Executive Summaries from the NIST OWM Analysis of the 2023 NCWM Specifications and Tolerances (S&T) Annual Meeting Agenda

The NIST OWM Executive Summary is extracted from the NIST OWM Analysis. This provides the NIST OWM community with high level points that summarize the technical aspects and recommendations for the Item Under Consideration. The full NIST OWM Analysis can be viewed at **https://www.nist.gov/pml/owm/publications/owm-technical-analysis**. NIST OWM offers these comments and recommendations based upon information and input available as of the date of this report.

Language shown in bold face print by **striking out** information to be deleted and **underlining** information to be added. Requirements that are proposed to be nonretroactive are printed in ***bold faced italics***.

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Subject Series List for the Specifications and Tolerances Committee

Handbook 44 – General Code ..... GEN Series

- Scales ..... SCL Series
- Belt-Conveyor Scale Systems ..... BCS Series
- Automatic Bulk Weighing Systems ..... ABW Series
- Weights ..... WTS Series
- Automatic Weighing Systems ..... AWS Series
- Weigh-In-Motion Systems used for Vehicle Enforcement Screening ..... WIM Series

- Liquid-Measuring Devices ..... LMD Series
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- Liquefied Petroleum Gas and Anhydrous Ammonia Liquid-Measuring Devices ..... LPG Series
- Hydrocarbon Gas Vapor-Measuring Devices ..... HGV Series
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- Milk Meters ..... MLK Series
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- Vehicle Tanks Used as Measures ..... VTU Series
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- Graduates ..... GDT Series
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- Berry Baskets and Boxes ..... BBB Series

- Fabric-Measuring Devices ..... FAB Series
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- Odometers ..... ODO Series
- Taximeters ..... TXI Series
- Timing Devices ..... TIM Series
- Grain Moisture Meters (a) ..... GMA Series
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GEN – General Code

NIST OWM Executive Summary for GEN-23.1 – G-N.3. Test Methods

NIST OWM Recommendation: We recognize that GEN-23.1 could be used as a roadmap to what is being proposed in Block 8 to support those States needing a specific requirement in the handbook that address the use of Standards within a Jurisdiction. NIST OWM supports this as a Voting item along with the changes where it ensures continuity in terms, as described in the detailed technical analysis section.

- Some States have argued the need for specific requirements in NIST HB44 for specific standards that can be used for testing commercial devices and this new proposal would address that concern.
- Item GEN-23.1 provides requirements in NIST HB 44 General Code reinforcing that jurisdictions have the authority to use standards that meet the criteria specified in NIST HB 44 Appendix A. Fundamental Considerations, Section 3. Testing Apparatus.
- Block 8 is a proposal to add tolerances to NIST HB 44 General Code applicable to devices tested with Type 2 Transfer Standards, add definitions to NIST HB 44 Appendix D for Type 1 & 2 Transfer Standards and supplement and clarify NIST HB 44 Appendix A. Fundamental Considerations, Section 3. Testing Apparatus.
- With both GEN-23.1 and the Block 8 Items, weights and measures Jurisdictions will have the necessary tools to determine the appropriate Standards for use when testing commercial devices.
- With respect to item WIM 23.1, the community may want to consider amending this item further to include the words "and law enforcement" after the word "commercial" per the NIST OWM Detailed Technical Analysis below.

SCL – Scales

NIST OWM Executive Summary for SCL-22.1 – Recorded Representation of Axle or Axle Group Weights

NIST OWM Recommendation:

- The S&T Committee agreed to update this item during the 2023 NCWM Interim Meeting to reflect some changes proposed by NIST OWM that had earlier been recommended by the SMA and supported by OWM. OWM believes this item is fully developed and should be presented for vote during the upcoming 2023 NCWM Annual Meeting
- The changes proposed by this item require all recorded representations of the different axle and axle group loads of a vehicle, when weighed in a single draft on a multi-independent platform vehicle scale system, to be identified as to which independent platform performed the weighing.

NIST OWM Executive Summary for SCL-22.1 – Recorded Representation of Axle or Axle Group Weights

Note: These scale systems <u>are not</u> required to be equipped with a ticket printer and the changes proposed by this item would not require one. Consequently, the changes proposed by this item only apply to those systems that provide recorded representations of the weight values determined from the scale system.

- OWM believes most (perhaps all) existing multi-independent platform vehicle scale systems used commercially or for law-enforcement purposes are equipped with a ticket printer. OWM also believes most (perhaps all) of these systems already identify, on the printed ticket generated from the scale system, the particular independent platform associated with each axle and axle group load of a vehicle weighed.

- It is important to identify the particular platform associated with each weight value that gets recorded on a ticket by these systems because there are typically four different values that get recorded, i.e., one for each independent platform and a summed total of all three platforms. Failure to provide this information on the ticket would cause confusion and could possibly facilitate the perpetration of fraud.

NIST OWM Executive Summary for SCL-22.2 – UR.1. Selection Requirements, UR.1.X. Cannabis

[1]NIST OWM Recommendation: Additional consideration to possibly withdraw or further develop this item by the Cannabis Task Group and/or its Scales Focus Subgroup is needed. For this reason, OWM recommends this item remain assigned to the Task Group until a decision is made by its members on how best to proceed.

No longer are maximum scale division values proposed for the weighing of cannabis products as was the case with the original proposal. Consequently, no longer do the comments and recommendations that OWM developed previously for this item apply.

The following represents OWM's executive summary for the current proposal and provides justification for the "Assigned" status recommendation:

- Although OWM doesn't believe it was the intent of the CTG Scales Focus Group, adding the terminology, "and weighing of all Cannabis products," to each of the three accuracy class classifications in Table 7a (i.e., Class I, Class II, and Class III) leads one to believe that a scale of any one of those three accuracy classes would be permissible for use to weigh <u>all</u> cannabis products.

- It is OWM's understanding that some participants of the CTG believe NIST HB 44 requirements cannot be applied to scales used commercially to weigh cannabis products unless Table 7a explicitly indicates such use. We do not share this opinion and note that the description in Table 7a for Class III scales specifies "All commercial weighing not otherwise specified…," which would include scales used to weigh cannabis products. That is, the description of "Weighing Application or Scale Type" in NIST HB 44 Scales Code Table 7a for Class III scales adequately captures scales used to weigh cannabis products.

NIST OWM Executive Summary for SCL-22.2 – UR.1. Selection Requirements, UR.1.X. Cannabis

- There are several commercial uses of scales excluded from Table 7a in which jurisdictions continually regulate those scales without concern. For example, scales used in a grocery store to weigh bakery items, meat products, delicatessen products, and produce are not explicitly identified in the existing table; yet these scales are regularly regulated by weights and measures officials throughout the US. The different uses of these scales are encompassed in the terminology, "All commercial weighing not otherwise specified…" as would be the case for scales used to weigh cannabis products.

- We take no position, however, on adding an additional example device type to HB 44 Scales Code Table 7a if others believe it is essential, since the title of the table specifies that the different device types listed are only "typical." Yet, because the "Note" included at the bottom of Table 7a specifies a scale with a higher accuracy class than that specified as "typical" may be used, it is unnecessary to add the additional device type to more than one accuracy class classification in the table. Adding it to the Class III description alone would suffice given that Class I and Class II scales are of higher accuracy class. Additionally, we believe adding the additional device type description to the Accuracy Class I and Class II classifications would cause unnecessary confusion due to the Note explaining that a higher accuracy class may be used.

- OWM currently participates on the Scales Focus Subgroup of the NCWM Cannabis Task Group. Most recently, several members of the subgroup have voiced support for the development of a scale suitability guidance document that could not only be used by the Cannabis industry, but other industries as well. We too would be in favor of developing such a document and believe it would be helpful in selecting a suitable scale.

[1] In contrast to hemp, marijuana remains a Schedule I substance under the Controlled Substances Act. NIST does not have a policy role related to the production, sale, distribution, or use of cannabis (including hemp and marijuana). NIST participates in the National Conference of Weights and Measures (NCWM) as part of NIST's statutory mission to promote uniformity in state laws, regulations, and testing procedures.

NIST OWM Executive Summary for SCL-22.3 Single-Draft Vehicle Weighing., and UR.3.4. Axle and Axle Group Weight Values.

NIST OWM Recommendation:

- SCL-22.3 proposes amending the text in the "Note" of existing HB-44 Scales Code paragraph UR.3.3. Single-Draft Vehicle Weighing and removing the "Note" reference. These proposed changes are needed because in 2022 the NCWM agreed to amend paragraph G-A.1. Commercial and Law-Enforcement Equipment of NIST Handbook 44 to explicitly make clear weighing and measuring equipment used for the purpose of providing a weight or measure for a fee constitutes commercial use of that equipment. Paragraph UR.3.3. currently requires a vehicle or vehicle combination to be weighed "commercially" on a vehicle scale only as a single draft except as noted in subparts (a) and (b) of the paragraph. The "Note" in UR.3.3. currently exempts highway-law-enforcement scales and scales used for the collection of

NIST OWM Executive Summary for SCL-22.3 Single-Draft Vehicle Weighing., and UR.3.4. Axle and Axle Group Weight Values.

statistical data from having to comply. Multi-independent platform vehicle scale systems typically weigh vehicles and vehicle combinations in multiple drafts yet comply with paragraph UR.3.3. because subpart (b) makes this permissible. When installed at a truck stop, the predominant commercial use of these vehicle scale systems is to weigh vehicles and vehicle combinations for a fee. All axles and axle groups of some oversized vehicles, however, are not able to fit onto one of the live platforms of a vehicle scale system and be weighed simultaneously. This necessitates the weighing of the portion of the vehicle that doesn't fit separately from the rest of the vehicle (i.e., split weighing). Weights and Measures officials have typically allowed this practice when the only use of those weight determinations is to verify compliance with highway legal load limits. Because a fee is charged, this too constitutes commercial use of the scale systems, but violates current paragraph UR.3.3. It is for this reason OWM has proposed a change to paragraph UR.3.3.

- SCL-22.3 also adds a new HB 44 Scales Code user requirement to make clear the acceptable use of multi-platform vehicle scale systems to charge a fee for the commercial service of providing customers (usually truckers) axle weights, axle group weights, and total weight of their vehicles to enable them to determine compliance with state and federal legal load limits.

- OWM amended this item in May 2023 based on feedback received from the SMA during and after the 2023 NCWM Interim Meeting. OWM requests the Committee replace the current proposal in SCL-22.3 with the following, which OWM hopes the SMA membership and others will be able to support:

  Amend Handbook 44, Scales Code as follows:

  UR.3.3. Single-Draft Vehicle Weighing. – A vehicle or a coupled-vehicle combination shall be commercially weighed on a vehicle scale only as a single draft. That is, the total weight of such a vehicle or combination shall not be determined by adding together the results obtained by separately and not simultaneously weighing each end of such vehicle or individual elements of such coupled combination. However, the weight of:

  (a) a coupled combination may be determined by uncoupling the various elements (tractor, semitrailer, trailer), weighing each unit separately as a single draft, and adding together the results; or

  (b) a vehicle or coupled-vehicle combination may be determined by adding together the weights obtained while all individual elements are resting simultaneously on more than one scale platform.

  ~~**Note:**~~ This paragraph does not apply to highway-law-enforcement scales**,** ~~**and**~~ scales used for the collection of statistical data**, or scales used to charge a fee for the service of providing weights of the different axle-, axle-group loads, and total weight of vehicles and coupled-vehicle combinations when the only use of those values is to determine compliance with established highway weight requirements and safe distribution of the load.**

  (Added 1992) **(Amended 20XX)**

NIST OWM Executive Summary for SCL-22.3 Single-Draft Vehicle Weighing., and UR.3.4. Axle and Axle Group Weight Values.

And

UR.3.4. Weighing of Axle- and Axle-Group Loads – Weighing the different individual axles and axle groups of a vehicle or coupled-vehicle combination is oftentimes necessary to verify compliance with established highway weight requirements and safe distribution of the load. When a fee is charged for this service, the scale's application is considered "commercial" under the provisions of paragraph G-A.1. Commercial and Law Enforcement Equipment and the scale shall comply with all applicable NIST Handbook 44 requirements for commercial weighing systems.

When weight values for axle- and/or axle-group loads are obtained using multiple-independent platform vehicle scale systems in which all parts of the vehicle or coupled-vehicle combination being weighed are simultaneously positioned on live elements of the scale, the values for the different axle- and axle-group loads may be summed to establish the legal gross vehicle weight.

In no case, however, shall a summed result of the different axle- and axle-group loads of a vehicle or coupled vehicle combination weighed in multiple drafts be used as the legal gross vehicle weight unless subparts (a) or (b) of paragraph UR.3.3. Single-Draft Vehicle Weighing is met.

(Added 20XX)

Renumber existing paragraphs UR.3.4 through UR.3.12.

- OWM notes this item is currently in a "Developing" status. OWM encourages a review of the most current proposal and continues to seek feedback from all interested parties or individuals.

NIST OWM Executive Summary for SCL-23.2 – Table S.6.3.a. Marking Requirements, and Table S.6.3.b. Notes for Table S.6.3.a. Marking Requirements

NIST OWM Recommendation: NIST OWM does not support the item as it is and recommends it is to be deescalated to the developing status. Alternatively, NIST OWM supports the voting status if the proposed marking for vehicle restriction is removed from the proposal.

- Should this proposal be accepted as is (without the removal of the vehicle restrictions), we encourage NTEP to consider identifying specific language to ensure uniformity in marking of vehicle restrictions. This will assist manufacturers and regulators in identifying appropriate markings.

NIST OWM Executive Summary for SCL-23.3 – Verification Scale Division e: Multiple Sections Including, T.N.1.3., Table 6., T.N.3., T.N.4., T.N.6., T.N.8., T.N.9., T.1., T.2., S.1.1.1., T.N.1.2., Table S.6.3.a., Table S.3.6.b., Appendix D, S.1.2.2., Table 3., S.5.4., UR.3., Table 8.

NIST OWM Recommendation: NIST OWM acknowledges the importance of this item and supports the work of the task group. We recommend that the NCWM Task Group (TG), which includes OWM Technical Advisor participation, continue to develop this item. OWM continues to evaluate and analyze the proposal and plans to continue to work with the TG to provide suggestions and recommendations to language, as well as discuss additional concerns that need to be vetted within the TG:

- Portions of the current proposal remain confusing and difficult to follow without the overall picture. We emphasize that for this proposal to succeed, a good understanding by all stakeholders is essential. Since the proposal will impact guidance and training previously provided to inspectors and manufacturers in the application of these requirements, OWM recommends the TG develop high-level guidelines to assist those applying the revised version of the code. For example, bullet points with instructions on points such as:
  - the use of "e" versus "d" in the calculation of tolerances,
  - the determination of accuracy class, and
  - the determination of recommended minimum loads.
- In addition, NIST OWM encourages the task group to simplify the language of some proposed changes. Some examples where the current language may lead to confusion in the correct application of the requirements are:
  - the use of unfamiliar OIML R 76 terminology throughout the item
  - the reference to additional associated requirements in NIST HB 44 when applying a particular requirement. One example are the changes proposed to note 3 of Table S.6.3.b., which instructs those applying the requirement to refer to proposed new Note 4, which only includes exceptions to Note 3. Another example is the parenthetical instruction appearing in Table 8 Recommended minimum load which specifies, "see also notes 3 and 4 in Table S.6.3.b.
- Table 8 in the proposal suggests that the minimum load should be based on the scale division, d, rather than on the verified scale interval, e. This conflicts with the conclusions reached at the 2018 NTEP Lab Meeting and the 2019 Weighing Sector Meeting. NIST OWM is concerned that these contradicting positions may endanger the adoption of the entire proposal. One possible solution is to define the minimum recommended load in terms of verified scale division, e, and submit a separate proposal for amendment of Table 8. Recommended Minimum Load.
- With respect to harmonization with OIML R 76, it is important to recognize that OIML R 76 has restrictions and additional requirements for scales used for "direct sales to the public", where NIST HB44 does not. NIST OWM is of the opinion that scales with a differentiated scale interval cause confusion to the general public and should not be used in such applications. The current proposal does not include a similar limitation of use.

NIST OWM Executive Summary for SCL-23.3 – Verification Scale Division e: Multiple Sections Including, T.N.1.3., Table 6., T.N.3., T.N.4., T.N.6., T.N.8., T.N.9., T.1., T.2., S.1.1.1., T.N.1.2., Table S.6.3.a., Table S.3.6.b., Appendix D, S.1.2.2., Table 3., S.5.4., UR.3., Table 8.

- We believe the current proposal still needs a substantial amount of work to make clear how the proposed changes are to be applied and to correct inconsistencies.

WIM – Weigh-in-Motion Systems – Tentative Code

NIST OWM Executive Summary for WIM-23.1 – Remove Tentative Status and Amend Numerous Sections Throughout

NIST OWM Recommendation: NIST OWM is of the opinion that the item currently has merit, but that it is not yet fully developed. NIST OWM recommends making this item Informational to give the submitters the opportunity to work with the Committee and address all raised concerns.

- The submitter has demonstrated there is a need for permanent and direct enforcement. The proposed code is intended to address this need.

- The proposed tolerances and test procedures are comparable to the OIML recommendation R 134 which is used in multiple countries as the standard for weighing road vehicles in motion (for both direct enforcement and other applications).

However, there are several issues that need to be addressed:

- The proposal should contain provisions to support unattended operation in order to prevent any reasonable doubt about the measurement. The different stakeholders involved in the future development of the proposal should decide on the different provisions that need to be part of the code (e.g., pictures of the vehicle, license plate and its position on the road, and other registrations of the circumstances).

- The selected reference vehicles must be representative to the traffic that can be expected traveling over the WIM installation. E.g., vehicles carrying fluids or vehicles with a steel leaf spring suspension. The current proposal excludes fluid carrying vehicles from the test schedule. Since these systems are to be installed on public roads, fluid carrying vehicles are expected to pass the WIM system. Therefore, this type of vehicle should be included in the evaluation of a WIM system.

- The proposed set of requirements should be comparable to the requirements applicable to other weighing devices to achieve a similar level of confidence in the instrument. The submitters have been supplied with the results of a gap analysis performed by NIST OWM.

- As states apply different 'forgiveness' margins to weighing and measuring results used for law enforcement, it is to be expected that states will also have different requirements on the tolerance of a WIM system used for law enforcement. The required tolerance may also depend on the specific application of the WIM system. To give states more flexibility to determine the appropriate tolerance for a certain application, NIST OWM encourage the submitters to

NIST OWM Executive Summary for WIM-23.1 – Remove Tentative Status and Amend Numerous Sections Throughout

introduce additional classes with different tolerances, and to align the tolerances with the tolerances in OIML R 134.

LMD – Liquid Measuring Devices

NIST OWM Executive Summary for LMD-23.4 – N.3.5. Wholesale Devices.

NIST OWM Recommendation: NIST supports these proposed changes to N.3.5 with adjustments to the item under consideration as shown in Table LMD-23.4, Table 1. This proposal helps to broaden the original intent of the paragraph. We believe the requirements for test drafts were written around the most common test methods at that time. Future requirements for test drafts may be better addressed in the General Code with additional guidance in the Fundamental Considerations or another guidance document.

- This item is one of three items (LMD-23.4, B1: LMD-23.1 and B5: LMD-23.2) that propose changes to LMD code paragraph N.3.5. All items are on the agenda as voting items. As currently written, they are in conflict with each other and if all are adopted there will be different changes adopted to the same paragraph. To prevent this, the item under consideration must be adjusted for these items so that each proposal reflects an appropriate change to the paragraph. See Table LMD-23.4, Table 1. below with options for changes to these items on the agenda.

- NIST HB 44 was written to be non-technology specific, but test draft criteria were written around the current technology most common at that time. When testing a positive displacement meter using an open neck prover there are ramp-up and ramp-down errors that are associated with the test. As such, the test draft must contain enough volume so that these errors do not contribute greatly to the test of the meter. With the use of different test standards, the ramp-up and ramp-down errors may not be factors that will affect the test but there may be other factors that contribute to error in the test procedure.

- Over the years some changes have been made to the N.3. Test Draft paragraph so that the requirement is more inclusive of other technology such as the change that was made to N.3.5 in 1996 to remove the term "Test Draft" and replace it with the term "The delivered quantity" to recognize the use "of Small Volume Provers in Routine Field Testing". The item was adopted as part of the consent calendar that year.

- Technology will continue to evolve, and we will need to respond to this evolution. As new technology is determined to be suitable for use as a standard, the community must carefully consider how test conditions are affected. We will need to ensure an appropriate amount of material is measured so the errors of the test method and the device under test do not contribute greatly to the determination of accuracy for the device.

- Considering what is already in the Appendix A: Fundamental Considerations regarding the selection of test standards and what is being proposed in Items Gen-23.1 and Block 8, we believe a solution may be to add a general code requirement, with additional guidance in Appendix A, to define what is a suitable amount of material to determine the accuracy of a meter. This would

NIST OWM Executive Summary for LMD-23.4 – N.3.5. Wholesale Devices.

allow the removal of the various Test Draft paragraphs from the individual codes. With no alternate proposal currently in place, we believe the changes proposed in LMD-23.4, LMD-23.1 (B1), and LMD-23.2 (B5) with the suggested NIST OWM changes in Table XX would assist in determining the appropriate test procedure for other standards in use.

VTM – Vehicle Tank Meters

NIST OWM Executive Summary for VTM-18.1 – S.3.1 Diversion of Measured Liquid and S.3.1.1. Means for Clearing the Discharge Hose and UR.2.6. Clearing the Discharge on a multiple-product, single discharge hose.

NIST OWM Recommendation: OWM believes the proposed changes represent a reasonable solution that will help minimize the potential for fraud with the use of manifold flush systems while allowing companies access to the safety-related benefits from the use of such systems in distributing products on VTMs. With the most recent version of the Item Under Consideration, OWM believes this item is ready for vote.

- A manifold flush system allows liquid to be diverted from the discharge line on single hose multi-product VTMs so that liquid of one product is not mixed with liquid of another in the discharge line.
- NIST Handbook 44 already includes provisions allowing the use of manifold flush systems.
  - However, without appropriate safeguards, these systems represent a significant potential for fraud.
  - OWM believes the current Item Under Consideration offers additional safeguards that are not present in the current NIST HB 44 language.
  - These changes will reduce the potential for facilitation of fraud with the design and use of these devices.
- When presented for a vote in 2019, this item (though revised multiple times in response to comments) failed to obtain sufficient votes to "pass" or "fail" and was returned to Committee.
  - Several additional variations to address comments and concerns were subsequently considered.
- In January 2020, this item was combined with a related Item VTM-20.1 (which proposed limits on the use of these systems with specific product types) with the goal of having the submitters of both items work together to reach a reasonable compromise between the two proposals.
- Since January 2020, the submitters of both items have worked to find a compromise that best meets the needs of the community.

NIST OWM Executive Summary for VTM-18.1 – S.3.1 Diversion of Measured Liquid and S.3.1.1. Means for Clearing the Discharge Hose and UR.2.6. Clearing the Discharge on a multiple-product, single discharge hose.

- In developing the current proposal, the submitters considered concerns raised regarding the use of these systems, including:
  - the potential for facilitation of fraud with the use of these systems;
  - the potential for cross contamination of products in different tank compartments; and
  - the suitability of using a single meter for multiple product types.
- These concerns were balanced against comments indicating:
  - these same product handling practices have occurred for many years without the use of such systems; and
  - manifold flush systems can offer distinct safety advantages for drivers when flushing product.
- OWM continues to have concerns regarding the safety of delivering products such as gasoline and home heating oil through the same meter (and questions whether a single meter is suitable for such purposes)
  - However, OWM recognizes this is already a widespread practice in the industry and placing a blanket limitation in NIST Handbook 44 may not best serve the community.
- OWM acknowledges the safety advantages of such a systems to the drivers since the drivers do not have to climb on top of the VTM truck to flush product from the line before delivering another product.
- OWM notes that such changes do not preclude a jurisdiction from implementing policies regarding the use of a single meter to dispense multiple different product types.

NIST OWM Executive Summary for VTM-20.2 – Table T.2. Tolerances for Vehicle Mounted Milk Meters.

NIST OWM Recommendation: OWM supports the Assigned status for this item and encourages the task group to continue its review of the proposed OIML tolerances for Vehicle Tank Milk Meters.

- One of the questions raised concerning the current proposal that includes the OIML tolerances is that the proposal includes tolerances for the system and a separate tolerance for the meter.
- NIST OWM observed that a separate tolerance for the meter would apply during OIML type evaluation. However, NIST HB 44 only includes requirements for the entire measurement

system and not separate main elements nor does it have separate tolerances for main elements known to be metrologically significant.

- NIST OWM will look forward to more discussion of this item during task group meetings.

LPG – Liquified Petroleum Gas and Anhydrous Liquid-Measuring Devices

NIST OWM Executive Summary for LPG-15.1 – N.3. Test Drafts.

NIST OWM Recommendation: Along with the proposed agenda items GEN-23.1, Block 7 and Block 8 which address the use of field reference meters NIST OWM supports this item as a Voting item.

- Agenda item GEN-23.1 provides a General Code requirement for all devices and those standards that can be used to test those devices including those approved by the State Director.

- Agenda item 7 changes the language in the tolerance paragraphs to provide consistency with the changes in the combined amended proposals of 2022 S&T Agenda Item Block 8.

- Block 8 clarifies what has long been recognized in NIST HB 44 concerning the responsibility for acceptance of a standard.

- State and industry have a need to use various types of field test standards to evaluate commercial devices installed in the marketplace. NIST OWM recognizes the need to use various standards to test commercial devices and support the use of these standards when test data supports its use.

- NIST OWM is also supporting the use of various types of field test standards through the purchase of several meters and the collection of data throughout the U.S.

- Currently the NIST OWM meter for testing CNG dispensers has been circulated to Colorado and Florida for data collection. The CNG meter, after it is returned from Florida, will be recalibrated before sending it out to other participating States.

  The NIST OWM is preparing to collect laboratory data on its two Coriolis units that will be used to test LPG dispensers. The laboratory data will be used to evaluate the Coriolis units and to identify any problem prior to circulating the units to participating States.

- The NIST OWM Coriolis unit that will be used to test loading racks is currently in NIST shop for repairs to the base of the units that likely happened during shipping. Once repairs are complete laboratory testing may be conducted before the unit is circulated to participating states.

- Plans are to keep all units in circulation as data is collected and analyzed.

NIST OWM Executive Summary for LPG-15.1 – N.3. Test Drafts.

- GEN-23.1 provides a requirement for all devices to avoid the need to specifically reference individual test methods in each specific code, it avoids the potential of implying that test methods not specifically referenced in a code would not be appropriate.

NIST OWM Executive Summary for LPG-23.1 – S.2.5. Zero-Set-Back Interlock

NIST OWM Recommendation: NIST OWM believes additional discussion is needed concerning this item and how it will be enforced when other LPG devices are in use that require zero-setback interlock and also the impact of the proposed requirement on other retail motor fuel devices of other products used to fuel vehicles. We recommend changing the status of this item to Informational to allow the community additional time to contemplate the effect of adopting this item.

- Zero set-back interlock ensures that a device is returned to zero before another customer or services person uses the device for another transaction (to ensure that an automatic interlock prevents subsequent delivery until the indicating element is returned to zero) thus preventing the facilitation of fraud per G-S.2. Facilitation of Fraud.

- The LPG Code paragraphs S.2.5.1 and S.2.5.2 address electronic stationary and other stationary devices because the process for zero-set-back interlock operates differently for an electronic stationary device than it does for a stationary retail motor fuel device as described in S.2.5.2. but both devices are required to return to zero before another transaction is made.

- The submitter states that only a few transactions for LPG dispenser are for fueling vehicles and they are limited to use by trained staff. Paragraphs S.2.5.1 and S.2.5.2 are not dependent on who is dispensing the product or how often the device is used as a retail motor dispenser; the paragraphs are intended to ensure that the device is so designed that each new transaction starts at zero. What happens if they are used more frequently for use in fueling vehicles?

- According to the requirements both electronic stationary and stationary retail motor fuel dispensers must have a zero-setback interlock.

- If this proposal is adopted "***Devices Used Exclusively as"*** would be added to both S.2.5.1. and S.2.5.2. to exempt stationary retail motor-fuel devices that are used for purposes other than dispensing retail motor-fuel from having a zero-set-back interlock and a note would be added to S.2.5.1. that would exempt Analog devices used for purposes other than dispensing retail motor-fuel from having a zero-set-back interlock.

- Is this equitable to other products dispensed, such as gasoline dispensers. Gasoline dispensers are required to have a zero-setback interlock, and some are used to fill containers used for gasoline- powered equipment. Granted, the majority of gasoline dispensers are used to fill vehicles; but does this create an unfair market situation where some fueling dispensers are required to have zero set-back interlock and others are not?

- The submitter also stated that proposed changes were introduced for consideration in 2023 to allow public refueling of LP Gas with safety precautions and with these new requirements

NIST OWM Executive Summary for LPG-23.1 – S.2.5. Zero-Set-Back Interlock

zero-setback interlock is needed. How will LPG devices with and without zero-setback interlock be fairly- regulated?

NIST OWM Executive Summary for LPG-23.2 – S.2.6. Automatic Timeout.

NIST OWM Recommendation: Different device types may require varying timeouts; as such, if 5 minutes is deemed appropriate for electronic vehicle tank meters NIST OWM supports this change.

- The Automatic time-out feature helps to prevents the use of the device by another customer when the preceding customer completes the transaction. This is achieved by requiring that the device automatically time-out after a specified time.
- The submitter is requesting that the automatic time out that is currently specified as 3 minutes for electronic vehicle mounted meters in the LPG code be removed from S.2.6.1 in the LPG code and another paragraph be created, S.2.6.3 for electronic vehicle tank meters and,
- The submitter is requesting that the automatic time out be extended to 5 minutes for electronic vehicle tank meters to account for the initiation time at the truck and moving the discharge hose to the customer tank which can exceed 150 feet.
- Discussion may be needed to determine how this will impact the VTM code requirements with Timeout requirements of three-minutes.
- Different device types will require varying timeout. As such, if the 5 minutes suggested is the appropriate industry standard for this device, NIST OWM supports this change.

NIST OWM Executive Summary for MLK-23.2 – Table T.1. Tolerances for Milk Meters

NIST OWM Recommendation: A review of this item by the Milk Meter Task Group when a new chair is appointed may be useful. We agree with other regionals that this item be assigned to the Milk Meter Task Group.

- The Milk Meter Task Group reviewed all the varying tolerances in HB 44 for Milk meters. Instead of keeping a decreasing tolerance as the test draft increases, as the tolerance in the Milk meters code, the Task Group is proposing that the tolerances as included in the 2023 interim Meeting Agenda for VTM-20.2 for milk meter also be adopted in the Milk Meter code.
- With the Task Group Chair currently not assigned since Charlie Stutesman no longer works with Kansas Weights and Measures and is no longer Chair of the Milk Meter Task Group, a review of the item by the Task Group when a new chair is appointed may be useful. We agree with other regionals that this item be assigned to the Milk Meter Task Group when a new task group chair is assigned.

MFM – Mass Flow Meters

NIST OWM Executive Summary for MFM-15.1 – N.3. Test Drafts.

NIST OWM Recommendation: OWM supports this item as a voting item with the changes that were made to the item under consideration along with the proposed agenda GEN-23.1, Block 7, and Block 8 which address the use of field reference meters.

- Agenda item GEN-23.1 provides a General Code requirement for all devices and those standards that can be used to test those devices including those approved by the State Director.

- Agenda Item 7 changes the language in the tolerance paragraphs to provide consistency with the changes in the combined amended proposals of 2022 S&T Agenda Item Block 8.

- Block 8 clarifies what has long been recognized in NIST HB 44 concerning the responsibility for acceptance of a standard.

- State and industry have a need to use various types of field test standards to evaluate commercial devices installed in the marketplace. NIST OWM recognizes the need to use various standards to test commercial devices and support the use of these standards when test data supports its use.

- The NIST OWM is also supporting the use of field test standards through the purchase of several meters and the collection of data throughout the U.S.

- Currently the NIST OWM meter for testing CNG dispensers has been circulated to Colorado and Florida for data collection. The CNG meter, after it is returned from Florida, will be recalibrated before sending it out to other participating States.

  The NIST OWM is preparing to collect laboratory data on its two Coriolis units that will be used to test LPG dispensers. The laboratory data will be used to evaluate the Coriolis units and to identify any problem prior to circulating the units to participating States.

- The NIST OWM Coriolis unit that will be used to test loading racks is currently in NIST shop for repairs to the base of the units that likely happened during shipping. Once repairs are complete laboratory testing may be conducted before the unit is circulated to participating states.

- Plans are to keep all units in circulation as data is collected and analyzed.

HGM – Hydrogen Gas-Measuring Devices

NIST OWM Executive Summary for HGM-23.1 – UR.3.8. Safety Requirement

NIST OWM Recommendation:

- It has not been part of the weights and measures standards development process to include prescriptive safety requirements into handbook legal metrology standards.
- The dispenser's design features regardless of their function should not affect the metrological integrity of the equipment.
- Traditional fueling applications have established mechanisms to address the safety features of dispenser installations not typically within in the scope of the weights and measures authority.
- Groundwork is not outlined in the proposal detailing key elements that must be established for an SAE J2601 verification program and what standards if any apply to equipment in operation before the effective date.

EVF – Electric Vehicle Fueling Systems

NIST OWM Executive Summary for EVF-23.1 – S.2.5.1. Money-Value Divisions Digital, S.8.(a) Minimum Measured Quantity, S.5.2. EVSE Identification and Marking Information, S.5.3.(d) Abbreviations and Symbols; Joule, N.1. No Load Test, T.5. No Load Test, N.2. Starting Load Test, T.6. Starting Load, Appendix D–megajoule (MJ)

NIST OWM Recommendation:

- NIST OWM agrees with this EVFE Subgroup's proposal that further refines the electrical vehicle fueling systems code requirements in NIST HB 44.
- NIST OWM also notes there is a related method of sale proposal on the L&R Committee Agenda (MOS-23.4) that updates the unit of measurement terminology for the EVSE application in NIST HB 130.
- NIST OWM concurs with the EVFE Subgroup's late fall 2022 proposed changes to the EVFS Code in S&T Agenda Item 23.1 to include:
  - further modification to paragraph S.2.5.1. Money-Value Divisions Digital to clarify that it is at the "end of the transaction when mathematical agreement shall occur.
  - proposed new modifications to:
    - paragraph S.5.2. EVSE Identification and Marking Information to ensure continuity across the EVFS Code in all references to the EVSE's current level; and
    - further amending paragraph S.5.3. Abbreviations and Symbols to recognize the term "kilowatt-hour"

NIST OWM Executive Summary for EVF-23.1 – S.2.5.1. Money-Value Divisions Digital, S.8.(a) Minimum Measured Quantity, S.5.2. EVSE Identification and Marking Information, S.5.3.(d) Abbreviations and Symbols; Joule, N.1. No Load Test, T.5. No Load Test, N.2. Starting Load Test, T.6. Starting Load, Appendix D–megajoule (MJ)

The additional modifications would read:

S.2.5.1. Money-Value Divisions Digital. – An EVSE with digital indications shall comply with the requirements of paragraph G-S.5.5. Money-Values, Mathematical Agreement, and the total price computation **at the end of a transaction** shall be based on quantities not exceeding ~~**0.5 MJ or**~~ 0.**0**1 kWh."

S.5.2. EVSE Identification and Marking Information.

(b) maximum ~~**current**~~ deliverable **amperes**;

S.5.3. Abbreviations and Symbols.

(d) ~~**J**~~kWh = ~~**joule**~~kilowatt hour.

NIST OWM Executive Summary for EVF-23.4 S.5. – Markings and N.5. Test of an EVSE System.

NIST OWM Recommendation:

- The proposed modifications to subparagraph S.5.2. (b) to specify EVSEs must be marked with the "maximum deliverable amperes" will clarify the appropriate terminology for specifying the amperage load rating for the equipment's operation and to be marked on the device.
- At this time the "joule" unit of measurement is not used for expressing electrical energy quantity values in commercial EVSE applications. For continuity across EVSE NIST Handbook codes and regulations the term and its abbreviation (J) should also be removed from subparagraph S.5.3.(d). The kilowatt-hour unit of measurement and its corresponding abbreviation should be recognized in the EVFS Code.
- Observe this proposal removes any reference to the feature used to determine the MDA percentage level achieved during accuracy tests and establishes a new MDA range for performing the light load test and when a vehicle is the test load for verifying EVFSs; whereas other proposals recommend the establishment of a new laboratory test in addition to field test procedures.
- There does not seem to be a general consensus on the minimum test criteria to apply to AC and DC systems. There may be test criteria that cannot be applied in both the laboratory and in the field because there are factors the examiner cannot control or adequately correct for. Tests should be conducted over the range of operating conditions for which the device is designed.

NIST OWM Executive Summary for EVF-23.4 S.5. – Markings and N.5. Test of an EVSE System.

- The 2023 proposal creates a new separate test requirement specifically for laboratory evaluations; therefore a 2028 exemption would also be new text that requires being underscored to clearly designate the 2028 effective date as new language.

- The 2028 effective date is confusing, is the intent that no testing at an approved brick and motor facility nor type evaluations can be carried out until January 1, 2028?

- A slight change is recommended for the agenda item's title to include missing paragraphs **S.5.2.(b) EVSE Identification and Marking Requirements and S.5.3.(d) Abbreviations and Symbols; joule** and striking ~~**S.5. Markings**~~ to clarify these units of measurement are a part of this proposal. This would also assist the community in distinguishing this item from multiple other 2023 proposals that address EVFS marking requirements.

- The EVFE Subgroup's Test Procedures Subcommittee is currently tasked with working through a recently modified version of the test procedures addressed in Item EVF 23.4. This latest modified version of the test procedures is the result of the collaborative effort of the submitters of both proposals. Based on the Test Procedures Subcommittee findings the Subgroup has targeted the upcoming standards development cycle to develop and provide input on both EVF-23.4 and EVF-23.7.

NIST OWM Executive Summary for EVF-23.6 – S.5.2. EVSE Identification and Marking Requirements and T.2. Tolerances

NIST OWM Recommendation:

- Items EVF-23.5 and EVF-23.6 both propose changes to marking and accuracy requirements in NIST Handbook 44.

- OWM has given thought to how we might assist the Committee and the Community in addressing these items and arriving at a single proposal that would meet the needs of the submitters of both items and other stakeholders.

- OWM believes this proposal (Item EVF-23.6) and the alternative recommended in Item EVF 23.5 both require more work and vetting as suggested by two of the four regional associations.

- We believe this work would most appropriately be done in the USNWG SG as recommended during the WWMA meeting and recommend the Committee designate these items as Developing and ask the SG for assistance in vetting the proposals.

- Should the Committee believe there is an urgent need to move one of these proposals forward, OWM encourages the Committee to use the proposed language in Item EVF-23.5 as a starting point to ensure clarity and understanding of the final language.

    - Having well-defined tolerances with clear and understandable effective dates is essential.

NIST OWM Executive Summary for EVF-23.6 – S.5.2. EVSE Identification and Marking Requirements and T.2. Tolerances

  - Defining tolerances in the specific device codes is also preferable to the alternative of having jurisdictions use the provisions of the General Code to implement tolerances suitable for the application since this has the potential for non-uniform application across the country.

- Regarding Item EVF-23.6, OWM offers the following specific technical concerns and comments.

- OWM questions the reference to the phrase "certified to…." In the proposed EVF-23.6 paragraph S.2.5.1. Marking.

  - If the intent is to note the marking is not required for devices capable of meeting the 1 % Acceptance and 2% Maintenance tolerance, then the language should clearly state this.

- OWM concurs that the markings need to be "conspicuously and legibly displayed." Prior versions of similar language considered by the EVFE Subgroup also included the term "indelible" in recognition that the General Code requires all markings to be of a permanent nature. OWM recommends including the term "permanent" to align with the language used in the General Code.

- There are several dates referenced in proposed EVF-23.6 paragraph T.2.2. Tolerances that conflict and OWM believes will create confusion for those implementing the proposed requirements.

- The statement adopted by the NCWM in July 2022 exempting DC devices from any tolerance requirements until 2028 remains in the proposal, yet there is a date of 2024 in both the proposed paragraph T.2.2.(a) and paragraph T.2.2.(b) which specifies requirements for DC devices installed prior to 2024. This is confusing and widens the gap: (1) in time delays in the application of tolerances in what will be a dual tolerance marketplace for DC systems (2) that encourages nonuniformity in equipment performance and (3) in the timely marking of information for consumer awareness.

- Proposed paragraph T.2.2.(a) references a sunset date of 2034, yet there is still a statement referring to a 2028 date, creating a conflict. Additionally, the 2034 date is 6 years after the 2028 date that was adopted by the NCWM in July 2022. The rationale for extending the sunset date is not clear. OWM also notes that a date of 2034 is eighteen years after the tentative code was first adopted by the NCWM.

- The rationale for the following statement in paragraph T.2.2.(b) is not clear and OWM believes this statement needs to be struck from the proposed new paragraph T.2.2.(b):

  - "or that do not bear the notice specified in paragraph S.5.2.1. Marking of Accuracy Limits, DC EVSEs Installed Prior to 2024 tolerances are"

NIST OWM Executive Summary for EVF-23.6 – S.5.2. EVSE Identification and Marking Requirements and T.2. Tolerances

- Proposed accuracy markings need to be separate from the markings of electrical energy levels and required temperature ranges, therefore OWM agrees the "Notice" be included as a separate, new subparagraph S.5.2.1.

- As shared in its comments in Item EVF-23.5, OWM believes the proposed changes in Item EVF-23.5 are much clearer in language, format, and application and are closer to language agreed to by the USNWG SG in June 2022 than are the proposed changes in Item EVF-23.6.

    - The NIST USNWG EVFE Subgroup reached a consensus through a June 2022 ballot in which the group agreed to move forward to recommend a wider tolerance of 5 percent only for DC systems installed before 2024 that must bear accuracy markings while maintaining for AC systems a 1 percent Acceptance Tolerance/2 percent Maintenance Tolerance and the tighter tolerance would also apply to post 2024 DC systems.

    - The language from the June 2022 ballot is included in OWM's detailed analysis below and in Item EVF-23.5.

    - As noted in its comments on Item EVF-23.5, OWM is aware of comments indicating EVF-23.5 may not meet the needs of all stakeholders as presently written and OWM believes additional changes would be needed to that item. However, the proposed changes in Item EVF-23.5 are much clearer in language, format, and application and are closer to language previously agreed to by the USNWG SG in June 2022 than are the proposed changes in Item EVF-23.6.

- There are differences between the language recommended in that June 2022 SG ballot and that proposed in Item EVF-23.6. The language adopted in the June 2022 ballot:

    - Permits DC devices installed before 2024 to have a wider tolerance if they were clearly marked to designate their accuracy.

    - Includes a wider tolerance of 5 % for DC systems installed before 2024 when accuracy is marked, which several OEMs identified as achievable. Note: The SG's language does not include an exemption for DC systems from accuracy tolerances up through 2028 to sunset in 2034.

    - Acknowledges the less-than-ideal existence of dual tolerances in the marketplace would be addressed by marking systems to indicate when 5 percent is their achievable accuracy; and

    - Recognizes the EVFE Subgroup would further refine the requirement's text.

- OWM is also aware of a Florida, Electrify America, Tesla, EVGo, and Siemens' October 15, 2022, letter sent to the S&T Committee regarding EVF-23.6 and a June balloted proposal of the USNWG EVFE Subgroup (SG). OWM submitted the following clarifications regarding this letter to the S&T Committee.

    - NIST OWM, as convenors of the EVFE SG, sent a response to the Committee indicating that although the results of the Subgroup's June 2022 ballot indicate the group's support for

NIST OWM Executive Summary for EVF-23.6 – S.5.2. EVSE Identification and Marking Requirements and T.2. Tolerances

modifications to tolerances and marking requirements this should not be construed as supporting the specific changes proposed in EVF-23.6.

- There are some key differences between the Subgroup's June balloted proposal and EVF-23.6. Specifically, the Subgroup's proposal does not include two different retroactive dates and differs in the magnitude of the tolerances and specific conditions under which they would apply, the permissible format required for markings (which are not indelible, do the submitters have a label or electronic only in mind?) and reference to certification. The convenors of the Subgroup will continue to provide written and verbal input as explicitly directed by the group.

- Below are some additional comments for the Committee and other stakeholders to consider in reviewing Items EVF-23.5 and EVF-23.6.

- Adoption should occur only after fully vetting proposals to modify fundamental requirements such as those that impact accuracy, transparency, or that ensure fair competition to:

  - avoid unforeseen consequences;

  - ensure stakeholders have the tools needed for this new device application;

  - discourage nonuniformity which can have a disruptive influence on the marketplace; and

  - take corrective action on discovering any gaps/oversight in modifications to the seven-year-old legal metrology requirements.

- NIST OWM encourages the community's participation in the USNWG EVFE Subgroup which began its work in 2012 and whose work resulted in NIST HB 44 3.40. EVFS Code's adoption in 2015. The Subgroup is reviewing the four paragraphs that appear in multiple 2023 proposals that address: (1) dual EVSE tolerances (2.0 percent or 5.0 percent [DC EVSEs]); (2) new EVSE markings required for the wider tolerance in the marketplace; and (3) corresponding accuracy test procedures.

- The EVFE Subgroup last met on December 8, 2022, to address proposals under consideration for the 2023 cycle and will provide a clear statement in writing of its exact position on agenda items.

- Where commercial equipment is known to operate at dual tolerances the proposed marking and performance requirements should be retroactive.

NIST OWM Executive Summary for EVF-23.7 – N.1. No Load Test, N.2. Starting Load Test N.5.2. Accuracy Testing, and Appendix D: Definitions– maximum deliverable amperes

NIST OWM Recommendation:

- Test procedures are not solely written to the operational characteristics or particular design of one test apparatus. Test procedures should encompass operational conditions over the course of the entire transactions in the marketplace. Test points should fall within the rated minimum up through the maximum operational ranges specified by the manufacturer for the EVFS under normal conditions of commercial use.

- Observe this proposal removes any reference to the feature used to determine the MDA percentage level achieved during accuracy tests and establishes a new MDA range for performing the light load test and when a vehicle is the test load for verifying EVFSs; whereas other proposals recommend the establishment of a new laboratory test in addition to field test procedures.

- The EVFS test standard must be fit for purpose or appropriate and suitable (this might be demonstrated by data) in its design, capacity, and accuracy; and would allow for replication of the manner in which the EVSE is used in commerce. The test standard used to verify an EVSE must also meet the NIST HB 44 Appendix A Fundamental Considerations for a test apparatus.

- Therefore, with a decade of experience with EVFSs having gone through type evaluation (i.e., CADMS) and test equipment designed to verify both AC and DC systems and the laboratory community closing in on filling the last gaps in the weights and measures infrastructure for EVFSs; it is important and necessary that all stakeholders (EVSE/test equipment manufacturers, type examiners, and regulators) reach a consensus on test procedures.

- Is this a proposal to renumber paragraph N.5. Accuracy Testing to become N.5.2.1.? The proposal does not show paragraph N.5.2 in entirety, is the submitter proposing to remove the 2028 enforcement date?

- For clarity the "meaning portion" of a definition should not include the term or parts of the term it is defining nor cite one of the many code paragraphs where the term is used because the appearance can be the term is unique to that sole paragraph. Therefore, the term's definition should include reference to the EVFS Code in brackets (i.e., [3.40] at the end of the definition rather cite a single code requirement or paragraph. The EVFS is a permanent code and definitions applicable to the code should be included in Appendix D—Definitions.

- The proposal removes the No Load Test and Starting Load Test but does not do the same for the tolerances applicable to these tests in paragraphs T.5. and T.6, respectively.

- The EVFE Subgroup's Test Procedures Subcommittee is currently tasked with working through a recently modified version of the test procedures addressed in Item EVF 23.4. This latest modified version of the test procedures is the result of the collaborative effort of the submitters of both proposals. Based on the Test Procedures Subcommittee findings the Subgroup has targeted the upcoming standards development cycle to develop and provide input on both EVF-23.4 and EVF-23.7.

GMA – Grain Moisture Meters 5.56 (a)

NIST OWM Executive Summary for GMA-19.1 – Table T.2.1. Acceptance and Maintenance Tolerances Air Oven Method for All Grains and Oil Seeds.

NIST OWM Recommendation: NIST OWM supports the collection of data to verify that the proposed reduction in tolerances is appropriate for all grains and supports as a Developing status.

- During the NTEP Grain Analyzer (GA) Sector 2019 meeting, the Sector reviewed data from Arkansas for Long Grain Rough Rice (LGRR) and other grains. The data showed that the proposal to tighten the acceptance and maintenance tolerance may not be appropriate for all grain types. The original data presented and used as a basis for the proposal applied to corn and soybeans. After reviewing the data, the Sector decided to collect inspection data from across the country. An industry representative offered to assist with data analysis and along with the NIST representative will work in producing the inspection data needed for the analysis. A request for State participation will be sent to State weight and measures. The Sector requests that this remain a Developing Item as they move forward in evaluating additional data.

- North Carolina submitted the requested grain data for review. Field meter inspection data from the state of North Carolina for years 2017 to 2019 was examined and comprised over 3300 records each usually averaged 3 commodity drops on UGMA and Non-UGMA meter types. While only one state's data cannot be considered representative of all the other states, the results provide indications of trouble with decreased tolerances on both UGMA and Non-UGMA meter types.

- Additional data is expected from other States participating in the grain data submission.

NIST OWM Executive Summary for GMA-23.1 – N.1.3. Meter to Like-Type Meter Method Transfer Standards and Table T.2.2. Acceptance and Maintenance Tolerances Meter to Like-Type Meter Method

NIST OWM Recommendation: NIST supports this item as Voting. With the modifications that were made at the 2023 NCWM Interim Meeting.

OTH – Other Items

NIST OWM Executive Summary for OTH-16.1 – Electric Watthour Meters Code Under Development
• The "Source" should read NIST U.S. National Work Group (USNWG) Electric Watthour Meters Subgroup (EWH SG) • The title of this Item should read "Non-Utility Electricity-Measuring Systems (NUEMS) – Tentative Code " • Most members supported the proposed language as it currently appears in the 2023 S&T Agenda (Pub. 16), although regulatory members of the SG disagreed with the proposed language. • In addition, the regulatory members provided a detailed list to the EWH SG of their concerns. These concerns are noted in the letter that NCWM received from the California Agricultural Commissioners and Sealers Association (CACASA) (dtd. June 29, 2023) and posted under the NCWM S&T Supporting document website. • The EHW SG attempted to address the regulators and CACASA concerns. They made headway in addressing those concerns and they appear in the Crosswalk below. • The Crosswalk below, provides updates of items that appear in the 2023 S&T Annual Agenda (Pub. 16). They represent changes the EWH SG voted on to move forward to the S&T Committee for consideration. Due to limited time, the EWH SG was not able to address all the items, and the work continues.

Crosswalk

Electric Watthour Subgroup submitted recommendations to S&T Agenda Item OTH-16.1. Electric Watthour Meters Tentative Code

Paragraph as it appears on S&T 2023 Annual Agenda (Pub. 16):	Changes represented in bold strikethrough or underscore and followed by a clean version
A.4. Type Evaluation. – The National Type Evaluation Program (NTEP) will accept for type evaluation only those measuring systems that have received safety certification by a nationally recognized testing laboratory (NRTL) and shall issue an NTEP Certificate of Conformance only to those measuring systems that comply with all requirements of this code.	**A.4. Type Evaluation.** – The National Type Evaluation Program (NTEP) will accept for type evaluation only those measuring systems that have received safety certification by a nationally recognized testing laboratory (**also referred to as "**NRTL**"**) and shall issue an NTEP Certificate of Conformance only to those measuring systems that comply with all requirements of this code. **Clean version:** **A.4. Type Evaluation.** – The National Type Evaluation Program (NTEP) will accept for type evaluation only those measuring systems that have received safety certification by a nationally recognized testing laboratory (also referred to as "NRTL") and shall

Crosswalk **Electric Watthour Subgroup submitted recommendations to S&T Agenda Item OTH-16.1. Electric Watthour Meters Tentative Code**	
Paragraph as it appears on S&T 2023 Annual Agenda (Pub. 16):	**Changes represented in bold strikethrough or underscore and followed by a clean version**
	issue an NTEP Certificate of Conformance only to those measuring systems that comply with all requirements of this code.
S.1.3.2. Test Output. – Each NUEMS within a system shall have either: (1) a location for the reading of the accumulated value; (2) a pulse output (visible and/or infrared pulse), an electrical pulse output in the form of a closure (relay or electronic such as an open drain field effect transistor (FET)) which provides a pulse at an interval of K_t Watt-Hours per pulse; or (3) other means for viewing accumulated values. The value of K_t shall be such that the NUEMS's accuracy can be tested in 5 minutes or less for any specified test condition.	**S.1.3.2. Test Output. – ~~Each~~ A** NUEMS **~~within a system~~** shall have either: (1) a **~~location for the reading of the accumulated value~~a rotating disk indicator**; (2) **~~an electrical~~** pulse output (visible **~~and/~~**or infrared **~~pulse~~**), **or (3)** an electrical pulse **~~output (~~**in the form of a closure **~~(~~**relay or electronic **means),** which provides a pulse a**~~t an interval of~~ with** K_t **or K_h** Watt-Hours per pulse**~~; or (3) other means for viewing accumulated values~~**. The value of K_t **or K_h** shall be such that the NUEMS's accuracy can be tested in 5 minutes or less for any **~~specified~~ specific** test **~~condition~~**. **Clean version:** **S.1.3.2. Test Output. –** A NUEMS shall have either: (1) a rotating disk indicator; (2) a pulse output (visible or infrared), or (3) an electrical pulse (in the form of a closure relay or an electronic means), which provides a pulse with K_t or K_h Watt-Hours per pulse. The value of K_t or K_h shall be such that the NUEMS's accuracy can be tested in 5 minutes or less for any specific test.
S.1.3.6. NUEMS With External Sensors Located Remotely from the Pulse Output or Display. – For NUEMS with external sensors located remotely from either the pulse output or display which can be installed as described in paragraph UR.2.4.8. External Sensors Located Remotely from the Pulse Output or Display, means shall be provided to allow either the pulse output or display to be remotely used.	**S.1.3.6. NUEMS With External Sensors Located Remotely from the ~~Pulse~~ Test Output ~~or Display~~.** – For NUEMS with external sensors located remotely from **~~either~~** the **~~pulse~~ test** output **~~or display~~** which can be installed as described in paragraph UR.2.4.8. External Sensors Located Remotely from the **~~Pulse~~ Test** Output **~~or Display~~**, means shall be provided to allow **~~either~~** the **~~pulse~~ test** output **~~or display~~** to be remotely used. **Clean Version** **S.1.3.6. NUEMS With External Sensors Located Remotely from the Test Output.** – For NUEMS with external sensors located remotely from the test output which can be installed as described in paragraph UR.2.4.8. External Sensors Located Remotely from the Test Output, means shall be provided to allow the test output to be remotely used.

Crosswalk

Electric Watthour Subgroup submitted recommendations to S&T Agenda Item OTH-16.1. Electric Watthour Meters Tentative Code

Paragraph as it appears on S&T 2023 Annual Agenda (Pub. 16):	Changes represented in bold strikethrough or underscore and followed by a clean version

Add into Table S.3.2.3.a. Device Identification and Marking Requirements for External Sensor (ES) NUEMS

	Physical Marking	Electronic
***Sensor True Ratio* (12) *Nonretroactive as of January 1, 2024*.**	**O**	**D**
K_h or K_t (**~~12~~13**)	**O**	**D**
Bi-directional (**~~13~~14**)	**O**	**D**
Temperature Range if narrower than −20 °C to + 50 °C (− 4 °F to + 122 °F) (**~~14~~15**)	**O**	**D**

Add into Table S.3.2.3.b. Descriptors for Device Identification and Markings Requirement of External Sensor (ES) NUEMS

12. True Ratio.

~~True Ratio.~~ The True Ratio, in primary amperes or volts to secondary amperes or volts shall be physically marked on a meter unless it is contained in either electronic or printed documentation. This is to be expressed as xxxA:yyyA; or xxxA:yyyV; or xxxV:yyyV. The number of digits is the number needed to express the values.

Examples of sensor ratio markings include:
200A:5A
400A:0.3V
480V:120V

T.2. No-Load Test. – For NUEMS with a K_t/K_h output, the NUEMS shall not emit more than one K_t/K_h pulse. For NUEMS without a pulse output, the register indication shall not change by more than 0.05 % of the energy at Current Class (CL) or the Sensor Primary Current Rating at unity power factor and rated voltage. Also see Note N.1. NUEMS No-Load Test.	**T.2. No-Load Test.** – **~~For~~ A** NUEMS **~~with a K_t/K_h output, the NUEMS~~** shall not emit more than one **~~K_t/K_h~~ test** pulse **output**. **~~For NUEMS without a pulse output, the register indication shall not change by more than 0.05 % of the energy at Current Class (CL) or the Sensor Primary Current Rating at unity power factor and rated voltage. Also see Note N.1. NUEMS No-Load Test.~~** **Clean Version** **T.2. No-Load Test.** – A NUEMS shall not emit more than one test pulse output.
N.3. Minimum Test Duration. – Full and light load tests shall require at least a one-minute test and at least one watthour test constant.	**N.3. NUEMS Minimum Test Duration.** – **A NUEMS f~~F~~ull load test shall consist of a minimum of 10 watthour test constants** and **a** light load test**~~s~~** shall **~~require at least a one-minute test and at least~~ consist of a minimum of** one watthour test constant.

Crosswalk **Electric Watthour Subgroup submitted recommendations to S&T Agenda Item OTH-16.1. Electric Watthour Meters Tentative Code**	
Paragraph as it appears on S&T 2023 Annual Agenda (Pub. 16):	**Changes represented in bold strikethrough or underscore and followed by a clean version**
	Clean Version **N.3. NUEMS Minimum Test Duration.** – A NUEMS full load test shall consist of a minimum of 10 watthour test constants and a light load test shall consist of a minimum of one watthour test constant.
S.3.3. Device Identification and Marking Requirements – External Sensors. – In addition to all the marking requirements of Section 1.10 General Code, paragraph G-S.1. Identification, each external sensor that is non-integral with the meter shall have the following conspicuously, legibly, and indelibly marked on a permanent identification label as shown in Table S.3.3.a. Device Identification and Marking Requirements - External Sensors and in Table S.3.3.b. Descriptors for Table S.3.3.a. Device Identification and Marking Requirements - External Sensors.	**S.3.3. Device Identification and Marking Requirements – External Sensors.** – In addition to all the marking requirements of Section 1.10 General Code, paragraph G-S.1. Identification, each external sensor that is non-integral with the meter shall have the following conspicuously, legibly, and indelibly marked ~~**on a permanent identification label**~~ as shown in Table S.3.3.a. Device Identification and Marking Requirements – External Sensors and in Table S.3.3.b. Descriptors for Table S.3.3.a. Device Identification and Marking Requirements – External Sensors. **Clean Version** **S.3.3. Device Identification and Marking Requirements – External Sensors.** – In addition to all the marking requirements of Section 1.10 General Code, paragraph G-S.1. Identification, each external sensor that is non-integral with the meter shall have the following conspicuously, legibly, and indelibly marked as shown in Table S.3.3.a. Device Identification and Marking Requirements – External Sensors and in Table S.3.3.b. Descriptors for Table S.3.3.a. Device Identification and Marking Requirements – External Sensors.
Appendix D. Definitions	
	bidirectional. – A NUEMS equipped to register the accumulation of energy in both directions (i.e., for delivered and received energy): **A bidirectional NUEMS shall fall into at least one of the following categories:** (a) **Single register or net meter that displays the difference between the delivered and received energy; or**

Crosswalk Electric Watthour Subgroup submitted recommendations to S&T Agenda Item OTH-16.1. Electric Watthour Meters Tentative Code	
Paragraph as it appears on S&T 2023 Annual Agenda (Pub. 16):	**Changes represented in bold strikethrough or underscore and followed by a clean version**
	(b) **Separate register(s) for delivered or received energy. [3.XX]**
	external sensor. – Any voltage sensor or current sensor not located inside of the meter body NUEMS itself and not inside the sealed enclosure containing the NUEMS. [3.XX]
	internal sensor. – Any voltage sensor or current sensor located inside of the meter body NUEMS itself or inside the sealed enclosure containing the NUEMS. [3.XX]
	non-integral. – Used to describe external sensors that can be disconnected from the meter body. [3.XX]

NIST OWM Executive Summary for Item Block 1 (B1) – Minimum Draft Size When Using a Field Standard Meter

NIST OWM Recommendation: NIST supports the proposed change to N.3.5 (B1: LMD-23.1) with adjustments to the item under consideration as shown in Block 1, Table 1. Analysis of Items – LMD-23.4, B1: LMD-23.1, and B5: LMD-23.2. NIST also supports items B1: VTM-23.1 and B1: MLK-23.1 with adjustments to the item under consideration as shown in Block 1, Table 2. Analysis of Items B1: VTM-23.1 and B1: MLK-23.1. This proposal helps to broaden the original intent of the paragraph. We believe the requirements for test drafts were written around the most common test methods at that time. Future requirements for test drafts may be better addressed in the General Code with additional guidance in the Fundamental Considerations or another guidance document.

- One of the items in Block 1 (B1: LMD-23.1) is one of three items (LMD-23.4, B1: LMD-23.1 and B5: LMD-23.2) that propose changes to LMD code paragraph N.3.5. All items are on the agenda as voting items. As currently written, they are in conflict with each other and if all are adopted there will be different changes adopted to the same paragraph. To prevent this, the item under consideration must be adjusted for these items so that each proposal reflects an appropriate change to the paragraph. See Block 1, Table 1. Analysis of Items – LMD-23.4, B1: LMD-23.1, and B5: LMD-23.2below with options for changes to these items on the agenda.

- B1: VTM-23.1 and B1: MLK-23.1 conflict in structure. See Block 1, Table 2. Analysis of Items B1: VTM-23.1 and B1: MLK-23.1with options for changes to these items on the agenda.

- Technology will continue to change and evolve, and we will need to respond to the number of changes, such as the different standards that will be in use, and the factors associated with different technologies. We will need to ensure an appropriate test draft is selected so that the

NIST OWM Executive Summary for Item Block 1 (B1) – Minimum Draft Size When Using a Field Standard Meter

errors of test method and device under test do not contribute greatly to the test of the device. Coupled with what is already in the fundamental considerations for responsibility for selecting a test standard and what is being proposed in Items Gen-23.1 and Block 8, we believe a solution may be to add a general code requirement with additional guidance in the fundamental consideration or EPOs for Test draft and consider removing Test Draft from the individual codes and addressing it in the general code in test notes as a suitability requirement.

NIST OWM Executive Summary for Item Block 4 (B4) – Electronically Captured Tickets or Receipts

NIST OWM Recommendation: This item has been through several years of review and revisions have been made to the item under consideration based on comments. NIST OWM believes that the additional changes made to the items under consideration provides clarity. NIST OWM supports a voting status for this item.

- NIST OWM found a minor edit and recommends updating B4: LMD-21.2, Paragraph U.R.3.3 to include **(Amended 20XX)** to part (b)(1) and add **(and 20XX)** to the end of the exceptions paragraph.

NIST OWM Executive Summary for Item Block 5 (B5) – Test Drafts

NIST OWM Recommendation: NIST OWM Supports the proposed changes to remove "should" and replace it with "shall' in the LMD-23.2 – N.3.5. and VTM-23.2 – N.3 paragraphs of NIST HB44 and with removing the last sentence "and shall in no case be less than 200 L (50 gal)" along with the recommendations in Block 5, Table 1.

- To ensure that an inspector is required to use the correct size test draft, the submitter is recommending that "should" in LMD-23.2 – N.3.5. Wholesale Devices and VTM-23.2 N.3. Test Drafts be changed to "shall"

- As explained in Table Block 5, Table 1

- The proposed changes to N.3.5. Wholesale Devices with adjustments to the item under consideration for other items on the agenda as shown in Block 5, Table 1. Will broaden the original intent of the paragraph. We believe the requirements for test drafts were written around the most common test methods at that time. Future requirements for test drafts may be better addressed in the General Code with additional guidance in the Fundamental Considerations or another guidance document.

- The removal of the last sentence in the test draft proposal were made to coincide with the changes from LMD-23.4 so that small volume provers are recognized in the N.3.5. paragraph.

NIST OWM Executive Summary for Item Block 7 (B7) – Tolerances on Tests Using Transfer Standards

NIST OWM Recommendation: When the S&T Committee presents Block 8 for a vote, OWM agrees that Block 7 should also go forward for a Vote.

- Block 7 Items are proposed changes to NIST HB 44 Codes that have transfer standard tolerance requirements.
- Because of the larger uncertainties associated with the use of transfer standards, the current Code requirement increases the tolerance to account for these uncertainties.
- The proposal would add a reference to the equation added to the General Code by B8: Item GEN-19.1, Paragraph G-T.5. to calculate the tolerances for devices tested with Type 2 Transfer standards replacing the requirements currently in those sections
- The equation places an upper limit on how large the uncertainty associated with the transfer standard can be.

NIST OWM Executive Summary for Item Block 8 (B8) – Tolerances on Tests Using Transfer Standards, Appendix A – Tolerances for Standards, and Appendix D – Field Standards and Transfer Standards

NIST OWM Recommendation: The submitters agree that these items, GEN-19.1 and OTH-22.1 are fully developed and recommend their adoption during the 2023 NCWM Annual Meeting.

- State and industry have a need to use various types of test standards to evaluate commercial devices installed in the marketplace. NIST OWM recognizes the need to use various standards to test commercial devices and support the use of these standards when test data supports their use.
- Block 8 clarifies the use and definition of three types of standards to be included in NIST HB 44:(1) Fields standards, (2) Type 1 transfer standards and (3) Type 2 transfer standards; it provides an equation that will be used to calculate the tolerances when Type 2 transfer standards are used, provides clarification that the State Director has the authority to approve the use of a standard and that specific requirements in NIST HB 44 device codes are not necessary to approve a standard for use.
- In addition to the changes in Block 8, GEN-23.1 adds a General Code requirement so that rather than revising a specific code in Handbook 44 every time a new field or transfer standard is proposed or developed, an overall statement in the General Code recognizes the use of other field and transfer standards that meet the requirements of Appendix A.
- NIST OWM also observed that the appropriate references to NIST HB 44 codes should be added to the definitions in Block 8, e.g., [1.10].
- It was noted that the term “Standard, Field” has a different definition in NIST HB 130. It appears that the definition in NIST HB 130 describes the standard from a laboratory perspective and

hierarchy of testing. As such, some future effort may be needed to harmonize the terms across all NIST handbooks.

- On page S&T 441 line 21 of the NCWM S&T Agenda the word “an” should be replaced with “a” and on line 42 the word “meter” shouldn’t be underlined as it is being removed if this item is adopted.