Appendix C

National Type Evaluation Program (NTEP)
Grain Analyzer Sector Summary

October 2015

INTRODUCTION

The charge of the Grain Analyzer Sector is important in providing appropriate type evaluation criteria based on NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices," Sections 1.10. General Code, 5.56.(a) and 5.56.(b) Grain Moisture Meters, and 5.57. Near-Infrared Grain Analyzers. The Sector's recommendations are presented to the National Type Evaluation Program (NTEP) Committee each January for approval and inclusion in NCWM Publication 14, "Technical Policy, Checklists, and Test Procedures" for national type evaluation.

The Sector is also called upon occasionally for technical expertise in addressing difficult NIST Handbook 44 issues on the agenda of National Conference on Weights and Measures (NCWM) Specifications and Tolerances (S&T) Committee. Sector membership includes industry, NTEP laboratory representatives, technical advisors, and the NTEP Administrator. Meetings are held annually, or as needed and are open to all NCWM members and other registered parties.

Proposed revisions to the handbook(s) are shown as follows: 1) deleted language is indicated with a **bold face font using ~~strikeouts~~** (e.g., **~~this report~~**), 2) proposed new language is indicated with an **underscored bold faced font** (e.g., **new items**), and 3) nonretroactive items are identified in *italics*. There are instances where the Sector will use **red** text and/or highlighted text to bring emphasis to text that requires additional attention. When used in this report, the term "weight" means "mass."

Note: It is the policy of the National Institute of Standards and Technology (NIST) to use metric units of measurement in all of its publications; however, recommendations received by NCWM technical committees and regional weights and measures associations have been printed in this publication as submitted. Therefore, the report may contain references in U.S. customary units.

Table A
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Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
BIML	International Bureau of Legal Metrology	NTETC	National Type Evaluation Technical Committee
CD	Committee Draft	OCP	Ongoing Calibration Program
CIML	International Committee of Legal Metrology	OIML	International Organization of Legal Metrology
CIPM	International Committee of Weights and Measures	OWM	Office of Weights and Measures
D	Document	R	Recommendation
EMRP	European Metrology Research Program	S&T	Specifications and Tolerances
FGIS	Federal Grain Inspection Service	SC	Subcommittee
GA	Grain Analyzer	SD	Secure Digital
GIPSA	Grain Inspection, Packers and Stockyards Administration	TC	Technical Committee
GMM	Grain Moisture Meter	TW	Test Weight
MRA	Mutual Recognition Agreement	UGMA	Unified Grain Moisture Algorithm
NCWM	National Conference on Weights and Measures	USB	Universal Serial Bus
NIR	Near Infrared Grain Analyzer	USDA	United States Department of Agriculture
NIST	National Institute of Standards and Technology	USNWG	United States National Working Group
NTEP	National Type Evaluation Program		

Details of All Items
(In order by Reference Key)

1. August 2015 Grain Analyer Sector Meeting

On June 30, 2015, Mr. Jim Truex sent an e-mail to the Grain Analyzer (GA) Sector and other interested parties to notify them that the August 2015 GA Sector meeting would not be held due to the limited number of NCWM Publication 14, and NIST Handbook 44 items on the August 2015 tentative agenda item list. Since most of the tentative items for the August 2015 agenda were updates or reports of activities, the Sector Chair recommended that the 2015 GA Sector meeting not be held and agreed that a Grain Analyzer Sector Report, which contained the updates and reports of activities, be distributed to the GA Sector for review and comment. The Technical Advisor, Ms. Diane Lee developed a report and comment form that was distributed to GA Sector members for review. GA Sector members are were to review the 2015 GA Sector report and provide comments.

2. Report on the 2015 NCWM Interim and Annual Meetings

The 2015 NCWM Iterim Meeting was held January 18 - 21, 2015, in Daytona Beach, Florida. At that meeting, no recommended amendments to NCWM Publication 14 for grain analyzers were provided by the Sector to the NTEP Committee. The 2015 NCWM Annual Meeting was held July 19 - 23, 2015, in Philidelphia, Pennsylvania. There were no Grain Analyzer Sector Voting items on the annual agenda. One Grain Analyzer Sector developing item appeared on the S&T agenda, **Item 360-4, Appendix D – Definitions: Remote Configuration Capability.** See Grain Analyzer Agenda Item 5, for details.

3. Report on NTEP Evaluations and Ongoing Calibration Program (OCP) (Phase II) Testing

Ms. Cathy Brenner and Mr. Jason Jordan, Grain Inspection, Packers and Stockyards Administration (GIPSA), the NTEP Participating Laboratory for grain analyzers, provided a list of grain analyzers that are enrolled in the Phase II for the 2015 harvest. There are six models enrolled for the 2015 harvest.

The six models:

1. DICKEY-john Corp. - GAC2000 (NTEP Version), GAC2100a and GAC2100b2100
2. DICKEY-john Corp. - GAC2500-UGMA
3. Foss North America - Infratec 1241
4. Perten Instruments Inc. - AM5200 and AM5200-A (The AM5200-A is UGMA Certified.)
5. Perten Instruments Inc. - IM9500
6. The Steinlite Corporation – SL95

4. Review of OCP (Phase II) Performance Data For Moisture and Test Weight per Bushel

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, Ms. Brenner, GIPSA, the NTEP Participating Laboratory for Grain analyzers, provided data for inclusion in the 2015 Grain Analyzer Sector Report showing the performance of NTEP meters compared to the air oven. This data is based on the last three crop years (2012 - 2014) using calibrations updated for use during the 2015 harvest season.

The 2012 - 2014 Grain Moisture Meter (GMM) Phase II comparison graphs are available for view or can be downloaded for printing at the following web address:

https://www.ncwm.net/_resources/dyn/files/75399703z4f717b59/_fn/TW+Comparision+Charts.pdf

At the August 2012 Sector Meeting, it was agreed that TW comparison and correlation charts should be prepared for the three grains that are most likely to be subject to discounts on the basis of TW: Corn and two wheat classes, and should be limited to Air Oven reference values less than 20 % moisture. The wheat classes selected were: Hard Red Winter and Soft Red Winter. Accordingly, Ms. Brenner, GIPSA, the NTEP Participating Laboratory for Grain analyzers, prepared data showing the performance of NTEP meters compared to the GIPSA reference Quart Kettle Test Weight Apparatus. Ms. Brenner provided this information for the Grain Analyzer Sector 2015 report. This data is based on the last three crop years (2012 - 2014) using calibrations updated for use during the 2015 harvest season.

The 2012 - 2014 TW comparison and correlation charts Phase II comparison graphs are available for view or can be downloaded for printing at the following web address:

https://www.ncwm.net/_resources/dyn/files/1081742zef27d924/_fn/TW+2013+Sector+Meeting.pdf

5. Modify the Definition of Remote Configuration Capability Appearing in Appendix D of NIST Handbook 44 to Recognize the Expanded Scope of "Remote Configuration Capability" (S&T Developing Item 360-7)

Source:
NTETC Grain Analyzer Sector

Purpose:
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 NIST Handbook 44 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 (e.g., an SD Memory Card that may or may not itself be necessary to the operation of the device), external computer, network, or other device plugged into a mating port (e.g., Universal Serial Bus (USB) port) on the measuring device or connected wirelessly to the measuring device. The changes proposed in Item Under Consideration expand the scope of "remote configuration capability" to cover instances where the "other device" may be necessary to the operation of the weighing or measuring device or which may be considered a permanent part of that device.

Item Under Consideration:

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

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

Background/Discussion:
Two common types of removable data storage devices are the USB flash drive and the Secure Digital (SD) memory card. A USB flash drive is a data storage device that includes flash memory with an integrated USB interface. USB flash drives are typically removable and rewritable, and physically much smaller than a floppy disk. A SD card is a non-volatile memory card format originally designed for use in portable devices. The SD standard is maintained by the SD Card Association.

Removable digital storage devices can be used in GMMs as either "data transfer" devices which are not necessary to the operation of the GMM or as "data storage devices" which are necessary to the operation of the GMM.

A USB flash drive is most likely to be used as a "data transfer" device. In a typical "data transfer" application, the USB flash drive is first connected to a computer with access to the web. The computer visits the GMM manufacturer's web site and downloads the latest grain calibrations that are then stored in the USB flash drive. The USB flash drive is removed from the computer and plugged into a USB port on the GMM. The GMM is put into "remote

configuration" mode to copy the new grain calibration data into the GMM's internal memory. When the GMM has been returned to normal operating (measuring) mode, the USB flash drive can be removed from the GMM.

Although an SD memory card could also be used as a "data transfer device," it is more likely to be used as a "data storage device." In a typical "data storage device" application, the SD memory card stores the grain calibrations used on the GMM. The SD memory card must be plugged into an SD memory card connector on a GMM circuit card for the GMM to operate in measuring mode. To install new grain calibrations the GMM must be turned "off" or put into a mode in which the SD memory card can be safely removed. The SD memory card can either be replaced with an SD memory card that has been programmed with the new grain calibrations or the original SD memory card can be re-programmed with the new grain calibrations in much the same way as that described in the preceding paragraph to copy new grain calibrations into a USB flash drive. In either case, the SD memory card containing the new calibrations must be installed in the GMM for the GMM to operate in measuring mode. In that regard, the SD memory card can be considered a "permanent part" of the GMM in that the GMM cannot operate without it.

Note: In the above example "SD memory card" could be any removable flash memory card such as the Secure Digital Standard-Capacity, the Secure Digital High-Capacity, the Secure Digital Extended-Capacity, and the Secure Digital Input/Output, which combines input/output functions with data storage. These come in three form factors: the original size, the "mini" size, and the "micro" size. "Memory Stick" is a removable flash memory card format, launched by Sony in 1998, and is also used in general to describe the whole family of Memory Sticks. In addition to the original Memory Stick, this family includes the Memory Stick PRO, the Memory Stick Duo, the Memory Stick PRO Duo, the Memory Stick Micro, and the Memory Stick PRO-HG.

At its 2012 meeting, the Grain analyzer Sector agreed by consensus to accept the Item Under Consideration and recommended forwarding this item to the S&T Committee for consideration.

2012 WWMA Annual Meeting: Ms. Juana Williams (NIST OWM) supported the intent. She talked about this item in conjunction with Item 356-1, S.2.5. Categories of Device and Methods of Sealing. This is a complex item affecting multiple other devices; therefore, the proposal requires further consideration. The language in the proposal to amend the definition of remote configuration capability is confusing. The Committee believes the current definition already allows the use of remote configuration devices and allows the flexibility desired. The ramifications of changing the definition could affect other devices in NIST Handbook 44. WWMA did not forward this item to NCWM.

2012 SWMA Annual Meeting: There were no comments. After reviewing the proposal and considering the potential impact on other device types, the Committee recommended this as a Developing Item. The Committee asks that the Sector continue to obtain input on the definition and the impact the changes would have on other device types. SWMA forwarded the item to NCWM, recommending it as a Developing Item and assigning its development to the Grain Analyzer Sector.

During its Open Hearings at the 2013 NCWM Interim Meeting, the Committee heard comments from Ms. Juana Williams (NIST, OWM). OWM suggests the Committee consider this item as a Developing item to allow other Sectors to discuss how a change to the definition may affect other device types of similar design and to consider changes if needed. OWM recognizes that the current definition for "remote configuration capability" may <u>not</u> address those grain moisture meters (GMMs) which can only be operated with a removable data storage device, containing, among other things, the grain calibrations intended for use with the GMM, inserted in the device (as was described by the Grain Analyzer Sector). As such, OWM notes that current sealing requirements were developed at a time when such technology likely didn't exist, nor could be envisioned, and are based on the current definition of remote configuration capability. Because the current definition was never intended to apply to this "next generation" technology, OWM suggests that those charged with further development of this item may wish to revisit the five philosophies of sealing and consider whether a new paragraph, completely separate from current sealing requirements, might be appropriate and a better option, than the one currently proposed. The five philosophies of sealing are included in the 1992 "Report of the 77th National Conference on Weights and Measures" (Report of the Specifications and Tolerances Committee). Another option, preferred over the changes currently proposed, would be to add a separate statement to the current definition of "remote configuration capability" to address removable storage devices. For example, the following sentence might be considered as an addition to the current definition for "remote configuration capability:"

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

The Committee also heard comments fromMr. Dmitri Karimov (LC), speaking on behalf of the MMA, who made two points: (1) Flow computers may already have these capabilities, thus, it may be more appropriate to consider adding requirements to the General Code so that the requirements will be uniformly applied to all device types; and (2) the Committee should look ahead and consider other capabilities that may or already have emerged such as wireless communication and configuration.

The Committee acknowledged the comments indicating that the current definition of "remote configuration capability" was developed at a time when certain technologies, such as blue tooth, SD storage devices, flash drives, etc., didn't exist. The Committee recognized that it may be difficult to modify the existing definition and associated requirements to be flexible enough to address emerging and future technologies without having a significant (and possibly detrimental impact) on existing devices. Consequently, rather than modifying the current definition, the Committee concluded that a better approach might be to develop an entirely separate set of security requirements that would apply to emerging technologies. The Committee believes that additional work is needed to develop proposed definition(s) and associated requirements and decided to designate the item as Developmental. The Committee requests other Sectors review the Grain Sector's proposed modification to the definition as well as OWM's suggestions and provide input.

At their 2013 Annual Meetings, both NEWMA and CWMA supported this as a "Developing" item. NEWMA heard from NIST who encouraged members to consider this work as it applies to all device types.

On the 2013 NCWM Online Position Forum, one Government representative indicated a neutral position on this item with no additional comments.

At the 2013 NCWM Annual Meeting Open Hearings, the Committee heard comments from Ms. Juana Williams who reiterated OWM's comments from the 2013 Interim Meeting, suggesting it may be appropriate to develop separate requirements to address new and future technologies, which can be remotely configured with removable media. OWM plans to develop draft language and ask for input from the various Sectors at their upcoming meetings. Ms. Williams also noted the suggestion made at the 2013 NCWM Interim Meeting by Mr. Karimov, LC, speaking on behalf of the MMA, that a provision might be added to the General Code to address this type of equipment.

Ms. Julie Quinn (Minnesota) agreed with OWM's comments and indicated support for possibly including requirements in the General Code to address newer and emerging technologies. Mr. Karimov, speaking on behalf of MMA, concurred with this suggestion.

At the August 2013 Grain Analyzer Sector Meeting, OWM had not drafted a definition for remote configuration capability to address devices that are programed using removable media such as SD cards or flash drives. During the August 2013 GA Sector meeting, the Sector discussed other ways devices can be remotely configured that should also be considered when drafting a definition for remote configuration capability to address these devices.

Mr. Hurburgh mentioned that we also need to consider devices that use cloud computing to remotely configure a device and suggested that we consider the various ways a device can be remotely configured.

The Sector agreed that OWM should develop a proposal for a definition for remote configuration capability, which addresses devices using removable media such as SD cards, flash drives or other methods not covered by the existing definition.

At the 2013 Weighing Sector meeting, OWM requested members of the Sector help identify the various types of removable storage media (e.g., USB flash drives, SD memory cards, etc.) currently in use with weighing equipment and to describe the functionality of that media. The information provided would likely be used by OWM to develop some draft proposals to amend NIST Handbook 44 to adequately address the security of the metrologically significant parameters of devices using such media.

The following feedback was provided by members of the Sector to OWM:

- I am not in favor of changing standards for advances in technology.
- Both SD cards and USB Flash drives can be used for data transfer and data storage. It would be difficult to address all devices by changing the General Code.
- There are other technologies besides SD and Flash digital storage devices that must be considered (e.g., Eprom and EEE, etc.).
- Several members commented that they felt it would likely be necessary to separate requirements in the various codes of NIST Handbook 44.
- It is not reasonable to expect manufacturers to share the technologies used in a public forum such as this meeting and it might be better to speak individually with representatives of the different manufacturers.

At the end of the discussion, a few WS members offered to provide technical expertise to assist OWM in answering any questions that might arise during future development of proposed requirements to address this issue.

At the 2013 Measuring Sector Meeting, the Sector did not support the language "may or may not be necessary" because this phrase changes the category of what is considered "remote configuration capability." The Sector agreed that if the card (or other removable device) needs to be a part of the measuring device for normal operation, then the card is effectively part of the device; in that case, the measuring device is a Category 1. If the card is only used for configuration or calibration and is not necessary for the operation of the measuring device, the measuring device is a Category 2. The Sector discussed whether or not additional guidance might be needed on what is covered by each sealing category; however, the Sector concluded that the definitions are adequate as currently written.

At the August 2014 Grain Analyzer Sector meeting, the Sector considered the responses from NIST OWM, SWMA, WWMA, Measuring Sector, and Weighing Sector concerning devices that use SD cards, flash drives, or other methods for configuration. The Grain Analyzer Sector agreed that the current proposed language may be confusing and agreed to Withdraw their proposal for changes to the definition of remote configuration.

Update for the 2015 Grain Analyzer Sector Report:
At the 2015 NCWM Interim Meeting S&T open hearings, Ms. Tina Butcher (OWM) requested that the Committee reassign this item to OWM noting that the issue identified by the Grain Analyzer Sector had not been resolved. Ms. Butcher noted that a gap still exists concerning the sealing of equipment in which the sealable parameters of that equipment can be changed by use of a removable digital storage device. She stated that members of OWM's Legal Metrology Devices Program (LMDP) have agreed to take up this issue after the 2015 Interim Meeting in hopes of being able to develop a proposal that addresses the issue and be able to report on its progress at the next NCWM Conference.

Mr. Michael Keilty (Endress + Hauser Flowtec AG USA) stated he would be willing to work with OWM on a proposal to address this issue.

The SMA commented that it looks forward to further clarification of this item.

The Committee agreed to reassign this item to OWM for additional development based on OWM's assessment there remains an unresolved issue involving the sealing of equipment using removable digital storage devices.

At the 2015 NCWM Annual Meeting, Ms. Tina Butcher provided an update to the Committee on OWM's progress in developing this item. Ms. Butcher noted that OWM's Legal Metrology Devices Program (LMDP) had met several times since the 2015 Interim Meeting to work on this issue. Rather than attempting to modify current sealing requirements, which never envisioned this method of adjustment, the LMDP propose creating a separate set of sealing requirements for this technology. Members of the LMDP developed a draft General Code paragraph they believe will address the sealing of devices using this technology to make adjustments. The LMDP requests the following draft General Code paragraph be included in this item to begin generating feedback to assist in further development of this item:

G-S.8.2. Devices Adjusted Using Removable Digital Storage Device. - For devices in which the configuration or calibration parameters can be changed by use of a removable digital storage device, such as a secure digital (SD) card, USB flash drive, etc., security shall be provided by use of an event logger in the device. The event logger shall include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available on demand through the device or through another on-site device. In addition to providing a printed copy of the information, the information may be made available electronically. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)

Ms. Butcher also noted that OWM plans to propose modifications to a number of the individual device codes in NIST Handbook 44 to reference the new General Code sealing requirement. The following draft example requirement was developed by the LMDP and included in OWM's written analysis of this item, to provide an indication of how some of the device codes in NIST Handboook 44 will need to be amended that this type of sealing can be addressed:

Proposed changes to Scales Code paragraph S.1.11. Provision for Sealing:

S.1.11. Provision for Sealing.

S.1.11.1. Devices Adjusted Using a Removable Digital Storage Device. - For those devices adjusted using a removable digital storage device, G-S.8.2. applies.

S.1.11.2. All Other Devices.- Except on Class I scales and devices specified in S.1.11.1. the following provisions for sealing applies:

(a) Provision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of an electronic device.
[Nonretroactive as of January 1, 1979]

(b) A device shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism.
[Nonretroactive as of January 1, 1990]

(c) Audit trails shall use the format set forth in Table S.1.11.
[Nonretroactive as of January 1, 1995]

A device may be fitted with an automatic or a semi-automatic calibration mechanism. This mechanism shall be incorporated inside the device. After sealing, neither the mechanism nor the calibration process shall facilitate fraud.
(Amended 1989, 1991, and 1993)

As a final comment regarding this item, Ms. Butcher indicated that devices using other means to access adjustments would continue to be addressed by current sealing requirements.

2014 Regional Association Meetings:
At its 2014 Interim Meeting, CWMA did not receive any comments on this item and believes the item is sufficiently developed. CWMA recommended that the item be a Voting item on the NCWM Agenda. During the 2015 CWMA Annual Meeting, the SMA reported that it looks forward to the further clarification of this item, yet it has concerns about changing metrological parameters without proper re-sealing. The CWMA agreed to recommend the item move forward as a Developing item noting that it supported the continued development of this item.

During open hearing at the 2014 WWMA Annual Meeting, an industry representative questioned whether or not this item would affect definitions for other device types. An NCWM representative expressed the opinion that it does affect other devices. The WWMA recommended that this item remain as a Developing item to allow additional input and consideration.

At its 2014 Annual Meeting, SWMA recommended that this item be withdrawn noting it believes this item is not necessary and the existing definition in Appendix D of NIST Handbook 44 is adequate.

At its 2014 Interim Meeting, NEWMA recommended this item be Withdrawn noting it believes the existing definition in Appendix D of NIST Handbook 44 is adequate. At the 2015 NEWMA Annual Meeting, no comments were received on this item. NEWMA agreed to recommend the item move forward as a Developing item as OWM continues its work on the proposal.

Additional letters, presentations and data may have been part of the Committee's consideration. Please refer to **http://www.ncwm.net/meetings/interim/publication** to review these documents.

The GA Sector is encouraged to review the OWM proposal for changes to NIST Handbook 44 to address devices that use removable storage devices and provide any additional feedback.

6. Status of Interagency Agreement

Source:
Cathy Brenner, USDA, GIPSA
G. Diane Lee, NIST, OWM

Background/Discussion: The current Interagency Agreement is the fourth five-year agreement of the on-going calibration program. The agreement was signed in March 2010 and runs through analysis of the 2014 crop and issuance of the 2015 Certificates of Conformance. Thus, we have just started the fifth year of the current agreement. It should be noted that annual calibration activities occur in two government fiscal years and are better defined by a starting date of July 1.

GIPSA noted in order to provide the standardization services to the commercial system, GIPSA TSD discussed options for improving the process and reducing the burden on all parties. At the August 2013 Grain Analyzer Sector meeting, GIPSA sought input from the Sector on limiting the number of samples tested to a maximum of 10 samples per 2 % moisture interval for all grains. It was noted that fewer samples are needed to calibrate the new UGMA meters It was also noted that GIPSA's fees are increasing and with no changes to the program the manufacturers' fees will increase. During the discussion one alternate proposal was to base the cost on one-third shared cost of the program where GIPSA and NIST cover one-thrid the cost of the program each and manufacturers split one-third the cost. It was noted during the meeting that due to budget issues GIPSA and NIST will likely not be able to fund more than the $30,000 per year.

Ms. Brenner agreed to review the statistics to determine how the sample size of up to 30 samples per 2 % moisture interval per grain type was established and to investigate the impact of reducing the sample size to 10 samples per 2 % moisture interval per grain type. The Sector agreed by consensus to reduce the number of samples used in the ongoing calibration program for each 2 % moisture range per grain type as long as the integrity of the program is not affected.

A fifth five-year Interagency Agreement has been drafted based upon GIPSA's base cost per NTEP only meters above the cost to maintain the official moisture meters. The agreement is currently being forwarded for appropriate signatures at NIST and then to GIPSA. The interagency agreement includes tables of the base cost per NTEP only meter and descriptions for funding calculations and fee tables for each year of the agreement. The fee tables are based on the reduced number of samples per 2 % moisture interval.

At the 2014 Grain Analyzer Sector Meeting, Ms. Cathy Brenner reported that she found no statistical impact in reducing the sample size in the ongoing calibration program from 30 samples to 10 samples per 2 % interval. During

the review of the ongoing calibration fee tables, Mr. Andy Gell, Foss North America pointed out that the cost per meter in the ongoing calibration program would be decreased due to the reduction in the number of samples per 2 % moisture interval. Mr. Gell then noted that the tables showed an increase in the cost per meter. After further review by the Sector an error was found in calculating the cost per meter and the tables were corrected.

2015 Grain Analyzer Sector Report Update:
The 2015 - 2019 Interagency Agreement between USDA, GIPSA, and NIST, OWM was cleared and signed in July 2015. The fees for the ongoing calibration program (Phase II program) are included in the tables below for each year of the program.

Table 1. Description of Program Fee Schedule Acronyms and Funding Source Calculations

Key and/or Funding Source	Description
O	Number of GIPSA official meters
N	Number of NTEP only meters (non-GIPSA official meters)
BC	FY Base Cost per NTEP only Meters in the ongoing calibration program
TP	Total NTEP Program Cost = N x BC
TM	(O + N) Total Meters including Official Meters
NIST	National Institute of Standards and Technology Contribution = TP /3 up to and not more than 30,000
GIPSA	Grain Inspection Packers and Stockyards Administration Contribution = TP /3 up to and not more than 30,000
MCMT	Manufacturers Cost per Meter Type = TP-NIST Contribution - GIPSA Contribution

Table 2. Ongoing Calibration Program Base Cost per NTEP only meter per Fiscal Year

Fiscal Year (FY)	NTEP On-going Calibration Program Base Cost per NTEP only meter (above GIPSA costs to maintain the official moisture meters) (BC)
2015	$17,678
2016	$18,064
2017	$18,453
2018	$18,513
2019	$18,576

NTEP On-going Calibration Program Fee Schedule for Year 2015							
(1) Total Meters (including official meter) (TM) = O + N	(2) Number of NTEP only meters (non-GIPSA official Meters) = N	(3) Base Cost per NTEP only Meters in ongoing Calibration Program = BC	(4) Total Program Cost (TP) = N × BC	Funding Contributions From Participants			
				(5) NIST = TP/3	(6) GIPSA =TP/3	(7) Total Funding from all Mfg's Meter Types =TP – NIST − GIPSA	(8) Mfg's Cost Per Meter Type (MCMT) =(TP – NIST − GIPSA)/TM
3	1	$ 17,678	$ 17,678	$ 5,893	$ 5,893	$ 5,893	$ 1,964
4	2	$ 17,678	$ 35,356	$ 11,785	$ 11,785	$ 11,785	$ 2,946
5	3	$ 17,678	$ 53,034	$ 17,678	$ 17,678	$ 17,678	$ 3,536
6	4	$ 17,678	$ 70,712	$ 23,571	$ 23,571	$ 23,571	$ 3,928
7	5	$ 17,678	$ 88,390	$ 29,463	$ 29,463	$ 29,463	$ 4,209
8	6	$ 17,678	$ 106,068	$ 30,000	$ 30,000	$ 46,068	$ 5,759
9	7	$ 17,678	$ 123,746	$ 30,000	$ 30,000	$ 63,746	$ 7,083
10	8	$ 17,678	$ 141,424	$ 30,000	$ 30,000	$ 81,424	$ 8,142

NTEP On-going Calibration Program Fee Schedule for Year 2016							
(1) Total Meters (including official meter) (TM) = O + N	(2) Number of NTEP only meters (non-GIPSA official Meters) = N	(3) Base Cost per NTEP only Meters in ongoing Calibration Program = BC	(4) Total Program Cost (TP) = N × BC	Funding Contributions From Participants			
				(5) NIST = TP/3	(6) GIPSA =TP/3	(7) Total Funding from all Mfg's Meter Types =TP – NIST − GIPSA	(8) Mfg's Cost Per Meter Type (MCMT) =(TP – NIST − GIPSA)/TM
3	1	$ 18,064	$ 18,064	$ 6,021	$ 6,021	$ 6,021	$ 2,007
4	2	$ 18,064	$ 36,128	$ 12,043	$ 12,043	$ 12,043	$ 3,011
5	3	$ 18,064	$ 54,192	$ 18,064	$ 18,064	$ 18,064	$ 3,613
6	4	$ 18,064	$ 72,256	$ 24,085	$ 24,085	$ 24,085	$ 4,014
7	5	$ 18,064	$ 90,320	$ 30,000	$ 30,000	$ 30,320	$ 4,331
8	6	$ 18,064	$ 108,384	$ 30,000	$ 30,000	$ 48,384	$ 6,048
9	7	$ 18,064	$ 126,448	$ 30,000	$ 30,000	$ 66,448	$ 7,383
10	8	$ 18,064	$ 144,512	$ 30,000	$ 30,000	$ 84,512	$ 8,451

NTEP On-going Calibration Program Fee Schedule for Year 2017							
(1) Total Meters (including official meter) (TM) = O + N	(2) Number of NTEP only meters (non-GIPSA official Meters) = N	(3) Base Cost per NTEP only Meters in ongoing Calibration Program = BC	(4) Total Program Cost (TP) = N × BC	Funding Contributions From Participants			
				(5) NIST = TP/3	(6) GIPSA =TP/3	(7) Total Funding from all Mfg's Meter Types =TP – NIST − GIPSA	(8) Mfg's Cost Per Meter Type (MCMT) =(TP – NIST − GIPSA)/TM
3	1	$ 18,453	$ 18,453	$ 6,151	$ 6,151	$ 6,151	$ 2,050
4	2	$ 18,453	$ 36,906	$ 12,302	$ 12,302	$ 12,302	$ 3,076
5	3	$ 18,453	$ 55,359	$ 18,453	$ 18,453	$ 18,453	$ 3,691
6	4	$ 18,453	$ 73,812	$ 24,604	$ 24,604	$ 24,604	$ 4,101
7	5	$ 18,453	$ 92,265	$ 30,000	$ 30,000	$ 32,265	$ 4,609
8	6	$ 18,453	$ 110,718	$ 30,000	$ 30,000	$ 50,718	$ 6,340
9	7	$ 18,453	$ 129,171	$ 30,000	$ 30,000	$ 69,171	$ 7,686
10	8	$ 18,453	$ 147,624	$ 30,000	$ 30,000	$ 87,624	$ 8,762

NTEP On-going Calibration Program Fee Schedule for Year 2018							
(1) Total Meters (including official meter) (TM) = O + N	(2) Number of NTEP only meters (non-GIPSA official Meters) = N	(3) Base Cost per NTEP only Meters in ongoing Calibration Program = BC	(4) Total Program Cost (TP) = N × BC	Funding Contributions From Participants			
				(5) NIST = TP/3	(6) GIPSA =TP/3	7) Total Funding from all Mfg's Meter Types =TP – NIST − GIPSA	(8) Mfg's Cost Per Meter Type (MCMT) =(TP – NIST − GIPSA)/TM
3	1	$ 18,513	$ 18,513	$ 6,171	$ 6,171	$ 6,171	$ 2,057
4	2	$ 18,513	$ 37,026	$ 12,342	$ 12,342	$ 12,342	$ 3,086
5	3	$ 18,513	$ 55,539	$ 18,513	$ 18,513	$ 18,513	$ 3,703
6	4	$ 18,513	$ 74,052	$ 24,684	$ 24,684	$ 24,684	$ 4,114
7	5	$ 18,513	$ 92,565	$ 30,000	$ 30,000	$ 32,565	$ 4,652
8	6	$ 18,513	$ 111,078	$ 30,000	$ 30,000	$ 51,078	$ 6,385
9	7	$ 18,513	$ 129,591	$ 30,000	$ 30,000	$ 69,591	$ 7,732
10	8	$ 18,513	$ 148,104	$ 30,000	$ 30,000	$ 88,104	$ 8,810

NTEP On-going Calibration Program Fee Schedule for Year 2019							
(1) Total Meters (including official meter) (TM) = O + N	(2) Number of NTEP only meters (non-GIPSA official Meters) = N	(3) Base Cost per NTEP only Meters in ongoing Calibration Program = BC	(4) Total Program Cost (TP) = N × BC	Funding Contributions From Participants			
				(5) NIST = TP/3	(6) GIPSA =TP/3	(7) Total Funding from all Mfg's Meter Types =TP – NIST − GIPSA	(8) Mfg's Cost Per Meter Type (MCMT) =(TP – NIST − GIPSA)/TM
3	1	$ 18,576	$ 18,576	$ 6,192	$ 6,192	$ 6,192	$ 2,064
4	2	$ 18,576	$ 37,152	$ 12,384	$ 12,384	$ 12,384	$ 3,096
5	3	$ 18,576	$ 55,728	$ 18,576	$ 18,576	$ 18,576	$ 3,715
6	4	$ 18,576	$ 74,304	$ 24,768	$ 24,768	$ 24,768	$ 4,128
7	5	$ 18,576	$ 92,880	$ 30,000	$ 30,000	$ 32,880	$ 4,697
8	6	$ 18,576	$ 111,456	$ 30,000	$ 30,000	$ 51,456	$ 6,432
9	7	$ 18,576	$ 130,032	$ 30,000	$ 30,000	$ 70,032	$ 7,781
10	8	$ 18,576	$ 148,608	$ 30,000	$ 30,000	$ 88,608	$ 8,861

7. Report on International Organization of Legal Metrology (OIML) TC 17/SC 1 R 59 *Moisture Meters for Cereal Grains and Oilseeds*

Background/Discussion:
This item is included on the Sector's agenda to provide a summary of the activities of OIML TC 17/SC 1 for the Grain Analyzer Sector and to those Sector members that participate on the U.S. National Working Group (USNWG) on grain moisture meters. In addition, the Sector is asked to review a proposal to change the Humidity test in NCWM Publication 14 to align with the OIML D 11 and IEC damp heat test procedure.

OIML TC 17/SC 1 was tasked to revise OIML R 59 *Moisture Meters for Cereal Grains and Oilseeds* to reflect new technologies and actual grain analysis. The Co-Secretariats (China and the United States) are working closely with an International Project Group to revise OIML Recommendation R 59 *Moisture Meters for Cereal Grains and Oilseeds*. The United States completed a sixth committee draft (6th CD) of OIML R 59, which was circulated to the international project group and the U.S. National Working Group (USNWG) on grain moisture measuring devices for review and comment on March 6, 2013. The U.S. Co-Secretariat requested that the comments to the 6th CD be submitted by June 6, 2013. The U.S. Secretariat collated the U.S. and international comments to the 6th CD and these comments were reviewed at the TC 17/SC 1 meeting hosted by NIST/OWM July 23 - 24, 2013.

At the TC 17/SC 1 July 23 - 24, 2013, meeting, comments on the 6th CD were reviewed and the major discussion was harmonization of test procedures between OIML TC 17/SC 1 R 59 *Moisture Meters for Cereal Grains and Oilseeds* and OIML TC 17/SC 8 recommendation on *Protein Measuring Instruments for Cereal Grain and Oil Seeds.*

At the July 2013 meeting, it was discussed that the international damp heat test (OIML D 11 and IEC) is significantly different from the NTEP Humidity test. The international test is more robust and more accurately reflects the environmental conditions an instrument is likely to encounter in field use. The damp heat test is conducted at a maximum temperature of either the manufacturer specified upper ambient temperature or 30 °C and a maximum

relative humidity of 85 %. The damp heat test is designed to evaluate the device under the environmental (temperature and relative humidity) conditions it will encounter during operation.

During the August 2013 Grain Analyzer Sector meeting, the Sector reviewed the proposal to replace the NCWM Publication 14, GMM and NIR Humidity test procedure with the OIML D 11 Damp Heat test procedure. It was noted that the proposed changes to the humidity test in NCWM Publication 14 were based on OIML D 11 requirements, Damp heat test, Severity level 1. During discussion of this item, it was mentioned that the temperature and humidity levels as specified in OIML D 11 may pose unsafe operating conditions to laboratory staff and also that grain moisture meters are not designed to operate in these extreme conditions. A question was asked if another severity level in D 11 would more closely match the testing that is currently in NCWM Publication 14 and has been used for many years in the United States. Ms. Lee reviewed OIML D 11 requirements following the meeting and found that both severity level 1 and 2 exceed the temperature and humidity levels specified in NCWM Publication 14. The Sector agreed by consensus that the OIML D 11, Damp heat test, is much too severe for grain moisture meters and that NCWM Publication 14 should not be changed to meet the requirements of OIML D 11.

The United States will develop a 7th CD that will be distributed for voting based on comments to the 6th CD, the July 2013 TC 17/SC 1 meetin,g and the GA Sector feedback from the August 2013 meeting.

At the August 2014 Grain Analyzer Sector meeting, Ms. Lee, provided an update on the status of the 7th CD on *Moisture Meters for Cereal Grains and Oilseed.* Ms. Lee reported that the United States is nearing completion of the 7th CD on *Moisture Meters for Cereal Grains and Oilseed.* This document will be forwarded to the TC 17/SC 1 participating and observing countries for a vote and will also be forwarded to participants of the USNWG on Grain Moisture Measuring Devices for vote and comment.

2015 Grain Analyzer Sector Report Update:
The 7th CD on *Moisture Meters for Cereal Grains and Oilseed* was completed and forwarded to OIML TC 17/SC 1 participating and observing countries in December 2014 for a vote by the participating countries by March 2015. The 7th CD received seven yes votes and one no vote with some additional comments. The additional comments will be considered. With a majority "yes" vote from the participating countries, the document will be forwarded as a Draft Recommendation for final voting by the CIML.

8. Report on OIML TC 17/SC 8 *Protein Measuring Instruments for Cereal Grain and Oil Seeds*

Background/Discussion:
This item was included on the Sector's agenda to provide a summary of the activities of OIML TC 17/SC 8 to the Grain Analyzer Sector and to those Sector members that participate on the U.S. National Working Group (USNWG) on grain protein measuring instruments. OIML TC 17/SC 8 was formed to study the issues and to develop a Recommendation on *Protein Measuring Instruments for Cereal Grain and Oil Seeds.* Australia is the Secretariat for this Subcommittee. The third committee draft (3rd CD) for this Recommendation was circulated to the USNWG group for comments on July 3, 2012, for review and commen. Comments were requested by September 8, 2012. The U.S. comments to the 3rd CD were forwarded to the Secretariat and the Secretariat developed the 4th CD based on these comments.

The 4th CD was circulated to the USNWG on grain protein measuring instruments on April 9, 2013, and comments to the 4th CD of TC 17/SC 8 were requested by June 13, 2013. The U.S. comments to the 4th CD were forwarded to the Secretariat. The United States was requested to vote on the 4th CD and a vote of no was provided due to a number of differences in the test procedures of the OIML Recommendation for *Protein Measuring Instruments for Cereal Grain and Oil Seeds* and the OIML Recommendation 59 *Moisture Meters for Cereal Grain and Oilseeds*.

A meeting was hosted by NIST, OWM, July 24 - 25, 2013, to discuss the comments to the 4th CD for the Recommendation on *Protein Measuring Instruments for Cereal Grain and Oil Seeds*. Discussions on the 4th CD dealt mostly with harmonization of testing with the 6th CD of the OIML Recommendation R 59 *Moisture Meters for Cereal Grain and Oilseeds*, software requirements, and influence quantities and test sample temperature.

At the August 2013 Grain Analyzer Sector meeting, the Sector reiterated their concerns with the OIML D 11 damp heat test and agreed that the damp heat test in OIML Recommendation on Protein Measuring Instruments for Cereal Grain and Oil Seeds, 4th CD should be replaced with the humidity test as written in OIML R 59 CD 6.

The TC 17/SC 8 Secretariat will distribute a 5th CD for voting.

At the August 2014 Grain Analyzer Sector meeting, Ms. Diane Lee, NIST, OWM, provided an update on the status of the 5th CD on *Protein Measuring Instruments for Cereal Grain and Oil Seeds*. The 5th CD on *Protein Measuring Instruments for Cereal Grain and Oil Seeds* was sent via e-mail to the USNWG on Protein Measuring Devices on August 26, 2014, for a vote and comments. The USNWG participants were requested to provide their vote and any comments to the 5th CD by October 14, 2014. Ms. Lee encouraged the Grain Analyzer Sector members that are also participating on the USNWG to provide a vote and any comment to the 5th CD on *Protein Measuring Instruments for Cereal Grain and Oil Seed.*

2015 Grain Analyzer Sector Report Update:
The United States provided a yes vote on the 5th CD of the Protein Measuring Instruments for Cereal Grain and Oil Seeds with a comment to remove the vibration test from the document. The 5th CD of the Protein Measuring Instruments for Cereal Grains and Oil Seeds received a majority "yes" vote from the participating countries. With a majority "yes" vote by the participating countries, the document was forwarded as a Draft Recommendation for final voting by the CIML. Prior to the U.S. CIML member providing the U.S. vote, Ms. Lee circulated the DR to the USNWG and requested any final comments by October 11, 2015.

9. Software Sector Items

(a) Software Identification/Marking**s**

Source:
NTETC Software Sector

Purpose:
Review and provide comment to the Software Sector reports and conclusions on software issues.

Background:
See the 2014 Software Sector Meeting Summary and the 2015 Interim Meeting S&T agenda Item 310-1 for more background on this item.

2015 Grain Analyzer Sector Report Update:
The Software Sector and Weighing Sector held a joint meeting in late August 2014. The two sectors agreed to the following proposal to amend Section G-S.1. of NIST Handbook 44. Revisions to NIST Handbook 44, Section G-S.1. Identification is a developing item on the National Conference on Weights and Measures Specification and Tolerences (S&T) Committee Agenda.

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

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

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

(1) The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation

for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lowercase.
[Nonretroactive as of January 1, 2003]

(Added 2000) (Amended 2001)

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

(Amended 2003)

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

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

(d) the current software version or revision identifier for not-built-for-purpose software-based devices~~;~~ **manufactured as of January 1, 2004 and all software-based devices or equipment manufactured as of January 1, 2020;**
~~[Nonretroactive as of January 1, 2004]~~

(Added 2003) **(Amended 20XX)**

(1) The version or revision identifier shall be:

i. *prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision;*
[Nonretroactive as of January 1, 2007]

(Added 2006)

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

(Added 20XX)

ii. directly linked to the software itself; and
[Nonretroactive as of January 1, 2020]

(Added 20XX)

iii. continuously displayed or be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an exception, permanently marking the version or revision identifier shall be acceptable providing the device does not have an integral interface to communicate the version or revision identifier.
[Nonretroactive as of January 1, 2020]

(Added 20XX)

(2) Abbreviations for the word "Version" shall, as a minimum, begin with the letter "V" and may be followed by the word "Number." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R" and may be followed by the word "Number." The abbreviation for the word

"Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). ***Prefix lettering may be initial capitals, all capitals, or all lowercase.***
[Nonretroactive as of January 1, 2007]

(Added 2006) **(Amended 20XX)**

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

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

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

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

At their August 2014 meeting, the Weighing and Software Sectors agreed to recommend there be no changes to paragraph G-S.1.1. The Software Sector had earlier proposed changes to G-S.1.1.; however, it was decided during the joint meeting that no changes to G-S.1.1. were necessary since the two sectors had agreed the term "not-built-for-purpose software-based devices" in G-S.1.(d) would be retained.

In consideration of the advancements made, it was recommended the "Developing " status of the item be changed to "Informational." The S&T Committee rejected the recommendation.

In recognition of the progress reported and the planned future joint meeting of the Measuring and Software Sectors, the S&T Committee agreed to keep the item on its agenda as a Developing item. However, because this item has remained on S&T's agenda for several years, the Committee also agreed it would Withdraw the item if a proposal that can be presented for vote is not received before the 2016 NCWM Interim Meeting.

(b) Identification of Certified Software

Source:
NTETC Software Sector

Purpose:
Review and provide comment to the Software Sector reports and conclusions on software issues.

Background:
This item originated as an attempt to answer the question, "How does the field inspector know that the software running in the device is the same software evaluated and approved by the lab?" In previous meetings it was shown that the international community has addressed this issue (both WELMEC and OIML).

From WELMEC 7.2:

Required Documentation:
The documentation shall list the software identifications and describe how the software identification is created, how it is inextricably linked to the software itself, how it may be accessed for viewing and how it is structured in order to differentiate between version changes with and without requiring a type approval**.**

From OIML D-31:

> The executable file "**tt100_12.exe**" is protected against modification by a checksum. The value of checksum as determined by algorithm **XYZ** is **1A2B3C**.

Previous discussions have included a listing of some additional examples of possible valid methods (not limiting):

- CRC (cyclical redundancy check)
- Checksum
- Inextricably Linked version no.
- Encryption
- Digital Signature

Is there some method to give the weights and measures inspector information that something has changed?
Yes, the Category III Audit Trail or other means of sealing.

How can the weights and measures inspector identify an NTEP Certified version?
They can't without adding additional requirements like what is described here, in conjunction with including the identifier on the CC.

The Software Sector believes we should work towards language that would include a requirement in NIST Handbook 44 similar to the International Organization of Legal Metrology (OIML) requirement. It is also the opinion of the Sector that a specific method should not be defined; rather the manufacturer should utilize a method and demonstrate the selected identification mechanism is suitable for the purpose. It is not clear from the discussion where such proposed language might belong.

NTEP strongly recommends that metrological software be separated from non-metrological software for ease of identification and evaluation.

From OIML:

> **Separation of software parts**. – All software modules (programmes, subroutines, objects etc.) that perform metrologically significant functions or that contain metrologically significant data domains form the metrologically significant software part of a measuring instrument (device or sub-assembly). The conformity requirement applies to all parts and parts shall be marked according to Section G-S.X.X.
>
> If the separation of the software is not possible or needed, then the software is metrologically significant as a whole.

(Segregation of parameters is currently allowed - see table of sealable parameters.)

Initial draft proposed language: (G-S.1.1?)

NIST Handbook 44 (This has been written into G-S.1.(d)(3)): Identification of Certified Software:

> **Software-based electronic devices shall be designed such that the metrologically significant software is clearly identified by the version or revision number~~.~~ ~~The identification~~, and this identification ~~of the software~~ shall be ~~inextricably~~ directly and inseparably linked to the software itself. The version or revision number may consist of more than one part, but at least one part shall be dedicated to the metrologically significant software.**

From NCWM Publication 14*:*

Identification of Certified Software:

> **Note:** Manufacturers may choose to separate metrologically significant software from non-metrologically significant software. Separation would allow the revision of the non-metrological portion without the need for further evaluation. In addition, non-metrologically significant software may be updated on devices without breaking a seal, if so designed. Separation of software requires that all software modules (programs, subroutines, objects etc.) that perform metrologically significant functions or that contain metrologically significant data ~~**domains**~~ form the metrologically significant software part of a measuring instrument (device or sub-assembly). If the separation of the software is not possible or needed, then the software is metrologically significant as a whole. ~~**The conformity requirement applies to all parts and parts shall be marked according to Section G-S.X.X.**~~
>
> The manufacturer must describe and possibly demonstrate how the version or revision identifier is directly and inseparably linked to the metrologically significant software. Where the version revision identifier is comprised of more than one part, the manufacturer shall describe which portion represents the metrological significant software and which does not.

From OIML D-31:

> Legally relevant software of a measuring instrument/electronic device/sub-assembly shall be clearly identified with the software version or another token. The identification may consist of more than one part but at least one part shall be dedicated to the legal purpose.
>
> The identification shall be inextricably linked to the software itself and shall be presented or printed on command or displayed during operation or at start up for a measuring instrument that can be turned off and on again. If a sub-assembly/an electronic device has neither display nor printer, the identification shall be sent via a communication interface in order to be displayed/printed on another sub-assembly/electronic device.

The first sentence of the first paragraph above is already addressed in NIST Handbook 44's marking requirements.

In 2010, the Software Sector recommended the following change to NIST Handbook 44, General Code: G-S.1.(d) to add a new subsection (3):

(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 20XX)**

(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.
[Nonretroactive as of January 1, 201X]
(Added 20XX)

Also the Sector recommended the following information be added to NCWM Publication 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)

There was some additional discussion on this item regarding where this new requirement was best located. It was suggested that the first sentence of G-S.1.d.(3) could be added as a clause to the base paragraph G-S.1.(d) text, for example, "*the current software version or revision identifier for* ***~~not-built-for-purpose~~ software-based*** *devices, which shall be directly and inseparably linked to the software itself;"*

It also was suggested that the second sentence in G-S.1.d.(3) might be more suitable for NCWM Publication 14, as it describes more "how" than "what" the requirement entails.

In addition, the Sector considered the following information to be added to NCWM Publication 14 as explanation/examples:

- The current software identifier must be displayable/printable on command during operation (or made evident by other means deemed acceptable by G-S.1.)
- At a minimum, the software identifier must include a version/revision indication (1.02.09, rev 3.0 a, etc.). It could also consist of/contain checksum, etc. (crc32, for example).
- 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.

Other questions that are still outstanding:

- 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?
- If a device is capable of doing so, does it still have to be able to display, print or communicate the identifier somehow, even if it is hard-marked?

At the 2012 NTETC Software Sector Meeting, there was some discussion as to where the terminology regarding inextricably linking the software version or revision to the software itself belonged. At the moment, it is not incorporated in the proposed text for G-S.1. NCWM Publication 14 may be a better option for the time being. This would be another item that would benefit from further explanation in a supplementary document.

One suggestion was this revision to G-S.1.d:

(d) when metrologically significant software is employed, the current software version or revision identifier, which shall be directly and inseparably linked to the software itself;**,** for not-built-for-purpose software-based electronic devices;

Alternatively, if the previously proposed new subsection G-S.1.d.3 from Item 1 is adopted, this concept could be inserted thus:

(3) The version or revision identifier shall be directly and inseparably linked to the software itself and *accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an exception, permanently marking the version or revision identifier shall be acceptable under the following conditions:*

Several Sector Members were of the opinion that attempting to make this change at the same time as the earlier changes might be a difficult sell. Mr. Truex, NTEP Administrator, reiterated the necessity of baby steps.

In 2012, the Sector thus recommended adding the following to NCWM Publication 14 and forward to NTETC Weighing, Measuring, Grain Analyzer sectors for feedback:

Identification of Certified Software:

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

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

Also, it was decided to forward the two alternate options for adding requirements for uniquely identifying software to the individual Sectors:

One suggestion was this revision to G-S.1.d:

(d) when metrologically significant software is employed, the current software version or revision identifier, which shall be directly and inseparably linked to the software itself;**,** for not-built-for-purpose software-based electronic devices;

Alternatively, if the previously proposed new subsection G-S.1.d.3 from Item 1 is adopted, this concept could be inserted thus:

(3) The version or revision identifier shall be **directly and inseparably linked to the software itself and** *accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an exception, permanently marking the version or revision identifier shall be acceptable under the following conditions:*

The Measuring Sector reviewed this item and had no feedback other than a statement that they support the continuing/ongoing efforts of this Sector. The Weighing Sector summary mentioned that no one opted to provide comment. They agreed to take no further action on this item, pending further action from the Software Sector. This was specifically in reference to the accepted symbols.

For the time being, Mr. Jim Truex recommended that we not attempt to provide a definition for “software-based device”.

We discussed the possibility of combining this change with the first agenda item, which had been attempted in previous years. Alternatively, if the NIST Handbook 44 changes from agenda Item 1 are made, this agenda item could be addressed in NCWM Publication 14.

After further discussion, the wording in G-S.1.d under agenda Item 1 (Software Identification/Markings) was changed. Agenda Item 2 (Identification of Certified Software) will remain; however, it will address potential changes to NCWM Publication 14 and contain no suggested modifications to NIST Handbook 44. (See changes and conclusion under agenda Item 1 for further details.)

The Sector chair volunteered to review the existing slide presentation detailing the purpose of these changes, to ensure that it accurately reflects this information.

2015 Grain Analyzer Sector Report Update:
In the Software Sector's 2014 Meeting Summary, it was noted that the list of acceptable menu text and symbols in Appendix A are intended to assist the laboratories in finding the certification number. See **www.ncwm.net** for a copy of the 2014 Software Sector Meeting Summary. The Software Sector noticed the Sectors had not provided feedback and response to the list when it was circulated for comment and reminded the Sectors to provide their comments on Appendix A, "List of Acceptable Menu Text and Symbols." The Software Sector provided examples of where this information can be included in the various checklists, for example, the Weighing Device NCWM Publication 14, page DES-22, Section 3; the Belt-Conveyor Scales, page BCS-10, Section 8.7; the Measuring Devices, page LMD-21, Section 1.6; the Grain Moisture Meter, page GMM-14, Section 1 (G.S.1); and Near Infrared Grain Analyzers, page NIR-8, Section 1 (G.S.1).

Included below is the "List of Acceptable Menu items from Appendix A of the 2014 Software Sector Report. The Software Sector suggested that the list be included in Section 1 General, code reference: G.S.1. Identification for both the GMM and NIR checklist. The GA Sector should review the proposed changes to be added to Section 1 General, code reference G.S.1. of both the GMM and NIR checklist and provide comments and feedback.

National Type Evaluation Program
Grain Moisture Meters – Checklists

Introduction

The checklist is designed so that the user can determine and record the conformance of the device with the elements of the checklist in a logical sequence. It is suggested that the user copy the checklist to serve as worksheets, and thus, preserve the original for reference. Unless specifically requested to do so, the applicant is not required to submit a completed checklist to the National Type Evaluation Program (NTEP) prior to the evaluation; however, the applicant is urged to carefully review the checklist prior to submission to ensure that the device meets the requirements of the checklist. In most cases, the results of evaluation for each element can be recorded by checking the appropriate response. In some cases, the user is required to record values, results, or comments. In those cases, space is provided.

1. General

Code Reference: G-S.1. Identification

Virtually all measuring equipment (except separate parts necessary to the measurement process but not having any metrological effect) must be clearly and permanently marked with the manufacturer's name or trademark, model designation, and serial number. Additionally, devices that have (or will have) an NTEP Certificate of Conformance (CC) Number, must be marked with the CC number or a corresponding CC addendum number "Permanent" markings addresses two aspects: (1) the printed information will withstand wear and cleaning, and (2) if the markings are on a plate or badge, then the marking badge must be "permanently" attached to the device. A permanently attached badge means that the identification information required by G-S.1. is not easily removed, and if removed, then it must be obvious that the badge or plate containing this information has been removed. All markings must be clear and easily readable. The following test procedure shall be used to determine the permanence of the identification markings.

Permanence of Lettering

The lettering for the markings is subject to the following tests to simulate accelerated wear. The markings are then compared with a typical set of labels exhibiting various degrees of wear, graded from minimal effect (1) to excessive unacceptable wear (7).

Attempts are made to remove the marked information, whether on a badge (plate) or on the device itself, using the following means:

1. Rub over one letter of the marking at least 20 times using an ink eraser in the same manner and force as one would normally exert while erasing an inscription written with a ball point pen.

2. Clean the marking or badge with the following cleaners presumed to be "readily available."

    a. Disinfecting cleaning liquid and a damp cloth.

    b. "Soft" household cleaning powder and a damp cloth.

    c. Window cleaning fluids and a damp cloth.

Permanence of Attachment Badge is an attempt to remove the badge by pulling it off or prying off a metal badge that is attached using only adhesive; removal must be "difficult" at all temperatures. If the badge can be removed, it must show obvious evidence that the badge was removed. Acceptable indications are destruction of the badge by tearing, permanent and extensive wrinkling, or repeated exposure of the word "VOID" upon removal of the badge.

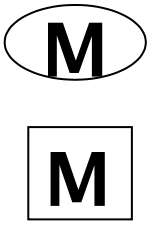
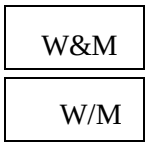
As a practical matter, remote moisture displays are not required to have serial numbers because they typically only repeat the moisture information received from the measuring element. Similarly, external printers are not required to have serial numbers because they do not alter the information received from the measuring element.

If the required information is located on the back of a device, the same information must also appear on the side, front, or top. The bottom of a device is not an acceptable surface for these markings.

The identification marking must be permanent and attached with pop rivets, adhesive, or other permanent means. Removable bolts or screws are not permitted. A foil badge may be used provided that it is durable, difficult to remove, and exhibits obvious evidence of an attempt to remove the marking or badge.

Acceptable menu text and symbols that may be used to assist NTEP laboratories in locating the certification number are included in the "List of Acceptable Menu Test and Symbols" in the table below:

List of Acceptable Menu Test and Symbols

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 circular, rectangular, or rounded rectangle border. • If present, the activation of this menu text/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?
Weights & Measures Info		

(b) Software Protection/Security

Source:
NTETC Software Sector

Background:
The Sector agreed that NIST Handbook 44 already addresses audit trails and physical seals, but these may need to be enhanced.

From the WELMEC Document:

Protection against accidental or unintentional changes
Metrologically significant software and measurement data shall be protected against accidental or unintentional changes.

Specifying Notes:
Possible reasons for accidental changes and faults are: unpredictable physical influences, effects caused by user functions and residual defects of the software even though state of the art of development techniques have been applied.

This requirement includes consideration of:

a. Physical influences: Stored measurement data shall be protected against corruption or deletion when a fault occurs or, alternatively, the fault shall be detectable.

b. User functions: Confirmation shall be demanded before deleting or changing data.

c. Software defects: Appropriate measures shall be taken to protect data from unintentional changes that could occur through incorrect program design or programming errors, e.g. plausibility checks.

Required Documentation:
The documentation should show the measures that have been taken to protect the software and data against unintentional changes.

Example of an Acceptable Solution:
- The accidental modification of software and measurement data may be checked by calculating a checksum over the relevant parts, comparing it with the nominal value and stopping if anything has been modified.
- Measurement data are not deleted without prior authorization, for example, a dialogue statement or window asking for confirmation of deletion.
- For fault detection see also Extension I.

The Sector continued to develop a proposed checklist for NCWM Publication 14. The numbering will still need to be added. This is based roughly on OIML R 76 – 2 checklist and discussions beginning as early as the October 2007 NTETC Software Sector Meeting. The information requested by this checklist is currently voluntary, however, it is recommended that applicants comply with these requests or provide specific information as to why they may not be able to comply. Based on this information, the checklist may be amended to better fit with NTEP's need for information and the applicant's ability to comply.

The California, Maryland, and Ohio laboratories agreed to use this check list on one of the next devices they have in the lab and report back to the Sector on what the problems may be. In February 2011, the North Carolina laboratory was also given a copy of the check list to try.

The Maryland laboratory had particular questions regarding 3.1 and 5.1. The information for 3.1 could be acquired from an operator's manual, a training video, or in-person training. The items in 5.1 were confusing to the evaluators. The terminology is familiar to software developers, but not necessarily others. It was indicated that manufacturers were typically quick to return the filled out questionnaire, but he didn't know how his laboratory was supposed to

verify that it was true. Generally, the laboratories wouldn't be expected to verify things to that level. For example, if the manufacturer states that a checksum is used to ensure integrity, the laboratories wouldn't be expected to evaluate the algorithm used.

The intent was to see whether the manufacturer had at least considered these issues, not for evaluators to become software engineers. Perhaps a glossary or descriptive paragraphs might be added to assist the evaluators for if the manufacturer has questions for the evaluators.

OIML makes use of supplementary documents to explain the checklist they use. Below are links:
http://www.oiml.org/publications/D/D031-e08.pdf
http://www.welmec.org/latest/guides/72.html
http://www.welmec.org/fileadmin/user_files/publications/2-3.pdf

WELMEC document 2.3 is the original source for our checklist, but it's been significantly revised and simplified. Mr. Payne, Maryland Department of Agriculture, is going to review the other documents and come up with some suggestions for the checklist. Mr. Roach, California Division of Measurement Standards, is going to begin using the checklist. The international viewpoint is that any device running an operating system is considered to be Type U. Mr. Roach mentioned that they're having lots of problems with "skimmers" stealing PINs. Is there some way they can detect this?

Mr. Lewis, Rice Lake Weighing Systems, Inc., mentioned he liked Measurement Canada's website. When answering similar questions, different pages would appear, based on answers to those questions: **http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00573.html**

At the 2011 NTETC Software Sector Meeting, the laboratories were polled to obtain any feedback on the use of the checklist. Maryland attempted to use this checklist a few times. They had some difficulty obtaining answers from the manufacturers because the individual(s) interacting with the Maryland evaluator didn't always have the required information on hand. More experience in using the checklist will help determine what needs to be revised.

It was suggested that the checklist could be sent to manufacturers for their feedback as well, with the stipulation that it's a completely voluntary exercise and purely informational at this point. The laboratories will coordinate with willing manufacturers to obtain feedback.

Work is ongoing on this item with the intent that it eventually will be incorporated as a checklist in NCWM Publication 14; again the laboratories are requested to try utilizing this checklist for any evaluations on software-based electronic devices.

The checklist has been reviewed with an eye to making its terminology clearer to laboratories. Some examples and clarifications have been added as shown in the discussion section of this item. The revised checklist will be distributed to the laboratories for additional review. Maryland and California laboratories agreed to use the checklist on a trial basis.

At the 2013 Software Sector meeting, it was reported by the NTEP laboratories that attempts to use the current checklist did not meet with many difficulties. The checklists were given to the manufacturers to fill out and that seemed to work rather well. Minor modicifactions were made to clarify confusing areas or eliminate redundancy

Discussion:
The Software Sector continued to develop a proposed checklist for NCWM Publication 14. The numbering will still need to be added. This is based roughly on OIML R 76 – 2 checklist and discussions beginning as early as the October 2007 NTETC Software Sector Meeting. The information requested by this checklist is currently voluntary; however, it is recommended that applicants comply with these requests or provide specific information as to why they may not be able to comply. Based on this information, the checklist may be amended to better fit with NTEP's need for information and the applicant's ability to comply.

The California, Maryland, and Ohio laboratories agreed to use this check list on one of the next devices they have in the lab and report back to the Sector on what the problems may be. In February 2011, the North Carolina laboratory was also given a copy of the check list to try.

The laboratories using this checklist on a trial basis indicated that there was some confusion as to versions/wording. There may be more than one version in circulation. The version shown in this Summary shall be used henceforth.

During the discussion, Mr. Ed Payne (NTEP lab, Maryland) said that his impression is that this is at least making some of the manufacturers think about security, which they hadn't necessarily done in the past.

It was indicated that some more or better examples may be helpful to manufacturers, and that more guidance is needed. Clearer instructions could be part of the checklist, or it could be a separate document. The Sector would like additional feedback specifically regarding what portions of it are causing confusion.

Due to proprietary issues, the laboratories can not give direct feedback from the companies they interact with. Mr. Darrell Flocken volunteered to obtain information from the labortories, aggregate it, and remove any potential proprietary information issues.

The following software checklist was updated during the 2014 Software Sector Meeting:

1. Devices with Software

1.1.	Declaration of the manufacturer that the software is used in a fixed hardware and software environment. **The manufacturer should indicate whether it's solely software or includes hardware in the system. Can the software be changed after the system has been shipped without breaking a seal? AND**	☐ Yes ☐ No ☐ N/A
1.2.	Cannot be modified or uploaded by any means after securing/verification. **With the seal intact, can you change the software?**	☐ Yes ☐ No ☐ N/A
	Note: It is acceptable to break the "seal" and load new software, audit trail is also a sufficient seal.	
1.3.	The software documentation contains:	
1.3.1.	Description of all functions, designating those that are considered metrologically significant.	☐ Yes ☐ No ☐ N/A
1.3.2.	Description of the securing means (evidence of an intervention).	☐ Yes ☐ No ☐ N/A
1.3.3.	Software Identification, including version/revision. **It may also include things like name, part number, CRC, etc.**	☐ Yes ☐ No ☐ N/A
1.3.4.	Description how to check the actual software identification.	☐ Yes ☐ No ☐ N/A

2. Programmable or Loadable Metrologically Significant Software

2.1. The metrologically significant software is:

2.1.1. Documented with all relevant (see below for list of documents) information. *The list of docs referred to exists in agenda item 5.* ☐ Yes ☐ No ☐ N/A

2.1.2. Protected against accidental or intentional changes. ☐ Yes ☐ No ☐ N/A

2.2. Evidence of intervention (such as, changes, uploads, circumvention) is available until the next verification / inspection (e.g., physical seal, Checksum, Cyclical Redundancy Check (CRC), audit trail, etc. means of security). ☐ Yes ☐ No ☐ N/A

3. Software with no access to the operating system and/or programs possible for the user. <u>This section and section 4 are intended to be mutually exclusive. Complete this section only if you replied Yes to 1.1.</u>

3.3. 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

3.4. Check whether the manufacturer has submitted a written declaration of the completeness of the set of commands. ☐ Yes ☐ No ☐ N/A

4. Operating System and / or Program(s) Accessible for the User. <u>Complete this section only if you replied No to 1.1.</u>

4.5. 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 Weights and Measures jurisdiction and type-specific parameters). **<u>This is a declaration or explanation by the manufacturer.</u>** ☐ Yes ☐ No ☐ N/A

4.6. 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). **<u>This is a declaration or explanation by the manufacturer.</u>** ☐ Yes ☐ No ☐ N/A

5. Software Interface(s)

5.7. Verify the manufacturer has documented:

5.7.1. **<u>If software separation is employed, t</u>**he program modules of the metrologically significant software are defined and separated. ☐ Yes ☐ No ☐ N/A

5.7.2. **<u>For software that can access the operating system or if the program is accessible to the user, t</u>**he protective software interface itself is part of the metrologically significant software. ☐ Yes ☐ No ☐ N/A

5.7.3. The functions of the metrologically significant software that can be accessed **~~via the protective software interface~~**. ☐ Yes ☐ No ☐ N/A

5.7.4. The **<u>metrologically significant</u>** parameters that may be exchanged **~~via the protective software interface~~** are defined. ☐ Yes ☐ No ☐ N/A

5.7.5. The description of the functions and parameters are conclusive and complete. ☐ Yes ☐ No ☐ N/A

5.7.6. There are software interface instructions for the third party (external) application programmer. ☐ Yes ☐ No ☐ N/A

2015 Grain Analyzer Sector Report Update:
It was noted in the 2015 Software Sector agenda that the software Sector checklist that was revised in 2014 will be forwarded to the NTEP laboratories for use on a trial basis. Please provide any comment you may have concerning the proposed revisions to the software checklist above.

(c) Software Maintenance and Reconfiguration

Source:
NTETC Software Sector

Background:
After the software is completed, what do the manufacturers use to secure their software? The following items were reviewed by the Sector. *Note that agenda Item 3 also contains information on Verified and Traced updates and Software Log.*

1. Verify that the update process is documented. (OK)

2. For traced updates, installed Software is authenticated and checked for integrity.

   Technical means shall be employed to guarantee the authenticity of the loaded software (i.e., that it originates from the owner of the type approval certificate). This can be accomplished (e.g,. by cryptographic means like signing). The signature is checked during loading. If the loaded software fails this test, the instrument shall discard it and either use the previous version of the software **or become inoperative**.

   Technical means shall be employed to guarantee the integrity of the loaded software, that is, that it has not been inadmissibly changed before loading. This can be accomplished, for example, by adding a checksum or hash code of the loaded software and verifying it during the loading procedure. If the loaded software fails this test, the instrument shall discard it and either use the previous version of the software **or become inoperative**.

   Examples are not limiting or exclusive.

3. Verify that the sealing requirements are met.

   The Sector asked, "What sealing requirements are we talking about?"

   This item is **only** addressing the **software update**, it can be either verified or traced. It is possible that there are two different security means, one for protecting software updates (software log) and one for protecting the other metrological parameters (Category I II or III method of sealing). Some examples provided by the sector members include but are not limited to:

   - Physical Seal, software log
   - Category III method of sealing can contain both means of security

4. Verify that if the upgrade process fails, the device is inoperable or the original software is restored

   The question before the group is, Can this be made mandatory?

   The manufacturer shall ensure by appropriate technical means (e.g., an audit trail) that traced updates of metrologically significant software are adequately traceable within the instrument for subsequent verification and surveillance or inspection. This requirement enables inspection authorities, which are responsible for the metrological surveillance of legally controlled instruments, to back-trace traced updates of metrologically significant software over an adequate period of time (that depends on national legislation). The statement in italics will need to be reworded to comply with U.S. weights and measures requirements.

The 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.

Note: *It's possible that the Philosophy of Sealing section of NCWM Publication 14 may already address the above IF the definitions of Verified and Traced Updates (and the statement below) were to be added. The contrary argument was that it may be better to be explicit).*

Use of a Category 3 audit trail is required for a Traced Update. A log entry representing a traced software update shall include the software identification of the newly installed version.

The Sector recommended consolidating the definitions with the above statement thus:

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**~~ Category 3 audit trail. The audit trail entry shall include the software identification of the newly installed version.

In 2012, the Sector recommended that as a first step, the following be added to *NCWM Publication 14*:

The updating of metrologically significant software, including software that checks the authenticity and integrity of the updates, shall be considered a sealable event.

Mr. Truex, NTEP Administrator, indicated his opinion that the above sentence is unnecessary since it's self-evident. It was agreed by the group however to ask the other Sectors for feedback on the value of this addition.

Though the Sector is currently considering only the single sentence be incorporated into NCWM Publication 14 for the time being, ultimately, the Sector may wish to advance the remaining language of the original item submission.

The Software Sector had no information indicating that the other Sectors had yet been approached for feedback on the value of the addition of the proposed sentence.

The Software Sector would like the other Sectors to evaluate the above proposed change to NCWM Publication 14 and would also like to include some description indicating that an existing audit trail should be protected during a software update.

At the August 2013 Grain Analyzer Sector meeting, Mr. Truex provided a review of the Software Sector's proposals for changes to NCWM Publication 14, Identification of Certified Software, Software Protection/Security, and Software Maintenance and Reconfiguration. Manufacturers had a number of question to include "What is the baseline for which software is considered metrologically significant?" After some discussion the manufacturers requested that they be given additional time to review the proposed changes and to allow their software designers an opportunity to look at the proposed changes to software. Ms. Brenner sent an e-mail on August 29, 2013. to all NTEP grain analyzer manufacturers requesting that comments be submitted to Ms. Lee by October 15, 2013.

The Grain Analyzer Sector manufacturers provided the following comments to the Software Sector's proposal for changes to NCWM Publication 14:

Grain Analyzer Manufacturer's Comments to Software Sector's Proposed Changes to NCWMPublication 14			
Manufacturer	**GA Sector Item**	**Comment**	**Proposed change**
Dickey-john	12a	We currently don't separate the metrologically significant code or identify it's version in the application. We can do this, but it will require a significant code change and validation. Question 1: Does the metrological significant code need to be actually separate from the application or is a label in the application identifying the version of the prediction module used acceptable. This will result in less changes to the code. Question 2: What if we had added a test on the prediction module that inserted key values into the engine, that we would document in the metrological specific tests, that would give a specific answer? For example, if the prediction module is the same then the same inputs with the same calibration file will yield the same results from version to version; log those results and include in the metrological report.	Object to 12.a – The document insists that we separate the legally relevant code and make separate binaries. We could simply add a label that is bound to the prediction module code. Adding this label could tie the prediction module to the version, and will allow us to separately maintain revision control of that code. However, the code itself will not be a separate binary.
FOSS	General	Since FOSS distributes instruments worldwide, having NTEP and OIML requirements the same would be beneficial. I know efforts are being made to have the two as similar as possible. A concern is the potential that software code that is adopted would invalidate the currently approved instruments. A preferred outcome would be that once software code is adopted, only instruments seeking approval (not currently approved) would be required to meet the code.	

In addition, manufacturers that attended the August 2013 Grain Analyzer Meeting, expressed an interest in attending the next 2014 Software Sector meeting to provide additional input.

It was noted in the 2014 S&T Annual Report that Developing Item 310-1 G-S.1. Identification was not considered at the 2013 GA Sector meeting. The Sector considered this item at previous Sector meetings, but it was noted that the Software Sector was still developing this item and that the Sector would provide additional feedback following further development. At the 2013 GA Sector meeting, the Sector was asked to provide comments to proposed changes to NCWM Publication 14.

At the August 2014 Grain Analyzer Sector meeting, manufacturers discussed the Software Sector's proposal for changes to NCWM Publication 14 for identification of certified software, Software Protection/Security, and Software

Maintenance and Reconfiguration. One manufacturer noted the difficulty in separating metrological and non-metrological software. It was noted that if the software is not separated then all software would be considered metrological. The Grain Analyzer Sector had additional questions and made additional comments to the proposed changes to NCWM Publication 14 for identification of certified software, software protection/security, and software maintenance and reconfiguration:

- If the software is not separated, would a manufacturer be required to resubmit the device to NTEP each year for reevaluation?
- Will the requirements for software affect devices that are currently designed and manufactured?
- There are issues with software changes if devices that are already manufactured are required to meet the software requirements.
- It is difficult to redesign devices.

The Grain Analyzer Sector was informed that the Software Sector meeting would be held August 27 - 28, 2014. Manufacturers expressed that they needed the requirements so that these requirements can be considered in future device designs.

At the 2014 joint meetings of the Software, Weighing and Measuring Sectors, the proposed changes to G-S.9. were made to reflect some of the concerns heard from some Sectors and interested parties:

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

The Software Sector still feels that explicitly requiring the metrologically significant software to be given at least the same level of protection as metrologically significant parameters is the best approach. The Software Sector requests feedback from the S&T Committee and other Sectors on this proposed change. The Software Sector continues to consider the issue of audit trail protection; there is some doubt as to whether the existing language is sufficient as it does not address the integrity of the audit trail during a software update, etc.

2015 Grain Analyzer Sector Report Update:
The GA Sector should review the changes to G-S.9. and provide any comments or suggested changes.

10. Update on Proficiency Testing

Source:
Dr. Hurburgh, Iowa State University

Purpose:
Develop an air-oven proficiency testing program to ensure state laboratory and manufacturer's air-oven measurements are traceable to the official USDA, GIPSA air-oven measurements.

Item Under Consideration:
Update on progress of the ongoing air-oven proficiency testing program for states maintaining a grain moisture laboratory and GMM manufacturers.

Background/Discussion:
At the 2009 NTETC Grain Analyzer Sector Meeting, Dr. 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.

At the 2011 NTETC Grain Analyzer Sector Meeting, Ms. 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 AOCS Soybean Quality Traits program, GIPSA air-oven results could be reported for comparison.

At the Sector's August 2012 meeting, the Sector learned that Ms. Christine Atkinson will be taking over the Proficiency Testing program for states and interested manufacturers, formerly headed by Ms. Amy Johnson. Ms. Atkinson verified that participant's cost will remain $100 per year. The Sector reiterated that the program should focus solely on the standard FGIS air-oven method. Instrument results will not be reported. Participants' air-oven results will be compared against GIPSA's standard FGIS air-oven results. In response to Ms. Atkinson's question about scheduling, the Sector was in general agreement that samples should ship after harvest, preferably between mid-January and mid-February with participants' results due 30 days after the shipping date.

The Sector agreed upon the following Program Details:

Samples – Soybeans 2, Corn 2, Hard Red Winter Wheat 2

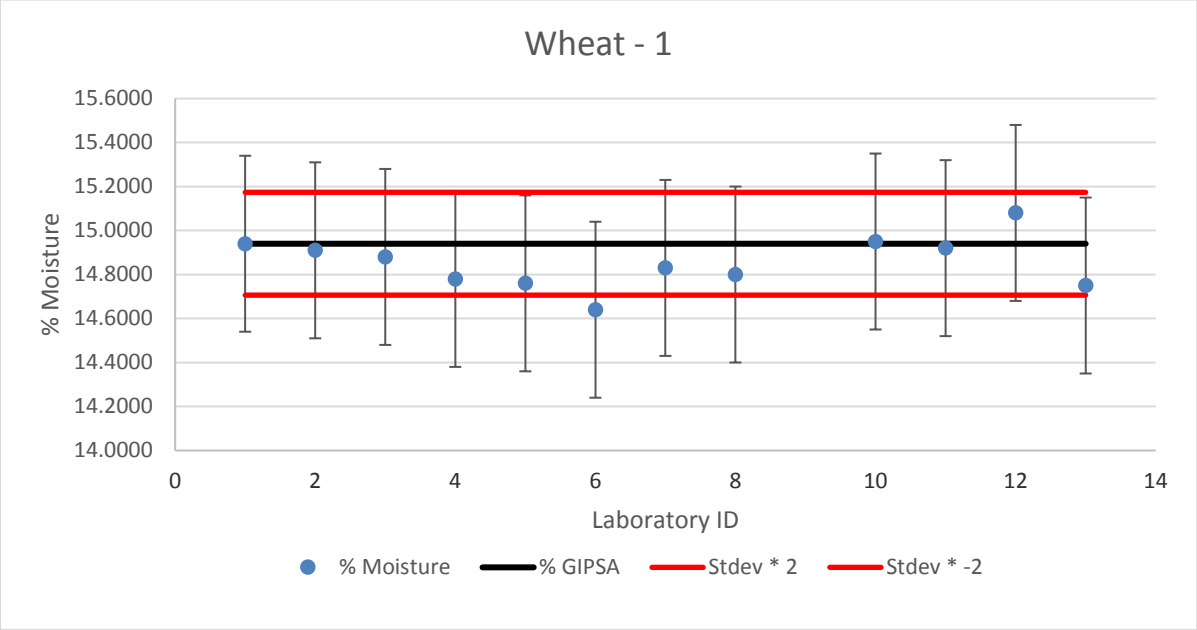
- Cost to Participants - $100.00/year
- Schedule:
  - Samples (6) ship between January 15 and February 15.
  - Samples must be tested within 5 business days of receipt with results due 30 days after the shipping date.
- Reports to be posted on www.SoybeanQualityTraits.org by 1 May.
- Only the GIPSA oven results will be identified. Individual manufacturer's and State participant's oven results will be assigned an identifier known only to the manufacturer or State participant. Instrument results will not be reported.
- Detailed Participant Instructions will be provided to each participant.

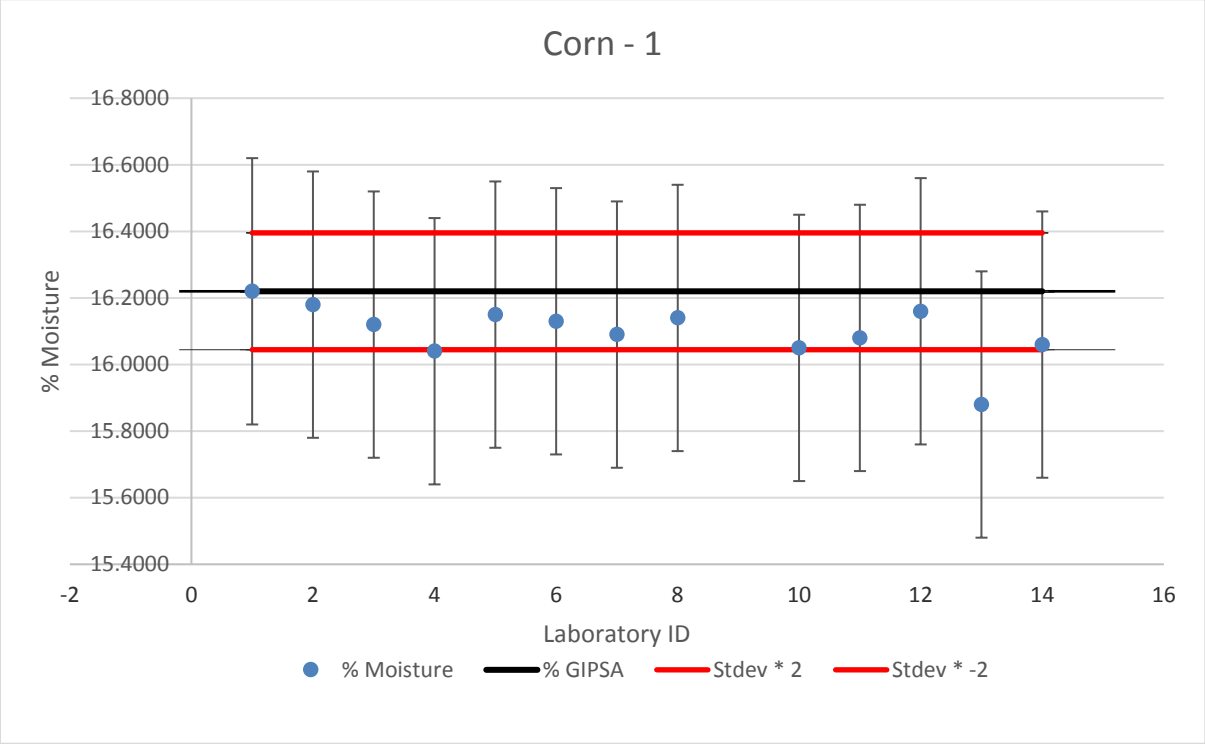
At the August 2013 Grain Analyzer Sector meeting, no report was provided on AOAC's efforts to conduct proficiency testing for grain moisture. Mr. Karl Cunningham, Illinois, and Mr. Kevin Hanson, Missouri, agreed to work together to conduct a grain moisture proficiency test. Mr. Cunningham agreed to provide the samples for proficiency testing and Mr. Hanson, agreed to analyze the data in accordance with the procedures used to conduct proficiency testing in the state laboratory program. Mr. Hanson also agreed to collect data on test weight per bushel which may be useful in field test procedures for evaluating test weight per bushel on instruments. Following the August 2013 Sector Meeting, arrangements were made for shipping grain samples to State participants.

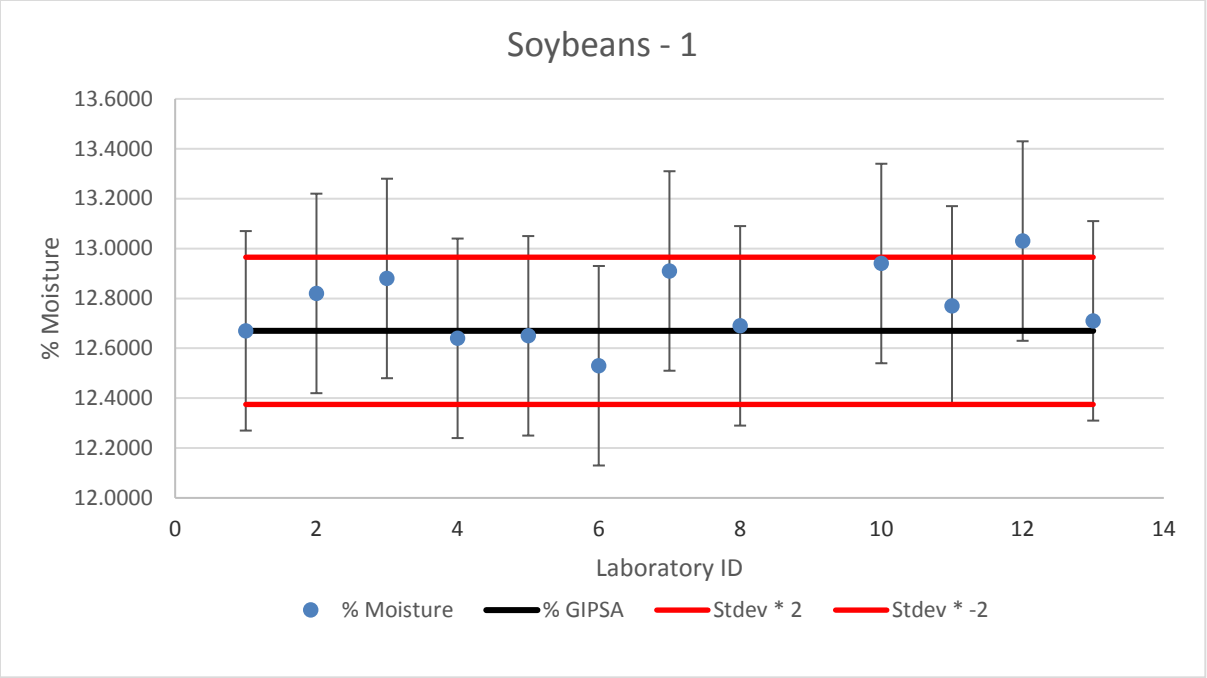
At the August 2014 Grain Analyzer Sector meeting, Mr. Karl Cunningham provide a update on the status of proficiency testing. Mr. Cunningham informed the Grain Analyzer Sector that he collected some wheat grain samples that can be used for grain moisture proficiency testing and that corn and soybeans will be collected during the 2014 harvest. Mr. Cunningham noted that after January 2015 wheat, corn,and soybeans grain samples may be ready for distribution to the participating States. Mr. Cunningham agreed to analyze the data in cooperation with NIST and requested a list of contact information for participating States and other interested parties.

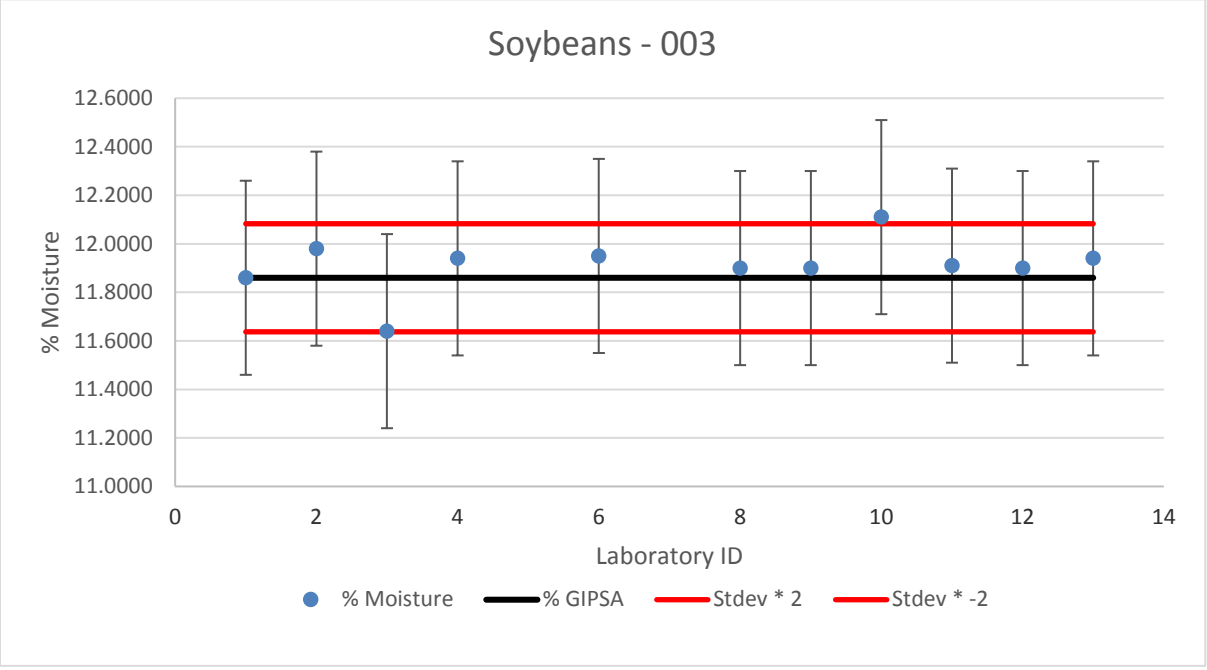
2015 Grain Analyzer Sector Report Update:
NTEP, state, and industry laboratories completed moisture measurement proficiency testing in 2015. Mr. Cunningham collected the data from the participating laboratories. The participants were the NTEP laboratory, USDA GIPSA, which is the laboratory that provided the reference moisture measurements; state laboratories, Arkansas, Colorado, Illinois, Iowa, Maryland, Mississippi, North Carolina, South Carolina, Wisconsin, and Wyoming; and industry laboratories, Dickey-john and Perten. One wheat sample, one corn sample, and two soybeans samples were tested. Ms. Diane lee developed graphs to analyze the data from the participating laboratories. The graphs below show the laboratory moisture measurement results. Only the NTEP laboratory results are indentified in the graphs. With the exception of laboratory number 10 for Soybeans-003, Laboratory 12 for Soybeans-1, and Laboratory number 13 for Corn-1, the laboratories were within two standard deviations of the reference laboratory (GIPSA),

which shows good agreement for most of the laboratory results. Although the laboratories did not report their measurement uncertainties, an average of some previously reported national and state laboratory uncertainties of ± 0.4 % were added to the graphs for further analysis. Although some laboratory moisture measurements were slightly outside two standard deviations from USDA, GIPSA's reference moisture measurement result, if their measurement uncertainty is approximately 0.4 %, the measurement uncertainty overlaps the reference value. The laboratory measurement uncertainties are different for each laboratory and must be reported so that separate evaluations can be made for each laboratory. Uncertanties are also needed for measurement traceability.






Soybeans - 1
% Moisture
13.6000
13.4000
13.2000
13.0000
12.8000
12.6000
12.4000
12.2000
12.0000
0
2
4
6
8
10
12
14
Laboratory ID
% Moisture
% GIPSA
Stdev * 2
Stdev * -2


Soybeans - 003
% Moisture
12.6000
12.4000
12.2000
12.0000
11.8000
11.6000
11.4000
11.2000
11.0000
0
2
4
6
8
10
12
14
Laboratory ID
% Moisture
% GIPSA
Stdev * 2
Stdev * -2

11. The Feasibility of a Phase II program for Near Infrared Grain Analyzers

Source:
Dr. Hurburgh, Iowa State University

Background/Discussion:
The GIPSA Grain Inspection Advisory Committee recommends that GIPSA initiate research to determine the feasibility of extending the theory of "equivalency" to multiple-constituent instruments in order to utilize standardized technology while maintaining accuracy and consistency in measurement of wheat protein.

Ms. Eigenmann provided an update on the Grain Inspection Advisory Committee's Resolutions. The Sector discussed the feasibility of an ongoing calibration program also referred to as a Phase II program for Near Infrared Grain Analyzers (NIR) instruments that measure wheat. The Phase II program for grain moisture is a program that monitors the moisture calibrations on grain moisture meters annually. As changes to the calibrations occur due to grains, climate, etc., data collected in this program allows for changes to moisture calibrations annually and ensures equivalency among the different moisture meter models. The Advisory Committee is recommending that this program be extended to include NIR instruments that measure wheat protein. It was noted that there could be multiple NIR instruments for wheat protein introduced into the market and that it may be advisable to have the Phase II program extended to NIR instruments that measure wheat protein. It was also mentioned that currently there are few States that are checking wheat protein on multi-constituent instruments.

GIPSA currently has an annual review program for the official protein system but would have to consider the cost associated with extending the program for other NIR wheat protein analyzers It was noted during the discussion that GIPSA currently has hourly rate fees set that could be applied to a phase II program for wheat.

Unlike moisture [meters] where there may be changes to the calibrations annually, there will not be year to year changes for wheat protein. As such, consideration may be given to conducting the program less than annually, and considering reviewing wheat protein calibrations every 3, 4, or 5 years, as appropriate. In addition it was noted that there also has to be a mechanism to get manufacturers' calibration data for calibration review.

The Sector will continue to discuss the feasibility of a phase II program for wheat protein giving consideration to the following issues:

- How the program will be funded,
- How often the calibrations for wheat protein will be updated,
- How many devices are currently being used in commercial transactions, and
- If being used commercially in a State, what is needed by States to begin testing these devices?

At the August 2014 Grain Analyzer Sector meeting USDA, GIPSA representatives provided an update on the activities concerning a phase II program for wheat protein. The Sector was informed that USDA, GIPSA is discussing funding options for this program. It was noted that the frequency of calibration for wheat protein is being considered and that this will impact the cost of the program. The Sector was also informed that Dr. David Funk is writing a discussion paper that will address many of the issues concerning a Phase II program for wheat protein.

2015 Grain Analyzer Sector Report Update:
USDA, GIPSA repesentatives mentioned that they are not aware of a discussion paper from Dr. Funk concerning the feasibility of a Phase II program for Near Infrared Grain Analyzers. The Sector should continue to provide feedback on the four bullet items listed above and USDA, GIPSA should provide any updates on any internal discussions.

12. Next Sector Meeting

The Software Sector met jointly with the Weighing Sector and the Measuring Sector in 2015 and are requesting the opportunity to meet jointly in 2016 with the GA Sector. The Software Sector is proposing a half day or one day

meeting at the Chase Suites by Woodfin at KCI in Kansas City, Missouri. The tentative dates for the joint Sector meeting are September 13 - 14, 2016. Sector memebers are asked to hold these days open pending confirmation of availability of facility, determination of agenda items, exact meeting times, and meeting duration. Final meeting details will be announced by early June 2016.

If you would like to submit an agenda item for the 2016 meeting, please contact any of the following persons by June 1, 2016:

Jim Truex, NTEP Administrator at **jim.truex@ncwm.net**
G. Diane Lee, NIST Technical Advisor, at **diane.lee@nist.gov**

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