National Type Evaluation Technical Committee (NTETC)
Grain Analyzer Sector
August 24-25, 2011 - Kansas City, Missouri
Meeting Agenda

Agenda Items

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1. Report on the 2011 NCWM Interim and Annual Meetings

The 96th Annual Meeting of the National Conference on Weights and Measures (NCWM) was held July 17-21, 2011 in Missoula, Montana.

No Grain Moisture Meter (GMM) or Near Infrared (NIR) Grain Analyzer items appeared in the Specifications and Tolerances (S&T) Committee Interim Report for consideration by the NCWM at the 2011 Annual Meeting. Jim Truex, NTEP Administrator will report on other items that may be of interest to the Sector.

2. Report on NTEP Type Evaluations and OCP (Phase II) Testing

Cathy Brenner of the Grain Inspection, Packers and Stockyards Administration (GIPSA), the NTEP Participating Laboratory for Grain Analyzers, will bring the Sector up to date on NTEP Type Evaluation (Phase I) activity. She will also report on the collection and analysis of Grain Moisture Meter OCP (Phase II) data on the 2010 crop. She will identify, for the 2011 harvest, the models enrolled in Phase II.

3. Review of Ongoing Calibration Program (Phase II) Performance Data

At the Sector's August 2005 meeting it was agreed that comparative OCP data identifying the Official Meter and listing the average bias for each NTEP meter type should be available for annual review by the Sector. Accordingly, Cathy Brenner, representing GIPSA, the NTEP Participating

Laboratory for Grain Analyzers, will present data showing the performance of NTEP meters compared to the air oven. These data are based on the last three crop years (2008–2010) using calibrations updated for use during the 2011 harvest season. See the attached 2008-2010 GMM Phase II comparison graphs [GMMBiases11.pdf].

4. Proposed Changes to Publication 14 to Address Issues Associated with the Expanded Grain Temperature Ranges of New Technology

Background: The recent introduction of GMMs utilizing a 149 MHz measurement frequency has made it possible to make accurate grain moisture measurements over a wider range of temperatures than were previously possible with the lower measurement frequencies used in older instruments. This has led to manufacturers requesting certification of wider grain temperature ranges and greater differences between instrument (room) and grain temperature. The type evaluation tests in the present GMM Section of NCWM Publication 14 do not adequately assess performance over these wider temperature ranges. Although the 149 MHz measurement frequency makes it possible to measure grain moisture at temperatures significantly below the freezing point of water, the acceptable accuracy of grain measurements below 0°C has an upper moisture limit that will have to be specified.

Proposed: Make the following changes and additions to the Grain Moisture Meters chapter of the 2011 edition of ***NCWM Publication 14*** to address the expanded grain temperature ranges of new technology:

(a) Proposed Changes to Test Procedures and Tolerances:

§ II. Sample Temperature Sensitivity

Testing is required to verify that accurate results are provided when the sample and instrument are at different temperatures. This will be referred to as the sample temperature sensitivity test. The sample temperature sensitivity test will be conducted using corn, HRW wheat, and soybean samples. Tests will be conducted with the instrument at room temperature and the sample temperature varying from room temperature plus ΔT_H to room temperature minus $\Delta T_{C\text{-Extreme}}$ where ΔT_H is the magnitude of the manufacturer specified maximum difference for grain above room temperature and $\Delta T_{C\text{-Extreme}}$ is the magnitude of the manufacturer specified maximum difference for grain below room temperature. If room temperature minus $\Delta T_{C\text{-Extreme}}$ is less than –10 °C an additional test will be conducted with grain temperature equal to room temperature minus one-half $\Delta T_{C\text{-Extreme}}$. In no case will room temperature plus ΔT_H be allowed to exceed 45 °C ~~but, ΔT_H need not equal ΔT_C~~ and in no case will room temperature minus $\Delta T_{C\text{-Extreme}}$ be allowed to be less than –20 °C. For purposes of these tests, room temperature will be defined as 22 °C ± 2 °C.

In the following Test Procedure, the temperature equal to room temperature minus $\Delta T_{C\text{-Extreme}}$ will be referred to as "Extreme Cold", and the temperature equal to room temperature minus one-half $\Delta T_{C\text{-Extreme}}$ will be referred to as "Cold". Room Temperature plus ΔT_H will be referred to as "Hot".

Two (2) samples will be selected from each of three 2% moisture intervals for each of the three grains - corn, HRW wheat, and soybeans. Three analyses will be made for each grain sample at each of the ~~three~~ test temperatures. The overall bias for the 18 observations (2 samples x 3 moisture intervals x 3 replicates) run at the Extreme Cold, Cold (if required), and Hot temperatures ~~extremes~~ must agree with the room temperature results within the following tolerances:

Corn	0.45
Wheat	0.35
Soybeans	0.35

Note: When changes are made in corn, soybeans, or hard red winter wheat calibrations, the Sample Temperature Sensitivity Test will have to be repeated unless spectral or other such "raw" data are available from an earlier Sample Temperature Sensitivity Test performed by the NTEP Laboratory on the same device type. When such "raw" data are available, the manufacturer will be required to predict performance at each temperature using the new calibration. If no "raw" data are available and the manufacturer can show that the temperature compensation factor (or factors) are unchanged and are independent of other calibration parameters, the Sample Temperature Sensitivity Test will not have to be repeated. For performance limits, test instructions, and testing requirements applicable to the "other 12" NTEP grains (e.g., grains other than corn, soybeans, and hard red winter wheat), see Appendix D.

(b) Proposed Changes to Appendix A Laboratory Performance and Test Procedures:

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TEST: Sample Temperature Sensitivity

Equipment Needed: Thermometers and Environmental Cabinet

Temperature: Instrument = 22 °C ± 2 °C
Sample = 22 °C ± 2 °C (± manufacturer specified temperature difference (T))
Sample(s) Required: HRW-2 Each
Moisture: 10% - 12%
12% - 14%
14% - 16%
Sample(s) Required: Soybeans-2 Each
Moisture: 10% - 12%
12% - 14%
14% - 16%
Sample(s) Required: Corn-2 Each
Moisture: 12% - 14%
14% - 16%
16% - 18%

Separate Sample Required for Each **Model**: Yes

Separate Sample Required for Each **Instrument**: No

General Information:

In the following Test Procedure, the temperature equal to room temperature minus $\Delta T_{C\text{-}Extreme}$ will be referred to as "Extreme Cold", and the temperature equal to room temperature minus one-half $\Delta T_{C\text{-}Extreme}$ will be referred to as "Cold". Room Temperature plus ΔT_H will be referred to as "Hot". For purposes of these tests, room temperature will be defined as 22 °C ± 2 °C.

Test Sequence:

1. Power on instruments.
2. Analyze the HRW 10% - 12% room temperature sample 3 times on each instrument, *see example*.

Analyses	Replicate	Instrument
1	1	1
2	1	2
3	2	1
4	2	2
5	3	1
6	3	2

3. Repeat step 2 for the second sample.
4. Repeat steps 2 - 3 for the 12% - 14% samples.
5. Repeat steps 2 - 3 for the 14% - 16% samples.
6. Place the HRW samples in the Environmental cabinet set at ~~22 °C AT~~ Extreme Cold.
7. Repeat steps 2 - 5 for the room temperature Soybean samples, and place them in the Environmental Cabinet.
8. Repeat steps 2 - 5 for the room temperature Corn samples, and place them in the Environmental Cabinet.
9. After all of the samples have equilibrated to ~~22 °C AT~~ Extreme Cold for at least 4 hours, remove the first HRW sample from the cabinet. After checking the sample temperature, make the first analysis of HRW 1 on instrument 1. Samples must be within ± 1/2 °C of the target temperature.
10. Return HRW 1 to the cabinet. Run HRW 2 on instrument 2.

Note: The sample cell on each instrument is given a minimum of 10 minutes to equilibrate to room conditions before the next sample is analyzed. Each sample is to be checked for temperature before it is analyzed. Samples must be within 0.5 °C of the desired test temperature at time of analysis, and samples are to be reconditioned to the test temperature after each analysis.

11. In order to efficiently analyze the samples, run all of the odd numbered samples on instrument 1 and all of the even numbered samples on instrument 2 starting with HRW then soybeans and ending with corn. By the time the last corn sample has been analyzed, the HRW samples should be reconditioned to the target temperature. Run the odd numbered samples on instrument 2 and the even numbered samples on instrument 1 to complete the replicate 1 analyses. Repeat until all samples have been analyzed 3 times on each instrument. *See Preferred Test Sequence.*

Note: Approximately 1-1/2 to 2 hours will be required to complete the first test cycle. Depending upon sample size, it may be necessary to wait until samples are within ± 1/2 °C of the target temperature before completing the second test cycle for Replicate 1.

12. After all the Extreme ~~c~~Cold analyses are performed, allow the samples to equilibrate to room temperature for at least 4 hours.
13. Repeat steps 2 – 5 (Room 2) for the room temperature HRW samples.

14. Place the HRW samples in the Environmental ~~c~~Cabinet set at ~~22 °C + ΔT~~ Cold.
15. Repeat steps 13 – 14 for the room temperature Soybean samples, and place them in the Environmental Cabinet.
16. Repeat steps 13 – 14 for the room temperature Corn samples, and place them in the Environmental Cabinet.
17. After all of the samples have equilibrated to ~~22 °C + ΔT~~ Cold for at least 4 hours, run the ~~hot~~ Cold samples using the same test sequence used for the Extreme ~~c~~Cold samples.
18. After all the ~~hot~~ Cold analyses are performed, allow the samples to equilibrate to room temperature for at least 4 hours.
19. Repeat steps 2 – 5 (Room 3) for the room temperature HRW samples.
~~19.~~20. Place the HRW samples in the Environmental Cabinet set to Hot.

~~20.~~21. Repeat step 19 for the room temperature Soybean samples, and place them in the Environmental Cabinet .

~~21.~~22. Repeat step 19 for the room temperature Corn samples and place them in the Environmental Cabinet.

23. After all the Hot analyses are performed, allow the samples to equilibrate to room temperature for at least 4 hours.
24. Repeat steps 2 – 5 (Room 4) for the room temperature HRW samples.
25. Repeat step 24 for the room temperature Soybean samples.
26. Repeat step 24 for the room temperature Corn samples.

Preferred Test Sequence		
Cycle	**Instrument 1**	**Instrument 2**
1	HRW 1	HRW 2
	HRW 3	HRW 4
	HRW 5	HRW 6
	SOY 1	SOY 2
	SOY 3	SOY 4
	SOY 5	SOY 6
	CORN 1	CORN 2
	CORN 3	CORN 4
	CORN 5	CORN 6
Cycle	**Instrument 1**	**Instrument 2**
2	HRW 2	HRW 1
	HRW 4	HRW 3
	HRW 6	HRW 5
	SOY 2	SOY 1
	SOY 4	SOY 3
	SOY 6	SOY 5
	CORN 2	CORN 1
	CORN 4	CORN 3
	CORN 6	CORN 5

The two cycles need to be repeated twice to complete the three replicates of all samples on both instruments.

Note: If the intermediate Cold temperature is not required, eliminate steps 13 through 19 above and use the results of steps 19 22 (Room 3) for (Room 2).

(c) Proposed Changes to Appendix E - Sample Temperature Sensitivity

(for grains/oil seeds other than corn, soybeans and hard red winter wheat)

This Appendix specifies the procedure for conducting the sample temperature sensitivity test on NTEP grains/oilseeds other than corn, soybeans, and hard red winter wheat. Tests will be conducted with the instrument at room temperature and sample temperature varying from room temperature plus ΔT_H to room temperature minus $\Delta T_{C\text{-}Extreme}$ (where ΔT_H is the manufacturer specified difference above room temperature for the grains in Section II, and $\Delta T_{C\text{-}Extreme}$ is the manufacturer specified difference for below room temperature for those grains.) If room temperature minus $\Delta T_{C\text{-}Extreme}$ is less than 10 °C an additional test will be conducted with grain temperature equal to room temperature minus one-half $\Delta T_{C\text{-}Extreme}$. In the following Test Procedure, the temperature equal to room temperature minus $\Delta T_{C\text{-}Extreme}$ will be referred to as "Extreme Cold", and the temperature equal to room temperature minus one-half $\Delta T_{C\text{-}Extreme}$ will be referred to as "Cold". Room Temperature plus ΔT_H will be referred to as "Hot". For purposes of these tests, room temperature will be defined as 22 °C ± 2 °C.

A device submitted for this test must be capable of transmitting, via its communications interface, "raw" data as well as date, grain type, predicted moisture result, and calibration version identification and recording in Standard Data Format on 3.5" diskette all the information listed in Appendix C. If the device itself does not include the necessary keyboard or disk drive, the manufacturer must supply a personal computer and the necessary software to build a file as described in Appendix C.

Note: Two (2) samples are to be selected from each of three 2% moisture intervals for each grain type for which the test is to be performed. Two analyses will be made for each grain sample at each of the ~~three~~ test temperatures. The overall bias for the 12 observations (2 samples x 3 moisture intervals x 2 replicates) run at the Extreme Cold, Cold (if required), and Hot temperatures ~~extremes~~ must agree with the room temperature results within the tolerances listed in the accompanying table.

Test Procedure:

1. Analyze the room temperature samples on the test instrument (Room 1.)
2. Condition samples to the ~~cold~~ Extreme Cold temperature and run them on the instrument under test ~~cold~~ Extreme Cold.

Note: Each sample is to be checked for temperature before it is analyzed. Samples must be within 0.5 °C of the desired test temperature at time of analysis, and samples are to be reconditioned to the test temperature after each analysis. The sample cell on the instrument under test is to be given a minimum of 10 minutes to equilibrate to room conditions between sample analyses.

3. Bring the samples to room temperature, and run the samples on the instrument under test (Room 2.)
4. Condition the samples to the ~~hot~~ Cold temperature and run them on the instrument under test ~~hot~~Cold, observing the precautions in the note following step 2.
5. Repeat step 3 to obtain another set of room temperature results (Room 3.)
6. Condition the samples to the Hot temperature and run them on the instrument under test Hot, observing the precautions in the note following step 2.
7. Repeat step 3 to obtain another set of room temperature results (Room 4.)

Note: If the intermediate Cold temperature is not required, eliminate step 4 above and use the results of step 3 (Room 2) for step 5 (Room 3).

EXTREME COLD BIAS = Extreme Cold - ((Room 1 + Room 2) / 2)

COLD BIAS = Cold - ((Room ~~1~~ 2 + Room ~~2~~3) / 2)

HOT BIAS = Hot - ((Room ~~2~~ 3 + Room ~~3~~4) / 2)

Note: When changes are made in any of the "other 12" calibrations, the Sample Temperature Sensitivity Test will have to be repeated unless spectral or other such "raw" data are available from an earlier Sample Temperature Sensitivity Test performed on the same device type by the NTEP Laboratory. When such "raw" data are available, the manufacturer will be required to predict performance at each temperature using the new calibration.

Moisture Ranges and Tolerances for Sample Temperature Sensitivity (for the "Other 12" NTEP grains)

Grain Type	Moisture Range for Test	Tolerance Limit (Bias at Extreme Cold, Cold, and Hot Temperatures ~~Extremes~~)
Durum Wheat	10 – 16%	0.35
Soft White Wheat	10 – 16%	0.35
Hard Red Spring Wheat	10 – 16%	0.35
Soft Red Winter Wheat	10 – 16%	0.35
Hard White Wheat	8 – 14%	0.35
Sunflower Seed (Oil)	6 – 12%	0.45
Grain Sorghum	10 – 16%	0.45
Two-Rowed Barley	10 – 16%	0.35
Six-Rowed Barley	10 – 16%	0.45
Oats	8 – 14%	0.45
Long Grain Rough Rice	10 – 16%	0.45
Medium Grain Rough Rice	10 – 16%	0.45

(d) Proposed Changes to GMM Checklist 3. Indicating Elements, Recording Elements and Recorded Representations:

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Code Reference: S.1.3. Operating Range

3.9. A meter shall automatically and clearly indicate when the moisture content operating range has been exceeded. Meters shall not display a moisture result when operating temperature ranges are exceeded. In both instances, a clear error indication is required. A 5 °C tolerance is applied to temperature ranges when testing to verify that moisture results are not displayed or printed when the temperature range is exceeded.	☐ Yes ☐ No ☐ N/A
3.10. The operating range shall specify the following:	
3.10.1. The ambient temperature range over which the meter may be used is specified and moisture results are neither displayed nor printed outside this range.	☐ Yes ☐ No ☐ N/A
3.10.2. The temperature range for each grain or seed for which the meter is to be used is specified and moisture results are neither displayed nor printed outside this range.	☐ Yes ☐ No ☐ N/A
3.10.2.1 If a grain or seed has multiple temperature ranges each intended for use over a different moisture range, the moisture ranges are specified for each temperature range, and moisture results are neither displayed nor printed if outside the applicable moisture or temperature ranges.	☐ Yes ☐ No ☐ N/A
3.10.3. The moisture range for each grain or seed for which the meter is to be used is specified. Moisture and test weight per bushel values may be displayed when the moisture range is exceeded and an error message is displayed when values are outside the moisture and test weight range.	☐ Yes ☐ No ☐ N/A
3.10.4. The maximum allowable difference in temperature between the meter environment (ambient temperature) and the sample for which an accurate moisture determination can be made is specified. Moisture results are neither displayed nor printed outside this range.	☐ Yes ☐ No ☐ N/A

5. Item 310-1 Electronic Adjustable Components, G-S.8.1., Adjustment Mode Indication, and Definitions for Adjustment and Adjustment Mode

Background: This item originated from the Southern Weights and Measures Association (SWMA) and first appeared on the S&T Committee's 2008 agenda. The purpose of the original submitter's proposed changes were intended to clarify what is considered an effective method of sealing metrological features, and what information is required to be indicated and recorded when a device is in a metrological adjustment mode.

The 92th through 96th NCWM S&T Committees, regional weights and measures associations, NTETC Sectors, and other interested parties have considered several proposals intended to address what is considered an effective method of sealing metrological features since 2008.

The proposals to amend HB 44 paragraph G-S.8. were intended to clarify what is considered an effective method of sealing that would be uniformly applied during type evaluation and field verification. Throughout these deliberations, it became apparent that a better solution to the issues identified in type evaluation was based upon multiple interpretations of G-S.8. and that a single interpretation was needed and should be distributed to the NTEP laboratories so that type evaluation procedures for sealing could be reviewed and, if necessary, amended.

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

The 2010 Committee agreed with comments that no changes are needed to paragraph G-S.8. and that type evaluation procedures have been amended in applicable sections of NCWM Pub 14 to address the issues of incorrectly applying the requirements in G-S.8.

The S&T Committee received no comments addressing potential inconsistent interpretations of the requirements by field officials, requirements for adjustment mode indications, and limitations on metrological indications while in the adjustment mode in any proposals. Consequently, the Committee developed an amended proposal in its 2010 Committee Report, and recommended that the amended proposal be given Informational status to allow interested parties sufficient time to analyze and comment on the most recent language.

The Weighing Sector (WS) and Scale Manufacturers Association (SMA) both recommended that the item be withdrawn, believing that type evaluation procedures have been amended in applicable sections of NCWM Pub 14 to address the issues of incorrectly applying the requirements in G-S.8.

Although the S&T Committee agreed with the comments to withdraw this item, it was concerned that its interpretation would be overlooked in the future because the item was Withdrawn. Therefore, the Committee agreed to remove the proposed language in its 2011 Interim Agenda and recommended the current proposal in the Item Under Consideration as a Voting item. The Committee further recommends that language in the "Item Under Consideration" be added to NIST and NCWM documents as appropriate, and that the NTETC Sectors consider adding the language to the applicable "Philosophy for Sealing" appendices in NCWM Pub 14.

The "Item Under Consideration" was made a voting item for the 2011 96th NCWM Annual Meeting. During the open hearings at the 2011 Annual Meeting, WMD suggested making changes to the "Item Under Consideration" to make clear how that interpretation is intended to apply to electronic devices protected by physical means of security versus electronic devices protected by electronic means of security.

[See the 2008 NCWM Annual, 2009 and 2010 Interim and Annual Reports for additional background information.]

Item Under Consideration:

At the 2011 NCWM Interim Meeting, the S&T Committee agreed to delete the proposed language as shown in its Interim Agenda and recommended an interpretation of HB 44 General Code paragraph G-S.8. Provision for Sealing Electronic Adjustable Components. During the open hearings at the 2011 NCWM Annual Meeting, WMD suggested making the following changes to Committee's interpretation of G-S.8. as shown in NCWM Publication 16 in the "Item Under Consideration" to make clear how that interpretation is intended to apply to electronic devices protected by physical means of security versus electronic devices protected by electronic means of security:

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

Discussion: This item is a carryover from the Grain Analyzer Sector's August 2009 meeting (Agenda Item 9) and again in 2010 (Agenda Item 5). Assuming that the above "Item Under Consideration" would be approved by the 96th Annual Meeting, the Sector is asked to consider adding the interpretation of HB 44 General Code paragraph G-S.8. to Appendix B of the Grain Moisture Meters chapter of the 2011 edition of ***NCWM Publication 14*** as shown in **(d)** below and to Appendix A of the Near Infrared Grain Analyzers chapter of the 2011 edition of ***NCWM Publication 14*** as shown in **(e)** below.

Table S.2.5. ***Categories of Device and Methods of Sealing*** that appears in §5.56.(a) of **NIST Handbook 44** lists acceptable methods of sealing for various categories of GMMs. When the Sector first recommended adding the table to HB44 at their September 1996 meeting, the concept of making a change to a GMM from a remote site involved information " …sent by to the device by modem (or computer)." In 2011 this concept has expanded to include the ability of the measuring device to accept new or revised sealable parameters from a memory chip, external computer, network, or other device plugged into a mating port (e.g., USB port) on the measuring device or connected wirelessly to the measuring device. The Sector is asked to consider recommending that a note be added to Table S.2.5. recognizing the expanded scope of "remote capability" as shown in **(a)** below.

Category 3 of Table S.2.5. includes the following requirement:

> When accessed remotely for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measuring mode.

All of the GMMs in Categories 3, 3a, and 3c of Table S.2.5. use an electronic method of sealing, and most of them also offer access to the configuration mode thorough a keyboard entered password. In this mode, sealable parameters can be changed locally through the keyboard. The Sector is asked to consider deleting "remotely" from the second paragraph of Category 3 requirements that begins, "When accessed remotely …" , and in adding the modified paragraph to Categories 3b and 3c. as

shown in **(a)** below for §5.56.(a) of Handbook 44 and as shown in **(b)** below for Appendix C of the GMM chapter of Publication 14. The Sector is also asked to consider the corresponding changes to the checklist of Publication 14 (deleting "remotely" from sections 1.1.15. and 1.1.16., deleting the heading "**For Category 3 Devices**", and appending the modified sections and their subsections to the checklist headed "For Category 3, 3a and 3b Devices" as shown in **(c)** below.

Similarly, NIR Grain Analyzers (NIR) use an electronic method of sealing, and most of them also offer access to the configuration mode thorough a keyboard entered password. In this mode, sealable parameters can be changed locally through the keyboard. The Sector is asked to consider modifying the NIR Check List of Publication 14 to delete "remotely" from §4 Design of NIR Analyzers, ¶ 4.9.16 as shown in **(f)** below.

(a) Proposed Changes to Table S.2.5. of §5.56.(a) in Handbook 44

Table S.2.5. ***Categories of Device and Methods of Sealing***	
Categories of Device	***Methods of Sealing***
Category 1: *No remote configuration capability.*	*Seal by physical seal or two event counters: one for calibration parameters (000 to 999) and one for configuration parameters (000 to 999). If equipped with event counters, the device must be capable of displaying, or printing through the device or through another on-site device, the contents of the counters.*
Category 2: *Remote configuration capability, but access is controlled by physical hardware.* *A device shall clearly indicate that it is in the remote configuration mode and shall not be capable of operating in the measure mode while enabled for remote configuration.*	*The hardware enabling access for remote communication must be at the device and sealed using a physical seal or two event counters: one for calibration parameters (000 to 999) and one for configuration parameters (000 to 999). If equipped with event counters, the device must be capable of displaying, or printing through the device or through another on-site device, the contents of the counters.*
Category 3: *Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).* *When accessed* ~~***remotely***~~ *for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measuring mode.*	*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 (for calibration changes consisting of multiple constants, the calibration version number may be used rather than the calibration constants). A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to twenty-five (25) 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.)*
Category 3a: *No remote capability, but operator is able to make changes that affect the metrological integrity of the device (e.g., slope, bias, etc.) in normal operation.* ***When accessed for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measuring mode.***	*Same as Category 3*
Category 3b: *No remote capability, but access to metrological parameters is controlled through a software switch (e.g., password).* ***When accessed for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measuring mode.***	*Same as Category 3*
Note: In addition to the definition of remote configuration capability as defined in Appendix D of HB44, as used in this table, "remote configuration capability" also includes the ability of the measuring device to accept new or revised sealable parameters from a memory chip, external computer, network, or other device plugged into a mating port (e.g., USB port) on the measuring device or connected wirelessly to the measuring device. (Added 201X)	

[*Nonretroactive as of January 1, 1999* ***and January 1, 201X***]

(Amended 1998 and 201X)

Note: Zero-setting and test point adjustments are considered to affect metrological characteristics and must be sealed. (Added 1993) (Amended 1995 and 1997)

(b) Proposed Changes to Table S.2.5. in Appendix C of the GMM Chapter of Publication 14

Table S.2.5. Categories of Device and Methods of Sealing

Categories of Device		Method of Sealing
Category 1:	No remote configuration capability	Seal by physical seal or two event counters: one for calibration parameters (000 to 999) and one for configuration parameters (000 to 999.) If equipped with event counters, the device must be capable of displaying, or printing through the device or through another on-site device, the contents of the counters.
Category 2:	Remote configuration capability, but access is controlled by physical hardware. Device shall clearly indicate that it is in the remote configuration mode and shall not be capable of operating in the measure mode while enabled for remote configuration.	The hardware enabling access for remote communication must be at the device and sealed using a physical seal or two event counters; one for calibration parameters (000 to 999) and one for configuration parameters (000 to 999.) If equipped with event counters, the device must be capable of displaying, or printing through the device or through another on-site device, the contents of the counters.
Category 3:	Remote configuration capability, access may be unlimited or controlled through a software switch (e.g. password.) When accessed ~~remotely~~ for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measure mode.	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 (for calibration changes consisting of multiple constants, the calibration version number may be used rather than the calibration constants.) A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to twenty-five (25) 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.)*
Category 3a:	No remote capability, but operator is able to make changes that affect the metrological integrity of the device (e.g. slope, bias, etc.) in normal operation. When accessed for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measure mode.	Same as Category 3
Category 3b:	No remote capability, but access to metrological parameters is controlled through a software switch (e.g. password.) When accessed for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measure mode.	Same as Category 3

Non-retroactive as of January 1, 1999. Amended 1998 and 201X

(c) Proposed Changes to the Checklist of the GMM chapter of Publication 14

~~**For Category 3 Devices:**~~

4.6.36. If a measurement is in process when the device is accessed ~~remotely~~ for the purpose of modifying sealable parameters, the measurement is either: ☐ Yes ☐ No ☐ N/A

- Terminated Before Results can be Displayed or Printed. **OR**
- Completed Before Entering the Configuration Mode

4.6.37. When accessed ~~remotely~~ for the purpose of modifying sealable parameters, the device clearly indicates that it is in the configuration mode and is not capable of operating in the measure mode. ☐ Yes ☐ No ☐ N/A

4.6.37.1 Describe the method used to seal the device or access the audit trail information:

_____

_____

(d) Proposed Changes to Appendix B of the GMM Chapter of Publication 14

Appendix B

Philosophy for Sealing

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

Typical Features to be Sealed

Principles for Determining Features to be Sealed

The need to seal some features depends upon:

- The ease with which the feature or the selection of the feature can be used to facilitate fraud. **AND**
- The likelihood that the use of the feature will result in fraud not being detected.

Features or functions which the operator routinely uses as part of device operation, such as selecting the grain calibration to be used, are not sealable parameters and shall not be sealed.

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(e) Proposed Changes to Appendix A of the NIR Grain Analyzer Chapter of Publication 14

Appendix A

Philosophy for Sealing

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

Typical Features to Be Sealed

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The need to seal some features depends upon:

- The ease with which the feature or the selection of the feature can be used to facilitate fraud. **AND**
- The likelihood that the use of the feature will result in fraud not being detected.

Features or functions which are routinely used by the operator as part of device operation, such as selecting the grain calibration to be used, are not sealable parameters and shall not be sealed.

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(f) Proposed Changes to the Checklist of the NIR Grain Analyzer Chapter of Publication 14

4.9.16. If a measurement is in process when the device is accessed ~~remotely~~ for the purpose of modifying sealable parameters, the measurement is either:

4.9.16.1.	Terminated before results can be displayed or printed. OR	☐ Yes ☐ No ☐ N/A
4.9.16.2.	Completed before entering the configuration mode	☐ Yes ☐ No ☐ N/A
4.9.16.3.	Describe the method used to seal the device or access the audit trail information:	

_____

_____

6. Item 310-2: G-S.1. Identification. – (Software)

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

Background: 2010 Carryover Item 310-3. Starting at the October 2007 meeting, the Software Sector has discussed the value and merits of required markings for software. After several iterations, the Software Sector developed a table to reflect their positions. This table was submitted to NCWM S&T Committee and was assigned Developing status in 2008. However, the Software Sector did not include a recommendation on how to incorporate the proposal into existing G-S.1. and G-S.1.1.

language. In particular, WMD was concerned about properly addressing the various existing requirements and multiple non-retroactive dates.

Prior to the NCWM 2009 Interim Meeting, NIST WMD commented on S&T Item 310-3, and presented an alternate proposal with significant modifications, which were included in the Interim Meeting Agenda background for the item. There was much additional comment and various proposed versions of the table from NIST WMD, et al.

At the 2009 Software Sector Meeting, it was agreed that the proposed table had not accomplished the intended purpose of clarifying the requirements. To remove some of the confusion the Software Sector revisited this item from the beginning modifying the text of G-S.1 to match the Software Sector's original intent.

At its March 2010 meeting, the Software Sector, in response to comments heard during the 2010 Interim meeting, revised the proposed language changes described in the S&T Committee Interim Agenda **Item 310-3**. These revisions removed existing mention of "not-built-for purpose" and the differentiation between Type P and Type U software types. The first sentence of G-S.1. was restored to the current HB44 wording.

The Software Sector also initiated discussion on two new concepts, which may eventually result in additional recommendations to amend G-S.1. First, the Software Sector sees merit to requiring some "connection" between the software identifier (i.e., version/revision) and the software itself. The proposal was as follows (with the expectation that examples of acceptable means of implementing such a link would be included in Pub 14).

Add a new sub-subparagraph **G-S.1.(d)(3)**:

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

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

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

> *(b) The CC Number shall be:*
>
> *(3) accessible through* ***<u>one or, at most, two levels of access.</u>***
>
> ***<u>(i) For menu-based systems, "Metrology", "System Identification", or "Help".</u>***
>
> ***<u>(ii) For systems using icons, a metrology symbol ("M" or "SI"), or a help symbol ("?," "I," or an "i" within a magnifying glass).</u>***

To facilitate review of the suggested amendments, additions, and changes G-S.1. and its sub-paragraphs the current HB44 language has been marked up to show all of the suggested modifications, some of which have been added by the 2011 S&T Committee and some of which are Software Sector recommendations not included in the 2011 S&T Interim Report. The mark-ups do not include changes that may have been made at the SS March 2011 Meeting.

G-S.1. Identification. – All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, ***and software-based devices covered in G-S.1.1. Location of Marking Information,*** shall be clearly and permanently marked for the purposes of identification with the following information:
[Nonretroactive as of January 1, 201X]

(a) the name, initials, or trademark of the manufacturer or distributor;

(b) a model identifier that positively identifies the pattern or design of the device;

(1) The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lowercase.
[Nonretroactive as of January 1, 2003]
(Added 2000) (Amended 2001)

(c) a nonrepetitive serial number, except for equipment with no moving or electronic component parts ***~~and not built-for-purpose, software-based devices;~~***
[Nonretroactive as of January 1, 1968]
(Amended 2003 **and 201X**)

(1) The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number.
[Nonretroactive as of January 1, 1986]

(2) Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No., and S. No.).
[Nonretroactive as of January 1, 2001]

(d) the current software version or revision identifier for ***~~not-built-for-purpose~~*** ***software-based electronic*** *devices;*
[Nonretroactive as of January 1, 2004]
(Added 2003) **(Amended 201X)**

(1) The version or revision identifier shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision.
[Nonretroactive as of January 1, 2007]
(Added 2006)

(2) Abbreviations for the word "Version" shall, as a minimum, begin with the letter "V" and may be followed by the word "Number." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R" and may be followed by the word "Number." The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).
[Nonretroactive as of January 1, 2007]
(Added 2006)

(3) The version or revision identifier shall be directly and inseparably linked to the software itself. The version or revision identifier may consist of more than one part, but at least one part shall be dedicated to the metrologically significant software. (Added 201X)

(e) an NTEP CC number or a corresponding CC Addendum Number for devices that have a CC. The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.)
[Nonretroactive as of January 1, 2003]

The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.
(Amended 1985, 1991, 1999, 2000, 2001, 2003~~, and,~~ 2006 **and 201X**)

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

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

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

(1) permanently marked on the device;

(2) continuously displayed; or

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

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

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

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

[Nonretroactive as of January 1, 2004 ***and 201X****]*

(Added 2003) (Amended 2006 **and 201X**)

Discussion: It should be noted that these new ideas are still in the developmental/information stage, and are included here at the request of the Software Sector, which is seeking comments from interested parties. The Sector is asked to comment on the proposed changes to G-S.1. and G-S.1.1. shown above, specifically those that will most affect Grain Analyzers:

1. G-S.1.(d) and its sub paragraphs will require a software version or revision identifier that is directly and inseparably linked to the software itself; and

2. G-S.1.1. and its sub paragraphs will allow the identifiers required in G-S.1. to be either permanently marked or continuously displayed for software-based electronic devices. This includes the software version or revision identifier.

   The GA Sector commented on this item in its August 2010 Meeting:

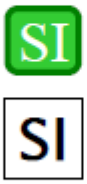
   > Regardless of how the wording is interpreted, the GA Sector agreed that it was not practical to permanently mark or continuously display the software/firmware version/revision identifier for GMMs. The GA Sector recommends that G-S.1.1.(b) be amended to include accessing the software version or revision identifier by menu or icon. At present all NTEP GMMs are built-for-purpose. They all have permanently marked CC numbers. Software version/revision identifiers, however, are accessible by menu or icon. GMM displays are of limited size. Some existing devices don't have room to display the software version/revision identifier on every "screen". Hard marking of that identifier is not practical, because it precludes updating software without also replacing the hard-marked label.

   These comments were forwarded to the Software Sector and appeared in the Agenda of their March 2011 Meeting. The Summary of the SS March 2011 was not available when the GA Sector Agenda was being prepared.

3. If not either permanently marked or continuously displayed, the CC Number will have to be accessible through one or two levels of access identified by the labels, "Metrology", "System Identification", or "Help" in menu based systems, or for systems using icons, a metrology symbol ("**M**" or "**SI**"), or a help symbol ("**?**," "**I**," or an "**i**" within a magnifying glass). Note that this is not suggested to be the final list of valid options; the Software Sector would like to have feedback specifically on additional menu text/icon images that should be considered acceptable. The Software Sector feels that the number of acceptable options is less of an issue (within reason) than the fact that the list is finite.

   The following Table of Proposed Text/Menu Icons was circulated by the Software Sector for comment.

Table 1 - Software Sector Proposed Menu Text /Icons

Permitted Menu Text examples	*Permitted Icon shape examples*	*Essential characteristics*
Information Info		Top level menu text or icon • Icon text is a lower case "i" with block serifs • Text color may be light or dark but must contrast with the background color • Icon may have a circular border • Activation of this menu text/icon may invoke a second level menu text/icon that recalls metrology information.
Help ?		Top level menu text or icon • Icon text is a question mark • Text color may be light or dark but must contrast with the background color • Icon may have a circular border • Activation of this menu text/icon may invoke a second level menu text/icon that recalls metrology information.
Metrology Metrological Information		Top or second level menu text or icon • Icon text is an upper case "M" • Text color may be light or dark but must contrast with the background color • Icon may have a rectangle or rounded rectangle border • If present, the activation of this menu text/icon must recall at a minimum the NTEP CC number.
SI S.I.		Top or second level menu text or icon • Icon text is upper case "SI" • Text color may be light or dark but must contrast with the background color • Icon may have a rectangle or rounded rectangle border • If present, the activation of this menu item/icon must recall at a minimum the NTEP CC number.
NTEP Data N.T.E.P. Certificate		This one is debatable – what if the certificate is revoked? Does NTEP grant holders of CCs the right to display the logo on the device, or just in documentation?

Comments were received from the Weighing Sector (WS). Darrell Flocken, WS Chairman, indicated that the green M is an EU metrology mark and for that reason should not be considered an acceptable icon. There was general consensus amongst WS members that the SI should not be considered acceptable since it is also used to identify the International System of Units.

GMM manufacturers are asked to comment on these (or other) menu text/icon images that could be applicable to their existing/future devices.

7. Other Software Requirements That May Impact Grain Analyzers

The items under this heading are mostly excerpts from the Software Sector's March 2010 meeting summary intended to keep Grain Analyzer Sector Members informed of developmental software requirements that may impact grain analyzers. For more detailed information, see the complete Software Sector meeting summary when it becomes available.

a. Identification of Certified Software

[Note: This item is now partially covered by the provisional proposal to make G-S.1.(d) applicable to software-based electronic devices and by adding the following new sub-subparagraph **G-S.1.(d)(3)**:]

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

Also the Software Sector recommends the following information be added to Pub. 14 as explanation/examples:

- *Unique identifier must be displayable/printable on command or during operation, etc.*
- *At a minimum, a version/revision indication (1.02.09, rev 3.0 a, etc). Could also consist of / contain checksum, etc. (crc32, for example)*

Software Sector Conclusions: The item needs additional discussion and development by the Software Sector. Outstanding questions: If we allow hard-marking of the software identifier (the Sector has wavered on this in the past), does the above wording then imply that some mechanical means is required (i.e. physical seal) to 'inseparably link' the identifier to the software? Do we still have to be able to display/print the identifier if it is hard-marked?

b. Software Protection / Security

Background: The Software Sector derived a trial Pub 14 checklist based on the OIML checklist to verify that the software adequately protected against fraudulent modification as well as accidental or unintentional changes. The checklist has been distributed to current NTEP labs for use on a trial basis for new type approval applications.

Devices with embedded software TYPE P (aka built-for-purpose)			
	Declaration of the manufacturer that the software is used in a fixed hardware and software environment, and		Yes☐ No ☐ N/A ☐
	cannot be modified or uploaded by any means after securing/verification		Yes☐ No ☐ N/A ☐
	Note: *It is acceptable to break the "seal" and load new software, audit trail is also a sufficient seal.*		
	The software documentation contains:		
		description of all ~~the metrologically significant~~ functions, **designating those that are considered metrologically significant** ~~*OIML states that there shall be no undocumented functions*~~	Yes☐ No ☐ N/A ☐
		description of the securing means (evidence of an intervention)	Yes☐ No ☐ N/A ☐
		software identification	Yes☐ No ☐ N/A ☐
		description how to check the actual software identification	Yes☐ No ☐ N/A ☐
	The software identification is:		
		clearly assigned to the metrologically significant software and functions	Yes☐ No ☐ N/A ☐
		provided by the device as documented	Yes☐ No ☐ N/A ☐

Personal computers, instruments with PC components, and other instruments, devices, modules, and elements with programmable or loadable metrologically significant software TYPE U (aka not built-for-purpose)			
	The *metrologically significant* software is:		
		documented with all relevant (see below for list of documents) information	Yes☐ No ☐ N/A ☐
		protected against accidental or intentional changes	Yes☐ No ☐ N/A ☐
	Evidence of intervention (such as, changes, uploads, circumvention) is available until the next verification / inspection (e.g. physical seal, Checksum, CRC, audit trail, etc. means of security)		Yes☐ No ☐ N/A ☐
Software with closed shell (no access to the operating system and/or programs possible for the user)			
	Check whether there is a complete set of commands (e.g. function keys or commands via external interfaces) supplied and accompanied by short descriptions		Yes☐ No ☐ N/A ☐
	Check whether the manufacturer has submitted a written declaration of the completeness of the set of commands		Yes☐ No ☐ N/A ☐
Operating system and / or program(s) accessible for the user:			
	Check whether a checksum or equivalent signature is generated over the machine code of the metrologically significant software (program module(s) subject to legal control W&M jurisdiction and type-specific parameters)		Yes☐ No ☐ N/A ☐
	Check whether the metrologically significant software will detect and act upon any unauthorized alteration of the metrologically significant software using simple software tools e.g. text editor.		Yes☐ No ☐ N/A ☐
Software interface(s)			
	Verify the manufacturer has documented:		
		the program modules of the metrologically significant software are defined and separated	Yes☐ No ☐ N/A ☐
		the protective software interface itself is part of the metrologically significant software	Yes☐ No ☐ N/A ☐
		the *functions* of the metrologically significant software that can be accessed via the protective software interface	Yes☐ No ☐ N/A ☐
		the *parameters* that may be exchanged via the protective software interface are defined	Yes☐ No ☐ N/A ☐
		the description of the functions and parameters are conclusive and complete	Yes☐ No ☐ N/A ☐
		there are software interface instructions for the third party (external) application programmer.	Yes☐ No ☐ N/A ☐

Software Sector Discussion: The labs again indicated they had not had a chance to utilize the checklist. The list was reviewed and some minor modifications to the checklist text were incorporated as shown above.

Software Sector Conclusion: Work is ongoing on this item with the intent that it eventually be incorporated as a checklist in Pub 14; again the labs are requested to try utilizing this checklist for any evaluations on software-based electronic devices.

c. Software Maintenance and Reconfiguration

Background: The Software Sector agreed that the two definitions below for Verified update and Traced update were acceptable.

> **Verified Update:** A verified update is the process of installing new software where the security is broken and the device must be re-verified. Checking for authenticity and integrity is the responsibility of the owner/user.
>
> **Traced Update:** A traced update is the process of installing new software where the software is automatically checked for authenticity and integrity, and the update is recorded in a software update log or audit trail.

The Software Sector also worked towards language proposed for defining the requirements for a Traced Update (currently considered as relevant for Pub 14):

For a Traced Update, an event logger is required. The logger shall be capable of storing a minimum of the 10 most recent updates. An entry shall be generated for each software update.

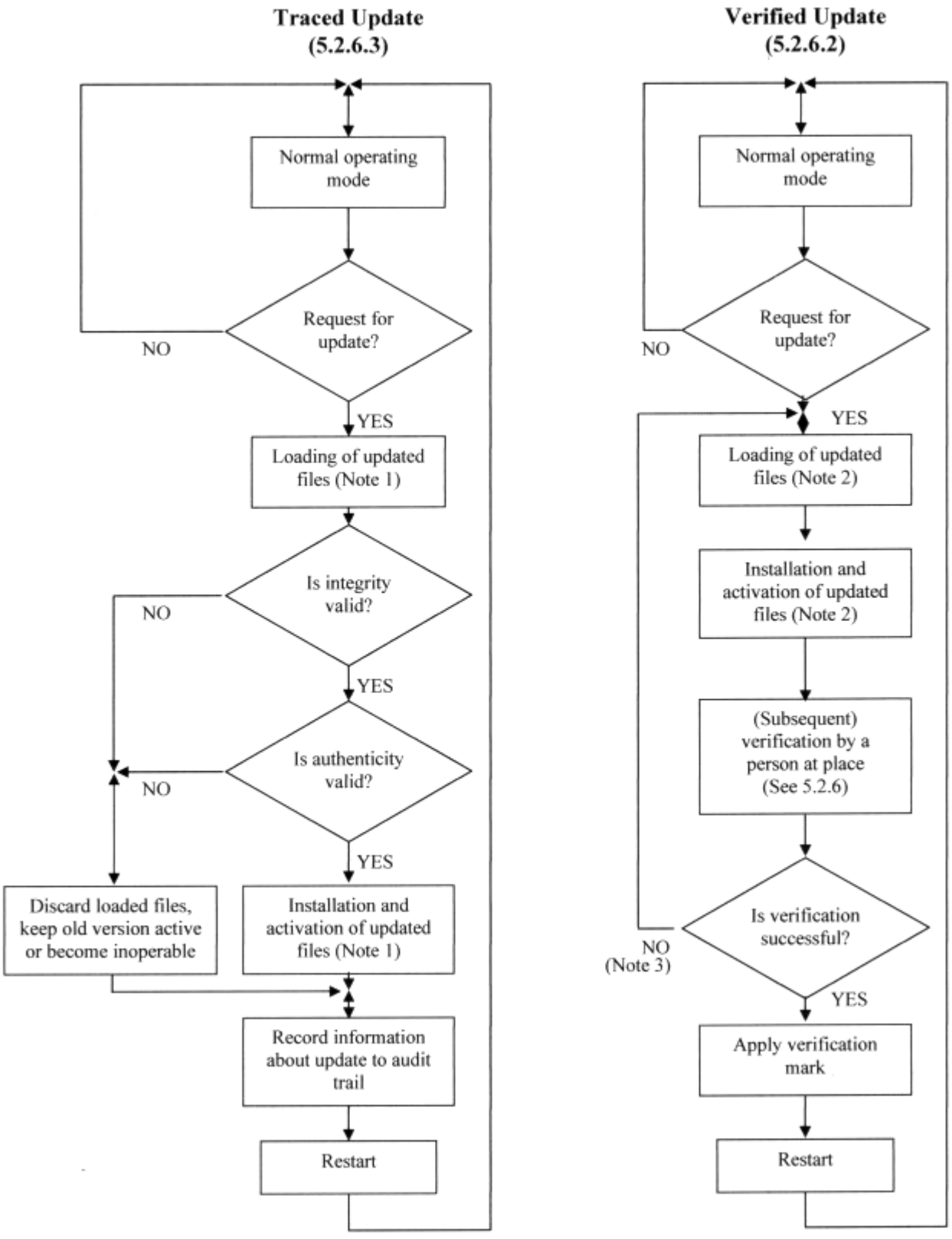
Use of a Category 3 audit trail is required for the Traced Update. If software update is the only loggable event, then the Category 3 audit trail can be limited to only 10 entries. A log entry representing a software update shall include the software identification of the newly installed version.

Software Sector Conclusions: The general consensus of the group after considering feedback from external interested parties is that a new G-S.9. with explicit requirements [for Metrologically Significant Software] is not necessary (nor likely to be adopted by the Conference) and that this requirement belongs in the Pub. 14 lists of sealable parameters rather than in Handbook 44; i.e.,

The updating of metrologically significant software shall be considered a sealable event.

Additional work is to be done to further develop the proposed text toward inclusion in Pub 14

Grain Analyzer Sector Discussion: At its August 2009 meeting the GA Sector questioned the need for a definition of "Traced Update". The traced update was initially intended to cover cases in Europe where the National Body controls a network of devices and wants to update all the devices simultaneously from a central location. Denmark and France do this with NIR Grain Analyzers. Even though individual states may still require that a device updated via a "Traced Update" must be "returned to service" by a registered serviceperson before it can be used, the Sector may want to consider adopting "Traced Update" requirements for all Category 3 Grain Analyzers. The device is still subject to later inspection by state Weights and Measures personnel. By designing to the requirements for "traced update", states might be encouraged to allow devices updated to those requirements to be returned to service without requiring a visit by a registered serviceperson.



Software Update Procedure – from OIML D 31:2008 (E)

Notes:

(1) In the case of a Traced Update updating is separated into two steps: "loading" and "installing/activating". This implies that the software is temporarily stored after loading without being activated because it must be possible to discard the loaded software and revert to the old version, if the checks fail.

(2) In the case of a Verified Update , the software may also be loaded and temporarily stored before installation but depending on the technical solution loading and installation may also be accomplished in one step.

(3) Here, only failure of the verification due to the software update is considered. Failure due to other reasons does not require re-loading and re-installing of the software, symbolized by the NO-branch.

8. Test Weight per Bushel Acceptance and Maintenance Tolerances

[Submitted by Jeffrey D. Adkisson, Grain & Feed Association of Illinois.]

Background: The Sector first considered this issue at its March 1996 meeting. In 1997 at its September meeting, the Sector agreed that priority should be given to drafting changes to the Grain Moisture Code to specify field test methods and reasonable tolerances. A draft of proposed changes to the Code was reviewed by the Sector at its March 1998 meeting. Action to forward the draft to the Committee on Specifications and Tolerances (S&T) was deferred pending receipt of feedback from the grain trade on the acceptability of the proposed tolerances and feedback from Weights and Measures (W&M) members on a sampling of field test results applying those tolerances. Committee Ballot 84-03 to add the proposed changes to NIST Handbook 44, Section 5.56(a), was issued on August 18, 1998 with ballots due for return by September 10, 1998. The TW tolerances proposed at that time are shown below.

Test Weight per Bushel	
Type of Grain or Seed	**Acceptance and Maintenance Tolerance**
Corn	1.1 pounds per bushel
Sorghum, soybeans, and all wheat classes	0.6 pounds per bushel
Barley, oats, rice, sunflower, and all other small cereal grains and oil seeds	0.9 pounds per bushel

Most of the Sector members agreed with the need for criteria but were not in agreement with the tolerances.

In a written comment accompanying his ballot, Prof. Charles Hurburgh, Iowa State University, suggested that the proposed tolerances had not been calculated correctly and were not discriminating enough. Prof. Hurburgh submitted an analysis of variances in test weight per bushel measurements based on data collected by the Grain Quality Laboratory at ISU. For corn, he proposed a tolerance of 0.80 pounds per bushel, setting it at plus or minus two standard deviations relative to the reference. His calculations assumed:

- A root mean square difference (RMSD) of 0.55 pounds/bushel (each sample tested once in standard quart cup and once in meter)

- A standard error (precision) of 0.3 for corn (and 0.15 for other grains) for both cup and meter

The Corn columns in following table illustrate the method used by Dr. Hurburgh in his calculations. The rest of the table has been filled in to show suggested tolerances for the remaining grains at both 95.4% and 99.7% confidence levels. [Editor's note: The grain groupings shown in the table represent the original groupings suggested prior to the Sector's 1999 meeting. The groupings in the present code are the groupings adopted at the Sector's September 1999 meeting.]

	Single Test one drop in cup and one in meter			Calculated for Replicated Tests 10 drops in cup and 3 in meter		
	Corn	Sorghum, Soybeans, Wheat (all classes)	Barley, oats, rice, sunflower, and all other small cereal grains and oil seeds	Corn	Sorghum, Soybeans, Wheat (all classes)	Barley, oats, rice, sunflower, and all other small cereal grains and oil seeds
Cup Standard Deviation (precision/repeatability)	0.3000	0.1500	0.1500			
Meter Standard Deviation (precision/repeatability)	0.3000	0.1500	0.1500			
Variance due to Cup precision/repeatability (SD^2 for Cup precision)	0.0900	0.0225	0.0225	0.0090	0.0023	0.0023
Variance due to Meter precision/repeatability (SD^2 for Meter precision)	0.0900	0.0225	0.0225	0.0300	0.0075	0.0075
Other Variances (calculated so sum of variances equals the total below)	0.1225	0.0450	0.1150	0.1225	0.0450	0.1150
Total variance ($RMSD^2$)	0.3025	0.0900	0.1600	0.1615	0.0548	0.1248
RMSD (for Single Test conditions this is obtained from test data)	0.55	0.30	0.40	0.40	0.23	0.35
Tolerance 1 (lb/bu) (2x RMSD)	1.10	0.60	0.80	0.80	0.46	0.70
Tolerance 2 (lb/bu) (3xRMSD)	1.65	0.90	1.20	1.20	0.69	1.05
Originally Proposed Tolerance (lb/bu)				1.10	0.60	0.90

At the Sector's September 1999 meeting, maintenance tolerances of ±0.8 pounds per bushel for corn and oats; ±0.5 pounds per bushel for all classes of wheat; and ±0.7 for soybeans, barley, rice, sunflower, and sorghum were proposed for further study. Although several members opposed adopting the proposed tolerances and groupings for the following reasons: 1) difficult to meet the proposed tolerance for wheat; 2) difficult to obtain samples for field test; and 3) not discriminating enough for corn, they agreed to consider them for further study.

States agreeing to participate in a field evaluation of the proposed tolerances and test methods included:

Arkansas	Nebraska	Maryland
Illinois	North Carolina	Missouri

In late September 2000, the USDA/Grain Inspection Packers and Stockyards Administration (GIPSA) sent one portion of a hard red winter wheat (HRW) standardizing sample to each of the participating State Laboratories. Participating laboratories verified that the quart kettle used in their standard test weight per bushel (TW) apparatus met the requirements in GIPSA's volume test procedures. They also verified that the apparatus was set up according to GIPSA standards before testing the HRW standardizing samples. With the exception of one State, the test weight apparatuses were within GIPSA's tolerance. GIPSA has since worked with the State to correct the test weight apparatus that was out of tolerance.

To obtain base-line performance data on the standard quart kettle test method for corn and soybeans, GIPSA sent corn and soybeans samples to the participating laboratories prior to the Sector's August 2002 meeting. Tests were run on each State's standard quart kettle TW apparatus and on any NTEP model Grain Moisture Meter with TW capability that the State had in its laboratory.

Quart Kettle Method Test Weight per Bushel Test Results for Participating State Grain Moisture Labs with GIPSA Measurements as Reference

	Corn		Soybeans	
	Bias (pounds per bushel) (avg. of 3 replicates)	Individual Lab Precision (pounds per bushel) (3 replicates)	Bias (pounds per bushel) (avg. of 3 replicates)	Individual Lab Precision (pounds per bushel) (3 replicates)
State 1	0.23	0.06	0.13	0.06
State 2	-0.60	0.00	-0.50	0.00
State 3	0.07	0.06	0.00	0.00
State 4	0.27	0.06	0.27	0.06
State 5	-0.07	0.06	-0.13	0.06
State 6	0.30	0.00	0.07	0.06
Avg Bias*	0.16	---	-0.07	---
SDD of Overall Bias*	0.16	---	0.15	---
* the data from State 2 was not included in Avg Bias and SDD of Overall Bias				

With the exception of State 2 that reported results significantly lower than the reference for both corn and soybeans, the results indicate that in a laboratory setting the quart kettle method can achieve accuracies (based on the average of 3 readings) that are approximately one-half to one-third the proposed maintenance tolerances of ±0.8 pounds per bushel for corn and ±0.7 pounds per bushel for soybeans.

The same set of samples used for the Quart Kettle Method tests were used to test NTEP grain moisture meters located in state moisture labs and in the ongoing calibration maintenance program at GIPSA. (Note: Some of the meters located in state moisture labs may have been used as Field Standards). For both NTEP and State Lab meters, the bias on NTEP meters using TW calibrations that had been standardized met the proposed tolerance requirements for corn and soybeans with one exception. The exception, with an error at least seven times greater than meters of the same type, was

judged to be an isolated case, most likely indicating the need for service, as results for nine other meters of like type were well within the proposed tolerance limits. Consistent biases on the majority of meter models with TW calibrations that had not been standardized suggest that with proper standardization, these models would also meet the proposed tolerance requirements. The laboratory TW results (from both NTEP and State labs) for GMM's are summarized below.

Test Weight per Bushel Test Results
for
Grain Moisture Meters in Participating State Grain Moisture Labs and at the NTEP Laboratory
with
GIPSA Quart Kettle Measurements as Reference

Model	number of meters tested	Corn		Soybeans	
		Average Bias (pounds per bushel)	SDD (pounds per bushel) Based on 3 replicates per meter	Average Bias (pounds per bushel)	SDD (pounds per bushel) Based on 3 replicates per meter
Model 1	2	-0.35	0.21	0.08	0.12
Model 2	9*	-0.29	0.17	-0.04	0.16
Model 3	3	-1.14	0.21	-0.66	0.07
Model 4	2	-1.12	0.40	-0.37	0.38
Model 5	2	-1.48	0.35	-1.35	0.07
* net of 1 outlier					

Dr. Richard Pierce, GIPSA, remarked that the repeatability of the meters was impressive, especially in light of the fact that the SD between two inspectors at GIPSA is typically 0.25 pounds per bushel for official inspections. This translates to 0.5 pounds per bushel at a 95% confidence level.

One Sector member noted that the samples used for the initial tests were fairly dry (corn: approximately 13.3% and soybeans: approximately 10%). The use of low moisture samples, plus the fact that the samples were also clean and free of foreign material and broken kernels may have contributed to the excellent results obtained in the initial lab tests. Official TW determinations by GIPSA, for most large grains, are obtained prior to removal of dockage and foreign material.

It was also pointed out that TW measurements on high moisture samples are not reliable. In normal years, TW will increase as a grain samples loses moisture. The grain kernel tends to shrink somewhat as it dries. In fact, the volume reduction is normally greater, percentage wise, than the reduction in mass due to drying. As a result, TW (weight per unit volume) increases. The surface condition of high moisture corn may also contribute to additional variance in the packing density as the sample is loaded into the test kettle or test cell of a GMM.

A Field Test was also conducted on a sampling of TW capable NTEP grain moisture meters. Participating laboratories obtained their own samples for this test. Each participating laboratory was to make an initial determination of the test weight per bushel of each sample portion with the standard quart kettle apparatus before sending it to the field. Tests were to be run on TW capable NTEP grain moisture meters and on the kettle test weight apparatus used at each commercial location selected for field-testing. Kettle tests at each location were to be made by the operator who normally made test weight per bushel determinations for commercial transactions. No instruction was to be given to the operator on how to perform the test. The participating laboratory was to make a final determination of test weight per bushel when the sample was returned to the lab. Data was to be collected on no more than twenty instruments per grain sample.

In August 2002, field data were received from Illinois, Missouri, Nebraska and Arkansas. The results are summarized below. The Sector noted that TW errors were essentially the same for both GMM's with TW capability and for the various kinds of stand-alone TW apparatus currently in use in the field. The results for corn and soybeans were especially encouraging considering that most of the field GMM's had not been adjusted for optimum performance on TW.

Biases reported by Arkansas were significantly greater (and all negative with respect to their reference) than those reported for wheat and soybeans by other states on both GMM devices and on kettle test weight apparatus. The Arkansas weights and measures representative said that he would review the data to see if a cause for this difference could be determined.

Field Evaluation – Bushel Test Weight
Hard Red Winter Wheat & Soft Red Winter Wheat
State Quart Kettle Apparatus as Reference

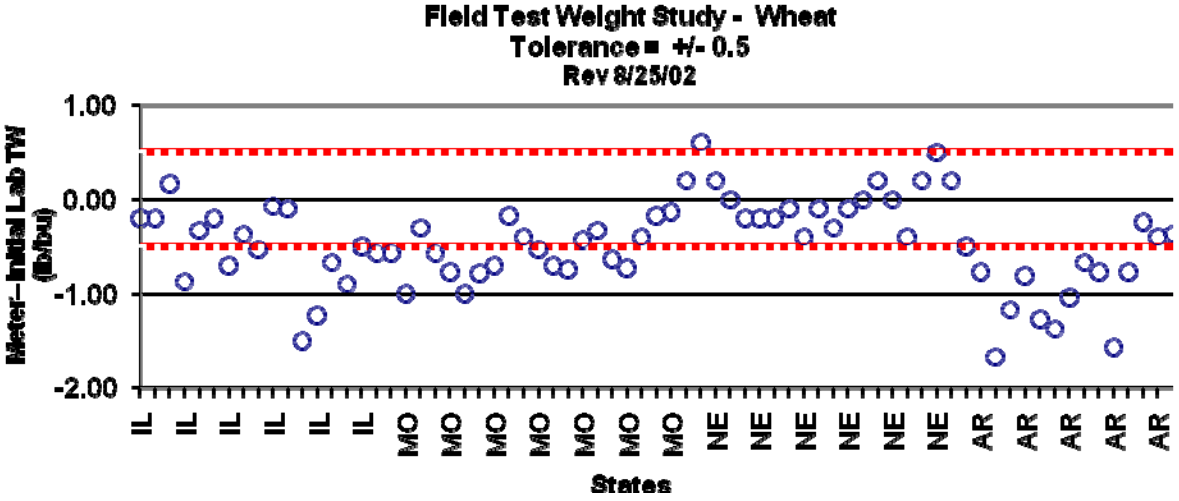
State	Grain Moisture Meters		TW Apparatus	
	SDD (pounds per bushel) Based on 3 replicates per meter	Average Bias (pounds per bushel) with respect to reference sample	SDD (pounds per bushel) Based on 3 replicates per device	Average Bias (pounds per bushel) with respect to reference sample
All participating states	0.47	-0.47	0.31	-0.23
Illinois	0.43	-0.52	0.50	0.02
Missouri	0.26	-0.55	0.32	-0.31
Nebraska	0.29	-0.02	0.23	-0.19
Arkansas (net of 1 outlier)	0.45	-0.92	0.23	-0.36

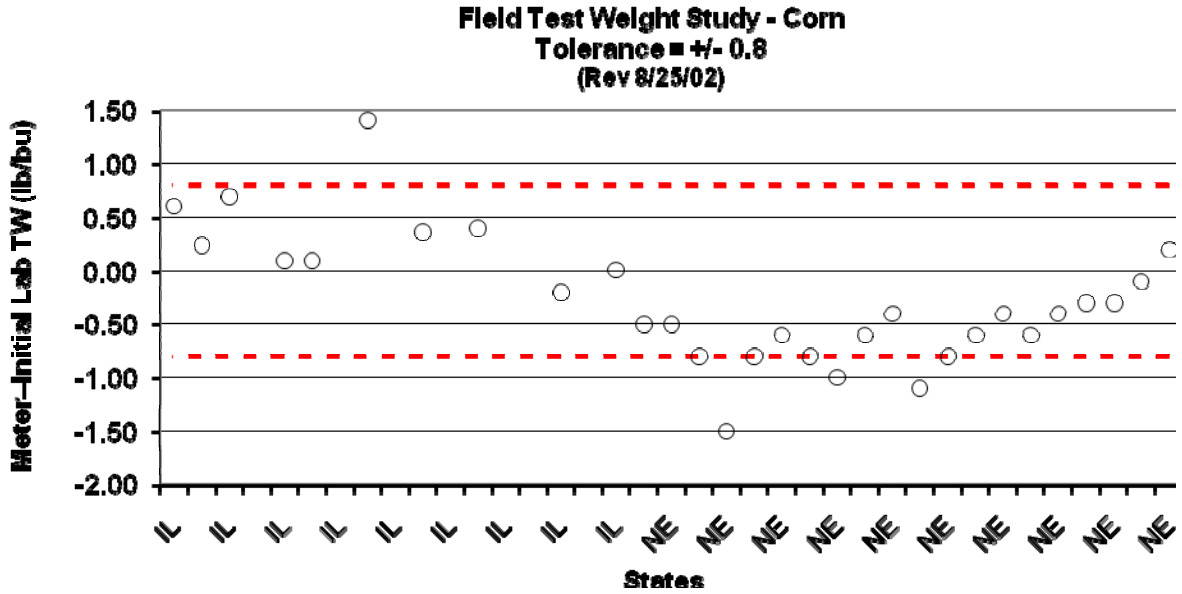
Field Evaluation – Bushel Test Weight
Soybeans
State Quart Kettle Apparatus as Reference

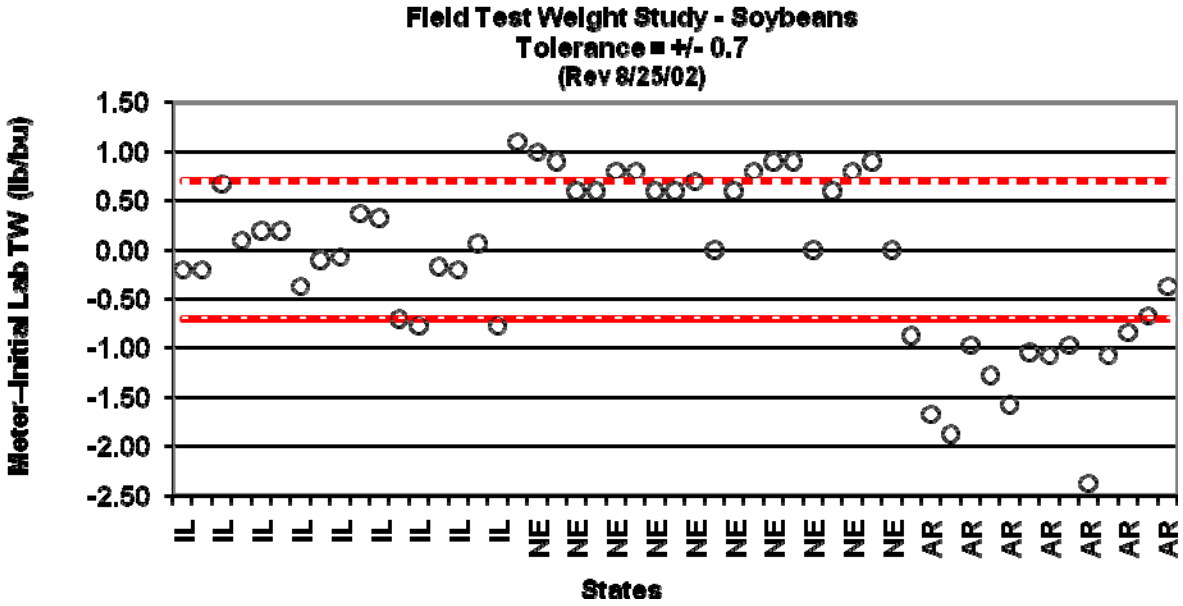
State	Grain Moisture Meters		TW Apparatus	
	SDD (pounds per bushel) Based on 3 replicates per meter	Average Bias (pounds per bushel) with respect to reference sample	SDD (pounds per bushel) Based on 3 replicates per device	Average Bias (pounds per bushel) with respect to reference sample
All participating states	0.85	-0.10	0.64	0.06
Illinois	0.40	-0.09	0.41	0.25
Nebraska	0.32	0.66	0.20	0.36
Arkansas (net of 1 outlier)	0.52	-1.19	0.56	-1.04

Field Evaluation – Bushel Test Weight Corn State Quart Kettle Apparatus as Reference				
State	**Grain Moisture Meters**		**TW Apparatus**	
	SDD (pounds per bushel) Based on 3 replicates per meter	Average Bias (pounds per bushel) with respect to reference sample	SDD (pounds per bushel) Based on 3 replicates per device	Average Bias (pounds per bushel) with respect to reference sample
All participating states	0.55	0.05	0.61	-0.27
Illinois	0.60	0.33	0.46	0.37
Nebraska	0.38	-0.18	0.37	-0.59

Plots of the August 2002 TW Field Evaluation showing results and tolerance limits are shown below.







In early 2007 an outreach study was conducted to determine which jurisdictions were inspecting GMMs for accuracy in test weight per bushel (TW) determination. Of the six states responding four had been inspecting GMMs for TW for several years. None of the four reported any problems with procedures or tolerances. South Carolina, then in its fourth year of inspecting for TW, reported a decline in meters rejected for TW indications. Initial rejection rate for TW was 47.57%. The 2006 inspection year yielded a rejection rate of 12.27%, while tests thus far in 2007 showed a rejection rate of 2.83%.

Problem/Justification: The submitter believes that test weight tolerances are too tight for field operation of GMMs at country grain elevators in Illinois. Some manufacturers have also expressed concern over the large number of GMM Field Test failures due to exceeding HB 44 TW Acceptance and Maintenance Tolerances.

Proposal: The submitter has recommended that HB44 TW tolerances be increased by 50%.

Table T.3. Acceptance and Maintenance Tolerances Test Weight per Bushel	
Type of Grain or Seed	Tolerance (Pounds Per Bushel)
Corn, oats	~~0.8~~ 1.2
All wheat classes	~~0.5~~ 0.75
Soybeans, all barley classes, all rice classes, sunflower, sorghum	~~0.7~~ 1.05

(Added 2003)

As an alternative solution, the submitter has suggested allowing GMMs to print [and display] "approximate test weight." [See Agenda Item 12.]

Discussion: At this writing, it is not known whether the failures are due to test sample selection/preparation, GMM precision, GMM standardization or unrealistic Acceptance and Maintenance Tolerances. The Sector is asked to study this issue and be prepared to discuss the proposed tolerance changes and approaches to a solution.

9. Report on OIML TC17/SC1 R59 "Moisture Meters for Cereal Grains and Oilseeds"

Background: This item was included on the Sector's agenda to provide a summary of the activities of OIML TC17/SC1. In October 2008, the Secretariat of TC 17/SC1 was jointly allocated to China and the United States. The Co-Secretariats (China and the United States) are working closely with an IWG to revise OIML R59 "Moisture meters for cereal grains and oilseeds." The 5 CD of **OIML R59**, revised to comply with OIML's Guide ***Format for OIML Recommendations*** and to incorporate tests for the recommended disturbances of **OIML D11** ***General Requirements for Electronic Measuring Instruments***, was distributed to the Subcommittee in February 2009. Comments to R59 5CD were received from 10 countries including the U.S. A preliminary R59 6 CD addressing those comments was prepared for discussion at the September 2010 TC17/SC1 meeting in Orlando, Florida.

Diane Lee, NIST/WMD, will brief the Sector on the September 2010 meeting and the current status of R59 6 CD.

10. Report on OIML TC 17/SC8 "Protein Measuring Instruments for Cereal Grain and Oil Seeds"

Background: This item was included on the Sector's agenda to provide a summary of the activities of OIML TC17/SC8. Subcommittee SC8 was formed to study the issues and write a working draft document "Measuring instruments for protein determination in grains." Australia is the Secretariat for this subcommittee. A TC 17/SC8 meeting was hosted by NIST in September 2007 to discuss the 2 CD. Discussions on 2 CD dealt mostly with maximum permissible errors (MPEs) and harmonization of the TC17/SC8 Recommendation for protein with the TC17/SC1 Recommendation for moisture. The secretariat distributed a 2 CD of the document in February 2010. A meeting of TC17/SC8 was held September 2010 in Orlando, Florida. At the September meeting comments to the Recommendation on Protein Measuring Instruments for Cereal Grain and Oil Seeds 2 CD were reviewed. It was agreed at this meeting that two instruments will be submitted for OIML type approval. This agreed change and other changes from the September 2010 meeting will be included in 3 CD.

Diane Lee, NIST/WMD, will bring the Sector up to date on the status of 3 CD.

11. Proficiency Testing

[Submitted by Amy L. Johnson, SQT Program Manager, American Oil Chemists Society (AOCS)]

Background: At the Sector's August 2009 Meeting Dr. Charles Hurburgh, Iowa State University, urged the representatives from the American Oil Chemists Society (AOCS) to prepare a proposal so that the collaborative (air-oven) study could be conducted on an on-going basis rather than on an ad hoc basis. He cautioned that the proposal would have to include corn and wheat as well as soybeans.

Several years ago the AOCS in conjunction with the United Soybean Board (USB) established the AOCS-USB Soybean Quality Traits Analytical Standards Program (SQT), a system of verification of analytical measurements. This program provided the infrastructure for the generation of reliable analytical results at all levels of the soybean industry by establishing industry-wide acceptance of analytical methods and protocols and their implementation under internationally accepted quality management standards. The AOCS has proposed the addition of an air-oven/grain moisture meter

proficency testing (PT) series to their Analytical Standards Program (ASP). Proficency testing is a continuous program, samples are sent out in regular intervals (e.g. 2-4 times/year). Participants are able to join on a continuous basis.

Amy Johnson, AOCS, proposed an air-oven/GMM proficiency testing series designed specifically to address the needs of GMM manufacturers and states maintaining a grain moisture laboratory. AOCS would administer the program, oversee distribution of samples, compile results, perform statistical analysis of results, and distribute a report to participants. AOCS does not collect the samples. This is subcontracted to suitable providers. AOCS does not have laboratories. Since GIPSA/FGIS is a certified laboratory already participating in the SQT program, GIPSA air-oven results could be reported for comparison if desired.

The Sector decided that a program that included distribution of 2 samples each of corn, wheat (preferably of one type), and soybeans per year would be adequate. A final report by mid July is desirable, so sample distribution would have to take place in early spring (March – April). The annual cost of such a program was estimated to be in the range of $80 - $100 per participant. Sector chair, Cassie Eigenmann, asked Ms. Johnson to put together a formal proposal based on the above criteria. Ms. Johnson will contact all those on the GA Sector mailing list as well as those on the NIST/WMD list of state W&M officials interested in grain moisture with details of the proposed program.

Ms. Johnson has indicated that there has been some difficulty making arrangements for samples, but they are working through the issue. She will update the Sector on their progress.

12. Printed Ticket User Requirements
[Submitted by Jeffrey D. Adkisson, Grain & Feed Association of Illinois.]
Problem/Justification: The submitter believes that HB44 User Requirements for printed tickets, as specified in §5.56(a), ¶ UR.3.4. (b) are not realistic for country elevators. Traffic patterns at country elevators do not lend themselves to providing a printed ticket to all customers. Many customers, in fact, do not want them. In addition, since meters in Illinois are inspected and are required to be using the correct calibration, there is no need for the calibration version identification to be printed on the ticket.

Proposal: The submitter has proposed that GMMs be allowed to print [and display] "approximate test weight," and that HB44, §5.56(a), ¶ UR.3.4. (b) be modified as shown below:

UR.3.4. Printed Tickets.

(b) If requested ~~The~~ the customer shall be given a printed ticket showing the date, grain type, grain moisture results, and actual or approximate test weight per bushel~~., and calibration version identification.~~ The ticket shall be generated by the grain moisture meter system.

(Amended 1993, 1995, ~~and~~ 2003, and 201X)

Discussion: The Sector is asked to consider the proposal.

13. Time and Place for Next Meeting
A tentative date and location will be selected for the next meeting. An August meeting in Kansas City is suggested.