

National Type Evaluation Technical Committee (NTETC) Grain Analyzer Sector Meeting Summary

August 22-23, 2012 / Kansas City, Missouri

INTRODUCTION

The charge of the NTETC Grain Analyzer Sector is important in providing appropriate type evaluation criteria based on specifications, tolerances and technical requirements of *NIST Handbook 44* Sections 1.10. General Code, 5.56. 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.

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

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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 | Universal 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. Report on the 2012 NCWM Interim and Annual Meetings

The 2012 NCWM Interim Meeting was held January 22-25, 2012 in New Orleans, LA. At that meeting, the NTEP Committee accepted the sector's recommended amendments and changes to the 2011 Edition of *NCWM Publication 14*. These changes appear in the 2012 Edition.

The changes are detailed in the table below. For additional background/details refer to Agenda Item 4 in the Sector's August 2011 Meeting Summary.

The 2012 NCWM Annual Meeting was held July 16-19, 2012 in Portland, ME. There were no Grain Analyzer Sector Voting Items on the agenda. **Item 351-1, UR.3.4. Printed Tickets** remains an Informational Item on the NCWM Agenda. See Grain Analyzer [Agenda Item 10](#), below, for details.

Mr. Jim Truex, NTEP Administrator, reported that attendance this year at both the Interim and Annual Meetings was better than that of the last few years. Paid membership in the NCWM is now in the 2,200-2,300 range.

| Amendments/Changes to the Grain Moisture Meters Chapter in the 2011 Edition of NCWM Publication 14 | | | |
|---|--|----------------------------|---|
| Section Number | Amendment/Change | Page (2011 Edition) | Source: 2011 Grain Analyzer Sector Meeting Summary |
| § II. Sample Temperature Sensitivity | Amend §II to accommodate cold grain temperatures down to -0 °C and to specify the conditions under which an intermediate manufacturer-specified cold grain temperature must be specified. | GMM-2 | Agenda Item 4.a. |
| Appendix A Test: Sample Temperature Sensitivity | Modify Sample Temperature Sensitivity Test to reflect the expanded cold grain temperatures described in § II. | GMM-34 | Agenda Item 4.b. |
| Appendix E – Sample Temperature Sensitivity | Modify Sample Temperature Sensitivity Test for grains/oilseeds other than corn, soybeans and hard red winter wheat to reflect the expanded cold grain temperatures described in § II. | GMM-45 | Agenda Item 4.c. |
| GMM Checklist 3. Code Reference: S.1.3. Operating Range | Add Paragraph 3.10.2.1 to require that grains or seeds with an extended temperature range neither display nor print moisture results if outside applicable moisture OR temperature ranges. | GMM-19 | Agenda Item 4.d. |

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

Ms. Cathleen Brenner, Grain Inspection, Packers and Stockyards Administration (GIPSA), brought the sector up to date on NTEP Evaluation (Phase I) activity. Renovation of the laboratory is nearly complete. The process of moving and installing the environmental chamber, air ovens, and other equipment into the new area will begin shortly after Labor Day. Because of the renovations, the laboratory has been without an environmental chamber for over a year. Once the move is underway, the NTEP lab can begin accepting applications for Phase I testing.

Ms. Brenner also reported on the collection and analysis of Grain Moisture Meter OCP (Phase II) data on the 2011 crop. For the 2012 harvest there are 7 models enrolled in Phase II. (Perten Instruments elected not to continue model AM5100 in Phase II this year. Their CC for the AM5100 will expire in June 2013.) The manufacturers will be charged on the basis of 6 models because, using GAC2500-UGMA data, DICKEY-john can automatically back calculate calibrations to the GAC2500 without having to run samples on the GAC2500*. Phase II data collection for the 2012 harvest began in early August.

The 7 meters:

1. Bruins Instruments - OmegAnalyzerG
2. DICKEY-john Corp. - GAC2000 (NTEP Version), GAC2100a and GAC2100b
3. DICKEY-john Corp. - GAC2500 (*See note above. Will not run samples on this model.)
4. DICKEY-john Corp. - GAC2500-UGMA
5. Foss North America - Infratec 1241
6. Perten Instruments Inc. - AM5200 and AM5200-A (The AM5200-A is UGMA Certified.)
7. The Steinlite Corporation - SL95

The 2012 Phase II enrollment cost to each manufacturer, based on 6 device types, is \$8,750.

3. Review of OCP (Phase II) Performance Data

At the sector's August 2005 meeting it was agreed that comparative OCP data identifying the Official Meter and listing the average bias for each NTEP meter type should be available for annual review by the sector. Accordingly, Ms. Brenner, GIPSA, presented data showing the performance of NTEP meters compared to the air oven. This data is based on the last three crop years (2009–2011) using calibrations updated for use during the 2012 harvest season. The 2009-2011 Grain Moisture Meter (GMM) Phase II comparison graphs may be viewed or downloaded for printing at the following web address:

http://ncwm.net/sites/default/files/meetings/grain_analyzer/2012/12_GMM_Bias.pdf

Ms. Brenner pointed out that the data identified as the "Official Meter" is based on the GAC 2100. The Official Meter data is in blue for all the charts. A randomized assignment of colors was used for the individual manufacturers, so the violet color identified as "Meter 1" on the charts represents a different manufacturer on each chart; "Meter 2" is a different manufacturer on each chart; etc.

Overall, the performance of the meters looked good for all the grains except Long Grain Rough Rice. It had the most variation between meters.

The sector was reminded that effective September 1, 2012, [editor's note: The effective date was subsequently delayed to September 10, 2012.] the DICKEY-john GAC2100 will no longer be the Official Meter for the following four grains: corn, soybeans, sunflower and sorghum. These four grains will have official calibrations from the two Official Meters, the GAC2500-UGMA and the AM5200-A. The remaining grains are scheduled to switch to the GAC2500-UGMA and the AM5200-A for Official Inspection on May1, 2013.

Discussions have been held at GIPSA as to how comparison data might be displayed next year since the Official Meter is changing. Present thinking is that meters will be randomly identified as Meter 1, Meter 2, Meter 3, etc. for each grain. The Official Meters will be included in that random assignment once they have accumulated 3 years of data.

4. Amend Table S.2.5. of §5.56.(a) in NIST Handbook 44

Source:

NTETC Grain Analyzer Sector

Purpose:

Delete "remotely" from the second paragraph of Category 3 requirements that begins, "When accessed remotely ..." to make it clear that the requirements of Category 3 apply whether accessed manually using the keyboard or accessed by remote means, and add the modified second paragraph of Category 3 requirements to Categories 3a and 3b to make it clear that these requirements apply to all the subcategories of Category 3.

Item Under Consideration:

| Table S.2.5. Categories of Device and Methods of Sealing | |
|---|--|
| Categories of Device | Methods of Sealing |
| <p>Category 1: No remote configuration capability.</p> | <p>Seal by physical seal or two event counters: one for calibration parameters (000 to 999) and one for configuration parameters (000 to 999). If equipped with event counters, the device must be capable of displaying, or printing through the device or through another on-site device, the contents of the counters.</p> |
| <p>Category 2: Remote configuration capability, but access is controlled by physical hardware.</p> <p>A device shall clearly indicate that it is in the remote configuration mode and shall not be capable of operating in the measure mode while enabled for remote configuration.</p> | <p>The hardware enabling access for remote communication must be at the device and sealed using a physical seal or two event counters: one for calibration parameters (000 to 999) and one for configuration parameters (000 to 999). If equipped with event counters, the device must be capable of displaying, or printing through the device or through another on-site device, the contents of the counters.</p> |
| <p>Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</p> <p>When accessed remotely for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measuring mode.</p> | <p>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter (for calibration changes consisting of multiple constants, the calibration version number may be used rather than the calibration constants). A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to twenty-five (25) times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)</p> |
| <p>Category 3a: No remote capability, but operator is able to make changes that affect the metrological integrity of the device (e.g., slope, bias, etc.) in normal operation.</p> <p><u>When accessed for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measuring mode.</u></p> | <p>Same as Category 3</p> |
| <p>Category 3b: No remote capability, but access to metrological parameters is controlled through a software switch (e.g., password).</p> <p><u>When accessed for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measuring mode.</u></p> | <p>Same as Category 3</p> |

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

(Amended 1998 and 201X)

Note: Zero-setting and test point adjustments are considered to affect metrological characteristics and must be sealed.

(Added 1993) (Amended 1995 and 1997)

Background / Discussion:

All of the GMMs in Categories 3, 3a, and 3c of Table S.2.5. use an electronic method of sealing, and most of them also offer access to the configuration mode through a keyboard entered password. In this mode, sealable parameters can also be changed locally through the keyboard. Category 3 of Table S.2.5. currently includes the following requirement:

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

At its 2011 Grain Analyzer Sector Meeting the sector agreed by consensus that the following changes to Table S.2.5. of §5.56.(a) of *NIST Handbook 44* should be forwarded to the S&T Committee for consideration:

- Add a note to Table S.2.5. to recognize the expanded scope of “remote capability”.
- Delete “remotely” from the second paragraph of Category 3 requirements that begins, “When accessed remotely ...” to make it clear that the requirements of Category 3 apply whether accessed manually using the keyboard or accessed by remote means.
- Add the modified second paragraph of Category 3 requirements to Categories 3a and 3b to make it clear that these requirements apply to all the subcategories of Category 3.

At the suggestion of National Institute of Standards Technology (NIST), Office of Weights and Measures (OWM), the Table S.2.5. changes approved by the sector in 2011 have been separated into two independent items: one dealing with the changes to Category 3 and its subcategories (as shown in Item Under Consideration) and one dealing with the modification of the definition of remote configuration capability appearing in Appendix D of *NIST Handbook 44* to recognize the expanded scope of “remote capability”. This independence insures that one item will not hold up the other from consideration.

Contingent upon approval of the Item Under Consideration by NCWM, a number of related changes will be required to both the GMM Chapter and the Near Infrared (NIR) Grain Analyzer Chapter of *NCWM Publication 14*. These changes are shown in Items 4(a), 4(b), and 4(c) following:

4.a. Proposed Changes to Table S.2.5. in Appendix C of the GMM Chapter of Publication 14

[Changes shown below are contingent upon acceptance of Item Under Consideration]

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

| Categories of Device | Method of Sealing |
|---|---|
| <p>Category 1: No remote configuration capability</p> | <p>Seal by physical seal or two event counters: one for calibration parameters (000 to 999) and one for configuration parameters (000 to 999.) If equipped with event counters, the device must be capable of displaying, or printing through the device or through another on-site device, the contents of the counters.</p> |
| <p>Category 2: Remote configuration capability, but access is controlled by physical hardware.</p> <p>Device shall clearly indicate that it is in the remote configuration mode and shall not be capable of operating in the measure mode while enabled for remote configuration.</p> | <p>The hardware enabling access for remote communication must be at the device and sealed using a physical seal or two event counters; one for calibration parameters (000 to 999) and one for configuration parameters (000 to 999.) If equipped with event counters, the device must be capable of displaying, or printing through the device or through another on-site device, the contents of the counters.</p> |
| <p>Category 3: Remote configuration capability, access may be unlimited or controlled through a software switch (e.g. password.)</p> <p>When accessed remotely for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measure mode.</p> | <p>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change and the new value of the parameter (for calibration changes consisting of multiple constants, the calibration version number may be used rather than the calibration constants.) A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to twenty-five (25) times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)</p> |
| <p>Category 3a: No remote capability, but operator is able to make changes that affect the metrological integrity of the device (e.g. slope, bias, etc.) in normal operation.</p> <p><u>When accessed for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measure mode.</u></p> | <p>Device shall clearly indicate that it is in the remote configuration mode and shall not be capable of operating in the measure mode while enabled for remote configuration.</p> |
| <p>Category 3b: No remote capability, but access to metrological parameters is controlled through a software switch (e.g. password.)</p> <p><u>When accessed for the purpose of modifying sealable parameters, the device shall clearly indicate that it is in the configuration mode and shall not be capable of operating in the measure mode.</u></p> | <p>Remote configuration capability, access may be unlimited or controlled through a software switch (e.g. password.)</p> |

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

4.b. Proposed Changes to the Checklist of the GMM chapter of Publication 14

[Changes shown below are contingent upon acceptance of Item Under Consideration]

For Category 3 Devices

- 4.6.36. If a measurement is in process when the device is accessed ~~remotely~~ for the purpose of modifying sealable parameters, the measurement is either: Yes No N/A
- Terminated Before Results can be Displayed or Printed. **OR**
 - Completed Before Entering the Configuration Mode
- 4.6.37. When accessed ~~remotely~~ for the purpose of modifying sealable parameters, the device clearly indicates that it is in the configuration mode and is not capable of operating in the measure mode. Yes No N/A
- 4.6.37.1 Describe the method used to seal the device or access the audit trail information:

4.c. Proposed Changes to the Checklist of the NIR Grain Analyzer Chapter of Publication 14

Near Infrared (NIR) Grain Analyzers use an electronic method of sealing similar to those of GMMs, and most of them also offer access to the configuration mode thorough a keyboard entered password. In this mode, sealable parameters can be changed locally through the keyboard. At the 2011 NTETC Graina Analyzer Sector Meeting the sector agreed that contingent upon acceptance of Item Under Consideration the NIR Check List of *NCWM Publication 14* should be modified to delete “remotely” from §4 Design of NIR Analyzers, ¶ 4.9.16 as shown below.

[The change shown below is contingent upon acceptance of Item Under Consideration]

- 4.9.16. If a measurement is in process when the device is accessed ~~remotely~~ for the purpose of modifying sealable parameters, the measurement is either:
- 4.9.16.1 Terminated Before Results can be Displayed or Printed. **OR** Yes No N/A
- 4.9.16.2 Completed before entering the configuration mode Yes No N/A
- 4.9.16.3 Describe the method used to seal the device or access the audit trail information:

Conclusion:

The sector agreed by consensus to accept the Item Under Consideration and recommended that a Form 15 be drafted for forwarding this item to the S&T Committee for consideration. Mr. Truex, NTEP Administrator, indicated that Items 4.a., 4.b., and 4.c. would automatically be considered by the NTETC upon approval of the Item Under Consideration by the NCWM.

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”

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.

Conclusion:

The sector agreed by consensus to accept the Item Under Consideration and recommended that a Form 15 be drafted for forwarding this item to the S&T Committee for consideration.

6. Test Weight per Bushel Acceptance and Maintenance Tolerances

Source:

Mr. Jeffrey D. Adkisson, Grain and Feed Association of Illinois

Purpose:

Due to problems cited in the grain and feed industry, review and make any needed changes to the test weight per bushel tolerances in *NIST Handbook 44* Section 5.56(a).

Item Under Consideration:

Re-form a task group to study the test weight per bushel measurement system to include issues with field inspection and grain moisture meters and provide the sector with recommendations for any needed changes to the test weight per bushel tolerances in *NIST Handbook 44* Section 5.56(a).

Background / Discussion:

This is a carryover from the sector’s 2011 meeting. Mr. Adkisson, Grain and Feed Association of Illinois, cited problems his industry is having regarding Test Weight (TW) per bushel. GMMs that have failed TW during field inspection are sent to the manufacturer for repair. When the meters are returned, the reports indicate that no problems have been found. There are also situations where a meter has failed TW. When the state inspector subsequently tested the elevator’s quart kettle it matched the meter, but it didn’t match the state inspector’s sample. This is particularly frustrating for the country elevators in Illinois that are using the GMM TW only as a screening tool.

At the Sector’s August 2011 meeting a task group was formed to investigate the whole TW system with the goal of defining procedures that would improve TW both for the user and for the inspection system. Past data obtained by the Sector had indicated that the existing tolerances were reasonable. It was felt that increasing TW tolerances would only cover up the problems. What was needed was an investigation of the whole system of calibrating meters, then translating that calibration into the field, and then keeping it that way.

Dr. Charles R. Hurburgh, Jr., Iowa State University, agreed to head the task group. Other TW Task Group members included:

- Mr. Jeffery Adkisson – Grain and Feed Association of Illinois
- Ms. Diane Lee – NIST, OWM
- Ms. Cassie Eigenmann – DICKEY-john Corporation
- Mr. Ivan Hankins – Iowa Department of Agriculture/Weights and Measures
- Mr. Tim Kaeding – Perten Instruments, Inc.
- Mr. Karl Cunningham – Illinois Department of Agriculture

Further action on the issue of tolerances was postponed until the TW Task Group was able to recommend appropriate action.

Earlier this year the TW Task Group developed the following list of Action Items:

- Survey the grain industry as to the frequency of discounting each of the major grains (wheat, corn, and soybeans) for test weight, and within those discounted the frequency of use of the meter test weight versus the cup-bucket test weight.
- Survey the industry for comparative data between meters and an Official GIPSA agency on the same samples.
- Develop a draft procedure for sample selection and pre-qualification

Dr. Hurburgh reported that discounting for low TW was not an issue in either 2010 or 2011. TWs for corn were so high that discounting was not an issue. Within Iowa most grain elevators were using the TW reported by their GMM. Only a few were using the standard quart kettle method. This is likely to change in the 2012 harvest as low TWs are likely to be more common. Also, there may not be as much TW increase in drying as would normally be expected. TW may come up again as a discount factor.

Same sample TW data has not been collected comparing grain elevator GMMs with an Official GIPSA agency. Dr. Hurburgh explained that this information should be relatively easy to obtain, because in almost every case when a train is officially graded the samples are run at the grain elevator first. Since last year's sector meeting, the rapid acceptance of the new UGMA GMMs as Official Meters for corn, soybeans, sunflowers, and grain sorghum (with the remaining grains scheduled to switch to UGMA GMMs for Official Inspection on May1, 2013), has altered some of the issues. The new technology not only provides a better moisture measurement, but a better TW measurement as well.

The remaining action item that the task group believed was necessary was a procedure for pre-qualifying TW samples as being good predictors for the TW function as well as moisture function. Most States pre-screen moisture samples to get the outliers out of the system. That pre-qualification would have to be expanded if TW is to be actively used to reject meters on the basis of TW.

Dr. Hurburgh recommended that the sector not adjust TW tolerances at this time, because the system is rapidly changing over to the new technology which is going to result in the improvement in TW readings. The problem should resolve itself as older instruments are retired.

Mr. Karl Cunningham, Illinois Dept of Agriculture, informed the Sector that Illinois's TW rejection rate has gone down in the last two years. He has no problem with TW on the meters in his laboratory and doesn't think the present tolerances are a problem. Many of the field problems may be due to rough handling of the meters during shipping. Mr. Cunningham advises elevators who have to have their devices worked on to take them to the manufacturer's service department themselves if at all possible.

Mr. Tim Kaeding, Perten Instruments, suggested that there might be value in expanding the Phase II OCP grain moisture comparison charts to include TW. Dr. Hurburgh recommended that a TW comparison chart showing the spread of TW measurements for individual meters against the corresponding official quart kettle TW measurements would address the tolerance issue, whereas a bias plot would not. He suggested plotting meter TWs on the x-axis and quart kettle results on the y-axis. A best-fit line could be drawn for each meter.

The sector agreed that TW comparison charts should be prepared for the 3 grains which are most likely to be subject to discounts on the basis of TW: Corn and two wheat classes. The wheat classes selected were: Hard Red Winter and Soft Red Winter. Manufacturer approval is required for NTEP Phase II TW performance data to be released for publication even if individual instruments are not identified. The two meter manufacturers present indicated that they would approve the release of this data. Permission would have to be obtained from the other manufacturers.

Conclusion:

Ms. Brenner will send letters, to all GMM manufacturers outlining the way TW data will be displayed for each meter for corn and two classes of wheat. The letters will request formal approval for release of NTEP Phase II TW performance data. Meters will NOT be identified.

The sector agreed to postpone further action on changing TW tolerances until more information was available.

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 was included on the sector's agenda to provide a summary of the activities of OIML TC17/SC1. The Co-Secretariats (China and the United States) are working closely with an International Work Group to revise OIML Recommendation R 59 *Moisture Meters for Cereal Grains and Oilseeds*. The 5 Committee Draft (CD) of OIML R 59, revised to comply with OIML's Guide *Format for OIML Recommendations* and to incorporate tests for the recommended disturbances of OIML Document D 11, *General Requirements for Electronic Measuring Instruments*, was distributed to the Subcommittee in February 2009. Comments to R 59 5 CD were received from 10 countries including the United States. A preliminary R 59 6 CD addressing those comments was prepared for discussion at the September 2010 TC 17/SC 1 meeting in Orlando, FL. Per discussions at that meeting, Germany submitted suggestions for additional software requirements that will be included in the final draft of R 59 6 CD.

Ms. Diane Lee, NIST, OWM, reported that the preliminary 6 CD will have to be revised to address the comments received at the September 2010 TC 17/S1 meeting and to incorporate Germany's additional software requirements. The final draft of 6 CD will then be circulated to the TC members for comment and a possible vote. The earliest anticipated date for the final draft of 6 CD is the Spring of 2013.

8. Update on Efforts to Establish Recognized Traceability under the International Committee of Weights and Measures (CIPM) Mutual Recognition Agreement (MRA) for Moisture in Grain Measurements

Background / Discussion:

At the 2011 NTETC Grain Analyzer Sector Meeting, Ms. Lee, NIST, OWM, reported that there is a proposal on the international front to do a study of moisture measurement methods with the apparent purpose of establishing a universal standard method "internationally accepted by competent authorities in the field of moisture measurements in grains and cereal." During the September 2010 TC 17/SC 1 meeting Mr. Jean-Francois Magana, International Bureau of Legal Metrology (BIML), gave an overview of a discussion paper titled, *Efforts to Establish Recognized Traceability Under the International Committee of Weights and Measures (CIPM) Mutual Recognition Arrangement (MRA) for 'moisture-in-grain' measurements.* This document discusses National Measurement Institutes having their measurement capabilities internationally recognized for moisture. It also discusses key comparisons for moisture, and the use of *ISO 712, Cereals and cereal products -- Determination of moisture content -- Reference method (not applicable to maize and pulses)*. In November 2011 the United States and China received a notice for a proposal for a new project within TC 17/SC 1 to create a new OIML recommendation to define the measurand "moisture mass fraction in grain" by a globally recognized measurement method. In the United States, NIST, OWM and United States Department of Agriculture (USDA), with management from both agencies, held a conference call to discuss technical issues concerning establishing a globally recognized reference method. After which the United States and China responded and elaborated on technical and economic issues. A copy of the response is shown below:

"...On the matter of International Committee of Legal Metrology (CIML) approval of this proposed project, we feel that the draft letter that you have prepared does not provide enough information to CIML Members for them to make an informed decision. We have consulted with members of the United States "mirror" committee, USDA, GIPSA, and they have informed us that studies of the type being proposed here have already been carried out in the 1980's, and so it is questionable whether it makes sense to try and 'reinvent the wheel' with this project. The results of the studies have shown that this issue involves not only the technical feasibility of developing an acceptable global measurement method for moisture mass fraction in grains (i.e., defining the measurand), but equally (if not more) importantly involves the economic (and hence political) feasibility of developing and implementing a single global standard. The anticipated global costs associated with making the changes that this project could lead to are staggering, and would quite likely not be acceptable to the stakeholder communities.

Therefore, we believe that the initial letter to the CIML Members should ask not only the technical questions that you have posed (and perhaps others as well), but should also ask what the national agencies and customers in the different Member States have to say about the idea of possibly changing the test method in their country

to accommodate a single global standard measurement method. We feel that such information should be obtained (through a formal survey, not in the informal way posed in your draft letter) and then shared with the CIML Members before asking them to vote on approval of this proposal. We would be happy to assist you in the re-drafting of your letter and preparation of the survey.

Elaborating on what we see as the technical issues, it is well recognized that no universal method can be used for all grains and seeds. The main steps of the experimental procedure, i.e., pre-drying, grinding, drying time, and temperature, generally differ from one grain type to the next as dictated by physical and chemical composition. Thus, a critical study of the procedure would be required for each grain type. A wide range of grain moisture reference methods are used by major grain exporting and importing countries. Grain moisture reference methods were adopted decades ago and are well established within these countries. Comparison studies have shown that no methods are identical and that differences can be significant between some methods. The extent to which the methods agree will vary by grain type.

Elaborating on what we see as the economic issues, it is challenging to identify economic benefits of moving to an international moisture reference method. Persuasive arguments have been presented that market prices have already adjusted to reflect differences in grain moisture reference results. It is easier, and fairly daunting, to predict costs associated with making a change to grain moisture reference methods for an individual country. It would be necessary to develop new moisture meter calibration coefficients for each grain type. In some cases, grain drying costs could be increased in order to meet moisture specifications. Perhaps most significantly, price structures would need to be modified...”

This was discussed further at the OIML Presidential Council meeting March 5-7, 2012, and it was included in the meeting minutes that there was insufficient evidence that the latest developments described in the NIST, OWM newsletter article would result in an instrument/procedure that could be used as an international standard for moisture mass fraction of grain measurements.

In a conversation with Mr. Patoray, BIML Director, Dr. Erlich, NIST, OWM was informed that the OIML is no longer pursuing the new project to create an OIML recommendation to define the measurand “moisture mass fraction in grain”.

Subsequently, the United States and China, secretariats of OIML Technical Committee (TC) 17/Technical Subcommittee (SC) 1, received a document from Ms. Stephanie Bell of the National Physical Laboratory in the UK with reference to a proposed research topic to submit to the current call of the European Metrology Research Program (EMRP) to address the need for a more effective metrology infrastructure for measurements of moisture in materials. The United States and China responded including excerpts from the response provided for the OIML Proposal to create a new OIML recommendation to define the measurand “moisture mass fraction in grain”. OIML TC 17/SC 1 was not listed in support of these efforts.

Ms. Diane Lee, NIST, OWM reported that she is developing an article on grain moisture measurements in the U.S. that has been reviewed by Dr. Richard Pierce of USDA, GIPSA. This article provides information on U.S. air-oven reference methods to include historical information and a summary of the various test methods used for different grains and types of commodities. This article may also serve to provide the international community with information on the air-oven reference test methods used in the U.S.

9. 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. Subcommittee SC 8 was formed to study the issues and write a working draft document *Measuring Instruments for Protein Determination in Grains*. Australia is the Secretariat for this subcommittee. A TC 17/SC 8 meeting was hosted by NIST, OWM in September 2007 to discuss the 2 CD. Discussions on 2 CD dealt mostly with Maximum Permissible Errors and harmonization of the TC 17/SC 8 Recommendation for protein with the TC 17/SC 1 Recommendation for moisture. The Secretariat distributed a 2 CD of the document in February 2010. A meeting of TC 17/SC 8 was held September 2010 in Orlando, FL. At the September meeting comments to the

Recommendation on Protein Measuring Instruments for Cereal Grain and Oil Seeds 2 CD were reviewed. It was agreed at this meeting that two instruments will be submitted for OIML type approval.

Diane Lee, NIST/OWM, reported that the 3rd CD of the OIML Recommendation on Protein was distributed to members of the USNWG via e-mail on July 3, 2012. Comments to the 3rd CD were requested by September 8, 2012. The 3rd CD incorporates the changes to 2nd CD that were agreed to at the 2010 TC17/SC8 meeting in Orlando, Florida. Changes were also made to the 3rd CD to harmonize some section with OIML R 59 and include requirements of OIML D 11. Further discuss is needed to address wheather or not all of the OIML D11 requirements that were added to the 3rd CD are necessary for protein analyzers. In response to a question: “How many revisions are associated with OIML Recommendations?” Ms. Lee responded that typically, if comments to an OIML Recommendation can be resolved by voice or e-mail the next version of the Recommendation could be forwarded for to the participating member countries for a vote.

10. Item 356-1 Printed Ticket User Requirements - Update

Source:

Grain and Feed Association of Illinois (2012)

Purpose:

Change the mandatory printing of tickets from grain moisture meters to an “on demand at the time of transaction” printing and remove the requirement of printing the calibration version identification. Note that the S&T Committee did not agree with proposed removal of the requirement to print the calibration version identification; this position is reflected in the version of the proposal currently under consideration by the committee.

Item Under Consideration:

Amend *NIST Handbook 44*, Grain Moisture Meter Code 5.56.(a) as follows:

UR.3.4. Printed Tickets.

- (b) The customer shall be given a printed ticket **at the time of the transaction or as otherwise specified by the customer.** The printed ticket shall include the date, grain type, grain moisture results, and test weight per bushel, and calibration version identification. The ticket **information** shall be generated by the grain moisture meter system.

(Amended 1993, 1995, ~~and~~ 2003, **and 20XX**)

Background:

According to the submitter, the user requirement to provide a printed ticket for every single load is unrealistic in the country elevator industry. Traffic patterns at country elevators do not lend themselves to providing a printed ticket to all customers and customers really don't want them. As the speed and capacity increases in the industry, outbound scales are being located at a distance from the inbound scale and the scale house where the moisture tester is located to alleviate traffic bottlenecks. When the outbound scale is located away from where the ticket is printed, the truck driver must circle back around to pick up the ticket, thus, causing logistical problems. In addition, since meters are sealed, inspected and required to have the correct calibration, there is no need for the calibration version identification to be printed on the ticket. Also, most customers are not going to know if it is the correct calibration version identification or not. There have been problems getting the information from the grain moisture meter to the grain accounting system – especially the calibration version identification. Some grain accounting systems have to be “hard coded” for calibration version identification which must be changed whenever the calibration changes. The change will be at an added cost for the industry.

When a consumer pays at a gas pump, they have the option of a receipt on demand at the time of transaction or not receiving a receipt. There would be a cost savings to moisture meter users as they would save on paper and filing space, and in the situation where the calibration version identification is “hard coded,” there will be a cost savings of the expense to have the grain accounting software provider make those changes.

Since moisture meters are capable of printing the ticket, some would argue that they should just go ahead and print them and provide them to the customer. In addition, the requirement does not say when the ticket shall be given to the customer; thus, the printed tickets could be saved for weeks, months, or even years in case the customer had a concern at some point. Printing the calibration version identification ensures the correct calibration is being used.

The submitter proposed amendments to paragraph UR.3.4. Printed Tickets as follows:

UR.3.4. Printed Tickets.

- (b) The customer shall be given a printed ticket on demand at the time of the transaction showing the date, grain type, grain moisture results, and test weight per bushel, ~~and calibration version identification~~. The ticket information shall be generated by the grain moisture meter system.

(Amended 1993, 1995, ~~and~~ 2003, and 20XX)

At the 2011 Central Weights and Measures Association (CWMA) Interim Meeting some jurisdictions opposed the proposal citing that it is a fundamental element of a point of sale transaction that there is either a witness to the transaction or that a receipt is made available. Others supported the item and recognized that many customers refuse to take the printed tickets. The CWMA believes that the calibration version identification is not necessary on the ticket since most jurisdictions are already verifying the calibrations version when the device is inspected. This proposal is not eliminating the opportunity for the seller to obtain a printed ticket. The CWMA forwarded the item to NCWM, recommending it as a Voting Item.

At the 2011 Western Weights and Measures Association (WWMA) Annual Meeting the committee heard no comments on this item. The WWMA amended the proposal to make the language consistent with other codes such as 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices Code paragraph UR.2.6. Ticket Printer: Customer Tickets. The WWMA forwarded the modified version below to NCWM, recommending it as a Voting Item.

UR.3.4. Printed Tickets.

- (b) The customer shall be given a printed ticket ~~showing at the time of the transaction or as otherwise specified by the customer. The printed ticket shall include~~ the date, grain type, grain moisture results, and test weight per bushel, ~~and calibration version identification~~. The ticket information shall be generated by the grain moisture meter system.

(Amended 1993, 1995, ~~and~~ 2003, and 20XX)

At the 2011 Northeastern Weights and Measures Association (NEWMA) Interim Meeting there were no comments. Deferring to the expertise of the NTETC Grain Analyzer Sector, NEWMA forwarded the item to NCWM, recommending it as a Developing Item.

At the 2011 Southern Weights and Measures Association (SWMA) Annual Meeting, Ms. Butcher, NIST Technical Advisor, noted that the proposed language submitted was slightly different from that discussed by the NTETC Grain Analyzer Sector and provided a summary corresponding to this item prepared by Ms. Lee, Grain Analyzer Sector Technical Advisor. Ms. Butcher also pointed out that WWMA proposed alternate language that is consistent with printed tickets requirements in other codes. The SWMA agreed that the customer should be given the option of receiving a printed ticket from a transaction and that the proposed changes would clarify the responsibility of the device user. The SWMA preferred the option forwarded by WWMA since it mirrors existing language in other *NIST Handbook 44* codes. The SWMA forwarded the item to NCWM, recommending it as a Voting Item as revised by WWMA.

At the 2012 NCWM Interim Meeting, the S&T Committee received comments in support of the alternative language submitted by the WWMA. NIST, OWM reported that the proposed language submitted to the regional weights and measures associations was different from that agreed to by the Grain Analyzer Sector at its August 2011 meeting.

The Grain Analyzer Sector had specifically opposed deleting the phrase “calibration version identification.” NIST, OWM also noted that not all grain moisture meters are Category 3 devices; consequently, calibration version identification information is a critical component on the printed receipt to reconstruct the basis for a sale and help officials to resolve complaints.

The committee agreed that the version proposed by WWMA and SWMA was preferable since it mirrors similar language in other *NIST Handbook 44* Codes. The committee also agreed that, given the Grain Analyzer Sector’s opposition to deleting the reference to “calibration version identification,” this phrase should be retained in the paragraph. The committee presented an amended version of the proposal. The committee recognized that the regional associations were not aware of the sector’s position on the proposed deletion of the reference to the calibration version and that the submitter has not had an opportunity to review the significant changes from the original version. The 2012 S&T Committee designated this item as an Informational Item to allow additional opportunity for input.

At the Sector’s August 2012 meeting one member suggested that the phrase “or as otherwise specified by the customer” be modified to read “or as agreed to by the customer”. Customers are not going to proactively specify how elevator record keeping systems are put together, but they can agree that this information comes on a settlement sheet. A contract for the sale of grain at some future date with XYZ Grain contains a phrase that the seller agrees to XYZ Grain’s various transaction policies. By signing the contract, the seller agrees to accept settlement sheet information via a web listing that can be accessed with a computer or possibly using a smart phone. The seller is not “specifying” how he wants to receive the “ticket” information, he is just “agreeing” to receive it in a different manner.

The wording proposed by the Sector in 2011, “A printed ticket shall be made available to the customer upon request at the time of transaction...” did not require the customer to do anything if he didn’t want a ticket, but it did require him to ask for one if he wanted one. The wording in the Item under Consideration required the customer to say, “I don’t want a ticket” if a ticket wasn’t wanted. If he said nothing, he would be given a ticket (or offered one).

Other Sector members felt that the wording of the Item under Consideration allowed flexibility, and most were in favor of accepting the Item under Consideration. An attempt to obtain a consensus on the S&T Committee’s proposal was unsuccessful due to one jurisdiction’s belief that ...”a ticket is given to the customer no matter what.”

There was further discussion on whether the wording in the Item under Consideration, “..... at the time of the transaction or as otherwise specified by the customer” means that the customer gets a ticket at the time of transaction or at a later specified time. Some believed that “as otherwise specified by the customer” could mean “Never” or “in another form”. Sector Chairman, Ms. Cassie Eigenmann, DICKEY-john, Corp., reminded the Sector that the reason Illinois Grain & Feed Association submitted the request for change was because they did not want to have to print a ticket at the time of transaction unless the customer requested one at the time of transaction.

It was pointed out that unless a ticket is printed by the GMM before the grain sample is “dumped” from the GMM it may not be possible for the GMM to print a ticket for that transaction. The information, however, could reside in the memory of the elevator’s grain transaction system and could be printed in another form e.g., on a settlement sheet that is sent (or transmitted) to the seller later. Further discussion suggested that the S&T proposed wording could be interpreted to mean that elevators that captured GMM information in their grain transaction system at the time of transaction would not have to supply a GMM printed ticket at time of transaction unless requested by the customer at time of transaction. If the elevator is using a GMM that is equipped to record and that was put into service **before** January 1, 1998, the elevator would be required to give the customer a printed ticket at the time of transaction (need print only percent moisture content and grain selected).

Conclusion:

After further discussion a formal vote was taken to accept the Item Under Consideration as shown above. The vote was 9 in favor to 1 opposed. The opposing vote was based on the implied need to give every customer a printed ticket.

11. Update on Proficiency Testing

Source:

Dr. Hurburgh, Iowa State University

Purpose:

Develop an air-oven proficiency testing program to ensure state laboratory and manufacturers air-oven measurements are traceable to the official USDA, GIPSA air-oven measurements.

Item Under Consideration:

Create an 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.

Conclusion:

In summary, 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.

12. NCWM Publication 14, NTEP Administrative Policy Changes

Source:

NTEP

Background / Discussion:

NCWM is working on revisions to *Publication 14, Administrative Policy*, to put it in a more logical order and more understandable form. The purpose is not to change the intent of the publication, but to realign and clarify sections as necessary. Sectors, committees and the NTEP laboratories are asked to review the revised section, NTEP Administrative Policy and provide feedback. An electronic copy of the document was distributed by NCWM to all who registered to attend the NTETC Grain Analyzer Sector meeting in August.

Conclusion:

No comments were offered at the August 2012 Sector meeting.

[**Editor's Note:** On September 14, 2012, Mr. Don Onwiler, NTEP Executive Director, sent an email message to GA Sector meeting attendees alerting them that the *Administrative Policy document* distributed for the sector's meeting was not the most up-to-date version. The most recent copy is now posted to the GA Sector "meeting documents" page on the NCWM web site. It can be accessed at: <http://www.ncwm.net/content/grain-analyzer-docs>. Mr. Onwiler welcomes comments for the next two months.]

13. Next Sector Meeting

Mr. Jim Truex, NTEP Administrator, suggested that the sector consider using some form of web conferencing if a meeting of only 4 or 5 hours would be required. At that time, it was difficult to determine what the outcome would be for the issues the sector was forwarding to the S&T Committee. Should it be necessary to hold a physical meeting, the sector agreed to the following tentative location and dates:

Dates: Wednesday, August 21 and Thursday, August 22, 2012
Location: Chase Suites by Woodfin at KCI in Kansas City, MO. (if available)

14. Review of Form 15s

Background/Discussion:

At the end of the first day of the sector's August 2012 meeting the Co-Technical Advisors agreed to complete the Form 15s that would be required to move Agenda Items 4, 5, and 10 forward. The following morning 3 completed Form 15s were presented for the sector's review and approval:

1. Amend Table S.2.5. of §5.56.(a) in NIST Handbook 44 (see GA Agenda Item 4.)
2. Modify Definition of Remote Configuration (see GA Agenda Item 5.)
3. S&T Committee Item 356-1 Printed Ticket User Requirements (See GA Agenda Item 10.)

Conclusion:

The sector accepted Form15s "1" and "2" by consensus and "3" by a vote of 9 in favor to 1 opposed. As before, the opposing vote was based on the implied need to give every customer a printed ticket.

15. Update on the New Meter Technology

Background/Discussion:

The sector invited Dr. David Funk, Deputy Director & Chief Scientist, GIPSA/FGIS Technology and Science Division, to update the sector on the new meter technology. Following is a summary of his presentation:

History of Official Moisture Meter Approvals

- 1937 – Tag-Heppenstall
- 1960 – Motomco Model 919
- 1998 – DICKEY-john GAC 2100
- April 11, 2012 – First UGMA-Compatible moisture meters approved
 - DICKEY-john GAC 2500UGMA
 - Perten AM-5200-A

What is GIPSA’s Unified Grain Moisture Algorithm (UGMA)?

- Very accurate dielectric-type moisture method
- Higher measurement frequency (about 150 MHz)
- Based on a defined physical parameter–Dielectric Constant
- Excellent density correction (Landau-Lifshitz, Looyenga Density Correction with LLL Exponent = 3)
- Three “unifying parameters” per grain group (Slope, Offset, and Translation Unifying Parameters)
- A single calibration “curve” for all grain types (a 5th-Order Polynomial)
- Precise, wide-range temperature correction
- Calibrated to GIPSA’s standard AIR Oven method
- “Open”– Available to any manufacturer

Why change to UGMA?

- Improved accuracy for all grain types
- Improved accuracy of UGMA
- Improved year-to year calibration stability
- Drastically improved accuracy on high and low test weight corn
- Wider sample temperature ranges (allows measuring frozen grain)
- “Green” grain effects reduced (moisture “rebound” significantly reduced)
- Easier calibration development

GIPSA’s basic definition of equivalency

- Same Technology
- Very close agreement among types as well as units of a type
- Same calibrations and standardization processes

UGMA – Compatibility Criteria

- NTEP Certification
- Documented & stable production processes
- Measurement frequency – 148.5 to 150.5 MHz
- Standardize Test cell design
- Standardized loading method
- Standardize measurements
 - Sample dielectric constant
 - Sample mass
 - Sample temperature
- Tight tolerances specified for individual subsystems as well as for moisture results
- Must use specified mathematics
- Units’ agreement with FGIS Master system must meet tolerances in FGIS Regulations
 - +/- 0.05% M for Headquarters Standard units
 - +/- 0.15% M for other Official units(where “M” is the mean difference on medium-moisture HRWW)
- All UGMA-Compatible models must be able to use the same check testing process.
- A simple check testing process must ensure performance on all grains over full moisture ranges.
- Instruments must provide for efficient means of entering calibrations.
- Instruments must provide standardized output data stream for printing or networking.

Anticipated Moisture Changes with Transition to UGMA

- GAC2100 and new UGMA-based meters are all calibrated to agree with GIPSA's air oven method as closely as possible.
- Do not expect significant average differences between GAC2100 and new UGMA-based meters – **except:**
- Low test weight corn moisture values will generally **increase:**
 - GAC2100 reads lower than UGMA by 0.2% per pound per bushel below 57 lb/bu.
- High test weight corn moisture values will generally **decrease:**
 - GAC2100 reads higher than UGMA by 0.2% per pound per bushel above 57 lb/bu.

Implications on field-testing UGMA meters

- Better to test with another UGMA meter
- Alternatively, test with one sample of grain
- Test weight will make a difference in the moisture result of UGMA meters (May need to verify that UGMA meter is measuring mass correctly.)

Implications for the next 5 years

- There may be profound changes. Do we need NTEP phase 2?
- Reduction in the number of grain samples that are being collected but will not need to collect as many samples for the official meters which are UGMA meters now.

More information can be found at the GIPSA web page on UGMA moisture meter implementation:

<http://www.gipsa.usda.gov/fgis/equipment.html>