to prevent conflicting terms as they are considered during future meetings.

The Committee did not take comments during open hearings on Developing items at the 2018 NCWM Annual Meeting except to grant the submitter of a Developing item (or block of Developing items) an opportunity to provide an update on the progress made to further develop the item(s) since the 2018 NCWM Interim Meeting.

Mike Keilty (Endress+Hauser Flowtec AG), the developer of this item provided comments during the NCWM annual meeting open hearings. He mentioned that this item has been before the conference since 2015. He agreed that the

definitions are confusing and agrees with the work that NIST is doing to clarify the terminology. Mr. Keilty recommended that any new information be presented at the January meeting and recommends that Block 5 items move forward as Voting items at the 2019 NCWM Annual Meeting.

The Committee received written comments from Seraphin Test Measure Company on all items in Block 4 regarding transfer standards raising several concerns and recommending the items remain developmental until such time those concerns have been resolved.

OWM provided the following written recommendations and comments to this block of items as feedback to the submitter and as part of its analysis of the S&T Committee's 2018 agenda items

The Committee agreed to carryover this block of items on its 2019 agenda to allow for further discussion and development of these proposals.

For full details on this issue, including the submitter's justification and recommendations and other background information, please see Appendix A, Page S&T – A20 in the S&T Committee's 2018 Interim Report found at: <http://www.ncwm.net/resources/e30d:p74t7a-2qg/files/76035627zccf278df/fn/4-ST-Web.pdf>

## 9. S&T 2018 Carryover Items in Block 7 – Address Devices and Systems Adjusted Using a Removable Digital Storage Device

**Source:** NIST OWM (2013)

**Purpose:** Expand the scope of definition to cover instances where the “other device,” as noted in the current definition, may be necessary to the operation of the weighing or measuring device or which may be considered a permanent part of that device.

**Item under Consideration:** The Sector is asked to review and provide input on the following items under this block. See Appendix F to this Agenda for proposed language under consideration for these items.

B7: GEN-2	D	G-S.8.2. Devices and Systems Adjusted Using Removable Digital Device Storage
B7: LMD-1	D	S.2.2. Provision for Sealing.
B7: VTM-2	D	S.2.2. Provision for Sealing.
B7: LPG-2	D	S.2.2. Provision for Sealing.
B7: HGV-1	D	S.2.2. Provision for Sealing.
B7: CLM-4	D	S.2.5. Provision for Sealing.
B7: MLK-1	D	S.2.3. Provision for Sealing.
B7: WTR-1	D	S.2.1. Provision for Sealing.
B7: MFM-1	D	S.3.5. Provision for Sealing.
B7: CDL-4	D	S.2.5. Provision for Sealing.
B7: HGM-3	D	S.3.3. Provision for Sealing.

**Background:** The proposal was originally intended to address the use of removable digital storage devices, such as USB flash drive, memory cards, etc. in grain moisture meters (GGMs). This proposal was later expanded to address all device types when it was recognized that other weighing and measuring systems may make use of the same type of media to make metrologically significant changes. The scenario originally identified in this item recognized that there are systems in which removable digital storage devices can be used as either data transfer devices that are not necessary to the operation of the device or as data storage devices which are necessary to the operation of the device. If removable data storage devices are necessary to the operation of the device, they are not covered by the current definition of remote configuration capability in HB 44.

Rather than propose requirements which could potentially impact weighing and measuring systems using other methods of making metrologically significant changes, OWM is proposing the addition of:

- (1) A General Code paragraph (G-S.8.2.) which specifies the method of sealing for those devices which can be adjusted using digital storage media; and
- (2) Changes to each specific HB44 code to reference this new General Code paragraph as the required method of sealing for those devices which can be adjusted using digital storage media.

The intent of proposed new paragraph G-S.8.2. is to address the sealing of devices and systems adjusted using a removable digital storage device that must remain in the device in order for the device to be operational. The intent of all the other items in this block is to provide an exemption to the existing sealing requirements in each of the device codes being applied when the calibration or configuration parameters are changed using a removable digital device and direct those performing the inspection to paragraph G-S.8.2.

OWM has developed multiple iterations of these proposed changes based on comments from the weights and measures community, including from the NTEP Measuring Sector. The most recent proposal (with changes to the General Code paragraph to address comments made at the 2018 Interim Meeting) are shown in the Item Under Consideration in Appendix F to the Sector's Agenda. With these changes, OWM believes these items are fully developed and ready for vote.

During its work session at the July 2018 NCWM Annual Meeting, members of the S&T Committee agreed that the amended version of paragraph G-S.8.2. offered by OWM to address the concern raised by a meter manufacturer improved clarification. Consequently, the Committee agreed to OWM's request to replace the existing proposed paragraph G-S.8.2. with the amended version made available by OWM and as shown in Item under Consideration for this item. No other changes were made to any other item in this block and members of the Committee agreed they believe the items in this block are fully developed and should be presented for vote in the 2019 NCWM Conference cycle. Refer to the Committee's 2018 Interim Report to view the version of paragraph G-S.8.2. that was replaced by the Committee at the 2018 NCWM Annual Meeting.

For full details on this issue, including the submitter's justification and recommendations and other background information, please see Appendix A, Page S&T – A23 in the S&T Committee's 2018 Interim Report found at: <http://www.ncwm.net/resources/e30d:p74t7a-2qg/files/76035627zccf278df/fn/4-ST-Web.pdf>

## **10. S&T 2018 Carryover Item GEN-3 – G-S.2. Facilitation of Fraud – “Skimmers”**

**Source:** Arizona, Florida, Maine, Michigan, and Cambridge, MA (2018) and NCWM S&T Task Group on Skimmers

**Purpose:** To prevent access and tampering by unauthorized persons to any area of the device where electronic financial transactions occur, credit card information is obtained, and/or personal information is stored or transmitted.

**Item under Consideration:** See Appendix F to this Agenda.

**Background:** The following background information appeared with this item when it was originally presented to the S&T Committee:

Given the potential financial impact to consumers and credit issuing companies Weights & Measures recognizes the need to offer more protection to both buyer and seller in these transactions. The current design of these devices offers little to no barrier to fraud through theft of credit information, as such it is our belief that the current design, in most cases, already violates G.S.2. by facilitating easy access to allow installation of these fraudulent card reading devices. Therefore, in our opinion stronger means must be implemented to decrease the potential for fraudulent activity with these devices.

The Florida Department of Agriculture and Consumer Services estimates that on average, each skimmer results in 100 counterfeit cards, each of which are used to make \$1,000 in fraudulent purchases. In other words, a single skimmer typically leads to \$100,000 in theft. This is a nationwide problem that causes millions of dollars in fraudulent charges to consumers, device owners and banking institutions each year. A solution can be achieved through upgraded security measures on the weighing and measuring devices that fall within the guidelines of this handbook.

One possible argument is that these preventative measures should be in User Requirements instead of in Specifications, but this is intended to be a long-term solution. The State of Florida has enacted legislation to require device users to add security measures. They have found that most owner/operators have chosen to use security seals or non-standard locks on the dispensers and that 85% of the skimming equipment being found is in devices with user applied security measures. User applied security measures are not as effective as electronic security and/or unique, tamper proof locks. The current design of these devices offers little to no barrier to fraud through theft of credit information, as such it is our belief that the current design, in most cases, already violates G.S.2. by facilitating easy access to allow installation of these fraudulent card reading devices.

Manufacturers of these devices may argue that the cost to make the necessary upgrades will be prohibitive. This item is not intended to be retroactive and the cost of the additional security measures will be universal and not place any manufacturer at a competitive disadvantage. Several manufacturers of electronic security systems designed for retail motor fuel dispensers have products available and at least three new manufacturers of low cost systems have recently come into the marketplace (at least one of them is working with OEM manufacturers and the security systems are being integrated into newly manufactured dispensers).

At the 2018 NCWM Interim Meeting, the S&T Committee heard comments both in favor or and in opposition to the proposal. The Committee agreed to recommend giving this item an “Assigned” status and requested the formation of a Task Group (TG). At the 2018 NCWM Annual Meeting, Mr. Hal Prince (FL), Chairman of the TG reported the following to the Committee, noting work is ongoing and the TG has been meeting bi-weekly since May 2018:

1. Is this a weights and measures issue that NCWM should take on?
2. If so, does weights and measures have the authority to require manufacturers and users of commercial weighing and measuring equipment to take whatever steps needed to ensure such equipment prevents unauthorized access to nonmetrological changes to the equipment?

Mr. Prince further reported members of the TG were recently surveyed and asked these questions, but results are not yet available. It is hoped more information will be available to report at the next (2019) NCWM Interim Meeting.

Mr. Prince also stated that more members and stakeholders are needed for the TG. Members of the TG believe that Weights and Measures needs an educational component, e.g., an outreach program set up for law enforcement and consumers and perhaps a “best practice guide” developed.

For full details on this issue, including the submitter’s justification and recommendations and other background information, please see Appendix A, Page S&T – A27 in the S&T Committee’s 2018 Interim Report found at: <http://www.ncwm.net/resources/e30d:p74t7a-2qg/files/76035627zccf278df/fn/4-ST-Web.pdf>

## **11. S&T 2018 Carryover Item LPG-3: S.2.5. Zero-Set-Back Interlock, Stationary and Vehicle-Mounted Meters, Electronic**

**Source:** Maryland (2018)

**Purpose:** To align the LPG code with the VTM code for electronic registers/indicators used in stationary and mobile applications.

**Item under Consideration:** See Appendix F to this Agenda.

**Background:** This specification has been in place for VTMs for many years. Its purpose is to prevent a second party from being charged for product delivered to the first party. However, there is no requirement for interlocks in the LPG Code, other than the requirement added in 2016 for stationary retail motor fuel devices. Currently, the only

protection is provided by two User Requirements paragraphs, UR.2.5. Ticket in Printing Device, which prohibits the “riding of tickets” (having a ticket in the printer while the vehicle is moving from one location to another) and UR.2.1. Return of Indication and Recording Element to Zero, which requires the indications to be set to zero before a delivery. Both requirements are extremely difficult, if not impossible to enforce where printers are frequently mounted in the cab of the vehicle and are not visible to an observer outside the vehicle. In addition, electronic registers used in stationary applications shall not be exempt from this requirement due to the possibility of a second party being charged for product delivered to the first party in this scenario as well.

This requirement for electronic indicators already exists in the VTM Code and being as the majority of electronic registers are used in both applications, I cannot see any objections as to why this requirement should be added to the LPG and Anhydrous Ammonia Liquid-Measuring Device Code.

During the 2018 NCWM Interim Meeting, the Committee received multiple comments in support of this item, including comments from NIST OWM suggesting some modifications adjustments to the proposed language. Based on comments received, the Committee felt nonretroactive date is needed before advancing the item to a “Voting” status and changed the status to “Developing” pending agreement on an effective date. The Committee did not invite comments from other than the submitter at the 2018 Annual Meeting. No updates were provided.

During the Committee’s work session, members of the Committee felt that the nonretroactive date needed to be included before the item could be advanced to a “Voting” status. The Committee elected to maintain the item on its agenda as “Developing” pending agreement of an effective date.

The Committee did not take comments during open hearings on Developing items at the 2018 NCWM Annual Meeting except to grant the submitter of a Developing item (or block of Developing items) an opportunity to provide an update on the progress made to further develop the item(s) since the 2018 NCWM Interim Meeting. There were no comments or updates provided on this item by the submitter at the Annual meeting.

For full details on this issue, including the submitter’s justification and recommendations and other background information, please see Appendix A, Page S&T – A51 in the S&T Committee’s 2018 Interim Report found at: <http://www.ncwm.net/resources/e30d:p74t7a-2qg/files/76035627zccf278df/fn/4-ST-Web.pdf>

## **12. S&T 2018 Carryover Item LPG-5: N.4.1.2. Repeatability Tests and N.4.2.4. Repeatability Tests for Type Evaluation**

**Source:** Ross Andersen, Retired (2017)

**Purpose:** To address differences between Handbook44 and Publication 14 practices for repeatability testing.

**Item under Consideration:** See Appendix F to this Agenda. This version of the Item Under Consideration reflects changes proposed by the submitter following the July 2018 NCWM Annual Meeting.

**Background:** The proposal is aimed to correct a number of areas of confusion. First, the inclusion of repeatability in the N.4.1. series indicates that repeatability is to be run at normal flow rates. There was some confusion if this was the actual intent when these sections were added to HB44 in multiple codes. Running the tests only at Normal flow rates is consistently how the test was typically performed in the field. The amendment to N.4.1.2. was to clarify this explicitly for field tests and type evaluation tests.

A new paragraph was proposed because NTEP has required repeatability on tests over the entire range of flow rates conducted under controlled conditions during type evaluation testing. This means anywhere between rated maximum and minimum flow rates. The proposed code addition would have formalized and legitimized what has been done for a long time.

Another question arose whether gross or net results could be used in repeatability tests? Obviously, you can’t compare net to gross but you can compare three consecutive gross or three consecutive net results. The tolerance paragraph in

the LPG Code specifies the tolerance does not apply to the test of the compensator. Also, the practice in HB44 is to test one variable at a time to the extent possible, the revision clarifies that repeatability is addressed to gross meter performance only. This can be through deactivating the ATC or just using gross values where both gross and net are available from the same test.

The submitter provided proposed changes with the goal of clarifying and maintaining the status quo as the code is presently written. Following the July 2018 Annual Meeting, the submitter submitted a revised version of the Item Under Consideration in response to comments received on the item. The proposal outlined in the Item Under Consideration reflects the updated version provided by the submitter. The submitter provided additional analysis and rationale for the updates made to the original proposal as outlined below.

In the original proposal (carried as developing item LPG-5 in 2018 L&R Report), the intent was to address only the LPG code and preserve the status quo based on what presently appears in the Handbook. It was understood that the decisions on this item would set precedents affecting all LMD codes that contained a repeatability test. After discussion at the 2018 Interim and Annual Meetings, with various Meter Manufacturers, with OWM, and with other interested parties, the original proposal is being amended. The questions being posed have been broadened to include all LMD codes. The issues in this revision can now be expressed through the following questions:

1. Should the repeatability test be conducted net (compensated) or gross (uncompensated)? Or possibly, are both allowed provided all test results are from the same mode of operation?

Response to Issue 1.

In developing this item, I heard comments agreeing with the original proposal to use only gross results and comments differing in that either gross or net should be accepted provided all results are from the same mode. The tolerance paragraph in the LPG/NH4 code indicates the test does not apply to the test of the ATC system. It can be argued that the ATC system already has a performance requirement in T.4., requiring agreement between net and gross, i.e. compensated and uncompensated results. This tolerance reads much like the T.3. paragraph. Also, Handbook 44 precedent tends to support performing the tests in gross mode only. That precedent implies that in testing one component or variable, you attempt to hold all other components or variables constant. The revised proposal retains the limitation of performing the test using gross results (uncompensated).

In those codes where different device applications are sometimes gross and sometimes net, it will be necessary to specify using gross results, if the device has ATC capability. It is proposed to add the following text in the note paragraph specifying the repeatability test. “For devices equipped with an automatic temperature compensator, the test results shall be based on uncompensated (gross) volume, i.e. with the temperature compensator deactivated.” (or equivalent wording) In the LPG/NH4 code this change renders the extra wording in T.3. unnecessary, i.e. that the tolerance does not apply to ATC.

2. Should the repeatability test be a normal test as presently presented in the Code? That is, is the test limited to flow rates within the range of normal tests? Note that the repeatability test now appears in the Normal Test section in every affected HB44 LMD Code, Sections 3.30, through 3.39. The table below shows the history of the related sections.

Code	Note Paragraph	Tolerance Paragraph
3.30. LMD	N.4.1.2. (Added 2001)	T.3. (Added 1992) (Amended 2001 and 2002)
3.31. VTM	N.4.1.2. (Added 2001)	T.3. (Added 1992) (Amended 2001 and 2002)
3.32. LPG/NH4	N.4.1.2. (Added 2001)	T.3. (Added 1992) (Amended 1997 and 2001)
3.33. Vapor	N.4.1.2. (Added 2002)	T.3. (Added 2002)

3.34. Cryogenic	N.5.1. (Added 2001)	T.4. (Added 2001)
3.35. Milk	N.4.1.1. (Added 2002)	T.3. (Added 2002)
3.36. Water	N.4.1.1. (Added 2002)	T.1.1. (Added 2002) (Amended 2010)
3.37. Mass Flow	N.6.1.1. (Added 2001)	T.3. (Amended 1992, 1994, and 2001)
3.38. CO <sub>2</sub>	N.4.1.1. (Added 2002)	T.2.1. (Added 2002)
3.39. Hydrogen	N.6.1.1. (Tentative Code 2010)	T.3. (Tentative Code 2010)

#### Response to Issue 2.

Overwhelming support has emerged for the proposition that repeatability tests may be performed at any flow rate within the legitimate operating range of the device. To accomplish this, the Note paragraph on repeatability tests must be removed from the Normal Test section of each Code and placed in its own section. In the proposed wording below, the repeatability Note was simply moved to the next available number under Testing Procedures in each Code. For example, in 3.30. LMD Code, note N.4.1.2. is proposed to be renumbered N.4.6. This results in the sequence N.4.1. Normal tests, N.4.2. Special Tests, N.4.3. Money-Value Computation Tests, N.4.4. Pour and Drain Times, N.4.5. Temperature Correction on Wholesale Meters, and N.4.6. Repeatability Tests. NIST OWM has suggested inserting it after Special Tests and renumbering N.4.3. to N.4.5. Either way accomplishes the same end. Adding at the end of the list may cause less disruption.

However, removing repeatability from the special tests now leaves the issue of flow rates for conducting the test unstated. I suggest we need to add a statement to each Note as follows: “When conducting the tests, the flow rates shall be within the minimum and maximum discharge rates as marked by the manufacturer.” However, some codes use different terminology and in some cases minimum and maximum discharge rates are not marked like RMFD’s. For these cases I propose to add an additional statement regarding minimum discharge rates and maximum discharge rates as appropriate to that code.

3. If the test may only be performed as a normal test in Issue 2, how do we legitimize the NTEP policy of applying the tolerance to repeatability tests at special test flow rates? Based on the response to Issue 2, this will be a moot issue and can be dropped moving forward.

For full details on this issue, including the submitter’s justification and recommendations and other background information, please see Appendix A, Page S&T – A59 in the S&T Committee’s 2018 Interim Report found at: <http://www.ncwm.net/resources/e30d:p74t7a-2qg/files/76035627zccf278df/fn/4-ST-Web.pdf>

### 13. S&T 2019 - New Proposal – Section 3.30 LMD Code - Airport Refueling Systems

**Source:** G. Diane Lee and Tina Butcher (NIST OWM)

**Purpose:** Modify the Liquid Measuring Devices Code to address self-service airport fueling dispensing systems equipped with a primary analog indicator and a separate card activated console with a printer that are used to fuel multiple tanks on aircrafts.

**Item Under Consideration/Background:** See corresponding NCWM Form 15 in Appendix H to this Agenda.

**14. S&T 2019 – New Proposal – Section 3.30 LMD Code - Recognition of Diesel Exhaust Fluid and Other Products**

**Source:** G. Diane Lee and Tina Butcher (NIST OWM)

**Purpose:** Modify the Liquid Measuring Devices Code to adequately address requirements for retail liquid measuring devices that measure DEF and other products.

**Item Under Consideration/Background:** See corresponding NCWM Form 15 in Appendix H to this Agenda.

**15. S&T 2019 – New Proposal – Section 3.37. Mass Flow Meters Code – Location of Marking Information, RMFDs**

**Source:** Juana Williams (NIST OWM)

**Purpose:** Extend the NIST Handbook 44 Mass Flow Meters Code provision allowing the use of a key or tool for accessing internal required markings for liquid retail motor-fuel dispensers to include retail motor-fuel dispensers delivering compressed gases.

**Item Under Consideration/Background:** See corresponding NCWM Form 15 in Appendix H to this Agenda.

**16. S&T 2019 – New Proposal – Block – Mass Flow Meters Code; Hydrogen Gas Measuring Devices Code; and Electric Vehicle Refueling Code – Addition of Timeout Requirements**

**Source:** Juana Williams (NIST OWM)

**Purpose:** To prevent the facilitation of fraud on a vehicle fueling system equipped with the capability for authorization of a transaction by a credit card, debit card, or cash.

**Item Under Consideration/Background:** See corresponding NCWM Form 15 in Appendix H to this Agenda.

**17. S&T 2019 – New Proposal – Section 3.37. Mass Flow Meters Code – Deletion of “GLE” and Addition of DGE Maximum Quantity Division**

**Source:** Juana Williams (NIST OWM)

**Purpose:** Delete the reference to “gasoline liter equivalent (GLE)” since that term that was removed from all Mass Flow Meters Code requirements in 2016. Clarify and limit the maximum value of the quantity division for indicated and recorded deliveries in the diesel gallon equivalent (DGE) to an increment of 0.001.

**Item Under Consideration/Background:** See corresponding NCWM Form 15 in Appendix H to this Agenda.

**18. S&T 2019 – New Proposal – Section 3.40 Electric Vehicle Fueling Systems Code - Definition - Power Factor**

**Source:** Tina Butcher (NIST OWM)

**Purpose:** To simplify the definition for “Power Factor” currently included in NIST Handbook 44 (HB44) Section 3.40. Electric Vehicle Fueling Systems – Tentative Code. To align the current HB 44 definition with a definition included in a proposal to adopt a “Method of Sale” requirement for electric watt hour meters that is currently under consideration by the NCWM Laws & Regulations Committee.

**Item Under Consideration/Background:** See corresponding NCWM Form 15 in Appendix H to this Agenda.

**19. Meeting Location and Date of 2019 Measuring Sector Meeting**

**Background:** This Item is included on the Sector’s agenda to apprise Sector members of arrangements for the 2019 Sector meeting.

At its 2017 meeting, the Sector concluded most Sector members prefer not to hold the meeting in conjunction with a regional association meeting and, in particular, want to avoid holding it over a weekend. The Sector identified the following possible destinations for future meetings to recommend to the NCWM BOD:

- Atlanta, GA
- Baltimore/Annapolis, MD
- Columbus, OH
- Denver, CO (different hotel than before)
- Fort Wayne, IN
- Indianapolis, IN
- Jacksonville, FL
- Orlando, FL

In June 2018, NTEP Director, Jim Truex polled the Sector on potential locations and dates for the 2019 Sector Meeting. Based upon the results of that poll, the meeting will be held September 24 – 26, 2019 in Denver, CO as follows:

**Meeting Location:**

Holiday Inn & Suites  
6900 Tower Road  
Denver, CO 80249  
(303) 574-1300

**Dates:**

Tuesday, 9/24/19: 8 am – 5 pm  
Wednesday, 9/25/19: 8 am – 5 pm  
Thursday, 9/26/19: 8 am – 5 pm

Final meeting and lodging details will be provided closer to the 2019 meeting.