

Grain Analyzer Sector Meeting Summary

August 9, 2023, 8:00 am to 5:00 pm. CDT
 Holiday Inn Express Kansas City Airport
 9550 NW Polo Drive, 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***.

Table A
Table of Contents

Title of Content	Page
INTRODUCTION	1
1. REPORT ON THE 2023 NCWM ANNUAL MEETING	2
2. REPORT ON NTEP EVALUATIONS AND ONGOING CALIBRATION PROGRAM (OCP) (PHASE II) TESTING	2
3. REVIEW OF OCP (PHASE II) PERFORMANCE DATA FOR MOISTURE AND TEST WEIGHT PER BUSHEL	3
4. IMPLEMENTATION OF NIR PHASE 2, ONGOING CALIBRATION PROGRAM.....	3
5. REPORT ON INTERNATIONAL ORGANIZATION OF LEGAL METROLOGY (OIML) TC 17/SC 1 R 59 <i>MOISTURE METERS FOR CEREAL GRAINS AND OILSEEDS</i>	10
7. AIR-OVEN GRAIN MOISTURE PROFICIENCY/COLLABORATIVE STUDY/INTERLABORATORY COMPARISON TESTING	11
8. STATE WEIGHTS AND MEASURES ISSUES WITH INSPECTION OF GRAIN MOISTURE METERS FOR CORN /TOLERANCES FOR UGMA METERS	14
9. METER TO LIKE-TYPE METER TESTING AND DEFINITION OF LIKE-TYPE METER.....	20
10. 2020-2024 INTERAGENCY AGREEMENT TO FUND THE GMM ONGOING CALIBRATION (PHASE II) PROGRAM	21
11. NEXT SECTOR MEETING AND NEW ITEM SUBMITTAL.....	22

Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
BIML	International Bureau of Legal Metrology	NTEP Sector	National Type Evaluation Program Sector
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 Arrangement	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		

1. Report on the 2023 NCWM Annual Meeting

At the 2023 NCWM Annual Meeting, there were two items on the Specifications and Tolerances Committee Report. Item GMA-19.1 is the proposed change to *Table T.2.2. Acceptance and Maintenance Tolerances Air Oven Method for All Grains and Oil Seeds*. This item has a Developmental Status. The second item is GMA-23.1 - *N.1.3. Meter to Like-Type Meter Method Transfer Standards and Table T.2.2. Acceptance and Maintenance Tolerances Meter to Like-Type Meter Method*. This second item is included for discussion later as Item 9 in this agenda.

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

Mr. Jason Jordan, Federal Grain Inspection Services (FGIS), the NTEP Participating Laboratory for grain analyzers, provided a list of grain analyzers that were enrolled in the 2022 Ongoing Calibration Program (OCP); there are 9 grain analyzer models enrolled.

The 9 models:

1. Dickey-john Corp. – GAC2500-UGMA and GAC2700-UGMA
2. Dickey-john Corp. – GAC2000, GAC2100, GAC2100a and GAC2100b
3. Perten Instruments Inc. - AM5200 and AM5200-A (UGMA)
4. Perten Instruments Inc. – IM9500 and IM9500 HLW/TW
5. Foss North America – GAC2500-C
6. Foss North America – Infratec 1241
7. Foss North America – Infratec Nova
8. The Steinlite Corp. – SL95
9. Missouri Moisture Analyzers – MTC 999ES

Discussion:

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

The 2020 – 2022 Phase II Moisture, Performance, and Test Weight charts are available on the GA Sectors web page for viewing or download. The link to the page is [2023 NTEP Grain Analyzer Sector Meeting | NCWM](#).

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, Mr. Jordan, FGIS, the NTEP Participating Laboratory for grain analyzers will provide data for inclusion in the 2019 Grain Analyzer Sector Meeting Agenda showing the performance of NTEP meters compared to the air oven. This data is based on the last three crop years (2017–2019) using calibrations updated for use during the 2019 harvest season.

At the Sector's August 2012 meeting, it was agreed that TW comparison and correlation 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 and limited to Air Oven reference values less than 20% moisture. The wheat classes selected were: Hard Red Winter and Soft Red Winter. Accordingly, Mr. Jordan, FGIS, the NTEP Participating Laboratory for Grain analyzers will provide data showing the performance of NTEP meters compared to the GIPSA reference Quart Kettle Test Weight Apparatus. This data is based on the last three crop years (2017 – 2019) using calibrations updated for use during the 2018 harvest season.

The 2018-2020 Grain Moisture Meter (GMM) Phase II comparison graphs are available for view or can be downloaded for printing from the NTEP Grain Analyzer Sector page, 2021 Meeting on the NCWM website at www.ncwm.com/grain-sector.

During the 2021 Sector Meeting, Mr. Jason Jordan provided the sector with an update on the OCP (Phase II) performance data for moisture and test weight per bushel for the 2018-2020 crop year and reviewed the comparison graphs. The Sector members provided no additional comments.

During the 2022 Sector Meeting, the members were informed that the 2019-2021 Grain Moisture Meter (GMM) Phase II comparison graphs are available for viewing or can be downloaded for printing from the NTEP Grain Analyzer Sector page, 2021 Meeting on the NCWM website at www.ncwm.com/grain-sector. Mr. Jordan stated that there may be differences in next year's data due to an ongoing drought. For the next Sector meeting, he will review historical data to verify whether there has been a reduction in variation between various meters.

Discussion:

4. Implementation of NIR Phase 2, Ongoing Calibration Program

This item was discussed over the last few years and the following action items were agreed to. The items were reported on during, or after, the 2021 sector meeting.

1. Mr. Jason Jordan reviewed the reporting examples for several grain types and constituents for reporting the performance of NIR instruments under the proposed Phase II program. The Phase II Program for NIR instruments will begin in 2022.

This item was completed, however, due to some unforeseen circumstances with the protein reference system at the FGIS lab in Kansas City, the implementation of the NIR program was delayed until the winter/spring of 2023.

2023 Grain Analyzer Sector Meeting Summary

2. It was agreed that the current NTEP Application for Grain Moisture Analyzers, Phase II will be revised to add the required information to permit a single application for both instrument types. A single application was developed and is ready for release.

Source:

Mr. Jason Jordon, NTEP Grain Analyzer Lab

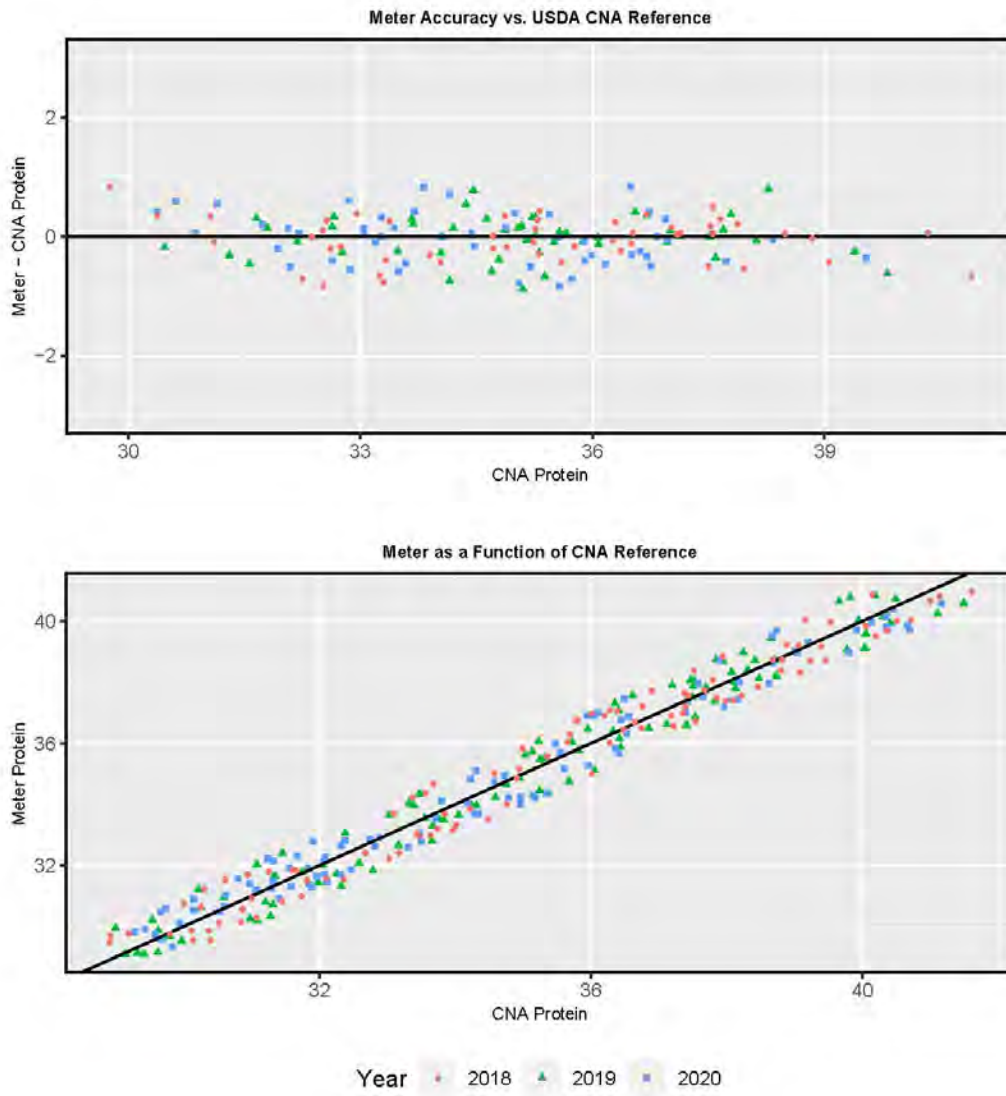
Purpose:

The NTEP Grain Analyzer Lab at FGIS will begin implementation of the NIR Phase 2 Ongoing Calibration Program in 2022. FGIS is seeking to keep participating manufacturers apprised of the evaluation process as it develops to ensure there is mutual agreement and understanding regarding the requirements for compliance.

Proposal:

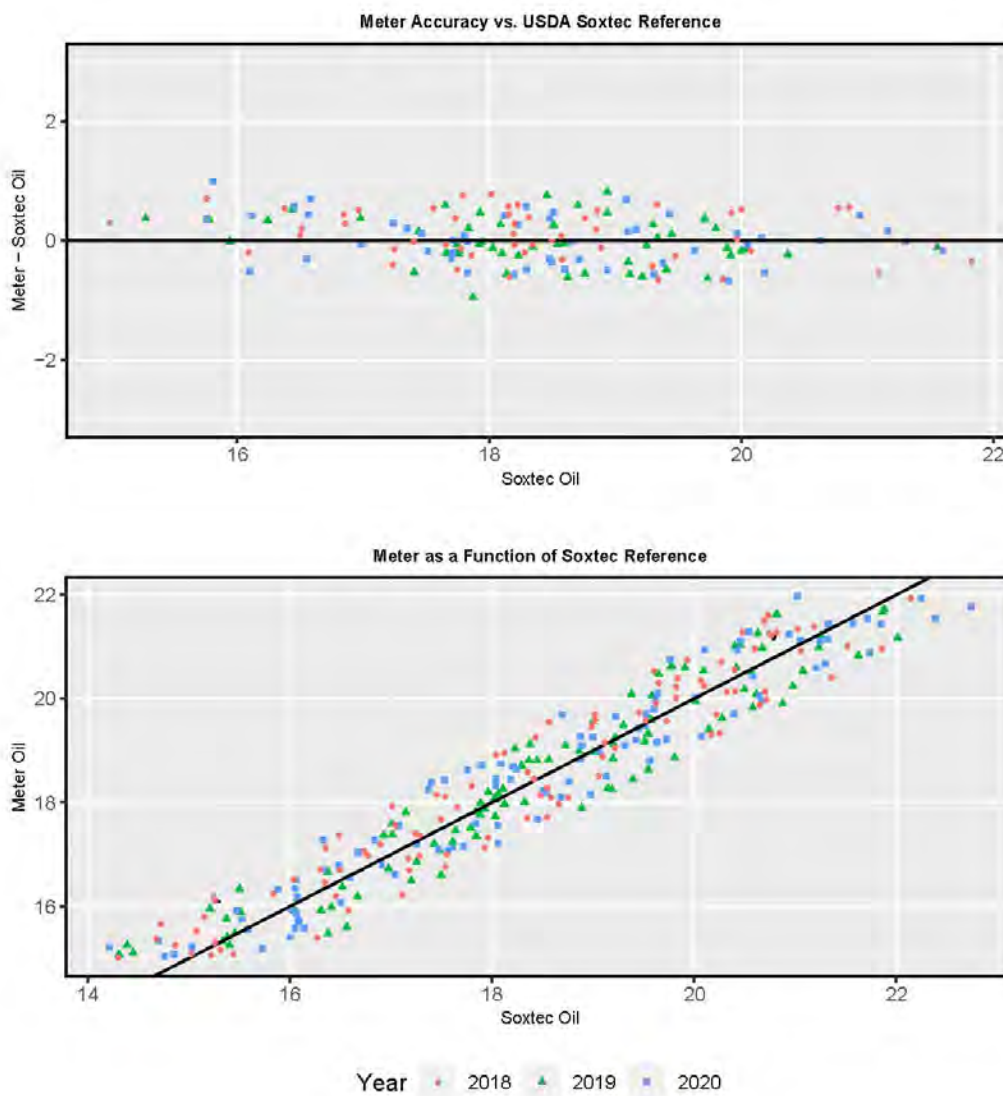
Similar to the Moisture Phase 2 program, the NIR Phase 2 will submit reports to manufacturers to demonstrate performance. Example reports for several grain types and constituents are shown in the following pages. These items, along with any additional items regarding the Phase 2 program, will be open for discussion.

2020 NIR Calibration Study – Soybeans Protein
2018, 2019, 2020 Crop Years
InstA (Calibration)
07/13/2021



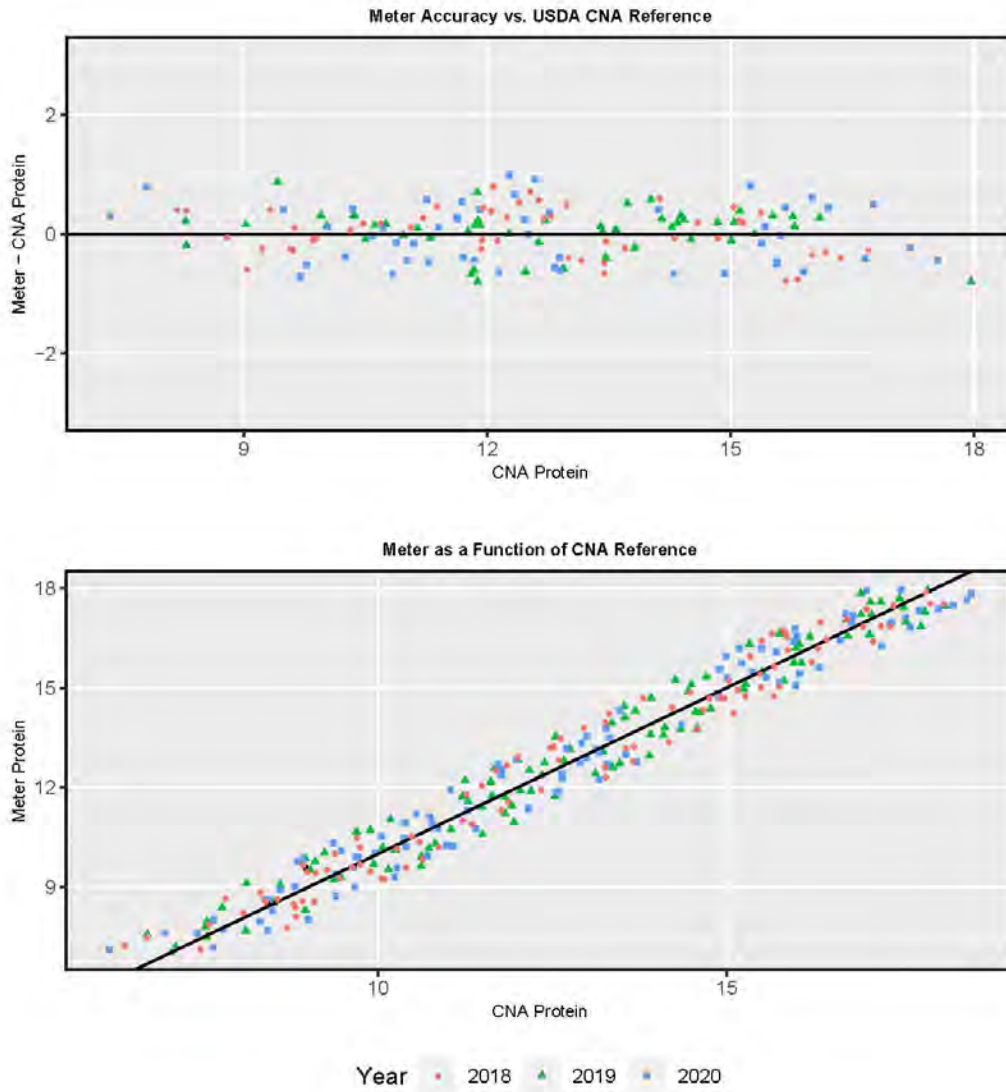
	2018	2019	2020	All Years	Tolerance	Status
<i>Samples</i>	50.00	50.00	50.00	150.00		
<i>Bias</i>	-0.06	-0.01	-0.04	-0.04	0.33	Pass
<i>SEP</i>	0.58	0.58	0.58	0.58	0.55	Fail
<i>Reproducibility</i>	4.51	5.45	5.12	5.01		

2020 NIR Calibration Study – Soybeans Oil
2018, 2019, 2020 Crop Years
InstA (Calibration)
07/13/2021



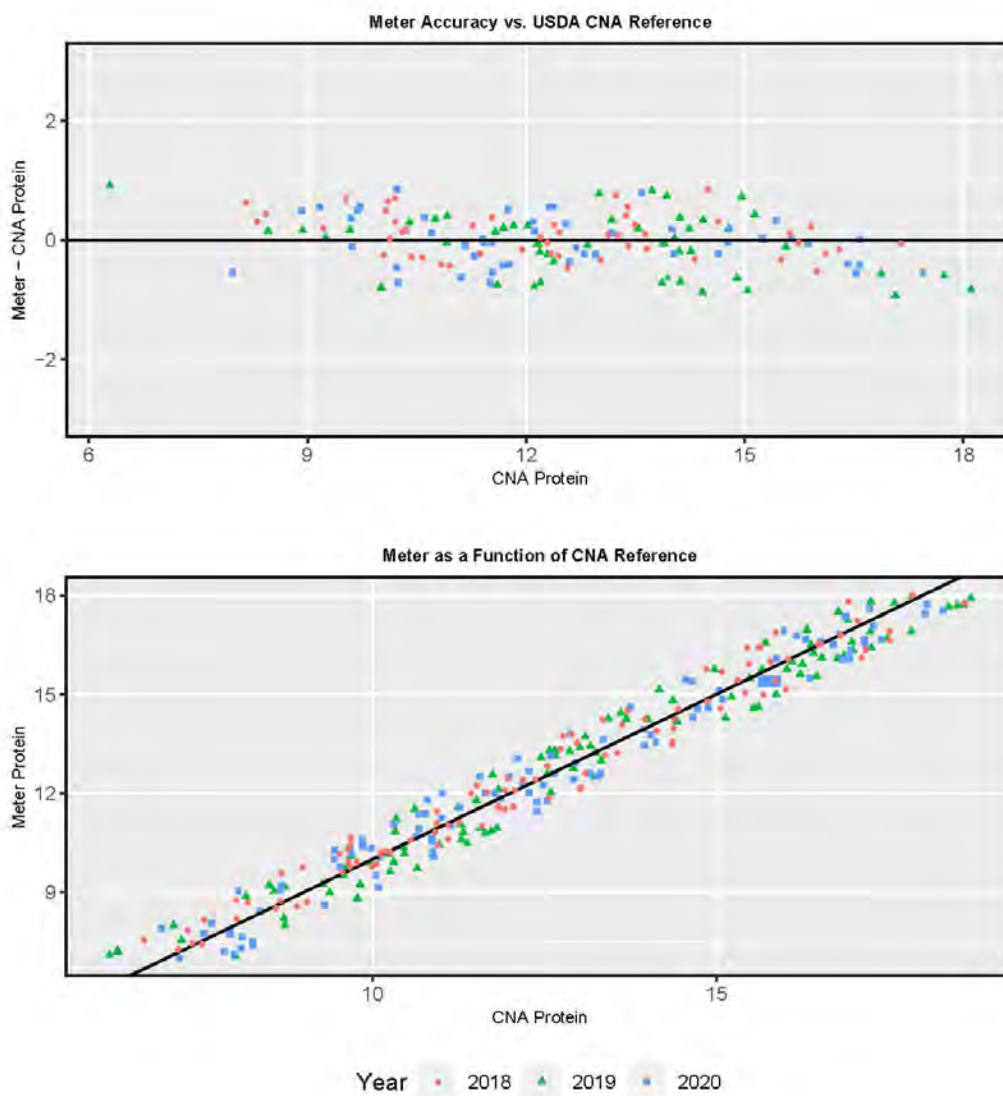
	2018	2019	2020	All Years	Tolerance	Status
<i>Samples</i>	50.00	50.00	50.00	150.00		
<i>Bias</i>	0.10	-0.02	0.01	0.03	0.27	Pass
<i>SEP</i>	0.55	0.55	0.55	0.55	0.45	Fail
<i>Reproducibility</i>	2.76	2.82	2.66	2.75		

2020 NIR Calibration Study – Six-Row Barley Protein
2018, 2019, 2020 Crop Years
InstA (Calibration)
07/13/2021



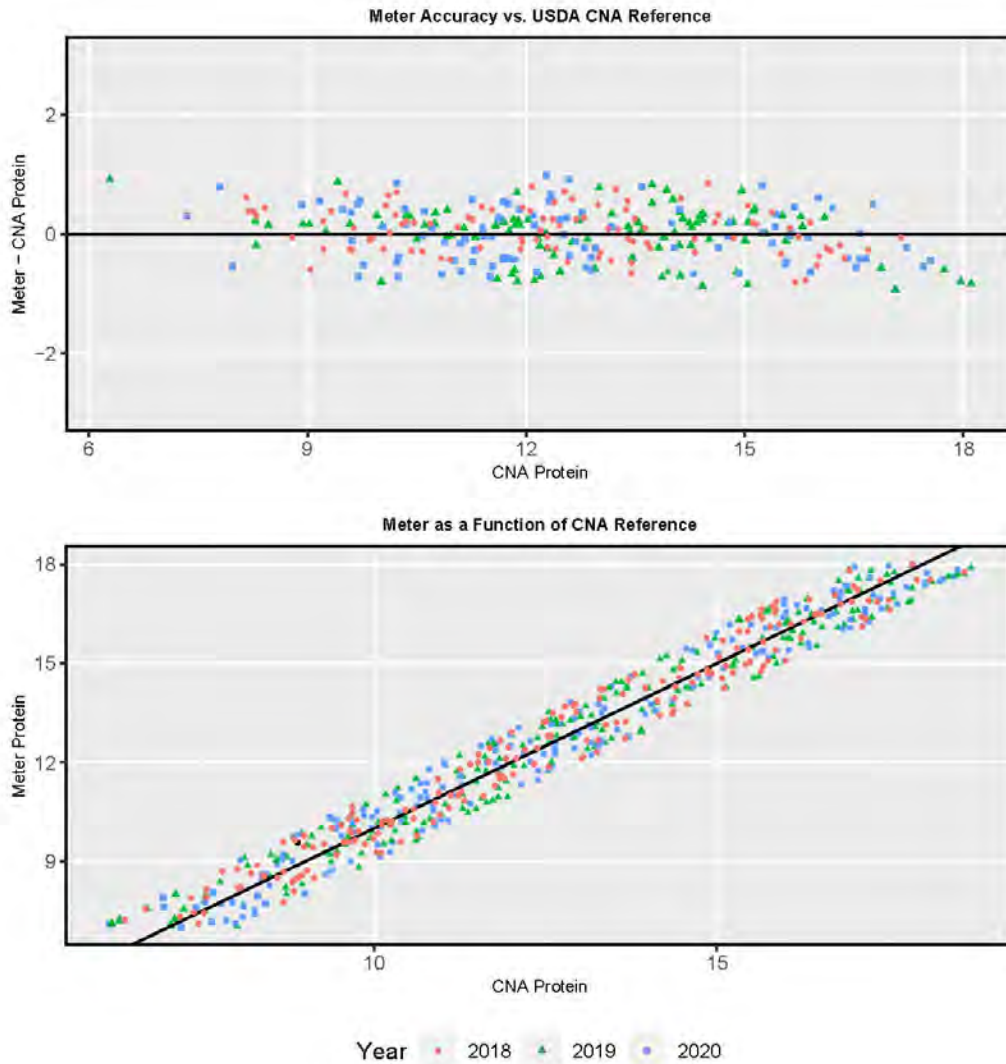
	2018	2019	2020	All Years	Tolerance	Status
<i>Samples</i>	50.00	50.00	50.00	150.00		
<i>Bias</i>	0.02	0.06	0.00	0.03	0.24	Pass
<i>SEP</i>	0.59	0.59	0.59	0.58	0.4	Fail
<i>Reproducibility</i>	4.26	4.26	3.94	4.16		

2020 NIR Calibration Study – Two-Row Barley Protein
2018, 2019, 2020 Crop Years
InstA (Calibration)
07/13/2021



	2018	2019	2020	All Years	Tolerance	Status
<i>Samples</i>	50.00	50.00	50.00	150.00		
<i>Bias</i>	0.07	-0.07	-0.01	0.00	0.24	Pass
<i>SEP</i>	0.58	0.58	0.58	0.58	0.4	Fail
<i>Reproducibility</i>	3.72	4.49	4.18	4.18		

2020 NIR Calibration Study – All Barley Protein
2018, 2019, 2020 Crop Years
InstA (Calibration)
07/13/2021



	2018	2019	2020	All Years	Tolerance	Status
<i>Samples</i>	100.00	100.00	100.00	300.00		
<i>Bias</i>	0.05	-0.01	0.00	0.01	0.24	Pass
<i>SEP</i>	0.58	0.58	0.58	0.58	0.4	Fail
<i>Reproducibility</i>	4.12	4.37	4.04	4.17		

During the 2022 Sector Meeting, Mr. Jordan said there will likely be a delay in further data collection until May 2023 due to a shortage of Helium, which is necessary in the reference method process.

5. 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 TC17/SC1 to the grain analyzer sector and to those Sector members that participate on the United States National Working Group (USNWG) on grain moisture meters.

OIML TC17/SC1 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) worked closely with an International Project Group to revise OIML Recommendation R 59 *Moisture Meters for Cereal Grains and Oilseeds*.

As reported at the 2016 GA Sector meeting, OIML R59 would be voted on at the 51st CIML Meeting. OIML R 59 *Moisture Meters for Cereal Grains and Oilseeds* was approved at the 51st CIML meeting, held October 17-21, 2016.

Grain moisture meter manufacturers were notified by e-mail on May 9, 2017 that OIML R59 2016 was published and available on the OIML website at https://www.oiml.org/en/files/pdf_r/r059-p-e16.pdf. In this e-mail NIST OWM requested any feedback or statement on how this standard impacts your company that can be used in NIST highlights to demonstrate the impact of our work in OIML. If you have not provided a statement or feedback please send this information to diane.lee@nist.gov.

During the 2017 GA Sector meeting, the Sector members were reminded that OIML R59 2016 was revised and published and available on the OIML web site and that the requirements include many U.S. requirements for evaluating grain moisture meters making it easier for U.S. manufacturers to meet the global regulations and metrological controls set for these devices. Sector manufacturers were reminded to provide any feedback on how the Standard impacts their company. For example, providing feedback on experiences with the use of the international standard.

During the 2018 GA Sector meeting manufacturers were asked to report on any impact from the use of this international standard. During the sector meeting, there were no reports on impact due to the use of OIML R59. It was reported that Mexico is looking into adopting requirements in R59.

During the 2019 GA Sector meeting, meter manufacturers were asked to report on any impact from the use of this international standard. Rachel Beiswenger (TSI, Inc.) reported that some countries are adopting the OIML standards directly as their country requirements. She report that Mexico has adopted OIML requirements. Larry Speaks (Perten Instruments) reported some countries do not accept U.S. requirements and some added their own requirements. Mr. Darrell Flocken provided an update on the OIML type evaluation activities. Mr. Flocken reported the change from Mutual Acceptance Agreements to OIML Certification Systems. Mr. Flocken mentioned that information is located on the OIML website. Ms. Beiswenger (TSI, Inc) and Mr. Speaks (Perten Instruments) commented that they must get certified by each country, but it helps that the device passes in the U.S. Ms. Diane Lee (NIST, OWM) reported the OIML standards are up for review every 5 years.

During the 2020 GA Sector meeting, Ms. Lee reported that R 59 *Moisture Meters for Cereal Grains and Oilseeds* will up for its 5 year review in 2021. The US and China are co-secretariats of the recommendation.

During the 2021 GA Sector meeting Ms. Diana Lee (NIST OWM) provided an update on the activity related to the update of OIML R 59 *Moisture Meters for Cereal Grains and Oilseeds*.

During the 2022 GA Sector meeting, Ms. Lee reported that OIML R 59 was last updated 5 years ago and is due for update there seems to be no need at this time. Manufacturers commented that, while R 59 was largely based on NTEP standards, they are finding it impossible to meet unreasonable additional requirements that OIML added in. Ms. Lee asked for details of those difficulties via email following the meeting.

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

Background / Discussion:

This item is 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 United States National Working Group (USNWG) on grain protein measuring instruments.

OIML TC17/SC8 was formed to study the issues and to develop a Recommendation on *Protein Measuring Instruments for Cereal Grain and Oil Seeds (OIML R 146)*. Australia is the Secretariat for this subcommittee.

As reported at the 2016 GA Sector meeting, OIML R 146 would be voted on at the 51st CIML Meeting. OIML R 146 *Protein Measuring Instruments for Cereal Grain and Oil Seeds* was approved at the CIML meeting, held October 17-21, 2016.

Grain moisture meter manufacturers were notified by e-mail on May 9, 2017 that OIML R146 *Protein Measuring Instruments for Cereal Grain and Oil Seeds* was published and available on the OIML website at https://www.oiml.org/en/files/pdf_r/r146-p-e16.pdf. In this e-mail NIST OWM requested any feedback or statement on how this standard impacts your company that can be used in NIST highlights to demonstrate the impact of our work in OIML. If you have not provided a statement or feedback please send this information to diane.lee@nist.gov.

During the 2017 GA Sector meeting, the Sector members were reminded that OIML R146 2016 was published and available on the OIML web site and that the requirements include many U.S. requirements for evaluating grain protein analyzers making it easier for U.S. manufacturers to meet the global regulations and metrological controls set for these devices. Sector members were reminded to provide any feedback on how the OIML Recommendation impacts their company. For example, providing feedback on experiences with the use of the international standard.

During the 2018 GA Sector meeting manufacturers were asked to report on any impact from the use of this international standard. During the sector meeting, there were no reports on impact due to the use of OIML R146.

During the 2019 GA Sector, meter manufacturers provided reports on any impact from the use of this international standard. See comments to Agenda Item 6 of this summary.

During the 2020 GA Sector meeting, Ms. Lee reported that R 146 *Protein Measuring Instruments for Cereal Grains and Oilseeds* will up for its 5 year review in 2021. Australia is the secretariat of the recommendation.

During the 2021 GA Sector Meeting, Ms. Diana Lee report on the activity related to the revision of the OIML R 146 *Protein Measuring Instruments for Cereal Grains and Oilseeds*. Anyone interested in receiving updates or participating in the work group activities of this update should contact Ms. Lee.

During the 2022 GA Sector Meeting, Ms. Lee explained that OIML R 146 was due for review in 2021 but that has not occurred. She would appreciate any details on difficulties meeting the requirements. The NTEP requirements were the basis for establishing the international requirements for protein.

7. Air-Oven Grain Moisture Proficiency/Collaborative Study/Interlaboratory Comparison Testing

Source:

Grain Analyzer Sector

Purpose:

Develop an air-oven proficiency/collaborative study/interlaboratory comparison 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:

Establish a timeline for consistent and periodic grain moisture proficiency testing.

Background/Discussion:

Under the NTEP program for grain moisture meters, calibrations are based on USDA/GIPSA air ovens while field inspection is based on State air ovens. For the program to be effective, procedures must be in place to assure that State oven results (and manufacturers' oven results) agree with the USDA/GIPSA air oven, which is, considered the standard. NIST, OWM's laboratory measurement traceability program requires that State Weights and Measures laboratories participate in interlaboratory and other collaborative experiments. State Weights and Measures programs with grain moisture laboratories typically meet this requirement by one of two methods: 1) laboratories independently send samples to GIPSA for air oven analysis, and subsequently compare their results to those obtained by GIPSA; or 2) a structured collaborative study where every laboratory, including GIPSA, measure the same sample. A structured collaborative study has at least two advantages over independent submission of samples to GIPSA by individual laboratories: 1) in addition to a check against the "standard", it provides information on how individual labs compare with each other; 2) it allows GIPSA to plan for a known work load.

A collaborative air oven study has been conducted with States and meter manufacturers periodically over a number of years and results discussed during the GA Sector meetings. These studies were conducted in 1995, 2001 and 2015.

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 and 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. The intent was for the AOCS to administer, 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. As such, Karl Cunningham, IL and Kevin Hanson, MO agreed to work together to conduct a grain moisture proficiency test. Karl Cunningham, IL, agreed to provide the samples for proficiency testing and Kevin Hanson, MO, agreed to analyze the data in accordance with the procedures used to conduct proficiency testing in the State laboratory program. Kevin 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 an 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. Proficiency testing was conducted in 2015 and reported in the 2015 Grain Analyzer Sector Report (Note: In 2015, a Grain Analyzer Sector meeting was not held but a report of activities was generated)

Although the Sector has periodically conducted proficiency testing over the years, a schedule of ongoing proficiency testing is needed to ensure that these tests are performed on a consistent basis. With changes in responsibilities in AOAC and loss connections, establishing an ongoing collaborative study with AOAC may be difficult to manage. As such the Grain Analyzer Sector is asked to consider the following timeline previously discussed for sending out samples and using the guidelines for proficiency testing which includes frequency of testing included in NISTIR 7082 "Proficiency Test Policy and Plan (For State Weights and Measures Laboratories), and tools and forms for analyzing the results which are located on the NIST OWM Website at:

<https://www.nist.gov/sites/default/files/documents/2017/05/09/nistir-7082.pdf>

It is suggested that the proficiency testing be managed, and oversight provided by State Weights and Measures, Grain Analyzer Sector members on a rotating basis. Per NISTIR 7082, the frequency of proficiency testing for grain moisture air oven measurements is 4 years or more often. As such the following scheduled is proposed for discussion. Please note that in addition to testing corn, soybeans and wheat the sector is asked to consider any benefits to including one specialty grain such as corn modified for high ethanol production to the proficiency testing. The schedule will be reviewed at the Sector meeting preceding the scheduled proficiency test date to confirm responsible parties and any specialty grains for inclusion in the proficiency test year. The specialty grain will change based on specific market concerns during the proficiency test year.

Air Oven Grain Moisture Proficiency Testing Schedule (Previous PTs 1995, 2001 and 2015)					
PT Test Date 4 yr. Cycle	Sample Collection Date	Samples for Testing 2 of each (corn, wheat, soybeans)	Sample Ship Date	Responsible for Sample Distribution w/ Instructions	Responsible for Data Collection and Analysis
Spr 2019	Spr 2018	✓	Jan/Feb 2019	IL	IL
Spr 2023	Spr 2022	✓	Jan/Feb 2023	_____?	_____?
Spr 2027	Spr 2026	✓	Jan/Feb 2027	_____?	_____?

During the 2017 GA Sector meeting the Sector agreed that there was no need to test specialty grain and that including these grains will not provide any useful information. The Sector decided that the three major grains, wheat, corn, and soybeans would be the grains included for proficiency testing. States and industry sector members participating in the proficiency testing were encouraged to provide their current contact information to Karl Cunningham for sample distribution. The above table represent the schedule for proficiency testing which was edited after the 2017 Sector meeting discussion of this item.

During the 2018 GA Sector meeting, Mr. Karl Cunningham report on the Grain Analyzer Sector's 2018 grain moisture proficiency testing activities. He noted that States are required to participate in proficiency testing and that any manufacturer may participate. Mr. Cunningham stated that round robins/proficiency testing will begin shortly after January 1, 2019 and that samples of corn, wheat and soybeans will be sent to participants.

At the 2019 GA Sector Meeting, Mr. Karl Cunningham provided an update of the proficiency testing activities and data collected. Mr. Cunningham reported that the government shutdown caused a delay in obtaining sample references from the AMS, FGIS. Karl Cunningham stated that he hopes to have sample this year for the round robin.

At the 2020 GA Sector meeting, Mr. Karl Cunningham commented that this effort did not get completed last year. Mr. Cunningham hoped that this could be completed in 2021 and the plan is to send samples out to laboratories using air ovens.

At the 2021 MA Sector Meeting, Mr. Karl Cunningham commented that due to the pandemic no action was taken on this project. Karl did report that action will be restarted this year with information to report back to the sector members. It was stated that for accurate results State Air Ovens should have correlation to the standards oven at the UDA Laboratory. This was mentioned as the round robin testing previously coordinated by NIST, has been stopped.

At the 2022 Sector Meeting the discussion indicated that States have moved away from the air oven reference methods to meter-to-meter testing. This may be in-part due to NIST no longer providing traceability. There are no standardized procedures for conducting meter-to-meter testing. Ms. Lee emphasized the need for proficiency testing and traceability. The states discussed methods they are using for meter-to-meter and Ms. Lee provided NIST Handbook 159 as a guidance tool for monitoring samples.

8. State Weights and Measures Issues with Inspection of Grain Moisture Meters for Corn /Tolerances for UGMA Meters

Source:

Ms. Diane Lee, NIST, OWM, Legal Metrology Device Group

Background / Discussion:

Diane Lee, NIST OWM received calls requesting a copy of the annual request for grain samples and list of grains that GIPSA request from States to include in the ongoing calibration program. These requests came from various States and other interested parties. One State reported seeing a difference between a UGMA meter and another meter on corn samples and wanted to ensure that grain samples in their State were represented in the ongoing calibration program.

2016 Grain Analyzer Sector Meeting

During the discussion of this item at the 2016 Grain Analyzer Sector meeting it was mentioned that this issue was raised when two states would not accept the new corn calibrations for grain moisture meters when they observed a difference in results for corn on different meter technologies. During the discussion, it was noted that the States that reported problems with the corn calibrations were States that have high ethanol production. It was explained that States with high ethanol production may have a high production of modified corn (corn modified to increase ethanol production). Since calibrations are based on a national sample set with grains collected from across the U.S., these modified samples may not have been included in the national sample set which could have contributed to the irregularities with the updated corn calibrations. It was suggested during the Sector meeting that modified corn samples be included in the national sample set and to monitor corn calibrations and modified corns for ethanol production. It was also noted that States should use the recommended procedures in NIST HB 44 when testing to ensure that errors are not introduced due to incorrect test procedures.

Following the discussion of this agenda item, Jeff McCluer, who had submitted an item to include on the 2016 sector agenda, that was ultimately not included on the agenda based on his request to change GIPSA tolerances, which is not in the scope of the GA Sector, presented information in reference to tolerance for UGMA meters. He explained that

if the UGMA meter technology can make better measurements, he recommends that a reduction in the tolerances should be made. Charlie Hurburgh noted that the Sector has not conducted a study of the new technology and that a task force could be developed to look at the results of these meters. Charlie Hurburgh agreed to chair the task group to look at results from UGMA meters.

After some discussion with Dave Funk, Grain Quality Analytics, LLC and some research on the tolerances for UGMA meters. At the temperature extremes errors in measurement are increased so the tolerances were set to account for an average error in these meters. As such, the task group should include a review of the measurements at varying temperature ranges.

2017 Grain Analyzer Sector Meeting

During discussion of this issue at the 2017 Grain Analyzer Sector meeting, it was suggested that different tolerances for this technology may be needed. Jim Truex mentioned that different tolerance for technology has been considered in the past for other devices. The Sector decided to form a task group to take a closer look at field tolerances associated with UGMA meters. Charlie Hurburgh agreed to chair the work group and the following State weights and measures GA Sector members agreed to participate on the work group:

Karl Cunningham – IL

Randy Burns – AR

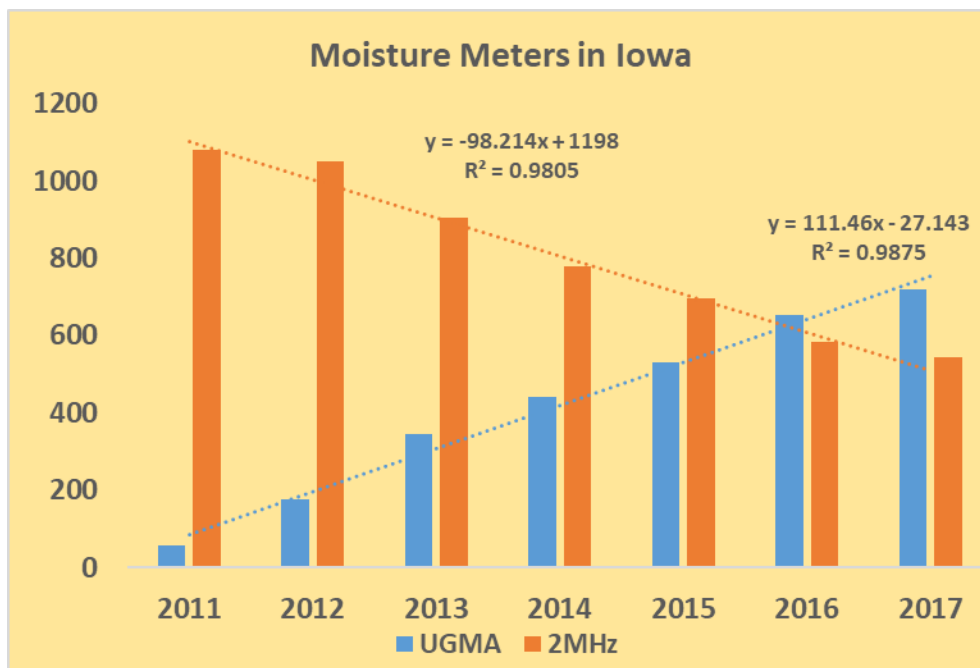
Tom Hughes - MO

It was noted that the task group may review previous inspection data for UGMA meters for wheat and corn samples.

2018 Grain Analyzer Sector Meeting

Dr. Charlie Hurburgh collected and analyzed data from Iowa State Weights and Measures Program to compare UGMA meters and 2MHz meters to assess a need for changes to the tolerances in NIST HB 44 Section 5.56(a) for the air-oven test method. During the 2018 meeting, Mr. Hurburgh reported that based on the data, UGMA meters read closer to the reference air oven moisture results than non-UGMA meters. See data below. The Y-axis on the chart below represents the number of meters (UGMA and 2MHz meters) and shows that as of 2017 the number of UGMA meters exceed the number of 2MHz meters in Iowa. It was also noted during the 2018 Grain Analyzer Sector meeting that the current tolerances were developed in 1991 and have not changed with the change in technology for these devices; and is needed for grain industry risk management.

Iowa Moisture Meter Inspection Results			2014-2017		
			Average Result on Inspector Sample		
Year	Tech	Number of	Corn 1	Corn 2	Soybean
		Meters	Meter-Std (% pts)	Meter-Std (% pts)	Meter-Std (% pts)
2014	UGMA	440	-0.02	0.02	-0.01
2015	UGMA	531	0.04	-0.06	-0.02
2016	UGMA	654	0.05	-0.06	0.01
2017	UGMA	720	-0.18	-0.06	-0.05
	Avg		-0.03	-0.04	-0.02
2014	2MHz	679	-0.25	0.04	-0.07
2015	2MHz	595	-0.29	-0.38	0.02
2016	2MHz	483	-0.28	-0.42	0.04
2017	2MHz	445	-0.15	-0.35	-0.01
	Avg		-0.24	-0.28	0.00
Different samples each year for Corn 1, Corn 2, Soy					



At the 2018 GA Sector meeting the Sector agreed to make changes to the tolerances for the air-oven reference method in NIST Handbook 44 Section 5.56(a) and following the review and discussion of the data, the NIST Technical advisor, Ms. Diane Lee, developed the Form 15 that included the proposed changes to NIST HB 44 that was agreed to by the Sector along with a table that provided specific tolerances per the proposed changes to NIST HB 44. The table of specific tolerances that will result from the proposed changes to the HB and the proposed changes to NIST HB 44 are included below:

**Specific tolerances resulting from the proposed change to NIST HB 44
Section 5.56(a) tolerances for air-oven method field tolerances.**

Moisture (%)	Tolerance (0.03% percent of the moisture content)	Minimum Tolerance (0.5% in moisture content)
8	0.24	0.5
9	0.27	0.5
10	0.30	0.5
11	0.33	0.5
12	0.36	0.5
13	0.39	0.5
14	0.42	0.5
15	0.45	0.5
16	0.48	0.5
17	0.51	0.5
18	0.54	0.5
19	0.57	0.6
20	0.60	0.6
21	0.63	0.6

**Specific tolerances resulting from the proposed change to NIST HB 44
Section 5.56(a) tolerances for air-oven method field tolerances.**

Moisture (%)	Tolerance (0.03% percent of the moisture content)	Minimum Tolerance (0.5% in moisture content)
22	0.66	0.7

**Proposed changes to NIST HB 44 Section 5.56(a) Air-Oven Reference Method Tolerances
T.2.Tolerances.**

T.2.1.Air Oven Reference Method. – Maintenance and acceptance tolerances shall be as shown in Table T.2.1. Acceptance and Maintenance Tolerances Air Oven Reference Method. Tolerances are expressed as a fraction of the percent moisture content of the official grain sample, together with a minimum tolerance.
(Amended 2001)

Table T.2.1.		
Acceptance and Maintenance Tolerances Air Oven Reference Method <u>for All Grains and Oil Seeds</u>		
Type of Grain, Class, or Seed	Tolerance	Minimum Tolerance
Corn, oats, rice, sorghum, sunflower	0.0503 of the percent moisture content	0.85 % in moisture content
All other cereal grains and oil seeds	0.04 of the percent moisture content	0.7 % in moisture content

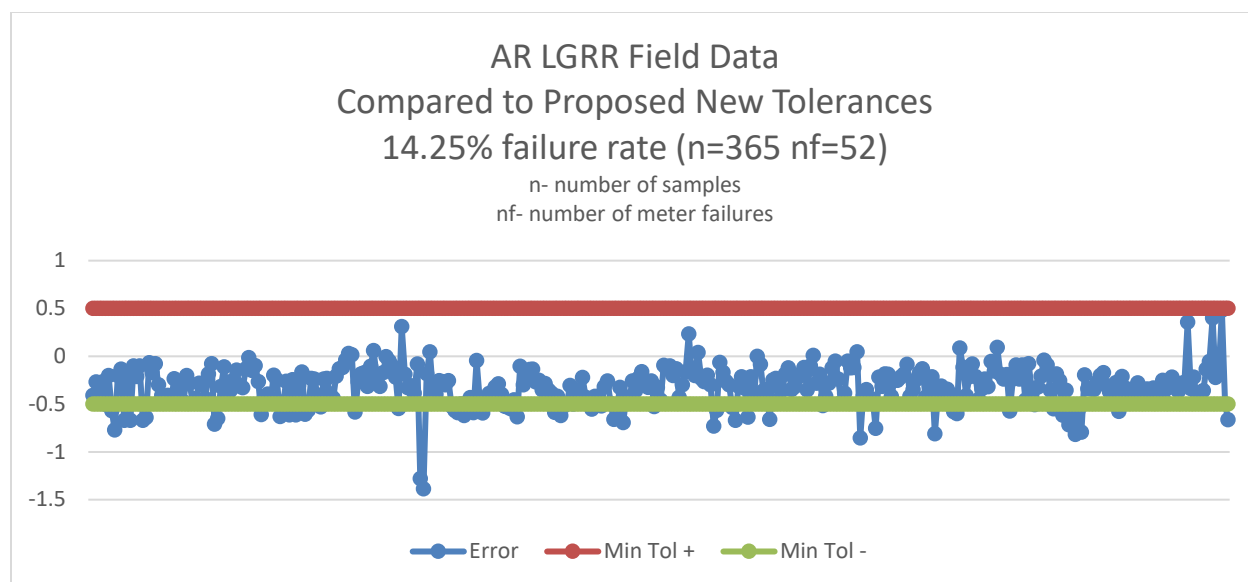
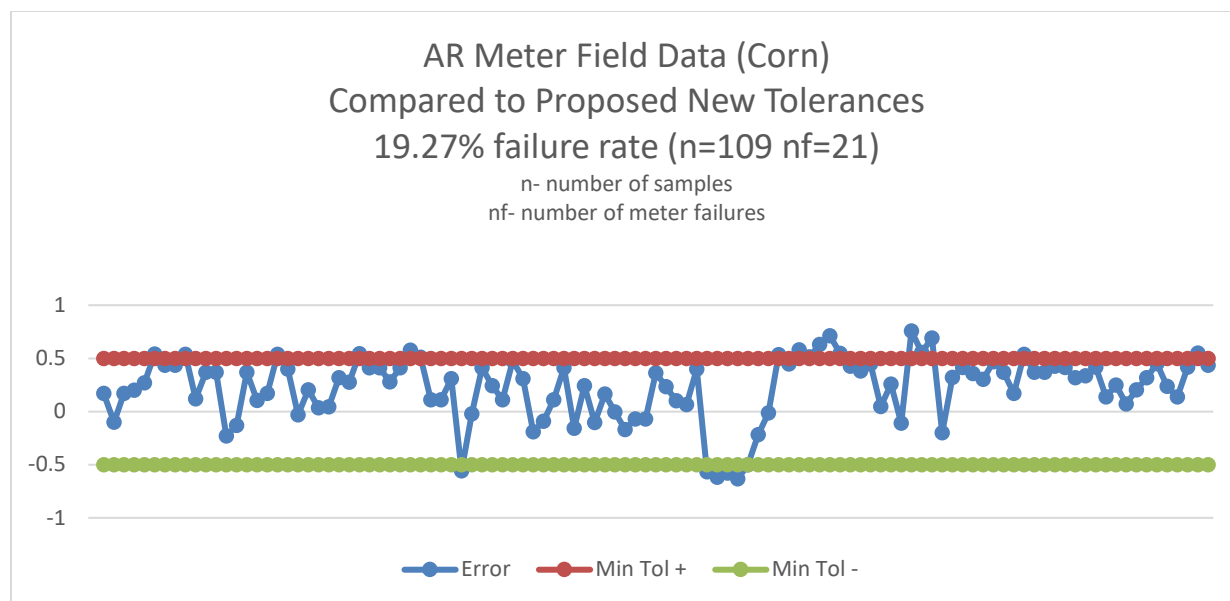
The

GA

(Amended ~~2001~~20xx)

Sector's proposal for changes to Table T.2.1 were forwarded to the NCWM for inclusion on the 2019 S&T Interim Meeting agenda and this proposal was circulated to regional weights and measures associations for review and recommendations. Prior to the NCWM 2019 Interim meeting, Randy Burns (AR) provided data that showed that although data provided for corn and soybeans may not indicate a problem with changing the tolerance as proposed, other grains may be affected by the proposed tolerance. The GA Sector was informed of the impact that a change in tolerance may have on other grains. As such, the GA Sector was polled and they agreed that the original proposal be given a developing status so that the GA sector may review data at its 2019 GA NTETC Meeting.

Ms. Diane Lee (NIST OWM) created graphs from data provided by Mr. Randy Burns (AR) and provided the Sector copies of the graphs during the 2019 GA Sector Meeting. Ms. Lee provided an overview of the graphs and information included in the graphs which showed a meter failure rate for corn sample of 19.27% and a meter failure rate for long grain rice samples of 14.25% . See graphs below:



Mr. Randy Burns (AR) mentioned that each State may not see the same results. Mr. Burns further stated that samples are screened on laboratory meters to within $\pm 0.3\%$ and samples are used 10 times before they are rechecked. Mr. Gordon Elliot(The Steinlite Corporation) recommended national data over a longer period of time is needed to make a determination of whether or not the proposed tolerances are acceptable. Ms. Lee agreed to develop a standard form so that the GA Sector can collect additional information from participating States. Mr. Elliot agreed to compile the data and also offered an alternative to create a program that sector members could run, if he had an example of the data format. Mr. Elliott also requested Phase 2 data to determine meter-air oven errors. Following the GA Sector meeting, meter manufacturers were sent a request to share Phase II data with model identifiers removed, with Mr. Elliot as part of the statistical analysis. All of the manufacturers granted permission for the data to be shared.

2020 Grain Analyzer Sector Meeting

Mr. Gordon Elliott (The Steinlite Corporation) reported on the results of the analysis of instruments performance using Phase II test data for the previous 7 years. The results were separated into UGMA and non-UGMA meters. A copy of the preliminary analysis is available for view or can be downloaded for printing from the NTEP Grain Analyzer Sector page, 2020 Meeting on the NCWM website at www.ncwm.com/grain-sector. Using NTEP meter data, not identified by meter manufacturer, for both UGMA and non-UGMA meters, Mr. Elliott provided a preliminary report and review of graphs showing sample deviations from the Air-Oven Method (AOM). Mr. Elliott reviewed the graphs which showed that the deviations were greater for non-UGMA meters. Additional analysis of in-tolerance and out-of-tolerance comparisons, and errors are included in his preliminary report. The members discussed the idea of expanding the analysis by requesting field evaluation data from State Weights and Measures Program, however; there was the concern about differences in data format and what impact this would have on the amount of work needed to obtain accurate results. Ms. Diane Lee (NIST) reported that she had developed an Excel Spreadsheet that could be used to record the field evaluation. The members reviewed the spreadsheet and offered suggestion to modify the spreadsheet by removing the “Min Tol%” and the “In Tol / Out Tol” columns. Some members mentioned that the field evaluation data was collected in WinWam (a third party program designed to collect field evaluation data for all device types) and questioned if the WinWam program had a data export function and if so, would the data format permit an easier import into the file used in Mr. Elliott’s analysis. Ms. Lee agreed to modify her Excel Spreadsheet based on the comments and Mr. Karl Cunningham agreed to work with his IT Support to review the export functions of the WinWam Software. It was agreed field evaluation data from a 3 year minimum period would be acceptable to expand the review of instrument performances against the proposed tolerance changes.

2021 Grain Analyzer Sector Meeting

Ms Lee will update the Sector Members on any changes to the previously provided information.

During the 2021 GA Sector Meeting Ms. Diana Lee reviewed an Excel Spreadsheet that she created for the purpose of reporting field data. The members reviewed the columns in the spreadsheet and suggested some modifications. The topic then moved to the amount of data to collect and possible other means of providing the information. Current, the data range is three years, it was agreed that this was sufficient. The discussion turned to the format, data could be entered into the spreadsheet, however; some States reported that they have the information in a program called Win Wam. AQn effort was going to be made to see if the correct information was available in the Win Wam Program and how it could be extracted. States were encouraged to provide this information to Ms. Lee and Mr. Gordon Elliott (The Steinlite Corporation) by the end of November 2021. Mr. Elliott agreed to collect and report on the data received.

2022 Grain Analyzer Sector Meeting:

The Sector recognized that their proposed .5% tolerance may not be appropriate for some grains based on Arkansas data for rough rice, the proposal to the NCWM Specifications and Tolerances Committee is on hold. Gordon Elliott presented North Carolina data on tolerances, but more data is necessary from more states. Mr. Elliott discussed the good uniformity among UGMA meters. To overcome the lack of uniformity between non-UGMA meters, labs “prequalify” samples by determining improved uniformity among those meters. Mr. Elliott requested that the states send any data they may have, even if it is limited. He has data received from USDA for other purposes and asked for permission to use it for this study. The manufacturers present granted that permission provided it remains anonymous. Since that data was obtained in a controlled NTEP lab, it may not be representative of data obtained in the field.

2023 Grain Analyzer Sector Meeting:

9. Meter to Like-Type Meter Testing and Definition of Like-Type Meter

This is item GMA 23.1 on the 2023 Specifications and Tolerances Committee Agenda during the 2023 NCWM Annual Meeting. This item status at the meeting is Voting.

This item originally aligned with item B1: GMA-18.1 on the Specifications and Tolerances Committee, however, the item was given a Withdrawn status by the Committee during the 2022 NCWM Interim Meeting. During the 2202 Sector Meeting Ms Lee requested information from States doing meter to like meter provide their test procedures to assist in possible standardized procedures.

Based on this information, a new proposal was submitted to the Specifications and Tolerance Committee and first appeared on the 2023 NCWM Interim S&T Committee Agenda as Item GMA-23.1 *N.1.3. Meter to Like-Type Meter Method Transfer Standards and Table T.2.2. Acceptance and Maintenance Tolerances Meter to Like-Type Meter Method*. The item was given a Voting Status for the 2023 NCWM Annual Meeting.

Source:

Grain Analyzer Sector

Background/Discussion:

Following the discussion of the Items included on the 2017 Grain Analyzer Sector's 2017 Agenda, the GA Sector members were asked if there were any additional topics for discussion. A discussion on Meter to like-type meter testing and the definition of a liker-type meter followed. During the discussion test procedures for meter to like-type meter testing were requested. It was noted that there may be only about two states using this type of test method and that it may be due to the cost of obtaining like-type meters to perform the test. A question was raised as to what is considered a like-type meter and it was explained that like-type meant that the make and model were the same. Suggestions were made to include a definition for like-type in NIST HB 44 and to consider documenting test procedures for meter to like-type meter testing.

2018 Grain Analyzer Sector Meeting

During the 2018 grain analyzer sector meeting, the sector discussed industry and State weights and measures programs that used meter to like-type meter testing and master meter test methods. Kansas reported that reference meters are used to collect moisture results on samples. The samples are then taken to the field to compare to commercial field moisture meters. It was also reported that most State weights and Measures that use a meter to meter test method for testing field meters do not use a meter to like-type meter testing program which is specified in NIST HB44. The Perten representative reported that Perten uses three layers of master meters when calibrating their devices. It was noted that an analysis of the failure rate for meter to meter test methods should be investigated and an analysis of all the issues for meter to meter test methods is needed along with test methods for this type of field testing.

There are a number of items on the 2019 NCWM S&T agenda that address the use of master meters for field testing that includes terms and definition for these standards. The NCWM has assigned a task group to discuss the issue of the use of master meters and terms and definitions for these standards. The GA technical advisor will follow the discussions of the task group and provide updates to the Sector on the task group discussions. It is suggested that before moving forward with additional efforts to address meter to like type meter testing for grain analyzers, that the GA sector observes the task group's actions. The task group actions may include guidelines for the use of master meters that may impact field test procedures for meter to like-type meter testing.

The Sector discussed tabling the discussion of meter to like-type meter testing until additional information is provided from the data collection on master meters and information is received from the NCWM task group concerning field standards and master meters terminology and definitions. Agenda Item B-1 currently on the NCWM S&T agenda was given an Assigned status and a task group will be looking at definitions for field standards, transfer standards and master meters. Mr. Loren Minnich (KS) noted that it may be good to have a representative from the GA sector because one of the items included in the Block is a grain moisture meter issue. Mr. Randy Burns (AR) volunteered to participate on the task group.

During the 2020 GA Sector meeting, Ms. Lee reminded everyone that this item is being held until the NCWM Task Group has completed its work concerning field standards and master meter terminology and definitions. Ms. Lee informed everyone that the S&T Committee Agenda Item Number of these items is Block 1 (B1). This item will be reviewed at the 2021 GA Sector meeting.

During the 2021 GA Sector Meeting, Ms Diana Lee reported that the work of the NCWM Task Group has been given to the S&T Committee. The S&T Committee proposal will be discussed during the 2021/2022 agenda cycle.

During the 2022 GA Sector Meeting, the sector discussed the need for a definition of like type for meter to like-type meter testing. Mr. Elliott suggested that, based on the data, UGMA meters could be used to test other UGMA meters, regardless of the manufacturers. NTEP defines type as the model family on a specific NTEP Certificate of Conformance. The sector approved a proposal to the NCWM Specifications and Tolerances Committee to use the NTEP definition of type as the standard for defining like-type meters in the Handbook 44 Grain Moisture Meter Code. The definition may change eventually to accommodate UGMA to UGMA testing based on data that comes available.

Dr. Hurburgh pointed out that it is impossible to carry an NIR meter to test other NIR meters. This would call for testing those devices using the air oven reference method.

Ms. Lee requested that states doing meter to like meter provide their test procedures to assist in possible standardized procedures.

2023 Grain Analyzer Sector Meeting:

As the NCWM 2023 Annual Meeting is in the week preceding the GMA Sector Meeting, An update of the item's voting results will be provided during this meeting.

10. 2020-2024 Interagency Agreement to Fund the GMM Ongoing Calibration (Phase II) Program

Source:

Mr. Jason Jordon, USDA, GIPSA
Ms. Diane Lee, NIST, OWM

Background/Discussion: The current 2015-2019 Interagency Agreement is the fifth 5-year agreement of the ongoing calibration program. The current agreement was signed in July 2015 and runs through analysis of the 2018 crop and issuance of the 2019 Certificates of Conformance. The 2019 certificates mark the final 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.

During the 2018 Grain Analyzer Sector meeting, Ms. Cathy Brenner reviewed a cost estimate for the Phase II, Ongoing Calibration Program that was prepared by FGIS (See cost estimates below). The cost estimate is based on collecting a total of 740 samples for the 15 NTEP grains and assumes that NIST and FGIS are able to provide funding up to \$30,000 to subsidize the program. In response to the review Mr. Andy Gell noted that the cost are similar to the current ongoing calibration program for grain moisture meters. The proposed cost analysis table is provided below:

Total NIR Models (including official model) = TM	Number of NTEP only models = N	Total Program Cost = TP	Funding From NIST = TP/3	Funding from FGIS = TP/3	Funding from Manufacturers = TP-NIST-FGIS	Cost per model
3	1	\$ 12,362	\$ 4,121	\$ 4,121	\$ 4,120	\$ 1,373
4	2	\$ 24,724	\$ 8,241	\$ 8,241	\$ 8,242	\$ 2,061

2023 Grain Analyzer Sector Meeting Summary

5	3	\$ 37,086	\$ 12,362	\$ 12,362	\$ 12,362	\$ 2,472
6	4	\$ 49,448	\$ 16,483	\$ 16,483	\$ 16,482	\$ 2,747
7	5	\$ 61,810	\$ 20,603	\$ 20,603	\$ 20,604	\$ 2,943
8	6	\$ 74,172	\$ 24,724	\$ 24,724	\$ 24,724	\$ 3,091
9	7	\$ 86,534	\$ 28,845	\$ 28,845	\$ 28,844	\$ 3,205
10	8	\$ 98,896	\$ 30,000	\$ 30,000	\$ 38,896	\$ 3,890

During the 2019 GA Sector Meeting Ms. Diane Lee provide an update on the status of the 2020-2024 interagency agreement. Ms. Lee provided background on the Ongoing Calibration Program (Phase II) and reported that NIST PML now has a dedicated person that monitors and assist with all Interagency agreements. Ms. Lee reported that the Interagency agreement is currently being reviewed by legal counsel.

During the 2020 GA Sector meeting, Ms. Cathy Brenner reported that Mr. Jason Jordon is developing the costs for the 2020 Phase II, Ongoing Calibration Program and initial indications shown that the costs will be slightly lower than the 2019 costs.

During the 2021 GA Sector Meeting, it was reported that NIST and FGIS are able to provide funding up to \$30,000 each to subsidize the program. The remained of the cost will come from manufacturers under the Phase II Program.

During the 2022 GA Sector Meeting, Ms. Lee provided an update. The renewal is every five years, and the costs may be updated. Mr. Jordan reported that the number of meters has dropped from 9 meters to 8 this year but the one that dropped out will return next year.

11. Next Sector Meeting and New Item Submittal

The GA Sector meetings are typically held the second week in August, start on a Tuesday (8:00 am to 5:00 pm) and are held at a hotel near the Kansas City, MO Airport.

If you would like to submit an agenda item for the 2024 meeting, please contact any of the following persons by July 1, 2024:

Mr. Darrell Flocken, NTEP Administrator, at darrell.flocken@ncwm.com

Mr. Jeff Gibson, NTEP Specialist, at jeff.gibson@ncwm.com

Ms. Diane Lee, NIST Technical Advisor, at diane.lee@nist.gov

Discussion:

12. Attendees

The following individuals participated in the Sector Meeting