

Grain Analyzer Sector Agenda

August 10, 2021, 11:30 am to 1:30 pm. EDT

Zoom Meeting

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	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		

Details of All Items
(In order by Reference Key)

1. Report on the 2020 NCWM Annual Meeting, 2021 NCWM Interim Meeting, and the 2021 NCWM Annual Meeting

The 2020 NCWM Annual Meeting and 2021 NCWM Interim Meeting were held in January 2021 in a virtual meeting format. At the 2020 NCWM Annual Meeting there was a total of three recommendations for changes to the NIST HB 44 GMM Code. The three items and their status were:

- B1: GMA-18.1, 5.56(a); N.1.1. Air Oven Reference Method Transfer Standards, N.1.3. Meter to Like-Type Meter Method Transfer Standards and 5.56(b) N.1.1. Transfer Standards, T. Tolerances is an assigned item.
- GMA-19.1 Table T.2.1 Acceptance and Maintenance Tolerances Air Oven method for all Grains and Oil Seeds is a developing item.
- GMA-20.1 S.2.5. Provisions for Sealing is a voting item.

During the voting session, item GMA-20.1 was adopted as part of the Specification and Tolerance Committee, Consent Calendar. This vote was ratified during the special voting session held during the 2021 NCWM Annual Meeting. The remaining two items (B1: GMA-18.1, and GMA-19.1 maintained their current status of Assigned and Developing,

respectively. See item 4 of this meetings agenda for recommended changes to Publication 14 based on the adoption of this item.

Items B1: GMA-18.1 and GMA-19.1 maintained their current status through the 2021 NCWM Interim Meeting and onto the 2021 NCWM Annual Meeting agenda.

At the 2021 NCWM Annual Meeting, held July 18 – 23 in Rochester, NY, there were a total of two recommendations for changes to the NIST HB 44 GMM Code. The two items and their status were:

- B1: GMA-18.1, 5.56(a); N.1.1. Air Oven Reference Method Transfer Standards, N.1.3. Meter to Like-Type Meter Method Transfer Standards and 5.56(b) N.1.1. Transfer Standards, T. Tolerances is an assigned item.
- GMA-19.1 Table T.2.1 Acceptance and Maintenance Tolerances Air Oven method for all Grains and Oil Seeds is a developing item.

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

Mr. Jason Jordan, Grain Inspection, Packers and Stockyards Administration (GIPSA), the NTEP Participating Laboratory for grain analyzers, provided a list of grain analyzers that were enrolled in the 2021 Ongoing Calibration Program (OCP); there are 7 grain analyzer models enrolled.

The 7 models:

1. Dickey-john Corp. – GAC2500-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 – Infratec 1241
6. Foss North America – Infratec Nova
7. The Steinlite Corp. – SL95

Mr. Jason Jordan provided the following information for the meeting.

- The MTC Moisture Analyzers – MTC 999 ES will not be participating in the NTEP Phase II ongoing calibration program evaluations.
- There is currently one device in phase 1 testing that will be included in phase II testing this year.

Discussion:

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

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

Discussion:

4. Adding a Nonretroactive Requirement to NIST HB44 Grain Moisture Meter Code 5.56(a) that Grain Moisture Meters meet Category 3 Sealing Requirements

Source:

2020 NCWM Annual Meeting, Voting Session

Purpose:

During the 2020 NCWM Annual Meeting, Item 20.1 – S.2.5. Provisions for Sealing was adopted and ratified during the 2021 NCWM Annual Meeting. Based on the adopted changes, the following changes are to be considered for changes to Publication 14.

Proposed Changes:

Replace the current wording in Pub 14, page GMM-19, section 4.6., second paragraph to read:

Code Reference: S.2.5. Provisions for Sealing

4.6. For devices....

~~Provision shall be made for applying a~~ **An approved means of security shall be provided** ~~seal in a manner that~~
~~2 requires the security seal to be broken, or for using other approved means of providing security (e.g., audit trail~~
~~3 available at the time of inspection as defined in~~ **paragraphs S.2.5.1 Sealing Requirements for Devices**
Manufactured Between January 1, 1999 and January 1, 2020 ~~Categories of Device and Methods of~~ **and**
S.2.5.2 Sealing Requirements for Devices Manufactured on or after January 1, 2020 ~~) before any change~~
that affects the metrological integrity of the device can be made to any mechanism.

Code Reference: S.2.5.1. Sealing Requirements for Devices Between January 1, 1999 and January 1, 2020

4.6.1. The appropriate sealing requirements in Table S.2.5.1. shall apply.

Code Reference: S.2.5.1. Sealing Requirements for Devices on or after January 1, 2020

4.6.2. 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 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.)

4.6.1-~~3~~**3**. The manufacturer has....

Renumber all remaining paragraphs

Discussion:

5. Implementation of NIR Phase 2, Ongoing Calibration Program

Source:

Mr. Jason Jordon, NTEP Grain Analyzer Lab

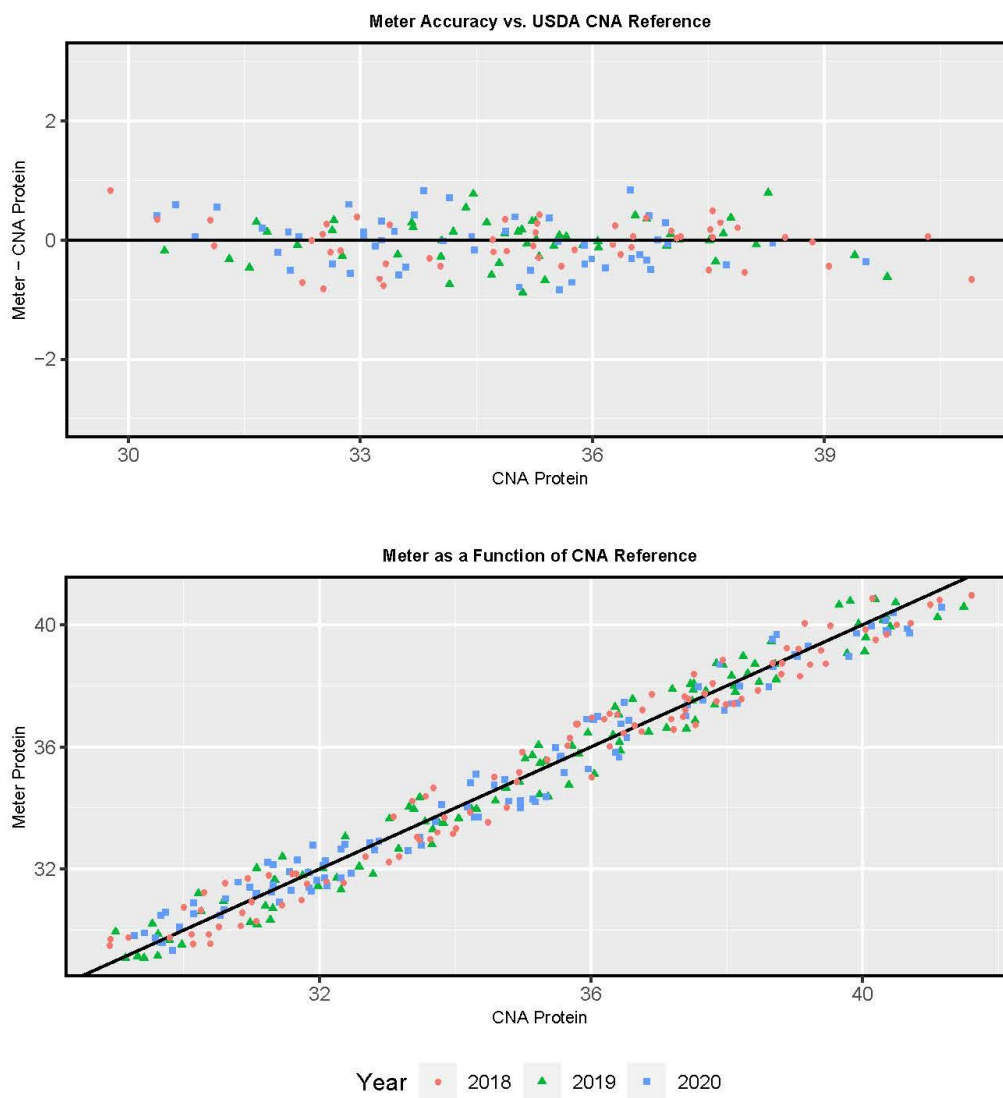
Purpose:

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:

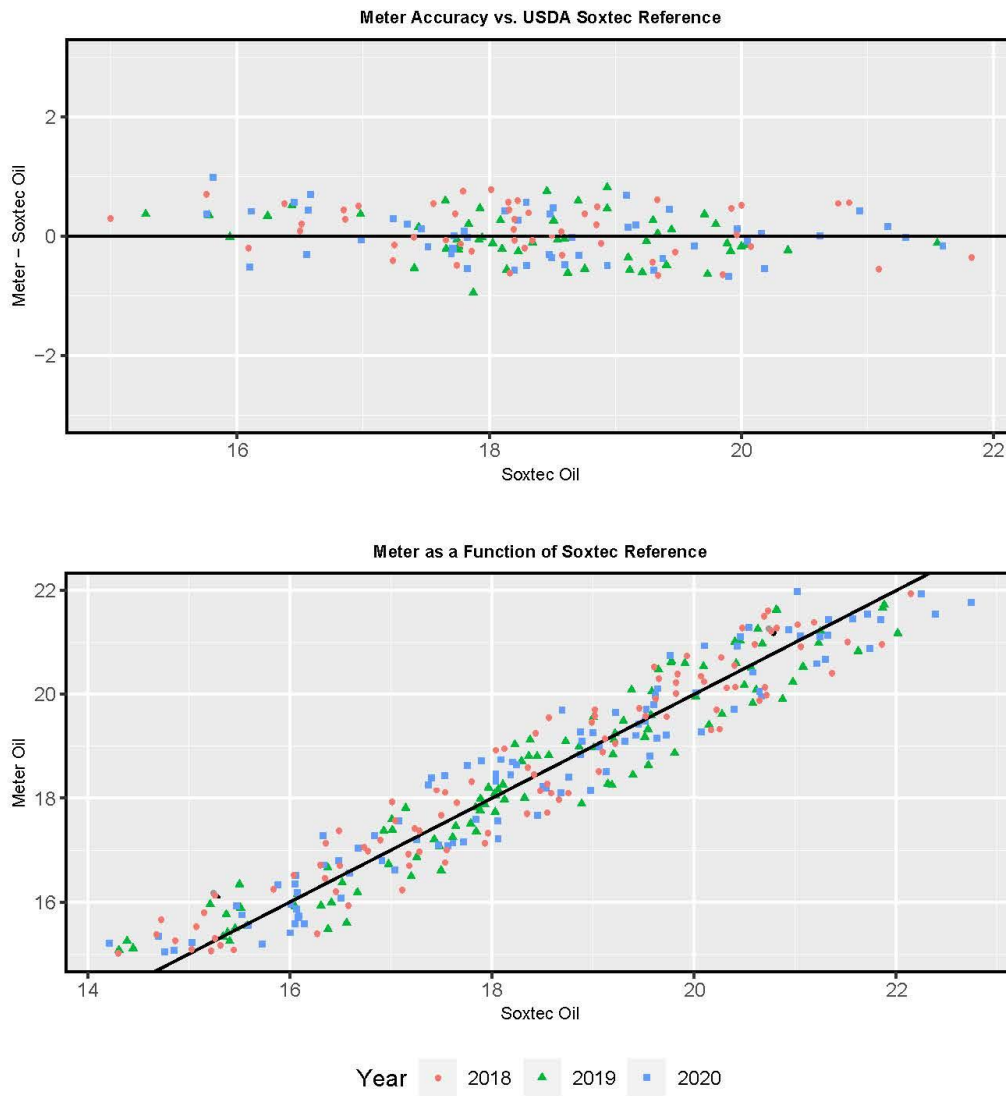
Similar to the Moisture Phase 2 program, the NIR Phase 2 will submit reports to manufacturers to demonstrate performance. Example reports for several grain types and constituents are shown in the following pages. These items, along with any additional items regarding the Phase 2 program, will be open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

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



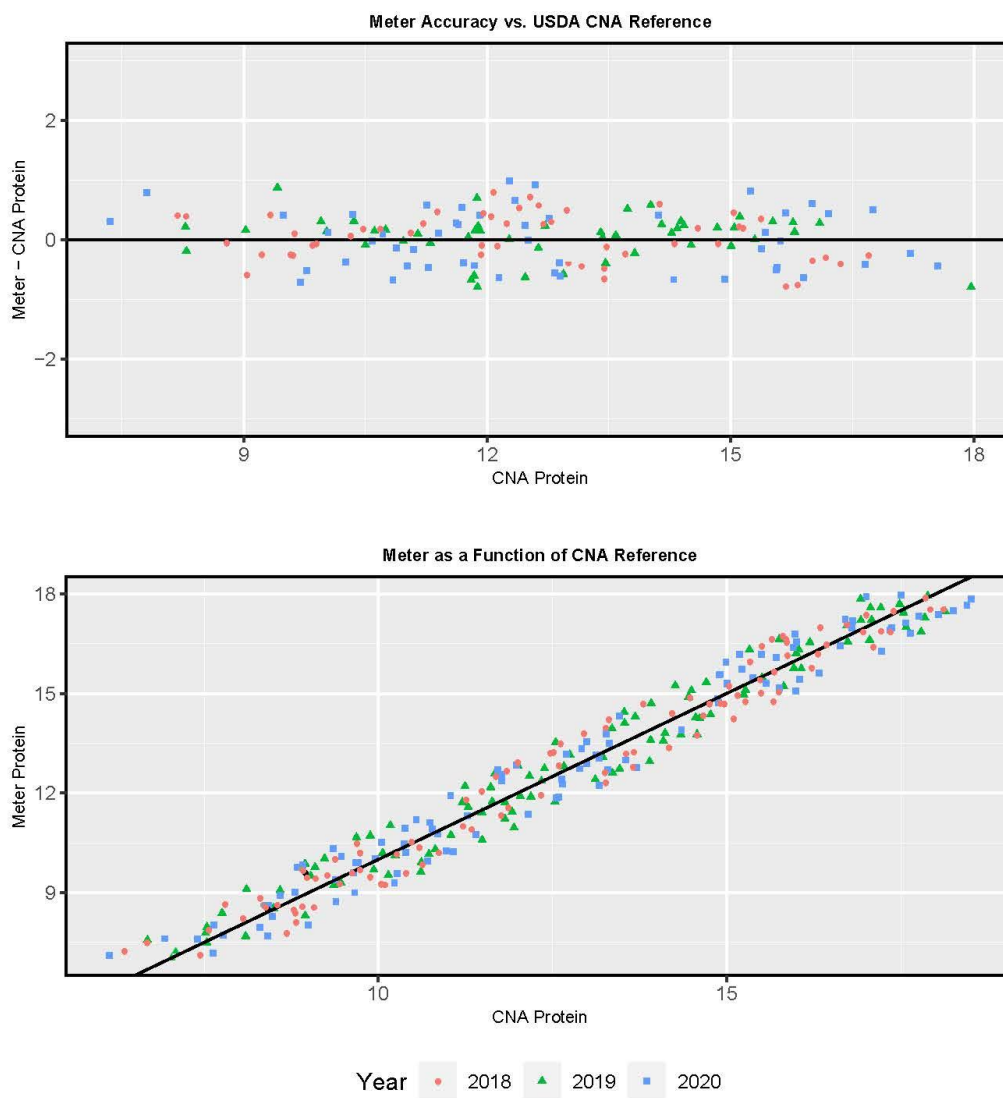
	2018	2019	2020	All Years	Tolerance	Status
<i>Samples</i>	50.00	50.00	50.00	150.00		
<i>Bias</i>	-0.06	-0.01	-0.04	-0.04	0.33	Pass
<i>SEP</i>	0.58	0.58	0.58	0.58	0.55	Fail
<i>Reproducibility</i>	4.51	5.45	5.12	5.01		

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



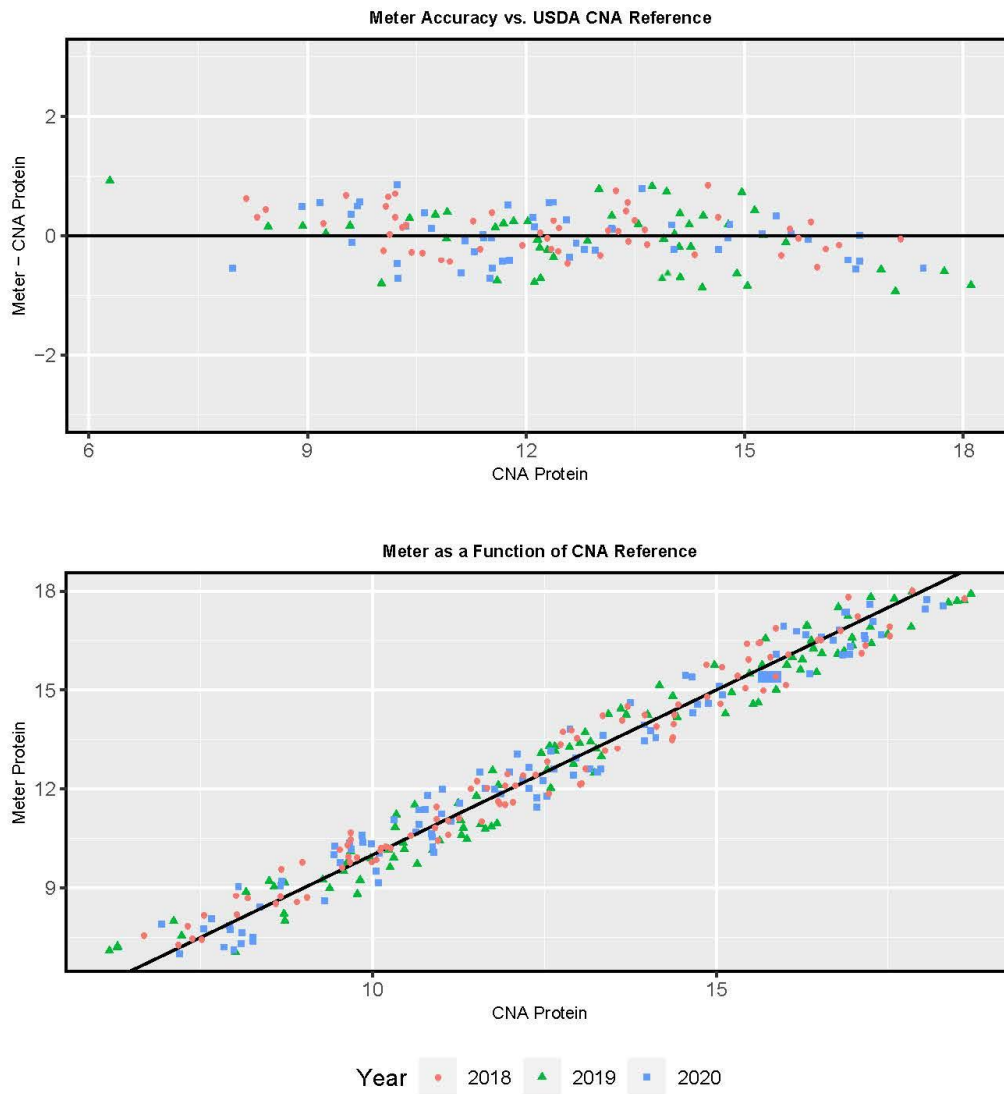
	2018	2019	2020	All Years	Tolerance	Status
<i>Samples</i>	50.00	50.00	50.00	150.00		
<i>Bias</i>	0.10	-0.02	0.01	0.03	0.27	Pass
<i>SEP</i>	0.55	0.55	0.55	0.55	0.45	Fail
<i>Reproducibility</i>	2.76	2.82	2.66	2.75		

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



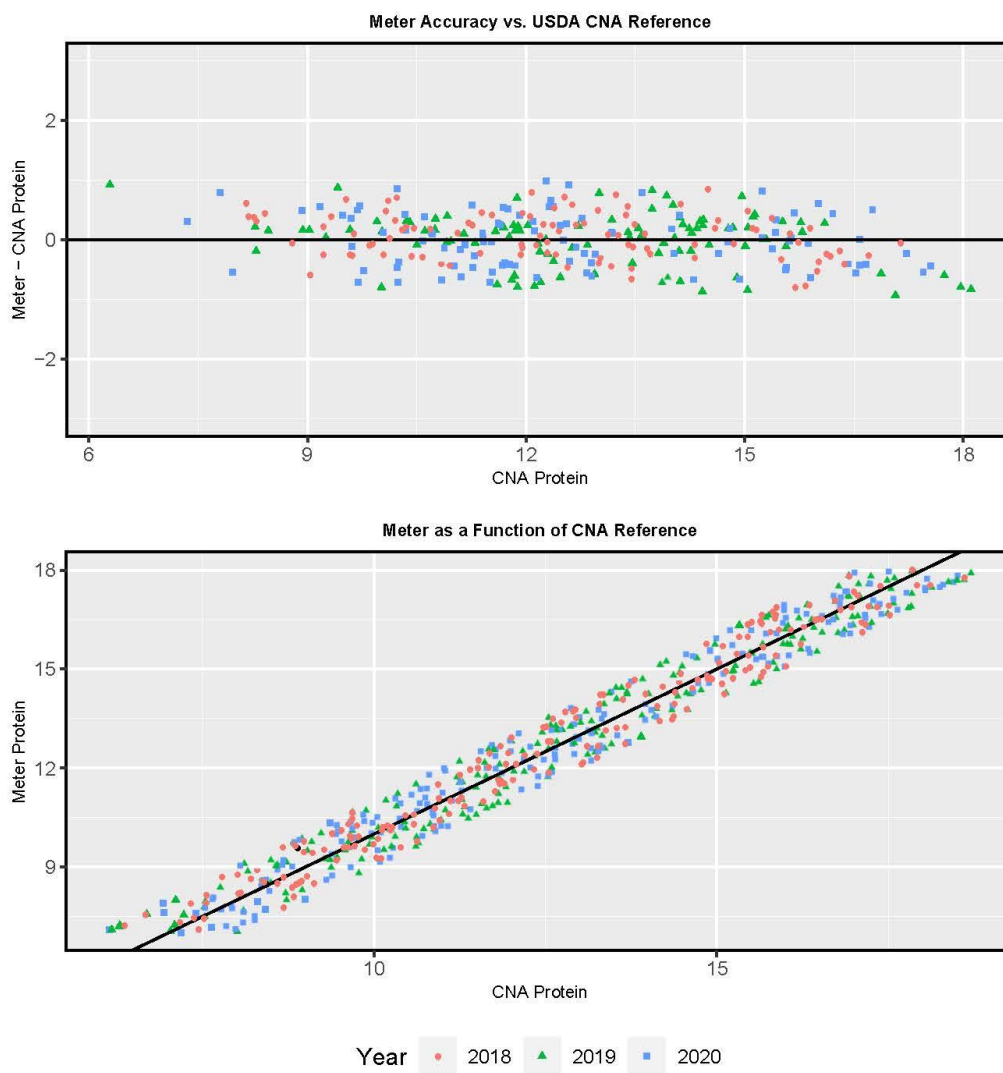
	2018	2019	2020	All Years	Tolerance	Status
<i>Samples</i>	50.00	50.00	50.00	150.00		
<i>Bias</i>	0.02	0.06	0.00	0.03	0.24	Pass
<i>SEP</i>	0.59	0.59	0.59	0.58	0.4	Fail
<i>Reproducibility</i>	4.26	4.26	3.94	4.16		

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		

Discussion:

6. 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.

Discussion:

7. 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.

Discussion:

8. 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 schedule 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.

Discussion:

9. Phase II program for Near Infrared Grain (NIR) Analyzers

Source:

Dr. Hurburgh, Iowa State University

Background/Discussion:

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

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

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

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

The sector discussed the feasibility of a phase II program for wheat protein giving consideration to the following issues:

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

2014 Grain Analyzer Sector Report:

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

2015 Grain Analyzer Sector Report:

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

2016 Grain Analyzer Sector Meeting:

Mr. Jordan, GIPSA, the NTEP Participating Laboratory for grain analyzers provided information on some work involving applying data transforms to spectra of multiple instrument models and provided an update of these activities along with others involved in considering Phase II testing for Near Infrared Grain Analyzers.

During the 2016 Grain Analyzer Sector meeting, the sector agreed that a program is needed based on observations and some feedback from sector members that review calibration data for these instruments. As such, the sector “brain stormed” ideas on what would be needed to develop a phase II program to periodically verify the calibrations on Near Infrared devices. The sector members generated the following information based on its discussion:

Near Infrared Phase II Program Needs:

- Set of robust samples that can be used every year,
- A reference laboratory to perform the testing,
- 100 samples for all meters or less per grain type on each meter,
- The program should verify calibrations for basic grains where there is a commercially impact to included protein in wheat, soybeans, barley, and corn and oil in corn and soybeans (it was noted during discussion that there is a large economic impact in the area of wheat protein and that protein and oil in corn and soybeans are used in many non-trade applications).
- The program would currently include a total number of three instruments (There are three instruments that measure protein and oil in the NTEP program)
- Testing should include a slope bias test for each 2 point intervals and include a confidence interval.
- The current NCWM, Inc policies for participating in the grain moisture phase II testing can be used for the near infrared phase II program.
- An estimate of the cost of the program is needed. There was also a question as to whether or not the cost of the program would be distributed among the participating manufacturers, similar to the Phase II program for grain moisture.

In addition to the discussion of program needs for Phase II testing for near infrared devices, it was noted that although States test near infrared devices for grain moisture measurements, not many States are evaluating these devices for protein or other grain constituents (oil or starch). The GA Sector also discussed the needs of State weights and measures jurisdictions in testing near infrared devices for protein, starch and oil. It was noted that State resources: staff and money are needed for testing and that currently, per the States that attended the Sector meeting, commercial transactions involving protein measurements are lower than for grain moisture measurements.

2017 Grain Analyzer Sector Meeting:

During the 2017 Grain Analyzer Sector meeting, the Sector discussed the cost of an ongoing calibration program (Phase II Testing) for near infrared grain analyzers. Dr. Charlie Hurburgh mentioned that he is aware of continuity problems with protein and oil calibrations. It was mentioned that funding the moisture Phase II testing is handled through the interagency agreement where NIST, GIPSA, and Manufacturers contribute to funding the program. It was noted that the largest cost will be the labor in collecting the instrument data. It was reported that 50 samples are used in the official system for near infrared meters and a monitoring system is also in place for the official system that is similar to that of the Phase II program for moisture. Dr. Charlie Hurburgh agreed to develop a Near Infrared Phase II Testing program cost analysis and share it with Ms. Cathy Brenner, USDA, GIPSA. Ms. Cathy Brenner agreed to review the cost analysis and write a proposed program for a phase II Near Infrared testing program. This information will be available for review at the 2018 Grain Analyzer Sector meeting.

For the 2018 Grain Analyzer Sector, FGIS prepared a cost estimate for an on-going calibration program for near infrared (NIR) grain analyzers which is based on collecting 50 samples per grain type for a total of 500 samples.

The cost estimates are for the additional work above the cost FGIS incurs to maintain the official inspection system.

For some of the grains, such as barley and corn, FGIS does not routinely select 50 samples per year for reference analysis due to the narrow constituent range and/or low volume of samples received for the FGIS NIR quality

control program. Therefore, FGIS will need to select additional samples to achieve 50 per year that require reference analysis. FGIS will share 50% of the cost associated with preparing the additional samples for reference analysis and for the reference costs.

The estimate fees for an ongoing NIR calibration program are included in the table below. These fees are based on the FGIS Directive 9180.74 dated 1/18/2018 fee schedule of \$83.90 hourly rate, \$13 for reference moisture, \$20 for reference oil, and \$16 for reference protein.

The estimates are based on the current funding outlook for FGIS. Ms. Cathy Brenner reviewed the cost analysis with the GA sector and Dr. Charlie Hurburgh noted that this is being driven by the market and that we should push forward on this effort.

Total NIR Models (including official model) =TM	Number of NTEP only models =N	Total Program Cost =TP	Mfg's Cost Per Model =TP/TM
3	1	\$ 6,137	\$ 2,046
4	2	\$ 12,274	\$ 3,069
5	3	\$ 18,411	\$ 3,682
6	4	\$ 24,548	\$ 4,091
7	5	\$ 30,686	\$ 4,384
8	6	\$ 36,823	\$ 4,603
9	7	\$ 42,960	\$ 4,773
10	8	\$ 49,097	\$ 4,910

2018 Grain Analyzer Sector Meeting:

At the 2018 GA Sector meeting, the Sector was in agreement with establishing a Phase II ongoing calibration for NIR grain analyzers. It was recognized that testing requirements and changes to Publication 14 are needed.

2019 Grain Analyzer Sector Meeting:

During the 2019 Grain Analyzer Sector Meeting, Ms. Cathy Brenner (AMS, FGIS) provided for discussion purposed a table that summarizes slope and bias errors for discussion and a proposal for changes to Publications 14:

Previous Discussions by the Sector for a proposed Phase II or Ongoing Calibration Program for Near Infrared Grain analyzers focused on the estimated cost of a program but did not include proposed tolerances and criteria for the calibration performance.

The guidelines of the American Association of Cereal Chemist International (AACC) Method 39-01.01 Evaluation of NIR Instrument Calibration and Statistical Process Control were applied to a common set of data obtained from at Iowa State University (ISU) as part of the 2016 FGIS NIR Equivalency Study. AACC Method 39-01 evaluates the slope and bias of a calibration compared to the reference method at the 95% confidence level. In addition, statistical process control (SPC) and assessment of measurement

uncertainty for the combined reference method, repeatability and reproducibility were applied to this data set (Uc) and expanded uncertainty (U).

The FGIS NIR Equivalency Study included the three NTEP approved NIR models and calibrations. Five units of each model were used to collect three replicates per sample of barley, corn, soybean, and wheat. The data included reference results of each sample. The data was analyzed in groups of up to 50 samples to represent a single year of the NIR Phase II program.

For discussion purposes, the following table summarizes the slope errors of each method that indicated when the slope exceeded a statistical tolerance. It also includes the ISU guidelines and previous guidelines used by FGIS.					
Grain/Constituent	AACC Method		SPC	FGIS	ISU
Barley/Protein	-0.092	0.048	±0.05	n/a	n/a
Corn Oil	-0.014	0.026	±0.094	±0.03	±0.05
Corn Protein	-0.021	0.023	±0.06	±0.03	±0.05
Soybean Oil	-0.026	n/a	±0.032	±0.03	±0.05
Soybean Protein	-0.034	0.042	±0.036	±0.03	±0.05
Wheat Protein	-0.021	0.018	±0.022	±0.02	n/a

For discussion purposes, the following table summarizes the bias errors for each method that indicated when the bias exceeded a statistical tolerance. FGIS typically does not adjust for biases within ±0.10% as these differences can easily vary year to year.					
Grain/Constituent	AACC Method		SPC	Uc	U
Barley/Protein	n/a	n/a	±0.11	0.23	0.47
Corn Oil	-0.09	0.12	±0.34	0.19	0.38
Corn Protein	-0.07	0.06	±0.26	0.21	0.42
Soybean Oil	-0.06	0.02	±0.20	0.17	0.34
Soybean Protein	-0.03	0.01	±0.38	0.34	0.38
Wheat Protein	-0.04	0.10	±0.10	0.23	0.45

Listed below are the proposed changes to the NIR Section of Publication 14 Grain Moisture Meters and Near Infrared Grain Analyzers

IV. Tolerances for Calibration Performance

Calibration performance must be tested against established criteria at the following stages of the type evaluation process:

1. Evaluation of the calibration data supplied by the manufacturer with the application for type evaluation.
2. Evaluating instrument and calibration performance for corn oil and protein; durum wheat protein; hard white wheat protein; hard red spring wheat protein; hard red winter wheat protein; six row barley protein; soft red winter wheat protein; soft white wheat protein; soybeans protein and oil; and two row barley protein (accuracy test discussed earlier).
3. Review of ongoing calibration data collected as part of the national calibration program (Phase II).

In order for a calibration to remain on the certificate of conformance, the calibration must continue to meet tolerances for the initial evaluation's Accuracy Standard Error of Performance (SEP) test. The latest three years of data will be used to make decisions regarding the need to make a calibration update.

Whenever a calibration update is made, the manufacturer shall re-predict protein and/or oil values using the three most recent years of available raw data collected by the Type Evaluation Laboratory.

Updated calibrations will be approved based upon the re-predicted protein and/or oil values. Tolerances will be the accuracy tolerance found in Table 2

Additionally, all calibrations must meet the following requirements for up to three years of available data:

- a. The difference between the average bias to applicable FGIS reference methods for all samples calculated using the most recent calibration and all available raw data collected within the last 3 years shall not exceed: 0.20 for barley protein, corn oil, soybeans oil, and wheat protein; 0.25 for corn protein; and 0.34 for soybeans protein.
- b. The slope errors (e.g. slope-1) calculated using the most recent calibration and all available raw data collected within the last 3 years shall not exceed: 0.05 for barley protein and corn protein; 0.03 for corn oil; 0.32 for soybeans oil; 0.036 for soybeans protein; and 0.022 for wheat protein.

Failure to meet the requirements in either item a. or b. above will cause a "No Longer Approved for Use" status to be assigned to the affected grain type(s) on the NTEP Certificate of Conformance (CC) for that instrument. Calibration coefficients will not be listed for any calibration failing these requirements.

Until calibrations for NTEP grains and constituents have been evaluated successfully they shall not be used on NTEP instruments. Calibrations for any of the NTEP grain types that have not been evaluated (or that a manufacturer chooses not to provide) will be listed on the CC as "Not Available."

V. Criteria for NTEP Near Infrared Grain Analyzer Calibration Review

The following criteria are to be applied along with criteria listed in Part IV above to verify calibration performance.

Special Considerations for "Multi-Class" Calibrations

For Phase II data for each individual grain class included in a "multi-class" calibration will be reviewed to determine what adjustment, if any are needed.

Data for each individual grain class and the combined data for all grain classes included in the "multi-class" calibration will be reviewed to verify calibration performance for each individual grain class and the combined data.

Mr. Andy Gell (Foss North America) and Mr. Larry Speaks (Pertin Instruments) expressed concerns about the slope because it is dependant on sample set and range. Ms. Cathy Brenner (AMS, FGIS) requested feedback from the

Sector on Annual time frame for testing, sample size, SEP and bias. Mr. Gell and Mr. Speaks expressed agreement with annual time frame, cost, sample size and SEP and bias. Mr. Gell and Mr. Speaks requested additional time to get feedback on the proposed tolerances. Mr. Karl Cunningham (IL) suggested that after getting additional feedback that a final summary be provided to the Sector. Ms. Brenner agreed to provide a table of tolerances that the manufacturers can review and a summary of feedback on the tolerances from the manufacturers for the 2020 GA Sector meeting. The earliest the requirements could be added to NCWM Publication 14 would be the 2021 publication.

2020 Grain Analyzer Sector Meeting:

During the 2020 Grain Analyzer Sector Meeting, Ms. Cathy Brenner (USDA, AMS, FGIS) provided an updated grain tolerance table, and reported that the additional work needed on the Pub 14 wording would be available in a few days. Below is the proposed wording to be inserted into the 2021 edition of Publication 14, Near Infrared Analyzers, Test Procedures and Tolerances.

IV. Tolerances for Calibration Performance

Calibration performance must be tested against established criteria at the following stages of the type evaluation process:

1. Evaluation of the calibration data supplied by the manufacturer with the application for type evaluation.
2. Evaluating instrument and calibration performance for corn oil and protein; durum wheat protein; hard white wheat protein; hard red spring wheat protein; hard red winter wheat protein; six-rowed barley protein; soft red winter wheat protein; soft white wheat protein; soybeans protein and oil; and two-rowed barley protein (accuracy test discussed earlier).
3. Review of ongoing calibration data collected as part of the national calibration program (Phase II).

In order for a calibration to remain on the certificate of conformance, the calibration must continue to meet tolerances for the initial evaluation's Accuracy Standard Error of Performance (SEP) test. The latest three years of data will be used to make decisions regarding the need to make a calibration update.

Whenever a calibration update is made, the manufacturer shall re-predict protein and/or oil values using the three most recent years of available raw data collected by the Type Evaluation Laboratory.

Updated calibrations will be approved based upon the re-predicted protein and/or oil values. Tolerances will be the Accuracy tolerance found in Table 2. Additionally, all calibrations must meet the average bias to the applicable FGIS reference method for all samples calculated using the most recent calibration and all available raw data collected within the last 3 years shall not exceed 60% of the applicable SEP tolerance. The tolerances are combined in Table 3.

Table 3. Calibration Performance Tolerances

<u>Grain Type</u>	<u>Constituent</u>	<u>Accuracy SEP Tolerance</u>	<u>Bias Tolerance</u>
<u>Durum Wheat</u>	<u>Protein</u>	<u>0.30</u>	<u>± 0.18</u>
<u>Hard Red Spring Wheat</u>	<u>Protein</u>		
<u>Hard Red Winter Wheat</u>	<u>Protein</u>		
<u>Hard White Wheat</u>	<u>Protein</u>		
<u>Soft Red Winter Wheat</u>	<u>Protein</u>		
<u>Soft White Wheat</u>	<u>Protein</u>		
<u>All-Class Wheat Calibration*</u>	<u>Protein</u>		
<u>Two-rowed Barley</u>	<u>Protein</u>	<u>0.40</u>	<u>± 0.24</u>
<u>Six-rowed Barley</u>	<u>Protein</u>		
<u>All-Class Barley Calibration*</u>	<u>Protein</u>		

<u>Corn</u>	<u>Protein</u>	<u>0.50</u>	<u>± 0.30</u>
	<u>Oil</u>	<u>0.50</u>	<u>± 0.30</u>
<u>Soybeans</u>	<u>Protein</u>	<u>0.55</u>	<u>± 0.33</u>
	<u>Oil</u>	<u>0.45</u>	<u>± 0.27</u>

Note: Calibrations marked with an asterisk () are "Multi-class" calibrations.*

Failure to meet the requirements in either Accuracy SEP or bias tolerance above will cause a "No Longer Approved for Use" status to be assigned to the affected grain type(s) and constituent(s) on the NTEP Certificate of Conformance (CC) for that instrument. Calibration coefficients will not be listed for any calibration failing these requirements.

Until calibrations for NTEP grains and constituents have been evaluated successfully, they shall not be used on NTEP instruments. Calibrations for any of the NTEP grain types that have not been evaluated (or that a manufacturer chooses not to provide) will be listed on the CC as "Not Available."

V. Criteria for NTEP Near Infrared Grain Analyzer Calibration Review

The following criteria are to be applied along with criteria listed in Part IV above to verify calibration performance.

Special Considerations for "Multi-Class" Calibrations

For Phase II, data for each individual grain class included in a "multi-class" calibration will be reviewed to determine what adjustments, if any, are needed.

Data for each individual grain class and the combined data for all grain classes included in the "multi-class" calibration will be reviewed to verify calibration performance for each individual grain class and the combined data.

Appendix C

Standard Data Format (for Submitting NTEP NIR Data for Calibration Review)

1. Data Fields:

<u>Sample</u>	<u>NIR</u>	<u>Ref</u>	<u>NIR</u>	<u>Ref</u>	<u>Moisture</u>	<u>NIR</u>	<u>NIR</u>	<u>Calibration</u>	<u>Grain</u>	<u>Crop</u>
<u>I.D.</u>	<u>Oil</u>	<u>Oil</u>	<u>Protein</u>	<u>Protein</u>	<u>Basis</u>	<u>Model</u>	<u>S.N.</u>	<u>I.D.</u>	<u>Type</u>	<u>Year</u>

4. Description of Data Fields:

Sample I.D.: The unique sample number assigned by FGIS.

NIR Oil: The NIR-predicted oil. For barley and wheat, this field must be NULL.

Ref Oil: The FGIS solvent oil extraction reference result. For barley and wheat, this field must be NULL.

NIR Protein: The NIR-predicted protein.

Ref Protein: The FGIS combustion nitrogen analyzer protein reference result.

Moisture Basis: The moisture content at which the NIR protein and oil predictions are reported.

NIR Model: The name of the model submitted by the manufacturer.

NIR S.N.: The instrument serial number assigned by the manufacturer.

Calibration I.D.: The unique name or number of the calibration used to predict the moisture value.

Grain Type: The abbreviated name of the grain type (see accompanying table).

Crop Year: The crop year in which the sample was received.

5. Instructions for Submitting:

Email as a Microsoft Excel® file or as a comma separated text file with each grain in a separate file. Name the files using the abbreviations in the accompanying table and report each observation as a single record on a single line. If more than one grain type is sent at a time, the data may be combined into a single file named using the model and current crop year.

File Names for Submitting NTEP NIR Data for Calibration Review

<u>Grain Type</u>	<u>File Name</u>
<u>Durum</u>	<u>DUWH</u>
<u>Hard Red Spring Wheat</u>	<u>HRS</u>
<u>Hard White Wheat</u>	<u>HDWH</u>
<u>Soft White Wheat</u>	<u>SWW</u>
<u>Hard Red Winter Wheat</u>	<u>HRW</u>
<u>Soft Red Winter Wheat</u>	<u>SRW</u>
<u>Six-Rowed Barley</u>	<u>SRB</u>
<u>Two-Rowed Barley</u>	<u>TRB</u>
<u>Corn</u>	<u>C</u>
<u>Soybeans</u>	<u>SB</u>

Since the updated proposal was received after the meeting, the members of the GA Sector will be polled via email for their acceptance of the wording. If consensus is achieved, the proposal will be placed into the 2021 edition of Publication 14; If consensus is not achieved, the item will carry over to next years meeting. An email was sent to all sector members on August 20, 2020 requesting agreement with a response deadline of the end of the business day Friday, September 4, 2020. The GA Sector received a comment from Mr. Charles Hurburgh (Iowa) offered the following two suggestions.

1. Specify or include the moisture basis of the data at each point. I understand that the mb is given in the Handbook, but my experience is that this is the biggest confusion in NIR data. For sure you will get data from someone that is a different moisture basis than the one in the handbook
2. Include the state of origin in the data line. Geographic diversity is very important even if the data has a wide data range.

Several members agreed, and no one opposed Mr. Hurburgh, suggestions. Mr. Jason Jordan (GIPSA) amended the wording, show above, to reflect the additions.

No opposition was received, the wording will be included into the 2021 Edition of Publication 14.

Discussion:

The above changes were inserted into the 2021 edition of Publication 14. No further action is needed on this item. This item will be removed from future meeting agendas and will not be reported on in the 2021 GA Sector meeting summary.

10. 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

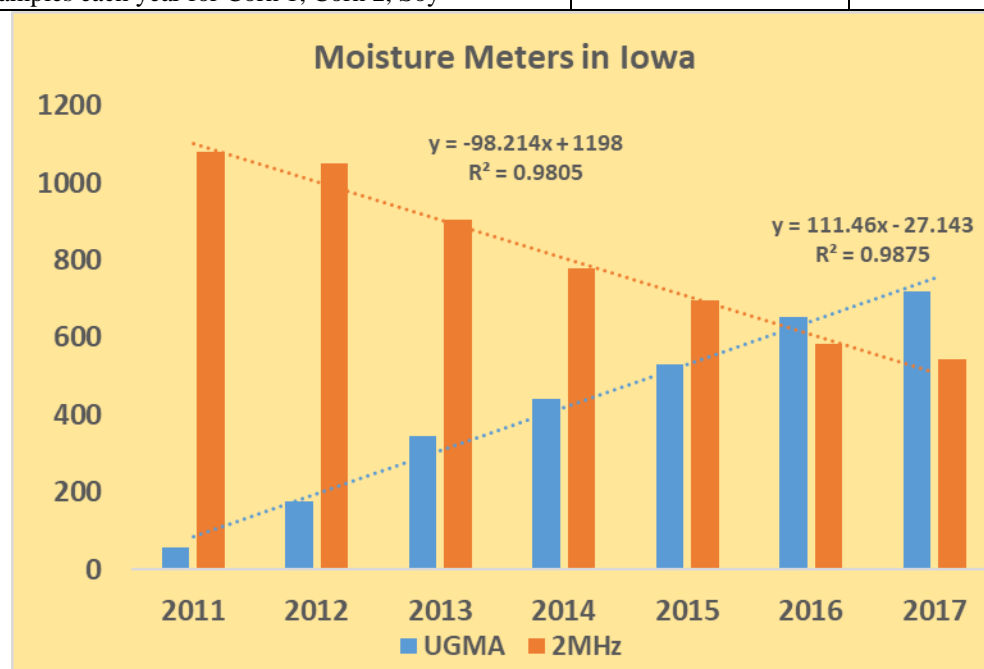
It was noted that the task group may review previous inspection data for UGMA meters for wheat and corn samples.

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	
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			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
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 All other cereal grains and oil seeds	0.05 03 of the percent moisture content 0.04 of the percent moisture content	0.8 5 % in moisture content 0.7 % in moisture content

The

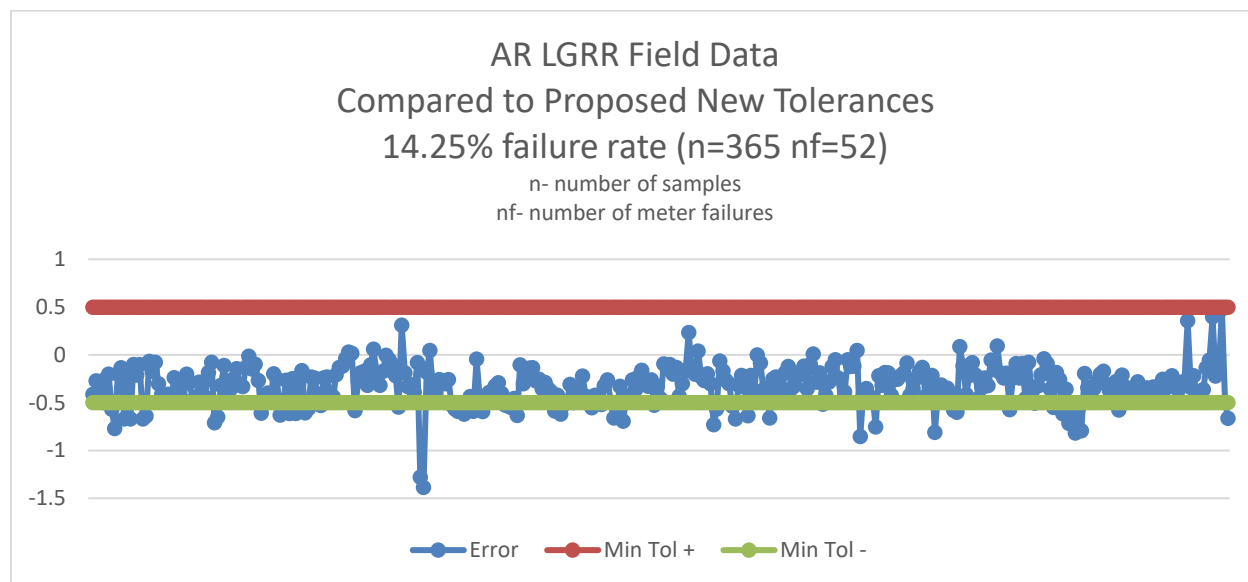
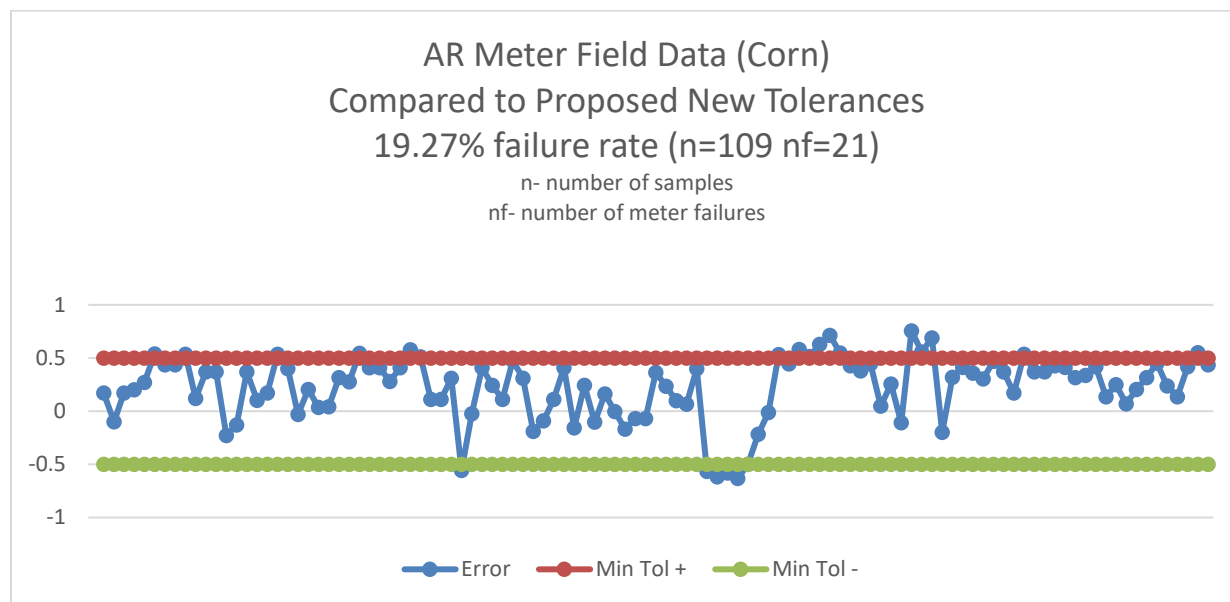
GA

(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 +/- 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. Elliott 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. Elliott 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.

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

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 like-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.

Discussion:

12. 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
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.

Discussion:

13. Change in Meeting Agenda and Summary Preparation

Source:

NTEP Administrator

Background/Discussion:

As reported at the 2020 NCWM Interim in Riverside, CA, NIST and the NCWM Board of Directors agreed to a change in the responsibilities for the development of the meeting agenda and the writing of the meeting summary. This change removes these tasks from the NIST Technical Advisor and moves them to the responsibility of the individual Sectors. To move forward with this change, the Sector Members are tasked with creating a position assigned to an individual who will be responsible for creating these documents. I need to point out that the NIST and NTEP Technical Advisor will support the individual in these tasks. As this may be the first you heard of this change, the NTEP Technical Advisor agreed to write the Meeting Summary for the 2020 meeting.

During the discussion, Mr. Cunningham (Sector Chair) mentioned that he is planning on stepping down as the Sector Chair and suggested that this would be a good time to find two individuals to step up into these roles. Mr. Flocken agreed to work with Mr. Cunningham to develop a plan for accomplishing this task.

Discussion:

14. 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 the Hyatt Place at the Kansas City, MO Airport.

If you would like to submit an agenda item for the 2022 meeting, please contact any of the following persons by June 1, 2022:

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

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

Discussion: