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Report of the 102nd National Conference on Weights and Measures

as adopted by the 102nd
National Conference on Weights and
Measures 2017

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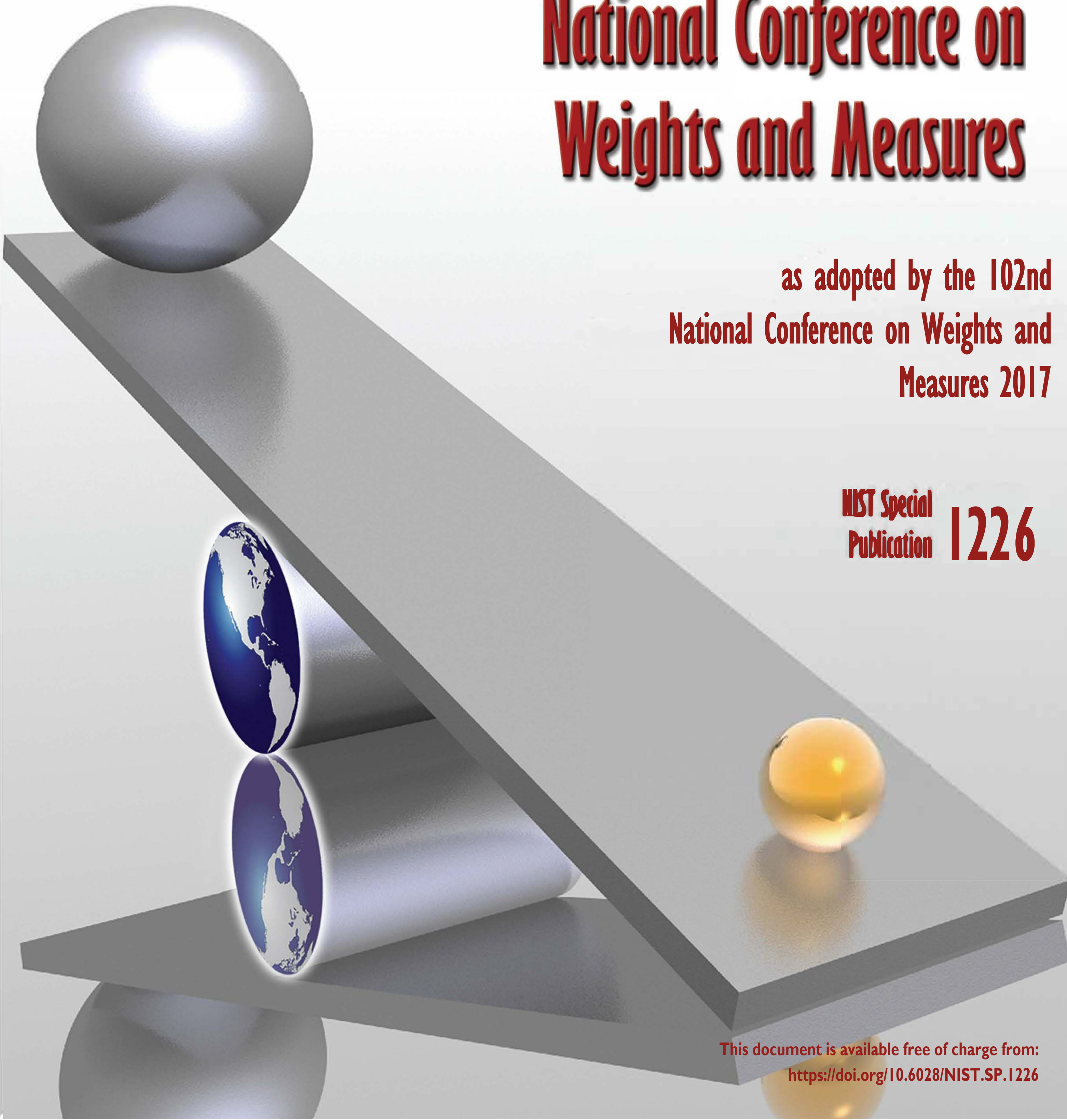

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NIST Special Publication 1226

Report of the 102nd National Conference on Weights and Measures

Pittsburgh, Pennsylvania – July 16 through 20, 2017
as adopted by the 102nd National Conference on Weights and Measures 2017

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July 2018

U.S. Department of Commerce
Wilbur L. Ross, Jr., Secretary

National Institute of Standards and Technology
Walter Copan, NIST Director and Under Secretary of Commerce for Standards and Technology

The National Conference on Weights and Measures is supported by the National Institute of Standards and Technology and is attended by officials from various states, counties, and cities, as well as representatives from the U.S. Government, other nations, industry, and consumer organizations.

Abstract

The 102nd Annual Meeting of the National Conference on Weights and Measures (NCWM) was held July 16 - 20, 2017, at the Omni William Penn Hotel, Pittsburgh, Pennsylvania. The theme of the meeting was "Tradition and Technology: Finding the Right Balance."

Reports by the NCWM Board of Directors, Standing Committees, and Special Purpose Committees constitute the major portion of this publication, along with the addresses delivered by Conference officials and other authorities from government and industry.

Special meetings included those of the Meter Manufacturers Association, Packaging and Labeling Subcommittee, Fuels and Lubricants Subcommittee, Associate Membership Committee, Regional Association Meetings, and the Weigh-in-Motion Task Group.

Key words: laws and regulations; legal metrology; meters; scales; specifications and tolerances; training; type evaluation; uniform laws; weights and measures.

Note: The policy of the National Institute of Standards and Technology is to use metric units of measurement in all its publications. In this publication, however, recommendations received by the NCWM technical committees have been printed as they were submitted, and, therefore, may contain references to U.S. Customary Units where such units are commonly used in industry practice. Opinions expressed in non-NIST papers are those of the authors and not necessarily those of the National Institute of Standards and Technology. Non-NIST speakers are solely responsible for the content and quality of their material.

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WASHINGTON: 2018

National Conference on Weights and Measures

Annual Report of the 102nd NCWM

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Past Chairmen of the Conference

Conference	Year	Location	Chairman
1st	1905	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
2nd	1906	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
3rd	1907	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
4th	1908	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
	1909	Conference Was Not Held	
5th	1910	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
6th	1911	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
7th	1912	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
8th	1913	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
9th	1914	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
10th	1915	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
11th	1916	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
	1917	Conference Was Not Held	
	1918	Conference Was Not Held	
12th	1919	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
13th	1920	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
14th	1921	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
15th	1922	Washington, D.C.	Dr. S.W. Stratton, Bureau of Standards
16th	1923	Washington, D.C.	Dr. George Burgess, Bureau of Standards
17th	1924	Washington, D.C.	Dr. George Burgess, Bureau of Standards
18th	1925	Washington, D.C.	Dr. George Burgess, Bureau of Standards
19th	1926	Washington, D.C.	Dr. George Burgess, Bureau of Standards
20th	1927	Washington, D.C.	Dr. George Burgess, Bureau of Standards
21st	1928	Washington, D.C.	Dr. George Burgess, Bureau of Standards
22nd	1929	Washington, D.C.	Dr. George Burgess, Bureau of Standards
23rd	1930	Washington, D.C.	Dr. George Burgess, Bureau of Standards
24th	1931	Washington, D.C.	Dr. George Burgess, Bureau of Standards
	1932	Conference Was Not Held	
	1933	Conference Was Not Held	
	1934	Conference Was Not Held	
25th	1935	Washington, D.C.	Dr. Lyman Briggs, National Bureau of Standards
26th	1936	Washington, D.C.	Dr. Lyman Briggs, National Bureau of Standards
27th	1937	Washington, D.C.	Dr. Lyman Briggs, National Bureau of Standards
28th	1938	Washington, D.C.	Dr. Lyman Briggs, National Bureau of Standards
29th	1939	Washington, D.C.	Dr. Lyman Briggs, National Bureau of Standards

Conference	Year	Location	Chairman
30th	1940	Washington, D.C.	Dr. Lyman Briggs, National Bureau of Standards
31st	1941	Washington, D.C.	Dr. Lyman Briggs, National Bureau of Standards
	1942	Conference Was Not Held	
	1943	Conference Was Not Held	
	1944	Conference Was Not Held	
	1945	Conference Was Not Held	
32nd	1946	Washington, D.C.	Dr. E.U. Condon, National Bureau of Standards
33rd	1947	Washington, D.C.	Dr. E.U. Condon, National Bureau of Standards
	1948	Conference Was Not Held	
34th	1949	Washington, D.C.	Dr. E.U. Condon, National Bureau of Standards
35th	1950	Washington, D.C.	Dr. E.U. Condon, National Bureau of Standards
36th	1951	Washington, D.C.	Dr. E.U. Condon, National Bureau of Standards
37th	1952	Washington, D.C.	Dr. A.V. Astin, National Bureau of Standards
38th	1953	Washington, D.C.	Dr. A.V. Astin, National Bureau of Standards
39th	1954	Washington, D.C.	Dr. A.V. Astin, National Bureau of Standards
40th	1955	Washington, D.C.	Dr. A.V. Astin, National Bureau of Standards
41st	1956	Washington, D.C.	Dr. A.V. Astin, National Bureau of Standards
42nd	1957	Washington, D.C.	Dr. A.V. Astin, National Bureau of Standards
43rd	1958	Washington, D.C.	J.P. McBride, MA
44th	1959	Washington, D.C.	C.M. Fuller, CA
45th	1960	Washington, D.C.	H.E. Crawford, FL
46th	1961	Washington, D.C.	R.E. Meek, IN
47th	1962	Washington, D.C.	Robert Williams, NY
48th	1963	Washington, D.C.	C.H. Stender, SC
49th	1964	Washington, D.C.	D.M. Turnbull, WA
50th	1965	Washington, D.C	V.D. Campbell, OH
51st	1966	Denver, CO	J.F. True, KS
52nd	1967	Washington, D.C.	J.E. Bowen, MA
53rd	1968	Washington, D.C.	C.C. Morgan, IN
54th	1969	Washington, D.C.	S.H. Christie, NJ
55th	1970	Salt Lake City, UT	R.W. Searles, OH
56th	1971	Washington, D.C.	M. Jennings, TN
57th	1972	Washington, D.C.	E.H. Black, CA
58th	1973	Minneapolis, MN	George Johnson, KY
59th	1974	Washington, D.C.	John Lewis, WA
60th	1975	San Diego, CA	Sydney Andrews, FL
61st	1976	Washington, D.C.	Richard Thompson, MD
62nd	1977	Dallas, TX	Earl Prideaux, CO

Conference	Year	Location	Chairman
63rd	1978	Washington, D.C.	James Lyles, VA
64th	1979	Portland, OR	Kendrick Simila, OR
65th	1980	Washington, D.C.	Charles Vincent, TX
66th	1981	St. Louis, MO	Edward Stadolnik, MA
67th	1982	Atlanta, GA	Edward Heffron, MI
68th	1983	Sacramento, CA	Charles Greene, NM
69th	1984	Boston, MA	Sam Hindsman, AR
70th	1985	Washington, D.C.	Ezio Delfino, CA
71st	1986	Albuquerque, NM	George Mattimoe, HI
72nd	1987	Little Rock, AR	Frank Nagele, MI
73rd	1988	Grand Rapids, MI	Darrell Guensler, CA
74th	1989	Seattle, WA	John Bartfai, NY
75th	1990	Washington, D.C.	Fred Gerk, NM
76th	1991	Philadelphia, PA	N. David Smith, NC
77th	1992	Nashville, TN	Sidney Colbrook, IL
78th	1993	Kansas City, MO	Allan Nelson, CT
79th	1994	San Diego, CA	Thomas Geiler, MA
80th	1995	Portland, ME	James Truex, OH
81st	1996	New Orleans, LA	Charles Gardner, NY
82nd	1997	Chicago, IL	Barbara Bloch, CA
83rd	1998	Portland, OR	Steven Malone, NE
84th	1999	Burlington, VT	Aves Thompson, AK
85th	2000	Richmond, VA	Wes Diggs, VA
86th	2001	Washington, D.C.	Louis Straub, MD
87th	2002	Cincinnati, OH	Ronald Murdock, NC
88th	2003	Sparks, NV	Ross Andersen, NY
89th	2004	Pittsburgh, PA	Dennis Ehrhart, AZ
90th	2005	Orlando, FL	Wes Diggs, VA
91st	2006	Chicago, IL	Don Onwiler, NE
92nd	2007	Salt Lake City, UT	Michael Cleary, CA
93rd	2008	Burlington, VT	Judy Cardin, WI
94th	2009	San Antonio, TX	Jack Kane, MT
95th	2010	St. Paul, MN	Randy Jennings, TN
96th	2011	Missoula, MT	Tim Tyson, KS
97th	2012	Portland, ME	Kurt Floren, CA
98th	2013	Louisville, KY	Stephen Benjamin, NC
99th	2014	Detroit, MI	John Gaccione, NY
100th	2015	Philadelphia, PA	Ronald Hayes, MO

Conference	Year	Location	Chairman
101st	2016	Denver, CO	Jerry Buendel, WA
102nd	2017	Pittsburgh, PA	Kristin Macey, CA

2016 - 2017 Organizational Chart

National Conference on Weights and Measures (NCWM) Board of Directors

OFFICE	NAME	AFFILIATION	TERM ENDS
Chairman	Kristin Macey	California	2017
Chairman-Elect	James Cassidy	City of Cambridge, Massachusetts	2017
Immediate Past Chair	Jerry Buendel	Washington	2017
Treasurer	Raymond Johnson	New Mexico	2017
Active Membership – Western	Brett Gurney	Utah	2017
Active Membership – Southern	Kenneth Ramsburg	Maryland	2018
Active Membership – Northeastern	Steve Giguere	Maine	2019
Active Membership – Central	Craig VanBuren	Michigan	2020
At-Large	Chuck Corr	Archer Daniels Midland Company	2018
At-Large	Julie Quinn	Minnesota	2021
Associate Membership Representative	Christopher Guay	Procter and Gamble, Co.	2019
Honorary NCWM President	Dr. Kent Rochford	Acting NIST Director	NA
Executive Director	Don Onwiler	NCWM	NA
Executive Secretary	Dr. Douglas Olson	NIST, Office of Weights and Measures	NA
NTEP Administrator	Jim Truex	NCWM	NA
Measurement Canada Advisor	Carl Cotton	Measurement Canada	NA

National Type Evaluation Program Committee (NTEP)

OFFICE	NAME	AFFILIATION	TERM ENDS
Committee Chair	Jerry Buendel	Washington	2017
Member	Kristin Macey	California	2018
Member	Kenneth Ramsburg	Maryland	2018
Member	James Cassidy	Massachusetts	2019
Member	Craig VanBuren	Michigan	2020
NTEP Administrator	Jim Truex	NCWM	NA

Finance Committee

OFFICE	NAME	AFFILIATION	TERM ENDS
Committee Chair	James Cassidy	City of Cambridge, Massachusetts	2017
Nominated Chair-Elect	Bret Gurney	Utah	2017
Member	Raymond Johnson	New Mexico	2017
Member	Christopher Guay	Procter and Gamble, Co.	2017
Executive Director	Don Onwiler	NCWM	NA

Laws and Regulations Committee (L&R)

OFFICE	NAME	AFFILIATION	TERM ENDS
Committee Chair	Ethan Bogren	Westchester County, New York	2020
Member	Louis Sakin	Towns of Hopkinton/Northbridge, Massachusetts	2017
Member	John Albert	Missouri	2018
Member	Michelle Wilson	Arizona	2019
Member	Hal Prince	Florida	2021
Associate Membership Representative	Rebecca Richardson	MARC – IV Consulting	2018
Canadian Technical Advisor	Lance Robertson	Measurement Canada	NA
NIST Technical Advisor	David Sefcik	NIST, Office of Weights and Measures	NA
NIST Technical Advisor	Lisa Warfield	NIST, Office of Weights and Measures	NA

Professional Development Committee (PDC)

OFFICE	NAME	AFFILIATION	TERM ENDS
Committee Chair	Stacy Carlsen	Marin County, California	2017
Member	Lori Jacobson	South Dakota	2018
Member	Gene Robertson	Mississippi	2019
Member	Cheryl Ayer	New Hampshire	2020
Member	Marco Mares	San Diego, California	2021
Associate Membership Representative	Richard Shipman	Rice Lake Weighing Systems, Inc.	2018
Safety Liaison	Julie Quinn	Minnesota	NA

Professional Development Committee (PDC)			
OFFICE	**NAME**	**AFFILIATION**	**TERM ENDS**
NIST Liaison	Tina Butcher	NIST, Office of Weights and Measures	NA
Certification Coordinator	Ross Andersen	Retired	NA

Specifications and Tolerances Committee (S&T)			
OFFICE	**NAME**	**AFFILIATION**	**TERM ENDS**
Committee Chair	Matthew Curran	Florida	2018
Member	Jane Zulkiewicz	Town of Barnstable, Massachusetts	2017
Member	Ivan Hankins	Iowa	2019
Member	Rachelle Miller	Wisconsin	2020
Member	Josh Nelson	Oregon	2021
Canadian Technical Advisor	Luciano Burtini	Measurement Canada	NA
NIST Technical Advisor	TBD	NIST, Office of Weights and Measures	NA
NIST Technical Advisor	Rick Harshman	NIST, Office of Weights and Measures	NA
NTEP Technical Advisor	Darrell Flocken	NCWM	NA

Nominating Committee			
OFFICE	**NAME**	**AFFILIATION**	**TERM ENDS**
Committee Chair	Jerry Buendel	Washington	2017
Member	John Gaccione	Westchester County, New York	2017
Member	Stephen Benjamin	North Carolina	2017
Member	Kurt Floren	Los Angeles County, California	2017
Member	Joe Gomez	New Mexico	2017
Member	Charles Carroll	Massachusetts	2017

Credentials Committee			
OFFICE	**NAME**	**AFFILIATION**	**TERM ENDS**
Committee Chair	Matt Maiten	Santa Barbara County, California	2017
Member	Lori Jacobson	South Dakota	2018
Member	Elaine Vieira	Massachusetts	2019
Coordinator	Darrell Flocken	NCWM	NA

Appointive Officials			
OFFICE	**NAME**	**AFFILIATION**	**TERM ENDS**
Chaplain	Constantine Cotsoradis	Flint Hills Resources	2017
Parliamentarian	Louis Straub	Fairbanks Scale, Inc.	2017
Presiding Officer	Tim Chesser	Arkansas	2017
Presiding Officer	Loren Minnich	Kansas	2017
Presiding Officer	Marc Paquette	Vermont	2017
Presiding Officer	Jack Walsh	Town of Wellesley, Massachusetts	2017
Sergeant-at-Arms	Chris Brenner	Pennsylvania	2017
Sergeant-at-Arms	Ron Pierce	Pennsylvania	2017

Associate Membership Committee			
OFFICE	**NAME**	**AFFILIATION**	**TERM ENDS**
Committee Chair	Richard Shipman	Rice Lake Weighing Systems, Inc.	2017
Vice-Chair	Bill Callaway	Crompco	2017
Secretary/Treasurer	Mark Flink	ADM	2017
Member	David Calix	NCR Corporation	2018
Member	Bill Callaway	Crompco	2018
Member	Robert Murnane, Jr.	Seraphin Test Measure	2018
Member	Richard Shipman	Rice Lake Weighing Systems, Inc.	2020
Member	Christopher Guay	Procter and Gamble, Co.	2020
Member	Mark Flint	ADM	2020
Member	Rebecca Richardson	MARC – IV Consulting	2020

Associate Membership Committee			
OFFICE	**NAME**	**AFFILIATION**	**TERM ENDS**
Member	Prentiss Searles	American Petroleum Institute	2022
Member	Bob Wiese	Northwest Tank and Environmental Services	2022

Fuels and Lubricants Subcommttee		
OFFICE	**NAME**	**AFFILIATION**
Committee Chair	Matthew Curran	Florida
Vice-Chair	Ronald Hayes	Missouri
Vice-Chair	Randy Jennings	Tennessee
Secretary	Kevin Ferrick	American Petroleum Institute
Vice-Secretary	Rebecca Richardson	MARC – IV Consulting
NIST Technical Advisor	David Sefcik	NIST, Office of Weights and Measures
NIST Technical Advisor	Lisa Warfield	NIST, Office of Weights and Measures
Advisory Member	Curtis Williams	Retired
Public Sector Member	Mahesh Albuquerque	Colorado
Public Sector Member	Stephen Benjamin	North Carolina
Public Sector Member	Tim Elliott	Washington
Public Sector Member	Kristin Macey	California
Public Sector Member	Doug Rathbun	Illinois
Public Sector Member	Bill Striejewske	Nevada
Public Sector Member	Timothy White	Michigan
Public Sector Member	Michelle Wilson	Arizona
Private Sector Member	Holly Alfano	Independent Lubricant Manufacturers Association
Private Sector Member	Matt Bjornson	Bjornson Oil Company
Private Sector Member	Bill Cannella	Chevron Global Downstream, LLC
Private Sector Member	Chuck Corr	Archer Daniels Midland Company
Private Sector Member	Davis Cosey	Davis Oil Company
Private Sector Member	Kelly Davis	Renewable Fuels Association
Private Sector Member	Ed Dougherty	Sunoco LP

Fuels and Lubricants Subcommttee		
OFFICE	**NAME**	**AFFILIATION**
Private Sector Member	Scott Fenwick	National Biodiesel Board
Private Sector Member	David Fialkov	NATSO
Private Sector Member	Rick Fragnito	Shell
Private Sector Member	Philip Guillemette	Flint Hills Resources, LP
Private Sector Member	John Harkins	Sunoco Logistics
Private Sector Member	Marilyn Herman	Herman and Associates
Private Sector Member	Cal Hodge	A 2nd Opinion, Inc.
Private Sector Member	Joanna Johnson	Automotive Oil Exchange Association
Private Sector Member	Brian Kernke	Loves Travel Stops
Private Sector Member	Stephen Kirby	General Motors
Private Sector Member	David A. Kovach	BP Products
Private Sector Member	Mike Kunselman	Center for Quality Assurance
Private Sector Member	Jeffrey Leiter	Bassman, Mitchell, Alfano & Leiter Chtd.
Private Sector Member	Russ Lewis	Marathon Petroleum, LLC
Private Sector Member	Michael Lynch	ExxonMobil Corporation
Private Sector Member	Scott Mason	Phillips 66
Private Sector Member	John Maynes	PMCI
Private Sector Member	Beverly Michels	BP Products
Private Sector Member	Kristi Moore	KMoore Consulting, LLC
Private Sector Member	Manuch Nikanjam	Chevron Global Downstream, LLC
Private Sector Member	Brian Parnell	Mapco Express
Private Sector Member	Keith Penn	Colonial Pipeline Company
Private Sector Member	Derek Regal	Tesoro Companies, Inc.
Private Sector Member	Prentiss Searles	American Petroleum Institute
Private Sector Member	Jenny Sigelko	Volkswagen Group of America
Private Sector Member	Dr. Prasad Tumati	Haltermann Solutions
Private Sector Member	Rob Underwood	Petroleum Marketers Association of America
Private Sector Member	Marie Valentine	Toyota – TEMA – ITC
Private Sector Member	Steve Vander Griend	ICM, Inc.

Packaging and Labeling Subcommittee		
OFFICE	**NAME**	**AFFILIATION**
Committee Chair	Christopher Guay	Procter and Gamble, Co.
NIST Technical Advisor	David Sefcik	NIST, Office of Weights and Measures
Public Sector – Central	Nicholas Owens	Stark County Weights and Measures, Ohio
Public Sector – Northeastern	Frank Greene	Connecticut
Public Sector – Southern	Hal Prince	Florida
Public Sector – Western	Angela Godwin	County of Ventura, California
Private Sector Member	Ann Boeckman	Kraft Food Group, Inc.
Private Sector Member	Krister Hard af Segerstad	IKEA North America Services, LLC
Private Sector Member	Zina Juroch	Pier 1 Imports

Promotional Tool Kit Task Group		
OFFICE	**NAME**	**AFFILIATION**
Chair	Stephen Benjamin	North Carolina
Public Sector Member	Kurt Floren	Los Angeles County, California
Public Sector Member	Jerry Buendel Kurt Floren	Washington
Private Sector Member	Henry Oppermann	Weights and Measures Consulting
Private Sector Member	John Hughes	Rice Lake Weighing Systems, Inc.

Safety Task Group		
OFFICE	**NAME**	**AFFILIATION**
Chair	Julie Quinn	Minnesota
Public Sector Member	Jason Flint	New Jersey
Public Sector Member	Georgia Harris	NIST, Office of Weights and Measures
Public Sector Member	Elizabeth Koncki	Maryland
Public Sector Member	Matt Maiten	Santa Barbara County, California
Public Sector Member	Brenda Sharkey	South Dakota
Public Sector Member	Mike Sikula	New York
Private Sector Member	Tisha Arriaga	Marathon Petroleum, LLC
Private Sector Member	Bill Callaway	Crompco
Private Sector Member	Remy Cano	Northwest Tank and Environmental Services, Inc.
Private Sector Member	Joe Grell	Rice Lake Weighing Systems, Inc.
Private Sector Member	Brad Fryburger	Rinstrum, Inc.
Private Sector Member	Robert LaGasse	Mulch and Soil Council
Private Sector Member	John Lawn	Rinstrum, Inc.

Meat, Poultry, Fish and Seafood Method of Sale Task Group		
Office	**Name**	**Affiliation**
Co-Chair	David Sefcki	NIST, Office of Weights and Measures
Co-Chair	Lisa Warfield	NIST, Office of Weights and Measures
Public Sector Member	Cheryl Ayer	New Hampshire
Public Sector Member	Stephen Benjamin	North Carolina
Public Sector Member	Charles Carroll	Massachusetts
Public Sector Member	Fran Elson-Houston	Ohio
Public Sector Member	Kurt Floren	Los Angeles County, California
Public Sector Member	Roger Frazier	Arkansas
Public Sector Member	Jason Glass	Kentucky
Public Sector Member	Brett Gurney	Utah
Public Sector Member	Milton Hargrave	Virginia

Meat, Poultry, Fish and Seafood Method of Sale Task Group		
Office	**Name**	**Affiliation**
Public Sector Member	Ryanne Hartman	Michigan
Public Sector Member	Lori Jacobson	South Dakota
Public Sector Member	Tim Osmer	New Hampshire
Public Sector Member	Hal Prince	Florida
Public Sector Member	Louis Sakin	Towns of Hopkinton/Northbridge, Massachusetts
Public Sector Member	Ken Tichota	Nebraska
Public Sector Member	Philip Wright	Texas
Private Sector	Dave Davis	Utah Food Industry Association
Private Sector	Linda Doherty	New Jersey Food Council
Private Sector	Eric Harden	The Fresh Market, Inc.
Private Sector	Vincent Orr	Whole Foods Market
Private Sector	Audrey Patterson	King Williams and Gleason, LLP
Private Sector	Michael Robertson	Publix Supermarkets
Private Sector	Kevin Schneider	Giant Food
Private Sector	Elizabeth Tansing	Food Marketing Institute

Weigh-In-Motion Task Group		
Office	**Name**	**Affiliation**
Co-Chair	Tim Chesser	Arkansas
Co-Chair	Alan Walker	Florida
NTEP Technical Advisor	Darrell Flocken	NCWM
NIST Technical Advisor	Rick Harshman	NIST, Office of Weights and Measures
Public Sector Member	John Barton	NIST, Office of Weights and Measures
Public Sector Member	Greg Gholston	Mississippi
Public Sector Member	Lenny Goebel	Illinois
Public Sector Member	John McGuire	New Jersey
Public Sector Member	Jason Smith	South Dakota
Private Sector Member	Jon Arnold	Intercomp Company
Private Sector Member	Tim Broemmer	Rice Lake Weighing Systems, Inc.

Weigh-In-Motion Task Group		
Office	**Name**	**Affiliation**
Private Sector Member	Scott Davidson	Mettler-Toledo, LLC
Private Sector Member	James Faas	YRC Freight
Private Sector Member	Brad Fryburger	Rinstrum, Inc.
Private Sector Member	Eric Golden	Cardinal Scale Manufacturing, Co.
Private Sector Member	Joe Grell	Rice Lake Weighing Systems, Inc.
Private Sector Member	Randy Hanson	International Road Dynamics
Private Sector Member	John Lawn	Rinstrum, Inc.
Private Sector Member	Joe Rickey	Rinstrum, Inc.
Private Sector Member	Louis Straub	Fairbanks Scale, Inc.
Private Sector Member	Richard Suiter	Richard Suiter Consulting
Private Sector Member	Brian Taylor	Intelligent Imaging Systems
Private Sector Member	Russ Vires	Mettler-Toledo, LLC
Private Sector Member	Sam Wimsett	Cardinal Scale Manufacturing, Co.
Private Sector Member	Matt Young	Intercomp Company

Multiple Dimension Measuring Device Work Group		
OFFICE	**NAME**	**AFFILIATION**
Chair	Robert Kennington	Quantronix, Inc.
NTEP Administrator	Jim Truex	NCWM
NTEP Specialist	Darrell Flocken	NCWM
Technical Advisor	Rick Harshman	NIST, Office of Weights and Measures
Public Sector Member	Tom Buck	Ohio
Public Sector Member	Fran Elson-Houston	Ohio
Public Sector Member	Pascal Turgeon	Measurement Canada, Policy/Regulations Group
Private Sector Member	Sprague Ackley	Honeywell
Private Sector Member	Seth Bauer	Old Dominion Freight
Private Sector Member	Bill Danderand	FedEx Freight
Private Sector Member	Scott Davidson	Mettler-Toledo, LLC
Private Sector Member	Michael Eichenberg	FreightSnap, LLC

Multiple Dimension Measuring Device Work Group		
OFFICE	**NAME**	**AFFILIATION**
Private Sector Member	Matthew Erim	National Motor Freight Traffic Association
Private Sector Member	Justin Harper	AOA Xinetic/NGC
Private Sector Member	Scott Henry	Zebra Technologies
Private Sector Member	Uwe Mohr	Vitronic
Private Sector Member	Scott Murchison	Zebra Technologies
Private Sector Member	Don Newell	National Motor Freight Traffic Association
Private Sector Member	Sameer Parmar	SICK, Inc.
Private Sector Member	Weston Privett	XPO LTL
Private Sector Member	Tony Romeo	Datalogic
Private Sector Member	Christopher Senneff	Rice Lake Weighing Systems, Inc.
Private Sector Member	Richard Shipman	Rice Lake Weighing Systems, Inc.
Private Sector Member	Mike Stutler	United Parcel Service
Private Sector Member	Richard Suiter	Richard Suiter Consulting
Private Sector Member	Russ Vires	Mettler-Toledo, LLC
Private Sector Member	Scott Wigginton	United Parcel Service

NTEP Belt-Conveyor Sector		
OFFICE	**NAME**	**AFFILIATION**
Chair	Peter Sirrico	Thayer Scale/Hyer Industries
NTEP Administrator	Jim Truex	NCWM
NTEP Specialist	Darrell Flocken	NCWM
Technical Advisor	John Barton	NIST, Office of Weights and Measures
Public Sector Member	Tina Butcher	NIST, Office of Weights and Measures
Public Sector Member	Zacharias Tripoulas	Maryland
Public Sector Member	Thomas Vormittag	Nevada
Private Sector Member	Rafael Jimenez	Association of American Railroads Transportation Technology Center, Inc.
Private Sector Member	Jason Kukachka	Thermo Fisher Scientific

NTEP Grain Analyzer Sector		
OFFICE	**NAME**	**AFFILIATION**
Chair	Karl Cunningham	Illinois
NTEP Administrator	Jim Truex	NCWM
NTEP Specialist	Darrell Flocken	NCWM
Technical Advisor	G. Diane Lee	NIST, Office of Weights and Measures
Advisory Member	Cassie Eigenmann	Retired
Public Sector Member	Randy Burns	Arkansas
Public Sector Member	Tina Butcher	NIST, Office of Weights and Measures
Public Sector Member	Ivan Hankins	Iowa
Public Sector Member	Thomas Hughes	Missouri
Public Sector Member	Jason Jordan	USDA, GIPSA, Technical Services Division
Private Sector Member	Jeffrey Adkisson	Grain and Feed Association of Illinois
Private Sector Member	Rachel Beiswenger	TSI Incorporated
Private Sector Member	Martin Clements	The Steinlite Corporation
Private Sector Member	Kathy Conover	DICKEY-john Corporation
Private Sector Member	Andrew Gell	Foss North America
Private Sector Member	Charles Hurburgh, Jr.	Iowa State University
Private Sector Member	Jess McCluer	National Grain and Feed Association
Private Sector Member	Thomas Runyon	Seedburo Equipment Co.

NTEP Measuring Sector		
OFFICE	**NAME**	**AFFILIATION**
Chair	Michael Keilty	Endress + Hauser Flowtec AG, USA
NTEP Administrator	Jim Truex	NCWM
NTEP Specialist	Darrell Flocken	NCWM

NTEP Measuring Sector		
OFFICE	**NAME**	**AFFILIATION**
Technical Advisor	Clark Cooney	California Division of Measurement Standards
Public Sector Member	Luciano Burtini	Measurement Canada
Public Sector Member	Tina Butcher	NIST, Office of Weights and Measures
Public Sector Member	Joe Eccleston	Maryland
Public Sector Member	Allen Katalinic	North Carolina
Public Sector Member	John Roach	California
Private Sector Member	Steve Bar	Bennett Pump Company
Private Sector Member	Marc Buttler	Emerson Process Management/Micro Motion
Private Sector Member	Craig Cavanaugh	Tuthill Transfer Systems
Private Sector Member	Rodney Cooper	Brodie International
Private Sector Member	Constantine Cotsoradis	Flint Hills Resources
Private Sector Member	Ronnell Gallon	Zenner Performance Meters, Inc.
Private Sector Member	Paul Glowacki	Murray Equipment, Inc.
Private Sector Member	Gordon Johnson	Gilbarco, Inc.
Private Sector Member	Dmitri Karimov	Liquid Controls, LLC
Private Sector Member	Douglas Long	RDM Industrial Electronics
Private Sector Member	Andrew MacAllister	Daniel Measurement and Control
Private Sector Member	Wade Mattar	Invensys/Foxboro
Private Sector Member	Richard Miller	FMC Technologies Measurement Solutions, Inc.
Private Sector Member	Randy Moses	Wayne Fueling Systems
Private Sector Member	Andre Noel	Neptune Technology Group, Inc.
Private Sector Member	Christopher (Adam) Oldham	Gilbarco, Inc.
Private Sector Member	Richard Tucker	RL Tucker Consulting, LLC

NTEP Software Sector

OFFICE	NAME	AFFILIATION
Chair	James Pettinato	FMC Technologies Measurement Solutions, Inc.
NTEP Administrator	Jim Truex	NCWM
NTEP Specialist	Darrell Flocken	NCWM
Secretary	Teri Gulke	Liquid Controls, LLC
Technical Advisor	Doug Bliss	Mettler-Toledo, LLC
Public Sector Member	Andrei Brezoica	California
Public Sector Member	Tom Buck	Ohio
Public Sector Member	Luciano Burtini	Measurement Canada
Public Sector Member	Joe Eccleston	Maryland
Public Sector Member	Eric Morabito	New York
Public Sector Member	John Roach	California
Public Sector Member	Ambler Thompson	NIST, Office of Weights and Measures
Public Sector Member	Zacharias Tripoulas	Maryland
Private Sector Member	Mary Abens	Emerson Process Management
Private Sector Member	John Atwood	Tyson Foods
Private Sector Member	Gary Benjamin	NCR Corporation
Private Sector Member	Benjamin Bertz	Red Seal Measurement
Private Sector Member	Kevin Detert	Avery Weigh-Tronix
Private Sector Member	Andrew Gell	Foss North America
Private Sector Member	Keith Harper	Gencor Industries, Inc.
Private Sector Member	Tony Herrin	Cardinal Scale Manufacturing, Co.
Private Sector Member	Dominic Meyer	KSi Conveyors, Inc.
Private Sector Member	Richard Miller	FMC Technologies Measurement Solutions, Inc.
Private Sector Member	Christopher (Adam) Oldham	Gilbarco, Inc.
Private Sector Member	Mike Roach	VeriFone
Private Sector Member	Robin Sax	CompuWeigh Corporation
Private Sector Member	David Vande Berg	Vande Berg Scales
Private Sector Member	Caleb Westadt	TSI Incorporated
Private Sector Member	John Wind	Bizerba USA, Inc.

NTEP Software Sector		
OFFICE	**NAME**	**AFFILIATION**
Private Sector Member	Kraig Wooddell	Hobart

NTEP Weighing Sector		
OFFICE	**NAME**	**AFFILIATION**
Chair	Rob Upright	Vishay Transducers
NTEP Administrator	Jim Truex	NCWM
NTEP Specialist	Darrell Flocken	NCWM
Technical Advisor	Rick Harshman	NIST, Office of Weights and Measures
Advisory Member	Robert Feezor	Retired
Public Sector Member	L. Cary Ainsworth	USDA, GIPSA
Public Sector Member	Tina Butcher	NIST, Office of Weights and Measures
Public Sector Member	Kevin Chesnutwood	NIST, Office of Weights and Measures
Public Sector Member	Fran Elson-Houston	Ohio
Public Sector Member	Nathan Gardner	Oregon
Public Sector Member	Marcus Harwitz	USDA, GIPSA, FGIS
Public Sector Member	Robert Meadows	Kansas
Public Sector Member	Eric Morabito	New York
Public Sector Member	Zacharias Tripoulas	Maryland
Public Sector Member	Pascal Turgeon	Measurement Canada
Public Sector Member	Juana Williams	NIST, Office of Weights and Measures
Private Sector Member	Steven Beitzel	Systems Associates, Inc.
Private Sector Member	Neil Copley	Thurman Scale Co.
Private Sector Member	Bill Danderand	FedEx Freight
Private Sector Member	Mitchell Eyles	Flintec, Inc.
Private Sector Member	Brad Fryburger	Rinstrum, Inc.
Private Sector Member	Eric Golden	Cardinal Scale Manufacturing, Co.
Private Sector Member	Jon Heinlein	Transcell Technology, Inc.
Private Sector Member	Scott Henry	Zebra Technologies

NTEP Weighing Sector		
OFFICE	**NAME**	**AFFILIATION**
Private Sector Member	Sam Jalahej	Totalcomp, Inc.
Private Sector Member	Rafael Jimenez	Association of American Railroads Transportation Technology Center, Inc.
Private Sector Member	John Lawn	Rinstrum, Inc.
Private Sector Member	L. Edward Luthy	Schenck Process Transport N.A.
Private Sector Member	Weston Privett	XPO LTL
Private Sector Member	Thomas Rice	Mettler-Toledo, LLC
Private Sector Member	Louis Straub	Fairbanks Scale, Inc.
Private Sector Member	Russ Vires	Mettler-Toledo, LLC
Private Sector Member	Jerry Wang	A&D Engineering, Inc.

Central Weights and Measures Association (CWMA)	**www.cwma.net**	
States	Illinois Indiana Iowa Kansas Michigan Minnesota Missouri Nebraska North Dakota	Ohio South Dakota Wisconsin
Contact	Sherry Turvey Kansas Department of Agriculture	(785) 564-6681 sherry.turvey@kda.ks.gov
Annual Meeting	May 21 - 24, 2018	Springfield, Illinois
Interim Meeting	October 16 - 18, 2017	St. Charles, Missouri

Northeastern Weights and Measures Association (NEWMA)	**www.newma.org**	
States	Connecticut Maine Massachusetts New Hampshire New Jersey New York Pennsylvania Puerto Rico Rhode Island	Vermont
Contact	James Cassidy City of Cambridge Weights and Measures Department	(617) 349-6133 jcassidy@cambridgema.gov
Annual Meeting	TBD, 2018	TBD
Interim Meeting	October 25 - 26, 2017	Portland, Maine

Southern Weights and Measures Association (SWMA)	**www.swma.org**	
States	Alabama Arkansas Delaware District of Columbia Florida Georgia Kentucky Louisiana Maryland Mississippi	North Carolina Oklahoma South Carolina Tennessee Texas U.S. Virgin Islands Virginia West Virginia
Contact	Tim Chesser Arkansas Bureau of Standards	(501) 570-1154 tim.chesser@aspb.ar.gov
Annual Meeting	October 8 - 11, 2017	North Little Rock, Arkansas

Western Weights and Measures Association (WWMA)	**www.westernwma.org**	
States	Alaska Arizona California Colorado Hawaii Idaho Montana Nevada New Mexico	Oregon Utah Washington Wyoming
Contact	Michelle Wilson Arizona Department of Weights and Measures	(602) 771-4933 mwilson@azda.gov
Annual Meeting	September 24 - 28, 2017	Scottsdale, Arizona

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General Session
Proceeding Speeches, Presentations, and Awards

Pittsburgh, Pennsylvania
July 16 – 20, 2017

Table A
Table of Contents

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Honorary President's Address
"Measurements: The Constant Frontier"

Pittsburgh, Pennsylvania
July 18, 2017

Kent Rochford
Acting Under Secretary of Commerce for Standards and Technology and
Acting Director, National Institute of Standards and Technology (NIST)

Mr. Kent Rochford, Acting Director of the National Institute of Standards and Technology (NIST) and Acting Under Secretary of Commerce, gave a presentation at the 102nd Annual Meeting. This presentation gives a thoughtful look at NIST's impact on measurement and science. Currently, NIST is working to redefine the kilogram based on a property of nature, the Planck constant, rather than using a physical artifact that is affected by environmental factors.

Mr. Rochford's presentation follows.

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Honorary President's Address Presentation

Measurements: The Constant Frontier

Kent Rochford, Acting Under Secretary of Commerce for Standards and Technology and Acting Director, National Institute of Standards and Technology

National Conference of Weights and Measurements | July 18, 2017

MEASURE.
INNOVATE.
LEAD.

NIST & Pittsburgh

WE GO WAY BACK

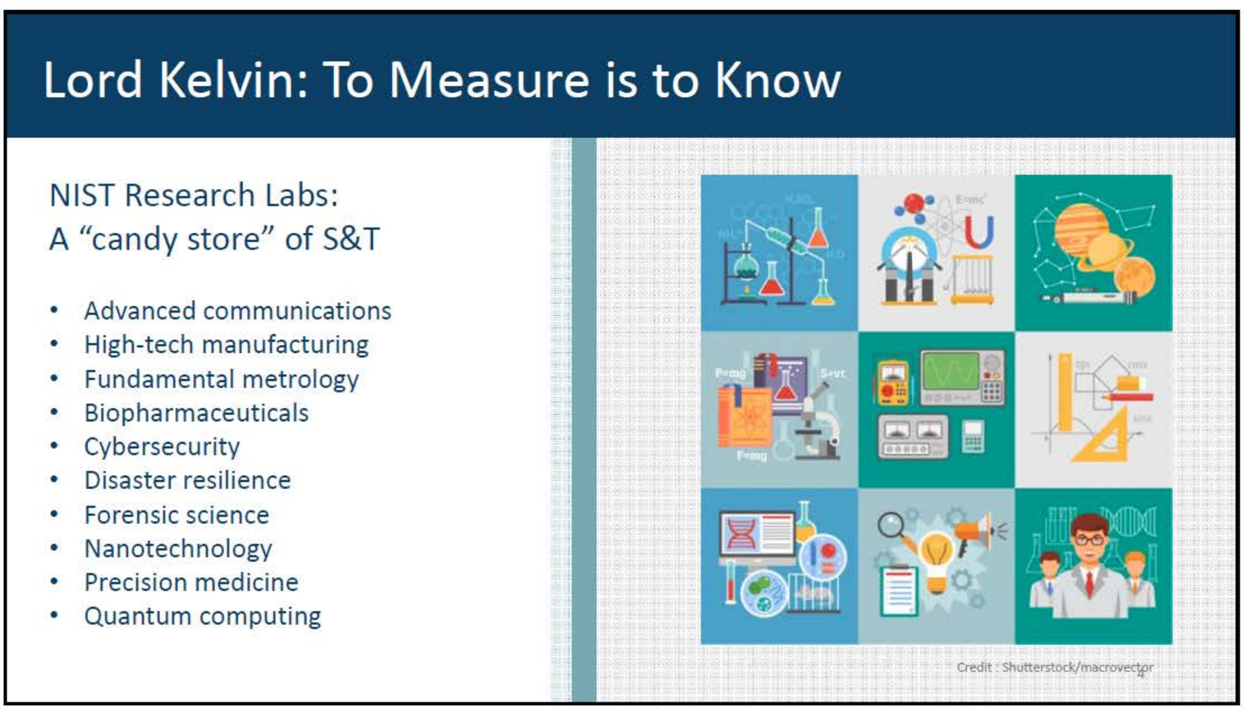
Main laboratory building at NIST/NBS Pittsburgh, 1910

Pittsburgh today:

- $20B Tech sector
- World class universities
- Leader in manufacturing

2


Better Measures, Better Commerce
Grocery shopping at the turn of the last century
(Note grocer's thumb at the ready)
1909 to 1911: NIST/NBS study finds
• W&Ms favor shopkeepers—50% of scales, 20% of weights, 50% of dry measures, and 25% of liquid measures cheat customers
Article I, Section 8:
The Congress shall have the power to...fix the standard of weights and measures
We the People
THE CONSTITUTION OF THE UNITED STATES OF AMERICA
3
Credit : P. Rush, J. O'Keefe, Weights and Measures, 1962


Lord Kelvin: To Measure is to Know
NIST Research Labs:
A "candy store" of S&T
• Advanced communications
• High-tech manufacturing
• Fundamental metrology
• Biopharmaceuticals
• Cybersecurity
• Disaster resilience
• Forensic science
• Nanotechnology
• Precision medicine
• Quantum computing
Credit : Shutterstock/macrovector
4

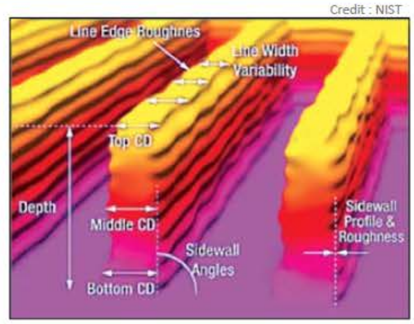
Tiny Measures, Large Impact

Advanced Semiconductor Metrology

NIST combined two advanced techniques with mathematical modeling:

- Sharper imaging
- More cost-effective fabrication
- Smaller linewidths
- Faster semiconductor chips
- Measurement **uncertainty improved by 35%**

Credit : NIST



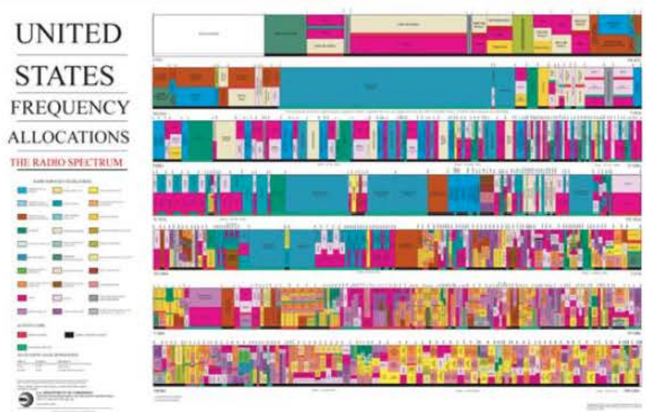
σ_{width} = ± 0.110 nm ± 0.119 nm ± 0.079 nm

X-ray SEM Hybrid

Accelerating Innovation

Autos:
Light, strong alloys = fuel efficiency, lower emissions

Biopharma:
Enhancing quality, consistency for safer, more effective macromolecules



Wireless communications:
Addressing frequency crunch with better metrology

6

Credit: www.france-metallurgie.com, DoC, NIST

Core Values: Perseverance, Integrity, Inclusivity, Excellence

Credit: NIST

NIST W&M's Training Since July 1, 2016:
1050 students in 55 class sessions

- Lab metrology
- Weighing and measuring devices
- Package control
- Price verification
- 1745 CEUs earned

21 Sessions held in your jurisdictions

- 15 states, Puerto Rico, Mexico

NIST-NCWM grant used for:

- State administrators workshop (21 students)
- Mentoring of candidate non-NIST instructors

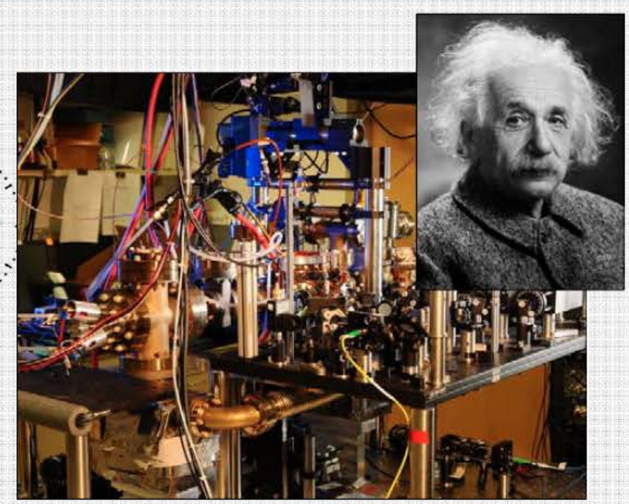
Educational outreach — 5826 participants

7

Crazy Precise: Einstein Was Right!

Time moves a tiny bit slower at higher altitudes

NIST Boulder scientists observed these effects by making specific changes in one of two aluminum clocks and measuring the resulting differences in the two ions' relative ticking rates.



Credit: Jim Burrus/ NIST, Wikimedia Commons

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Futureproofing: A Fully Nature-based SI

Redefining the Kilogram

The Problem:
The whole world has one true kilogram

Redefinition: Replace the physical mass artifact with a definition based on nature, the Planck constant

Physical kilogram artifact (1889)

New Definition: Two routes to a better Planck, electromagnetic force & counting atoms in a perfect sphere of silicon

Credit all: NIST

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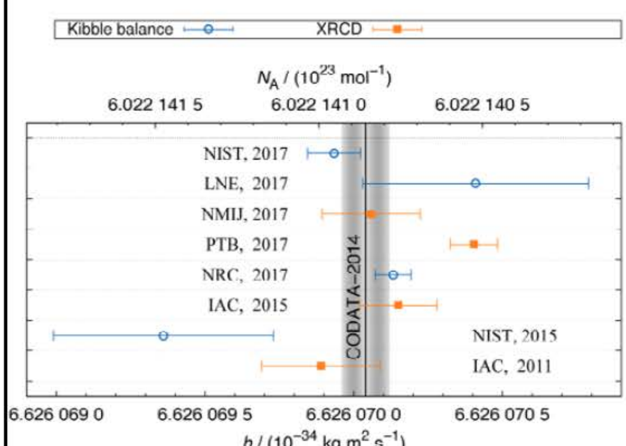
The Planck Constant: **Key to a Revised SI**



Credit: Stephan Schlamminger/NIST

Converging on a Planck-based kilogram

Working with other national metrology institutes around the world, NIST researchers carefully measured the Planck constant so that it can be the cornerstone of a new, improved International System of Units.

Two independent methods:

- Electromagnetic force – blue
- Mass of silicon atoms, perfect sphere – orange

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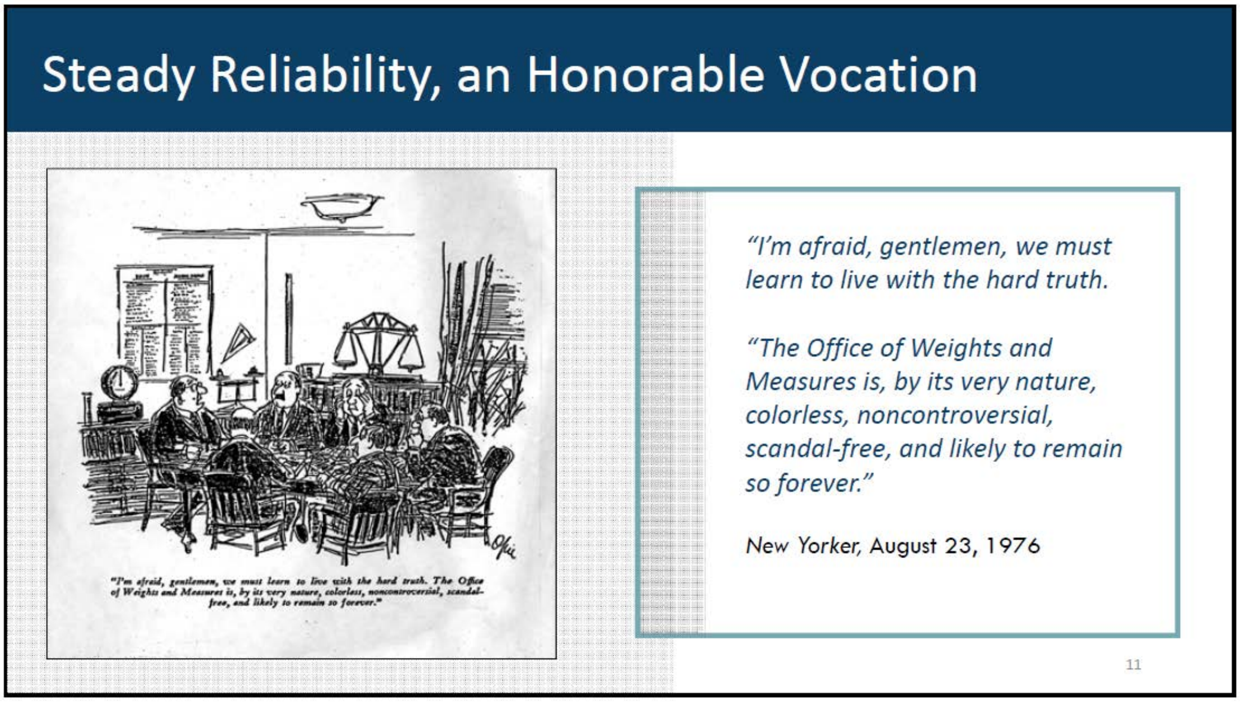
Steady Reliability, an Honorable Vocation
“I’m afraid, gentlemen, we must learn to live with the hard truth.
“The Office of Weights and Measures is, by its very nature, colorless, noncontroversial, scandal-free, and likely to remain so forever.”
New Yorker, August 23, 1976
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National Conference on Weights and Measures
Chairman's Address

Pittsburgh, Pennsylvania
July 18, 2017

Kristin Macey
California Department of Food and Agriculture
Division of Measurement Standards

Honored guests, fellow members, and friends, it is my honor to welcome you to Pittsburgh, Pennsylvania, and the 102nd Annual Meeting of the National Conference on Weights and Measures (NCWM).

This time last year in Denver, Colorado, we learned the name, and briefly met, the new chief of the National Institute of Standards and Technology (NIST), Office of Weights and Measures (OWM), Dr. Doug Olson. Any change at NIST OWM will potentially affect the NCWM, and anyone following Carol Hockert has big shoes to fill. However, today, I am pleased to report that Carol's knowledge transfer efforts worked; Dr. Olson has grown very big feet and is filling in those shoes quite nicely. Doug's actions so far speak volumes about the commitment NIST has to the NCWM and ensures our relationship will remain on solid ground.

My theme for this year is "Tradition and Technology: Finding the Right Balance." Pittsburgh is such a great city to experience instances of each. It is one of the few U.S. cities now testing autonomous vehicles in real-world conditions. Indeed, the transportation sector is a very good example of how the speed of technological changes are necessitating the development of new and timely measurement standards. For those of you who are interested in tradition, it may surprise you that there is, right here in Pittsburgh, a museum of old weights and measures artifacts, provided and supported by the International Society of Antique Scale Collectors. This is an excellent example of how we give reverence to our past.

Regarding standards development, I am pleased to appoint former NCWM Chairman Jerry Buendel, to lead the Charter Team he created to review NCWM's current method of developing and creating new standards. To briefly recap the issue: The process to adopt prompt measurement standards has become more problematic in recent years. Industry is constantly ahead of regulators in developing new measurement technologies or means to sell their products. The NCWM Committees' agendas have grown. They report there is not enough time at their meetings to thoroughly consider each item, develop finished language, and deliver items ready for consideration at the voting sessions. When the voting and publishing changes to the NIST handbooks becomes delayed, this frustrates businesses trying to go through proper channels. Regulators are also becoming more impatient with the deferral of agenda items, as states are being forced to react with state-specific laws that may or may not agree with the adopted uniform codes. Patchwork enforcement is not good for businesses. It is problematic for regulators and NIST technical advisors. Under Jerry's leadership, we have an opportunity to refresh NCWM's review of how we conduct business to ensure process efficiency and effectiveness for all.

As you heard earlier today, NCWM is conducting a widespread review of regulatory programs across the United States this year that will establish a baseline for recurring future surveys. The NCWM Weights and Measures Survey, developed by Don Onwiler (NCWM), Steve Harrington (Oregon) and Craig VanBuren (Michigan) was sent to all state directors this July. This is the most comprehensive request for information in recent years. The survey asks questions about funding sources, operating expenses, staffing, salaries, scope of activities, inspection intervals, and compliance rates. The NCWM Board of Directors has approved a two-year cycle for this survey, which will alternate with the biannual NIST Metrology Workload Survey. Additionally, the Board has approved the development of a comprehensive Petroleum Laboratory Survey. Combined, these three surveys will give us valuable data accruing on a broad spectrum of subject areas that can be used by individual jurisdictions and the U.S. weights and measures community. This is in keeping with our Strategic Goal 2 to expand the role of the NCWM as a source of support for state and local weights and measures programs.

Another way NCWM is demonstrating value to regulatory and industry stakeholders is the continued advancement on professional certification exams. It has been five years now since the first exam was produced for retail motor-fuel dispensers. Six exams are in place, and two more have just been created. Unlike the others, these two are to test individuals on the basic weighing and measuring concepts of NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements of Weighing and Measuring Devices." After the Board of Directors approves proctoring procedures, all exams will need to be proctored. This will assure the integrity of the exam process and is a requirement of the accreditation we are seeking.

Our Conference, the 102nd, is being held in the historic Omni-William Penn Hotel, built in 1916. This is where celebrities and presidents stay when visiting Pittsburgh. Every sitting president since Theodore Roosevelt has stayed here while in office so we know that John F. Kennedy has been here. You've heard the good things that NCWM is doing this year, so in the spirit of JFK let me just say, "My fellow members, ask not what NCWM can do for you, ask what you can do for NCWM!" Ours is an organization that is driven from the bottom up; NCWM is only the conduit for change. It is most likely to be an inspector in the field who finds something amiss which generates a proposal to change a handbook. For each of the 237 registrants at this Conference, there are tenfold back home. How do we inspire, train, and retain these people? Some of them will become our future leaders, so how do we get them involved in our process? Let them participate! Do you remember your first NCWM Conference? I do, and I remember what an inspiration it was to me. Allow your employees to experience the same "light-bulb moment." Expose them to a regional meeting, NIST training event, or NCWM Conference if nearby. This year a full 20 % of the registrants are first time attendees, and we have two students registered, Maxwell Kirby and Holly Butcher. Help them grow into our future leaders! Other things you can do to keep the Conference fresh in our minds is to talk about these meetings with your staff back home and continue to educate your administrators about the importance of weights and measures.

In closing, I want you to know how much your trust and confidence this last year has meant to me. I've been supported at each step of the way by many groups and individuals – by the Nominating Committee who selected me; by Jerry Buendel who, as immediate past chair, was my mentor; by Don Onwiler, the NCWM staff, and Board of Directors who had to put up with a newbie; and by the NIST staff with their coordination of events and technical support.

Thanks to each one of you for making this year's Conference a huge success! And next year, you will be in good hands with Jimmy Cassidy as Chairman, and Brett Gurney who is on the horizon for 2018!

National Conference on Weights and Measures
Chairman-Elect's Address

Pittsburgh, Pennsylvania
July 20, 2017

James Cassidy
City of Cambridge, Massachusetts

Good Morning,

I am honored to be the Chairman of the 103rd Meeting of the National Conference of Weights and Measures. For those of you who don't know me and I think most do, because I have been told by many that I got character and a great personality; if not most, the colorful clothes that I do wear, and I do stand out. I am Jim Cassidy from the City of Cambridge in Cambridge, Massachusetts. I have been with the City of Cambridge, Weights and Measures Department for 18 years. My first Conference was in 1999 when I was able to come and represent the City of Cambridge.

Now, I would like to thank the City of Cambridge, City Manager, Louis DePasquale, and the Deputy City Manager, Lisa Petersen, and a couple of my former bosses, Bob Healy and Rich Rossi, which are great city managers and given me the opportunity to be here and participate with this great group. I do want to thank all of them for making this possible.

Over my 18 years, I have served as presiding officer multiple times and sat on the Credentials Committee. I have been on the Laws and Regulations Committee as Kristen (Macey) mentioned earlier. Going on in 2002 to 2007, I was very grateful in accepting this when Ross Anderson offered it to me. In 2007, I was the Chair as Kristin said earlier when the Conference was dealing with Automatic Temperature Compensation (ATC). Myself and my friend, Mr. Chesser, got to stand up here for quite a long time up at Snow Bird. It was a contentious long day, but we got through it. After serving as the L&R Committee Chair, I went on the Board of Directors from 2011 through 2016, when I was nominated to the Chair-elect position. I have served as the past chair of the Northeastern Weights and Measures Association (NEWMA) and numerous committees at NEWMA. I am presently the Secretary/Treasurer.

I'm also honored to be the fifth National Chairperson from the Commonwealth of Massachusetts. I am the third local official from Massachusetts, behind J.E. Bowen in 1967 and Tom Geiler in 1994. We also had J.P. McBride in 1958 and Ed Stadolnik in 1981, which were the State Directors at that time, and I'm grateful and honored. I would like to thank the Massachusetts folks that are here today Lou Sakin, Jack Walsh, Elaine Vieira, Angel Nazario, Mark Coyne. Past members, Bob McGrath, Bill Timmons, Tom Geiler and Steve Agostinelli. I can't forget, one of my good friends, that couldn't be here; he sent me a nice e-mail this morning, Charlie Carroll. As well as, many of my friends of NEWMA, Steve Giguere, John McGuire, Frank Greene Walt Remmert, Mike Sikula, Marc Paquette, Cheryl Ayer, and Ethan Bogren. All the great work that they have done here, and the other people here from NEWMA. I want to thank them for everything they have done.

In saying that, my theme for this upcoming year is "Back to the Basics, As We Arrive in the Cloud." As we look into the future of weights and measures, as we have seen this week folks, we now have a tentative code for Transportation Network Measurement System (TMNS). My main goal with saying this is there will be other devices and other systems we are going to look at that will be cloud based in other different ways. But, we must still remember, I'm still an inspector, I get my hands dirty, and I want to make sure every other inspector in this room feels comfortable. And, you have to remember a couple of things, a mile is still going to be 5280 feet, a gallon is still 231 cubic inches and a pound is still 16 ounces. How we test devices and systems might be a little bit different, but the measurement will still be the same. And I want to make sure we all understand this and feel comfortable. Not to take two steps back and when we're not sure what is going on here; what we do, the main concepts will not change. I don't think they ever will change. And, I want to make sure we really feel comfortable with that there.

My other goals for this year: first, I must thank Matt Curran for doing a great job with Fuels and Lubricants Subcommittee (FALS) group. I will replace Matt with Bill Striejewske from Nevada. Bart, thank you very much for allowing Bill to step into this role. I could meet with Bill when we sat in Boston. He has a lot of great drive. He is a very intelligent man, and he will help that group immensely. But saying that, when we look at our organizational chart, we only have a few states who participate on the FALS Committee on the regulated side. I am reaching out now, and I will as I come around the country to the four regions this year. I'm going to be asking you folks that have fuel quality labs and programs, if you have some great people in those groups, we need them, and I want them. Whatever I can do to help, if travel is an issue in the beginning, they still have web meetings. We need to strengthen that group, and there are other subcommittees and tasks groups, but this one right here is one of my tasks for right now. As we go along, we are going to be looking at others. But this is one of my main ones. So, I am reaching out to the states with these programs, if you have good quality people, we need them. Because, honestly folks, our membership is our Conference, we are better in numbers.

That's how I feel and I hope you feel the same way. Also, in talking about the regions, it was a great year, going from Hawaii with Jerri Kahana and Tim Lloyd, they did a fabulous job at the Western Weights and Measures Association (WWMA). Then going to Arlington, Texas, Phil Wright did a great job, and I thank those folks there. Kristin and I had a great time traveling together this year. We went to NEWMA, my home region, Ethan did a great job. Then we finished up in Lincoln, Nebraska. Ken Tichota also did a great job.

My goal is to strengthen our subcommittees and regions associations are as follows

1. Reach out to states with fuel labs to help strengthen the expertise of the membership to the FALS, which includes creating an on-line list server that allows members to communicate and access information.

2. Evaluate the structure of all regional meetings to ensure that they are running smoothly and efficiently.

3. For all regions, to designate one representative to assist me in mapping out a master calendar for our regional meetings.

Now, I would like to thank Jane Zulkiewicz and Matt Curran for their service on the S&T Committee, Lou Sakin for the L&R Committee, Stacey Carlson for the PDC, and Matt Curran for the FALS.

The appointments are as follows:

Standards and Tolerances (S&T) Committee

- Brad Bachelder, Maine: representing the Northeast region.

- Joe Eccleston, Maryland: completing Matt Curran's term; representing the Southern region.

Laws and Regulations (L&R) Committee

- John McGuire, New Jersey: representing the Northeast region.

Professional Development Committee (PDC)

- Jean Kliethermes, Missouri

Fuels and Lubricants Subcommittee (FALS)

- Bill Striejewse, Nevada: Chairman

Credentials Committee

- David Aguay, San Luis Obispo, California

Nominating Committee

- Chair Kristin Macey, Chair
- Stephen Benjamin
- Mark Coyne
- Frank Greene
- Ivan Hankins
- Rich Lewis
- Hal Prince

Presiding Officers

- Tim Chesser, Arkansas
- Loren Minnich, Kansas
- Bart O'Toole, Nevada
- Jack Walsh, Town of Wellesley, Massachusetts

Parliamentarian

- Lou Straub, Fairbanks Scale

Chaplain

- Constantine Cotsoradis, Flint Hills Resources.

Lastly, I would like to thank my lovely wife for her support and sacrifice in allowing me to fulfill my commitment and passion in weights and measures. After all, we are one of three couples, which I know of, that met through this fabulous organization. And thanks to you, Mr. John Albert and Mr. Ron Hayes, for letting me steal her away.

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Roll Call of the States

The Roll Call of the States is taken at the commencement of the Voting Session of the Annual Meeting.

Alabama	Kentucky **(X)**	Northern Mariana Islands
Alaska	Louisiana	Ohio **(X)**
American Samoa	Maine **(X)**	Oklahoma
Arizona **(X)**	Maryland **(X)**	Oregon **(X)**
Arkansas **(X)**	Massachusetts **(X)**	Pennsylvania **(X)**
California **(X)**	Michigan **(X)**	Puerto Rico
Colorado **(X)**	Minnesota **(X)**	Rhode Island
Connecticut **(X)**	Mississippi **(X)**	South Carolina
Delaware	Missouri **(X)**	South Dakota **(X)**
District of Columbia **(X)**	Montana	Tennessee **(X)**
Florida **(X)**	Navajo Nation	Texas **(X)**
Georgia **(X)**	Nebraska **(X)**	Utah **(X)**
Guam	Nevada **(X)**	Vermont **(X)**
Hawaii **(X)**	New Hampshire **(X)**	Virgin Islands
Idaho	New Jersey **(X)**	Virginia **(X)**
Illinois **(X)**	New Mexico **(X)**	Washington **(X)**
Indiana **(X)**	New York	West Virginia
Iowa **(X)**	North Carolina **(X)**	Wisconsin **(X)**
Kansas **(X)**	North Dakota	Wyoming

Present (X): **38**
Absent: **19**

102nd NCWM Annual Meeting/Award Recipients

Anniversary Awards

For 5 Years Attendance

- Luciano Burtini
- Joanna Johnson
- Jeri Kahana
- Robert Legg
- Matt Maiten
- Marco Mares
- Rachelle Miller
- Joe Moreo
- Louis Sakin
- Richard Scali
- Richard Shipman
- Elisa Stritt
- Stan Toy

For 10 Years Attendance

- John Albert
- Chuck Corr
- Fran Elson-Houston
- Krister Hard af Segerstad
- Jim Hewston
- Dmitri Karimov
- Julie Quinn
- Craig VanBuren
- Lisa Warfield

For 15 Years Attendance

- Cary Ainsworth
- Jerry Buendel

For 20 Years Attendance
- Kurt Floren
- Bob Murnane

For 25 Years Attendance
- Michael Kelly
- Don Onwiler

For 30 Years Attendance
- Lou Straub
- Richard Suiter

Special Recognition Awards

Presiding Officers
- Tim Chesser, Arkansas
- Loren Minnich, Kansas
- Marc Paquette, Vermont
- Jack Walsh, Town of Wellesley, Massachusetts

Chaplain
- Constantine Cotsoradis, Flint Hills Resources

Parliamentarian
- Lou Straub, Fairbanks Scale, Inc.

Sergeants-at-Arms
- Chris Brenner, Pennsylvania
- Ron Pierce, Pennsylvania

Nominating Committee
- Chairman – Jerry Buendel, Washington
- Stephen Benjamin, North Carolina
- Charles Carroll, Massachusetts
- Kurt Floren, Los Angles California
- John Gaccione, Westchester County, New York
- Joe Gomez, New Mexico

Credentials Committee
- Chairman – Matt Maiten, Santa Barbara County, California

Associate Membership Committee
- Chairman – Richard Shipman, Rice Lake Weighing Systems Inc.
- Vice-Chair – Bill Callaway, Crompco
- Secretary/Treasurer – Mark Flint, ADM

COMPLETING TERMS

Board of Directors
- Brett Gurney, Utah, Active Membership (Western)
- Raymond Johnson, New Mexico (Treasurer)

Laws and Regulations Committee
- Louis Sakin, Towns of Hopkinton/Northbridge, Massachusetts

Professional Development Committee
- Stacy Carlsen, Marin County, California

Specifications and Tolerances Committee
- Jane Zulkiewicz, Town of Barnstable, Massachusetts

CONTRIBUTIONS AWARD
- Dr. Matthew Curran, Florida
- Rebecca Richardson, MARC-IV Consulting

DISTINGUISHED SERVICE AWARD
- Tim Chesser, Arkansas
- Kurt Floren, Los Angeles County, California

LIFETIME ACHIEVEMENT AWARD
- Ross Andersen, Retired, New York

Lifetime Achievement Award

Qualifications:[1] This award recognizes members that are by and large well-known and highly regarded for their outstanding performance and contributions to NCWM. No more than one (1) award can be granted annually. The recipient will have been a member of NCWM for at least ten years. Nominees will be considered based on the following characteristics:

Integrity: Their contributions based on unbiased input in such a manner that members are confident that the only motivation is for the improvement the organization and our work products.

Leadership: Their contribution in leading NCWM Committees, Sub-Committees, Sectors, Task Forces, Ad Hoc Assignments, work as Appointive Officials, or other displays of leadership that have advanced the NCWM toward becoming an overall better organization. The individual selected for this award will have displayed sound decision making capabilities, communication skills, motivational skills, and a tolerance for the views of others.

Figure 1. Lifetime Achievement Award recipient, Mr. Ross Anderson (center), receives his award from Ms. Kristin Macey, NCWM Chairperson (left), and President Dr. Kent Rochford, NIST Acting Director (right).

[1] The criteria for special awards were obtained from the NCWM website at http://www.ncwm.net.

Distinguished Service Award

Qualifications: This award recognizes members that have made a long-term commitment of service and leadership to NCWM. The recipient will have been a member of NCWM for at least ten years and made significant contributions to the enhancement of the organization as a whole through committee service, important contributions to standards development, served as a resource for knowledge, promoted the vision for NCWM, or other long-term commitments that have advanced the mission of NCWM. Please note it is not necessary for the nominee to have provided contributions in each category.

Figure 2. Distinguished Service Award to Mr. Gordon Johnson, Gilbarco, Inc.

Mr. Gordon Johnson (center), receives the Distinguished Service Award form Ms. Kristin Macey, NCWM Chairperson (left) and Conference President, Dr. Kent Rochford (NIST, Acting Director (right).

Figure 3. Distinguished Service Award to Mr. Kurt Floren, Los Angeles County, California.

Mr. Kurt Floren, Los Angeles County, California (center), receiving the Distinguished Service Award from Chairperson Kristin Macey (left), and Dr. Kent Rochford (right).

Contributions Award

The NCWM Contributions Award recognizes members who have made notable contributions to NCWM standards, policy, administrative support or other services deemed worth of recognition. Recipients have been NCWM members for at least five years.

Figure 4. Contributions Award was present to Ms. Rebecca Richardson, MARC IV Consulting. Chairperson Kristin Macey (left) and President Dr. Kent Rochford (right) present the award to Ms. Rebecca Richardson (center).

Figure 5. Contributions Award was presented to Dr. Matthew Curran, Florida. Chairperson Kristin Macey (center) and President Dr. Kent Rochford (right) present the award to Dr. Matthew Curran (left).

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Report of the NCWM Board of Directors

Kristin Macey, Chair
California

1000 INTRODUCTION

This is the report of the Board of Directors (BOD) (hereinafter referred to as the "Board") for the 102nd Annual Meeting of the National Conference on Weights and Measures (NCWM). This report is based on the Interim Report offered in the NCWM Publication 16, "Board Report," testimony heard at public hearings, comments received from the regional weights and measures associations and other parties, the addendum sheets issued at the Annual Meeting, and actions taken by the membership at the voting session of the Annual Meeting. The voting items presented below were adopted as presented when this report was approved.

Table A identifies the agenda and appendix items by reference key, title of item, page number, and the appendices by appendix designations. The acronyms for organizations and technical terms used throughout the agenda are identified in Table B. The first four digits of an item's reference key are assigned from the Subject Series List. The status of each item contained in the report is designated as one of the following: **(D) Developing Item:** the Committee determined the item has merit; however, the item was returned to the submitter or other designated party for further development before any action can be taken at the national level; **(I) Informational Item:** the item is under consideration by the Committee but not proposed for Voting; **(V) Voting Item:** the Committee is making recommendations requiring a vote by the active members of NCWM; **(W) Withdrawn Item:** the item has been removed from consideration by the Committee.

Table C provides a summary of the results of the voting on the Committee's items and the report in its entirety. Some Voting Items are considered on an individual basis; others may be grouped in a consent calendar. Consent calendar items are Voting Items that the Committee has assembled as a single Voting Item during their deliberation after the open hearings on the assumption that the items are without opposition and will not require discussion. The Voting Items that have been grouped into consent calendar items will be listed on the addendum sheets. Prior to adoption of the consent calendar, the Committee entertains any requests from the floor to remove specific items from the consent calendar to be discussed and voted upon individually.

Proposed revisions to the handbook(s) are shown as follows. 1) deleted language is indicated with a **bold face font using ~~strikeouts~~** (e.g., **~~this report~~**), and 2) proposed new language is indicated with an **underscore bold faced font** (e.g., **new items**). When used in this report the term "weight" means "mass".

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

Subject Series List

Table A
Table of Contents

Appendices

Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
AMC	Associate Membership Committee	NTEP	National Type Evaluation Program
CTT	Conformity to Type	OIML	International Organization of Legal Metrology
ISWM	International Society of Weighing and Measuring	OWM	Office of Weights and Measures
MAA	Mutual Acceptance Arrangement	PDP	Principal Display Panel
L&R	Laws and Regulations Committee	PDC	Professional Development Committee
NCWM	National Conference on Weights and Measures	VCAP	Verified Conformity Assessment Program
NIST	National Institute of Standards and Technology		

Table C
Summary of Voting Results

Reference Key Number	*House of Senate Representatives*		*House of Delegates*		*Results*
	Yeas	*Nays*	*Yeas*	*Nays*	
1200-5	Voice Vote				Adopted
1200-6 To hear the amendment.	Voice Vote				Amendment was heard.
1200-6 To amend.	Voice Vote				Adopted
1200-6 As amended.	Voice Vote				Adopted
To Accept the Report	Voice Vote				Adopted

Details of All Items
(In order by Reference Key)

1100 ACTIVITY REPORTS

1100-1 I MEMBERSHIP

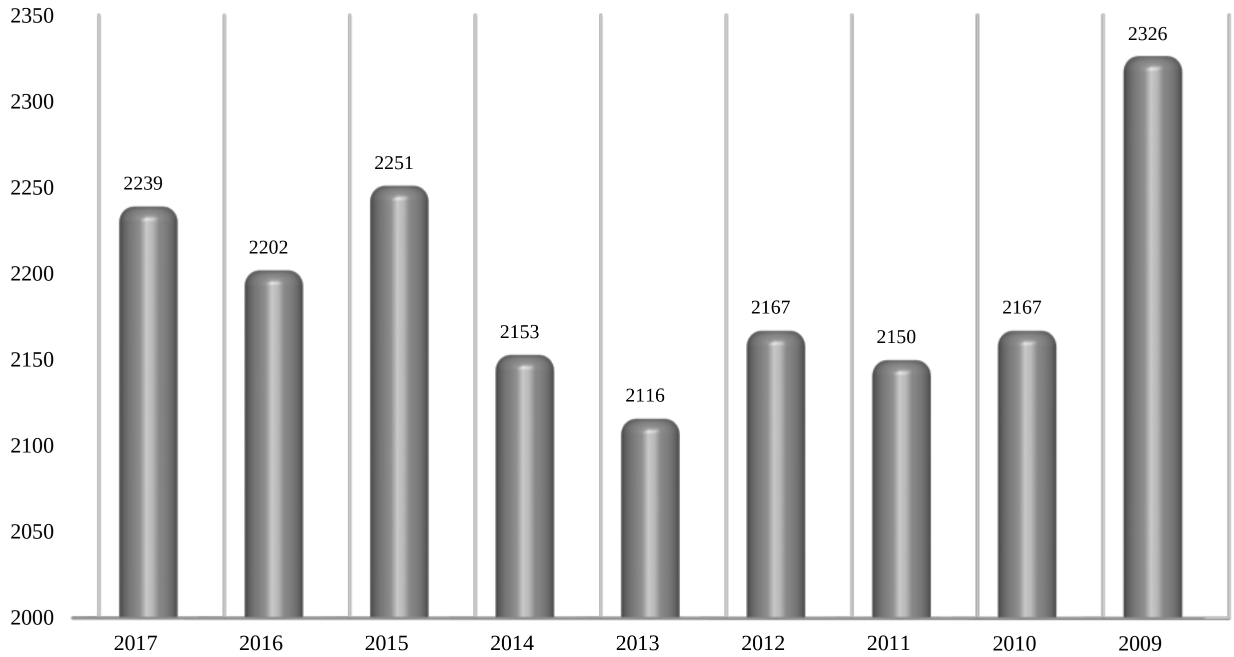
Membership

The chart and graph below show NCWM membership levels as of June 30 of recent years by membership categories. The potential growth remains significant and NCWM continues to enhance programs and services that add value to membership.

Annual Membership Totals

Year / Type	June 2017	June 2016	June 2015	June 2014	June 2013	June 2012	June 2011	June 2010	June 2009
Associate	817	803	806	802	818	842	813	814	822
Foreign Associate	87	89	76	64	50	58	62	53	53
Total Associate	**904**	**892**	**882**	**866**	**868**	**900**	**875**	**867**	**875**
State Government	658	675	665	603	558	589	567	565	696
Local Government	474	492	491	492	486	487	495	524	558
Total Active	**1132**	**1167**	**1156**	**1095**	**1044**	**1076**	**1062**	**1089**	**1254**
NIST	16	14	16	16	16	16	16	12	14
Other Federal Government	10	11	11	9	10	11	11	12	10
Foreign Government	14	14	13	13	13	14	14	12	24
Retired	222	215	219	207	198	195	202	196	196
Total Advisory	**262**	**254**	**259**	**242**	**237**	**236**	**243**	**232**	**244**
Grand Total	**2298**	**2313**	**2297**	**2203**	**2149**	**2212**	**2180**	**2188**	**2373**

Annual Membership Totals as of March 31, Each Year



1100-2 I MEETINGS

The 101st Annual Meeting was held at the Grand Hyatt in downtown Denver, Colorado, with attendance among the highest of the past 10 years and a large number of exhibitors. The Committees successfully moved on many important items on their agendas.

The 2017 Interim Meeting in San Antonio, Texas, was also very successful. For the second year, a special educational session was held on Wednesday morning. This year was a panel discussion on weights and measures in agriculture. Panelists included Ms. Kristin Macey (California), Mr. Ron Hayes (Missouri), Mr. Stephen Benjamin (North Carolina), Mr. Stuart Strnad (Texas), Ms. Stacey Schofield (GIPSA) and Mr. Ken Tichota (Nebraska). The session was very well attended and included very interesting discussions as each presenter delivered messages on impact in a wide range of agriculture market sectors. Because these sessions have been so successful, NCWM will continue to hold Wednesday morning educational sessions at the Interim Meetings. Anyone with ideas for compelling topics may submit them to NCWM for consideration by the Chairman.

Interim Meetings:

- January 21 - 24, 2018 Sirata Beach Resort and Conference Center, St. Petersburg, Florida
- January 13 - 16, 2019 Francis Marion Hotel, Charleston, South Carolina

Annual Meetings:

- July 15 - 19, 2018 103rd Annual Meeting: Hyatt Regency Tulsa Hotel in Tulsa, Oklahoma
- July 14 - 18, 2019 104th Annual Meeting: Hyatt Regency Hotel, Milwaukee, Wisconsin
- July 2020 Location to be determined in the Western Region

The 103rd Annual Meeting will be located at the Hyatt Regency Tulsa Hotel in Tulsa, Oklahoma. This hotel is in the heart of downtown Tulsa's vibrant business, entertainment, and cultural districts. The hotel overlooks the scenic gardens of the Williams Center Complex and is only eight miles from Tulsa International Airport. Adjoined via skybridge to Williams Towers, our luxury, high-rise Tulsa hotel is adjacent to the famous Tulsa Performing Arts Center and just a few walking blocks from the Cox Convention Center, BOK Center, and more than 50 restaurants and bars. For more information about the 103rd Annual Meeting, go to **www.ncwm.net/sems/event_detail/2018-annual-ok** or contact Ms. Elisa Stritt, NCWM Office Manager, at (402) 434-4872 or **elisa.stritt@ncwm.net**.

In January 2019 NCWM Interim Meeting, we will return to the Francis Marion Hotel, Charleston, South Carolina. This location was a favorite of attendees in 2013. It is truly a beautiful hotel situated perfectly for attendees to get the full Charleston experience. For more information about this meeting, contact Ms. Elisa Stritt, NCWM Office Manager, at (402) 434-4872 or **elisa.stritt@ncwm.net**.

The Board of Directors strives to plan meetings in locations that have reasonably priced airline service and are within government per diem rates. The board also evaluates locations and bids from hotels based on their ability to offer comfortable rooms, quality meeting space, and a variety of nearby entertainment and dining options.

1100-3 I PARTICIPATION IN INTERNATIONAL STANDARD SETTING

Dr. Charles Ehrlich, NIST OWM, provided a report during open hearings of the 102nd NCWM Annual Meeting in Pittsburgh, Pennsylvania. An updated report is also included as an appendix to this agenda of the Board of Directors. (See Appendix A.)

See the NTEP Committee Agenda for additional reports on NCWM's involvement internationally, including the Mutual Recognition Arrangement (MRA) with Measurement Canada and the Mutual Acceptance Arrangement (MAA) with OIML.

1100-4 I ASSOCIATE MEMBERSHIP COMMITTEE ACTIVITY

The Associate Membership Committee (AMC) is organized in accordance with the Bylaws of the National Conference on Weights and Measures, Inc. In addition, AMC operates by its own bylaws, which are available on the Committee pages of **www.ncwm.net**. AMC meets at least two times per year in conjunction with NCWM Interim and Annual Meetings. It consists of between 5 and 10 members who, amongst themselves, elect officers to serve as Chair, Vice-Chair, and Secretary/Treasurer. See Appendix B for information on current members and officers.

AMC has established a reputation of promoting and improving NCWM and has demonstrated its desire to improve understanding of weights and measures activities in public and private sectors.

The NCWM membership dues for Associate members of $90 are $15 higher than that for Active or Advisory members. The extra $15 is not for NCWM, but rather is placed in a separate account referred to as the AMC Fund. While AMC has discretion to allocate the funds in various ways, one means of allocating these funds is to provide grants in support of weights and measures training. The Committee receives applications and awards training grants from the AMC fund in accordance with their "Guidelines for Selection and Approval of Training Funds," which are posted on the Committee's webpage on **www.ncwm.net**. Downloadable applications for training grants and reimbursement forms are also available at this site.

The criteria to receive AMC funds for training are as follows:

1. Funding request forms that are complete, specific, and detailed will receive priority attention for approval. Based on the degree of missing or ambiguous information provided, individual requests may not be given any consideration during the AMC review process pending further clarification.

2. Training requests that benefit higher numbers of participants are generally preferred over those for fewer or single-person benefit. Multi-state training that encourages uniformity will also be given priority consideration.

3. In general, attending meetings such as NCWM Annual Meetings, Interim Meetings, or regional associations meetings will not be considered training.

4. As a lower priority, requests for the purchase of training materials will be considered, but requests for purchase of assets (such as projectors) will not.

5. Reasonable funding for travel and expenses will be considered if it is necessary to acquire an "expert trainer" that would benefit a high number of weights and measures officials. This will be an option when qualified volunteers are not available.

Regulatory agencies are encouraged to make use of these funds to improve training opportunities and the expertise of inspection personnel.

AMC members are also looking for new, perhaps innovative ways to play a more effective role in the NCWM structure to further improve the organization.

Mr. Chris Guay reported on the activity of the AMC including the status of the AMC fund, emphasizing the ways in which the AMC fund is being used to support training and special projects in the advancement of NCWM's mission. He encouraged additional applications for offsetting costs of training activities. Mr. Kurt Floren of Los Angeles County expressed great appreciation for the funding that the AMC provided to sponsor the travel for trainers. Mr. Brett Gurney provided a report on his experience traveling to Saipan to provide NIST Handbook 133 training to 25 through the AMC fund. CNMI Governor Ralph Torres reported an estimated $3 million in annual losses for consumers due to inaccurate package contents that are imported to the region through the Saipan seaport. Mr. Gurney said the training was a huge success, and he was impressed by the enthusiasm to learn and commitment to their work. He expressed gratitude to the AMC for making this effort possible and for their ongoing efforts to support NCWM's mission.

The AMC met during the 102nd Annual Meeting on Tuesday evening, July 18, 2017, at 5:00 p.m. All Annual Meeting attendees, especially NCWM Associate members are encouraged to attend AMC Meetings. (See Appendix B for the AMC Meeting Minutes from January 2017.)

1100-5 I TASK GROUPS, SUBCOMMITTEES, STEERING COMMITTEES

Focus Groups, Task Groups, Subcommittees, Steering Committees:
Focus groups, task groups, subcommittees and steering committees are created by appointment by the NCWM Chairman and operate as defined in NCWM Policy 1.5.1. Subgroups Supporting the Work of the Organization. A task group is given a specific charge, and it reports to the appropriate NCWM standing committee. A task group will disband at the completion of its assignment. A subcommittee is charged with ongoing responsibilities in support of a standing committee in a specific field of expertise. A steering committee is charged with unbiased fact-finding that will assist NCWM membership in decision processes for difficult issues. A steering committee will disband upon completion of its specific charge.

NCWM offers resources to these task groups and subcommittees including meeting space at Interim and Annual Meetings, conference calling and web-meeting services, group e-mail services, a dedicated web page for posting and archiving documents related to their work, and broadcast e-mail services to reach targeted audiences. Additionally, NIST OWM provides technical advisors and web-meeting forums. These tools enable year-around progress of task group and subcommittee work.

Because NCWM task groups and subcommittees are part of the NCWM organizational structure and report directly to its standing committees, their proposals may possibly appear in NCWM Publication 15 without first being vetted through a regional association. Any such proposals are properly vetted through the open hearings of NCWM.

The Promotional Toolkit Task Group reports to the Board of Directors. Among the activities of this group, it has developed four videos, each showcasing inspection activities in the supermarket, scale inspections, retail motor-fuel dispenser inspections, and motor fuel quality. Mr. Stephen Benjamin (North Carolina) reported on behalf of the Promotional Toolkit Task Group that a fifth video was shot recently on package inspections. Suggestions for additional videos include LPG meter inspections, grain moisture meters, and possibly two videos on metrology; one focused on the laboratory and the other linking this to the field.

Mr. Alan Walker (Florida) reported that the WIM Task Group will submit an information paper to the regions this fall in their ongoing effort to put standards in NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices," for these types of devices.

A new Safety Task Group is being formed under the leadership of Ms. Julie Quinn of Minnesota to report to the Professional Development Committee. The task group will identify the common safety hazards encountered by inspectors and the resources available to mitigate those hazards. The task group will also focus on areas where resources are lacking and how those resources can be developed. Future reporting of this task group will appear in the Professional Development Committee report.

Fuels and Lubricants Subcommittee:
This group reports to the Laws and Regulations Committee. For more information, contact:

Chair
Dr. Matthew Curran
Florida Department of Agriculture and Consumer Service
3125 Conner Boulevard, Building 2
Mail Stop L2
Tallahassee, FL 32399-1650
Phone: (850) 921-1570
E-mail: **matthew.curran@freshfromflorida.com**

Packaging and Labeling Subcommittee:
The group reports to the Laws and Regulations Committee. For more information, contact:

Chair
Mr. Christopher Guay
Procter and Gamble Co.
One Procter and Gamble Plaza
Cincinnati, OH 45202
Phone: (513) 983-0530
Email: **guay.cb@pg.com**

Promotional Tool Kit Task Group:
This group reports to the Board of Directors. For more information, contact:

Chair
Mr. Stephen Benjamin
North Carolina Department of Agriculture
Raleigh, NC 27699
Phone: (919) 707-3225
Email: **steve.benjamin@ncagr.gov**

Weigh-in-Motion Vehicle Scale Task Group:
The group reports to the Specifications and Tolerances Committee. For more information, contact:

Co- Chair
Mr. Alan Walker
Florida Bureau of Standards
6260 Buckingham Road
Fort Meyers, FL 33905
Phone: (850) 274-9044
Email: **alan.walker@freshfromflorida.com**

Co- Chair
Mr. Tim Chesser
Arkansas Bureau of Standards
4608 West 61st Street
Little Rock, AR 72209
Phone: (501) 570-1159
Email: **tim.chesser@aspb.ar.gov**

Safety Task Group:
This group reports to the Professional Development Committee:

Chair
Ms. Julie Quinn
Minnesota Weights and Measures Division
14305 South Cross Drive
Suite 150
Burnsville, MN 55306
Phone: (651) 5369-1555
E-mail: **julie.quinn@state.mn.us**

1100-6 I REGIONAL ASSOCIATION ACTIVITIES

Upcoming Regional Association Meetings:

Spring 2017 Meetings

CWMA Annual Meeting
May 22 - 25, 2017
Lincoln, Nebraska
Contact: Sherry Turvey
E-mail: **sherry.turvey@kda.ks.gov**

NEWMA Annual Meeting
May 15 - 18, 2017
Saratoga Springs, New York
Contact: James Cassidy
E-mail: **jcassidy@cambridgema.gov**

Fall 2017 Meetings

WWMA Annual Meeting
September 24-28, 2017
Scottsdale, Arizona
Contact: Michelle Wilson
E-mail: **mwilson@azda.gov**

NEWMA Interim Meeting
October 24-26, 2017
Hyatt Place Old Port
433 Fore Street
Portland, ME 04101
Contact: James Cassidy
E-mail: **jcassidy@cambridgema.gov**

CWMA Interim Meeting
October 16-18, 2017
Embassy Suites
Two Convention Center Plaza
St. Charles, MO 63303
Contact: Sherry Turvey
E-mail: **sherry.turvey@kda.ks.gov**

SWMA Annual Meeting
October 8-11, 2017
Wyndham Riverfront Little Rock
2 Riverfront Place
Little Rock, Arkansas 72114
Contact: Tim Chesser
E-mail: tim.chesser@aspb.ar.gov

1200 STRATEGIC PLANNING, POLICIES, AND BYLAWS

1200-1 I STRATEGIC PLANNING

The Executive Director presents a Strategic Plan progress report each year at the fall Board Meeting. The Board conducts a strategic planning session every other year in January at its quarterly meeting just prior to the Interim Meeting. The next strategic planning session will be Friday, January 19, 2018, in St. Petersburg, Florida, prior to the NCWM Interim Meeting. Members can review the Strategic Plan online at **www.ncwm.net** in the "About" section**.** The Board welcomes member input. Suggestions may be submitted to Executive Director, Don Onwiler, at **don.onwiler@ncwm.net**.

There are five Goals in the NCWM Strategic Plan:

1. Enhance NCWM as a national and international resource for measurement standards development.
2. Expand the role of NCWM as a resource for state and local weights and measures programs.
3. Promote uniform training for individuals involved in weights and measures.
4. Continue to improve NTEP.
5. Preserve the financial stability of NCWM.

Goal 1: Enhance the National Conference on Weights and Measures as a national and international resource for standards development:
Under this goal, NCWM has recognized the benefit of participating in other organizations where appropriate as a means of drawing on mutual resources toward common goals and heightening awareness of NCWM. This has been very successful in recent years.

Also as part of this goal, NCWM is hoping to increase stakeholder participation in NCWM through outreach efforts.

Goal 2: Expand the role of the National Conference on Weights and Measures as a source of support for state and local weights and measures programs:
NCWM is increasing the number of press releases. This will raise the level of recognition for NCWM and its membership as a resource for expert information in a vast array of topics.

Another part of this goal is to conduct surveys on occasion that benefit our members. In some cases, surveys are used to create benchmarks for comparison with future surveys.

A task group was formed and continues its work to develop a "toolkit" of items that can be used by program administrators to generate awareness and support for their programs. This toolkit is available on the NCWM website at **www.ncwm.net/resource/promotional-toolkit**. North Carolina took the lead in developing the first video, which is now available. The Board of Directors and the Associate Membership Committee have pledged matching funds toward four additional video productions.

In 2015, NCWM began posting a "Tip of the Month" on its website. Ideas are welcome and should be addressed to Mr. Onwiler at **don.onwiler@ncwm.net**.

Also new in 2015 is a strategy to develop guidance for retaining personnel and succession planning for positions in state and local weights and measures agencies.

Goal 3: Enhance the technical competence of individuals involved in weights and measures:
The Professional Certification Program has been a high priority under this goal. Mr. Ross Andersen serves as Certification Exam Coordinator working with the Professional Development Committee (PDC) and Subject Matter Experts (SME). Volunteer SMEs are needed in the areas of LP Gas Meters and Price Verification. Anyone interested in assisting with the writing and reviewing exam questions should contact NCWM

The PDC is also working with Mr. Andersen to develop two types of basic level exams; one type for service agents and the other for inspectors that are completing their initial training. See more discussion on this in the PDC report.

There are several other strategies under Goal 3. Advancement toward those strategies includes a cooperative effort with NIST whereby NCWM uses grant funds from NIST to fund travel for approved trainers from around the country to assist with NIST training events. See the "Training" tab at **www.ncwm.net** for more information.

Goal 4: Continue to improve the National Type Evaluation Program:
In support of this goal, NCWM surveys regulatory officials every two years to monitor how they access NTEP Certificates of Conformance in the field. The mobile version of the website has benefited them greatly. As technology advances, NCWM will have a better understanding for how it can make Certificates of Conformance more accessible.

Other strategies in Goal 4 are toward training for applying information from NTEP Certificates of Conformance, maintaining viable laboratory support through authorized labs and international agreements, and continued implementation of the Verified Conformity Assessment Program.

Goal 5: Preserve the financial stability of NCWM:
In an attempt to be prepared, the Board has studied potential hazards that could present a burden on NCWM's financial reserves. This is being balanced with continued efforts to improve services in support of customers and membership. The Board closely monitors the financial health of the organization through monthly reports and formal reviews at each of the Board meetings. An independent audit of the NCWM finances is conducted at the close of each fiscal year.

The next strategic planning session will be held in January 2018 in conjunction with the NCWM Interim Meeting.

NCWM Chair Kristin Macey reported that a recent survey of weights and measures programs has been developed and sent to all states in support of the goals of the strategic plan. This survey is very comprehensive. States should forward the survey invitation to any county or city weights and measures programs within their state. Mr. Steven Harrington provided further explanation of the survey and requested that respondents complete the survey in a timely manner, rather than wait for the October 1 deadline. Any agency that has not received the survey invitation and guidance document should contact Executive Director Don Onwiler. For clarification on the actual survey questions, responders should contact Mr. Steven Harrington. Contact information is provided in the survey guidance document.

Chairman Macey also reported that a team will develop a survey on fuels and lubricants quality inspection programs.

1200-2 I IMPROVING THE NCWM STANDARDS DEVELOPMENT PROCESS

Source:
NCWM Board of Directors (2016)

Purpose:
Assess the NCWM standards development process to determine ways to improve efficiency and participation.

Background/Discussion:
At the 100th NCWM Annual Meeting in 2015, several members suggested to the Board of Directors that the standards development process could be improved upon in ways that would make it move more efficiently and at the same time encourage broader attendance and participation by stakeholders. Some suggestions included modeling NCWM's process to be more like an ANSI process and possibly voting on standards twice per year instead of once.

In January 2016, NCWM Chairman, Jerry Buendel, formed a Charter Team and set out four phases in developing recommendations to improve the standards development process. In Phase 1, the Charter Team evaluated the NCWM's existing process and outlined its strengths and weaknesses and report back to the Board of Directors in July 2016. Phase 2 is planned as the phase in which the team identifies potential changes to existing NCWM processes and considers their impact on operation of regional associations, NIST, NCWM governance, and others to provide adequate regulations to users on a timelier basis. Also in Phase 2, the Charter Team will consider other regulation setting models that may be suitable for NCWM. In Phase 3 the Charter Team will offer two alternatives for consideration by the Board. The alternatives will include implementation plans and identify barriers and issues. In Phase 4 the Board will select the changes and begin implementation.

Charter Team Members are:

John Gaccione, Chair	Westchester County, New York	Northeast Region
Joe Gomez	New Mexico	Western Region
Rob DeRubeis	Michigan	Central Region
Dr. Matthew Curran	Florida	Southern Region
Eric Golden	Cardinal Scales Mfg.	Associate Membership
Rob Upright	Seraphin Test Measure	Associate Membership
Don Onwiler	NCWM	
Carol Hockert	NIST OWM, Retired	

NCWM Chairman Kristin Macey attended a meeting of the Charter Team at the 2017 Interim Meeting as it continues its work in Phase II. She provided a report during open hearings. The team is exploring the possibility of NCWM having voting sessions at both meetings each year instead of just the July meeting. The team envisions a system where a new proposal could be submitted to the Southern and Western regions in the fall and to the Central and Northeastern regions in the spring. The spring and fall meetings would be conducted in a very similar fashion to the current regional associations' annual meetings. At both meetings, the Committees will assign a status to each item that will be carried over to the next NCWM meeting. The Charter Team believes this approach addresses many of the issues that were identified in the current process that NCWM uses. The discussion is now focused on when adopted standards would become enforceable and whether they could be published once per year or trice per year. The group will study the impact on NIST resources and regulatory programs in developing its recommendations. The group will also discuss possible alternatives and hopes to have a final Phase II report available for the July 2018 Annual Meeting. (See Appendix C for a copy of the report.)

NCWM Chairman Kristin Macey has asked the team to consider a Lean Six Sigma approach of identifying and implementing specific tools to help the team meet its goals.

Since the existing standards development process and voting system are defined in NCWM Bylaws, there is the probability that any solutions would be brought to a vote of the general NCWM membership in the form of bylaw amendments.

The Board of Directors believes this process should be slow and deliberate so any action taken will be well-conceived and in the best interest of NCWM and its stakeholders. The Board will communicate with membership throughout this process in open hearings, the newsletter, NCWM Publication 15 agendas, and NCWM Publication 16 reports.

Mr. Jerry Buendel reported as newly appointed chairman of the NCWM Charter Team on its activities. The group will hold web meetings with the goal of submitting a report to membership at the 2018 Interim Meeting.

1200-3 I PUBLICATION AND DISTRIBUTION OF NCWM WORK PRODUCTS

Source:
Packaging and Labeling Subcommittee (2015)

Purpose:
Develop a plan for publication and distribution of new NCWM work products.

Background/Discussion:
The NCWM Package and Labeling Subcommittee (PALS) is developing a document that provides principles and recommendations to capture best practices for the many kinds of existing quantity related statements which appear on package Principal Display Panels (PDPs). These are statements, which are present, in addition to the required declaration of net quantity. The practice of adding these expressions has increased significantly over the past decade, and it is recognized that some statements can help consumers make fair value comparisons while others arguably may confuse or mislead consumers.

The principles and recommendations under development by PALS are intended to provide both manufacturers and regulators with a standard and guidance regarding best practices for these kinds of statements to provide increased uniformity and statement integrity. Rather than attempt to create regulations covering these topics, which would require involvement of multiple federal agencies, PALS believes the development of principles and recommendations provides an actionable and reasonable approach for bringing standardization and consistency to this topic.

Mr. Chris Guay explained that this project is a two-step process.

1. Identify and remove any policies and guidelines published in Appendix D of NIST Handbook 130 that are obsolete.

2. Leave remaining items in the handbook, but also reorganize them into a new electronic publication which will expand as new guidance documents or policies are developed.

A focus group within the Board of Directors provided the following recommendations for these guidance documents:

- Create a new tab on the website that would also have the handbooks.

- Duplicate the Interpretations and Guidelines in Section VI of NIST Handbook 130, reorganize them by topic and post them to the website in the same tab.

- Guidance documents should be adopted by a vote of membership under the Board agenda or appropriate standing committee.

- Modify Form 15 to accommodate proposals related to the guidance documents
- In the process, also simplify Form 15.

The reorganized Interpretations and Guidelines from Handbook 130 were presented at the May 2016 Board Meeting. At that meeting, Mr. Ken Butcher, NIST, OWM, explained that these were originally developed to provide leverage for enforcement agencies. The focus group will provide a final review of the new document. Upon completion of that review, the document will be posted to the NCWM Website.

The simplified Form 15 was approved and will be implemented immediately. The form was also modified to include its use in recommending changes to the new guidance document.

1200-4 I POLICY 3.2.2. PROCEDURES TO MODIFY HANDBOOKS

Source:
NCWM Board of Directors (2017)

Purpose:
Streamline the open hearings by establishing a status for items that have been assigned to a subcommittee, steering committee, or task group for development whereby the standing committee will refrain from taking comments until it receives recommendations that can be presented for discussion.

Item under Consideration:
Amend NCWM Policy 3.2.2. Procedures to Modify Handbooks as follows:

G. Interim Meeting

1. The Committee shall hold public hearings at the Interim Meeting for the purpose of discussing and taking comments on ~~**all**~~ agenda items.

2. Upon request, the Committee will provide the opportunity for presentations by government officials, industry representatives, consumer groups, or other interested parties during the Interim Meeting. Requests to make presentations must be received by the Committee Chairman or Technical Advisor at least two weeks prior to the start of the meetings.

H. Interim Meeting Report

1. Items under consideration by the Committee, and about which the Committee offers comments or recommendations to NCWM to act upon during the Annual Meeting, will be included in the Committee's Interim Report published in the Annual Meeting Program and Committee Reports (NCWM Publication 16).

2. The Annual Meeting Program and Committee Reports will be prepared and distributed to Conference members approximately three months prior to the NCWM Annual Meeting.

I. Classifications for Agenda Items
At the Interim Meeting, the Committee can classify proposals in one of three ways as:

1. "**Voting**" **–** These are items the Committee believes are fully developed and ready for final consideration of the voting membership. Each item has either received majority support from the Committee or the Committee has reached agreement that it is ready for voting status to let NCWM membership decide. The Committee has the ability to remove items from the voting agenda at the Annual Meeting by changing the status prior to a vote of the NCWM membership. The Committee may amend voting items during the course of the Annual Meeting based on additional information received following the Interim

Meeting and testimony received at the Annual Meeting. These items may also be amended by the voting membership during the voting session of the Annual Meeting following the procedures outlined in the NCWM Bylaws; or

2. "**Informational**" **–** These items are deemed by the Committee to have merit. They typically contain a proposal to address the issue at hand and a meaningful background discussion for the proposal. However, the Committee wants to allow more time for review by stakeholders and possibly further development for addressing concerns. The Committee has taken the responsibility for any added development of Informational items. For particularly difficult items, the Committee may assign the item to an existing Subcommittee under its charge or request that the NCWM Chair appoint a special task group that reports to the Committee. At the Annual Meeting, the Committee may change the status of the items but not to Voting status, because the item has not been published as such in advance of the meeting; or

3. "**Developing**" – These items are deemed by the Committee to have merit, but are found to be lacking enough information for full consideration. Typically, the item will have a good explanation of the issue, but a clear proposal has yet to be developed. By assigning Developing status, the Committee has sent the item back to the source **for** ~~**or assigned it to some other entity outside the scope of the Committee with the responsibility of**~~ further development. The Committee Report will provide the source with a clear indication of what is necessary to move the item forward for full consideration. The item will be carried in the Committee agenda in bulletin board fashion with contact information for the person ~~**or organization that is**~~ responsible for the development. Since the Committee is not required to receive testimony on developing items, this status should be carefully implemented so as not to weaken the standards development process; or

4. **"Assigned" – These items are deemed by the Committee to have merit, but are found to need further development before being considered by the Committee. Typically, the item will have a good explanation of the issue, but a clear proposal has yet to be developed and the Committee thinks further development should be conducted by a subcommittee, steering committee or task group. The Committee Report will provide the designated group with clear direction and expectations. The item will be carried in the Committee agenda in bulletin board fashion and will include contact information for the chairperson of the responsible subcommittee, steering committee, or task group. Since the item is being developed by a designated group outside of the Committee, the Committee will not receive testimony during open hearings on assigned items; however, a representative of the responsible group will provide a brief progress report on the development efforts. An assigned item will be returned to the Committee when the responsible group feels the item is fully developed or no further progress can be made in developing the item. A Committee may revoke the assigned status at any time.**

5. "**Withdrawn**" – These are items that the Committee has found to be without merit. The Committee's determination to withdraw should not be based on the Committee's opinion alone but on the input received from stakeholders. The Committee's report will contain an explanation for the withdrawal of the item. Once an item appears in NCWM Publication 16 as Withdrawn, the status of that item may not be amended. The item may be reintroduced through the regional associations for consideration as a new item.

(Amended 2013)

Background/Discussion:
In recent years, open hearings have exceeded the allotted time. Much of the testimony during these open hearings is being spent on items that are still under development by a subcommittee or task group. The Board of Directors believes that debates and testimony during open hearings should be spent on items where the "item under consideration" has been developed and is being presented for action by the standing committee and NCWM membership.

Under this proposal, the standing committee agenda would identify those items that are assigned by the committee to a subcommittee, steering committee, or task group with the status "Assigned." Those items with this status will not be discussed in open hearings other than an optional update report from the chairman of the group that is developing a recommendation. When the Committee receives a recommendation to present as the "Item under Consideration," the Committee would change the status to "Informational" or "Voting" to allow for the normal vetting through open hearings.

Mr. Chuck Corr of ADM an at-large officer on the Board of Directors provided a presentation at the 2017 Interim Meeting explaining this proposed additional agenda item status. The item prompted several comments regarding various elements of the current process including the following.

- Consider a deadline for Developing Items to be developed so they don't linger too long on agendas.
- Create a forum separate from the Committee agendas to discuss Developing Items.
- Bring back the Online Position Forum, but as a "Discussion Forum."
- Put the assigned developer of an item in control of the content for that item in NCWM Publications 15 and 16.
- Do not bring Developing Items up for open hearing discussions until they are developed.
- Provide an example of a properly developed item that is ready for consideration.

Mr. Corr explained, the establishment of an "Assigned" status would focus discussion of those items to the appropriate venue such as a subcommittee or task group until they are ready for consideration by the larger body in open hearings. All activities would provide full transparency.

The following is an example of how "Assigned" items would be handled in NCWM Publication 15 and 16 Committee agendas. This example is representative of the Laws and Regulations Committee.

Sample Agenda Index:

Sample Agenda Item:

2801 FUELS AND LUBRICANTS SUBCOMMITTEE ACTIVITY REPORTS

NOTE: The following items have been assigned to the Fuels and Lubricants Subcommittee for development. The Chair or other representative of the subcommittee will provide an update report on these items during open hearings. See Appendix A, page XX for additional background and discussion on these items.

2801-1 A Uniform Regulation for the Method of Sale of Commodities, Section 2.XX. Automatic Transmission Fluids

Source:
American Petroleum Institute (2016)

Purpose:
Define how transmission fluids shall be identified in the marketplace on delivery documents and invoices and receipts from service.

Item under Consideration:
This item is being developed by the Fuels and Lubricants Subcommittee.

Background/Discussion:
See Appendix A, Page XX

1200-5 V BYLAWS, ARTICLE VI – DIRECTORS

(This Item was Adopted.)

Source:
NCWM Board of Directors (2017)

Purpose:
Increase the term of office of the Treasurer on the Board of Directors from one year to three years to ensure better continuity and expertise.

Item under Consideration:
Amend the NCWM Bylaws as follows;

Article VI – Directors

Section 1 – Directors

The Directors of the National Conference on Weights and Measures, Inc., shall be:

An 11-member Board of Directors consisting of:

1. Chairman,
2. Past-Chairman,
3. Chairman-Elect,
4. Treasurer, and
5. Seven other Directors: Four directors to be elected from the active membership, the Nominating Committee will endeavor, where practical, to nominate one director from each of the four regional Conferences, (Central, Northeastern, Southern and Western: the "Active Directors"); one director from the associate membership (the "Associate Director"); and two at-large Directors, (the "at-large Directors") who may be elected from the Active, Advisory, or Associate membership who are eligible to serve.

~~**The treasurer and the active, associate and at-large directors may be consecutively re-elected, however, the consecutive reelection of a Chairman and Chairman-Elect is prohibited. Should the Chairman-Elect for**~~

~~**any reason be unable or unwilling to be installed as Chairman, his/her successor shall be elected by the Board of Directors. In this event, the newly elected Chairman-Elect shall be installed as Chairman**~~.

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Section 3 - Nominations and Elections

D. Terms of Office

1. The Chairman, Chairman-Elect, Past Chairman, ~~**and Treasurer,**~~ shall serve for a term of one year or until their successors are respectively elected or appointed and qualified. ~~**The Treasurer may be re-elected.**~~ The **consecutive reelection of a Chairman and Chairman-Elect is prohibited; however, the eight** ~~seven~~ other directors may be **consecutively** re-elected. The **eight** ~~seven~~ other directors shall serve for five-year terms; except for the Associate Director **and Treasurer**, who shall serve a three-year term. Elections shall take place at such intervals as are necessary to retain an 11-member Board at all times, except that vacancies shall be filled under Section 3, paragraph E, below.

2. All Directors shall take office immediately following the close of the Annual Meeting at which they were elected.

3. **Should the Chairman-Elect for any reason be unable or unwilling to be installed as Chairman, his/her successor shall be elected by the Board of Directors. In this event, the newly elected Chairman-Elect shall be installed as Chairman.**

E. Filling Vacancies

In case of a vacancy in any of the elective offices, the Chairman (or, if the vacancy is for the Chairman's position, the immediate Past-Chairman) shall nominate a replacement, and that person shall be appointed to fill the office if a majority of the members of the Board approve the nomination.

Background/Discussion:
There was a consensus of the officers of the Board of Directors at the July 2016 meeting to increase the term of office for the Treasurer from one year to three years. This increase would allow the Treasurer to develop a deeper understanding of the financial affairs of the Conference. No comments were received at the 2017 Interim Meeting.

1200-6 V BYLAWS, ARTICLE X – VOTING SYSTEM

(This Item was Adopted)

Source:
NCWM Board of Directors (2017)

Purpose:
Replace the terms "official" and "unofficial" with clearer terminology to describe whether a vote has met the required number of votes to pass or fail within each house.

Item under Consideration:
Amend the NCWM Bylaws as follows:

Article I - Voting System

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Section 4 - Minimum Votes Needed ~~for an Official Vote of a~~ in each House on Technical Items

A. House of State Representatives

A minimum of 27 votes in favor of, or 27 votes in opposition to, an issue must be cast for **an item to pass or fail in that house**~~the vote to be considered official~~. If 54 or more votes are cast in the House of State Representatives, a simple majority of the total votes is required to pass ~~(~~or defeat~~)~~ the issue. Should a tie vote occur, with 27 or more votes each in favor and opposition, the item neither passes nor fails and shall be addressed as set forth in Section 9A (C).

B. House of Delegates

A minimum of 27 votes in favor of, or 27 votes in opposition to, an issue must be cast for **an item to pass or fail in that house**~~the vote to be considered official~~. If 54 total or more votes are cast in the House of Delegates, a simple majority rules. If the minimum 27 votes in support or opposition are not cast, the issue is decided by the vote of the House of State Representatives. It there is a tie vote with 27 or more votes each in favor and opposition, the item neither passes nor fails and shall be addressed as set forth in Section 9A (C).

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Section 9A -Voting – Technical Issues

Only members of the House of Delegates and the House of State Representatives will vote on the technical questions before the Corporation. At the conclusion of debate (if authorized) on a motion, there shall be a call for the vote by voice vote, a show of hands, standing, or electronic count. The requirements for ~~an official vote~~**minimum votes** in a house are found in Article X, Section 4.

A. Motion Accepted If:

1. the **majority of the** House of State Representatives casts ~~an official vote~~**the required minimum votes** in favor of the item

   And

2. the **majority of the** House of Delegates casts ~~an official vote~~**the minimum required votes** in favor of the item or the House of Delegates fails to cast ~~an official vote~~**the minimum required votes in opposition to the item**.

C. Motion Rejected If:

1. the **majority of the** House of State Representatives casts ~~an official vote~~**the minimum required votes** in opposition of the item

   And

2. the **majority of the** House of Delegates casts ~~an official vote~~**the minimum required votes** in opposition of the item or the House of Delegates fails to cast ~~an official vote~~**the minimum required votes in opposition to the item**.

D. Issue Returned to Committee for Future Consideration if:

1. The House of Representatives fails to cast ~~an official vote~~**the minimum required votes.**

2. A~~n official vote~~**The minimum required votes** is cast in each house but one house votes yea and the other house votes nay.

   Or

3. Either the House of Representatives or House of Delegates casts a tie vote of 27 votes or more each in favor and in opposition to the item.

The issue cannot be recalled for another vote at the same Annual Meeting.

Voting on Technical Issues: The Two-House System

~~**The vote by a house is "Official" if:**~~ ~~**The number of Yea votes is 27 or more**~~

~~**OR**~~

~~**The number of Nay votes is 27 or more**~~

			House of Delegates					
			Majority Vote Yea		Majority Vote Nay		Tie Vote	
			~~**Official Vote**~~ ~~(~~≥ 27 **Votes**~~)~~	~~**Unofficial Vote**~~ ~~(~~< 27 **Votes**~~)~~	~~**Official Vote**~~ ~~(~~≥ 27**Votes** ~~)~~	~~**Unofficial Vote**~~ ~~(~~< 27**Votes** ~~)~~	~~(~~ < 54 total votes~~)~~	~~(~~≥ 54 total votes~~)~~
House of State Representatives	Majority Vote Yea	~~**Official Vote**~~ ~~(~~≥ 27**Votes** ~~)~~	**Motion Accepted**	**Motion Accepted**	Returned to Committee	**Motion Accepted**	**Motion Accepted**	Returned to Committee
		~~**Unofficial Vote**~~ ~~(~~<27**Votes** ~~)~~	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee
	Majority Vote Nay	~~**Official Vote**~~ ~~(~~≥ 27**Votes** ~~)~~	Returned to Committee	**Motion Rejected**	**Motion Rejected**	**Motion Rejected**	Motion Rejected	Returned to Committee
		~~**Unofficial Vote**~~ ~~(~~< 27**Votes** ~~)~~	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee
	Tie Vote		Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee

Background/Discussion:
Presently, the bylaws define an "official" vote as one that has met the specified minimum number of votes within a house. In 2015, a table was incorporated into Article X to help clarify action taken on issues depending on whether the "official" vote has been achieved. When this table was developed, the term "unofficial" was introduced to describe any house vote that did not meet the minimum number of required votes for an "official" vote. It has been mentioned however, that those votes are still official votes, even if the minimum votes are not cast.

The Board of Directors suggests removing the terms “official” and “unofficial.” Instead, the bylaws would simply define the number of votes needed in each house and the outcome of the item based on those requirements. This proposal does not change in any way the interpretation of the bylaws or how they are applied.

Based on comments received in open hearings, the proposal is modified as follows to provide further clarity and to provide editorial correction to the lettering.

The words “majority of the” were added to Section 9A, Parts A. 1., A. 2., B.1., and B. 2.

The words, “in opposition to the item” were added to the end of Section 9A, Parts A. 2. and B. 2.

Clean copy of the voting table as proposed:

Voting on Technical Issues: The Two-House System

			House of Delegates					
			Majority Vote Yea		Majority Vote Nay		Tie Vote	
			≥ 27 Votes	< 27 Votes	≥ 27 Votes	< 27 Votes	< 54 total votes	≥ 54 total votes
House of State Representatives	Majority Vote Yea	≥ 27 Votes	**Motion Accepted**	**Motion Accepted**	Returned to Committee	**Motion Accepted**	**Motion Accepted**	Returned to Committee
		<27 Votes	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee
	Majority Vote Nay	≥ 27 Votes	Returned to Committee	**Motion Rejected**	**Motion Rejected**	**Motion Rejected**	Motion Rejected	Returned to Committee
		< 27 Votes	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee
	Tie Vote		Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee	Returned to Committee

1300 FINANCIAL

1300-1 I FINANCIAL REPORT

NCWM operates on a fiscal year of October 1 through September 30. Budgets are set to be conservative on projected revenues and realistic on anticipated expenses. In 2017, the Board implemented a 10-year forecasting method to assist in the budgeting process.

The Board of Directors continues to monitor its ability to fully implement contingency plans based on potential costs compared to reserve funds.

Treasurer Ray Johnson reported that a $100,000 Certificate of Deposit recently matured and was combined with a $12,000 cash balance in the Charles Schwab account to invest in a new $112,000, five-year CD.

The following is the balance sheet as of June 30, 2017, in comparison with the same time the previous year. Assets in the balance sheet were inflated by $20,668.70 in 2016 by the NIST Training Initiative Grant that was awarded to NCWM. Those funds have been depleted, and the new grant will reimburse NCWM as funds are spent. This will provide a more stable representation of NCWM's actual assets. Assets are also inflated by the Associate Membership Fund. These funds are accumulated through the additional $15 dues paid by Associate Members and are spent at the discretion of the Associate Membership Committee in accordance with Committee Bylaws.

ASSETS	**June 30, 2017**	**June 30, 2016**
Current Assets	$	$
Checking/Savings		
Associate Member Fund	25,517.49	29,542.91
NIST Training Grant	0	20,668.70
Certificates of Deposit	1,232,848.39	1,216,909 .66
Checking	1,539.55	15,324 .16
Savings	315,751.13	254,702 .03
Total Checking/Savings	1,575,656.56	1,537,147.46
Accounts Receivable	38.00	23.00
Other Current Assets	72,872.70	92,360.30
Other Assets	17,818.54	15,436.99
TOTAL ASSETS	**1,666,385.80**	**1,644,967.75**
LIABILITIES & EQUITY		
Liabilities		
Current Liabilities	43,406.48	39,423.45
Total Liabilities	43,406.48	39,423.45
Equity		
Designated - Associate Membership	25,517.49	29,542.91
Designated – NIST Training Grant	0	20,668.70
Unrestricted Net Assets	1,418,856.63	1,375,059.54
Net Income	178,605.20	180,273.15
Total Equity	1,622,979.32	1,605,544.30
TOTAL LIABILITIES & EQUITY	**1,666,385.80**	**1,644,967.75**

1400 OTHER ITEMS

1400-1 I ELECTRONIC VOTING SYSTEM

Source:
NCWM Board of Directors (2017)

Purpose:
Implement a modern, fast, and reliable voting system that will improve efficiency of voting sessions.

Background/Discussion:
NCWM purchased a wireless electronic voting system in 2016. It was used at the 2016 Annual Meeting for the first time. Unfortunately, the wireless communication was slower than expected, raising concerns for whether votes were being received. After voting on several items in this manner, the voting assembly reverted back to manually counting raised state placards and hands.

After reviewing the circumstances of this first attempt, several hardware issues were identified that would have delayed communication. Additionally, there appeared to be some user issues, partially from experimentation by some voters who wanted to see how the vote tally responds and partially from incorrect use of the keypads. The latter can be overcome with simple education in how to interpret information provided to the voter through the keypad display.

Following the 2016 Annual Meeting, the manufacturer of the voting system provided several updates to the software to improve communication speed between the keypads and the computer. Several hardware improvements were also made to increase the speed of communication between the keypads and the computer. Upon further testing, the system appeared to be more responsive. The voting process will also be modified by removing the time limit to vote. This will allow each voter to receive confirmation from the system that their vote has been registered.

The attendees of the 2017 Interim Meeting attempted to run tests of the system to see if the concerns were alleviated. Unfortunately, there was a software disconnect between the data collection software and the slide presentation software. The cause of this disconnect was identified and further testing was conducted at the CWMA Annual Meeting in May 2017.

The voting system was successfully implemented at the 102nd Annual Meeting and will be used at future Annual Meetings.

Ms. Kristin Macey, California | Chairman
Mr. James Cassidy, City of Cambridge, Massachusetts | Chair-Elect
Mr. Jerry Buendel, Washington | NTEP Committee Chair
Mr. Raymond Johnson, New Mexico | Treasurer
Mr. Brett Gurney, Utah | Active Membership - Western
Mr. Craig VanBuren, Michigan | Active Membership - Central
Mr. Kenneth Ramsburg, Maryland | Active Membership - Southern
Mr. Steve Giguere, Maine | Active Membership - Northeastern
Mr. Chris Guay, Procter and Gamble | Associate Membership
Mr. Chuck Corr, Archer Daniels Midland Co. | At-Large
Ms. Julie Quinn, Minnesota | At-Large

Mr. Don Onwiler, NCWM | Executive Director
Dr. Douglas Olson, NIST, OWM | Executive Secretary
Mr. Jim Truex, NCWM | NTEP Administrator
Mr. Carl Cotton, Measurement Canada | Board of Directors Advisor

Board of Directors

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Appendix A

Report of the Activities of the International Organization of Legal Metrology (OIML) and Regional Legal Metrology Organizations

National Institute of Standards and Technology (NIST), Office of Weights and Measures (OWM)

INTRODUCTION

The OWM at NIST is responsible for coordinating United States participation in OIML and other international legal metrology organizations. Learn more about OIML at www.oiml.org and about NIST, OWM at **www.nist.gov/owm**. Dr. Charles Ehrlich, Program Leader of the International Legal Metrology Program, can be contacted at (301) 975-4834 by fax at (301) 975-8091 or **charles.ehrlich@nist.gov**.

Note: OIML publications are available electronically without cost at **www.oiml.org**.

Table A
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Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
ANSI	American National Standards Institute	ISO	International Standardization Organization
APEC	Asia-Pacific Economic Cooperation	IWG	International Work Group
APLMF	Asia-Pacific Legal Metrology Forum	LMWG	Legal Metrology Work Group
APMP	Asia-Pacific Metrology Program	MAA	Mutual Acceptance Agreement
B	Basic Publication	MTL	Manufacturers' Testing Laboratory
BIML	International Bureau of Legal Metrology	NIST	National Institute of Standards and Technology
BIPM	International Bureau of Weights and Measures	NTEP	National Type Evaluation Program
CD	Committee Draft[1]	OIML	International Organization of Legal Metrology
CIML	International Committee of Legal Metrology	OWM	Office of Weights and Measures
CTT	Conformity to Type	PG	Project Group
D	Document	R	Recommendation
DD	Draft Document[2]	SC	Technical Subcommittee
DoMC	Declaration of Mutual Confidence	SIM	Inter-American Metrology System
DR	Draft Recommendation[2]	TC	Technical Committee
DV	Draft Vocabulary[3]	USNWG	U.S. National Work Group
GA	General Assembly	VIM	International Vocabulary of Metrology
IEC	International Electrotechnical Commission	VIML	International Vocabulary of Legal Metrology
IQ Mark	International Quantity Mark	WD	Working Draft[3]

[1] CD: a committee draft at the stage of development within a technical committee, subcommittee, or project group; in this document, successive drafts are numbered 1 CD, 2 CD, etc.

[2] DD, DR, and DV: a draft document approved at the level of the technical committee, subcommittee or project group concerned and sent to BIML for approval by CIML.

[3] WD: working draft that precedes the development of a CD; in this document, successive drafts are number 1 WD, 2 WD, etc.

Details of All Items
(In order by Reference Key)

I. REPORT ON THE ACTIVITIES OF THE OIML TECHNICAL COMMITTEES

This section reports on recent activities and the status of work in the OIML Technical Committees (TCs), Technical Subcommittees (SCs), and Project Groups (PGs) of specific interest to members of the National Conference on Weights and Measures (NCWM). Schedules of future activities of the TC/SC Secretariats, PG Conveners, the U.S. National Work Groups (USNWGs), and the International Work Groups (IWGs) and Project Groups of the TCs and SCs are also included.

TC 3/SC 5 Conformity Assessment (United States)

The OIML Basic Publications B 3:2011 *Certificate System* and B 10:2012 *Mutual Acceptance Arrangement* (MAA) are the core documents underpinning the OIML Certificate System. An amendment to B 10 was approved by the CIML that allows for the voluntary use of test data from manufacturer's test laboratories (MTLs) under specially supervised conditions (NCWM has adopted the position that it will not accept test data under the MAA that was obtained from MTLs).

The OIML Ad Hoc Working Group (AHWG) on the OIML Certificate System developed a proposal that will significantly change the way that the OIML Certificate System is structured, managed, and operated. This proposal includes the creation of an OIML Certification System (called OIML-CS) that would be managed by a Management Committee instead of by the BIML. Advisory Committees to the Management Committee are also planned. The AHWG put this proposal forward to the CIML at its meeting in Arachon, France, in October 2015, where it was approved. The AHWG was then disbanded, and a new certification system project group (CSPG) was established that prepared a draft of a proposed new framework document establishing the OIML-CS, for voting on at the 2016 CIML Meeting (in Strasbourg, France). Prior to this CIML Meeting, a meeting of the CSPG was held (in Teddington, England) to resolve issues with the framework document, which permitted the framework document to be approved at the 2016 CIML Meeting. Also, approved at the 2016 CIML Meeting was the creation of a Preliminary Management Committee (PrMC), also Chaired by Dr. Schwartz. Draft Operational Documents for the OIML-CS were discussed at a meeting of the PrMC in February 2017 in Berlin, Germany. A second meeting of the PrMC was held in Shanghai, China, in June 2017 so that all the OIML-CS documents could be approved at the 2017 CIML Meeting, with implementation of the OIML-CS anticipated to begin in January 2018. Until the new OIML-CS is fully implemented, the current Basic and MAA systems will continue and will be supported by the BIML.

A meeting of the CPR was held in Shanghai, China, in June 2017; the United States was represented at the meeting by Mr. Darrell Flocken (NCWM NTEP) and Dr. Charles Ehrlich (NIST OWM).

A new OIML Guide OIML G 19 entitled *The Role of Measurement Uncertainty in Conformity Assessment Decisions in Legal Metrology* was published in January 2017. This document was published as an OIML Guide, rather than a Document, to give the user community, the necessary time to consider how to incorporate it into OIML Recommendations. If there are any questions, or for more information, please contact Dr. Ehrlich at (301) 975-4834 or **charles.ehrlich@nist.gov**. Please also see the MAA section in the National Type Evaluation Program (NTEP) Committee Report of this publication.

TC 5/SC 1 Environmental Conditions (Netherlands)

OIML D 11, *General requirements for measuring instruments - Environmental conditions* has been published. This is a very important document in the OIML system and is used by all the OIML TCs as a general reference for technical and testing requirements on all measuring instruments. Highlights of this recent revision cycle include: expanding the terminology section, updating several testing sections to reflect the latest International Electrotechnical Commission (IEC) reference standards, and including a new environmental class ("E3") for a non-mains local source of electrical power supply. Please contact Mr. Ralph Richter at (301) 975-3997 or **ralph.richter@nist.gov**, if you would like additional information on TC 5/SC 1 or OIML D 11.

TC 5/SC 2 Software (Germany and BIML)

A new project to revise OIML D 31, *General Requirements for Software-controlled Measuring Instruments* was approved in October 2016. This document serves as guidance for software requirements in International Recommendations by OIML TCs. The United States will participate in the technical work on this project, which will expand the scope of the document to include software verification. A new Working Draft (WD) has been distributed by the convener with comments requested by June 2017. Please contact Dr. Ambler Thompson at (301) 975-2333 or if you would like to discuss OIML software efforts.

TC 6 Prepackaged Products (South Africa)

A new publication entitled "Guidance for Defining the System Requirements for a Certification System for Prepackages" will be finalized and submitted to the CIML for adoption in 2017. This guideline was developed to assist countries in establishing reciprocal agreements to accept the test results on prepackaged goods.

A new edition of OIML Recommendation R 87 "Quantity of Product in Prepackages" (equivalent to NIST Handbook 133, "Checking the Net Contents of Packaged Goods") has been published on the OIML website. This new edition includes a comprehensive overhaul of the statistical requirements and sampling plans (the revisions were prepared by Mr. Blaza Toman of NIST's Statistical Engineering Division) to correct errors discovered by a statistician from Asia a few years ago. The United States and several other countries were successful in opposing efforts by several European Union countries to add drained weight test procedures and packaging requirements utilized in that region to the new edition of R 87. Those procedures were rejected primarily because they failed to recognize drained weight test methods that have been in use around the world for decades, which have been adopted by Codex Alimentarius. The preliminary ballot of R 87 passed in September 2015. A sufficient majority of CIML Members supported the Draft Recommendation, but it was decided that two issues concerning sample sizes and the statistical requirements for sampling needed to be resolved before the Final Draft Recommendation could be submitted to the CIML for final approval. The project group held a meeting in Rio de Janeiro, Brazil, in January 2016 and resolved the statistical issues. The CIML approved the final draft of R 87 in October 2016.

OIML R 79, *Labeling Requirements for Prepackaged Products* received final CIML approval in October 2015 and has now been published. The United States voted "yes" on both the CIML preliminary ballot in June 2015 and the final Draft Recommendation.

For more information or to participate on the activities of this committee, please contact Mr. Ken Butcher at (301) 975-4859 or **kbutcher@nist.gov**.

TC 8 Measurement of Quantities of Fluids (Japan)

Based on responses received on a questionnaire concerning several projects in TC 8, Japan decided to cancel a project to combine and revise R 40, R 41 and R 43 into a single standard entitled *Standard volumetric measures.* Japan also decided to delay the project to revise R 63 *Petroleum Measurement Tables* (1994) until the corresponding ISO standard is next revised. The Secretariat plans to start the revision of R 119, *Pipe Provers for Testing of Measuring Systems for Liquids Other Than Water* (1996) – this document is important for other OIML Recommendations involving liquid measurement. Please contact Mr. Ralph Richter at (301) 975-3997 or **ralph.richter@nist.gov**, if you would like copies of any of these documents or to participate in the project to revise R 119.

TC 8/SC 1 Static Volume and Mass Measurement (United States and Netherlands)

The United States and The Netherlands became the new Co-Secretariats of TC 8/SC 1 in June 2016 after Germany announced that it wished to step down as Secretariat. The United States chairs the Project Group that drafted new sections of OIML 71 *Fixed Storage Tanks* and R 85 *Automatic Level Gages for Measuring the Level of Liquid in Fixed Storage Tanks* to add specific requirements for specialized tanks. The 1CDs of R 71 and R 85 were distributed for project group comment in March 2016. The 2CD of OIML R 80-2, *Road and Rail Tankers, Test Methods* was distributed in April 2016. A meeting to discuss all these TC 8/SC 1 projects was held in June 2016 in Gothenburg, Sweden. The Subcommittee also discussed the importance of revising OIML R 125, *Measuring Systems for the Mass of Liquids in Tanks,* at the meeting in Sweden, and a new project to revise R 125 was approved by the CIML in October 2016. Please contact Mr. Ralph Richter at (301) 975-3997 or **ralph.richter@nist.gov**, if you would like copies of the documents or to participate in any of these projects.

TC 8/SC 3 Dynamic Volume and Mass Measurement for Liquids Other Than Water (United States and Germany)

This subcommittee continues the effort on a new project for the "immediate revision" of all three parts of R 117, *Dynamic Measuring Systems for Liquids Other Than Water*. This new project will fully harmonize all three parts and add new annexes to R 117 for several complete measuring systems, including: (a) measuring systems for the unloading of ships' tanks and for rail and road tankers using an intermediate tank, (b) measuring systems for liquefied gases under pressure (other than LPG dispensers), (c) measuring systems for bunker fuel, and (d) measuring systems for liquefied natural gas (LNG). The 1 CD of R 117 was distributed in April 2016, and an R 117 project group meeting was held in Delft, The Netherlands, in July 2016 to resolve comments received on the 1 CD. If you have any questions or would like to participate in this project, please contact Mr. Ralph Richter at (301) 975-3997 or **ralph.richter@nist.gov**.

TC 8/SC 6 Measurement of Cryogenic Liquids (United States)

The Secretariat for R 81, *Dynamic Measuring Devices and Systems for Cryogenic Liquids,* distributed a first committee draft (1 CD) of R 81 to project group members and the USNWG for their review and comment; this comment period on R 81 closed in September 2016. To obtain more information or to participate in this project, please contact Ms. Juana Williams at (301) 975-3989 or **juana.williams@nist.gov**.

TC 8/SC 7 Gas Metering (Netherlands)

All three parts of OIML R 137, *Gas Meters* have been published. Extensive U.S. comments on the 1 CD, the 2 CD, and the DR were developed in cooperation with the measurement committees of the American Gas Association. The OIML R 137 document is especially important to the U.S. interests because the American National Standards Institute (ANSI) B 109 committee on gas measurement is using the published R 137 to create a new performance-based standard for gas meters in the United States. Please contact Mr. Ralph Richter at (301) 975-3997 or **ralph.richter@nist.gov**, if you would like to participate in these efforts or if you would like to obtain a copy of any of these gas measurement documents.

Although all three parts of OIML R 139, *Compressed gaseous fuel measuring systems for vehicles,* have recently been published, a project to initiate a new revision of R 139 was approved by the CIML in October 2016. The Netherlands and Japan serve as Co-Conveners on this new project that will mostly focus on ensuring that the Recommendation fully and accurately includes proper requirements and test procedures for hydrogen fuel dispensers. A kick-off meeting of the R 139 Project Group was held in February 2017 in Tokyo, Japan. This standard is important to U.S. stakeholders, especially in the effort to maximize harmonization between domestic and international legal metrology requirements used for the delivery of alternative fuels. A 1 CD of R 139 was distributed in the summer of 2017. To obtain more information on this effort, please contact Mr. Ralph Richter at (301) 975-3997 or **ralph.richter@nist.gov**.

TC 9 Instruments for Measuring Mass (United States)

The United States distributed the 5th Committee Draft (CD) of all parts of R 60 *Metrological Regulation for Load Cells* (Metrological and technical requirements and Metrological controls and performance tests) in October 2016. Votes and comments from the R 60 Project Group were received and collated in January 2017. Twenty votes in total were received from the P members of TC 9/p1. The votes consisted of: 1 abstention; 2 "no" votes; and 18 "yes" votes. The threshold needed for approval of the 5th Committee Draft was met. While the two-thirds majority needed for approval of the 5 CD was exceeded, some Project Group members had submitted comments that implied there were a few significant issues, which were unacceptable to those members. Considering those significant issues could result in the rejection of the 5 CD during a CIML preliminary ballot, it was determined that a subgroup be formed to resolve those few issues. A meeting of that subgroup (TC 9/p1/SG 1) was convened on March 14, 2017, and resulted in additional revisions to the 5 CD. These revisions alleviated the objections raised by the PG members working in that subgroup. The current draft (5.1 CD) was posted on the appropriate OIML PG Workspaces. Provided the 5.1 CD is approved by the PG, it will then be forwarded to the CIML for preliminary ballot. For more information on TC 9 activities, please contact Mr. John Barton at (301) 975-4002 or **john.barton@nist.gov**.

TC 9/SC 1 Non-Automatic Weighing Instruments (Germany and France)

A new project to revise OIML R 76:2006 *Non-automatic weighing instruments* was approved by the CIML in October 2016 at its annual meeting in Strasbourg, France. In addition to revising R 76, the project group has been requested to provide suggestions on how to best approach the verification and inspection of these measuring instruments. Please contact Mr. Rick Harshman at (301) 975-8107 or **richard.harshman@nist.gov** if you are interested in the project to revise this document.

TC 9/SC 2 Automatic Weighing Instruments (United Kingdom)

In October 2016, the CIML approved a new TC 9/SC 2 project to develop a new OIML Recommendation on *Continuous totalizing automatic weighing instruments of the arched chute type.* To receive copies of the documents concerning this project or to obtain more information on the work of this subcommittee, please contact Mr. John Barton at (301) 975-4002 or **john.barton@nist.gov**.

The TC 9/SC 2 Secretariat has distributed the 5 CD of OIML R 61, *Automatic gravimetric filling instruments*; votes and the Project Group approved the 5 CD. The Preliminary Ballot of R 51 was approved. The TC 9/SC 2 Secretariat distributed a questionnaire concerning a possible project to revise OIML R 51, *Automatic catch-weighing instruments,* which was last revised in 2006. The proposed international effort to revise R 51 was also announced by the NCWM. Please contact Mr. Rick Harshman at (301) 975-8107 or **richard.harshman@nist.gov** if you are interested in the project to revise this document.

TC 17/SC 1 Humidity (China and United States)

The voting on the preliminary ballot of OIML R 59, *Moisture Meters for Cereal Grains and Oilseeds,* closed in July 2016. R 59 received final CIML approval in October 2016, and it was published on the OIML website in March 2017. Please contact Ms. G. Diane Lee at (301) 975-4405 or **diane.lee@nist.gov** if you would like more information on this effort.

TC 17/SC 8 Quality Analysis of Agricultural Products (Australia)

Preliminary ballot voting closed in Nov 2015 on a new draft document, *Measuring Instruments for Protein Determination in Grains.* The United States submitted a "no" vote with some significant comments on the DR based on the non-uniformity with the testing requirements in OIML R 59. These issues were resolved, and this new Recommendation received final CIML approval in October 2016. It was published as OIML R 146 on the OIML website in February 2017. Please contact Ms. G. Diane Lee at (301) 975-4405 or **diane.lee@nist.gov**, if you would like more information on this effort.

OIML Mutual Acceptance Arrangement (MAA)

The report on the OIML MAA can be found in the TC 3/SC 5 report above and in the NTEP section of this document. For further information on the MAA and its implementation, please contact Dr. Charles Ehrlich at (301) 975-4834 or email **charles.ehrlich@nist.gov**.

II. REPORT ON THE 51ST CIML MEETING AND THE 15TH OIML INTERNATIONAL CONFERENCE IN STRASBOURG, FRANCE IN OCTOBER 2016

Mr. Peter Mason, CIML member from the United Kingdom and President of the CIML, opened the meeting and gave the President's Report.

Mr. Stephen Patoray, who has been serving as BIML Director since January 2011, provided several reports on financial and administrative matters at the BIML, including improvements that have been implemented since his arrival at the BIML. Mr. Patoray also discussed several upgrades to the OIML website. Mr. Patoray's appointment as the BIML Director will end in 2018.

The Committee sadly noted the unexpected passing of BIML Assistant Director Mr. Willem Kool, and posthumously awarded him the OIML Medal. It was decided that the vacant position of a BIML Assistant Director be advertised with the plan to have a new BIML Assistant Director appointed at the 52nd CIML Meeting in 2017.

Dr. Roman Schwartz of the PTB in Germany is currently serving as CIML First Vice-President; the Committee selected Dr. Schwartz to continue serving in the role for a six-year term.

The Committee welcomed Thailand as a new Member State and welcomed Angola as a new Corresponding Member.

The Committee noted a report on OIML activities in liaison with other international organizations aimed at developing countries. The Committee also noted the report of an advisory group that was established to carry out wide consultation, to seek suggestions, and to build up links with other bodies with an interest in promoting the economic development of countries and economies with emerging metrology systems.

The CIML, recognizing the continued efforts that are needed to assist in building the capacity of legal metrology institutions and their staff in countries and economies with emerging metrology systems (CEEMS), instructed the Bureau to (1) continue its efforts to participate in capacity building activities through training courses and other regional activities organized by other organizations, and (2) further develop the OIML website such that it may be used as a source of up-to-date information on capacity-building initiatives, including training materials and, if feasible, a database of experts available to contribute to such work. The CIML also requested relevant Technical Committees and Subcommittees to take note of the demand from CEEMS to ensure Recommendations take more account of the needs of CEEMS.

The Committee recognized the continuing efforts of the Ad-hoc Working Group that is working to revise OIML B 6:2013, *Directives for OIML technical work.*

The Committee approved the following final draft publications:

- Revision of R 59, *Moisture meters for cereal grains and oilseeds*;
- Revision of R 87, *Quantity of product in prepackages*;
- New Recommendation (will become R 146) *Protein measuring instruments for cereal grains and oilseeds*;
- New Recommendation (will become R 147) *Standard blackbody radiator for the temperature range from – 50 °C to 2500 °C.*

The Committee approved several new technical projects:

- Revision of D 31:2008, *General requirements for software controlled measuring instruments*;
- Revision of R 46:2012, *Active electrical energy meters*;
- Revision of R 76:2006, *Non-automatic weighing instruments*;
- Revision of R 125:1998, *Measuring systems for the mass of liquids in tanks*;
- Revision of R 139:2014, *Compressed gaseous fuel measuring systems for vehicles*;
- Development of a new Recommendation on *Continuous totalizing automatic weighing instruments of the arched chute type*;
- Development of a new Recommendation on *Near infra-red saccharimetry instruments*.

The Committee held lengthy discussions on the effort to create and implement the new OIML Certification System (called OIML-CS) that would be managed by a Management Committee instead of by the BIML. (For a summary of this effort, please see the TC 3/SC 5 section of this report.) Until the new OIML-CS is fully operational, the current Basic and MAA systems will continue and will be supported by the BIML.

The Committee instructed the secretariats of Technical Committees and Subcommittees and the conveners of Project.

Groups, when OIML Recommendations for relevant categories of measuring instruments are being developed or revised, to ensure that a requirement should be included, if necessary, stating that the instruments shall not exploit the maximum permissible errors or systematically favor any party. The Committee also instructed the Bureau to monitor the implementation of this resolution.

The Committee congratulated this year's recipient of the OIML Award for Excellent Achievements in Legal Metrology in Developing Countries – The Institute of Trade Standards Administration, Kenya.

III. FUTURE OIML MEETINGS

The 52nd CIML Meeting is being planned to be held in Cartagena, Columbia, in October 2017. The 53rd CIML Meeting is being planned to be held in Hamburg, Germany, in October 2018.

IV. REGIONAL LEGAL METROLOGY ORGANIZATIONS

A meeting of the Inter-American Metrology System (SIM) General Assembly is organized annually and is the event where delegates from National Metrology Institutes of the Americas meet to discuss important issues. The past two years, the SIM General Assembly was held in in Punta Cana, Dominican Republic, (November 2015) and in Montevideo, Uruguay (November 2016). Mr. Hector Laiz from INTI, Argentina serves as the SIM President. The new chair for the Legal Metrology Working Group is Mr. Raimundo Alves de Rezende, Legal Metrology Director of INMETRO, Brazil. The organization is working to build capacity in legal metrology for SIM member countries. In April 2016, INTI organized a workshop on "Metrological requirements for household water meters" in Lima, Peru. Please contact Mr. Ralph Richter at (301) 975-3997 or **ralph.richter@nist.gov** for more information on SIM.

The 23rd Meeting of the Asia-Pacific Legal Metrology Forum (APLMF) was hosted by Japan and was held in Tokyo in November 2016. Starting in January 2016, New Zealand assumed the APLMF Secretariat, and Mr. Stephen O'Brien of New Zealand's Ministry of Business, Innovation and Employment (MBIE) assumed the Presidency. Previously, the People's Republic of China held the Presidency and the Secretariat of APLMF for several years.

The main objectives of APLMF are to coordinate regional training courses in legal metrology and to provide a forum for exchange of information among legal metrology authorities. APLMF activities are facilitated through its seven work groups. The most active WG is the Working Group on Training Coordination chaired by Australia. In 2016, APLMF held the following training courses:

Course	Venue/Host	Trainers	Delivery Dates
Verification of Fuel Dispensers	Pattaya City, Thailand	Australia	July 11 - 13, 2016
Mass Standards	Jakarta, Indonesia	Japan	Aug 30 - Sept. 1, 2016
Verification of Non-Automatic Weighing Instruments	Kuala Lumpur, Malaysia	Malaysia	Nov 28 - Dec. 1, 2016

The results of a recent APLMF survey clearly indicated that the more than 20 courses conducted by APLMF in the last 10 years were highly valued by the member economies, promoted harmonization in the Asia-Pacific region, and frequently led to revised/improved legislation and regulations in the member economies.

A significant joint project entitled "Metrology Enabling Developing Economies in Asia" (MEDEA) has been launched by APLMF, the Asia Pacific Metrology Programme (APMP) and the Physikalisch-Technische Bundesanstalt (PTB). This four-year project is being managed by PTB and is primarily funded by Germany. The project aims to foster and further develop the capabilities of the APLMF and the Asia-Pacific Metrology Program (APMP) to support developing economies in the Asia-Pacific region, to promote metrology systems within developing economies, and to strengthen the metrology systems/infrastructure within developing economies. Several more training courses are planned through the MEDEA Project.

Mr. Ralph Richter represented the United States at the APLMF meeting in Tokyo, Japan. Mr. Richter served as the Acting-Chair of the APLMF work group on Mutual Recognition Arrangements (acting for Dr. Charles Ehrlich) and gave a report and update on the OIML Certificate System project. Mr. Richter also presented the U.S. Country Report.

Cambodia is scheduled to host the next APLMF meeting in October 2017. Please contact Mr. Ralph Richter at (301) 975-3997 or **ralph.richter@nist.gov** for more information on APLMF and the 2017 APLMF Annual Meeting.

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Appendix B

Associate Membership Committee (AMC) Agenda and Draft Meeting Minutes

Richard Shipman, Chair
Rice Lake Weighing Systems

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AGENDA

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- (c) Laws and Regulations Committee Report

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VI. Filling Vacant Positions

VII. Old Business

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IX. Adjournment

APPENDIX B
ASSOCIATE MEMBERSHIP COMMITTEE (AMC)
ANNUAL MEETING MINUTES

July 2017
Pittsburgh, Pennsylvania

1. Call to Order

The Meeting was called to order by Mr. Dick Shipman (Committee Chair) at 5:00 p.m.

2. Acceptance of Previous Minutes

Mr. D. Shipman called for a motion to accept the minutes from the previous meeting (held January 2017). Mr. Bill Calloway (Vice Chair) made the motion. Mr. Mark Flint (Secretary) seconded the motion. The motion passed unanimously.

3. Financial Review

Mr. D. Shipment lead a review of funds for the Committee.

- The Committee began the fiscal year (as of October 1, 2016) with $25,967.91. As of June 30, 2017, the Committee had funds in the amount of $25,157.49.
- There is $9747.50 in payments pending leaving $15,409.99 in available funds.
- Mr. Doug Rathbun (State of Illinois) expressed his gratitude for a grant given to the State of Illinois.
- Mr. D. Shipment asked for a motion for approval of the budget. Mr. M. Flint made the motion. The motion was seconded by B. Calloway. Budget was accepted unanimously.

4. Committee Liaison Reviews

Mr. Chris Guay (Procter & Gamble) gave a review of the Board of Directors meeting, held July 15, 2017.

- NIST has hired a metrologist.
- NCWM is developing a CD Compilation of meetings dating to 1905.
- NIST, Office of Weights and Measures held 50 meetings with 900 students between July 2016 and June 2017.
- NIST budget for 2018 has not been set but a flat budget over 2017 is expected.
- Measurement Canada currently has 177 authorized service providers conducting inspections resulting is a substantial increase in inspections.
- Packaging and Labeling Subcommittee (PALS) has an opening for one industry position.
- Mr. Jerry Buendel has been designated by Ms. K. Macey as Charter Team Chair. Two additional appointments will be made by Mr. J. Cassidy.
- A Task Force is being formed to conduct surveys on Fuels and Lubricants testing.
- ISWM was present at the Board Meeting to discuss overlap in regulatory and industry training.

Mr. D. Shipman presented a review of Professional Development Committee (PDC).

- A presentation was given on Inspector Certification. Several States provided testimony that they would like to see tests for basic weighing and measurement as soon as possible.
- The Safety Task Force was reviewed. A discussion was held on whether training of safety should be provided from Industry to Regulators, with the general thought being that Industry may be more advanced in safety practices than Regulators.

Rebecca Richardson (Mark IV Consulting) provided an update on Laws and Regulations Committee

- She noted that Mr. Lou Sakin (City of Hopkinton, Massachusetts) is terming from the Committee.
- Mr. Matt Curren (State of Florida) is stepping down as the Fuels and Lubricants Subcommittee Chair.
- The polystyrene issue has been moved from Voting to Informational status.

No Industry member currently sits on the Standards and Technology Committee. Mr. C. Guay noted, historically, there has been concern from industry that an industry member on the Committee may give a particular Sector undue influence.

Further discussion was held regarding the Charter Committee. Mr. Eric Golden discussed the fact that the new Chair (J. Buendel) would like to follow up on eight current recommendations for workflow through the group. One possible item being discussed is twice per year voting. Several comments were made during the discussion that the current system is broken and needs to be redeveloped.

5. Review of Funding Applications

Mr. D. Shipment began discussions on two current funding applications

- The State of New York submitted an application in the amount of $3500 for funds to cover classroom and AV equipment rental for a training school. Mr. D. Shipman commented that the he was not sure if the application was specific enough. Mr. C. Guay made the motion to accept the application. The motion was seconded by Mr. Bill Calloway (Crompco). The Committee voted unanimously to accept the application.
- The State of Missouri submitted an application in the amount of $2500 for funds to cover NIST training on Handbook 133, "Checking the Net Contents of Packaged Goods," to be held in Lebanon, Missouri, on March 26 - 30, 2018. Mr. M. Flint made the motion to accept the application. The motion was seconded by Mr. B. Calloway. The Committee voted unanimously to accept the application.

6. Vacant AMC Positions

Mr. D. Shipman opened the discussion on vacant positions on the AMC. He stated that each position has a one-year term. He stated it has been practice that the Vice Chair and the Secretary each "moved up" one position each year. Mr. B. Calloway will serve as Chair this coming year. Mr. M. Flint will serve as Vice Chair this coming year. Mr. D. Shipman opened the floor to nominations for Secretary. Mr. Bob Weise (Northwest Tank) volunteered for the position. The Committee voted unanimously to make him Secretary on the AMC for this coming year.

7. New Business

Further discussion was held regarding industry representation on the S & T committee. Don Onwiler (NCWM) suggested that the AMC spell out the rational for having an industry representation. Several members expressed the opinion that the issue should be discussed further at the interim meeting.

8. Adjournment

Mr. Jim Pettinato made the motion to adjourn the meeting. The motion was seconded by Mr. C. Guay. The meeting was adjourned at 6:08 p.m.

9. Attendance

Name	Affiliation
Mark Flint	ADM
Jim Hewston	J.A. King
Louis Straub	Fairbanks Scale
Eric Golden	Cardinal Scale
Rob Upright	VPG Transducers
Russ Vires	Mettler-Toledo
Jim Pettinato	Technip FMC
David Calix	NCR Corp.
Ron Gibson	Seraphin
Doug Rathbun	Illinois Department of Agriculture
Matthew J. Morrison	B & R Stores
Ann Boeckman	Kraft Heinz
Jan Konijnenburg	Rice Lake Weighing Systems
Chris Guay	Proctor and Gamble
Bob Murnane	Seraphin
Richard Suiter	Richard Suiter Consulting
Henry Oppermann	Weights & Measures Consulting
Patrick Brutus	Walmart
Rebecca Richardson	Mark IV Consulting
Mauricio Mejia	State of Florida
Chris Bradley	Seraphin
Bob Weise	NorthWest Tank
Bill Callaway	Crompco
Richard Shipman	Rice Lake Weighing System

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Appendix C

Report of Team Charter to the Chairman

July 2016

In recent years, concerns have been raised over the ability of the National Conference on Weights and Measures (NCWM) to accept, review, and pass or reject items that appear on its Committee's agenda in a timely manner. Team Charter was asked to assess the current status of standards development in NCWM and identify areas that are problematic. The following report includes a brief overview of the existing standards process and provides examples of recent items that appeared on the agendas of NCWM Committees and outlines areas where changes are needed.

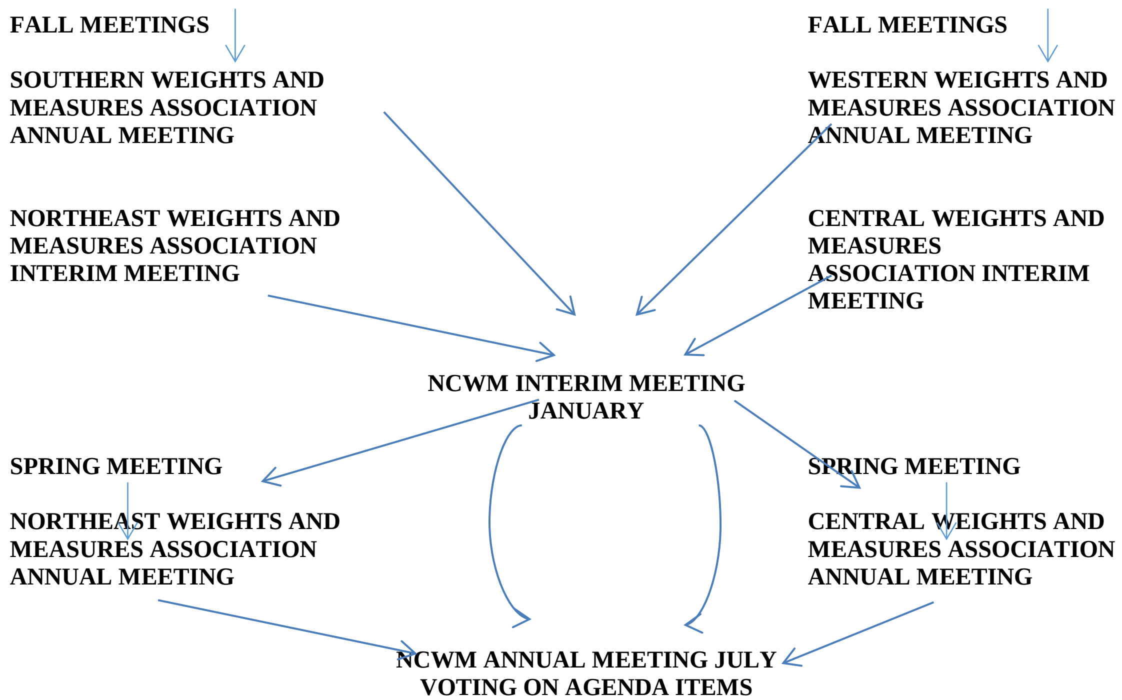
The report also identifies other standards groups whose workings may provide valuable information to Team Charter as its work progresses. Also identified are the participants in NCWM, as well as end users of the work product of NCWM.

NCWM's internal structure includes a Board of Directors, Standing Committees, Special Purpose Committees, the National Type Evaluation Committee, and Ad Hoc Committees, Subcommittees, Task Forces, and Study Groups.

The Standing Committees of NCWM are the Committee on Specifications and Tolerances, the Committee on Laws and Regulations, and the Professional Development Committee. The final work product of the standing committees is published in NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices," NIST Handbook 130, "Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality," and NIST Handbook 133, "Checking the Net Contents of Packaged Goods."

Interested parties wishing to present an item (proposal) to the National Conference on Weights and Measures must follow the guidelines described in NCWM's Bylaws, Policies, and Rules. Items of a technical nature are assigned to a standing committee and then included as an agenda item at both the regional and national levels. Agenda items are reviewed and discussed at the regional and national level and then either presented as a voting item or removed from an agenda.

NCWM – THE "MEETING FLOW" OF AGENDA ITEMS AS THEY MOVE FROM REGIONAL MEETINGS TO NATIONAL MEETINGS



Other National and International Standards Setting Groups:

Studying the methodology of standards setting used by other standards setting organizations will assist Team Charter in addressing the concerns raised in Phase 1 of the report.

American Society for Testing and Materials (ASTM) **www.astm.org/**

> ASTM International is an international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services.

Society of Automotive Engineers (SAE) **www.sae.org/**

> SAE International, initially established as the Society of Automotive Engineers, is a U.S.-based, globally active professional association and standards organization for engineering professionals in various industries.

International Standards Organization (ISO) **www.iso.org/iso/home.html**

> The International Organization for Standardization (ISO) is an international standard-setting body composed of representatives from various national standards organizations. The organization promotes worldwide proprietary, industrial, and commercial standards.

National Institute of Standards and Technology (NIST) **www.nist.gov/**

> NIST promotes U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

The American National Standards Institute (ANSI) **www.ansi.org/**

ANSI oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States.

Underwriters Laboratories (UL) **ulstandards.ul.com/**

UL is a product safety testing, certification, and standards development organization.

National Fire Protection Association (NFPA): **www.nfpa.org/**

NFPA is a trade association that creates and maintains standards and codes for usage and adoption by local governments.

International Electrotechnical Commission (IEC) **www.iec.ch/**

IEC is a nonprofit organization that develops and publishes standards concerning electrical technologies.

Stakeholders in the National Conference on Weights and Measures:

Membership in NCWM is made up of three classes: **Active, Advisory, and Associate**. For the purposes of voting on an agenda item, NCWM is divided into three (3) houses; the House of State Representatives, The House of Delegates, and The House of General Membership. NCWM presently has 2300 members.

Membership Breakdown

Type	Number of Members
Active	1162
Associate	884
Advisory	254
Total	2300

Active Members:

Applies to individuals in the employ of States, Commonwealths, Territories, or Possessions of the United States, their political subdivisions, the Navajo Nation, and the District of Columbia, who are actively engaged in the enforcement of weights and measures laws and regulations.

- Each of these groups designates one official as its representative to the **House of State Representatives**.
- All remaining State, County, and City Regulatory Weights and Measures Officials in attendance are seated in the **House of Delegates**.

Advisory Members:

Applies to (1) representatives of agencies of the Federal Government, (2) representatives of State and local governments other than those involved in the enforcement of weights and measures laws and regulations, (3) foreign government officials, and (4) retired persons who are interested in the objectives and activities of the Corporation and who participate as individuals rather than as representatives of a particular industry or interest group.

- These members are seated in the **House of General Membership**.

Associate Members:

Applies to representatives of manufacturers, industry, business, consumers, and other persons who are interested in the objectives and activities of the Corporation and who do not qualify as Active or Advisory members.

These members are seated in the **House of General Membership**

At the Annual Meeting of the Conference in July of each year, committees of the conference present agenda items to the membership for debate and a possible vote. All registered attendees may comment on both business and technical items during open hearings and voting sessions. However, the adoption of technical items and committee reports is to be decided by a formal vote of the active members in accordance with the NCWM Bylaws. For business items presented by the Board of Directors, all NCWM Associate, Advisory, and Active members are eligible to vote.

End Users:

NIST/NCWM Publications are used by government agencies at the federal, state, and local levels. The publications when adopted become law, regulations or rules depending on the involved public entity. Private sector users (manufacturers, wholesalers, and retailers) use the publications as guidelines to insure compliance with state and local weights and measures regulations.

Public Sector Users	**Private Sector Users**
Field Inspectors	Manufacturers
Auditors	Producers
Supervising Officials	Commodity Packers
Device Evaluators	Retailers - Consumer Goods
Law Enforcement	Advertisers and Marketers

The timelines below represent five (5) wide ranging recent agenda items.

Compressed Natural Gas/Liquefied Natural Gas - Method of Sale

2013: New Informational Item: Assigned to a new steering committee

2014: Item Withdrawn by Submitter

- New Voting Item by same submitter: Returned to Committee
- Steering Committee charged with making recommendations prior to Annual
- Steering Committee provided recommendations in June
- NIST offered an alternative proposal in July for mass
- Voting was on the Steering Committee’s version

2015: Voting Item: Returned to Committee

- Conference now had two “compromise” proposals; one establishing volume equivalents and the other establishing mass
- The Committee agreed to move the volume equivalents version for vote

2016: Voting Item

Length of Time on a Committee(s) Agenda – 3 Years

Net Results – ***No New Rule, Regulation, or Law Added to Handbooks***

Automatic Temperature Compensation Timeline:

2000: Proposed by WWMA for VTMs

2001: Informational

2002: Voting Item Returned to Committee

2003: Voting Item Returned to Committee

2004: Voting Item Returned to Committee

- New proposed Method of Sale for ATC

2005: Both items were informational

2006: Both items were informational

2007:

- ATC Steering Committee was formed
- NCWM Chair testified at congressional hearing on ATC
- L&R vote on permissive ATC Returned to Committee
- ATC for RMFD was proposed – Informational
- ATC for VTMs was adopted

2008:

- L&R presented informational item with 2 options for ATC recommendation and original proposal
- ATC for RMFD was informational

2009:

- L&R moved item from voting to withdrawn
- S&T retained informational item for RMFDs

2010: S&T withdrew item for RMFDs

Length of Time on a Committee(s) Agenda – 11 Years

Net Results – ***No New Rule, Regulation or Law Added to Handbooks***

Software Identification Timeline

2005: Software Sector was created to address software concerns including identification

2007: Software Sector submitted G-S.1. Identification as a Developing item

2008: Item was upgraded to Informational

2009: Informational

2010: Informational

2011: Downgraded to Developing

2012: Developing

2013: Developing

2014: Developing

2015: Developing

2016: Voting Item

Length of Time on a Committee(s) Agenda – 12 Years

Net Results – ***No New Rule, Regulation or Law Added to Handbooks***

Pasta Timeline

2010: Voting Item Returned to Committee

2011: Voting Item Returned to Committee

2012: Voting Item Returned to Committee

2013: Adopted

Length of Time on a Committee(s) Agenda – 4 Years

Net Results – ***New Guidance Given on package Inspections - Added to Handbooks***

GPS Systems Timeline

2012: New Developing Item from Seattle

2013: The GPS item was grouped with other taxi items into a new single Developing item for the USNWG on Taximeters.

2014: Developing

2015: Developing

2016:
- USNWG placeholder item is still Developing.
- California proposed a new draft code for GPS systems.
- Additional states are considering adopting standards in advance of NCWM.

Length of Time on a Committee(s) Agenda – 5 Years

Net Results – ***No New Rule, Regulation or Law Added to Handbooks***

Final Actions of Laws and Regulations and Specifications and Tolerances Committees – 2011 - 2015

In addition to the timelines listed above, the committee was also provided with data on final actions taken on voting items from two of the Standing Committees for the years 2011 to 2015. The data does not include split votes or status downgrades by the Committees prior to voting.

Laws and Regulations Committee

Final Actions Taken on Voting Items

Year	Item	Years in System	Action	Title
2011	232-3	1	Adopted	1.7.2. Pelletized Ice Cream
2012	231-3	1	Adopted	10.11. Statements of Cubic Measure in Compressed Form
	232-1	3	Adopted	2.13.4. Declaration of Weight (Polyethylene)
	232-2	1	Adopted	2.19. Kerosene
	232-3	1	Adopted	2.23. Animal Bedding
	232-4	2	Adopted	2.33. Vehicle Motor Oil
	232-7	1	Adopted	2.32.1. Definition of Hydrogen Fuel
	237-1	2	Adopted	2.1.2. Gasoline - Oxygenate Blends
	237-3	1	Adopted	3.3.4. Nozzle Requirements for Diesel Fuel
	237-4	2	Adopted	3.13.1. Labeling of Vehicle Motor Oil
	237-6	1	Adopted	3.2.X. EPA Labeling Requirements Also Apply
	237-7	1	Adopted	4. Retail Storage Tanks and Dispenser Filters
	237-9	4	Adopted	2.XX. Requirements for Hydrogen Fuel
	237-10	2	Adopted	X.X. Definitions Hydrogen Fuel, Internal Combustion Engines, Fuel Cell Vehicles
	260-4	3	Adopted	4.7. Polyethylene Sheeting Test Procedure
2013	221-1	2	Adopted	1. Definitions
	232-3	1	Adopted	2.33. Oil, 2.33.1.4.5. Tank Trucks and Rail Cars
	232-5	2	Adopted	2.XX. Retail Sale of Electricity/Vehicle
	260-1	4	Adopted	2.3.8. Moisture Loss - Pasta Products
2014	231-2	3	Adopted	10.3. Aerosols and Self-Pressurized Containers
	232-4	2	Adopted	Section 2.33. Oil
	232-6	3	Adopted	2.30. Ethanol Flex Fuel Blends
	232-7	1	Adopted	2.XX. Diesel Exhaust Fluid (DEF)
	232-8	1	Adopted	2.20. Gasoline-Oxygenate Blends
	237-6	2	Adopted	3.13. Oil, 3.13.1. Labeling of Vehicle Engine (Motor) Oil Required
	237-7	1	Adopted	3.2.7. Documentation for Dispenser Labeling Purposes
	237-9	3	Adopted	4. Definitions, 2. Standard Fuel Specifications, 3. Classification and Method of Sale of Petroleum Products
	237-10	1	Adopted	3.XX. Diesel Exhaust Fluid (DEF)

Laws and Regulations Committee

Final Actions Taken on Voting Items

Year	Item	Years in System	Action	Title
	237-11	1	Adopted	2.12. Motor Oil
	260-2	1	Adopted	3.12. Fresh Oysters Labeled by Volume
2015				
	231-1	2	Adopted	Sections 6.4., 6.5., and 6.7. Addition of Tables
	232-2	2	Withdrawn	Section 2.20.3. Street Sign Prices and Advertising
	260-1	1	Adopted	Section 2.7. Chitterling Test Procedure
	260-2	1	Adopted	Section 3.9. Dimensional Test Procedure for Verifying the Compressed Quantity

Specifications and Tolerances Committee

Final Actions Taken on Voting Items

Year	Item	Years in System	Action	Title
2011	310-1	4	Adopted	Provision for Sealing Electronic Adjustable Components
	310-3	2	Adopted	G-A.6. Non-retroactive Requirements (Remanufactured Equipment)
	320-2	1	Adopted	T.N.4.7. Creep Recovery for Load Cells
	321-1	4	Adopted	N.3.1.3. Check for Consistency of the Belt Along Its Entire Length
	331-1	1	Adopted	S.2.6. Thermometer Well, Temperature Determination
	336-1	1	Adopted	Appendix D - Definitions of Utility-Type Water Meters
	342-1	2	Adopted	N.5.1. Verification of Master Metering Systems
2012	320-3	1	Adopted	N.3.1.2. Interim Approval
	320-4	1	Adopted	UR.1.2. Grain Hopper Scales
	320-6	1	Adopted	Appendix D - Definitions. Reference weight car
	321-1	1	Adopted	S.1.9. Zero Read Indicator
	321-2	1	Adopted	UR.1. User Requirements
	330-1	1	Adopted	Unit Price Posting…
	330-2	1	Adopted	Selection of Unit Price
	330-3	1	Adopted	Agreement Between Indications
	330-4	1	Adopted	Recorded Representations
	330-5	1	Adopted	Unit Price and Product Identity
	330-6	1	Adopted	Computing Device
	336-1	1	Adopted	S.3. Markings

Specifications and Tolerances Committee

Final Actions Taken on Voting Items

Year	Item	Years in System	Action	Title
	358-1	1	Adopted	N.1.3.4. Test Objects with Protrusions
	359-1	1	Adopted	Tentative Status of Code 5.59
2013	320-1	2	Adopted	S.6.4. Railway Track Scales and Appendix D - Definitions
	320-4	2	Adopted	Appendix C - Units of Mass (ton)
	321-1	1	Adopted	UR.1.2. Conveyor Installation
	321-2	1	Adopted	Appendix D - Definitions. Belt Revolution, Belt Load…
	330-2	1	Adopted	Table T.2. Accuracy Classes and Tolerances for Liquid Measuring Devices
	331-1	1	Adopted	Table 1. Accuracy Classes and Tolerances for VTMs
	331-2	5	Adopted	T.4. Product Depletion Test
	337-3	1	Adopted	Table T.2. Accuracy Classes for MFMs
	356-1	1	Adopted	Table S.2.5. Categories of Device and Method of Sealing
	356-2	2	Adopted	UR.3.4. Printed Tickets
2014	310-2	1	Adopted	G-S.5.6. Recorded Representations
	320-2	1	Adopted	UR.2.4. Foundations, Supports and Clearance
	321-1	1	Adopted	UR.1.2. Conveyor Installation
	330-1	1	Adopted	S.1.6.8. Recorded Representations and UR.3.3. Computing Device
	330-3	2	Adopted	N.4.2.4. Wholesale Devices
	330-5A	2	Adopted	UR.3.3. Computing Device
	330-5B	2	Adopted	UR.3.3. Computing Device
	332-2	1	Adopted	S.1.5.3. Recorded Representations, POS Systems
2015	310-2	1	Adopted	G-UR.4.1. Maintenance of Equipment
	320-2	1	Adopted	T.N.3.5. Separate Main Elements
	320-4	5	Adopted	2.20 Weigh-in-Motion Vehicles Scales for Law Enforcement
	321-1	1	Adopted	A.1. General
	321-2	1	Adopted	S.4. Marking Requirements
	321-3	1	Adopted	N.2.1. Initial Verification
	321-4	1	Adopted	N.2.3. Minimum Test Load
	321-5	1	Adopted	N.3.1.1. Determination of Zero
	321-6	1	Adopted	UR.1.2. Conveyor Installation
	321-7	1	Adopted	UR.3.1. Scale Conveyor Maintenance, Weighing Systems
	321-8	1	Adopted	Appendix D - Definitions. Weigh-belt systems
	330-2	1	Adopted	Table S.3.3. Categories of Device and Methods of Sealing

Specifications and Tolerances Committee				
Final Actions Taken on Voting Items				
Year	**Item**	**Years in System**	**Action**	**Title**
	354-1	1	Adopted	S.1.1.1. Recording Elements
	354-2	1	Adopted	S.1.2. Advancement of Indicating Elements
	354-3	1	Adopted	S.1.3.3. Passenger Indications
	354-4	1	Adopted	S.1.8. Protection of Indications
	354-5	1	Adopted	S.1.9. Recorded Representation
	360-3	1	Adopted	Appendix D - Definitions. Point-of-sale-system
	360-5	2	Adopted	Electric Vehicle Fueling and Submetering

Conclusions:

The Committee members exchanged e-mails and phone calls that fostered discussion on the items identified below. All Committee members agreed practical solutions should be developed to address the concerns listed below.

1. Standing Committee agendas include too many items. In recent years, agendas have overwhelmed committee members. Committee work sessions have become all-consuming and diminish the Committee's final work product. Late night time commitments affect committee members' morale and cause difficulties in recruiting new committee members. The existing agenda item designation system only provides guidance to the committees as it relates to the status of an item.

2. Items remain on committee agendas for indefinite periods of time. Clearly, there are agenda items needing extensive development, but ***revisiting and/or voting*** on the same items on a yearly basis raises frustration and causes interested groups to question the credibility of the Conference. Interested parties have bypassed the NCWM process and have reached out to the Federal and State Governments for favorable legislation. Some states have passed "boutique legislation" to address that state's immediate need.

3. Adoption or non-adoption of agenda items by the Conference occurs just once a year. Items that are ready for a vote or have been voted on and are ready for a revote cannot be revisited until the July Annual Meeting. Voting only once a year inherently slows the approval process.

4. Agenda items can be intensely technical and inconsistent technical knowledge of a specific item by committee members can hinder the study of the item. Committees may not have the expertise or time to develop items, and proposal authors may not have the resources or connections to reach out to affected parties except at national meetings. The result is items of a technical nature may not be developed adequately before reaching the committee and may return year after year without significant change because of a continuing lack of resources for development.

5. Committee Chairpersons have broad authority and control over their agendas. The tools provided to committee chairs are explained in detail during the NCWM Committee Orientation process, but we believe committee chairs do not use these tools enough in reviewing agenda content. Also, emphasis should be placed on the most efficient utilization of time outside of the NCWM meeting timeframes to work on agenda items.

6. Comments during open hearings and the voting process at times are not directed to the Committees and their chairpersons, inviting "back and forth" discussions on agenda items. Although comments are strongly encouraged, "back and forth" discussions can cause unnecessary delays and can diminish the time necessary

to consider "last minute" changes. As a result, an item deemed by the Committee ready for a vote may be quickly "pulled back" increasing the time it remains on an agenda.

7. Subcommittees perform an important function by advising and assisting the standing committees on agenda specific topics. A subcommittee's recommendation and work product become an integral part of an agenda item. Subcommittee members are subject matter experts, whose expertise and background should be fully utilized by standing committees.

8. Every proposal/agenda item presented to a regional association and/or to the NCWM is distinct and raises a corresponding level of interest. Determining "how long" an item takes to move through the NCWM process is difficult and is driven by the uniqueness (technical nature and the widespread effect on the marketplace) of agenda items. Data suggests that most items move relatively smoothly through the Conference approval process, but this suggestion is clearly diminished by the uniqueness of an item.

NCWM members representing different interests have raised concerns that NCWM will not be able rise to the challenges it will confront in the 21st Century. Finding solutions to the concerns identified above will greatly assist the Conference in meeting those challenges.

Mr. John Gaccione, Westchester County, New York | Chairman & Northeastern Representative
Dr. Matthew Curran, Florida | Southern Representative
Mr. Joseph Gomez, New Mexico | Western Representative
Mr. Robert DeRubeis, Michigan | Central Representative
Mr. Eric Golden, Cardinal Scale Manufacturing | Associate Membership
Mr. Robert Upright, Vishay Transducers | Associate Membership
Mr. Don Onwiler, NCWM
Ms. Carol Hockert, NIST/OWM (Retired)

Team Charter Committee Members

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Report of the
Laws and Regulations (L&R) Committee

Mr. Ethan Bogren, Committee Chair
Westchester County, New York

2000 INTRODUCTION

This is the report of the Laws and Regulations (L&R) Committee (hereinafter referred to as the "Committee") for the 102nd Annual Meeting of the National Conference on Weights and Measures (NCWM). This report is based on the Interim Report offered in the NCWM Publication 16, "Committee Reports," testimony at public hearings, comments received from the regional weights and measures associations and other parties, the addendum sheets issued at the Annual Meeting, and actions taken by membership at the voting session of the Annual Meeting. The voting items shown below were adopted as presented when this report was approved. This report contains those recommendations to amend National Institute of Standards and Technology (NIST) Handbook 130 (2017), "Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality," or NIST Handbook 133 (2017), "Checking the Net Contents of Packaged Goods."

Table A identifies the agenda and appendix items by reference key, title of item, page number and the appendices by appendix designations. The acronyms for organizations and technical terms used throughout the agenda are identified in Table B. The first four digits of the Reference Key Numbers of the items are assigned from the Subject Series List. The status of each item contained in the report is designated as one of the following: **(D) Developing Item:** the Committee determined the item has merit; however, the item was returned to the submitter or other designated party for further development before any action can be taken at the national level; **(I) Informational Item:** the item is under consideration by the Committee but not proposed for Voting; **(V) Voting Item:** the Committee is making recommendations requiring a vote by the active members of NCWM; **(W) Withdrawn Item:** the item has been removed from consideration by the Committee.

Table C provides a summary of the results of the voting on the Committee's items and the report in its entirety. Some Voting Items are considered individually; others may be grouped in a consent calendar. Consent calendar items are Voting Items that the Committee has assembled as a single Voting Item during their deliberation after the Open Hearings on the assumption that the items are without opposition and will not require discussion. The Voting Items that have been grouped into consent calendar items will be listed on the addendum sheets. Prior to adoption of the consent calendar, the Committee entertains any requests from the floor to remove specific items from the consent calendar to be discussed and voted upon individually.

Proposed revisions to the handbook(s) are shown as follows. 1) deleted language is indicated with a **bold face font using ~~strikeouts~~** (e.g., **~~this report~~**), and 2) proposed new language is indicated with an **<u>underscore bold faced font</u>** (e.g., **<u>new items</u>**). When used in this report the term "weight" means "mass."

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

Subject Series List

Table A
Table of Contents

Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
AKI	Minimum Antiknock Index	MAV	Maximum Allowable Variation
API	American Petroleum Institute	MPFS	Meat, Poultry, Fish, and Seafood
ASTM	ASTM International	OEM	Original Equipment Manufacturer
CFR	Code of Federal Regulations	NCWM	National Conference on Weights and Measures
CNG	Compressed Natural Gas	NEWMA	Northeastern Weights and Measures Association
CWMA	Central Weights and Measures Association	NIST	National Institute of Standards and Technology
FALS	Fuels and Lubricants Subcommittee	OWM	Office of Weights and Measures
FDA	Food and Drug Administration	PALS	Packaging and Labeling Subcommittee
FPLA	Fair Packaging and Labeling Act	PITI	Product Traceability Initiative
FTC	Federal Trade Commission	S&T	Specifications and Tolerances
HB	Handbook	SAE	Society of Automotive Engineers
IRQ	Identity, responsibility, and quantity	SWMA	Southern Weights and Measures
FG	Focus Group	TG	Task Group
JASO	Japanese Automotive Standards Organization	UPLR	Uniform Packaging and Labeling Regulation
L&R	Laws and Regulations	USNWG	U.S. National Work Group
LNG	Liquefied Natural Gas	WWMA	Western Weights and Measures Association

Table C
Voting Results

Reference Key Number	***House of State Representatives***		***House of Delegates***		***Results***
	Yeas	***Nays***	***Yeas***	***Nays***	
Consent Calendar					
2302-8	37	0	61	0	Adopted
2302-9					Adopted
2307-1					Adopted
2500-1					Adopted
2302-2	30	6	52	9	Adopted
2302-6	33	5	51	8	Adopted
2600-1	29	7	44	14	Adopted
2600-4	37	0	57	1	Adopted
2302-1	15	21	31	30	Returned to Committee
2302-7 & 2307-2 To amend	No Vote				Committee moved to Information al Status
To Accept the Report	Voice Vote				Adopted

*Items 2302-7 and 2307-2 were voted upon as a block.

Details of All Items
(In order by Reference Key)

2301 NIST HANDBOOK 130 – UNIFORM PACKAGING AND LABELING REGULATION

2301-1 W SECTION 11. EXEMPTIONS, 11.XX. MULTI-UNIT FRESH FRUIT AND VEGETABLE PACKAGES.

(This item was Withdrawn.)

Source:
Counties of Monterey and Ventura, California (2017)

Purpose:
To eliminate the total quantity of the multi-unit package and "bags or counts" for non-consumer packages.

Item under Consideration:
Amend NIST Handbook 130, Uniform Packaging and Labeling Regulation as follows:

> **11.XX. Multi-unit Fresh Fruit and Vegetable Packages. – A multi-unit, non-consumer package of fresh fruits and vegetables bearing (a) the number of the individual units and (b) the quantity of each individual unit are exempt from 10.4.(c) declaration of the total quantity of the contents of the multi-unit package.**

Background/Discussion:
This will allow for the UPLR to be identical to FDA's preemptive regulation on multi-unit retail packages in 21 CFR 101.105(s).

Growers and producers are using a Product Traceability Initiative (PTI) sticker (2016 Food Safety Modernization Act requirement – **www.fda.gov/Food/GuidanceRegulation/FSMA/default.htm**) that also doubles for identity, responsibility, and quantity (IRQ) requirements. Producers are no longer putting all multi-unit requirements from HB 130, Section 10.4. Multi-unit Packages (omitting term "bag or counts" and total count) on their agricultural packages. This issue is prevalent in California, Arizona, Texas, and Florida.

21 CFR 101.105(s) that is presented here:

> *[Code of Federal Regulations]*
>
> *[Title 21, Volume 2]*
>
> *[Revised as of April 1, 2015]*
>
> *TITLE 21--FOOD AND DRUGS, CHAPTER I--FOOD AND DRUG ADMINISTRATION DEPARTMENT OF HEALTH AND HUMAN SERVICES*
>
> *SUBCHAPTER B--FOOD FOR HUMAN CONSUMPTION*
>
> *PART 101 -- FOOD LABELING*
>
> *Subpart G--Exemptions From Food Labeling Requirements - 21 CFR Sec. 101.105 Declaration of net quantity of contents when exempt.*

(s) On a multiunit retail package a statement of the quantity of contents shall appear on the outside of the package and shall include the number of individual units, the quantity of each individual unit, and, in parentheses, the total quantity of contents of the multiunit package in terms of avoirdupois or fluid ounces, except that such declaration of total quantity need not be followed by an additional parenthetical declaration in terms of the largest whole units and subdivisions thereof, as required by paragraph (j)(1) of this section. A multiunit retail package may thus be properly labeled: "6-16 oz bottles--(96 fl oz)" or "3-16 oz cans--(net wt. 48 oz)". For the purposes of this section, "multiunit retail package" means a package containing two or more individually packaged units of the identical commodity and in the same quantity, intended to be sold as part of the multiunit retail package but capable of being individually sold in full compliance with all requirements of the regulations in this part. Open multiunit retail packages that do not obscure the number of units or prevent examination of the labeling on each of the individual units are not subject to this paragraph if the labeling of each individual unit complies with the requirements of paragraphs (f) and (i) of this section. The provisions of this section do not apply to that butter or margarine covered by the exemptions in 1.24(a) (10) and (11) of this chapter.

Item was initially as:

10.4. Multi-unit Retail Packages. [***NOTE 7***, page 74] – Any package containing more than one individual "commodity in package form" (see Section 2.1. Package) of the same commodity shall bear on the outside of the package a declaration of:

(a) the number of individual units;

(b) the quantity of each individual unit; and

(c) the total quantity of the contents of the multi-unit package.

Example:
soap bars, 6 Bars, Net Wt 100 g (3.53 oz) each
total Net Wt 600 g (1.32 lb).

The term "total" or the phrase "total contents" may precede the quantity declaration.

A multi-unit package containing unlabeled individual packages which are not intended for retail sale separate from the multi-unit package may contain, in lieu of the requirements of section (a), a declaration of quantity of contents expressing the total quantity of the multi-unit package without regard for inner packaging. For such multi-unit packages, it shall be optional to include a statement of the number of individual packages when such a statement is not otherwise required by the regulations.

Examples:
Deodorant Cakes –
5 cakes, Net Wt 113 g (4 oz) each, Total Net Wt 566 g (1.25 lb); or
5 cakes, Total Net Wt 566 g (1 lb 4 oz)

Soap Packets –
10 packets, Net Wt 56.6 g (2 oz) each, Total Net Wt 566 g (1.25 lb); or Net Wt 566 g (1 lb 4 oz); or
10 packets, Total Net Wt 566 g (1 lb 4 oz)

(Amended 1993)

NOTE 7: *For foods, a "multi-unit" package means a package containing two or more individually packaged units of the identical commodity in the same quantity, intended to be sold as part of the multi-unit package but labeled to be individually sold in full compliance with this regulation. Open multi-unit retail food packages under the authority of the FDA or the USDA that do not obscure the number of units or prevent examination of the labeling on each of the individual units are not required to declare the number of individual units or the total* *quantity of contents of the multi-unit package if the labeling of each individual unit complies with requirements so that it is capable of being sold individually. (See also Section 11.11. Soft Drink Bottles and Section 11.12. Multi-Unit Soft-Drink Bottles.)*

(Added 1984)

At the 2017 NCWM Interim Meeting, the Committee received modified language from the submitter requesting that the current item under consideration be stricken and replaced with language to create an exemption under Section 11. Exemption for multi-unit fresh fruit and vegetable packages. Two presentations were provided; Mr. Eric Lauritzen (Monterey County, California) and a joint presentation from Mr. Matthew McInerney (Western Growers Association) and Mr. Ed Treacy (Produce Marketing Association). Mr. David Sefcik, NIST Technical Advisor remarked that NIST Handbook 130, UPLR Section 10. Requirements: Specific Consumer Commodities, Non-consumer Commodities, Packages, Containers applied to consumer and non-consumer packages. He also remarked that the three exemptions for non-consumer packages are the net content statement can appear anywhere (no PDP), no font size, or free area requirements. Non-consumer packages may fall under the Food, Drug, and Cosmetic Act of 1938, as well as the UPLR. Other non-consumer products in the marketplace all comply. Mr. Sefcik reached out to Ms. Elizabeth Tansing (Food Marketing Institute) and commented, "Why would you not want to provide this information?" It gives the retailer a guarantee of what is in the box. It also provides the retailer the ability to protect themselves because they can do an audit by weighing at the warehouse or store and compare the results to the total net." Other industry and commodities are required to be labeled with a total net if it is multi-unit package. There were concerns that if an exemption is granted other manufacturers would request similar exemptions. Ms. Anne Boeckman (Kraft Heinz Foods) believed it only applies to retail packages. Several states remarked they perform warehouse inspections on the basis of total net weight.

During the Committee work session, they reviewed several non-consumer labels for fresh fruits and vegetables. The Committee discussed whether there were spacing limitations that did not allow for proper labeling and were there any other restrictions not to have the labeling comply with the UPLR. It was also noted that NIST Handbook 130 regulations for symbols and abbreviations were not being followed. There was concern if this exemption was granted it would lead to other manufacturers to start requesting exemptions. It was unanimous that producers can comply and label in accordance with the regulations. This item was Withdrawn.

Regional Association Comments:
The WWMA did not forward this item to NCWM.

The CWMA heard several comments that they were unsure about the intent of this item, and the language does not add anything currently not included in NIST Handbook 130. CWMA did not forward this item to NCWM.

The SWMA reviewed a presentation provided by the submitter, which explained the concept of their proposal. NIST has contacted the Produce Marketing Association (PMA) seeking their requirements for net content labeling. The SWMA forwarded the item to NCWM and recommended the status of this item be Developing. It is recommended that the submitter work with NIST, OWM to further develop.

NEWMA received a comment from NIST, OWM that industry is concerned there would be a cost associated, if this change is not adopted. NIST will be meeting with the Produce Marketing Association and other stakeholders to discuss further. NIST commented the recommendation of inserting the term "retail" impacts a significant amount of the marketplace. NIST encouraged this be a Developing item until an update from meeting with stakeholders can be provided by the 2017 Interim Meeting. NEWMA forwarded the item to NCWM and recommended the status the status of the item be Developing.

2302 NIST HANDBOOK 130 – UNIFORM REGULATION FOR THE METHOD OF SALE COMMODITIES

2302-1 V SECTION 1. FOOD PRODUCTS AND SECTION 2. NON-FOOD PRODUCTS

(This item was returned to Committee.)

Source:
Los Angeles County, California (2016)

Purpose:
Clarify and formalize the long-standing, fundamental, core tenet of legal metrology and weights and measures regulation that the sale of any commodity, in any form or by any method, be according to legally-recognized, traceable units of measure.

Item under Consideration:
Amend NIST Handbook 130, Uniform Regulation for the Method of Sale of Commodities as follows:

Section 1. Food Products

(a) Any food product, whether sold from bulk or in packaged form, shall be sold only in a unit of measure or weight that meets all of the following criteria:

(1) is recognized and defined by NIST as legal for use in commerce;

(2) has been published in the "Federal Register"; and

(3) has metrological traceability ***(NOTE #, page #)*** **to a national standard**

Note: Sale of a product or commodity according to count, where appropriate to be fully informative to facilitate value comparison, is permissible as a method of sale.

(b) At the discretion of the respective State Director, the following commodities may be exempted from the method of sale limitations set forth in Section 1.(a) and permitted to be sold according to "head" or "bunch," as appropriate:

(1) asparagus;

(2) Brussels sprouts (on stalk);

(3) rhubarb;

(4) edible bulbs (onions [spring or green], garlic, leeks, etc.);

(5) flower Vegetables (broccoli, cauliflower, Brussel sprouts, etc.);

(6) leaf vegetables (lettuce, cabbage, celery, parsley, herbs, loose greens, etc.); and

(7) root vegetables (turnips, carrots, radishes, etc.);

(Added 20XX)

And

Section 2. Non-food Products [*NOTE 1*, page 109]

(a) Any non-food product, whether sold from bulk or in packaged form, shall be sold only in a unit of measure or weight that meets all of the following criteria:

(1) is recognized and defined by NIST as legal for use in commerce;

(2) has been published in the "Federal Register"; and

(3) has metrological traceability *(NOTE #, page #)* **to a national standard.**

Note: Sale of a product or commodity according to count, where appropriate to be fully informative to facilitate value comparison, is permissible as a method of sale.

(b) The only exemptions from the method of sale limitations set forth in Section 2(a) shall be:

(1) Retail sales of compressed natural gas (CNG) sold as a vehicle fuel, which are permitted to be sold in terms of gasoline gallon equivalent (GGE) or diesel gallon equivalent (DGE) as defined, respectively, in Section 2.27.1. Definitions.

(2) Retail sales of liquefied natural gas (LNG) sold as a vehicle fuel, which are permitted to be sold in terms of diesel gallon equivalent (DGE) as defined in Section 2.27.1. Definitions.

Note: As defined in NIST Handbook 130, Uniform Weights and Measures Law, Section 1.15. Metrological Traceability means the property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty.

(Added 1989) (Amended 20XX)

Background/Discussion:
Much discussion and debate has been undertaken within the NCWM over the past two years regarding proposals for methods of sale of commodities (specifically, liquefied natural gas (LNG) and compressed natural gas (CNG) as vehicle fuels) based upon "equivalencies" to other methods of sale for different commodities (in these recent cases, based upon calculated average energy content comparisons to gasoline or diesel fuel). With the exception of a singular commodity, CNG, for which gasoline-liter-equivalent (GLE) and gasoline-gallon-equivalent (GGE) methods of sale were permitted some 20 years ago, the methods of sale for all other commodities have historically and consistently been established based upon legally-recognized units of weight or measure that are traceable to national standards maintained by NIST, the sole exceptions (found in interpretations and guidelines) being specific fresh vegetable commodities permitted to be sold by "head" or "bunch." Discussions surrounding considerations of "equivalency" units have raised the potential for untold similar proposals to establish methods of sale for countless competing products in the marketplace claiming comparisons of performance, quality, energy or nutritional content, or other factors, which can be subjective, widely varying due to inconsistent chemical or biological makeup, or a host of other influences that are, or may be, based on little to no scientific or metrologically sound and traceable determinations or calculations.

While a core tenet of weights and measures regulation and legal metrology, whether regarding design and function of weighing and measuring devices or sales of commodities has always been widely recognized to require employment of units of measure that are recognized and published as legal for use and having metrological traceability, clear language in model laws and regulations developed by NCWM and published in NIST Handbooks is absent, likely never heretofore being deemed necessary due to the well-established, long-held tenet. This proposal serves to codify, memorialize, and specifically clarify that tenet as a formal adoption in the Uniform Regulation for the Method of Sale of Commodities to ensure against potentially misleading, confusing, or unclear business practices in commerce, whether in sales from bulk or in labeling of packaged commodities, that may be based upon observations, calculations, assumptions, or other considerations that may be subjective and not metrologically traceable.

At the 2016 NCWM Interim Meeting, Mr. Kurt Floren (Los Angeles County, California) remarked that this proposal would codify a long-standing practice. This item not intended to interfere with the current debate on liquefied natural gas (LNG). Mr. Floren encouraged the item on LNG to have a vote prior to considering this item. If the LNG proposal is adopted, this item could be amended from the floor of the Conference. A former regulator remarked that Uniform Weights and Measures Law, Section 12(n), Powers and Duties of the Director allows the term or unit of weight or measure be used if it is determined that an existing or firmly established practice. This proposal conflicts with Weights and Measures Law Section 12(n) that states this is a state function, not NIST controlled. The term "traceability" is in NIST Handbook 130, Uniform Weights and Measures Law. NIST remarked that when changes are made to NIST SP 811, "The NIST Guide for use of International System of Units" or NIST SP 330, "The International System of Units (SI)" it is required that a Federal Register notice be done. The Committee is unclear as to what issue this proposal resolves. The Committee would also like to know what impact this would have for all items covered under the current Method of Sale of Commodities Regulation. The Committee agreed to move this forward as a Developing Item to allow the submitter to develop additional data and to have the Regions submit feedback. At the 2016 NCWM Annual Meeting, there were no updates for the Committee but stated this is a commonsense practice in determining the method of sale of commodities.

At the 2017 NCWM Interim Meeting, Mr. Floren commented this item was delayed pending the outcome of a former L&R agenda item pertaining to compressed natural gas. The Committee agreed unanimously that this is ready as a Voting item.

At the 2017 NCWM Annual Meeting, Mr. Floren submitted modified language to the Committee for consideration. This modified language included the adopted Section 2.27.1. Definitions and a minor modification to Section 1. Food Products (b) to add language that it was at the discretion of the State Director. There were several voices that supported this item or concept. A retired New York regulator expressed his objection to this item in its entirety. He believes the Uniform Method of Sale Regulation is specific for the items having a uniform method of sale. He also stated NCWM's authority does not extend to impact all products and commodities. This item was returned to Committee for future consideration.

Regional Association Comments:
At the 2016 WWMA Annual Meeting, it was noted that the adoption of L&R Item 232-8, at the 2016 NCWM Annual Meeting, (refer to the Report of the 101st National Conference on Weights and Measures [SP 1212, 2016]) resulted in the amendment of the method of sale for CNG (deleting allowance of sales according to gasoline liter equivalent [GLE]) and adding a new method of sale for LNG, allowing sales according to diesel gallon equivalent (DGE).

Recognizing the NCWM adoption of the Item 232-8 (refer to the Report of the 101st National Conference on Weights and Measures [SP 1212, 2016]) and its incorporation into NIST Handbook 130, the proposed amendments have been made to reflect changes to adopted methods of sale regarding CNG and LNG and includes them as exceptions to the original proposed requirement that all other methods of sale be according only to legally recognized metrologically traceable units of measure. The submitter encourages moving this item forward as a Voting item, with the proposed amendment below to Section 2. Non-food Products. Multiple local jurisdictions also supported this item with the proposed amendment below.

The Committee agrees the use of measurement units defined by the Secretary of Commerce are the most appropriate for use in commerce and would be the most effective in facilitating fair value comparisons in the marketplace. The measurement units defined by the Secretary of Commerce are published in NIST Handbook 44 in Appendices B and C.

Section 2. Non-food Products [***NOTE 1***, page 109]

(a) Any non-food product, whether sold from bulk or in packaged form, shall be sold only in a unit of measure or weight that meets all of the following criteria:

(1) is recognized and defined by NIST as legal for use in commerce;

(2) has been published in the "Federal Register"; and

(3) has metrological traceability ***(NOTE #, page #)*** **to a national standard.**

Note: Sale of a product or commodity according to count, where appropriate to be fully informative to facilitate value comparison, is permissible as a method of sale.

~~(a) The only exemption from the method of sale limitations set forth in Section 2(a) shall be retail sales of compressed natural gas sold as a vehicle fuel, which are permitted to be sold in terms of gasoline liter equivalent (GLE) or gasoline gallon equivalent (GGE) as defined in Section 2.27.1. Definitions~~

(b) The only exemptions from the method of sale limitations set forth in Section 2(a) shall be:

(1) Retail sales of compressed natural gas (CNG) sold as a vehicle fuel, which are permitted to be sold in terms of gasoline gallon equivalent (GGE) or diesel gallon equivalent (DGE) as defined, respectively, in Section 2.27.1. Definitions.

(2) Retail sales of liquefied natural gas (LNG) sold as a vehicle fuel, which are permitted to be sold in terms of diesel gallon equivalent (DGE) as defined in Section 2.27.1. Definitions.

Note: As defined in NIST Handbook 130, Uniform Weights and Measures Law, Metrological traceability means the property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty.

(Added 20XX)

At the 2016 CWMA Interim Meeting, an industry representative had concern this provision could inadvertently put the weights and measures community into a difficult position in the future, even though he philosophically agrees with the concept. A state regulator commented this is a reasonable approach to undergird the scientific principles of weighing and measuring. Another regulator wondered if this item would serve the purpose for which it is intended. She had concerns it would put weights and measures into a position where we would be locked into a scenario where we cannot respond in a nimble fashion. Another regulator commented, while it is unfortunate this item is necessary, he believed it should be moved forward as a voting item. At the 2017 CWMA Annual Meeting, two industry representatives spoke against the proposal as written. The Committee felt the 2016 concerns were still applicable. The CWMA recommends this as a Voting item.

At the 2016 SWMA Annual Meeting they heard from a regulator asking where could you find all the sections in Section 1. Food Products (a) and whether all three criteria's need to be met? The SWMA recommends this item be Withdrawn.

At the 2016 NEWMA Interim Meeting, a recommendation was made by the NIST Technical Advisor to review the WWMA report for additional clarification. She summarized the changes that were related to units of measure for fuel gallon equivalencies. A regulator from New York commented there are other units of measure that are not necessarily recognized as a technical unit of measure (such as "hog's head"), which would not meet these criteria. He believed this would be problematic for the State of New York and is unsure what problem this is trying to solve. The NIST Advisor reviewed the original purpose of this proposal was to provide a clear statement to avoid developing alternative units of measure when one already exists. NEWMA recommends this item be Withdrawn. At the 2017 NEWMA Annual Meeting this item was considered fully developed and ready for a Vote. This followed a discussion from a New York state regulator who has concerns with this item, commenting there are units of measure, which are customary but not included in NIST Handbook 130. He gave an example of face-cord that New York adopts by state law, but is prohibited in NIST Handbook 130.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

2302-2 V SECTION 1.12. READY-TO-EAT FOOD

(This item was Adopted.)

Source:
Meat, Poultry, Fish, and Seafood Task Group (MPFS) (2016)

Purpose:
Provide clarification in the definition and method of sale for these products.

Item under Consideration:
Amend the NIST Handbook 130, Method of Sale Regulation as follows:

1.12. Ready-to-Eat Food.

1.12.1. Definition - Ready-to-Eat Food. – Restaurant ~~**style**~~ **type** food offered or exposed for sale, whether in restaurants, supermarkets, or similar food service establishments, that is ready for **immediate human** consumption, though not necessarily on the premises where sold**, and which does not require any cooking or heating preparation by the customer.** Ready-to-Eat Food does not include sliced luncheon products, such as meat, poultry, or cheese when sold separately.

Some examples of Ready-to-Eat food items: (The list is not intended to be all inclusive):

- **servings of pastas, potato or coleslaw;**
- **servings of salads, vegetables, or grains such as rice;**
- **pizzas, whole or sliced;**
- **meat/vegetable pockets/pies;**
- **tacos, fajitas, enchiladas, tostadas;**
- **cooked, whole chickens or turkeys;**
- **buckets, tubs, or individual pieces of cooked chicken or fish;**
- **cooked ribs by the slab or piece;**
- **stuffed clams, oysters, shrimp, and fish;**
- **cooked shrimp or crab cakes;**
- **slices of cake, pie, and quiche;**
- **donuts, bagels, and rolls for individual sale;**
- **cookies and brownies for individual sale;**
- **sandwiches, egg, and spring roll;**
- **servings of prepared chili or soup;**
- **stuffed peppers, tomatoes, and cabbage;**

- **knishes; and**
- **pickles**

NOTE: *The sale of an individual piece of fresh fruit (like an apple, banana, or orange) is allowed by count.*

(Added 2004) **(Amended 2017)**

1.12.2. Methods of Sale. – Ready-to-Eat Food sold from **retail cases displaying product in** bulk or in ~~**single**~~ servings packed **or prepared** on the premises may be sold by weight, measure, or count **(i.e., by piece, portion, or serving)** ~~**(count includes servings)**~~**. If pre-packaged, the product shall have the appropriate statement of quantity set forth in the current edition of NIST Handbook 130, Uniform Packaging and Labeling Regulation (UPLR).**

(Amended 1993 **and 2017)**

Background/Discussion:

The current definition and method of sale is broad and subject to individual (both inspector and establishments) interpretation as to what is considered ready-to-eat. The State of Michigan submitted the following proposal at their 2015 CWMA Interim Meeting.

1.12. Ready-to-Eat Food.

1.12.1. Definition - Ready-to-Eat Food. – Restaurant style food offered or exposed for sale, whether in restaurants, supermarkets, or similar food service establishments, that is ready for consumption~~,~~ **and will not require additional cooking preparation by the customer. Consumption may not necessarily be on the premises where sold.** ~~**though not necessarily on the premises where sold.**~~ Ready-to-Eat Food does not include **bulk deli food or** sliced luncheon products, such as meat, poultry, or cheese when sold separately.

NOTE: *The sale of an individual piece of fresh fruit (like an apple, banana, or orange) is allowed by count.*

(Added 2004) **(Amended 20XX)**

1.12.2. Methods of Sale. – Ready-to-Eat Food ~~**sold from bulk or in single servings packed on the premises may be sold by weight, measure, or count (count includes servings).**~~ **shall be sold from bulk or in single serving packages. Bulk ready-to-eat foods may be sold by random weight or count which includes serving size. Pre-packaged single serving or multi-serving packages shall display a net weight statement representative of the contents, a unit price and a total cost.**

(Amended 1993 **and 201X**)

At the 2016 NCWM Interim Meeting, the NIST Technical Advisor remarked the Meat, Poultry, Fish, and Seafood (MPFS) TG is tasked with reviewing the Method of Sale, Ready-to-Eat Food requirements. This task group is comprised of state directors, inspectors, and grocery store chains. The State of Michigan agreed this proposal should be developed by the MPFS TG. A MPFS TG member requested the history of this item be documented in the current report. The following excerpts are from the 1991 and 1992 NCWM Conference reports.

> The Committee is aware that consumer buying habits and food marketing practices are constantly changing. Retail food stores compete with restaurants and fast food outlets in the prepared, ready-to-eat market. The traditional methods of sale required in retail grocery stores for ready-to-eat food items put grocers at a substantial competitive disadvantage compared to restaurants and fast food outlets that sell the same or similar items. An industry representative testified that consumers want to purchase these foods in supermarkets, but find it difficult to relate the cost per pound of a ready-to-eat item in the supermarket to the common method of sale used in a restaurant or fast food establishment (for example, "by each".) The industry indicated that allowing supermarkets to offer ready-to-eat food for sale by the piece would enhance value comparison by consumers. When purchasing ready-to-eat items in the supermarket, most consumers do not compare the price per pound, for instance, to the unprepared product, but rather take the total cost of the meal into consideration. Consumers then compare that price not only to other products in the grocery store,

but to the same prepared items they might buy were they dining at a restaurant or purchasing a meal at a fast food establishment. The following list is presented to illustrate a few of the menu item foods that would be included under the definition of ready-to-eat foods. The list is not intended to be all inclusive. Some examples of Ready-to-Eat food items:

- Servings of pastas
- Cooked, whole chickens or turkeys
- Bar-b-qued ribs by the slab or piece
- Stuffed clams, oysters, shrimp, and fish
- Slices of cake, pie, and quiche
- Sandwiches, egg, and spring roll
- Buckets or tubs of chicken or fish
- Servings of chili or soup
- Servings of salads, vegetables, or grains such as rice
- Meat/vegetable pockets/pies
- Tacos, fajitas, enchiladas, tostadas
- Stuffed peppers, tomatoes, and cabbage
- Knishes
- Pickles
- Pizzas, whole or sliced
- Cookies and brownies

The Committee heard comments during the Interim Meeting that restaurants sell such items by the piece or in small, medium, or large size portions, whereas supermarkets are required to sell them by weight or measure. Representatives from the food industry indicated that supermarkets are not inclined to sell by the piece any ready-to-eat food items that have traditionally been carried in their delis and sold by weight (such as sliced cold cuts or cheese, and prepared salads). Consumers are familiar and comfortable with the pricing and method of sale of these items, and grocers are reluctant to change the system. According to the Food Marketing Institute (FMI), which represents grocery retailers nationally, the supermarket business is highly competitive. Grocers depend on return business, and therefore most grocers would not risk "shorting" consumers by selling them inconsistent portions when offering ready-to-eat items by the piece. Rather, they would work to employ strict practices and controls to ensure uniform servings. FMI contacted their members from throughout the United States, grocery retailers large and small, regarding the sale of ready-to-eat food. Each agreed that the concerns raised initially by supermarkets in the northeastern part of the country are valid across the country. Retailers told FMI that their consumers would prefer to see ready-to-eat food items priced by the piece so they can easily determine the product's value.

In its deliberations to develop a definition for ready-to-eat foods, the Committee agreed that attempting to limit the definition to only items "prepared on the premises" was unreasonable because it would be impossible to enforce, especially if the term "prepared" is not defined. The Committee took the position that how the products are advertised and sold is the issue to be addressed, not where products are "prepared" or what constitutes "preparation." The Committee recognized that many items sold in restaurants, fast food outlets, and supermarkets are prepared in central kitchens and then distributed to the various retail outlets, and that this is the trend for the future. The

Committee also decided that attempting to develop an all-inclusive list of products that could be sold as ready-to-eat food would be difficult because of the wide scope of products; in addition, it would be difficult to keep such a list current.

The NCWM first addressed the issue of ready-to-eat food at the 43rd NCWM in 1958. At that time, the terms “carry out meal” and “menu items” were used to provide illustrations of what the Committee intended to exempt from any specific method of sale. These broad terms allowed the individual jurisdiction to establish, according to its marketplace needs, policies or individual regulations to address which products had to be sold by weight, measure, or count. The key to applying the proposed requirement is to focus on how a product is advertised. For example, if a product is advertised in the same way as a food item is on a restaurant or fast food outlet menu, it could be sold by weight, measure, or count.

The Committee considered the importance of this issue, which is of national significance, and believes that action by the NCWM is needed to provide the States and industry with uniform guidance. The Committee proposed to amend Section 1.12. Ready-to-Eat Food to permit the sale of any ready-to-food by weight, measure, or count (count includes serving sizes such as small, medium, or large) if the food is sold from bulk and is ready for consumption. The proposed definition for "Ready-To-Eat Food" is comparable to the definition for restaurant foods used by the Federal Food and Drug Administration regulations that implement the Nutrition Labeling and Education Act of 1990. At the Annual Meeting, the Committee heard comments that the proposal was not supported by the Central and Northeastern Weights and Measures Associations and several members of industry. Therefore, the item was carried forward as an informational item to allow for additional review and development of alternative proposals.

During 2016 NCWM Interim, Mr. Kurt Floren (Los Angeles County, California) recommended that consideration be given to the language in Section 1.12. Ready-to-Eat Food in removing the term serving size and have items sold by weight or count. The Committee would like to have the MPFS TG continue to develop this item and recommends this be an Informational item.

At the 2016 NCWM Annual Meeting, the Committee stated that the MPFS TG submitted language for consideration to the Committee on March 23, 2016. The L&R Committee accepted this language and looks forward to receiving feedback from the fall Regional Meetings.

At the 2017 NCWM Interim Meeting, there were several comments in support of this item to be a Voting item. A representative from New Hampshire remarked that this proposal did not provide clarity, and the examples are not defined in definition. She also remarked the method of sale does not consider small business where food is produced and packaged off-site. The Committee moved this forward as a Voting item.

At the 2017 NCWM Annual Meeting, Ms. Cheryl Ayer (New Hampshire) remarked that she did not concur with the language the Task Group submitted but does believe current handbook language needs to be modified. Ms. Julie Quinn (Minnesota) asked for clarification as to what the language covers and what it does not. She opposes this language because convenience stores treat cookies differently, some are bulk and some are packaged in a count. Ms. Lisa Warfield (TG Chair) commented these issues date back to 1958 and expressed that this is a fast-growing marketplace. If a product is prepackaged, it will need to meet NIST Handbook 130, Packaging and Labeling requirements for labeling. Several states expressed their support for this item.

Regional Association Comments:

At the 2016 WWMA Annual Meeting, there was concern expressed during the Committee work session that the list of items included in the proposal could be confused as an all-inclusive list. To try and clarify the Committee strengthened the language introducing the list of examples by removing the words “some” and “intended” and adding the phrase “includes but is not limited to….” The Committee believes this item as amended is fully Developed.

At the 2016 CWMA Interim Meeting an industry representative stated this issue was generated, at least in part, to address the sale of rotisserie chickens. A state regulator asked about items such as pizza, which is sold both cooked and ready-to-cook, and whether there would be an issue with selling the same item with two different methods of sale. One state regulator said her state is already doing this. Another state regulator wondered if ready-to-eat party platters and items that are cold but would likely be taken home would fall under this provision. A regulator stated the purpose of this item is to provide the consumer with information on the sale of a specific item at a particular time. A state regulator responded, consumers need to know what they are buying. For example, when a store offers a "pick five items" sale, there is no consideration of weight, so a price comparison does not exist. The regulator believes all items should have a weight for purposes of comparison. A regulator commented that a ready-to-eat product that provides a weight may not provide any useful informational to a consumer. Another regulator's comment was grocery chains developed delis to allow grocers to sell products that otherwise would have been thrown away. Grocers need to remember ready-to-eat items are a separate entity from typical grocery store items. She also stated ready-to-eat food is regulated by the FDA and/or USDA from a food safety standpoint, and weights and measures may not need to regulate these items. A state regulator remarked consumers care about more than price per pound; consumers also care about portion size. She stated all ready-to-eat packaged foods should be sold by weight; another regulator agreed. A regulator commented he had concerns about having all ready-to-eat foods being sold by weight. This issue has many gray areas, and there was uncertainty among Committee members as to how it would be implemented. They felt this would be subjective and would lead to inconsistencies.

At the 2017 CWMA Annual Meeting, Ms. Warfield, NIST, OWM, L&R Technical Advisor, and Chair of the Ready-to-Eat TG stated 14 states, 7 industries representing grocery stores, and the Food Marketing Institute (FMI) participated in the workgroup. The Item under Consideration strengthens the language in the handbook. Ms. Warfield provided additional information about the growth of ready to eat foods being offered in grocery stores.

The CWMA believes this language is an improvement to the existing language. However, there are concerns that it may still not be clear. This is a fast-growing marketing area, and it is believed it is in the best interest to provide clear language to the states. The Committee does feel this is a tough issue, and they are moving it forward to allow the voting body to decide.

Ms. Quinn (Minnesota) submitted the following alternative language for consideration:

> **1.12.2. Methods of Sale. –** Ready-to-Eat Food sold from **retail cases displaying product in** bulk or in ~~single~~ servings ~~**packed or**~~ **prepared** on the premises **and packed at the time of sale** may be sold by weight, measure, or count **(i.e., by piece, portion, or serving)** ~~**(count includes servings)**~~. **If pre-packaged at any location either on-site or off-site, the product shall have the appropriate statement of quantity set forth in the current edition of NIST Handbook 130, Uniform Packaging and Labeling Regulation [UPLR].)**
> (Amended 1993 **and 20XX)**

The Committee reviewed the alternative language submitted by Ms. Quinn and believes the item under consideration should move forward without changes.

At the 2016 SWMA Annual Meeting, the Committee heard from a NIST Technical Advisor and Co-Chair of the MPFS TG that this proposal has been fully developed and submitted in March 2016 to the NCWM L&R Committee. The NIST Advisor remarked there were six members from SWMA on the TG. The Committee also reviewed a minor change from the WWMA final report and concurs with this change. Mr. Gene. Roberson (Mississippi) also provided the Committee with additional information on "ready-to eat" from his state. The SWMA recommends this as a Voting status.

During the 2016 NEWMA Interim Meeting, NEWMA heard from the NIST Technical Advisor and Co-chair of the TG who reviewed the WWMA proposed change. A regulator who served on the TG commented that the language was approved by the TG. A New York state regulator stated the title is ambiguous and does not help clarify what items this language covers. Food is consumed in contrasting manners considering the different cultures in our country. She believes the list should be eliminated. An all-inclusive list of "ready-to-eat" products is virtually impossible considering how quickly the market changes. The distinction between a number of sales terms should not determine if an item is "ready-to-eat." The location where food items are prepared should not be a weights and measures issue. She recommends this item be an Informational item. The NIST Technical Advisor commented that years ago, a group worked to develop language for "ready-to-eat" items to address the sale of whole chickens at retail, and restaurants could not compete with the low price. She commented that leaving this project as an Informational item means that the Committee "owns" the project. She stated the item should remain as a Voting item with no other revisions needed. A regulator asked if a "ready-to-eat" item prepared in one state and sold in another would fall under federal oversight. A regulator from New York state asked if self-serve frozen custard and yogurt could be included in the list. The NIST Technical Advisor remarked that the list is not all-inclusive. A state regulator from New Hampshire requested the regional group review another proposal on their agenda regarding this same item. NEWMA recommends this be a Voting item.

At the 2017 NEWMA Annual Meeting, a state regulator from New York asked what items are included or excluded? The NIST Technical Advisor commented that items packed and prepared on the premise, whether or not intended to be warmed up, are considered "ready-to-eat." She commented that ready-to-eat items are the fastest growing category of foods, and the Conference needs to be prepared for this rapidly growing sector of the marketplace. A state regulator from Maine commented that with regards to the intrastate regulation, packaged products require a label if it is a self-served product only. No label is required for products made onsite where a consumer must interact with a clerk for service. NEWMA considered this item fully developed and ready for a Vote.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

2302-3 W SECTION 1.12. READY-TO-EAT FOOD

(This item was Withdrawn.)

Source:
New Hampshire (2017)

Purpose:
Allow businesses the ability to offer restaurant type food to the consumer in a manner similar to restaurant counterparts.

Item under Consideration:
Amend NIST Handbook 130, Uniform Method of Sale Regulation as follows:

1.12. Ready-to-Eat Food.

1.12.1. Definitions<u>s</u> – ~~Ready-to-Eat Food. Restaurant style food offered or exposed for sale, whether in restaurants, supermarkets, or similar food service establishments, that is ready for consumption, though not necessarily on the premises where sold. Ready-to-Eat Food does not include sliced luncheon products, such as meat, poultry or cheese when sold separately.~~

<u>(a) Restaurant Style Food and Service. – Restaurant style food offered for sale in a manner similar to restaurants, including advertising, service, and sale where a customer places an order and receives prepared food. This type of food is ready for immediate human consumption and does not require any cooking or heating preparation by the customer.</u>

<u>(b) Self-Service from Bulk. – Bulk food offered for sale from a retail display case, such as donuts, muffins, etc. This type of food is ready for immediate human consumption and does not require any cooking or heating preparation by the customer.</u>

<u>(c) Single-Serve Packages. – Single serve portions that are pre-packaged by the seller and are ready for immediate human consumption and does not require any cooking or heating preparation by the customer.</u>

NOTE: *The sale of an individual piece of fresh fruit (like an apple, banana, or orange) is allowed by count.*

(Added 2004) **(Amended 20XX)**

1.12.2. Methods of Sale. – Ready-to-Eat Food ~~**sold from bulk or in single servings packed on the premises may be sold by weight, measure, or count (count includes servings).**~~ **may be sold by weight, measure, or count (i.e., by piece, portion, or serving). If pre-packaged, the product shall have the appropriate statement of quantity set forth in the current edition of NIST Handbook 130, Uniform Packaging and Labeling Regulation (UPLR).**

(Amended 1993 **and 20XX**)

Background/Discussion:

The submitter, Ms. Cheryl Ayer, provided the following comments:

The act of providing food in a similar manner as restaurants should be the most important distinguishing factor to what is currently referred to as "Ready-To-Eat." If grocery stores want to compete with restaurants, the method of advertising, service, and sale should be similar to restaurants.

Our intention is to create clarity to the proposed "Ready-To-Eat" regulation and not to eliminate current long-standing practices that have been adopted as reasonable, such as cooked wrapped chickens, donuts/muffins in a display case, etc. These types of items can be addressed at a jurisdictional level, or in the creation of specific methods-of-sale. New Hampshire does not support the L&R Item 232-3 proposal as it will likely lead to possible unintended consequences by changing the method-of-sale for numerous items, and is too confusing for regulators and businesses. The New Hampshire proposal is clear, concise, reasonable, and understandable.

Re: Title: "Ready-To-Eat" is an ambiguous and confusing title, as many things are ready-to-eat but are not intended to fall under this regulation. Why not call it what it is? If the intent is to compete with restaurants, then the title should align with that intent. "**Restaurant Type Food and Service"** embodies the intent of this regulation.

Re: List of examples: Why a "whole" turkey, but only a "slice" of quiche? Why a "serving" of vegetables, but a "bucket" of chicken. These qualifiers are unenforceable. Why can you buy eight single slices of pie, but not a whole pie? What if a vegetarian wants more than one serving to create a meal? What reasons do inspectors give to businesses when trying to explain this? All food items can theoretically be included in "ready-to-eat" when prepared and sold properly.

We do not feel it is appropriate to create an example list of allowed foods in the regulation. The list will be difficult to maintain because businesses will request the addition of food items. Enforcement may be hindered because of issues with interpretation. The list leads to more confusion rather than clarity. For these reasons, the list should be eliminated.

See language from the 1992 Annual Conference Ready-To-Eat Committee: *"The Committee also decided that attempting to develop an all-inclusive list of products that could be sold as ready-to-eat food would be difficult because of the wide scope of products; in addition, it would be difficult to keep such a list current."*

Re: Packed and prepared on premise: This is not equitable for smaller businesses, food stands, farmers markets, etc. where the food is prepared offsite. The location where the food items are prepared should not be a weights and measures issue. This requirement will be time consuming and difficult to enforce, with no benefit to the consumer.

See language from the 1992 Annual Conference Ready-To-Eat Committee: *"…the committee agreed that attempting to limit the definition to only items "prepared on the premises" was unreasonable because it would be impossible to enforce, especially if the term "prepared" is not defined…The Committee recognized that many items sold in restaurants, fast food outlets, and supermarkets are prepared in central kitchens and then distributed to the various retail outlets…"*

Re: Portion Size: The distinction between portion sizes, slices, whole, etc. is not important to whether food should qualify as "restaurant type food." Once an item is allowed to be sold by a single serving or slice, it is unenforceable to prevent people from buying multiple servings or slices. It is not reasonable for businesses or inspectors to research or enforce what a single serving is for each food item.

Re: Single Serve: If there is a strong need for single serve items, then there should be a separate regulation to cover this.

Re: Older version language: *"…food for **direct** (i.e. seller and consumer are present when the quantity is determined) sale…"*

This was taken out of the proposed language…why? This is the intent and should be included in the regulation. Businesses should compete in a similar manner as restaurants.

Re: Restaurants selling packaged food: If restaurants want to compete with grocery stores by selling pre-packed foods, then the packages need to follow NIST HB 130.

Clearly, regardless of what language is adopted, there is going to be some "gray area" and inspector/jurisdictional discretion will be necessary. However, the New Hampshire proposal is clear, concise, reasonable, and understandable.

At the 2017 NCWM Interim Meeting the submitter provided a brief presentation to provide a different perspective on ready-to-eat food regulation. Her language emphasizes the manner that food is sold, which includes advertising. It was remarked that the agenda Item 2302-2, Ready-to-Eat, addresses this submitters concerns. The Committee has Withdrawn this item.

Regional Association Comments:
At the 2016 CWMA Interim Meeting they believe there is merit in this proposal and the MPFS Task Group proposal and suggests the submitters work together to further develop it. The CWMA forwarded the item to NCWM and recommended it as a Developing item.

At the 2016 SWMA Annual Meeting, the Committee reviewed this proposal and did not believe it addressed the concerns for clarity. A fully developed ready-to-eat proposal has been submitted by the MPFS. The SWMA did not forward this item to NCWM.

At the 2016 NEWMA Interim Meeting, the submitter submitted this proposal after studying the current regulation, notes from the current task force, and other comments. Ms. Cheryl Ayer (New Hampshire) felt all issues that could be seen in the marketplace are not reflected as part of this regulation, and there was no clear direction for the business owner. She believes ready-to-eat should be food sold in similar "style" as a restaurant. If grocery stores want to sell food like a restaurant, they should sell it like a restaurant. Her intention is not to eliminate methods that are already well-established, but that this proposal covers how to sell restaurant-type food in a non-restaurant setting. The proposal takes a slightly different approach to this issue, and she recommends this proposal be accepted by the Committee and made an Informational item. A regulator from Massachusetts asked if the proposal is changing the term from "type" to "style." Another state regulator from New Hampshire proposed that "restaurant-type" food be changed to "restaurant-style" food, as businesses will better understand this term. The NIST advisor commented that the language in the alternative proposal was fully vetted by many regulators and businesses. A regulator from New York suggested the language stay consistent. Another state regulator from New York commented there is no method of sale addressed in the proposal. The state regulator from New Hampshire stated the method of sale language in this proposal is the same as the alternate proposal. The regulator from New York remarked he is unclear in what the method of sale is? Ms. Ayers further commented this process is new for New Hampshire, and they welcome additional comments. The NIST Technical Advisor stated she reviewed all the regional reports from the fall and shared this proposal with the TG. The TG believes their submitted proposal (Item 2302-2) is fully developed and ready for Voting status. There is no plan for the TG to reconvene. A New Hampshire regulator commented that because an item is packed and prepared onsite, it should not be exempt from a unit of measure. A state regulator from New York remarked he supported some of the language of this item, and suggested the alternate proposal address the state's concern. The submitter commented this proposal is different from the "ready-to-eat" TG item. The NIST Technical Advisor and the NEWMA L&R Chair stated if the submitter is not considering this as Ready-to-Eat language then it should not have the related section number (2.12. Ready-to-Eat) food assigned to it, but rather given an "XX" number. NEWMA forwarded the item to NCWM and recommended this as a Developing item.

2302-4 W SECTION 1.7.X. BULK ICE CREAM AND SIMILAR FROZEN PRODUCTS

(This item was Withdrawn.)

Source:
Florida (2017)

Purpose:
Update the advertising and price computing for bulk frozen milk products to include the current and commonly used practice of computing by weight in ounces.

Item under Consideration:
Amend the NIST Handbook 130, Method of Sale Regulation as follows:

1.7. Other Milk Products – Cottage cheese cottage cheese products, and other milk products that are solid, semi-solid, viscous, or a mixture of solid and liquid, as defined in the Pasteurized Milk Ordinance of the U.S. Public Health Service, as amended in 1965, shall be sold in terms of weight.

(Amended 1995)

1.7.1. Factory Packaged Ice Cream and Similar Frozen Products. – Ice cream, ice milk, frozen yogurt and similar products shall be kept, offered, or exposed for sale or sold in terms of fluid volume.

(Amended 1995)

1.7.2. Pelletized Ice Cream and Similar Pelletized Frozen Desserts. – A semi-solid food product manufactured at very low temperatures using a nitrogen process and consisting of small beads of varying sizes. Bits of inclusions (cookies, candy, etc.) that also vary in size and weight may be mixed with the pellets.

1.7.2.1. Method of Retail Sale. – Packaged pelletized ice cream or similar pelletized frozen desserts shall be kept, offered, or exposed for sale on the basis of net weight.

NOTE: *This method of sale for pelletized ice cream shall be enforceable after April 17, 2010, and after August 2, 2011, for similar pelletized frozen desserts.*

(Added 2010)

1.7.X. Bulk Ice Cream and Similar Frozen Products. – Ice cream, ice milk, frozen yogurt, and similar products when sold from bulk by weight shall be advertised, displayed, and sold in terms of whole weight units of ounces.

(Added 20XX)

Background/Discussion:
The bulk ice cream and frozen yogurt market has been operating with prices displayed in ounces (wt) without issue for many years. This unit has become commonly accepted throughout this industry and is more representative of actual purchase weights compared to pounds (i.e., not many people are purchasing multiple pounds of frozen yogurt in single serving applications). Handbook requirements to advertise the price by kilograms or pounds are not in line with consumer expectations that the advertised price will be in the same unit displayed during the sale. While this information is intended to allow the consumer to make a value comparison between locations, the currently displayed weight in ounces allows for the same. We believe this change will allow businesses to continue a practice that has had no adverse impact on the consumer.

If the rules, as they exist, are enforced and primary and supplemental pricing are posted, so that businesses can continue to advertise this product in the historically accepted weight unit, pricing may become more difficult for average consumers to interpret and thus lead to confusion in the marketplace. Enforcement of current regulations may also be costly for businesses and not benefit the consumer.

At the 2017 NCWM Interim Meeting, it was commented that NIST Handbook 130, Section 1.9.2. Advertising and Price Computing of Bulk Food Commodities covers how bulk items are sold. The issue at hand is retailers do not want to post the price per pound. In the past, there have been other companies with products they wanted to sell by ounces and were informed this was not allowed. In the past year, the Conference adopted an item that you could have a supplemental declaration in advertising meat by the ounce, but the price per pound had to be posted. For these reasons, the Committee Withdrew this item.

Regional Association Comments:
The 2016 WWMA Annual Meeting did not forward this item to NCWM.

At the 2016 CWMA Interim Meeting, it was noted that all similar frozen products are not sold in the same units. This proposal needs clarity to determine what is and what is not covered. The CWMA did not forward this item to NCWM.

At the 2016 SWMA Annual Meeting, a regulator remarked this proposal was being submitted to address a commonly used practice in the marketplace. The NIST Technical Advisor commented the same objective could be accomplished by enforcing NIST Handbook 130, Section 1.9.2. Advertising and Price. The SWMA forwarded the item to NCWM and recommended it as Voting status.

At the 2016 NEWMA Interim Meeting, the NIST Technical Advisor commented there is existing language under the Method of Sale, Section 1.9.2. Unit Pricing Advertising that already addresses this issue. A regulator from the State of New York commented he liked the idea of pricing yogurt by the ounce. The Chairman asked if the states were enforcing the existing regulation. The states remarked they were not doing enforcement on yogurt stores. NEWMA did not forward this item to NCWM.

2302-5 SECTION 2.13. POLYETHYLENE PRODUCTS

(The Committee moved this to Informational status.)

Source:
California (2017)

Purpose:
This proposal is to modify the current language to allow for a truncation method for larger non-consumer packages.

Item under Consideration:

2.13. Polyethylene Products.

2.13.1. Consumer and Non-Consumer Products. – Offered and exposed for sale shall be sold in the terms given in Section 2.13.1.1. Sheeting and film.

2.13.1.1. Sheeting and Film.

Consumer products shall include quantity statements in both SI and U.S. customary units.

Consumer products:

(a) length and width (in SI and U.S. customary units)

(b) area (in square meters and square feet)

(c) thickness (in micrometers and mils [***NOTE 4***, page 117])

(d) weight (in SI and U.S. customary units)

Non-Consumer Products:

(a) length and width (in SI or U.S. customary units)

(b) area (in square meters or square feet)

(c) thickness (in micrometers or mils [***NOTE 4***, page 117])

(d) weight (in SI or U.S. customary units)

(Added 1982) (Amended 1979, 1993, and 1998)

NOTE 4: *1 mil = 0.001 in = 25.4 micrometers (μm). 1 micrometer = 0.000 039 37 in.*
(Amended 1993)

2.13.2. Consumer Products. – At retail shall be sold in the terms given in Section 2.13.2.1. Food wrap, Section 2.13.2.2. Lawn and trash bags, and Section 2.13.2.3. Food and sandwich bags.

2.13.2.1. Food Wrap.

(a) length and width

(b) area in square meters and square feet
(Amended 1979)

2.13.2.2. Lawn and Trash Bags.

(a) count

(b) dimensions

(c) thickness in micrometers and mils
(Amended 1993)

(d) capacity [***NOTE 5***, page 118]

2.13.2.3. Food and Sandwich Bags. – The capacity statement does not apply to fold-over sandwich bags.

(a) count

(b) dimensions

(c) capacity [***NOTE 5***, page 118]

NOTE 5: See Section 10.8.2. Capacity of the Uniform Packaging and Labeling Regulation.

2.13.3. Non-Consumer Products. – Shall be offered and exposed for sale in the terms given in Section 2.13.3.1. Bags. (Package shall be labeled in SI or U.S. customary units and may include both units.) (Amended 1998)

2.13.3.1. Bags.

(a) count

(b) dimensions

(c) thickness in micrometers or mils

(d) weight

(e) capacity [*NOTE 5*, page 118]

2.13.4. Declaration of Weight. – The labeled statement of weight for polyethylene sheeting and film products under Sections 2.13.1.1. Sheeting and Film, and 2.13.3.1. Bags, shall be equal to or greater than the weight calculated by using the formula below. The final value shall be calculated to **~~four~~** **<u>no more than two</u>** digits **<u>after the decimal and truncate any additional digits</u>** **~~and declared to three digits, dropping the final digit as calculated~~** (for example, if the calculated value is **<u>3</u>**2.078 lb, then the declared net weight shall be **<u>3</u>**2.07 lb).

(Added 1977) (Amended 1980, 1982, 1987, 1989, 1990, 1993, **~~and~~** 2012**<u>, and 20XX</u>**)

For SI dimensions:

$M = T \times A \times D/1000$, where:

M = net mass in kilograms
T = nominal thickness in centimeters
A = nominal length in centimeters times nominal width [*NOTE 6*, page 119] in centimeters
D = minimum density in grams per cubic centimeter as defined by the latest version of ASTM Standard D1505, "Standard Test Method for Density of Plastics by the Density-Gradient Technique" and the latest version of ASTM Standard D883, "Standards Terminology Relating to Plastics."

For the purpose of this regulation, the minimum density (D) for linear low-density polyethylene plastics (LLDPE) shall be 0.92 g/cm^3 (when D is not known).

For the purpose of this regulation, the minimum density (D) for linear medium density polyethylene plastics (LMDPE) shall be 0.93 g/cm^3 (when D is not known).

For the purpose of this regulation, the minimum density (D) for high density polyethylene plastics (HDPE) shall be 0.94 g/cm^3 (when D is not known).

For U.S. customary dimensions:

$W = T \times A \times 0.03613 \times D$, where:

W = net weight in pounds
T = nominal thickness in inches;
A = nominal length in inches times nominal width [*NOTE 6*, page 118] in inches

D = minimum density in grams per cubic centimeter as defined by the latest version of ASTM Standard D1505, “Standard Test Method for Density of Plastics by the Density-Gradient Technique” and the latest version of ASTM Standard D883, “Standards Terminology Relating to Plastics.”

0.03613 is a factor for converting g/cm^3 to lb/in^3

For the purpose of this regulation, the minimum density (D) for linear low-density polyethylene plastics (LLDPE) shall be 0.92 g/cm^3 (when D is not known).

For the purpose of this regulation, the minimum density (D) for linear medium density polyethylene plastics (LMDPE) shall be 0.93 g/cm^3 (when D is not known).

For the purpose of this regulation, the minimum density (D) for high density polyethylene plastics (HDPE) shall be 0.94 g/cm^3 (when D is not known).

(Added 1977) (Amended 1980, 1982, 1987, 1989, 1990, 1993, and 2012)

NOTE 6: *The nominal width for bags in this calculation is twice the labeled width.*

Background/Discussion:

The most efficient means for testing polyethylene products is by weight. The method of truncating the weight value to three digits is suitable for smaller consumer packages, but not for non-consumer products where packages often range in weights from 10 lb to more than 1000 lb. As currently written, this section limits the calculated weight to three digits for all sizes of packages and will not accommodate heavier packages typically tested at wholesale or production sites. For example, a product with a calculated weight of 1759 lb would be truncated to 1750 lb, thus, providing a 9 lb allowance. If adopted, the proposed language would correct this error.

At the 2017 NCWM Interim Meeting, Ms. Kristin Macey (California) stated that this is important for the mil thickness of bags. The polyethylene test procedure was being reviewed and this change aligns with the test procedure. The Committee moved this forward as a Voting item.

At the 2017 NCWM Annual Meeting, Ms. Macey (California) commented that the language could be clarified. Ross Andersen (retired regulator) stated that when weight is required as part of the method of sale, the weight must be correct. The current formula is a minimum weight factor and is only good to a 1 % variance. Mr. Andersen (retired NY state regulator) recommends that the current language providing for three digits remain as is. He is recommending moving this and the test procedure forwarded, but provide examples in both the method of sale and test procedure. The NIST Technical Advisor remarked that he is seeking additional information from industry and recommends this be removed from voting status. The Committee concurred that additional work and vetting is needed for this item. For these reasons the Committee removed it from the Voting agenda and de-escalated the status to Informational.

Regional Association Comments:

At the 2016 SWMA Annual Meeting believes this item is fully developed. They forwarded the item to NCWM and recommended it as a Voting item.

At the 2016 NEWMA Interim Meeting they received no comments except that the SWMA believed it was fully developed and recommends this as a Voting item. During the NEWMA 2017 Annual Meeting, L&R voting session, discussion ensued regarding the need to retain the language that the Committee proposed to be stricken. The concern is that the language provides a practical way to test the product label to ensure it correctly represents the contents, and removal of the language would eliminate that option. The submitter of the item commented that the intent of the original language was to clarify an imperfect method, and the amendment by the Committee to strike the language was intended to further accomplish that end. The Committee deleted the sentence “The final value shall be calculated to four no more than two digits after the decimal and truncate any additional digits and declared to three digits, dropping the final digit as calculated (for example, if the calculated value is 32.078 lb, then the declared net weight shall be 32.07 lb.)” During Voting session NEWMA opted to recommend the item be changed to Informational, and recommends that the submitted and NIST further develop and vet the language.

At the 2017 CWMA Annual Meeting, Mr. Ron Hayes (Missouri) suggested a note to address other types of plastic sheeting products, gave an example of plastic bale wrap and plastic tubes for silage. He also commented that there are other types of plastic sheeting on the market which may need to be reviewed. The CWMA is recommending this as a Voting item.

2302-6 V SECTION 2.17. PRECIOUS METALS

(This item was Adopted.)

Source:
Florida (2016)

Purpose:
Provide critical information consumers should have when deciding to sell items containing precious metals.

Item under Consideration:
Amend the NIST Handbook 130, Method of Sale Regulation as follows:

2.17. Precious Metals.

2.17.1. Definition.

2.17.1.1. Precious Metals. – Gold, silver, **palladium,** platinum, or any item composed partly or completely of these metals or their alloys and in which the market value of the metal in the item is principally the gold, silver, **palladium,** or platinum component.

2.17.2. Quantity. – The unit of measure and the method of sale of precious metals, if the price is based in part or wholly on a weight determination, shall be either troy weight or SI units. ~~**When the measurement or method is expressed in SI units of mass, a conversion chart to troy units shall be prominently displays so as to facilitate price comparison. The conversion chart shall also display a table of troy weights indicating grains, pennyweights, and troy ounces.**~~ **To facilitate price comparison and provide information allowing consumers to make an informed decision a chart must be prominently displayed and present in proximity to the purchasing scale being used for the transaction. This chart requirement is not intended to apply to pure precious metal bullion traded on commodity markets such as stock exchanges and the like rather it is only intended to apply to precious metals purchased by weight by businesses from the general public through non-retail transactions. The chart must be clearly visible to the seller and contain at a minimum the following information.**

(a) A table of weights indicating grams and troy ounces.

(b) The percentages as noted in Table 3 of Precious Metal Contained in Common Mixtures found in the marketplace.

(c) If buying precious metals based on weight the chart shall also state the price per unit weight on which the buying price is based.

(d) If buying precious metals based on weight the following formula:

(Item Weight × Percentage in Decimal Form of Precious Metal Contained in the Item) × (Price per Weight Being Paid) = Potential Monetary Offer.

NOTE: The item weight and price per unit weight must be in the same units.

(e) When the measurement or method of sale is expressed in SI units of mass, a conversion chart to troy units must also be present on the chart.

Table 3. Percentage of Precious Metal Contained in Common Mixtures		
Gold	**10 karat**	**41.7 %**
	14 karat	**58.3 %**
	18 karat	**75.0 %**
	24 karat	**100 %**
Silver	**Sterling**	**92.5 %**
Platinum	**900 Platinum**	**90 %**
	950 Platinum	**95 %**
Palladium	**950 Palladium**	**95%**

(Added 1982) **(Amended 2017)**

Background/Discussion:

The accurate and fair purchase of precious metals by retailers from the general public is dependent on two primary factors. The first factor being the accuracy of the scale, which is well covered in Section 2.20. of NIST Handbook 44. The second factor has not been addressed, but it involves the calculation or method used by buyers to make an offer to the seller (the general public). It is probably fair to say that the average consumer is unaware of how to calculate market value for their precious metal containing items (e.g., gold and silver jewelry, etc.) and, thus, creates the potential for an inequitable or uniformed transaction; despite an accurate scale. The weights and measures community routinely refers to the quintessential (and justified) need for "equitable transactions" and if the general public elects to sell precious metals in a time of need or for whatever reason they should have sufficient information to ensure value comparison and be able to engage in an equitable transaction. We believe this additional information will further ensure equitable transactions occur in the precious metal buying market (from the general public).

Florida officials are aware of scenarios where consumers were paid as low as 10 % of the melt value. Their suspicion is consumers were unaware they were being paid such a low percentage of the melt value for their property. The officials believe it is difficult for consumers to discern whether they are being offered a fair price for their items. The proposed information will help make it less difficult. Secondhand dealers and pawn shops may not be in favor of the additional declarations, but there is no additional cost or requirement to these businesses. Pursuant to existing language (since 1982) charts are already required.

At the 2016 NCWM Interim Meeting, Dr. Matt Curran (Florida) provided background information as to why this proposal was submitted. He believes providing consumers with this information will help them when making a precious metals transaction. The Committee encourages the submitter to reach out to notify stakeholders of this change. The Committee believes this item has importance for marketplace transactions and recommends this move forward as a Voting Item.

At the 2016 NCWM Annual Meeting, Dr. Curran remarked that the intent of this proposal was to address secondhand and pawn shops. This requirement is not intended for precious metals traded on the commodity market. There was discussion from the regions regarding the marketplace and how precious metals are sold in their region. It was remarked that terminology needs to be defined for the terms "meltdown, salvage, and secondhand market." Ms. Julie Quinn (Minnesota) commented the language needs to include the salvage price offering and the chart should include grams. The Item under Consideration, which appeared in NCWM Publication 16 was modified by Dr. Curran from the floor. This modified proposal was not adopted and returned to Committee.

At the 2017 NCWM Interim Meeting, Dr. Curran remarked he had reached out to the regions with concerns on the original proposal. Dr. Curran submitted modified language and would like this language to proceed forward as a Voting item. The Committee agreed the previous concerns with this item have been addressed with additional clarity being provided as to the items intent. The Committee recommends this item move forward as a Voting item.

At the 2017 NCWM Annual Meeting, NEWMA commented this item needed further development. Dr. Curran remarked he met with the states that had expressed some concerns with the language. He had also vetted this proposal to industry. The Committee reviewed all the comments and continued to move the item forward as a Voting item.

Regional Association Comments:
WWMA received comment from NIST, OWM for support of the concept but suggested the reference to a purchasing scale should be removed in connection with the placement of the chart. The language should require instead, "The following information shall be prominently displayed and readable from a 'reasonable customer position' when describing placement of the chart." An alternative to the proposed chart was offered since it is believed the chart as proposed puts too much of a burden on the inspector when trying to decide whether or not it conforms to the proposal. The chart suggested by the NIST Technical Advisor would require the buyer to post the karat and unit price. If troy units are used, then no conversion factors are required. If metric units are used, then conversion factors to troy units must be posted. NIST, OWM offered an amendment to the proposal. The Committee accepted the NIST, OWM's amendment with minor revisions. The Committee recommended the following revisions and an Informational status be given to the item, as there were no industry members present at the WWMA meeting to provide additional input.

2.17. Precious Metals.

2.17.1. Definition.

2.17.1.1. Precious Metals. – Gold, silver, palladium, platinum, or any item composed partly or completely of these metals or their alloys and in which the market value of the metal in the item is principally the gold, silver, palladium, or platinum component.

2.17.2. Quantity. – If the price is based in part or wholly on a weight determination then the unit of measure and the method of sale or purchase of precious metals shall be in either troy ounces or pennyweights or fractions thereof; or grams or milligrams or fractions thereof.

2.17.3. Information Posting. – In order to facilitate price comparisons, the following information shall be prominently displayed and must be readable from a reasonable customer position (e.g., on a web page where the consumer accepts an offer to purchase their precious metals or, in direct sales, where the customer stands to see the scale indications and to observe the weighing).

(a) If the measurement is made in grams or milligrams a conversion chart to troy ounces or pennyweights as shown in Table 1 must be provided.

Table 1. Conversion Factors

	Troy Units		Metric (SI) Units*	
	troy ounce (oz) T	**pennyweight (dwt)**	**gram (g)**	**milligrams (mg)**
1 troy ounce	**1**	**20**	**31.103 476 8**	**31 03.476 8**
1 gram	**0.032 150 75**	**0.643 014 9**	**1**	**1000**
1 pennyweight	**0.05**	**1**	**1.555 173 84**	**1555.173 84**

Table 2. Percentage of precious metal contained in mixtures

			Unit Price Paid Per Troy Ounce
Gold	**10 karat**	**41.7 %**	**$**
	14 karat	**58.3 %**	**$**
	18 karat	**75.0 %**	**$**
	24 karat	**100 %**	**$**
Silver	**Sterling**	**92.5 %**	**$**
Platinum	**900 Platinum**	**90 %**	**$**
	950 Platinum	**95 %**	**$**
Palladium	**950 Palladium**	**95 %**	**$**

(b) A statement of prices for the precious metals being purchased as a result of the weight determination. The statement of prices shall include, but not be limited to, the following in terms of the price per troy ounce:

(1) The prices for 24 karat, 18 karat, 14 karat, and 10 karat gold.

(2) The price for pure silver and sterling silver.

(3) The prices for platinum (900 and 950).

(4) The prices for palladium (950).

(c) The percentages as noted in Table 2 of precious metals contained in common mixtures found in the marketplace.

(d) If buying precious metals based on weight the following formula must be utilized in all transactions:

(Item Weight × Percentage in Decimal Form of Precious Metal Contained in the Item) × (Price per Weight Being Paid ~~Melt Value Being Used × Percentage in Decimal Form Being Paid of Melt Value Being Used~~) = Monetary Value.

Note: The item weight and price per unit weight must be in the same units.

2.17.4. Exceptions. – The requirements in 2.17.3. Information Posting does not apply to precious metals sold over commodity exchanges.
(Amended 1982) **(Amended 20XX)**

At both the 2016 CWMA Interim Meeting and the 2017 CWMA Annual meeting, they believe the original proposal is too complicated and will not improve equity in the marketplace and offers substitute language for this proposal.

The alternative proposal below is more concise, easy to understand and it clearly states the seller's requirements. The CWMA recommends this alternative proposal as an Informational item.

2.17.1. Definition.

2.17.1.1. Precious Metals. – Gold, silver, platinum, **palladium,** or any item composed partly or completely of these metals or their alloys and in which the market value of the metal in the item is principally the gold, silver, platinum, or **palladium** component.

2.17.2. Quantity. – **~~The unit of measure and the method of sale of precious metals, if the price is based~~** **When the price offered for items containing precious metals is** based in part or wholly on the weight **~~determination, shall be either troy weight or SI units.~~** **of precious metals they contain, the price per unit for the precious metal content must be in troy ounces. The receipt or recorded documentation of the transaction should contain the gross weight and the percent of precious metal multiplied by the price offered which will equal the price given by the buyer.** **~~When the measurement or method of sale is expressed in SI units of mass, a conversion chart to troy units shall be prominently displayed so as to facilitate price comparison. The conversion chart shall also display a table of troy weights indicating grains, pennyweights and troy ounces.~~**

At the 2016 SWMA Annual Meeting they proposed the following modified proposal from the original submitter and recommended Voting status:

2.17. Precious Metals.

2.17.1. Definition.

2.17.1.1. Precious Metals. – Gold, silver, **palladium,** platinum, or any item composed partly or completely of these metals or their alloys and in which the market value of the metal in the item is principally the gold, silver**, palladium,** or platinum component.

2.17.2. Quantity. – The unit of measure and the method of sale of precious metals, if the price is based in part or wholly on a weight determination, shall be either troy weight or SI units. **~~When the measurement or method is expressed in SI units of mass, a conversion chart to troy units shall be prominently displays so as to facilitate price comparison.~~** **To facilitate price comparison and provide Informational allowing consumers to make an informed decision a chart must be prominently displayed and present in proximity to the purchasing scale being used for the transaction. This chart requirement is not intended to apply to pure precious metal bullion ~~metals~~ traded on commodity markets such as stock exchanges and the like rather it is only intended to apply to precious metals purchased by weight by businesses from the general public through non-retail transactions ~~by second hand markets.~~ The chart must be clearly visible to the seller and contain at a minimum the following Informational.**

(a) A table of ~~troy~~ weights indicating ~~grains, pennyweights,~~ grams and troy ounces.

(b) The percentages as noted in Table 3. Percentage of Precious Metals Contained in Common Mixtures found in the marketplace.

Table 3. Percentage of Precious Metal Contained in Common Mixtures		
Gold	**10 karat**	**41.7 %**
	14 karat	**58.3 %**
	18 karat	**75.0 %**
	24 karat	**100 %**
Silver	**Sterling**	**92.5 %**
Platinum	**900 Platinum**	**90 %**
	950 Platinum	**95 %**
Palladium	**950 Palladium**	**95 %**

(c) **If buying precious metals based on weight the chart shall also state the price per unit weight ~~minimum percentage of the current melt value being used to calculate the buying price and the minimum melt value~~ on which the buying price is based.**

(d) **If buying precious metals based on weight the following formula:**

(Item Weight × Percentage in Decimal Form of Precious Metal Contained in the Item) × ~~(~~Price per Weight Being Paid ~~Melt Value Being Used × Percentage in Decimal~~

(e) **When the measurement or method of sale is expressed in SI units of mass, a conversion chart to troy units must also be present on the chart.**

(Added 1982) **(Amended 20XX)**

At the 2016 NEWMA Interim Meeting, they reviewed several alternatives from other regions during its meeting. A question was asked if the revised language makes it clear this proposal does not address precious metals on the commodities exchange. After considerable discussion, the region collectively believed this issue needed further development and recommends it as a Developing item.

At the 2017 NEWMA Annual Meeting, the L&R Committee and members raise renewed concerns, which surfaced during open hearings, regarding the ability to maintain the price/value charts in the proposal given that the commodity is often exchanged in real time and remain a legitimate concern. The Table 3 percentages would also imply that purity of the items for sale falls under the purview of weights and measures inspectors. Historically, it has not. The participants also were not clear if the submitter reached out for industry input, and clarification is needed on this. NEWMA recommended this item be returned to the submitter for additional work and clarification.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

2302-7 I SECTION 2.20. GASOLINE – OXYGENATE BLENDS AND SECTION 2.30. ETHANOL FLEX-FUEL (SEE RELATED ITEM 2307-2)

(This item was removed from the Voting agenda and returned to Informational status.)

Source:
KMoore Consulting, LLC (2017)

Purpose:
Align the duplicative labeling wording for Gasoline-Oxygenate Blends and Ethanol Flex Fuel blends that appears in Section B. Uniform Regulation for the Method of Sale of Commodities with the proposed Section G. Ethanol labeling being proposed by the NIST Handbook 130 Focus Group.

Item under Consideration:
Amend NIST Handbook 130, Uniform Method of Sale of Commodities Regulation as follows:

2.20. Gasoline-Oxygenate Blends.

2.20.1. Method of Retail Sale. – Type of Oxygenate must be Disclosed. – All automotive gasoline or automotive gasoline-oxygenate blends kept, offered, or exposed for sale, or sold at retail containing at least 1.5 mass percent oxygen shall be identified as "with" or "containing" (or similar wording) the predominant oxygenate in the engine fuel. For example, the label may read "contains ethanol" or "with MTBE." The oxygenate contributing the largest mass percent oxygen to the blend shall be considered the predominant oxygenate. Where mixtures of only ethers are present, the retailer may post the predominant oxygenate followed by the phrase "or other ethers" or alternatively post the phrase "contains MTBE or other ethers." In addition, gasoline-methanol blend fuels containing more than 0.15 mass percent oxygen from methanol shall be identified as "with" or "containing" methanol. This information shall be posted on the upper 50 % of the dispenser front panel in a position clear and conspicuous from the driver's position in a type at least 12.7 mm (½ in) in height, 1.5 mm ($^{1}/_{16}$ in) stroke (width of type).

(Amended 1996)

2.20.2. Documentation for Dispenser Labeling Purposes. – The retailer shall be provided, at the time of delivery of the fuel, on product transfer documents such as an invoice, bill of lading, shipping paper, or other documentation:

(a) Information that complies with 40 CFR § 80.1503 when the fuel contains ethanol.

(b) For fuels that do not contain ethanol, information that complies with 40 CFR § 80.1503 and a declaration of the predominant oxygenate or combination of oxygenates present in concentrations sufficient to yield an oxygen content of at least 1.5 mass percent in the fuel. Where mixtures of only ethers are present, the fuel supplier may identify either the predominant oxygenate in the fuel (i.e., the oxygenate contributing the largest mass percent oxygen) or alternatively, use the phrase "contains MTBE or other ethers."

(c) Gasoline containing more than 0.15 mass percent oxygen from methanol shall be identified as "with" or "containing" methanol.

(Added 1984) (Amended 1985, 1986, 1991, 1996, and 2014)

2.20.3. EPA Labeling Requirements Also Apply. – Retailers and wholesale purchaser-consumers of gasoline shall comply with the EPA pump labeling requirements for gasoline containing greater than 10 volume percent (v %) up to 15 volume percent (v %) ethanol (E15) under 40 CFR § 80.1501. (for additional information refer to Section 2.30.2. Labeling Requirements).

(Added 20XX)

2.30. Ethanol Flex Fuel.

2.30.1. How to Identify Ethanol Flex Fuel. – Ethanol flex fuel shall be identified as "Ethanol Flex Fuel or EXX Flex Fuel."

2.30.2. Labeling Requirements.

(a) Ethanol flex fuel **shall be identified and labeled in accordance with Federal Trade Commission Automotive Fuel Ratings, Certification and Posting Rule, 16 CFR, as amended** ~~**with an ethanol concentration no less than 51 and no greater than 83 volume percent shall be labeled "Ethanol Flex Fuel, minimum 51 % ethanol.**~~**"** **(For additional information refer to Section 2.20.3. EPA Labeling Requirements Also Apply.)**

(Amended 2014 **and 20XX)**

~~**(b) Ethanol flex fuel with an ethanol concentration less than or equal to 50 volume percent shall be labeled "EXX Flex Fuel, minimum YY % ethanol," where the XX is the target ethanol concentration in volume percent and YY is XX minus five (− 5). The actual ethanol concentration of the fuel shall be XX volume percent plus or minus five (± 5) volume percent.**~~

~~**(Added 2014)**~~

~~**(c) A label shall be posted which states "For Use in Flexible Fuel Vehicles (FFV) Only." This information shall be clearly and conspicuously posted on the upper 50 % of the dispenser front panel in a type at least 12.7 mm (½ in) in height, 1.5 mm (1/16 in) stroke (width of type). A label shall be posted which states, "CHECK OWNERS MANUAL," and shall not be less than 6 mm (¼ in) in height by 0.8 mm (1/32 in) stroke; block style letters and the color shall be in definite contrast to the background color to which it is applied.**~~

~~**(Amended 2014)**~~

(Added 2007**)** (Amended 2014 **and 20XX**)

Background/Discussion:
The proposal to eliminate the duplicative wording that appears in Section B. Method of Sale for Commodities will streamline the handbook contents, send users of the handbook to only one section that provides appropriate guidance on labeling for both oxygenated fuels and ethanol flex fuels. Having duplicative wording is both confusing and redundant. There is no other fuel related guidance for gasoline or diesel for that matter, which appears in Section B. All fuel related information appears in Section G. Uniform Engine Fuels and Automotive Lubricants section.

At the 2017 NCWM Interim Meeting, Dr. Curran (FALS Chair) remarked they are submitting modified language to the Committee. Several states and stakeholders support this amendment. There was a remark that the FTC rule references EPA but does not require it to be followed. The Committee moved this forward as a Voting item.

At the 2017 NCWM Annual Meeting, Dr. Curran informed the Committee that the FALS met Sunday, July 16, 2017. There was extensive discussion and comment on this item. The FALS was unable to achieve consensus on the language under consideration in NCWM Publication 16. The primary issue is EPA and FTC have conflicting regulations. The FTC labeling requirements has fewer elements to their language. The Committee noted that Section 2.30.1. was reflected as being stricken, this is not accurate and corrected editorially. The Committee reviewed the following alternatives.

1. Making the item Informational and sending it back to the FALS for consideration and review.
2. Move the item forward as it published in Publication 16 (2017).
3. Move the item forward with proposed amendments submitted by API.
4. Move the item forward with alternative language proposed by Committee member, Michelle Wilson and Washington State regulator, Tim Elliot.

The Committee agreed to add a cross reference to Section 2.20.3. EPA Labeling Requirements Also Apply and Section 2.30.2. Labeling Requirements to add clarity. This modified change was moved forward on the addendum sheet for a Vote. In response to a motion made on the floor during the voting session, the Committee reconsidered this item and agreed to Withdraw its recommendation for adoption and removed it from the voting agenda. It was believed the amended proposal was substantially different than the version published in the Committee's agenda. The amended proposal will be returned to the Committee's agenda.

The item as it appeared in NCWM Publication 16 (2017):

2.20. Gasoline-Oxygenate Blends.

2.20.1. Method of Retail Sale. – Type of Oxygenate must be Disclosed. – All automotive gasoline or automotive gasoline-oxygenate blends kept, offered, or exposed for sale, or sold at retail containing at least 1.5 mass percent oxygen shall be identified as "with" or "containing" (or similar wording) the predominant oxygenate in the engine fuel. For example, the label may read "contains ethanol" or "with MTBE." The oxygenate contributing the largest mass percent oxygen to the blend shall be considered the predominant oxygenate. Where mixtures of only ethers are present, the retailer may post the predominant oxygenate followed by the phrase "or other ethers" or alternatively post the phrase "contains MTBE or other ethers." In addition, gasoline-methanol blend fuels containing more than 0.15 mass percent oxygen from methanol shall be identified as "with" or "containing" methanol. This information shall be posted on the upper 50 % of the dispenser front panel in a position clear and conspicuous from the driver's position in a type at least 12.7 mm (½ in) in height, 1.5 mm ($^{1}/_{16}$ in) stroke (width of type).

(Amended 1996)

2.20.2. Documentation for Dispenser Labeling Purposes. – The retailer shall be provided, at the time of delivery of the fuel, on product transfer documents such as an invoice, bill of lading, shipping paper, or other documentation:

(a) Information that complies with 40 CFR § 80.1503 when the fuel contains ethanol.

(b) For fuels that do not contain ethanol, information that complies with 40 CFR § 80.1503 and a declaration of the predominant oxygenate or combination of oxygenates present in concentrations sufficient to yield an oxygen content of at least 1.5 mass percent in the fuel. Where mixtures of only ethers are present, the fuel supplier may identify either the predominant oxygenate in the fuel (i.e., the oxygenate contributing the largest mass percent oxygen) or alternatively, use the phrase "contains MTBE or other ethers."

(c) Gasoline containing more than 0.15 mass percent oxygen from methanol shall be identified as "with" or "containing" methanol.

(Added 1984) (Amended 1985, 1986, 1991, 1996, and 2014)

2.20.3. EPA Labeling Requirements Also Apply. – Retailers and wholesale purchaser-consumers of gasoline shall comply with the EPA pump labeling requirements for gasoline containing greater than 10 volume percent (v %) up to 15 volume percent (v %) ethanol (E15) under 40 CFR § 80.1501.

(Added 20XX)

2.30. Ethanol Flex Fuel.

~~**2.30.1. How to Identify Ethanol Flex Fuel. Ethanol flex fuel shall be identified as "Ethanol Flex Fuel or EXX Flex Fuel."**~~

2.30.~~2~~1. Labeling Requirements.

~~**(a)**~~ Ethanol flex fuel **shall be identified and labeled in accordance with Federal Trade Commission Automotive Fuel Ratings, Certification and Posting Rule, 16 CFR, as amended** ~~**with an ethanol concentration no less than 51 and no greater than 83 volume percent shall be labeled "Ethanol Flex Fuel, minimum 51 % ethanol."**~~

(Amended 2014 **and 20XX)**

~~**(b) Ethanol flex fuel with an ethanol concentration less than or equal to 50 volume percent shall be labeled "EXX Flex Fuel, minimum YY % ethanol," where the XX is the target ethanol concentration in volume percent and YY is XX minus five (− 5). The actual ethanol concentration of the fuel shall be XX volume percent plus or minus five (± 5) volume percent.**~~

~~**(Added 2014)**~~

> ~~**(c) A label shall be posted which states "For Use in Flexible Fuel Vehicles (FFV) Only." This information shall be clearly and conspicuously posted on the upper 50 % of the dispenser front panel in a type at least 12.7 mm (½ in) in height, 1.5 mm (1/16 in) stroke (width of type). A label shall be posted which states, "CHECK OWNERS MANUAL," and shall not be less than 6 mm (¼ in) in height by 0.8 mm (1/32 in) stroke; block style letters and the color shall be in definite contrast to the background color to which it is applied.**~~
> ~~**(Amended 2014)**~~

(Added 2007**)** (Amended 2014 **<u>and 20XX</u>**)

Regional Association Comments:
The WWMA did not forward this item to NCWM.

At the 2016 CWMA Annual Meeting, they reviewed written comments from the submitter that indicate this provision should be referred to the FALS for further development. A regulator stated there is an informal focus group that has been updating the Uniform Engine Fuels section of NIST Handbook 130, and this new language will be a part of the process. A regulator asked how this provision would impact E15. She expressed concern if this provision would require changing the face of the dispenser from season to season. An industry representative from API commented on October 3, 2016, that EPA released the Renewable Enhancement and Growth Support (REGS) proposed rule and E15 is considered gasoline, and is not allowed to be re-labeled as flex fuel during the summer months. He believes this item needs to continue to be developed through FALS as the federal rule moves through the process. The CWMA did not forward this item to NCWM and recommended that it be Withdrawn.

At the 2016 SWMA Annual meeting they heard a comment that FTC was being consulted with regarding this issue. The submitter, a representative of API and the State of Florida would like to see the issue forwarded to FALS. The submitter took issue with the Method of Sale language differing from the Fuels and Lubricants Regulation. SWMA forwarded the item to NCWM and recommends it be giving an Informational status.

At the 2016 NEWMA Item Meeting, the L&R Chair commented that items 2302-7 and 2307-2 are both proposals that be reviewed by the FALS. NIST OWM commented that if you want it to go to FALS it will need to be given an information status from this region. A state regulator commented that the new FTC Part 306 allows E15 to be considered as part of D4814. Also, E15 would require the EPA label that 2001 and newer vehicles can use the product, but there is no octane label required. NEWMA forwarded the item to NCWM and recommended it for an Informational status to be reviewed by the FALS.

At the 2017 NEWMA Annual Meeting During the 2017 NEWMA Annual Meeting L&R voting session, there was repeated concern by a New York state regulator that section 2.30.2(c) of the item that originally appears in Publication 16 reflect strike-through language and should be reinstated if it does not contradict or countermand federal labeling requirements. The L&R suggested language was supported by the region. If possible, NEWMA wants to maintain section 2.30.2(c), and voting status contingent on review and report by FALS.

2302-8 V SECTION 2.23. ANIMAL BEDDING

(This item was Adopted.)

Source:
American Wood Fibers (2017)

Purpose:
Delay the enforceable date for the 2016 change to the Method of Sale of animal bedding from January 1, 2018, to January 1, 2020, to avoid undue hardship and costs for manufacturers and retailers

Item under Consideration:
Amend NIST Handbook 130, Uniform Regulation for the Method of Sale of Commodities as follows:

2.23. Animal Bedding.

(Amended 2016)

2.23.1. Definition.

2.23.1.1. Compressed Animal Bedding – Means that the volume of the bedding was reduced under pressure during the packaging process.

(Added 2016)

2.23.1.2. Useable Volume – The volume of the product that can be recovered from a package by the consumer after it is unwrapped and, if necessary, uncompressed.

2.23.2. Method of Sale.

(a) Packaged animal bedding of all kinds, except for baled straw, shall be advertised, labeled, offered for sale, and sold by volume in either a compressed or an uncompressed package. A package of compressed animal bedding shall be advertised, labeled, offered, and exposed for sale and sold on the basis of the "Useable Volume." If unit pricing is provided for use by retail customers to make a value comparison it shall be in terms of the price per liter.

(b) A quantity declaration shall be in terms of the largest whole unit of the milliliter, liter, or cubic meter. A declaration may also include the quantity in terms of largest whole unit of the cubic inch, cubic foot, or cubic yard only. The terms "Useable Volume" must appear in the quantity declaration on a package of compressed animal bedding.

Examples for Uncompressed Animal Bedding:
Volume 41 Liters (1.4 Cubic Feet)
Volume 125 Liters

Examples for Compressed Animal Bedding:
Useable Volume 1.4 Cubic Feet (41 Liters)
Useable Volume 27.9 Liters (1700 Cubic Inches)
Useable Volume 113 L (4 Cubic Feet)
Useable Volume 226 L

(c) The display of a net or gross weight, pre-compression volume, compressed volume, or supplementary dry measure quantities (e.g., dry pint, dry quart, or bushel) anywhere on the package is prohibited.

(Added 2016)

2.23.3. Exemption - Non-Consumer Packages Sold to Laboratory Animal Research Industry. – Packaged animal bedding consisting of granular corncobs and other dry (8 % or less moisture), pelleted, and/or non-compressible bedding materials that are sold to commercial (non-retail) end users in the laboratory animal research industry (government, medical, university, preclinical, pharmaceutical, research, biotech, and research institutions) may be sold on the basis of weight.

(Added 2010)

NOTE: *This method of sale for animal bedding shall be enforceable after January 1, ~~2018~~* ***2020.***

(Added 2016) **(Amended 2017)**

Background/Discussion:

After calculating transition timing and days of inventory remaining, many industry manufacturers and retailers will still have remaining unused bag inventory after January 1, 2018. American Woods Fibers has 181 different bedding bags. Many of these bags are turned around rapidly, but there are quite a few products that have a very small market and a very slow turnover. Most of these are pet bedding. The minimum order on many bags is 25,000 this results in a lot of inventory. Based on estimates, we have 40 bags valued over $400,000 on-hand today that will not be sold by the end of calendar year 2017. In addition, when these changes were initially contemplated, as transition period of three years was envisioned.

At the 2017 NCWM Interim and Annual Meeting, there were no objections to this item. The Committee is recommending this as a Voting item.

Regional Association Comments:
At the 2016 CWMA Interim Meeting, they supported the request to extend the enforcement date to January 1, 2020, to allow for smooth implementation with minimal waste of product packaging. The CWMA recommended this be a Voting item. At the 2017 CWMA Annual Meeting, they believe the request to extend the enforceable date is reasonable and doesn't significantly change policy only the timeline for implementation of the policy. The Committee feels previous CWMA comments are still applicable.

At the 2016 SWMA Annual Meeting, they did not receive comments. The SWMA recommended this be a Voting item.

At the 2016 NEWMA Interim Meeting, a comment was made from a Massachusetts representative stating this proposal is solely to extend the current implementation date. He said at the time it was initially adopted, industry had agreed 2018 was sufficient for them to use up existing labels. He believes the item should be Withdrawn. A NIST Technical Advisor commented that after further consideration, the industry realized there would be additional costs involved in testing material, etc., and asked for additional implementation time. NEWMA considered the item fully developed and forwarded it to NCWM, recommending it be a Voting item. At the 2017 NEWMA Annual Meeting, no comments were received, and the item was considered fully developed and ready for a Vote.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

2302-9 V SECTION 2.36. TRANSMISSION FLUID (SEE RELATED ITEM 2307-1)

(This item was Adopted.)

Source:
American Petroleum Institute (API) (2016)

Purpose:
Define how transmission fluids shall be identified in the marketplace on delivery documents and invoices and receipts from service.

Item under Consideration:
Amend NIST Handbook 130, Uniform Regulation for the Method of Sale of Commodities as follows:

2.36. Transmission Fluid.

2.36.1. Products for Use in Lubricating Transmissions – Transmission fluids shall meet the original equipment manufacturer's requirements for those transmissions or have demonstrated performance claims to be suitable for use in those transmissions. Where a fluid can be licensed against an original equipment manufacturer's specification, evidence of current licensing by the marketer is acceptable documentation of performance against the specification. In the absence of a license from the original equipment manufacturer, adherence to the original equipment manufacturer's recommended requirements shall be assessed after testing per relevant methods available to the lubricants industry and the state regulatory agency. Suitability for use claims shall be based upon appropriate field, bench and/or transmission rig testing. Any manufacturer of a transmission fluid making suitable-for-use

claims shall provide, upon request by a duly authorized representative of the Director, credible documentation of such claims. If the product performance claims published by a blender and/or marketer are based on the claim(s) of one or more additive suppliers, documentation of the claims may be requested in confidence by a duly authorized representative of the Director. Supporting data may be supplied directly to the Director's office by the additive supplier(s).

2.36.1.1. Conformance. – Conformance of a fluid per Section 2.36.1. Products for Use in Lubricating Transmissions does not absolve the obligations of a fluid licensee with respect to the licensing original equipment manufacturer or the original equipment manufacturer's licensing agent(s), where relevant.

2.36.1.2. Transmission Fluid Additives. – Any material offered for sale or sold as an additive to transmission fluids shall be compatible with the transmission fluid to which it is added, and shall meet all performance claims as stated on the label or published on any website referenced by the label. Any manufacturer of any such product sold in this state shall provide, upon request by a duly authorized representative of the Director, documentation of any claims made on their product label or published on any website referenced by the label.

2.36.2. Labeling and Identification of Transmission Fluid. – Transmission fluid shall be labeled or identified as described below.

2.36.2.1. Container Labeling. – The label on a container of transmission fluid shall not contain any information that is false or misleading. Containers include bottles, cans, multi-quart or liter containers, pails, kegs, drums, and intermediate bulk containers (IBCs). In addition, each container of transmission fluid shall be labeled with the following:

(a) the brand name;

(b) the name and place of business of the manufacturer, packer, seller, or distributor;

(c) the words "Transmission Fluid," which may be incorporated into a more specific description of transmission type such as "Automatic Transmission Fluid" or "Continuously Variable Transmission Fluid";

(d) the primary performance claim or claims met by the fluid and reference to where any supplemental claims may be viewed (for example, website reference). Performance claims include but are not limited to those set by original equipment manufacturers and standards-setting organizations such as SAE and JASO and are acknowledged by reference; and

(e) an accurate statement of the quantity of the contents in terms of liquid measure.

2.36.2.2. Identification on Documentation. – Transmission fluid sold in bulk shall be identified on the manufacturer, packer, seller, or distributor invoice, bill of lading, shipping paper, or other documentation with the information listed below:

(a) the brand name;

(b) the name and place of business of the manufacturer, packer, seller, or distributor;

(c) the words "Transmission Fluid," which may be incorporated into a more specific description of transmission type such as "Automatic Transmission Fluid" or "Continuously Variable Transmission Fluid";

(d) the primary performance claim or claims met by the fluid or reference to where these claims may be viewed (for example, website reference). Performance claims include but are not limited to those set by original equipment manufacturers and standards-setting organizations such as SAE and JASO and are acknowledged by reference; and

(e) an accurate statement of the quantity of the contents in terms of liquid measure.

2.36.2.3. Identification on Service Provider Documentation. – Transmission fluid installed from a bulk tank at time of transmission service shall be identified on the customer invoice with the information listed below:

(a) the brand name;

(b) the name and place of business of the service provider;

(c) the words "Transmission Fluid," which may be incorporated into a more specific description of transmission type such as "Automatic Transmission Fluid" or "Continuously Variable Transmission Fluid";

(d) the primary performance claim or claims met by the fluid or reference to where these claims may be viewed (for example, website reference). Performance claims include but are not limited to those set by original equipment manufacturers and standards-setting organizations such as SAE and JASO and are acknowledged by reference;

(e) an accurate statement of the quantity of the contents in terms of liquid measure.

2.36.2.4. Bulk Delivery. – When the transmission fluid is sold in bulk, an invoice, bill of lading, shipping paper, or other documentation must accompany each delivery. This document must identify the fluid as defined in Section 2.36.2.2. Identification of Documentation.

2.36.2.5. Storage Tank Labeling. – Each storage tank of transmission fluid shall be labeled with the following:

(a) the brand name;

(b) the primary performance claim or claims met by the fluid or reference to where these claims may be viewed (for example, website reference). Performance claims include but are not limited to those set by original equipment manufacturers and standards-setting organizations such as SAE and JASO and are acknowledged by reference.

2.36.3. Documentation of Claims Made Upon Product Label. – Any manufacturer, packer, or distributor of any product subject to this article and sold in this state shall provide, upon request of duly authorized representatives of the Director, credible documentation of any claim made upon their product label, including claims made on any website referenced by said label. If the product performance claims published by a blender and/or marketer are based on the claim(s) of one or more additive suppliers, documentation of the claims may be requested in confidence by a duly authorized representative of the Director. Supporting data may be supplied directly to the Director's office by the additive supplier(s).

(Added 2017)

Background/Discussion:

Many original equipment manufacturers (OEMs) set their own transmission fluid standards and recommend that consumers use these fluids in their designated applications. However, the current version of NIST Handbook 130 does not adequately define how transmission fluids shall be identified in the marketplace, on delivery documents, invoices, and receipts from service. Requiring more specific information on invoices and receipts will provide some assurance to consumers that recommended automatic transmission fluids are being installed in their cars and trucks.

The changes proposed are consistent with those approved for gasoline and diesel engine (motor) oils sold in packages or dispensed from bulk containers.

At the 2016 NCWM Interim Meeting, Dr. Curran (FALS Chairman) recommended this and related Item 237-4 be an Informational item, so the language can be worked on. Several members supported additional work on this proposal. The Committee recommends this as an Informational item.

At the 2016 NCWM Annual Meeting, Mr. Ferrick (API) submitted modified language to the Committee for consideration. The Committee moved forward the modified language and looks forward to receiving feedback from the fall Regional Meetings.

At the 2017 NCWM Interim Meeting, Mr. Ferrick submitted modified language to the Committee for consideration. Mr. Ferrick remarked that the language refers to industry standards and specification in relation to performance standards. There were several stakeholders who support the amendment. The Committee moved forward the modified language as a Voting item.

At the 2017 NCWM Annual Meeting, Mr. Ferrick stated there was an editorial change submitted to FALS for review, and the FALS supports this change. One regulator expressed concerns with the phrase “primary performance claims” and would prefer the term “claims of suitability.” Mr. Ferrick explained the industry is accustomed to certain labeling nomenclature and often have blanket terminology to cover several varying transmissions. Several members voiced their support for this item.

Regional Association Comments:
The WWMA heard from one regulator stating this is a good item, it is very complete, and does a good job of modernizing the language. One regulator testified that “performance claims” should be replaced with “suitable for use claims” throughout the proposal. A performance claim is very general and would be difficult to enforce. “Are we not trying to say that the transmission fluid is acceptable for use in specific transmissions as opposed to making claims of reduced transmission wear, improved cleaning agents, extended fluid life, or the like?” One regulator stated the proposal had been updated to remove “performance claims” and replaced it with “suitable for use claims.” The WWMA believed this is a well-developed and worthy item and agreed with the suggested amendments it addresses, the concerns presented regarding the term “performance claims.” The WWMA believed replacing “performance claims” with “suitability for use claims” makes the labeling requirement clear and not subject to misinterpretation. The WWMA recommended the following modified proposal with Voting status.

2.XX. Transmission Fluid.

2.XX.1. Labeling and Identification of Transmission Fluid. – Transmission fluid shall be labeled or identified as described below.

2.XX.1.1. Container Labeling. – The label on a container of transmission fluid shall not contain any information that is false or misleading. Containers include bottles, cans, multi-quart or liter containers, pails, kegs, drums, and IBCs. In addition, each container of transmission fluid shall be labeled with the following:

(a) the brand name;

(b) the name and place of business of the manufacturer, packer, seller, or distributor;

(c) the words “Transmission Fluid,” which may be incorporated into a more specific ‘‘description of transmission type such as “Automatic Transmission Fluid” or “Continuously Variable Transmission Fluid”;

(d) **claims of suitability for use in specific transmissions met by the fluid. Suitability-for-use claims include those set by original equipment manufacturers and standards-setting organizations such as SAE and are acknowledged by reference;**

(e) **references to locations where any supplemental claims may be viewed (for example, website references) and;**

(f) **an accurate statement of the quantity of the contents in terms of liquid measure.**

2.XX.1.2. Identification on Documentation. – Transmission fluid sold in bulk shall be identified on the invoice, bill of lading, shipping paper, or other documentation with the information below:

(a) **the brand name;**

(b) **the name and place of business of the manufacturer, packer, seller, or distributor;**

(c) **the words "Transmission Fluid," which may be incorporated into a more specific description of transmission type such as "Automatic Transmission Fluid" or "Continuously Variable Transmission Fluid";**

(d) **claims of suitability for use in specific transmissions met by the fluid. Suitability-for-use claims include those set by original equipment manufacturers and standards-setting organizations such as SAE and are acknowledged by reference;**

(e) **references to locations where any supplemental claims may be viewed (for example, website references) and;**

(f) **an accurate statement of the quantity of the contents in terms of liquid measure.**

2.XX.1.3. Identification on Service Provider Documentation. – Transmission fluid installed from a bulk tank at time of transmission service shall be identified on the customer invoice with the information listed below:

(a) **the brand name;**

(b) **the name and place of business of the service provider;**

(c) **the words "Transmission Fluid," which may be incorporated into a more specific description of transmission type such as "Automatic Transmission Fluid" or "Continuously Variable Transmission Fluid";**

(d) **claims of suitability for use in specific transmissions met by the fluid. Suitability-for-use claims include those set by original equipment manufacturers and standards-setting organizations such as SAE and are acknowledged by reference;**

(e) **references to locations where any supplemental claims may be viewed (for example, website references) and;**

(f) **an accurate statement of the quantity of the contents in terms of liquid measure.**

2.XX.1.4. Bulk Delivery. – When the transmission fluid is sold in bulk, an invoice, bill of lading, shipping paper, or other documentation must accompany each delivery. This document must identify the fluid as defined in Section 2.XX.1.2.

2.XX.1.5. Storage Tank Labeling. – Each storage tank of transmission fluid shall be labeled with the following:

(a) the brand name;

(b) claims of suitability for use in specific transmissions met by the fluid. Suitability-for-use claims include those set by original equipment manufacturers and standards-setting organizations such as SAE and are acknowledged by reference;

2.XX.2. Documentation of Claims Made Upon Product Label. – Any manufacturer, packer, or distributor of any product subject to this article and sold in this state shall provide, upon request of duly authorized representatives of the Director, documentation of any claim made upon their product label.

(Added 20XX)

At the 2017 CWMA Annual Meeting they received comments from the submitter that the proposal is fully developed. Any further edits would be to provide greater clarity to the proper identification of transmission fluid in the marketplace. The CWMA recommends it as a Voting item.

At the 2016 SWMA Annual Meeting they reported that all comments indicated that this item should move to FALS for further development and vetting. SWMA recommended it as an Informational item

At the 2016 NEWMA Interim Meeting they received comment from the API (submitter) they had received a request for additional language changes from industry. He suggested these changes be made and then presented to FALS at the NCWM Interim Meeting in January. NEWMA agreed with this recommendation. A state regulator commented that he thought the language regarding a requirement that the label include "no false or misleading statements" was unnecessary. The submitter agreed to review this language. NEWMA recommended this be an Informational item. At the 2017 NEWMA Annual Meeting Items 2302-9 and 2307-1 were considered in tandem. An industry representative with API expressed support for this proposal and requests that NEWMA also support. Mr. Chuck Corr (Archer Daniels Midland) commented that the wording with both items should be identical. NEWMA does consider both items to be fully developed.

2302-10 W SECTION 2.XX. AGRICULTURAL VENDING

(This item was Withdrawn.)

Source:
Mississippi (2017)

Purpose:
Provide a method of sale by weight for agricultural feed, grain (corn, wheat, etc.), rock salt, or protein pellets when dispensed by agricultural vending machines.

Item under Consideration:
Amend NIST Handbook 130, Uniform Method of Sale of Commodities Regulation as follows:

2.XX. Agricultural Vending. – Agricultural feed, grain (corn, wheat…), rock salt, or protein pellets shall be offered or exposed for sale on the basis of net weight.

Background/Discussion:
Agricultural vending machines are new to the marketplace, and this method of sale will allow the consumer to make value comparisons with various machines and locations when the method of sale allows for the same. Currently, there are two companies manufacturing agricultural vending machines and a possible third company coming into the marketplace. One of the existing companies is marketing the products by the gallon and the other by weight. Both

manufacturers' websites provide a listing of states where the machines are currently in operation. They also provide other information as to where you can expect to find these devices in the future. Information gathered from the websites includes locations in nine states and 43 devices current and pending. Recently, we received information that an ice vending machine owner was interested in converting their machines to handle agricultural type products during the winter months and then return to ice for the remainder of the year. Again, the issue here is price comparison; these commodities are marketed by weight at the retail market place today (big box, farm supply, sport/outdoor, and other similar stores). This proposal is necessary to prevent the next company coming up with another method of sale such as by the bag/sack, bushel, or truck load. It is essential to provide equity in the market place and the most accurate way to test products delivered by agricultural vending machines is by net weight

At the 2017 NCWM Interim Meeting, the submitter remarked that the handbook already covers this method of sale and for that reason it was Withdrawn.

Example 1.

Figure 1. Vending Machine or Dispenser.

Figure 2. Vending Machine or Dispenser.

Figure 3. Vending Machine Selection Panel

Figure 4. Instructions on Dispensing Product.

Figure 5. Instructions on Dispensing

Figure 6. Payment Screen.

Example 2:

Figure 7. Vending Machine or Dispenser.

Figure 8. Payment/Selection Screen on Vending

Figure 9. Dispensed Product.

All photos are the courtesy of the State of Mississippi.

Regional Association Comments:
At the 2016 CWMA Interim Meeting, it was commented that this proposal duplicates the existing method of sale for feed and is unnecessary. There was a question as to whether the dispensing devices are NTEP certified. The CWMA did not forward this item to NCWM.

At the 2016 SWMA Annual Meeting, the Committee received a presentation from CornXpress detailing the development and business processes for their machine. They expressed a desire to sell their product via their machine by volume. The SWMA heard from several states that the preferred method of sale be by weight. One state remarked they have vending machines that must be state type evaluated. Some states commented that competitors sell by weight. The SWMA L&R Committee believed that most regulators preferred the sales be by weight. The Committee also believed this proposal should be expanded to other commodities. The SWMA forwarded this to NCWM and recommended it as an Informational item.

At the 2016 NEWMA Interim Meeting, they did not forward this item to NCWM.

2302-11 D ELECTRIC WATTHOUR

Source:
NIST OWM (2016)

This item has been assigned to the submitter for further development. For more information or to provide comment, please contact:

Tina Butcher
Chairman, NIST USNWG on Electric Vehicle Refueling and Submetering
(301) 975-2196, tbutcher@nist.gov

or

Juana Williams
Technical Advisor, NIST USNWG on Electric Vehicle Refueling and Submetering
(301) 975-3989, Juana.williams@nist.gov

Purpose:

1. Make the weights and measures community aware of work being done within the U.S. National Work Group on Electric Vehicle Fueling and Submetering to develop proposed requirements for electric watthour meters used in submeter applications in residences and businesses;
2. Encourage participation in this work by interested regulatory officials, manufacturers, and users of electric submeters.
3. Allow an opportunity for the USNWG to provide regular updates to the S&T Committee and the weights and measures community on the progress of this work;
4. Allow the USWNG to vet specific proposals as input is needed.

Background/Discussion:
The creation of Developing items on both the L&R and S&T Committee agendas will provide for a venue to allow the USNWG to update the weights and measures community on continued work to develop test procedures and test equipment standards. This item will also provide a forum for reporting on work to develop proposed method of sale requirements for electric watthour meters and a tentative device code for electric watthour meters in residential and business locations and serve as a placeholder for eventual submission of these proposals for consideration by NCWM.

In 2012, NIST OWM formed the U.S. National Working Group on Electric Vehicle Fueling and Submetering to develop proposed requirements for commercial electricity-measuring devices (including those used in sub-metering electricity at residential and business locations and those used to measure and sell electricity dispensed as a vehicle fuel) and to ensure that the prescribed methodologies and standards facilitate measurements that are traceable to the International System of Units (SI).

In 2013, the NCWM adopted changes recommended by the USNWG to the NIST Handbook 130 requirements for the Method of Sale of Commodities to specify the method of sale for electric vehicle refueling. At the 2015 NCWM Annual Meeting, the NCWM adopted NIST Handbook 44, Section 3.40. Electric Vehicle Refueling Systems developed by the USNWG.

This Developing item is included on the Committee's agenda (and a corresponding item is proposed for inclusion on the L&R Committee Agenda) to keep the weights and measures community apprised of USNWG current projects, including the following:

- The USNWG continues to develop recommended test procedures for inclusion in a new EPO 30 for Electric Vehicle Refueling Equipment along with proposed requirements for field test standards.
- The USWNG is continuing work to develop a proposed code for electricity-measuring devices used in sub-metering electricity at residential and business locations. This does not include metering systems under the jurisdiction of public utilities. The USNWG hopes to have a draft code for consideration by the community in the 2016 - 2107 NCWM cycle.

The USNWG will provide regular updates on the progress of this work and welcomes input from the community.

The USNWG on Measuring Systems for Electric Vehicle Fueling and Submetering's Subgroup on Watthour Type Electric (WHE) Meters will meet (and by Tele/web conference) on September 12 - 14, 2017, in Sacramento, California, to discuss the full development of a November 2014 version of a watthour meter draft code, intended to address legal metrology requirements for the device its minimum inspection and test procedures and test equipment, the appropriate method of sale of electricity through the device and an efficient process for achieving these goals. Additional discussion may include topics such as wireless technology, test procedures, traceability of test standards, and the subgroup's next steps; as well as the U.S. standards development process and timelines for other related projects.

The USNWG will provide regular updates on the progress of this work and welcomes input from the community.

Regional Association Comments:
The Regions support the continued development of this item and acknowledges the importance of this work.

2307 NIST HANDBOOK 130 – UNIFORM ENGINE FUELS AND AUTOMOTIVE LUBRICANTS REGULATION

2307-1 V SECTION 2.14. PRODUCTS FOR USE IN LUBRICATING ~~AUTOMATIC~~ TRANSMISSION FLUIDS AND SECTION 3.14. ~~AUTOMATIC~~ TRANSMISSION FLUID (SEE RELATED ITEM 2302-9)

(This item was Adopted.)

Source:
American Petroleum Institute (API) (2016)

Purpose:
Define how transmission fluids shall be identified in the marketplace on delivery documents and invoices and receipts from service.

Item under Consideration:
Amend the NIST Handbook 130, Engine Fuels and Automotive Lubricants Regulation as follows:

2.14. Products for Use in Lubricating ~~Automatic~~ Transmissions. – **~~Any automatic transmission fluid sold without limitation as to type of transmission for which it is intended shall meet all automotive manufacturers' recommended requirements for transmissions in general use in the state.~~** **~~Automatic~~** Transmission fluids **~~that are intended for use only in certain transmissions, as disclosed on the label of its container,~~** shall meet the **~~latest automotive~~** **original equipment** manufacturer's **~~recommended~~** requirements for those transmissions **or have** **~~been~~** **demonstrated performance claims to be suitable for use in those transmissions**. **Where a fluid can be licensed against an original equipment manufacturer's specification, evidence of current licensing by the marketer is acceptable documentation of performance against the specification. In the absence of a license from the original equipment manufacturer, a**dherence to **~~automotive~~** **the original equipment** manufacturer's recommended requirements shall be **assessed after testing per relevant methods** ~~based on tests currently~~ available to the lubricants industry and the state regulatory agency. **~~Any material offered for sale or sold as an additive to automatic transmission fluids shall be compatible with the automatic transmission fluid to which it is added, and shall meet all performance claims as stated on the label. Any manufacturer of any such product sold in this state shall provide, upon request by duly authorized representative of the Director, documentation of any claims made on their product label.~~** **Suitability for use claims shall be based upon appropriate field, bench and/or transmission rig testing. Any manufacturer of a transmission fluid making suitable-for-use claims shall provide, upon request by a duly authorized representative of the Director, credible documentation of such claims. If the product performance claims published by a blender and/or marketer are based on the claim(s) of one or more additive suppliers, documentation of the claims may be requested in confidence by a duly authorized representative of the Director. Supporting data may be supplied directly to the Director's office by the additive supplier(s).**

(Added 2004, **Amended 2017**)

2.14.1. Conformance. – Conformance of a fluid per Section 2.14. Products for Use in Lubricating Transmissions does not absolve the obligations of a fluid licensee with respect to the licensing original equipment manufacturer or the original equipment manufacturer's licensing agent(s), where relevant.

2.14.2. Transmission Fluid Additives. – Any material offered for sale or sold as an additive to transmission fluids shall be compatible with the transmission fluid to which it is added, and shall meet all performance claims as stated on the label or published on any website referenced by the label. Any manufacturer of any such product sold in this state shall provide, upon request by a duly authorized

representative of the Director, documentation of any claims made on their product label or published on any website referenced by the label.

(Added 2017)

Section 3. Classification and Method of Sale of Petroleum Products

3.14. ~~Automatic~~ Transmission Fluid.

3.14.1. Labeling and Identification of Transmission Fluid. – Transmission fluid shall be labeled or identified as described below.

(Added 2017)

3.14.~~1~~2. Container Labeling. – The label on a container of **~~automatic~~** transmission fluid shall not contain any information that is false or misleading. **Containers include bottles, cans, multi-quart or liter containers, pails, kegs, drums, and intermediate bulk containers (IBCs).** In addition, each container of ~~automatic~~ transmission fluid shall be labeled with the following:

(a) the brand name;

(b) the name and place of business of the manufacturer, packer, seller, or distributor;

(c) the words "**~~Automatic~~** Transmission Fluid" **which may be incorporated into a more specific description of transmission type such as "Automatic Transmission Fluid" or "Continuously Variable Transmission Fluid"**;

(d) **~~the duty type of classification;~~ the primary performance claim or claims met by the fluid and reference to where any supplemental claims may be viewed (for example, website reference). Performance claims include but are not limited to those set by original equipment manufacturers and standards-setting organizations such as SAE and JASO and are acknowledged by reference;** and

(e) an accurate statement of the quantity of the contents in terms of liquid measure.

(Added 2004) **(Amended 2017)**

3.14.3. Identification on Documentation. – Transmission fluid sold in bulk shall be identified on the manufacturer, packer, seller or distributor invoice, bill of lading, shipping paper, or other documentation with the information listed below:

(a) the brand name;

(b) the name and place of business of the manufacturer, packer, seller, or distributor;

(c) the words "Transmission Fluid" which may be incorporated into a more specific description of transmission type such as "Automatic Transmission Fluid" or "Continuously Variable Transmission Fluid";

(d) the primary performance claim or claims met by the fluid or reference to where these claims may be viewed (for example, website reference). Performance claims include but are not limited to those set by original equipment manufacturers and standards-setting organizations such as SAE and JASO and are acknowledged by reference; and

(e) an accurate statement of the quantity of the contents in terms of liquid measure.

(Added 2017)

3.14.4. Identification on Service Provider Documentation. – Transmission fluid installed from a bulk tank at time of transmission service shall be identified on the customer invoice with the information listed below:

(a) the brand name;

(b) the name and place of business of the service provider;

(c) the words "Transmission Fluid" which may be incorporated into a more specific description of transmission type such as "Automatic Transmission Fluid" or "Continuously Variable Transmission Fluid";

(d) the primary performance claim or claims met by the fluid or reference to where these claims may be viewed (for example, website reference). Performance claims include but are not limited to those set by original equipment manufacturers and standards-setting organizations such as SAE and JASO and are acknowledged by reference; and

(e) an accurate statement of the quantity of the contents in terms of liquid measure.

(Added 2017)

3.14.5. Bulk Delivery – When the transmission fluid is sold in bulk, an invoice, bill of lading, shipping paper, or other documentation must accompany each delivery. This document must identify the fluid as defined in Section 3.14.2. Container Labeling.

(Added 2017)

3.14.6. Storage Tank Labeling. – Each storage tank of transmission fluid shall be labeled with the following:

(a) the brand name;

(b) the primary performance claim or claims met by the fluid or reference to where these claims may be viewed (for example, website reference). Performance claims include but are not limited to those set by original equipment manufacturers and standards-setting organizations such as SAE and JASO and are acknowledged by reference.

(Added 2017)

3.14.~~2~~.7. Documentation of Claims Made Upon Product Label. – Any manufacturer, ~~**or**~~ packer**, or distributor** of any product subject to this article and sold in this state shall provide, upon request of duly authorized representatives of the Director**, credible** documentation of any claim made upon their product label**, including claims made on any website referenced by said label. If the product performance claims published by a blender and/or marketer are based on the claim(s) of one or more additive suppliers, documentation of the claims may be requested in confidence by a duly authorized representative of the Director. Supporting data may be supplied directly to the Director's office by the additive supplier(s).**

(Added 2004) **(Amended 2017)**

Background/Discussion:

Many original equipment manufacturers (OEMs) set their own transmission fluid standards and recommend that consumers use these fluids in their designated applications. However, the current version of NIST Handbook 130 does not adequately define how transmission fluids shall be identified in the marketplace on delivery documents, invoices, and receipts from service. Requiring more specific information on invoices and receipts will provide some assurance to consumers that recommended automatic transmission fluids are being installed in their cars and trucks.

The changes proposed are consistent with those approved for gasoline and diesel engine (motor) oils sold in packages or dispensed from bulk containers.

At the 2016 NCWM Interim Meeting, Dr. Curran (FALS Chairman) recommended this and related Item 232-9 be an Informational item, so the language can be developed. Several members supported additional work on this proposal. Mr. Ferrick (API) will be circulating language to all interested parties for review. The Committee recommends this as an Informational Item. At the 2016 NCWM Annual Meeting, Mr. Ferrick remarked that he is submitting updated language to the Committee for consideration. The Committee recommends the updated language for consideration.

At the 2017 NCWM Interim Meeting, Mr. Ferrick submitted modified language to the Committee for consideration. Mr. Ferrick remarked the language refers to industry standards and specification in relation to performance standards. There were several stakeholders who support the amendment. The Committee moved forward the modified language as a Voting item.

At the 2017 NCWM Annual Meeting, Mr. Ferrick commented that there was an editorial change submitted to FALS for review and the FALS supports this change. One regulator expressed concerns with the phrase “primary performance claims” and would prefer the term “claims of suitability.” Mr. Ferrick explained that industry is accustomed to certain labeling nomenclature, and often have blanket terminology to cover several varying transmissions. Several members voiced their support for this item.

Regional Association Comments:
The WWMA received comment from a regulator that the requirement, “Any transmission fluid sold without limitation as to type of transmission for which it is intended shall meet all manufactures recommended requirements for transmissions in general use in the state.” is unattainable and suggested alternative language to be provided to the Committee. Another regulator echoed this concern. A regulator testified that “performance claims” should be replaced with “suitable for use claims” through the proposal. A performance claim is very general and would be difficult to enforce, and they suggested the intent is to say that the transmission fluid is acceptable for use in specific transmissions as opposed to making claims of reduced transmission wear, improved cleaning agents, extended fluid life, or the like. The WWMA believed this is a well-developed and worthy item. The WWMA supports the suggested amendments and believe they address the concerns presented in the open hearings regarding the term “performance claims.” The WWMA believed replacing “performance claims” with “suitability for use claims” makes the labeling requirement clearer and less subject to misinterpretation. The WWMA recommended the following modified proposal and recommended Voting status for the item:

Section 2. Standard Fuel Specifications

2.14. Products for Use in Lubricating ~~Automatic~~ Transmissions. – ~~Any automatic transmission fluid sold without limitation as to type of transmission for which it is intended shall meet all automotive manufacturers’ recommended requirements for transmissions in general use in the state. Automatic~~ Transmission fluids **~~that are intended for use only in certain transmissions, as disclosed on the label of its container,~~** shall meet **~~the latest automotive~~** **the original equipment manufacturer’s** recommended requirements for those transmissions **or have been demonstrated to be suitable for use in those transmissions**. Adherence to **~~automotive~~** **the original equipment** manufacturer’s recommended requirements shall be based on tests currently **~~available~~** **published by the transmission or vehicle manufacturer and available** to the lubricants’ industry and the state regulatory agency. **Suitability for use shall be based upon appropriate field, bench and/or transmission rig testing. Any manufacturer of a transmission fluid making suitable-for-use claims shall provide, upon request by a duly authorized representative of the Director, documentation of such claims.**

(Added 2004, **Amended 20XX**)

2.14.1. Transmission Fluid Additives. – Any material offered for sale or sold as an additive to ~~automatic~~ transmission fluids shall be compatible with the ~~automatic~~ transmission fluid to which it is added, and shall meet all performance claims as stated on the label. Any manufacturer of any such product sold in this state shall provide, upon request by a duly authorized representative of the Director, documentation of any claims made on their product label.

(Added 20XX)

Section 3. Classification and Method of Sale of Petroleum Products

3.14. ~~Automatic~~ Transmission Fluid.

3.14.1. Container Labeling. – The label on a container of ~~**automatic**~~ transmission fluid shall not contain any information that is false or misleading. **Containers include bottles, cans, multi-quart or liter containers, pails, kegs, drums, and intermediate bulk containers (IBCs).** In addition, each container of ~~**automatic**~~ transmission fluid shall be labeled with the following:

(a) the brand name;

(b) the name and place of business of the manufacturer, packer, seller, or distributor;

(c) the words "~~**Automatic**~~ Transmission Fluid;"

(d) ~~**the duty type of classification;**~~ **claims of suitability for use in specific transmissions met by the fluid. Suitability-for-use claims include those set by original equipment manufacturers and standards-setting organizations such as SAE and are acknowledged by reference;**

(e) **references to locations where any supplemental claims may be viewed (for example, website references); and**

(f) an accurate statement of the quantity of the contents in terms of liquid measure.

(Added 2004) **(Amended 20XX)**

3.14.2. Identification on Documentation ~~**of Claims Made Upon Product Label.**~~ **– Transmission fluid sold in bulk shall be identified on the manufacturer, packer, seller or distributor invoice, bill of lading, shipping paper, or other documentation with the information listed below:**

(a) the brand name;

(b) the name and place of business of the manufacturer, packer, seller, or distributor;

(c) the words "Transmission Fluid";

(d) claims of suitability for use in specific transmissions met by the fluid. Suitability-for-use claims include those set by original equipment manufacturers and standards-setting organizations such as SAE and are acknowledged by reference;

(e) references to locations where any supplemental claims may be viewed (for example, website references); and

(f) an accurate statement of the quantity of the contents in terms of liquid measure.

(Added 2004) **(Amended 20XX)**

3.14.3. Identification on Service Provider Documentation – Transmission fluid installed from a bulk tank at time of transmission service shall be identified on the customer invoice with the information listed below:

(a) the brand name;

(b) the name and place of business of the service provider;

(c) the words "Transmission Fluid";

(d) claims of suitability for use in specific transmissions met by the fluid. Suitability-for-use claims include those set by original equipment manufacturers and standards-setting organizations such as SAE and are acknowledged by reference;

(e) references to locations where any supplemental claims may be viewed (for example, website references) and;

(f) an accurate statement of the quantity of the contents in terms of liquid measure.

(Added 20XX)

3.14.4. Bulk Delivery. – When the transmission fluid is sold in bulk, an invoice, bill of lading, shipping paper, or other documentation must accompany each delivery. This document must identify the fluid as defined in Section 3.14.2.

(Added 20XX)

3.14.5. Storage Tank Labeling. – Each storage tank of transmission fluid shall be labeled with the following:

(a) the brand name;

(b) claims of suitability for use in specific transmissions met by the fluid. Suitability-for-use claims include those set by original equipment manufacturers and standards-setting organizations such as SAE and are acknowledged by reference;

(Added 20XX)

3.14.6. Documentation of Claims Made Upon Product Label. – Any manufacturer, packer, or distributor of any product subject to this article and sold in this state shall provide, upon request of duly authorized representatives of the Director, documentation of any claim made upon their product label.

(Added 2004) **(Added 20XX)**

At the 2016 CWMA Interim Meeting, they agreed with a comment from the submitter that this proposal is fully developed and ready for Voting status. Any further edits would be to provide greater clarity to the proper identification of transmission fluid in the marketplace. The CWMA is recommending this be a Voting item. At the 2017 CWMA Annual, meeting no negative comments were received for this item. The Committee confirmed this item is ready for a Vote.

The SWMA reported that all comments and letters indicated this item should move to FALS. The Committee requested FALS take into consideration the letter dated October 13, 2016, from ILMA in their continued development of this item. The SWMA recommended Informational status.

NEWMA received a comment from API, that they had received a request for additional language changes from industry. API suggested these changes be made and then presented to FALS in January. The region agreed to move this item forward as Informational item for further consideration by FALS. A state regulator stated he felt the language about a requirement in which the label include “no false or misleading statements” was unnecessary. The submitter agreed to review this language. NEWMA recommended Informational status for this item.

At the 2017 NEWMA Annual Meeting, Items 2302-9 and 2307-1 were considered in tandem. An industry representative with API expressed support for this proposal and requests that NEWMA also support it. Mr. Chuck Corr (Archer Daniels Midland) commented that the wording with both items should be identical. NEWMA does consider both items to be fully developed.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

2307-2 I SECTION 3.28. ETHANOL FLEX FUEL AND SECTION 3.8. ETHANOL FLEX FUEL (SEE RELATED ITEM 2302-7)

(This item was removed from the Voting agenda and returned to Informational status.)

Source:
KMoore Consulting LLC (2017)

Purpose:
Align the ethanol labeling language with the recently released Federal Trade Commission updates to 16 CFR 306 on the Automotive Fuel Rating Rule as it pertains to ethanol fuel blend rating, labeling on retail dispensers, certification, and recordkeeping requirements.

Item under Consideration:
Amend NIST Handbook 130, Uniform Engine Fuels and Automotive Lubricants Regulation as follows:

3.2.8. EPA Labeling Requirements Also Apply. – Retailers and wholesale purchaser-consumer of gasoline shall comply with the EPA pump labeling requirements for gasoline containing greater than 10 volume percent (V%) up to 15 volume percent (V%) ethanol (E15) under 40 CFR § 80.1501. **(For additional information refer to Section 3.8.2. Labeling Requirements)**

3.8. Ethanol Flex Fuel.

3.8.1. How to Identify Ethanol Flex Fuel. – Ethanol flex fuel shall be identified as Ethanol Flex Fuel or EXX Flex Fuel.

3.8.2. Labeling Requirements.

~~(a)~~ Ethanol flex fuel ~~**with an ethanol concentration no less than 51 and no greater than 83 volume percent shall be labeled "Ethanol Flex Fuel, minimum 51 % ethanol."**~~ **shall be identified and labeled in accordance with the Federal Trade Commission Automotive Fuel Ratings, Certification and Posting Rule, 16 CFR 306, as amended. (For additional information, refer to Section 3.2.8. EPA Labeling Requirements Also Apply.)**

(Amended 20XX)

~~**(b) Ethanol flex fuel with an ethanol concentration less than or equal to 50 volume percent shall be labeled "EXX Flex Fuel, minimum YY % ethanol," where the XX is the ethanol concentration in volume percent and YY is XX minus five (− 5). The actual ethanol concentration of the fuel shall be XX volume percent plus or minus five (± 5) volume percent.**~~

~~**(Added 2014)**~~

~~**(c) A label shall be posted which states "For Use in Flexible Fuel Vehicles (FFV) Only." This information shall be clearly and conspicuously posted on the upper 50 % of the dispenser front panel in a type at least 12.7 mm (½ in) in height, 1.5 mm ($^{1}/_{16}$ in) stroke (width of type). A label shall be posted which states, "CHECK OWNER'S MANUAL," and shall not be less than 6 mm (¼ in) in height by 0.8 mm ($^{1}/_{32}$ in) stroke; block style letters and the color shall be in definite contrast to the background color to which it is applied.**~~

(Amended 2007, 2008, ~~and~~ 2014, **and 20XX**)

Background/Discussion:
It is important that NIST Handbook 130 language stay in alignment with government regulations. The FTC regulation update was effective on July 14, 2016.

At the 2017 NCWM Interim Meeting, Dr. Curran (FALS Chair) remarked they are submitting modified language to the Committee. Several states and stakeholders support this amendment. There was a remark about the FTC rule references, the EPA but does not require it to be followed. The Committee is recommending this as a Voting item.

At the 2017 NCWM Annual Meeting, Dr. Curran informed the Committee that FALS met Sunday, July 16, 2017. There was extensive discussion and comment on this item. FALS was unable to achieve consensus on the language under consideration in the NCWM Publication 16. The primary issue is EPA and FTC have conflicting regulations. The FTC labeling requirements has fewer elements to their language. The Committee noted Section 2.30.1. was reflected as being stricken; this is not accurate and corrected editorially. The Committee reviewed the following alternatives.

1. Making the item Informational and send it back to FALS for consideration and review.
2. Move the item forward as published in NCWM Publication 16 (2017).
3. Move the item forward with proposed amendments submitted by the API.
4. Move the item forward with alternative language proposed by Committee member, Ms. Michelle Wilson and Washington State regulator, Mr. Tim Elliot.

The Committee agreed to add changed Section 3.2.8. EPA Labeling Requirements Also Apply to provide a statement to the user that there are also labeling Requirements under Section 3.8.2. Labeling Requirements. With these changes the Committee recommended the modified language for a Vote. In response to a motion made on the floor during the voting session, the Committee reconsidered this item and agreed to Withdraw its recommendation for adoption and removed it from the voting agenda. It was believed that the amended proposal was substantially different than the version that was published in the Committee's agenda. The amended proposal will be returned to the Committee's agenda.

The item as it was published in NCWM Publication 16 (2017):

3.8. Ethanol Flex Fuel.

3.8.1. How to Identify Ethanol Flex Fuel. – Ethanol flex fuel shall be identified as Ethanol Flex Fuel or EXX Flex Fuel.

3.8.2. Labeling Requirements.

~~**(a)**~~ Ethanol flex fuel ~~**with an ethanol concentration no less than 51 and no greater than 83 volume percent shall be labeled "Ethanol Flex Fuel, minimum 51 % ethanol."**~~ **<u>shall be identified and labeled in accordance with the Federal Trade Commission Automotive Fuel Ratings, Certification and Posting Rule, 16 CFR 306, as amended.</u>**

<u>(Amended 20XX)</u>

~~**(b) Ethanol flex fuel with an ethanol concentration less than or equal to 50 volume percent shall be labeled "EXX Flex Fuel, minimum YY % ethanol," where the XX is the ethanol concentration in volume percent and YY is XX minus five (− 5). The actual ethanol concentration of the fuel shall be XX volume percent plus or minus five (± 5) volume percent.**~~

~~**(Added 2014)**~~

~~**(c) A label shall be posted which states "For Use in Flexible Fuel Vehicles (FFV) Only." This information shall be clearly and conspicuously posted on the upper 50 % of the dispenser front panel in a type at least 12.7 mm (½ in) in height, 1.5 mm ($^{1}/_{16}$ in) stroke (width of type). A label**~~

~~**shall be posted which states, "CHECK OWNER'S MANUAL," and shall not be less than 6 mm (¼ in) in height by 0.8 mm (1/32 in) stroke; block style letters and the color shall be in definite contrast to the background color to which it is applied.**~~

(Amended 2007, 2008, ~~**and**~~ 2014, **and 20XX**)

Regional Association Comments:
At the WWMA, a regulator testified the proposal does not completely capture the new regulations contained in 16 CFR Part 306. He testified that the FALS Committee is working on a major revision of the Uniform Engine Fuels and Automotive Lubricants Regulation which would, among other things, align NIST Handbook 130 with 16 CFR Part 306. The lettering size as proposed conflicts with the Federal Trade Commission's (FTC) requirement. The work of the FALS Committee is expected to take two or more years to complete. The WWMA recommended the amended version of the proposal below, which includes the exact text found in 16 CFR 306.12, mirrors the federal requirement language. The WWMA recommends Voting status for this amended version.

3.8.2. Labeling Requirements.

~~**(a) Ethanol flex fuel with an ethanol concentration no less than 51 and no greater than 83 volume percent shall be labeled "Ethanol Flex Fuel, minimum 51 % ethanol."**~~

~~**(b) Ethanol flex fuel with an ethanol concentration less than or equal to 50 volume percent shall be labeled "EXX Flex Fuel, minimum YY % ethanol," where the XX is the ethanol concentration in volume percent and YY is XX minus five (− 5). The actual ethanol concentration of the fuel shall be XX volume percent plus or minus five (± 5) volume percent.**~~

~~**(Added 2014)**~~

~~**(c) A label shall be posted which states "For Use in Flexible Fuel Vehicles (FFV) Only." This information shall be clearly and conspicuously posted on the upper 50 % of the dispenser front panel in a type at least 12.7 mm (1/2 in) in height, 1.5 mm (1/16 in) stroke (width of type). A label shall be posted which states, "CHECK OWNER'S MANUAL," and shall not be less than 6 mm (1/4 in) in height by 0.8 mm (1/32 in) stroke; block style letters and the color shall be in definite contrast to the background color to which it is applied.**~~

~~**(Amended 2007, 2008, and 2014)**~~

3.8. Ethanol Flex Fuels.

3.8.1. The label is 7.62 cm (3 in) wide × 6.35 cm (2½ in) long. "Helvetica Black" or equivalent type is used throughout. The band at the top of the label contains one of the following:

(a) For all ethanol flex fuels. The numerical value representing the volume percentage of ethanol in the fuel followed by the percentage sign and then by the term "ETHANOL"; or

(b) For ethanol flex fuels containing more than 10 percent and no greater than 50 percent ethanol by volume. The numerical value representing the volume percentage of ethanol in the fuel, rounded to the nearest multiple of 10, followed by the percentage sign and then the term "ETHANOL"; or

(c) For ethanol flex fuels containing more than 50 percent and no greater than 83 percent ethanol by volume. The numerical value representing the volume percentage of ethanol in the fuel, rounded to the nearest multiple of 10, followed by the percentage sign and then the term "ETHANOL" or the phrase, "51 % to 83 % ETHANOL."

3.8.2. The band should measure 2.54 cm (1 in) deep. The type in the band is centered both horizontally and vertically. The percentage disclosure and the word "ETHANOL" are in 24-point font. In the case of labels including the phrase, "51 % - 83 % ETHANOL," the percentage disclosure

is in 18-point font, and the word "ETHANOL" is in 24-point font and at least 0.32 cm (1/8 in) below the percentage disclosure. The type below the black band is centered vertically and horizontally. The first line is the text: "USE ONLY IN." It is in 16-point font, except for the word "ONLY," which is in 26-point font. The word "ONLY" is underlined with a 2-point (or thicker) underline. The second line is in 16-point font, at least 0.32 cm (1/8 in) below the first line, and is the text: "FLEX-FUEL VEHICLES." The third line is in 10-point font, at least 0.32 cm (1/8 in) below the first line, and is the text "MAY HARM OTHER ENGINES."

3.8.3. Colors. – The label background color is Orange: PMS 1495 or its equivalent. The knock-out type within the black band is Orange: PMS 1495 or its equivalent. All other type is process black. All borders are process black. All colors must be non-fade.

At the 2016 CWMA Annual Meeting they received a comment from a regulatory member of the FALS that this item is being addressed in the FALS Handbook 130, Uniform Engine Fuels update, which should be ready in draft form for review by the 2017 NCWM Interim Meeting. The CWMA recommended that this be a Developing item.

At the 2016 CWMA Interim Meeting, comments on this item and Item 2302-7 were taken together during open hearings. The American Petroleum Institute (API) testified during the CWMA L&R open hearing. API proposed an amendment to modify Items 2302-7 and 2307-2. Their suggested amendment is the **double underlined** language below. The other **bold underlined** text is part of the current proposal in NCWM Publication 16.

3.8. Ethanol Flex Fuel.

3.8.1. How to Identify Ethanol Flex Fuel. – Ethanol flex fuel shall be identified as Ethanol Flex Fuel or EXX Flex Fuel **as defined in 16 CFR 306.0(o).**

3.8.2. Labeling Requirements.

~~**(a)**~~ Ethanol flex fuel ~~**with an ethanol concentration no less than 51 and no greater than 83 volume percent shall be labeled "Ethanol Flex Fuel, minimum 51 % ethanol."**~~ **shall be identified and labeled in accordance with the Federal Trade Commission Automotive Fuel Ratings, Certification and Posting Rule, 16 CFR 306, as amended with the exception that retailers and wholesale purchaser-consumers of gasoline shall comply with the EPA pump labeling requirements for gasoline containing greater than 10 volume percent (v %) up to 15 volume percent (v %) ethanol (E15) under 40 CFR § 80.1501.**

(Amended 20XX)

(b) ~~**Ethanol flex fuel with an ethanol concentration less than or equal to 50 volume percent shall be labeled "EXX Flex Fuel, minimum YY % ethanol," where the XX is the ethanol concentration in volume percent and YY is XX minus five (− 5). The actual ethanol concentration of the fuel shall be XX volume percent plus or minus five (± 5) volume percent.**~~

~~**(Added 2014)**~~

~~**(c) A label shall be posted which states "For Use in Flexible Fuel Vehicles (FFV) Only." This informational shall be clearly and conspicuously posted on the upper 50 % of the dispenser front panel in a type at least 12.7 mm (1/2 in) in height, 1.5 mm (1/16 in) stroke (width of type). A label shall be posted which states, "CHECK OWNER'S MANUAL," and shall not be less than 6 mm (1/4 in) in height by 0.8 mm (1/32 in) stroke; block style letters and the color shall be in definite contrast to the background color to which it is applied.**~~

(Amended 2007, 2008, ~~**and**~~ 2014, **and 20XX**)

At the 2017 CWMA Annual Meeting, Mr. Prentiss Searles (API), testified during the CWMA L&R open hearing restating his remarks from the 2016 Interim Meeting (noted above). Eight individuals supported the item as written in NCWM Publication 16. There were four individuals in support of the API proposal.

The SWMA heard comment that FTC was being consulted on this item. Currently, the lettering size as proposed does conflict with the FTC requirement. The submitter from API and the State of Florida would like to see the issue forwarded to FALS. The submitter takes issue with the Method of Sale and Fuels and Lubricants section not having identical specifications. The SWMA recommended this be an Informational item.

At the 2016 NEWMA Interim Meeting, they received comments from the FALS Chair that this item and Item 2302-7 are both proposals that should go through FALS. NIST, OWM and an ethanol industry representative stated this proposal should remain Informational and referred to FALS for further development. A state regulator commented the new FTC Part 306 allows E15 to be considered as part of D4814. Also, E15 would require on the EPA label that 2001 and newer vehicles can use the product, but there is no octane label required. NEWMA forwarded the item to NCWM and recommended it as an Informational item.

During the 2017 NEWMA Annual Meeting voting session, there was discussion on this item and Item 2302-7. There was repeated concern by a New York State regulator that Section 2.30.2.(c) of the item, which originally appears in NCWM Publication 16 as struck language, should be reinstated if it does not contradict or countermand federal labeling requirements. The L&R Committee suggested language was supported by the region. If possible, NEWMA wants to maintain Section 2.30.2.(c) and Voting status contingent on review and a report provided by the FALS.

2307-3 I SECTION 4.1. WATER IN <u>RETAIL ENGINE FUEL STORAGE TANKS,</u> GASOLINE ALCOHOL BLENDS, BIODIESEL BLENDS, ETHANOL FLEX FUEL, AVIATION GASOLINE, AND AVIATION TURBINE FUEL, AND SECTION 4.2. WATER IN GASOLINE, DIESEL, GASOLINE-ETHER, AND OTHER FUELS.

Source:
State of Colorado (2016)

Purpose:
Provide a consistent best management practice regarding managing water in any engine fuel utilizing current detection technology.

Item under Consideration:
Amend NIST Handbook 130, Uniform Engine Fuels and Automotive Lubricants Regulation as follows:

4.1. Water in <u>Retail Engine Fuel Storage Tanks</u> ~~Gasoline-Alcohol Blends, Biodiesel Blends, Ethanol Flex Fuel, Aviation Gasoline, and Aviation Turbine Fuel.~~ – No water phase greater than 6 mm (¼ in) as determined by an appropriate detection paste or other acceptable means, is allowed to accumulate in any **<u>retail</u>** tank utilized in the storage of **<u>engine fuels including, gasoline,</u>** gasoline-alcohol blend, biodiesel, biodiesel blends, **<u>ultra-low sulfur diesel,</u>** ethanol flex fuel, aviation gasoline, and aviation turbine fuel**<u>, gasoline ether blends, kerosene, or any other engine fuels</u>**.

(Amended 2008, 2012, **~~and~~** 2014**<u>, and 20XX</u>**)

~~4.2. Water in Gasoline, Diesel, Gasoline-Ether, and Other Fuels. – Water shall not exceed 25 mm (1 in) in depth when measured with water indicating paste or other acceptable means in any tank utilized in the storage of diesel, gasoline, gasoline-ether blends, and kerosene sold at retail except as required in Section 4.1. Water in Gasoline-Alcohol Blends, Biodiesel Blends, Ethanol Flex Fuel, Aviation Gasoline, and Aviation Turbine Fuel.~~

~~(Amended 2008, 2012, and 2014)~~

Background/Discussion:
All engine fuels degrade more rapidly in the presence of water and can result in an off-spec product, microbial growth, and internal corrosion of tanks and tank equipment. Besides impacting the quality of fuel such as when ethanol dissolves in water causing phase separation, affecting RVP and reducing AKI or octane number, the occurrence of microbial growth and corrosion particulates clog dispenser filters and affect other fuel clarity parameters. The fuels landscape has changed significantly across the country and currently almost all gasoline is blended with ethanol and

all diesel is now Ultra Low Sulfur Diesel with up to five percent biodiesel. This proposal provides a consistent best management practice regarding managing water in any engine fuel utilizing current detection technology (water finding paste or other acceptable means), and simplifies the handbook by eliminating the necessity for Section 4.2. Water in Gasoline, Diesel, Gasoline Ether, and Other Fuels.

At the 2016 NCWM Interim Meeting, Dr. Curran (FALS Chairman) remarked that FALS is forming an informal focus group (FG) lead by Mr. Albuquerque (Colorado) for developing this item. Mr. Bill Hornback (Chevron Products Co.) remarked, there is no way to detect one-quarter inch of water. The Committee agreed additional work needs to be done and recommends this as an Informational item.

At the 2016 NCWM Annual Meeting, Mr. Mahesh Albuquerque (Informal IFG Chair) gave a presentation regarding water in fuel storage tanks. Mr. Albuquerque will continue to develop this item through the Informational focus group and report back to FALS on their progress.

At the 2017 NCWM Interim Meeting, Mr. Mahesh Albuquerque provided an update to FALS. Mr. Albuquerque noted this proposal arose because there are two different requirements in the handbooks regarding permissible levels of water in fuel storage tanks, and he was looking to harmonize them to one-quarter inch. He gave a presentation highlighting some of the research, which has been conducted regarding the effects of water in fuel storage tanks. Much discussion ensued and one of the overarching lingering questions left before group was if this was worth the cost of implementation. The informal FG plans to continue to evaluate this and other related questions in hopes to have a resolution ready to move forward in the near future.

At the 2017 NCWM Annual Meeting, Dr. Curran (FALS Chair) stated this item was discussed in length at the FALS meeting. Mr. Albuquerque (informal FG Chair) continues to gather information and vet the proposal

Regional Association Comments:
The WWMA received testimony from the submitter that this item will serve 1) to simplify the requirements in NIST Handbook130 by eliminating Section 4.2. Water in Gasoline, Diesel, Gasoline-Ether, and Other Fuels and applying a single standard for water allowance in all fuel storage tanks, and 2) to protect the fuel from degradation associated with water contamination, and 3) to reduce storage tank integrity issues associated with water contamination. He stated diesel fuel today is more susceptible to microbial growth since the comparatively high sulfur levels in pre-2006 diesel fuel naturally inhibited microbial growth. He is working with FALS on this item and invites participation from all stakeholders. One industry representative asked that the standard, whatever it ends up being, be uniformly applied to the fuels identified in Section 4.2. Water in Gasoline, Diesel, Gasoline-Ether, and Other Fuels. There was considerable discussion as to whether one-quarter inch is something that is detectible using current tank monitoring equipment and conventional water detecting paste. One industry representative testified that current tank monitoring equipment is unable to detect water levels less than three-quarter inch depth. However, most agreed water finding paste used in conjunction with sticking the tank is quite capable of resolving one-quarter inch of water. The WWMA agreed that additional input from industry, regulators, and the FALS Committee is necessary and recommended this be an Informational item.

The CWMA received a comment from a regulator who sits on the board of the Steel Tank Institute (STI) is currently on a working group that is revising the recommended practices for water in storage tanks. He believes NCWM and NIST Handbook 130 should be harmonized with this group, because there is a broad-based industry stakeholder group working on these recommendations. He further commented the maximum allowable limit will likely be one-half inch, as well as a frequency requirement that varies depending on the type of tank. A regulator commented their state requirement is one-half inch maximum allowable, but essentially it is a de minimus level that identifies any water. An industry representative from API asked several questions for consideration including: 1) how are UST facilities measuring the ¼ in water; are they able to use electronic measuring equipment or are they relying on stick and paste; 2) has Colorado or any other state identified a correlation between tank conditions when one inch of water is present versus a one-quarter inch of water; 3) are USTs changing out their filters more often with one inch of water than with one-quarter inch of water; is there any correlation between water in the tanks and consumer complaints; 4) if the facilities are using filters, are they using water sensitive filters; 5) how often are facilities cleaning their tanks; 6) how often are facilities removing the water from the tanks; and 7) is there a correlation to the amount of water measured in the tank? The state regulator on the STI board commented any presence of water will cause the issues such as corrosion, which is trying to be prevented. An industry representative from the National Biodiesel Board (NBB) commented that NBB does not oppose this idea, but also does not know the most effective de minimus amount. She commented that NBB believes that regardless of the maximum allowable limit, all fuels should have the same requirement. The CWMA recommended this be a Developing item. At the 2017 CWMA Annual Meeting, they believed the intent of this was valid; however, they feel the scientific supporting data is lacking. CWMA encourages further development of this proposal by the informational FG.

The SWMA heard from the FALS Chair that an informal focus group is working on this item. An API representative remarked that limiting water was important but wondered how the proposal will help address the issue. The SWMA recommended this be an Informational item.

At the 2016 NEWMA Interim Meeting, they received a report that an informal focus group from FALS is working to further develop this proposal by determining what the appropriate maximum water volume should be for storage tanks. A biodiesel industry representative commented that regardless of what is determined to be the de minimus amount of water allowed, it should be the same for all fuels, unlike what is currently in NIST Handbook 130. NEWMA recommended this be an Informational item. At the 2017 NEWMA Annual Meeting they support the work of the informal focus group.

2307-4 W SECTION 4.3. DISPENSER FILTERS

(This item was Withdrawn.)

Source:
Missouri Department of Agriculture (2012)

Purpose:
Recognize the need for 10 micron or smaller nominal pore-sized filters for today's diesel engines.

Item under Consideration:
Amend the NIST Handbook 130, Engine Fuels and Automotive Lubricants Regulation as follows:

4.3. Dispenser Filters.

4.3.1. Engine Fuel Dispensers.

(a) All gasoline, gasoline-alcohol blends, gasoline-ether blends, ethanol flex fuel, and M85 methanol dispensers shall have a 10 micron or smaller nominal pore-sized filter.

(b) All biodiesel, biodiesel blends, diesel, and kerosene dispensers shall have a ~~**30**~~ **10** micron or smaller nominal pore-sized filter **with the following exceptions:**

(1) Dispensers with flow rates greater than 15 gal per minute shall use a 30 micron or smaller nominal pore size filter.

(2) Dispensers with flow rates less than or equal to 15 gal per minute in the following states may use a 30-micron or smaller nominal pore size filter during the months of December through March. These states include: Nevada, Idaho, Montana, Wyoming Colorado, South Dakota, Nebraska, Minnesota, Iowa, Wisconsin, Michigan, Illinois, Pennsylvania, New York, Vermont, New Hampshire, and Maine. This exception has a sunset date of April 2020.

(3) **Dispensers with flow rates less than or equal to 15 gal per minute in North Dakota may use a 30 micron or smaller nominal size filter during the months of November through March. This exception has a sunset date of April 2020.**

(Amended 2014 **and 20XX**)

Background/Discussion:
Abnormal dispenser filter plugging at retail will alert the retailer of potential storage tank problems. Requiring 10-micron filters for all products will reduce the inventory and the potential of installing the wrong filter for all products at the same site.

NCWM 2012 Interim Meeting, Mr. Ronald Hayes, FALS Chair, informed the Committee that FALS recommended that this item be Informational because of industry concerns that 10-micron filters would be too restrictive of flow in high-flow systems. One industry representative expressed opposition for the use of 10-micron filters and recommends this item to be Withdrawn. A representative of an automobile manufacturer claimed diesel passenger vehicles do not have the sophisticated filtration systems commonly found on commercial duty vehicles and 10-micron filters on dispensers are needed for protection from particulate contamination. As proposed, this item could cause clogging of diesel dispenser filters in colder climates. The Committee believes this item has merit but lacks a consensus and believes FALS needs to address these concerns. The 2012 L&R Committee designated this item as an Informational Item and assigned it to FALS for further development.

At the 2012 NCWM Interim Meeting, it was apparent to the Committee there are many unresolved issues related to passenger vehicles. The Committee encourages the FALS to continue developing this item.

At the 2012 NCWM Annual Meeting, several stakeholders spoke in opposition on this item. Mr. Ronald Hayes, FALS Chair remarked that the FALS worked on this item in 2007 and believes FALS needs to continue to work on this item. The NCWM L&R Committee agreed that this item is not ready and supports the continued development by FALS.

At the 2013 NCWM Interim Meeting, Mr. Hayes, FALS Chairperson, remarked that a similar item was bought before the Committee in 2007. FALS did not have enough time in their work session to work on this item. There are several stakeholders and states that are having issues with the terminology and would like it removed from the agenda. Mr. Ronald Hayes (Missouri) remarked that they supported this item because contamination is an issue with cars that do not have filtering systems. The Committee reviewed comments from the Regional Associations however; FALS did not have sufficient time review and consider recommendation to the Committee. The Committee would like for FALS to continue to work on this item and is proposing this as an Informational item.

At the 2013 NCWM Annual Meeting, Mr. Hayes, FALS Chair requested that the Committee allow them to continue to work on a recommendation for this item. There was opposition on moving this item forward. In less than two years since this proposal came forward, there has been no data developed. The Committee reviewed Regional Association reports, open hearing comments, and letters received changed the status of this to a Developing item.

At the 2014 NCWM Interim Meeting, Mr. Hayes (Missouri), who submitted the proposal, offered modified language and supporting data to support the flow rate on 10-micron diesel filters. There was considerable discussion regarding the fill time reduction, burdensome cost for station owners, and equipment and filter maintenance. It was noted there is work being done within ASTM, but at this time the information cannot be shared. The Committee reviewed the Item Under Consideration within NCWM Interim Publication 15 (2014). The Committee moved forward the modified language provided by Mr. Hayes for consideration as a Voting Item.

At the 2014 NCWM Annual Meeting, the Committee reviewed several letters and additional data submitted by the Petroleum Marketers Association of America (PMAA). The FALS recommended this item move forward for a Vote. During open hearings, concerns were mixed regarding this this Item. Numerous were concerns were expressed concerning the data from PMAA. Several comments were heard that ASTM should be allowed to develop a standard.

At the 2015 NCWM Interim Meeting the FALS Chair notified the Committee that this proposal was discussed in their work session and the FALS group is divided on a recommendation. Mr. Russ Lewis (Marathon Petroleum Co.) submitted the Coordinating Research Council (CRC) report "Diesel Fuel Storage and Handling guide. In addition, Prentiss Searles (API) provided the Committee with a listing of the various studies and the findings that support moving this Item forward. The Committee reviewed additional letters and Regional Association recommendations. During open hearing testimony, there was discussion as to whether this is a weights and measures issue or a housekeeping issue for the stations. There was lengthy discussion was at length as to the type of particulates and contaminates that a 10 micron could filter. Cost effectiveness was a concern as to who would bear the burden of the cost. With the extensive discussion on this subject matter and new information received, the Committee is designating this item as a Voting Item.

At the 2015 NCWM Annual Meeting, Mr. Lewis (on behalf of API) provided a presentation on dispenser filters. Mr. Curran (FALS Chair) informed the Committee that FALS is divided on this issue but would like it to proceed with a Vote. There were no new comments other than those that have already been provided in this report. The outcome of the voting session was a split vote; therefore, it was returned to the Committee.

At the 2016 NCWM Interim Meeting, Mr. Prentiss Searles (API) provided a presentation and remarked that North Dakota is being stricken from Section 4.3.1.(b)(2). Dr. Curran (FALS Chairman) remarked that FALS had some opposition from marketers on this proposal. However, FALS is recommending this move forward as a Voting item. There was discussion on the floor as to who is responsible for clean tanks, refiners, terminals, or retailers? It was also mentioned that the ASTM standard may not be sufficient. The Committee is recommending this as a Voting Item.

At the 2016 NCWM Annual Meeting, Dr. Curran (FALS Chair) recommended that this item move forward with a vote even though FALS could not reach a consensus on this item. There were several remarks that this item should be Withdrawn due to the financial burden this would have on small independent operators. Oregon, Maine, and Massachusetts requested they be added to the exemption listing. States were added to the exemption listing based on temperature studies and on ASTM D975 10 percentile ambient temperature tables (fig. X 5.2 and 5.3). Those in support of this proposal agree studies on fuel cleanliness have been done. This item protects the consumer, and this proposal adds the last line of defense. Stations must maintain their tanks; however; they claim contamination is in the product being delivered. There was also a comment as to how the sunset date of April 2020 was determined. Mr. Russ Lewis remarked the sunset date was proposed so that if adopted and this did not resolve the issue, then it will allow for a switch back to the 30-micron filter.

At the 2017 NCWM Interim Meeting, Dr. Curran remarked that the FALS is recommending this be Withdrawn. The Committee did not see any new information or data come forward on this item, so they have Withdrawn this item.

Regional Association Comments:
The WWMA received a comment from a regulator that voting on this item was split solidly down the middle the last two times it was brought before NCWM for adoption and doesn't see any evidence of this changing and asks that item be Withdrawn. A regulator testified that the item is overreaching and should simply be a business decision left up to the fuel marketers. The Committee observed there is no evidence of consensus among either regulators or industry on this issue. The WWMA recommended the item be Withdrawn.

The CWMA received a comment from a regulator that Missouri is credited as the submitter of this item, when in fact, the item originated from the Fuels and Lubricants Subcommittee. This item is a separate item pulled off a larger revision similar to the update revision currently being made through FALS. He commented that the engine manufacturers originally brought this concern to FALS, and several years later we are still deliberating the move from 30- to 10-micron filter maximum pore size. A state regulator from Minnesota commented that if this proposal is to ever pass, the requirement should be enforced at the terminal as well as at the retail level. A regulator commented that the further downstream the product gets, the more likely it is to collect particulate. An industry representative commented there have been very few issues or complaints from the retailers indicating they were taking possession of dirty fuel. The practicality of a 10-micron filter at the terminal is problematic. An industry representative commented the data indicating a problem with tank corrosion is at retail, not upstream. A regulator commented that the problem is with dirty tanks, not fuel filters. He commented that NCWM should consider labeling diesel fuel as filtered or unfiltered. The CWMA recommended this item be Withdrawn.

The SWMA heard from the FALS Chair that they have been unable to reach consensus on this item. The SWMA also heard API had no additional data to provide. The SWMA recommended the item be Withdrawn.

NEWMA recommended that the item be Withdrawn.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

2500 NCWM POLICY, INTERPRETATIONS, AND GUIDELINES

2500-1 V SECTIONS 2.1.1. WEIGHT(S) AND/OR MEASURE(S)., 2.1.2. WEIGHT(S) AND/OR MEASURE(S), 2.1.3. DEFINITION OF NET WEIGHT., 2.2.1. GIFT PACKAGES., 2.2.2. SAND., 2.2.3. SOLD BY $^{4}/_{5}$ BUSHEL., 2.2.5. LOT, SHIPMENT, OR DELIVERY., 2.2.6. AEROSOLS AND SIMILAR PRESSURIZED CONTAINERS., 2.2.7. AEROSOL PACKAGED PRODUCTS., 2.2.8. VARIETY AND COMBINATION PACKAGES., 2.2.9. TEXTILE PRODUCTS., 2.2.10. YARN., 2.2.11. TINT BASE PAINT., 2.2.12. REFERENCE TEMPERATURE FOR REFRIGERATED PRODUCTS: WHEN A PRODUCT IS REQUIRED TO BE MAINTAINED UNDER REFRIGERATION, 2.3.9. FIREPLACE LOGS., 2.3.11. PACKAGED FOODS OR COSMETICS SOLD FROM VENDING MACHINES., 2.3.12. MOVIE FILMS, TAPES, CASSETTES

(This item was Adopted.)

Source:
NIST/OWM (2017)

Purpose:
Remove sections from the Interpretations and Guidelines that are either no longer necessary or outdated.

Item under Consideration:
Amend NIST Handbook 130, NCWM Policy, Interpretations and Guidelines as follows:

~~**2.1.1. Weight(s) and/or Measure(s).**~~

~~**(L&R, 1985, p. 77)**~~

~~**The measuring elements of a point-of-sale system are "weights and/or measures." Errors in pricing when found in point-of-sale systems come under "Misrepresentation of Pricing" in the weights and measures law and are under the jurisdiction of weights and measures.**~~

~~**Background**~~

~~**A recommendation was made to change the definition of "weights and measures" in the Uniform Weights and Measures Law to specifically define a scanner or point-of-sale system as under weights and measures jurisdiction.**~~

~~**Several state representatives said that they had enforcement problems when a scanner or point-of-sale system was being used and when the price marked on an item (or on the shelf) was not the same as the price printed on the receipt. These officials believe that unless the law specifically defines these devices as "weights and measures," they have no jurisdiction over the devices' function.**~~

~~**The Committee disagreed. The NCWM Uniform Weights and Measures Law has a section that forbids the practice of a different price on the retail shelf as compared with the price provided by a scanner. Section 15 of the Uniform Weights and Measures Law reads:**~~

> ***~~No person shall misrepresent the price of any commodity or service sold, offered, exposed, or advertised for sale by weight, measure, or count, nor represent the price in any manner calculated or tending to mislead or in any way deceive a person.~~***

~~This section (plus Section 14 forbidding misrepresentation of quantity), if enacted by a state, already provides enforcement authority over scanners and point-of-sale systems.~~

~~In addition, the Committee does not want to set a precedent by listing by name the types of devices that might be considered weights and measures devices. This might provide a potential "loop-hole" for those devices not specifically listed. Finally, the Committee members pointed out that it is the human element (the person reading in data or receiving price updates) that introduces the discrepancies in shelf and receipt prices rather than any inherent incapability of the reading device or scanner. Therefore, it is much more effective to forbid the practice of mispricing rather than focus on a single device or apparatus as the means for obtaining compliance.~~

~~2.1.2. Section 19(a), Identity.~~

~~(L&R Committee, 1986, p. 143)~~

~~Packaged food not containing meat or poultry does not have to have an identity statement if the identity of the commodity can easily be identified through the wrapper or container.~~

~~Background~~

~~Virginia Weights and Measures recommended revision to Section 19(a) of the Uniform Weights and Measures Law (UWML) to eliminate the exemption of an identity statement from packages when the item "can easily be identified through the wrapper or container." The Committee is of the opinion that there is merit in retaining the language in Section 19(a) of the Uniform Law. Packages of fresh product packaged in a retail establishment are considered to be packages as long as a price is attached. If the exemption were eliminated, such packages instead of being marked, for example, "12/89 cents" would have to be marked "lemons, 12/89 cents." It was argued that there could be a problem in deciding whether or not a commodity could "easily be identified" (such as might occur in an ethnic specialty grocery or with an exotic produce item). In researching the issue, the Committee has determined that Title 21, Section 101.100(b)(3) of the Code of Federal Regulations specifically exempts the food identity statement from having to appear "..if the common or usual name of the food is clearly revealed by its appearance." Since no specific problems of enforcement were brought to the attention of the Committee concerning this issue, the Committee recommends no change to Section 19(a) at this time. However, the Committee recommends that Section 3.1. and 4. of the Uniform Packaging and Labeling Regulation be noted as follows:~~

> ***~~Section 19(a) of the Uniform Weights and Measures Law, and 21 CFR 101.100(b) (3) for non-meat and non-poultry foods, specifically exempt packages from identity statements if the identity of the commodity "can easily be identified through the wrapper or container."~~***

~~2.1.3. Definition of Net Weight.~~

~~(L&R, 1987, p. 123)~~

1. **~~It is the intent of this definition to include truck-loads of commodities, not just packages ("containers").~~**

2. **~~It is not the intent to define the net weight of packaged goods as requiring dry tare (". . . excluding. . . substance(s) not considered to be part of the commodity" could just as well be interpreted as excluding liquids not considered part of the commodity at the time of sale).~~**

~~**3. It is also the intent to permit more specific definitions as the occasion warrants (". . . material(s) . . . not considered. . . part of the commodity" might include dirt or "foreign material" in a commodity).**~~

~~**2.2.1. Gift Packages**~~

~~**(Resol. 1975, p. 237)**~~

~~**See also Interpretation 2.2.8.**~~

~~**Interpretation Seasonal gift packages are often put up in retail stores in baskets and other decorative containers using cellophane or other clear flexible wrap to enclose a number of similar or dissimilar prepackaged items (for example: cheese, jellies, sausages, wine, fruit, etc.). The resulting combination or variety package must have a legally conforming label including the net contents statement.**~~

2.2.2. Sand.

~~**(L&R, 1978, p. 151)**~~

~~**Interpretation**~~

~~**Sand put up in permanent wooden bins is a consumer package and must be labeled with all mandatory information as required by the Uniform Packaging and Labeling Regulation.**~~

~~**Background**~~

~~**The State of Hawaii raised the issue of the sale of sand in permanent wooden bins and sold by price per cubic measure. The Committee agrees with Hawaii that the sale of sand in this manner is subject to the Uniform Packaging and Labeling Regulation, under the definition of "Consumer Package" (Section 2.2. of the Uniform Packaging and Labeling Regulation) and that no further action is needed.**~~

~~**2.2.3. Sold by 4/5 Bushel.**~~

~~**(L&R, 1974, p. 220)**~~

~~**Interpretation**~~

~~**The trade practice of crating citrus fruit in 4/5 bushel units is a long-standing one. It is not intended to be a consumer package. If offered as a consumer package, the general consumer usage and trade custom in the particular state would have to be explored:**~~

~~**Section 6.10.(b)(1) of the Uniform Packaging and Labeling Regulation would permit a declaration employing different fractions in the net quantity declaration other than those permitted under Section 6.10.(b) if there exists a firmly established practice of using 4/5 bushel in consumer sales and trade custom.**~~

~~**Background**~~

~~**It has been called to the attention of the Committee that certain commodities are being sold to consumers in "unacceptable" fractional units of dry measure in violation of Section 6.10. of the Uniform Packaging and Labeling Regulation. Specifically, the Committee has been asked for an interpretation as to whether the packaging of oranges in a 4/5 bushel, which is later sold unweighed to a consumer, is a violation of the binary submultiple principle as implied in Section 6.10.(b). Some Committee members asserted that a clear exception exists under Section 6.10.(b)(1) which applies to this long established tradition of crating**~~

~~**citrus fruit in ⁴⁄₅ of a bushel. Approximately 85 % of this fruit is sold by this trade practice. Additionally, it was asserted that the packager never intended the ⁴⁄₅ bushel to be a consumer package, but if the ⁴⁄₅ bushel of citrus fruit is sold to consumers, this would be a matter between the appropriate state or local official and the retailer.**~~

~~**The consensus of the Committee is that this action of the packagers is not in violation of the indicated section.**~~

~~**2.2.5. Lot, Shipment, or Delivery.**~~
~~**(L&R, 1981, p. 95)**~~

~~**Policy**~~

~~**The requirements for the average package net contents to meet or exceed the labeled declaration may be applied to production lots, shipments, or deliveries. Shipments or deliveries are smaller collections of packages than production lots that may or may not consist of mixed lot codes.**~~

~~**Emphasis in inspection activities should be placed on warehouse and in plant testing without neglecting retail consumer protection.**~~

~~**Background**~~

~~**The Committee heard a petition from the California Brewers Association to define a lot as:**~~

> ~~***…a selection of containers under one roof produced by a single company of the same size, type and style, manufactured or packed under similar conditions with a minimum number to be equivalent to one production line shift.***~~

~~**The intention of the petition is to focus Weights and Measures enforcement on production lots as opposed to small collections of packages on retail shelves, because the production lot is under the control of the packager.**~~

~~**An alternative proposal was made that would require mingling of lot and date codes in package inspection at warehouse locations.**~~

~~**The Committee has reviewed the proposals in light of Section 7.6. and Section 12.1. of the Uniform Packaging and Labeling Regulation which refers to "shipment, delivery, or lot." If the petition is approved, the terms "shipment" and "delivery" would have to be dropped from this Uniform Regulation.**~~

~~**The Committee recognizes the inherent value of in-plant and warehouse inspection and is of the opinion that, wherever possible, such inspections should be carried out. At the same time, the Committee recognizes the need for the state and local weights and measures officials to protect the consumer at the level where the ultimate sale is made. Therefore, the Committee recommends no change to the Uniform Regulation.**~~

~~**The Committee looks forward to the work of the Special Study Group on Enforcement Uniformity of the NCWM which will be exploring the mechanisms that might be instituted to make in-plant inspection workable.**~~

~~**2.2.6. Aerosols and Similar Pressurized Containers.**~~
~~**(L&R, 1976, p. 248)**~~

~~**See also Guideline 2.2.7.**~~

~~**Interpretation**~~

~~**It is the opinion of the NCWM that an FDA opinion as expressed in the Fair Packaging and Labeling Act Manual Guide FDA 7563.7, not objecting to volume declarations on aerosol products, does not supersede or preempt state requirements that aerosols be labeled by net weight.**~~

~~**Background**~~

~~**The Department of Commerce through the Office of Weights and Measures of the National Institute of Standards and Technology, under its statutory responsibility for "cooperation with the states in securing uniformity in weights and measures laws and methods of inspection," developed Section 10.3.**~~

> ~~**10.3. Aerosols and Similar Pressurized Containers – The declaration of quantity on an aerosol package and on a similar pressurized package shall disclose the net quantity of the commodity (including propellant), in terms of weight, that will be expelled when the instructions for use as shown on the container are followed.**~~

~~**Several states, which are among the 32 that have adopted the Uniform Packaging and Labeling Regulation, indicated that pressurized cans were currently being marked by volume rather than by weight as required above. Industry representatives indicated that according to the FDA, they are permitted to mark this type of container by volume and that for competitive purposes they will continue to do so. The NCWM was asked to contact FDA and inform them that a declaration of volume on pressurized containers is not acceptable to the states since it cannot be verified.**~~

~~**A meeting was requested to express NIST/NCWM's concern over the FDA position on quantity of contents declarations on aerosols, which is found in the Fair Packaging and Labeling Act (FPLA) Manual Guide FDA 7563.7. This Guide states that in the past, the FDA has not objected to the use of units of volume to declare the net contents of aerosol preparations that would be liquid if not combined with the propellant and a net weight statement in avoirdupois units for products that would be solids if not combined with a propellant. The FDA was asked to modify its position to provide that existing state regulations (concerning aerosol quantity of contents declarations) are not superseded by FDA Guidelines. FDA officials stated that the FDA would consider the request, but it did not appear at the time of the Interim Meetings that the FDA would make any statement to modify its position without following its administrative procedures and permitting interested parties to exhaust every element of due process.**~~

~~**One industry representative stated that there has been a good deal of concern that fluorocarbon propellants may in the long run cause the partial destruction of the ozone layer in the upper atmosphere surrounding the earth, and that the diminution of the ozone layer would have adverse effects on human health. Therefore, they have converted to new formulations which eliminate fluorocarbon propellants. As a result of this conversion to a non-fluorocarbon propellant system, which uses a propellant with a much lower density than that of the usual fluorocarbon propellants, continued use of a weight measure would be highly misleading to the consumer. Therefore, some spray labels have been changed so as to denote the contents in terms of fluid measure, rather than in terms of weight measure.**~~

~~**The industry representative stated that if manufacturers were to be required to use weight measure, consumers would be deceived into buying products, such as hair spray, with large amounts of fluorocarbon that vaporizes before it reaches the hair. Consumers prefer products with a large amount of base. Industry further indicated that they wanted to avoid a confrontation with the states over this issue and believe that the matter can readily be resolved without the need for litigation. Although the use of fluid measure on**~~

~~**the principal panel will give consumers the most helpful information at the point of purchase, the industry would have no objection to putting the net weight on the back of the label.**~~

~~**The Committee wants to commend FDA for their interest in this matter and the manufacturers who seek to improve their product and its labeling information. The Committee is also encouraged to work with all interested parties to resolve this issue. However, the Committee does not believe that mere guidelines can preempt a Uniform Regulation developed under the technical authority of the federal agency delegated by Congress and adopted by the states through its representatives, no matter how broad the preemptive clause of an act might be. Additionally, the Committee cannot support open and notorious violations of state regulations where those violations occurred prior to bringing the issue before the Conference. Therefore, the Committee believes that NCWM should support a firm stand by the states that their regulations must be respected**~~.

~~**2.2.7. Aerosol Packaged Products.**~~

~~**(Liaison, 1979, p. 239)**~~

~~**See also Guideline 2.2.6.**~~

~~**Policy**~~

~~**The NCWM recommends all aerosol packages be labeled by net weight. FDA permits volume declarations. The NCWM has requested the FDA to change its regulations and revise its interpretation of these regulations.**~~

~~**Substance of Petition**~~

~~**The NCWM petitions the FDA to make the necessary changes to their regulations and interpretation of 21 CFR 101.105(g) as appearing in the FDA Fair Packaging and Labeling Manual Guide, 7563.7 pertaining to the quantity of contents declaration on aerosol packaged products. It is requested that the net quantity statement on aerosol packaged products or similar pressurized packages be made in terms of net weight only. The reasons for recommending such changes are as follows:**~~

1. ~~**Net quantity labeling of aerosol packaged products in terms of net weight is a firmly established trade practice for such products.**~~

2. ~~**Net quantity labeling of aerosol packaged products in terms of volume is difficult (if not impossible) to verify with consumer verification methods or by conventional package inspection methods. State or local enforcement action is discouraged by such labeling.**~~

3. ~~**Since the labeling of aerosol packaged products by volume cannot be compared with the labeling of such products in terms of net weight, labeling in terms of volume and weight inhibits value comparisons and causes consumer confusion with respect to the quantity of product the consumer is buying and can be a form of deceptive labeling.**~~

4. ~~**Uniformity between all state and federal regulations is highly desirable for both enforcement and fair competition in the marketplace. The Uniform Packaging and Labeling Regulation and the FTC and EPA Regulations require net quantity labeling of aerosol packaged products in terms of net weight.**~~

~~**2.2.8. Variety and Combination Packages.**~~
~~**(L&R, 1982, p. 149)**~~

~~**See also Guideline 2.2.1.**~~

~~**Interpretation**~~

~~**(a) Seasonal gift packages are "variety packages" within the meaning of the Uniform Packaging and Labeling Regulation if they contain "reasonably similar commodities" (such as various fruits). They are "combination packages" if they contain "dissimilar commodities" (such as wine, fresh fruit, and jellies). Variety package labels must declare the total quantity in the package. Combination package labels must declare a quantity declaration for each portion of dissimilar commodities.**~~

~~**(b) The example provided with Section 10.6., Variety Packages, of the Uniform Packaging and Labeling Regulation, shows a total quantity declaration and individual declaration for each type of commodity. The individual declaration is not required but is encouraged.**~~

~~**Background**~~

~~**The Committee reviewed Section 10.5 and Section 10.6 of the Model Packaging and Labeling Regulation in order to determine the need for further clarification. Several questions have arisen over the years with respect to:**~~

~~**(1) What are the net contents labeling requirements for seasonal gift packages composed of varying types of commodities or goods all combined into one package?**~~

~~**(2) Is the example provided in Section 10.6. entirely in keeping with the declaration requirements? (This section requires that total net contents be declared, but the example shows both total and individual net contents.)**~~

~~**The Committee believes that there is no need to modify these sections, but the discussions below may serve as guidance to enforcement officials and packagers on these sections.**~~

~~**Concerning labeling requirements for seasonal gift packages, it must first be determined what the individual units comprising each package are. The following examples are possibilities:**~~

~~**(a) individual packages of sausage, individual packages of cheese;**~~

~~**(b) several kinds of fruit of different weights; and**~~

~~**(c) several kinds of fruit, bottle of wine, several packages of cheese.**~~

~~**Examples (a) and (c) above are combination packages and should be labeled with net quantities of each unit or type of unit. It is possible to combine fruit net weight (or count if appropriate) as one declaration, cheese net weight as a second declaration, etc.**~~

~~**Example (b) above is a variety package and must be labeled with the total net weight or count (as appropriate) of fruit in the package. It is also reasonable for packagers to include, for full consumer information, a declaration of the individual net contents of each type of package or item in the gift package although this latter declaration is not required (e.g., 1 lb bananas, 3 pears). This is also the key to the second question asked above concerning the example provided in Section 10.6.; that is, although a declaration of individual item net contents is not required, packagers are encouraged to provide additional information wherever useful to the consumer.**~~

~~**2.2.9. Textile Products.**~~

~~**(L&R, 1977, p. 215)**~~

~~**Interpretation**~~

~~**(a) When a range of widths (e.g., 58/60) appears on the label of bolts or rolls for yard goods, enforcement action should be taken whenever the action width falls below the lesser of the two widths given as the range (in the example above, when the fabric width is less than 58 in).**~~

~~**(b) Section 10.9.3. Textiles: Variations from Declared Dimensions of the Uniform Packaging and Labeling Regulation is not to be interpreted as providing tolerances. The average requirement must be met. The average quantity of contents of a lot, shipment, or delivery must equal or exceed the declared dimensions. Dimensions of individual packages of textiles may vary as much as Section 10.9.3. permits, but the average requirement must still be met.**~~

~~**Background**~~

~~**The State of California and the American Textile Manufacturers Institute asked the NCWM Laws and Regulations Committee and the National Institute of Standards and Technology to assist in the resolution of two textile-product issues. In the first issue California asks for help in correcting a short measure condition, apparently a nationwide problem, which has been found in the packaging and labeling of textile yard goods put up on bolts or rolls.**~~

~~**The problem is outlined as follows:**~~

1. ~~**Approximate width measurements are being used by some manufacturers in their label declarations.**~~

   ~~**Example: 58/60 in (inch) width**~~

2. ~~**Label declarations are false and misleading in that actual amounts are less than the quantity represented on the label.**~~

3. ~~**Section 10.9.3. of the Uniform Packaging and Labeling Regulation is extremely vague as to its intent and true meaning. Are the substantial variations (3 % and 6 %); (6 % and 12 %) permitted as product tolerances, or are they maximum unreasonable minus and plus errors to be allowed when sampling the product for quantity when using Handbook 67?**~~

~~**California favors the repeal or clarification of Section 10.9.3. and suggests amending Section 10.9.2.(k) to read:**~~

> ~~***The quantity statement for packages of textile yard goods packaged on the bolt or roll for either wholesale or retail shall state its net measure in terms of yards for the length and width of the item, or its net weight in terms of avoirdupois pounds or ounces, or in terms of their metric equivalent.***~~

~~**During the Interim Meetings, a representative of the American Textile Manufacturers Institute (ATMI) informed committee members that the proposal to identify the width of yard goods with a single measurement (as opposed to a range) would be given serious consideration by their members, after which a recommendation will be finalized and submitted to the Laws and Regulations Committee.**~~

~~**After the Interim Meetings, the National Home Sewing Association said that if a single width declaration is required, the following could result:**~~

~~**(a) No change in manufacturing process would be effectuated; only the size declaration on bolts would be changed.**~~

~~**(b) Short measure problems could be created because consumers would look for the fabric to be exactly the stated width. Because the manufacturing processes were not changed, the width is actually the same as it was with the range declaration.**~~

~~**(c) Increased cost to manufacturers would result. One loom is used for many different fibers now; a single width declaration could create a need for many looms for each of the different fibers, thereby imposing "pass-along" costs to consumers.**~~

~~**(d) Consumer deception would be fostered in that a single declaration implies actual measurement.**~~

~~**California officials state that roll or bolt fabric should be labeled accurately with a single declaration. Additionally, they believe that industry does have enough shrinkage data on fibers used in the manufacturing processes, and thus could provide accurate measurement declaration on finished fabrics or materials.**~~

~~**The Committee believes that accurate quantity information should be provided on consumer products; however, no labeling changes should be required until patterns and yard goods are marketed in metric units. At that time, all measures shall be singularly stated (eliminating dual numbers) and, until that time, any products where size declaration is a range and found to be less than the smaller of the range declaration shall be subject to enforcement action. For example, a product marked "58 to 60 in" and found to be less than 58 inches should be considered to be in violation of weights and measures laws and/or regulations.**~~

~~**Additionally, the Committee affirms that the intent of the Variations from Declared Dimensions permitted in Section 10.9.3. in no way eliminates the requirement that quantity declarations for textiles must, on the average, not be less than declared declarations.**~~

~~**2.2.10. Yarn.**~~

~~**(L&R, 1983, p. 153)**~~

~~**Interpretation**~~

~~**The appropriate net contents declaration for yarn is weight.**~~

~~**Background**~~

~~**A consumer has requested that the net quantity statement for yarn be changed from weight to length. The proposal is based on the consumers' use of the product, darker colors often weigh more per unit of length. Therefore, they found that a lighter color yarn will "go farther" in craft applications than a darker yarn; consumers indicate that it is difficult to predict how much yarn of varying colors to purchase based on a weight declaration. The Committee is sympathetic to the request but must support existing labeling requirements for several reasons.**~~

~~**Yarn, by nature, is extremely stretchy; in order to label yarn by length, a specified tension would have to be applied in order to make any repeatable length measurement. Such a tension would have to be agreed upon by all the yarn manufacturers, and they would have to apply to compliance testing of product by weights and measures officials. Even if this tension "standard" were negotiated and decided upon, it would have little real meaning in use by needle crafters, knitters, and others. The tension applied to yarn in use varies from user to user and from application to application; therefore, the length also varies. Not only**~~

~~**does dyeing yarn change the weight, dyeing also changes the length of yarn. For these reasons, industry representatives also support the requirements as they presently are written in the Uniform Packaging and Labeling Regulation.**~~

~~**The Committee recognizes the difficulty of working with this product and suggests that users of yarn consider buying an excess of the yarn over what is expected to be used in any application. The consumers should find out before purchase if, after finishing the product, they can return the unopened skeins to the retailers from whom the skeins were purchased.**~~

~~**2.2.11. Tint Base Paint.**~~

~~**(L&R, 1986, p. 146)**~~

~~**Section 11.23. of the Uniform Packaging and Labeling Regulation currently permits tint base paints (paints to which colorant must be added prior to sale) to be labeled in terms of the volume (a quart or gallon) that will be delivered to the purchaser after addition of the colorant only if three conditions are met:**~~

1. ~~**"the system employed ensures that the purchaser always obtains a quart or a gallon";**~~

2. ~~**"a statement indicating that the tint base paint is not to be sold without the addition of colorant is presented on the principal display panel;" and**~~

3. ~~**"the contents of the container, before the addition of colorant, is stated in fluid ounces elsewhere on the label."**~~

~~**2.2.12. Reference Temperature for Refrigerated Products: When a Product is Required to be Maintained under Refrigeration.**~~

~~**(L&R, 1990, p. 86)**~~

~~**Background**~~

~~**Section 6.5.(b) was revised to clarify that the reference temperature of 4.4 ºC (40 ºF) applies only to products that must be refrigerated to maintain product quality, rather than to items, such as carbonated soft drinks, that are refrigerated for the purchaser's convenience.**~~

~~**Guideline**~~

~~**The Committee also discussed how an inspector could decide whether a product under refrigeration is required to be maintained under refrigeration. The following guidelines are provided:**~~

1. ~~**The traditional food items that normally require refrigeration and are found in refrigerated cases will not ordinarily have any statement about requiring refrigeration. These items include milk, orange juice, and similar products. They may be tested at any temperature at, above or below their reference temperature of 40 ºF (4 ºC) because such products are at their maximum density at their reference temperature, and the volume of such products will always increase at higher or lower temperatures. Thus any errors made by not measuring at the exact reference temperature will be in the favor of the packer.**~~

2. ~~**Food items that normally require refrigeration, but which are processed so as not to require refrigeration prior to opening, will have "refrigerate after opening" or similar wording on the label. Such items as milk and orange juice can be found in this category as well as in the "refrigeration required" category. The two categories can be distinguished by the "refrigerate**~~

~~**after opening" statement, which calls for testing at or above their reference temperature of 68 ºF (20 ºC).**~~

~~**3. Food items that are not expected to require refrigeration, but which may be refrigerated for the convenience of the consumer (such as carbonated beverages), are to be tested at temperatures of 68 ºF (20 ºC) or above even when found refrigerated for the convenience of the consumer.**~~

~~**2.3.9. Fireplace Logs.**~~
~~**(L&R, 1975, p. 174)**~~

~~**Interpretation**~~

~~**Time of burning is not an appropriate quantity declaration for fireplace logs. (Section 2.4.3. of the Uniform Method of Sale of Commodities requires single logs to be sold by weight, or if packaged and less than 4 ft^3, weight plus count.)**~~

~~**Background**~~

~~**The enforceability of quantity declarations using time as the basis of measurement for commodities, including packaged commodities, must be considered carefully if equity in the marketplace is to be achieved. The Committee wants to stress to those who have submitted time declaration questions that the enforceability factor should not override consumer protection and uniformity considerations. Based on the above criteria, the Committee recommends that the Conference take the position that time is not an appropriate quantity declaration for fireplace logs.**~~

~~**2.3.11. Packaged Foods or Cosmetics Sold from Vending Machines.**~~
~~**(L&R, 1982, p. 152)**~~

~~**Interpretation**~~

~~**Packaged foods and cosmetics sold from vending machines must be labeled the same as similar items not sold in vending machines, including identity, responsibility, net contents, and ingredient declaration, except that Section 3.3. of the Uniform Regulation for the Method of Sale of Commodities permits identity and net contents to be posted on the machine in lieu of appearing on the package.**~~

~~**Background**~~

~~**As part of its review of the Uniform Regulation for the Method of Sale. of Commodities, the FDA recommended adding a statement to Section 3.3. that packaged foods and cosmetics sold in vending machines must in general be labeled in accordance with requirements for similar articles not sold in vending machines (e.g., ingredient declaration requirements). The Committee recommends that this information be made a guideline rather than incorporated as part of the uniform regulation.**~~

~~**2.3.12. Movie Films, Tapes, Cassettes.**~~
~~**(L&R, 1975, p. 174)**~~

~~**Guideline**~~

~~**Movie film may be sold by linear measure. Magnetic tapes and cassettes may be sold by either linear measure or playing time.**~~

~~**Background**~~

~~**The enforceability of quantity declarations using time as the basis of measurement for commodities, including packaged commodities, must be carefully considered to achieve equity in the marketplace. The Committee wants to stress to those who have submitted time declaration questions that the enforceability factor should not override consumer protection and uniformity considerations. The committee further recommends that the states follow FTC guidelines in requiring lineal measure for the sale of movie films and permit either linear measure or playing time for magnetic tapes and cassettes.**~~

NOTE: To find the history on the following items, please refer to past Reports of the National Conference Weights and Measures; Sections 2.1.1. Weight(s) and/or Measure(s)., 2.1.2. Weight(s) and/or Measure(s), 2.1.3. Definition of Net Weight., 2.2.1. Gift Packages., 2.2.2. Sand., 2.2.3. Sold by ⅘ Bushel., 2.2.5. Lot, Shipment, or Delivery., 2.2.6. Aerosols and Similar Pressurized Containers., 2.2.7. Aerosol Packaged Products., 2.2.8. Variety and Combination Packages., 2.2.9. Textile Products., 2.2.10. Yarn., 2.2.11. Tint Base Paint., 2.2.12. Reference Temperature for Refrigerated Products: When a Product is Required to be Maintained under Refrigeration. 2.3.9. Fireplace Logs., 2.3.11. Packaged Foods or Cosmetics Sold from Vending Machines., 2.3.12. Movie Films, Tapes, Cassettes.

Background/Discussion:
There was no yearly review to revise or update the Interpretations and Guidelines (I&G) located in the back of NIST Handbook 130. The NIST Office of Weights and Measures reviewed the current language in the Interpretations and Guidelines Section and believes the following information can be removed. Below NIST has included their justification for removal for each Section.

2.1.1. Weight(s) and/or Measure(s). – This is a good interpretation and useful information in relationship to Price Verification. However, the NCWM amended the Uniform Weights and Measures Law (UWML) in 1990, this appears in Section 16. Misrepresentation of Pricing. This is addressed in the UWML, Section 12(q) Powers and Duties of the Director which provides specific authority to conduct Price Verification Inspections.

2.1.2. Section 19(a), Identity. – The UWML Section 19(a) and the Uniform Packaging and Labeling Regulation (UPLR) Section 3. Declaration of Identity: Consumer Package (NIST Handbook 130 (2016- page 59) addresses this area and this interpretation is no longer valid.

2.1.3. Definition of Net Weight. – The 1997 L&R Reports provides information regarding this subject matter. The UWML Section 1. Definitions, 1.8. Net: "Mass" or Net "Weight" was added in 1988. If individuals are seeking background information regarding this matter it could be retrieved from the conference reports.

2.2.1. Gift Packages. – The NCWM adopted UPLR Section 2.9. Combination Package, 2.10. Variety Package, and 10.5. Combination Packages, 10.6. Variety Packages.

2.2.2. Sand. – In 2000 the NCWM adopted a Method of Sale of Commodities for this item (2.29. Sand, Rock, Gravel, Stone, Paving Stone, and Similar Materials, when Sold in Bulk.)

2.2.3. Sold by ⅘ Bushel. – This reference 6.10.(b)(1), which is no longer accurate. The UPLR Section 6.11. Fractions addresses this issue.

2.2.5. Lot, Shipment, or Delivery. – This 1981 interpretation is no longer needed and is outdated. NIST Handbook 133 - Chapter 1 adequately supersedes this section.

2.2.6. Aerosols and Similar Pressurized Containers and 2.2.7. Aerosol Packaged Products. – This 1976 interpretation is no longer required. Both FDA and FTC, as well as the UPLR define labeling requirements. In addition, the Conference adopted a method of sale for Bag-on-Valve (BOV) containers.

2.2.8. Variety and Combination Packages. – The NCWM adopted UPLR 10.5 Combination Packages and 10.6. Variety Packages.

2.2.9. Textiles Products. – This issue was raised by California in 1977. Over the past years this issue has been address in the marketplace. The terms range and approximate dimensions on yard – goods and fabrics and most, if not all, clothing patterns now include SI Units. This this information is no longer needed.

2.2.10. Yarn. – NIST does not see this as either an interpretation or guideline. It was an explanation for not accepting a proposal. This information can be found on the past conference reports.

2.2.11. Tint Based Paint. – This information is in the UPLR Section 11.23. Tint Base Paint.

2.2.12. Reference Temperature for Refrigerated Products. - When a Product is Required to be Maintained under Refrigeration. – This information is adopted in NIST Handbook 133, Chapter 3 Table 3-1.

2.3.9. Fireplace Logs. – This was adopted as a method of sale in 1991. Refer to MOS Section 2.4. Fireplace and Wood Stove.

2.3.11. Packaged Food or Cosmetics Sold from Vending Machines. – The Method of Sale Regulation, Section 3.3. includes these requirements.

2.3.12. Movie Films, Tapes, Cassettes. – A UPLR Section 11.22. Camera Film, Video, Recording Tape, Audio Recording Tape, and Other Image and Audio Recording Media Intended for Retail Sale and Consumer Use was adopted in 1990.

At the 2017 NCWM Interim Meeting it was noted the by the NIST Technical Advisor that this removes sections that are no longer necessary or deemed to be outdated. Ms. Kristin Macey (California) supports this item but believes these items may have some value and recommends that a note be in the handbook as to where to find the history. The Committee agrees by keeping these items in the Index of the handbook interested parties would be directed to a note indicating when these items were removed from the Handbook. With noting that historical perspective is available in previous versions of the handbook the Committee recommends this item as Voting.

Regional Association Comments:
At the 2016 SWMA Annual Meeting they received a comment from the NIST Technical Advisor that these items have either been adopted or are obsolete. Removing these sections will not hinder the work of the PALS guidance document. The PALS Chair commented they are working on additional topics and any item could be incorporated into their reference document. The NIST Technical Advisor remarked that the history of any item in the handbook or Conference can be found in the Reports of the National Conference on Weights and Measures. The SWMA recommended that this be a Voting item.

NEWMA received comment from NIST Technical Advisor that these items either have already been adopted or are obsolete. This information can be found in the Reports of the National Conference on Weights and Measures, so they are no longer needed. NCWMA considered the item fully developed and recommended them as a Voting item.

At the 2017 CWMA Annual Meeting they believe this item has merit and recommends this as a Voting item.

2600 HANDBOOK 133

2600-1 V SECTION 1.2.1. INSPECTION LOTS AND SECTION 3.10. MULCH AND SOILS LABELED BY VOLUME

(This item was Adopted.)

Source:
Mulch & Soil Foundation (2016)

Purpose:
Clarify test procedures and promote uniform practices.

Item under Consideration:
Amend NIST Handbook 133 as follows:

Chapter 1. General Information

1.2. Package Requirements

1.2.1. Inspection Lot

An "inspection lot" (called a "lot" in this handbook) is defined as a collection of identically labeled (except for quantity or identity in the case of random packages) packages available for inspection at one time. The collection of packages will pass or fail as a whole based on the results of tests on a sample drawn from the lot **in accordance with Section 1.3. Sampling Plans and Section 2.3.4. Random Sample Selection**. This handbook describes procedures to determine if the packages in an "inspection lot" contain the declared net quantity of contents and if the individual packages' variations are within acceptable limits.

(Amended 2017)

Chapter 3. Test Procedures – For Packages Labeled by Volume

3.10. Mulch and Soils Labeled by Volume

Mulch is defined as "any product or material except peat or peat moss that is advertised, offered for sale, or sold for primary use as a horticultural, above-ground dressing, for decoration, moisture control, weed control, erosion control, temperature control, or other similar purposes."

Soil is defined as "any product or material, except peat or peat moss that is advertised or offered for sale, or sold for primary use as a horticultural growing media, soil amendment, and/or soil replacement."

3.10.1. Test Equipment:

- A test measure appropriate for the package size that meets the specifications for test measures in Table 3-4. "Specifications for Test Measures for Mulch and Soils"
- Drop cloth/polyethylene sheeting for catching overflow of material
- Level (at least 15 cm [6 in] in length)

Table 3-4.
Specifications for Test Measures for Mulch and Soils

Nominal Capacity of Test Measure[4]	Actual Volume of the Measure	Interior Length[1]	Interior Width[1]	Interior Height[2]	Marked Intervals on Interior Wall[3]	Volume Equivalent of Marked Intervals
30.2 L (1.07 cu ft) for testing packages that contain less than 28.3 L (1 cu ft or 25.7 dry qt)	31.9 L (1.13 cu ft)	213.4 mm (8.4 in)	203.2 mm (8.0 in)	736.6 mm (29 in)	12.7 mm (1/2 in)	550.6 mL (33.6 cu in)
28.3 L (1 cu ft)	~~28.3 L (1 cu ft)~~	304.8 mm (12 in)	304.8 mm (12 in)	~~304.8 mm (12 in)~~		1179.8 mL (72 cu in)
	33.04 L (1.16 cu ft)	**406.4 mm (16 in)**	**228.6 mm (9 in)**	**355.6 mm (14 in)**		
56.6 L (2 cu ft)	63.7 L (2.25 cu ft)	304.8 mm (12 in)	304.8 mm (12 in)	685.8 mm (27 in)		
		406.4 mm (16 in)	228.6 mm (9 in)	685.8 mm (27 in)		
84.9 L (3 cu ft)	92 L (3.25 cu ft)	304.8 mm (12 in)	304.8 mm (12 in)	990.6 mm (39 in)		
		406.4 mm (16 in)	228.6 mm (9 in)	990.6 mm (39 in)		

Measures are typically constructed of 1.27 cm (1/2 in) marine plywood. **The measure must accommodate the entire contents of the package being tested, and** a transparent sidewall is useful for determining the level of fill, but must be reinforced if it is not thick enough to resist distortion. If the measure has a clear front, place the level gage at the back (inside) of the measure so that the markings are read over the top of the mulch.

Notes

1 Other interior dimensions are acceptable if the test measure approximates the configuration of the package under test, **can accommodate the entire contents of the package at one time** and does not exceed a base configuration of the package cross-section.

2 The height of the test measure **shall be 355.6 mm (14 in) for a 1 cu ft package, 685.8 mm (27 in) for a 1.5 - 2 cu ft package or 990.6 mm (39 in) for a 3 cu ft package**. ~~**may be reduced, but this will limit the volume of the package that can be tested.**~~

3 When lines are marked in boxes, they should extend to all four sides of the measure **if possible** to improve

Table 3-4. **Specifications for Test Measures for Mulch and Soils**
readability. It is recommended that a line indicating the MAV level also be marked to reduce the possibility of reading errors when the level of the mulch is at or near the MAV. [4] The Nominal Capacity is given to identify the size of packages that can be tested in a single measurement using the dry measure with the listed dimensions. It is based on the most common package sizes of mulch in the marketplace. If the measures are built to the dimensions shown above the actual volume will be larger than the nominal volume so that plus errors (overfill) can be measured accurately.

(Amended 2010 **and 2017**)

3.10.2. Test Procedure

1. Follow the Section 2.3.1. "Define the Inspection Lot." Use a "Category A" sampling plan in the inspection, and select a random sample.

~~**2. Open each package in turn. Empty the contents of the package into a test measure and level the contents by hand. Do not rock, shake, drop, rotate, or tamp the test measure. Read the horizontal marks to determine package net volume.**~~

2. ~~**Note**~~ Some types of mulch are susceptible to clumping and compacting. ~~**Take steps**~~ **T**o ensure that the material is loose and free flowing when placed into the test measure**, g**ently **massage the package while** roll**ing** the bag **on the ground (or flat surface) at least four full rotations (but not more than eight full rotations), without lifting or dropping the package,** before opening to reduce the clumping and compaction of the material.

Note: Mulch products stored exposed to the elements may become saturated with moisture. Excessive moisture adds weight to mulch particles and distorts the volume test results. Test samples with flowing or excessive collected moisture in the package shall be excluded from the test procedure.

~~**3. Exercise care in leveling the surface of the mulch/soil and determine the volume reading from a position that minimizes errors caused by parallax.**~~

3. Placing contents into the test measure.

- **Open the bag, gather the bag opening to ensure that no product is lost. Place the gathered bag opening as far into the top of the measure as possible without disturbing or leaning against the measure.**

- **Release the bag opening and quickly dump the contents of the package into a test measure in a continuous flow**

Note: Do not touch the product or disturb the test measure by rocking, shaking, dropping, or tamping it during the test procedure.

- **Massage the outside of the bag to maintain a continuous flow of the product but not for the purpose of de-clumping the product.**

- **Using your hand, gently level the contents, being careful not to affect the compaction of the product.**

4. **Read the horizontal marks at a position level with the product and round the readings between two marked intervals up to the nearest 38.1 mm (½ in) increment to determine the package**

net volume.

5.~~4.~~ Determine package errors by subtracting the labeled volume from the package net volume in the measure. Record each package error.

$$Package\ Error = Package\ Net\ Volume - Labeled\ Volume$$

(Amended 2017)

3.10.3. Evaluation of Results

Follow the procedures in Section 2.3.7. "Evaluate for Compliance" to determine lot conformance.

Note: In accordance with Appendix A, Table 2-10. Exceptions to the Maximum Allowable Variations for Textiles, Polyethylene Sheeting and Film, Mulch and Soil Labeled by Volume, Packaged Firewood, and Packages Labeled by Count with 50 Items or Fewer, and Specific Agricultural Seeds Labeled by Count, apply an MAV of 5 % of the declared quantity to mulch and soil sold by volume. When testing mulch and soil with a net quantity in terms of volume, one package out of every 12 in the sample may exceed the 5 % MAV (e.g., one in a sample of 12 packages; two in a sample of 24 packages; four in a sample of 48 packages). However, the sample must meet the average requirement of the "Category A" Sampling Plan.
(Amended 2017)

Background/Discussion:
Recent observations of test activities being conducted by industry and states indicate there are areas in the current test procedures that are not sufficiently defined to assure uniform testing practices by all parties. Council testing conducted by Dr. William Fonteno (Horticultural Substrates Lab at North Carolina State University) indicates some reported and observed variations in testing procedures that are not completely defined in NIST Handbook 133 can have an adverse impact on testing results due to the highly variable particle size distribution that is the very nature of the products.

There should be no major costs resulting from this proposal. Some manufacturers and inspectors may need updated test measures suitable for the package size being tested. All stakeholders will benefit from coordinated training by NIST and industry and test procedures uniformly applied in interstate commerce.

At the 2016 NCWM Interim Meeting, it was noted this proposal clarifies the language of the testing procedures currently within NIST Handbook 130. It was noted the language in Section 1.3.1. Audit Test stating "Do not take enforcement action using audit test results," should be underlined and bold in NIST Handbook 130. Since the change is not a technical correction or clarification the language was removed from the Item Under Consideration.

The Committee made the following changes:

- Remove the term "statistically valid" from Section 1.2.1.

  1.2.1. Inspection Lot

  An "inspection lot" (called a "lot" in this handbook) is defined as a collection of identically labeled (except for quantity or identity in the case of random packages) packages available for inspection at one time. The collection of packages will pass or fail as a whole based on the results of tests on **a statistically valid, randomly drawn** sample ~~**drawn from**~~ **of** the lot. This handbook describes procedures to determine if the packages in an "inspection lot" contain the declared net quantity of contents and if the individual packages' variations are within acceptable limits.

- Under 3.10.2. Test Procedure modified the second sentence in the note to read: Test samples with flowing or **excessive** collected moisture in the package shall be excluded from the test procedure.

With the modifications stated above the Committee is recommending this be a Voting item.

At the 2016 NCWM Annual Meeting, Mr. LaGasse (Mulch and Soil Council) remarked that this clarifies the current test procedures in NIST Handbook 133. Mr. Floren (Los Angeles County, California) remarked that he has no issue with the inspection procedure but has major concerns with Section 1.2.1. This section applies to all products in the marketplace for those reasons this portion of the proposal should be stricken. The handbook already states how a random selection is to be done. Mr. Mike Sikula (New York) opposed this item because it is difficult to pour the product into the test measure without touching. Mr. Craig VanBuren (Michigan) asked for the supporting data regarding the change in the test measure size. It is also suggested that the term "excessive moisture" is too subjective.

The Committee made the following changes:

1.2. Package Requirements

1.2.1. Inspection Lot

An "inspection lot" (called a "lot" in this handbook) is defined as a collection of identically labeled (except for quantity or identity in the case of random packages) packages available for inspection at one time. The collection of packages will pass or fail as a whole based on the results of tests on a **~~randomly drawn~~** sample **drawn from** the lot **in accordance with Section 1.3. Sampling Plans and Section 2.3.4. Random Sample Selection**. This handbook describes procedures to determine if the packages in an "inspection lot" contain the declared net quantity of contents and if the individual packages' variations are within acceptable limits.

The Committee made a minor editorial change to the note in Section 3.10.2.3. in removing the word "touching" and replacing it with the word "disturbing"

At the Voting session, a motion to amend was heard from the State of Michigan. This motion was to Withdraw the Table 3-4. Test Measure size until further data can be submitted on why this change is valid. The Committee removed this item from Voting status.

1. Additional testing needs to be done on the use and variability of the various test vessels sizes. This data should be shared with membership in advance of any meetings.
2. Modify the language to state that the measurement must be made in a single pour. In stating this requirement, the specifications for the current test measurement not be changed?
3. Concern was voiced regarding the cost of building new test vessels. *Possible solution:* Permit the use of the current test vessels but have a note that test vessels constructed after a specific date use the new recommended chart.
4. The current practice and use of test measures has been used for an extended period of time, why is this change before the Conference? The product has not changed, so why is there a proposal before the conference?
5. When there is "excessive moisture the package is not to be tested. However, because this product is stored outside it could be could be affected by the various weather climates (i.e., rain, sleet, ice, humidity, snow). In some regions once, the product gets wet and then has exposure to freezing temperatures it never dries out. The term "excessive moisture" is too subjective
6. Replace the word "touch" with "disturb(ing)" in the test procedure has been sufficient resolution and this will appear in the Fall regional reports to get additional feedback.

3. Placing contents into the test measure.

- **Open the bag, gather the bag opening to ensure that no product is lost. Place the gathered bag opening as far into the top of the measure as possible without disturbing or leaning against the measure.**

- **Release the bag opening and quickly dump the contents of the package into a test measure in a continuous flow.**

Note: Do not touch the product or disturb the test measure by rocking, shaking, dropping, or tamping it during this procedure.

At the 2017 NCWM Interim Meeting, the Committee accepted the modifications submitted through the 2016 fall regional meetings and moves this forward as a Voting item.

At the 2017 NCWM Annual Meeting, Mr. LaGasse (MSC) reported the proposal was amended to address prior issues and concerns and were reviewed at the regional meetings. Ms. Elson-Houston (Ohio) expressed concern about the number of various test vessel and was it financially feasible for a state with many county jurisdictions to afford this procedure. She also was concerned there has not been an answer provided as to what is "excessive moisture." The way this is defined is open to interpretation.

Regional Association Comments:
The WWMA reviewed a letter from the Mulch and Soil Council to NCWM requesting to amend the proposal to address concerns raised by the State of Michigan during the 2016 NCWM Annual Meeting. The amendment requested by the Mulch and Soil Council would delete the original proposed changes to Table 3-4 for 2 and 3 cubic foot test measures. The requirements for 2 cu ft and 3 cu ft test measures in the 2016 edition of NIST Handbook 133 would be retained "as is" in this amendment to the original proposal. The WWMA supported the proposed modification to the Table 3-4 as shown below and recommended this be a Voting item.

Table 3-4.
Specifications for Test Measures for Mulch and Soils

Nominal Capacity of Test Measure[4]	Actual Volume of the Measure	Interior Length[1]	Interior Width[1]	Interior Height[2]	Marked Intervals on Interior Wall[3]	Volume Equivalent of Marked Intervals
30.2 L (1.07 cu ft) for testing packages that contain less than 28.3 L (1 cu ft or 25.7 dry qt)	31.9 L (1.13 cu ft)	213.4 mm (8.4 in)	203.2 mm (8.0 in)	736.6 mm (29 in)	12.7 mm (1/2 in)	550.6 mL (33.6 cu in)
28.3 L (1 cu ft)	~~28.3 L (1 cu ft)~~ **33.04 L (1.16 cu ft)**	304.8 m (12 in)	304.8 mm (12 in)	~~304.8 mm (12 in)~~ **355.6 mm (14 in)**		1179.8 mL (72 cu in)
56.6 L (2 cu ft)	63.7 L 2.25 cu ft)	304.8 mm (12 in)	304.8 mm (12 in)	685.8 mm (27 in)		
		406.4 mm (16 in)	228.6 mm (9 in)	685.8 mm (27 in)		
84.9 L (3 cu ft)	92 L (3.25 cu ft)	304.8 mm (12 in)	304.8 mm (12 in)	990.6 mm (39 in)		
		406.4 mm (16 in)	228.6 mm (9 in)	990.6 mm (39 in)		

Measures are typically constructed of 1.27 cm ($^{1}/_{2}$ in) marine plywood. **The measure must accommodate the entire contents of the package being tested, and** a transparent sidewall is useful for determining the level of fill, but must be reinforced if it is not thick enough to resist distortion. If the measure has a clear front, place the level gage at the back (inside) of the measure so that the markings are read over the top of the mulch.

Notes

[1] Other interior dimensions are acceptable if the test measure approximates the configuration of the package under test, **can accommodate the entire contents of the package at one time** and does not exceed a base configuration of the package cross-section.

[2] The height of the test measure **shall be 355.6 mm (14 in) for a 1 cu ft package, 685.8 mm (27 in) for a 1.5 - 2 cu ft package or 990.6 mm (39 in) for a 3 cu ft package.** ~~may be reduced, but this will limit the volume of the package that can be tested.~~

[3] When lines are marked in boxes, they should extend to all four sides of the measure **if possible** to improve readability. It is recommended that a line indicating the MAV level also be marked to reduce the possibility of reading errors when the level of the mulch is at or near the MAV.

[4] The Nominal Capacity is given to identify the size of packages that can be tested in a single measurement using the dry measure with the listed dimensions. It is based on the most common package sizes of mulch in the marketplace. If the measures are built to the dimensions shown above the actual volume will be larger than the nominal volume so that plus errors (overfill) can be measured accurately.

The 2016 CWMA Interim Meeting, it was unclear whether the item was fully developed based on comment during the meeting. The CWMA recommended this item be Developing. At the 2017 CWMA Annual Meeting, no comments were received. Previously the CWMA felt this item needed more development, but no such comments were received at these hearings to support further development.

At the 2016 SWMA Annual Meeting, they heard a comment from Mr. LaGassee (Mulch and Soil Council) that there is a modification to the Table 3-4. for the 2 cu ft and 3 cu ft test measures. This modification addresses the concerns the states had at the 2016 NCWM Annual Meeting. The submitter also left out the test measure for 9 × 16 test measures. The SWMA supported the proposed modification to Table 3-4 as shown below and recommended it as a Voting item.

Table 3-4.
Specifications for Test Measures for Mulch and Soils

Nominal Capacity of Test Measure[4]	**Actual Volume of the Measure**	**Interior Length[1]**	**Interior Width[1]**	**Interior Height[2]**	**Marked Intervals on Interior Wall[3]**	**Volume Equivalent of Marked Intervals**
30.2 L (1.07 cu ft) for testing packages that contain less than 28.3 L (1 cu ft or 25.7 dry qt)	31.9 L (1.13 cu ft)	213.4 mm (8.4 in)	203.2 mm (8.0 in)	736.6 mm (29 in)	12.7 mm (1/2 in)	550.6 mL (33.6 cu in)
28.3 L (1 cu ft)	~~**28.3 L (1 cu ft)**~~ **33.04 L (1.16 cu ft)**	304.8 mm (12 in)	304.8 mm (12 in)	~~**304.8 mm (12 in)**~~ **355.6 mm (14 in)**		1179.8 mL (72 cu in)
		~~**406.4 mm (16 in)**~~	~~**228.6 mm (9 in)**~~			
56.6 L (2 cu ft)	63.7 L (2.25 cu ft)	304.8 mm (12 in)	304.8 mm (12 in)	685.8 mm (27 in)		
		406.4 mm (16 in)	228.6 mm (9 in)	685.8 mm (27 in)		
84.9 L (3 cu ft)	92 L (3.25 cu ft)	304.8 mm (12 in)	304.8 mm (12 in)	990.6 mm (39 in)		
		406.4 mm (16 in)	228.6 mm (9 in)	990.6 mm (39 in)		

Measures are typically constructed of 1.27 cm (1/2 in) marine plywood. **The measure must accommodate the entire contents of the package being tested, and** a transparent sidewall is useful for determining the level of fill, but must be reinforced if it is not thick enough to resist distortion. If the measure has a clear front, place the level gage at the back (inside) of the measure so that the markings are read over the top of the mulch.

Notes

[1] Other interior dimensions are acceptable if the test measure approximates the configuration of the package under test, **can accommodate the entire contents of the package at one time** and does not exceed a base configuration of the package cross-section.

Table 3-4. Specifications for Test Measures for Mulch and Soils
[2] The height of the test measure **<u>shall be 355.6 mm (14 in) for a 1 cu ft package, 685.8 mm (27 in) for a 1.5 - 2 cu ft package or 990.6 mm (39 in) for a 3 cu ft package.</u>** ~~**may be reduced, but this will limit the volume of the package that can be tested.**~~
[3] When lines are marked in boxes, they should extend to all four sides of the measure **<u>if possible</u>** to improve readability. It is recommended that a line indicating the MAV level also be marked to reduce the possibility of reading errors when the level of the mulch is at or near the MAV.
[4] The Nominal Capacity is given to identify the size of packages that can be tested in a single measurement using the dry measure with the listed dimensions. It is based on the most common package sizes of mulch in the marketplace. If the measures are built to the dimensions shown above the actual volume will be larger than the nominal volume so that plus errors (overfill) can be measured accurately.

At the 2017 NEWMA Interim Meeting, an industry representative reviewed the changes already proposed and commented that an additional proposed change had been recommended. He stated new products are coming to the market, which are sold in 1 cu ft packages, so there needs to be testing materials to accommodate the smaller size. This new addition was presented at the SWMA Annual Meeting. NEWMA considered this item fully developed and recommends it be a Voting item. At the 2017 NEWMA Annual Meeting, a state regulator from New York remarked he recognizes a great amount of work has been undertaken to develop this item. His concerned is about practicality in the field while using this method. The NIST Technical Advisor commented this method is used in the NIST training class. The Technical Advisor also stated there was confusion as to which units could be included in the test lot (overly wet units for example), and this proposal clarifies those areas of confusion. A state regulator from Connecticut remarked this procedure is easier than procedures in the past. NEWMA considered this item fully developed and ready for a Vote.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

2600-2 W SECTION 1.2.3. INDIVIDUAL PACKAGE REQUIREMENT

(This item was Withdrawn.)

Source:
Ventura County, California (2016)

Purpose:
Improve efficiency in the time and resources to conduct inspections where it is determined early in the testing that the lot is going to fail.

Item under Consideration:

Amend NIST Handbook 133 as follows:

1.2.3. Individual Package Requirement

The variation of individual packages contents from the labeled quantity must not be "unreasonably large." In this handbook, packages that are under filled by more than the Maximum Allowable Variation (MAV) specified for the package **<u>labeled net quantity statement</u>** are considered unreasonable **<u>minus errors (UME)</u>**. Unreasonable shortages are not generally permitted, even when averages in other packages in the *same* lot, shipment, or delivery compensate for such shortages. **<u>If during an official package inspection using "Category A" or Category B"</u>**

sampling plan, the number of packages whose net values exceed the number of negative MAV's permitted for the sample size, then the lot fails and testing may be considered complete for the purpose of removing the lot from sell in its current condition. Completion of the official package inspection sampling plan for each lot is needed for further enforcement actions. ~~**This handbook does not specify limits of overfilling (with the exception of textiles), which is usually controlled by the packer for economic, compliance, and other reasons.**~~

(Amended 2010 **and 20XX)**

Background/Discussion:
Current procedures in NIST Handbook 133 require inspectors to test all products in a sample before determining compliance of a lot (e.g., Peat Moss Section 3.9.). If one follows the test procedure in Section 3.9.2.2., Test Procedures, ("Open each package in turn, …"), every package must be opened and its error determined before the results can be evaluated. Section 3.9.3. Evaluation of Results, then refers the inspector to Section 2.3.7. where unreasonable minus errors (UMEs) are considered. Every test procedure in the handbook has the same requirement. If an inspector determines the number of package errors exceed the UMEs allowed before completing testing of all the packages in the sample, there is no provision to allow the inspector to reject the lot. All the packages must be tested. The submitter has tested peat moss where the first two packages had UMEs. This exceeded the number allowed in the sample and would, in the final analysis, have resulted in the rejection of the lot. Yet following the requirement of Section 3.9.2.2. Test Procedure, the rest of the sample had to be tested, for a product that should have been rejected after the test of the first two packages. Requiring testing of the whole sample before determining the number of packages errors exceeding the number of UME's allowed is costly in time and resources. It would be far better to allow an inspector to reject a lot when early in the testing there are obvious multiple unreasonable minus errors that exceed the number allowed. This would shorten the overall testing time for products requiring extensive time to determine errors and still result in the same determination of compliance.

There are several products that require destructive testing and excessive testing times, sometimes 15 or 20 minutes for each sample (e.g., peat moss, mulch and soils, ice cream novelties, paint, compressed gas in cylinders). Requiring the testing of all packages in a sample for those products, which require extensive and time-consuming testing, when it is apparent the lot fails because of an excess of UMEs, is an unnecessary waste of time and resources. Permitting rejection of a lot before all samples have been tested would eliminate an unnecessary and arduous procedure and provide an efficient resolution to the sampling of difficult to test products.

At the 2015 NCWM Annual Meeting, during a discussion on the testing of peat moss, a NIST Technical Advisor stated the intent of the handbook was to allow the failure of a lot immediately on discovering excessive UMEs and this was taught in NIST Handbook 133 classes. Although this may be what the authors of NIST Handbook 133 intended, unless it is made clear through specific language, it is very possible such action by an inspector could face a legal challenge.

It is realized that proposal Option 1 affects many different sections of the NIST Handbook 133; therefore, it cannot address every specific section. If this proposal is supported by one or more of the regional weights and measures associations and forwarded to the L&R Committee, it will be up to the Committee and the NIST Technical Advisors to identify and correct the language in each test procedure within the handbook.

At the 2016 NCWM Interim Meeting, there was not a fully developed proposal for the Committee to consider. The Committee believed this item had merit and returned it to the submitter to develop a proposal. The Committee recommended this be a Developing Item.

Initial language submitted:

Amend NIST Handbook 133 as follows:

Option 1.

Amend each test procedure in NIST Handbook 133, indicated in 14 above, to make it permissive to allow the rejection of a lot if it is obvious that the number of UMEs exceeds the number allowed before all samples in the lot have been tested.

For each test procedure add the phrase "If an inspector at any time during testing packages determines the number of unreasonable minus errors exceeds the number allowed, the inspector may fail the lot without further testing and will not need to follow the requirements of Section 2.3.7. Evaluation for Compliance."

Option 2.

Make one "general" statement up front in Chapter 1, in Sections 1.2.3. and/or 1.2.4. and/or or Chapter 2, Section 2.3.7.1. where it talks about the Individual Package Requirements and MAV.

The general statement or explanation should say something along the lines that "nothing in NIST Handbook 133 or the test procedures are to be interpreted that an inspector must continue testing all samples when the number of MAVs allowed are exceeded. Once the MAVs allowed are exceeded, the lot fails and can be immediately rejected. It is no long necessary (required) to continue testing the remainder of the samples. Reference to statements such as "every package must be opened and its error determined before the results can be evaluated" does not apply in cases where the number of allowed MAVs is exceeded."

At the 2016 NCWM Annual Meeting, the submitter of the proposal provided the Committee with developed language. The Committee accepted the language and looks forward to receiving feedback from the fall regional meetings.

At the 2017 NCWM Interim Meeting, there were no comments heard on this item. After review of the fall regional reports, the Committee Withdrew this item.

Regional Association Comments:
At the WWMA, the submitter testified she believed it is necessary to perform a complete inspection in the event further legal action would be taken. The WWMA L&R Committee contemplated how best to include sampling and testing requirements that are taken as part of an investigation and will lead to legal action and generally believed this requirement is outside of the scope of Section 1.2.3. Individual Package Requirement. Further research and development is needed to amend this proposal to correctly set the requirements for sampling and testing in this case. The Committee understood the importance of separating the requirements for removing a lot from sale or taking different levels of enforcement action. The WWMA is recommend this as a Developing item.

The CWMA received a comment from a regulator that this item could inadvertently create inefficiency if the testing fails the entire lot before any destructive sampling is undertaken. In cases where litigation requires package inspection, a partial or full test may still be necessary. A second state regulator indicated he believed there is a provision in federal language that you cannot take action from an audit inspection or gross weights. The group agreed this issue needs further development and input. The CWMA recommended this be a Developing item.

The SWMA heard comments that the item was not necessary and inspectors could already do this. Enforcement action should not be in NIST Handbook 133. The SWMA recommended that the item be Withdrawn.

NEWMA recommended the item be Withdrawn.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

2600-3 D RECOGNIZE THE USE OF DIGITAL DENSITY METERS

Source:
Missouri (2016)

Purpose:
Allow the use of digital density meters for package checking testing of viscous fluids such as motor oils, diesel exhaust fluid (DEF), and antifreeze.

Item under Consideration:
Amend NIST Handbook 133 as follows:

> Develop specific test procedures for NIST Handbook 133, "Chapter 3. Test Procedures – For Packages Labeled by Volume" that would recognize the use of digital density meters in lieu of volumetric flasks and thermometers when testing certain viscous fluids such as motor oil, DEF, antifreeze, syrups, etc.

Background/Discussion:
Current test procedures are slow and awkward due to the need of using borosilicate glassware for package checking. Digital density meters are fast, use small samples size (2 ml) and have built in thermometers.

Digital density meters are fast and accurate in comparison with recognized NIST Handbook 133 test procedures for viscous fluids. Using digital density meters equipped with built-in API density tables will not require the cooling samples to 60 °F. There is no need to "wet down" volumetric flasks before each measurement. Most non-food products may be recovered without contamination. Only a small sample size (2 ml) of the product is needed for testing. There is no need for a partial immersion thermometer or volumetric flasks. The current method in "Section 3.4. Volumetric Test Procedures for Viscous Fluids – Headspace" does not work for plastic oblong bottles often used for motor oil. This new test procedure would eliminate the entrapment of air in testing viscous fluids (i.e., motor oil, DEF, antifreeze, syrups, etc.) Well established ASTM and other international standard test methods are available with precision statements.

At the 2016 NCWM Interim Meeting, Mr. Ron Hayes (Missouri) spoke regarding his submittal of this proposal. The Committee believes this item has merit and requested the submitter form an informal task group to further develop. Mr. Hayes agreed this item needs additional data gathered to support the use and accuracy of the digital density meters. The American Petroleum Institute (API) remarked that they would like to assist the task group on this project. The Committee is making this a Developing item.

At the 2017 Interim Meeting, the submitter, Mr. Hayes, asked for the states participation in a round robin to compare the current handbook test procedures with the density meter. The Committee encouraged the submitter to develop a proposal by fall 2017.

At the 2017 Annual Meeting, Mr. Hayes provided an update to membership that he had completed a comparison in his lab and is seeing uncertainty in the glass method. He is aware some states have purchased the density meters, and he would like to do a round robin to gather additional required data. The Committee encourages those states to contact Mr. Hayes.

Regional Association Comments:
The WWMA supported the continued development of this item. The WWMA recommended the item be Withdrawn until a proposal has been developed for consideration.

The CWMA recommended this item remain in Developing status.

The SWMA heard no comments on the item and recommends the submitter follow up with the NCWM L&R Committee to provide further information. The SWMA recommended the item remain in Developing status.

NEWMA received comment from NIST, OWM that this item is a placeholder for future development. A state regulator from New York commented he doesn't know if the digital density meters are accurate, and how they are tested/verified. NEWMA recommended this item remain in Developing status until fall 2017.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

2600-4 V SECTION 4.5 POLYETHYLENE SHEETING, BAGS, AND LINERS

(This item was Adopted.)

Source:
California (2017)

Purpose:
Add procedures to NIST Handbook 133 for testing polyethylene bags and liners, including bags with a cut out (T-shirt bags).

Item under Consideration:
Amend NIST Handbook 133 as follows:

4.5. Polyethylene Sheeting, Bags, and Liners

Most polyethylene products are sold by length, width, thickness, area, and net weight. Accordingly, this procedure includes steps to test for each of these measurements.

4.5.1. Test Equipment

- A scale that meets the requirements in Section 2.2. “Measurement Standards and Test Equipment.”
- Steel tapes and rules. Determine measurements of length to the nearest division of the appropriate tape or rule.
  - Metric units:

    For labeled dimensions 400 mm or less, linear measure: 300 mm in length, 1 mm divisions; or a 1 m rule with 0.1 mm divisions, overall length tolerance of 0.4 mm.

    For labeled dimensions greater than 400 mm, 30 m tape with 1 mm divisions.
  - U.S. customary units:

    For labeled dimensions 25 in or less, use a 36 in rule with $^{1}/_{64}$ in or $^{1}/_{100}$ in divisions and an overall length tolerance of $^{1}/_{64}$ in.

    For dimensions greater than 25 in, use a 100 ft tape with $^{1}/_{16}$ in divisions and an overall length tolerance of 0.1 in.
- Deadweight dial micrometer (or equal) equipped with a flat anvil, 6.35 mm or (¼ in) diameter or larger, and a 4.75 mm ($^{3}/_{16}$ in) diameter flat surface on the head of the spindle. The anvil and spindle head surfaces should be ground and lapped, parallel to within 0.002 mm (0.0001 in), and should move on an axis perpendicular to their surfaces. The dial spindle should be vertical, and the dial should be at least 50.8 mm (2 in) in diameter. The dial indicator should be continuously graduated to read directly to 0.002 mm (0.0001 in) and should be capable of making more than one revolution. It must be equipped with a separate indicator to indicate the number of complete revolutions. The dial indicator mechanism should be fully jeweled. The frame should be of sufficient rigidity that a load of 1.36 kg (3 lb) applied to the dial housing, exclusive of the weight or spindle presser foot, will not cause a change in indication on the dial of more than 0.02 mm (0.001 in). The indicator reading must be repeatable to 0.001 2 mm (0.000 05 in) at zero. The mass of the probe head (total of anvil, weight 102 g or [3.6 oz], spindle, etc.) must be 113.4 g (4 oz). The micrometer should be operated in an atmosphere free from drafts and fluctuating temperature and should be stabilized at ambient room temperature before use.

- Gage blocks covering the range of thicknesses to be tested should be used to check the accuracy of the micrometer
- T-square

4.5.2. Test Procedures

a. <u>Test Procedure for Polyethylene Sheeting</u>

1. Follow Section 2.3.1. "Define the Inspection Lot." Use a "Category A" sampling plan in the inspection; select a random sample.

2. Be sure the product is not mislabeled. Check the label declaration to confirm that all of the declared dimensions are consistent with the required standards. The declaration on sheeting, film, and bags shall be equal to or greater than the weight calculated by using the formulas below. Calculate the final value to four digits and declare to three digits dropping the final digit (e.g., if the calculated value is 2.078 lb, then the declared net weight is truncated to 2.07 lb).

   Example:

   Label –

Polyethylene Sheeting
1.82 m (6 ft) × 30.48 m (100 ft)
101.6 µm (4 mil)
5.03 kg (11.1 lb)

3. Use the following formulas to compute a target net weight. The labeled weight should equal or exceed the target net weight or the package is not in compliance.

   - For SI (metric) Dimensions:

     Target Mass in Kilograms = (T × A × D) ÷ 1 000

     Where: T = nominal thickness in centimeters

     A = nominal length in centimeters × nominal width (the nominal width for bags is twice the labeled width) in centimeters

     *D = minimum density in grams per cubic centimeter**

   Note: Check label for density declaration and type of polyethylene. Refer to Box * for density (D) value if not declared.

> *Determined by the latest versions of ASTM Standard D1505, "Standard Method of Test for Density of Plastics by the Density-Gradient Technique" and ASTM Standard D883, "Standard Terminology Relating to Plastics."
>
> For the purpose of this regulation, the minimum density (D) for linear low density polyethylene plastics (LLDPE) shall be 0.92 g/cm^3 (when D is not known).
>
> For the purpose of this regulation, the minimum density (D) for linear medium density polyethylene plastics (LMDPE) shall be 0.93 g/cm^3 (when D is not known).
>
> For the purpose of this regulation, the minimum density (D) for high density polyethylene plastics (HDPE) shall be 0.94 g/cm^3 (when D is not known).

- For U.S. Customary Dimensions:

Target Weight in Pounds = T × A × D × 0.036 13

Where: T = nominal thickness in inches;

A = nominal area; that is the nominal length in inches × nominal width (the nominal width for bags is twice the labeled width) in inches;

D = minimum density in grams per cubic centimeter; 0.036 13 is a factor for converting g/cm^3 to lb/in^3.

4. Perform the calculations as shown in the following example. If the product complies with the label declaration, go to Step 5.

Example:

- *For metric units:*

(0.010 16 cm × [(1.82 m × 100 cm/m) × (30.48 m × 100 cm/m)] × 0.92 g/cm^3) ÷ 1000 g/kg = a target weight of 5.18 kg

In this example, the labeled net mass of 5.03 kg does not meet the target net mass, so the product is not in compliance.

- *For U.S. customary units:*

(0.004 in) × [(6 ft × 12 in/ft) × (100 ft × 12 in/ft)] × 0.92 g/cm^3 × 0.03613 = a target weight of 11.48 lb

In this example, the labeled net weight of 11.1 lb does not meet the target net weight, so the product is not in compliance.

5. Select packages for tare samples according to Section 2.3.5.1. "Determination of Tare Sample and Average Tare Weight."

6. Determine and record the gross weights of the initial tare sample.

7. Extend the product in the sample packages to their full dimensions and remove by hand all creases and folds.

8. Measure the length and width of the product to the closest 3 mm (1/8 in). Make all measurements at intervals uniformly distributed along the length and width of the sample and record the results. Compute the average length and width, and record.

   - With rolls of product, measure the length of the roll at three points along the width of each roll and measure the width at a minimum of 10 points along the length of each roll.

   - For folded products, such as drop cloths or tarpaulins, make three length measurements along the width of the sample and three width measurements along the length of the sample.

9. Determine and record the average tare weight according to Section 2.3.5.1. "Determination of Tare Sample and Average Tare Weight."

10. Follow the procedures in Section 2.3.7. "Evaluate for Compliance" to determine the lot conformance requirements for length, width, and weight.

11. If the sample failed to meet the package requirements for any of these declarations, no further measurements are necessary. The lot fails to conform.

Note: If the sample meets the package requirements for the declarations of length, width, and weight proceed to Step 12 to verifying the thickness declaration.

12. Measure the thickness of the plastic sheet with a micrometer using the following guide. Place the micrometer on a solid level surface. If the dial does not read zero with nothing between the anvil and the spindle head, set it at zero. Raise and lower the spindle head or probe several times; it should indicate zero each time. If it does not, find and correct the cause before proceeding.

13. Take measurements at five uniformly distributed locations across the width at each end and five locations along each side of each roll in the sample. If this is not possible, take measurements at five uniformly distributed locations across the width of the product for each package in the sample.

14. When measuring the thickness, place the sample between the micrometer surfaces and lower the spindle head or probe near, but outside, the area where the measurement will be made. Raise the spindle head or probe a distance of 0.008 mm to 0.01 mm (0.000 3 in to 0.000 4 in) and move the sheet to the measurement position. Drop the spindle head onto the test area of the sheet.

15. Read the dial thickness two seconds or more after the drop, or when the dial hand or digital readout becomes stationary. This procedure minimizes small errors that may occur when the spindle head or probe is lowered slowly onto the test area.

16. For succeeding measurements, raise the spindle head 0.008 mm to 0.01 mm (0.000 3 in to 0.000 4 in) above the rest position on the test surface, move to the next measurement location, and drop the spindle head onto the test area. Do not raise the spindle head more than 0.01 mm (0.000 4 in) above its rest position on the test area. Take measurements at least 6 mm (¼ in) or more from the edge of the sheet.

17. Repeat Steps 12 through 16 above on the remaining packages in the sample and record all thickness measurements. Compute and record the average thickness for the individual package and apply the following MAV requirements.

(Amended 2012 **and 2017**)

b. Test Procedure for Polyethylene Bags and Liners

1. Follow Section 2.3.1. "Define the Inspection Lot." Use a "Category A" sampling plan in the inspection; select a random sample.

2. **Follow the steps in Section 4.5.2.a. "Test Procedure for Polyethylene Sheeting" for calculating the weight of polyethylene sheeting. Multiply the calculated weight times the count (the number of bags or liners), then multiply by two (to account for both sides of each bag or liner) to obtain your target net weight.**

3. **To determine the target net weight for bags with a cut out, (i.e., t-shirt or specialty bags), subtract from the target net weight the weight of the cut out. Use the following method to calculate the weight of the cut out:**

   - **Trace the cut out on ruled graph paper with 0.5 cm (¼ in) squares as shown in the diagram that follows, (Figure 1.).**

   - **For t-shirt bags with a fold or gusset, you will need to draw an extra line up from the gusset to the edge of the graph paper. This will aid in accounting for the additional plastic layers within the bag (see shaded area in Figure 4-1).**

Figure 4-1. T-Shirt Bag.

   - **Count the squares and divide this number by the number of squares per square inch (sq in) (i.e., 16 – ¼ inch squares = 1 sq in) to determine the total area of the cutout. Adjust your total area by taking into account the number of layers for each region counted. (Figure 2)**

   - **Once the total area of the bag has been determined, take the total area of the cutout and divide it by the total area of the bag to calculate the percentage of the cutout.**

   - **Compute and record the weight of the bag without the cutout by subtracting the calculated net weight of the cutout from the total target net weight of the bags being tested. The calculated net weight of the cutout is determined by multiplying the total target net weight of the bag by the percentage of the area of the cutout.**

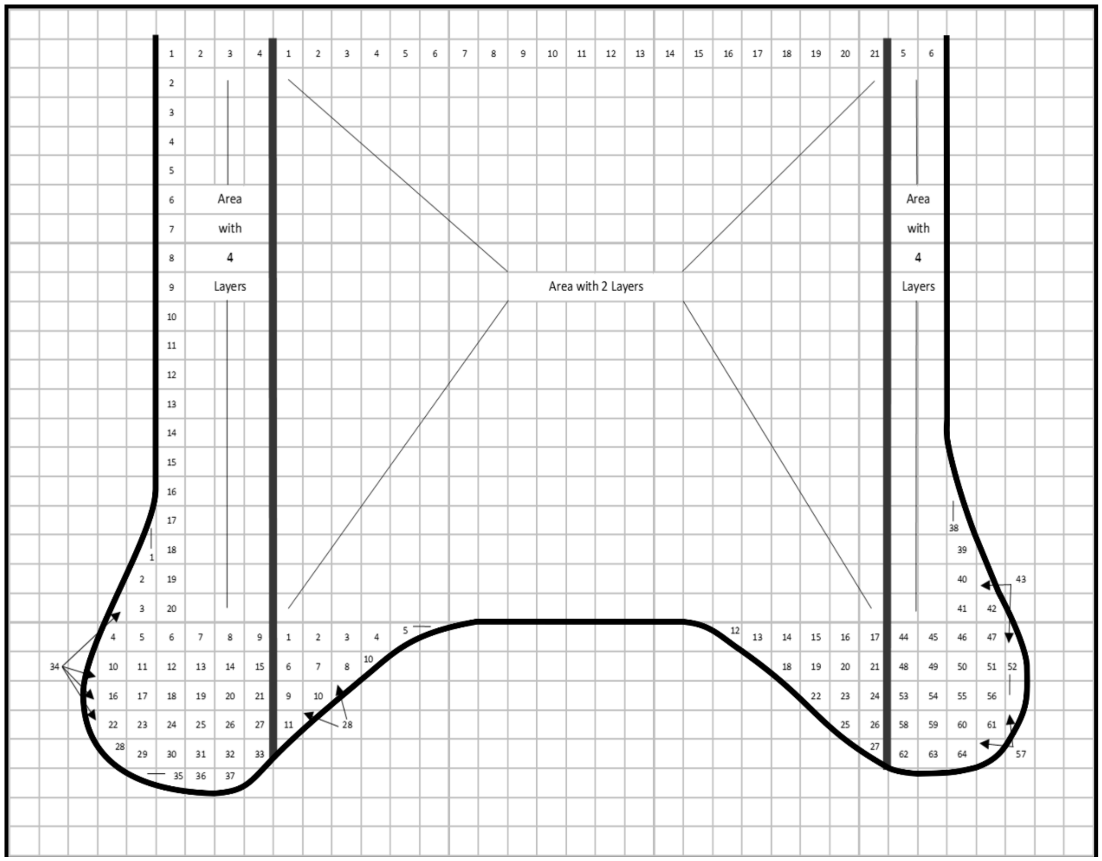

Figure 4-2. Polyethylene Bag Outline on Graph

Example:

- ***To find the total area of the cut out, determine the area for the 4-layer region and the area for the 2-layer region and add them together. For example:***

  4-Layer Area: 4 [(6 × 20) + 64 additional boxes]/16 squares/sq in = 46 sq in

  2-Layer Area: 2 [(21 × 20) +28 additional boxes]/16 squares/sq in = 56 sq in.

The area of the cut out = 46 sq in + 56 sq in = 102 sq in.

- ***If the total area for the bags prior to cut out is 836 sq in, then the percentage of the cut out is 12.2 %, (102 sq in ÷ 836 sq in = 0.1220 × 100)***

- ***Multiply the theoretical weight by 12.2 % to determine the weight of the cut out for the bags, then subtract this from the target net weight to determine the weight of the bags.***

- ***If the calculated target net weight for a box of bags is 11.57 lb, then 12.2 % would weigh 1.41 lb (11.57 lb × 12.2% = 1.41lb). Therefore, the target net weight of the product: 11.57 lb − 1.41 lb = 10.16 lb***

(Amended 2017)

4.5.3. Evaluation of Results

a. Individual Thickness

Note: Refer to Appendix A, Table 2-10. Exceptions to the MAVs for Textiles, Polyethylene Sheeting and Film, Mulch and Soil Labeled by Volume, Packaged Firewood, and Packages Labeled by Count with 50 Items or Fewer, and Specific Agricultural Seeds Labeled by Count.

(Amended 2010)

- On polyethylene with a declared thickness greater than 25 µm (1 mil or 0.001 in): an individual thickness measured may be up to 20 % less than the declared thickness.
- On polyethylene with labeled thickness less than or equal to 25 µm (1 mil or 0.001 in), individual thickness measurements may be up to 35 % below the labeled thickness.

Count the number of values that are smaller than specified MAVs (0.8 × labeled thickness if 25 µm [1 mil] or greater or 0.65 × labeled thickness, if less than 25 µm [1 mil]). If the number of values that fail to meet the thickness requirement exceeds the number of MAVs permitted for the sample size, the lot fails to conform to requirements. No further testing of the lot is necessary. If the number of MAVs for thickness measurements is less than or equal to the number permitted for the sample size, go on to Evaluation of Results – Average Thickness.

b. Average Thickness

The average thickness for any single package should be at least 96 % of the labeled thickness. This is an MAV of 4 % (refer to Appendix A, Table 2-10. Exceptions to the MAVs for Textiles, Polyethylene Sheeting and Film, Mulch and Soil Labeled by Volume, Packaged Firewood, and Packages Labeled by Count with 50 Items or Fewer, and Specific Agricultural Seeds Labeled by Count.) Circle and count the number of package average thickness values that are smaller than 0.96 × labeled thickness. If the number of package average thicknesses circled exceeds the number of MAVs permitted for the sample size, the lot fails to conform to requirements. No further testing of the lot is necessary. If the number of MAVs for package average thickness is less than or equal to the number of MAVs permitted for the sample size, proceed to Section 2.3.7. "Evaluate for Compliance" to determine if the lot meets the package requirements for average thickness.
(Amended 2010)

Background/Discussion:
The most efficient means for testing polyethylene bags is by weight. Polyethylene bags that include a cut out (T-shirt bags) are especially problematic because there is not currently a method to determine the amount of cut out material.

At the 2017 NCWM Interim Meeting, Ms. Macey (California) stated this is important for mil thickness of bags. The polyethylene test procedure was being reviewed and this change aligns with the test procedure. The NIST Technical Advisor remarked this test procedure was used in a training class, and it is fully developed. The Committee is recommending this as a Voting item.

At the 2017 NCWM Annual Meeting, the Committee reviewed all submitted proposed changes. The Committee will not be moving forward the language in Section 4.5.2.a.2. Test Procedure. There is developing work being done to the companion Uniform Method of Sale for Polyethylene (Item 2302-5). When the method of sale issue has been resolved, the Committee grants editorial privileges for Section 4.5.2.a.2. to be updated. The current NIST handbook language for this specific session will remain unchanged.

Regional Association Comments:
WWMA did not forward this item to NCWM.

At the 2017 CWMA Annual Meeting, Mr. Hayes (Missouri) suggested a note to address other types of plastic sheeting products, gave an example of plastic bale wrap and plastic tubes for silage. He also commented there are other types of plastic sheeting on the market, which may need to be reviewed.

The SWMA received comment from the NIST Technical Advisor that they would be using this procedure next week in a training course being taught in California. The SWMA recommended that NIST and California provide data/feedback to the NCWM L&R Committee on how well this procedure works to the National Committee. The SWMA forwarded the item to NCWM and recommended Informational status.

At the 2016 NEWMA Interim Meeting, the NIST Technical Advisor remarked there is additional work being done in the field to gather additional test data. NEWMA forwarded the item to NCWM and recommended Informational status. At the 2017 NEWMA Annual Meeting, it was noted this item is a companion to Item 2302-5. A state regulator from California, who was present at the NEWMA meeting, stated this proposal came from a NIST Packaging and Labeling class. These items are noted changes that resulted from this training.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

2600-5 W TABLE 2-12. UPPER AND LOWER MAV LIMITS FOR FISH AND FISHERY PRODUCTS LABELED WITH A COUNT

(This item was Withdrawn.)

Source:
U.S. Department of Commerce, NOAA Seafood Inspection (2017)

Purpose:
The U.S. Department of Commerce, NOAA Seafood Inspection intends to apply NIST Handbook 133 "Maximum Allowable Variables (MAVs)" to Declared Counts to all applicable U.S. Grade Standards for Fish and Fishery Products. This proposal would add a new MAV table, which can be used by state and local officials, to verify the supplemental declared count statement on a package (i.e., shrimp and scallops), recognizing that the method of sale is net weight.

Item under Consideration:
Amend NIST Handbook 133, Appendix A as follows:

U.S. Department of Commerce, NOAA Seafood Inspection Table 2-12. Upper and Lower MAV Limits for Fish and Fishery Products Labeled with a Count	
Sample Size[1]	**Number of Package Errors Allowed to Exceed the Maximum Allowable Variations**
6	**0**
Labeled Quantity	**Maximum Allowable Variations (MAVs)**
17 or less	**0**
18 to 50	**1**
51 to 83	**2**

U.S. Department of Commerce, NOAA Seafood Inspection
Table 2-12. Upper and Lower MAV Limits for Fish and Fishery Products Labeled with a Count

Sample Size[1]	**Number of Package Errors Allowed to Exceed the Maximum Allowable Variations**
84 to 116	**3**
117 to 150	**4**
151 to 200	**5**
201 to 240	**6**
241 to 290	**7**
291 to 345	**8**
346 to 400	**9**
401 to 465	**10**
466 to 540	**11**
541 to 625	**12**
626 to 725	**13**
726 to 815	**14**
816 to 900	**15**
901 to 990	**16**
991 to 1075	**17**
1076 to 1165	**18**
1166 to 1250	**19**
1251 to 1333	**20**
1334 or more	**1.5 % of labeled count rounded off to the nearest whole number.**

[1]The sample size for all lot sizes is six.

(A note should be included in the Scope of Chapter 4 indicating when an inspector uses Table 2-12 to verify declared counts [i.e., shrimp and scallops] the inspector should randomly select six packages from the sample and, if the sample size is under six, select all packages.)

Background/Discussion:
Per Federal Regulation 21 CFR Part 101, finished product packages with label declarations must meet labeling requirements. When a processor labels a finished product package, label declarations must be truthful and accurate per FDA labeling laws. Such statements that must meet labeling laws include statement of identity, ingredients (if applicable), name of manufacturer or distributor, and other information such as net weights, counts per package and counts per pound.

NOAA Seafood Inspection inspects fish and fishery products for net weight compliance since the method of sale for such products is net weight. In the interest of harmonization, NOAA recently adopted NIST Handbook 133 guidance for determining net weight compliance to align our inspection practices with NIST and state agencies.

NOAA Seafood Inspection also evaluates labeling claims, including declared counts per package and declared counts per pound. NOAA recently adopted NIST Handbook 133 guidance by applying the MAVs in Table 2-7 to the upper and lower limits for declared counts per package and declared counts per pound to fish and fishery products.

Declared Counts Per Package and Declared Counts Per Pound

When evaluating fish and fishery products such as shrimp or scallops, products that have a higher count per pound are smaller in size and less expensive. And, products that have a lower count per pound are larger in size and more expensive. Products sold with a higher count per pound than the declared count per pound negatively affects the consumer's purchase price. Products sold with an either a higher or lower count per pound than the declared count per pound can also affect the product's intended use (i.e., baked stuffed shrimp instead of cocktail shrimp or jambalaya).

Applying MAVs to higher counts per package and higher counts per pound as well as lower counts per package and lower counts per pound would establish an acceptable threshold for variability for the producer, as well as establishing a uniform procedure to ensure that declared counts per package and declared counts per pound meet labeled claims for consumers.

For clarification purposes, the following information provides guidelines to determine a sample unit's compliance for shrimp count per package and shrimp count per pound.

Shrimp Count Per Package and Shrimp Count Per Pound

Size designation (count per pound) refers to the number of whole, unbroken, and undamaged shrimp on a per pound basis in a primary package (sample unit). Whole shrimp refers to unbroken and undamaged shrimp, that have a minimum of five (four) complete segments with or with tail fins attached for ≤ 70 (> 70) determined shrimp count per pound, respectively.

To determine the actual count per package or actual count per pound, the whole, unbroken, and undamaged shrimp are separated from any physical adulteration, extraneous material, broken shrimp, damaged shrimp, shrimp pieces and unusable material present in the sample unit and defined below.

- Physical adulteration refers to the presence of any visible foreign material that has not been derived from product and (1) poses a threat to human health, and includes, but is not limited to animal excreta, animal infestation, glass, metal, plastic, or wood or (2) renders the product unfit for human consumption. It does not include (1) extraneous material or (2) distinct and persistent odors or flavors, which have not been derived from product and pose a threat to human health and includes, but is not limited to contaminants such as solvents or fuel oil.

- Extraneous material refers to visible extraneous material that has not been derived from product and (1) does not pose a threat to human health, and includes, but is not limited to, seaweed, or (2) does not render the product unfit for human consumption.

- Broken shrimp refers to shrimp that have a break in the flesh more than or equal to one-half the shrimp's thickness where the break occurs and the break results in fewer than five (four) whole consecutive segments, with or without tail fins attached for ≤ 70 (> 70) determined shrimp count per pound, respectively.

- Damaged shrimp refers to shrimp that are crushed or mutilated so as to materially affect its appearance and usability and the damage results in fewer than five (four) whole consecutive segments, with or without tail fins attached for ≤ 70 (> 70) determined shrimp count per pound, respectively.

- Shrimp pieces refers to shrimp that have fewer than five (four) segments, with or without tail fins attached for a sample unit with ≤ 70 (> 70) determined shrimp count per pound, respectively.

- Unusable shrimp material refers to any objectionable material that has been derived from the shrimp and does not pose a threat to human health, and includes, but is not limited to detached walking legs, detached shells, detached antennae, detached heads, or detached tail fins.

Then, the whole, unbroken, and undamaged shrimp are counted and weighed to determine the shrimp count per pound.

Example 1: During product inspection, it was determined that a 16.23-ounce sample unit has 75 whole, unbroken, and undamaged shrimp that weigh 15.58 ounces. The sample unit's size designation – shrimp count per pound is calculated as 77.02 shrimp count per pound.

$$\frac{\mathbf{75}\ \boldsymbol{whole\ shrimp}}{\mathbf{15.58}\ \boldsymbol{ounces}} = \frac{\boldsymbol{x\ whole\ shrimp}}{\mathbf{16.00}\ \boldsymbol{ounces}}$$

$$\boldsymbol{X = 77.02\ shrimp\ count\ per\ pound}$$

Example 2: During product inspection, it was determined that an 8.35-ounce sample unit has 30 whole, unbroken, and undamaged shrimp that weigh 7.35 ounces. The sample unit's size designation – shrimp count per pound is calculated as 65.31 shrimp count per pound.

$$\frac{\mathbf{30}\ \boldsymbol{whole\ shrimp}}{\mathbf{7.35}\ \boldsymbol{ounces}} = \frac{\boldsymbol{x\ whole\ shrimp}}{\mathbf{16.00}\ \boldsymbol{ounces}}$$

$$\boldsymbol{X = 65.31\ shrimp\ count\ per\ pound}$$

When a count per package or count per pound is declared on the label, the NIST Table is used to ascertain MAVS and to determine if a sample unit is in compliance.

Examples of Using NIST Table to Ascertain MAVS for Count per Pound (CPP)

- An 8-ounce sample unit with a declared 35 shrimp count per package should have 35 whole shrimp (and a retail price based on 70 shrimp count per pound). Using Table 2-12 would allow 34 to 36 whole shrimp to meet the labeling declaration for declared count per package.

- A 12-ounce sample unit with a declared 150 shrimp count per package should have 150 whole shrimp (and a retail price based on 200 shrimp count per pound). Using Table 2-12 would allow 146 to 154 whole shrimp to meet the labeling declaration for declared count per package.

- An 8-ounce sample unit with a declared 60 to 80 shrimp count per pound should have 30 to 40 whole shrimp. Using Table 2-12 would allow 29 to 41 whole shrimp to meet the labeling declaration for declared count per pound.

- A 2-pound (32-ounce) sample unit has a declared 100 to 125 shrimp count per pound should have 200 to 250 whole shrimp. Using Table 2-12 would allow 195 to 257 whole shrimp to meet the labeling declaration for declared count per pound.

NOAA Seafood Inspection acknowledges that the method of sales for fish and fishery products is net weight and during all product inspections determines net weight compliance. However, some products such as shrimp and scallops are initially priced and sold using the standard U.S. quantitative unit "count per pound," then sold on a net weight basis. *In order to demonstrate the relevance for applying MAVs to count per pound ranges, NOAA Seafood Inspection would be pleased to present retail shrimp or scallop packages with different declared counts per pound to the SWMA and NEWMA meeting attendees.*

At the 2017 NCWM Interim Meeting, there was discussion regarding the reference of scallops and shrimp; however, the table list "fish and fishery" products. There is also a term of upper limits being used, but this is not a term used in NIST Handbook 133. If this term is adopted is needs further explanation.

At the Committee work session, it was determined that considerable work needs to be done to develop this proposal. The Committee encourages the submitter to take into consideration comments heard at the SWMA and NEWMA regional meetings. The submitter should work out internal (NOAA) considerations prior to coming to NCWM. The submitter should also be clearer on what their proposal is considering. The Committee discussed the regional presentation and discussion regarding the segmentation of shrimp to develop a count. This is a quality procedure for NOAA and not a procedure for weights and measures officials. There is nothing documented on segmenting shrimp within NIST Handbook 133 and is this a role of the weights and measures officials? Is this a quality or quantity issue? Table 2-12 MAV Limits for Shrimp and Scallops should be reviewed for clarity on the table title and headers. The Committee Withdrew this item.

Regional Association Comments:
The SWMA heard a presentation from Ms. Jane Fox-Dobson with NOAA seafood inspection. Ms. Fox-Dobson remarked that NOAA seafood inspection adopts NIST Handbook 133. It was clarified by the NIST Technical Advisor that states will continue to do inspections using the proper method of sale of net weight. During the Committee work session, there were questions concerning, "if count would just be applied toward seafood with the U.S. Grade Standard." Ms. Fox-Dobson remarked they are a fee for service program, and they do not look at the international marketplace. There was discussion on renaming the table to read "Table 2-12. MAV Limits for Shrimp and Scallops labeled with a supplementary declaration" and the column that read "Labeled Quantity" would read "Labeled Count." After further clarification from Ms. Fox-Dobson, she would need inspectors to also follow the NOAA procedure for count. The Committee believed too many changes were needed, and this was not heard during open hearings. The SWMA forwarded this item to NCWM and recommended Developing status.

NEWMA received a presentation from Ms. Fox-Dobson of NOAA, regarding maximum allowable volume requirements in seafood regulations. NIST, OWM asked why NOAA isn't developing their own handbook? These new proposed regulations may result in language weights and measures will not adopt. Also, who would train inspectors on the testing methods? An industry representative commented this proposal is new for the industry as well, so they want to have some time to review it for consideration. The submitter will be further developing the proposal and include various updates for consideration at the 2017 NCWM Interim Meeting in January. A regulator from the New York commented, if we adopt this proposal, we would have to start verifying other supplemental information statements on packaging. NEWMA forwarded this item and recommended it be Developing.

2700 OTHER ITEMS

2700-1 D FUELS AND LUBRICANTS SUBCOMMITTEE

Source:
The Fuels and Lubricants Subcommittee (2007)

Purpose:
Update the Uniform Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation in NIST Handbook 130 including major revisions to fuel ethanol specifications. Another task will be to update the Basic Engine and Fuels, Petroleum Products, and Lubricants Laboratory Publication.

Item under Consideration:
This item is under development. All comments should be directed to Dr. Matthew Curran, FALS Chair at (850) 921-1570, **Matthew.Curran@freshfromflorida.com**, or Ms. Lisa Warfield, NIST Technical Advisor at (301) 975-3308, **lisa.warfield@nist.gov**.

Background/Discussion:
The Subcommittee met on Sunday, January 10, 2016, at the NCWM Interim Meeting in San Diego, California, to review several significant issues related to fuel and motor vehicle fluid standards appearing before the L&R Committee. The meeting began with an update from an agenda review teleconference, which was held on Tuesday, December 15, 2015. There were six items on the L&R agenda with one additional related item in the Method of Sale section, which were discussed by FALS. The meeting also consisted of updates from the three informal focus groups (FG) working within FALS. Summaries are detailed below. Finally, a fourth informal focus group was formed within FALS during the Sunday meeting to investigate L&R Item 237-5 relating to minimum requirements for water in fuel storage tanks.

The Subcommittee met on Sunday, January 8, 2017, at the NCWM Interim Meeting in San Antonio, Texas, to review several significant issues related to fuel and automotive fluid standards appearing before the L&R Committee. The meeting began with an update from an agenda review teleconference, which was held on Tuesday, January 3, 2017. There were four items on the L&R agenda with two additional related items in the Method of Sale section, which were discussed by FALS. The meeting also consisted of updates from four informal focus groups (IFG) working within FALS; further discussion on some of the agenda items; and several presentations from FALS members. Summaries of the IFGs are detailed below. Finally, the Subcommittee discussed membership and voting guidelines that would be applied to agenda items and issues addressed within FALS.

The Subcommittee met on Sunday, July 16, 2017, at the NCWM Annual Meeting in Pittsburgh, Pennsylvania, to review several significant issues related to fuel and motor vehicle fluid standards appearing before the L&R Committee. The meeting began with an update from an agenda review teleconference, which was held on Thursday, June 8, 2017. There were four items on the L&R agenda with two additional related items in the Method of Sale section, which were discussed by FALS. Item 2307-2 related to Ethanol Flex Fuels was discussed at the meeting as the submitter was not able to attend the agenda review teleconference. The meeting also consisted of updates from the four informal focus groups (FG) working within FALS. Summaries are detailed below.

Handbook 130 Harmonization IFG: Ms. Marilyn Herman delivered an update to the FALS membership. She noted the FG has held several teleconferences and met at the 2015 NCWM Annual Meeting as well as at the ASTM International Meeting in Austin, Texas, in December 2015 to gather input and suggestions. The FG has developed several drafts and has posted them on the NCWM collaboration site for all to review and comment. She encouraged members to continue to review the document and provide comment. While significant progress has been made, she noted the project is going to take time due to the magnitude of possible changes to the handbook as well as how to address the recently released Federal Trade Commission final rule pertaining to labeling requirements for ethanol blended fuels. At the 2017 NCWM Interim Meeting, Ms. Herman provided an update to the FALS membership. She noted the IFG has held several teleconferences and distributed e-mails to gather input and suggestions and review existing semi-final drafts. She provided an update of the path forward and indicated the IFG was targeting completing work to have it ready for consideration during the 2017 regional and 2018 national cycle. At the 2017 NCWM Annual Meeting, Mr. Randy Jennings commented that the informal FG reviewed the latest draft proposal to NIST Handbook 130, and the comments on the draft during a four-hour call the previous week. Mr. Jennings will provide a revised document with changes based on the call for consideration to recommend as Voting item at the 2018 NCWM Interim Meeting.

Renewable Diesel Labeling and Definitions FG: At the 2015 NCWM Annual Meeting, Ms. Rebecca Richardson (MARC IV Consulting) delivered an update to the FALS membership. She noted they had held several teleconferences and exchanged e-mails and were still trying to determine what course of action, if any, should be recommended through FALS about the FTC labeling requirements for renewable diesel fuels. At the 2017 NCWM Interim Meeting Ms. Richardson provided an update to the FALS membership on behalf of Mr. Allan Morrison (California). She noted that Allan had received renewed interest in the work of this IFG and has reviewed the history of the issues. At the 2017 NCWM Annual Meeting, Mr. Morrison requested the informal FG resume work, but at the meeting FALS was informed the informal FG had not had a chance to meet since the request was made to resume work.

Premium Diesel IFG: Mr. Ron Hayes provided an update to the FALS membership on behalf of Mr. Manuch Nikanjam (Chevron Global Downstream, LLC) and Mr. Randy Jennings (Tennessee). Mr. Ron Hayes (Missouri) noted the informal FG was reviewing all aspects of the premium diesel requirements including fuel cleanliness, energy content, corrosion, stability, filter blocking tendencies, lubricity, injector deposits, cetane number, aromatics, and metals. The informal FG held one face-to-face meeting in Nashville, Tennessee, and has had numerous other calls and e-mail exchanges. They have broken the topics up into categories to determine the utility in carrying them forward and will convene monthly until those evaluations have been completed. The hope of the informal FG is to have a proposal ready for the 2018 meeting cycle.

Water in Storage Tanks Informal FG: Mr. Mahesh Albuquerque provided an update and revisited the intent if his proposal since it is related to current L&R agenda Item 2307-3. The intent of the proposal is to harmonize the permissible amount of water allowed in both blended and unblended fuel storage tanks. However, there has been many questions raised as to the benefit of moving forward in this direction. The informal FG is working to address cost analysis issues as well as how effective such a change would be if implemented. (Refer to Item 2307-3 for additional information.)

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

2700-2 D PACKAGING AND LABELING SUBCOMMITTEE

Source:
Packaging and Labeling Subcommittee (2011)

Purpose:
Provide an update of the activities of this Subcommittee which reports to the L&R Committee. The mission of PALS is to assist the L&R Committee in the development of agenda items related to packaging and labeling. The Subcommittee will also be called upon to provide important and much needed guidance to the regulatory and consumer packaging communities on difficult questions. PALS will report to NCWM L&R Committee. The Subcommittee is comprised of a Chairperson and eight voting members.

Item under Consideration:
This item is under development. All comments should be directed to Mr. Chris Guay, Packaging and Labeling Subcommittee Chair, at (513) 983-0530, **guay.cb@pg.com** or Mr. David Sefcik, NIST Technical Advisor, at (301) 975-4868, **david.sefcik@nist.gov**.

Background/Discussion:
The Package and Labeling Subcommittee (PALS) comprised of four voting regulatory officials (one from each region) and four voting from industry (retailers and manufacturers) in addition to its Chairman and NIST Technical Advisor. Mr. Guay, PALS Chair, reported that work is currently being held through monthly webinar meetings and at the NCWM meetings. Members of NCWM can participate in the PALS webinar meetings by contacting Mr. Guay. PALS members are responsible for providing updates at their Regional Meetings. Mr. Guay added, PALS will be developing proposals and providing guidance and recommendations on existing proposals as assigned by the NCWM L&R Committee. He also stressed the importance of having key federal agencies (FDA, FTC, and USDA) participating.

Mr. Guay reported, the Subcommittee is working on a Recommended Practice Document for quantity expressions appearing on the principal display panel (PDP) in addition to the statement of net quantity and is also considering further development of the following items:

- **Additional Net Content Declarations on the Principal Display Panel to Meet U.S. and International Requirements** – Package net contents are most commonly determined by the product form, for example – solid products are labeled by weight and liquid products are labeled by volume. Semi-solid products such as pastes, creams, and viscous liquids are required to be labeled by weight in the United States and by volume in Canada.
- **Icons in Lieu of Words in Packaged labeled by Count** – Can a clear and non-misleading icon take the place of the word "count" or "item name" in a net content statement? While existing Federal regulation requires regulatory label information to be in "English," the increasing presence of multilingual labels and the growing diversity of the U.S. population suggest more consumers are served with a clear and non-misleading icon.
- **Multipacks and Bundle Packages** – The net content statements for multipacks and bundled packages of individually labeled products can be different based on the approach used to calculate them. The difference is the result of the degree of rounding for dual U.S. customary units and metric declarations. Using two apparently valid but different methods can yield one net content statement result, that provide better accuracy between the metric and U.S. customary unit declarations and a different net content result, which is consumer friendly.

At the 2015 NCWM Interim Meeting, Mr. Guay (PALS Chair) reported PALS was making progress on a Recommended Practice Document for quantity-related statements appearing on the package net content statement outside of the required statement of net quantity. He noted that no guidance or regulation exists for these types of statements and, as a result, every manufacturer creates their own approach. A Recommended Practice Document is expected to help bring uniformity and consistency by providing a reference for these types of label statements. This document will either be a stand-alone document on the NCWM website or included as part of another NCWM publication.

At the 2015 NCWM Annual Meeting, Mr. Guay (PALS Chair) reported the FTC has recommended adoption of the five-amendments recommended by PALS into their final FPLA regulations. FTC also responded to each recommendation made by PALS. FTC did not propose adoption of amendments from any other source.

Mr. Guay (PALS Chair) and Angela Godwin (Ventura County, California) gave an abbreviated presentation providing details of the developing Recommended Practice Document to build awareness and to get broader input on this item. The Subcommittee's goal is to have the document drafted by early 2016, so that it can be refined and edited prior to the 2016 NCWM Annual Meeting. It is expected to be submitted for regional review in the fall of 2016.

At the 2016 NCWM Interim Meeting Mr. Guay (PALS Chair) and Mr. Hal Prince (PALS SWMA representative) gave a presentation on the developing Recommended Practice Document. PALS noted this document is envisioned to be a stand-alone document on the NCWM website and PALS is targeting to have the document drafted by April 2016 with the goal of getting a broader review by the NCWM membership prior to submission as a formal NCWM item.

At the 2016 NCWM Annual Meeting, Mr. Guay (PALS Chair) reported the Subcommittee continues to address question and issues surfacing as the PALS Subcommittee works on the Recommend Practice Document.

At the 2017 NCWM Interim Meeting, Ms. Ann Boeckman (PALS Member) provided a presentation to the PALS summarizing the history of the U.S. Fair Packaging and Labeling Act, FTC's FPLA regulations, and positions taken by FTC when questions were referred to the agency. The PALS Committee is planning to contact FTC and FDA to discuss how PALS can provide guidance to manufacturers consistent with FTC and FDA requirements and interpretations.

At the 2017 Annual Meeting, PALS met with a representative of the FDA to provide a detailed overview of the background, development, and status of the developing Recommended Best Practice Document. While also invited, FTC was unable to attend this meeting. PALS is planning to continue development of this document and continue outreach to the federal agencies as it works to finalize the first draft of the document. PALS plans to share the Best Practice Document with NCWM members for input once the draft is complete.

Regional Association Comments:
Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

2700-3 W NIST HANDBOOK 158, "FIELD SAMPLING PROCEDURES FOR FUEL AND MOTOR OIL QUALITY TESTING"

Source:
NIST Office of Weights and Measures (2017)

Purpose:
NIST Handbook 158, "Field Sampling Procedures for Fuel and Motor Oil Quality Testing: A Handbook for Use by Fuel and Oil Regulatory Officials" was published by NIST, OWM in 2016. NIST is requesting the NCWM L&R Committee delegate to the Fuels and Lubricants Subcommittee (FALS) the responsibility for maintenance of this handbook. FALS have the most subject matter experts to assist with any modifications that may arise. NIST OWM would serve as Technical Advisors and editor of this handbook.

Item under Consideration:
Adopt NIST Handbook 158, "Field Sampling Procedures for Fuel and Motor Oil Quality Testing: A Handbook for Use by Fuel and Oil Regulatory Officials."

See Appendix A for NIST Handbook 158 in its entirety.

Background/Discussion:
Fuel and motor oil quality programs are implemented to provide an official presence in the marketplace and to verify that sellers of engine fuels and motor oils have control systems in place, which ensure the products they sell conform to the quality specifications in federal and state laws and regulations. Routine, unannounced verification of fuel and motor oil quality enables the programs to identify sellers and their suppliers who have quality control systems in place and to focus enforcement resources on those who do not. This handbook outlines how samples are to be taken, identified, protected, and transported to a laboratory for testing. It also provides information on safety and sampling equipment and includes illustrations of the equipment and forms described in the text. Adoption and use by regulatory programs may improve the accuracy and reliability of quality testing and contribute to national uniformity in sampling methods.

NIST heard from some states, which had additional changes, that they would like to have reviewed. For these reasons, NIST will continue to review any additional changes and continue to maintain this document. The Committee Withdrew this item

Regional Association Comments:
The WWMA received a comment from the submitter that this item was developed to provide a fuel sampling handbook. NIST OWM does not have the resources or expertise to continuously maintain this document and asks it to be turned over to the experts in the Fuels and Lubricants Subcommittee for ongoing maintenance so it can remain a current, relevant, useful resource to states. The submitter notes this book addresses the sampling procedure necessary to obtain E15 samples from blending dispensers, which may be used by EPA in their individual fuel sampling programs. The WWMA believed this document is valuable and assignment to the L&R Committee would ensure it remains a relevant tool for Weights and Measures jurisdictions for years to come. The WWMA recommended forwarding the document to the NCWM Professional Development Committee for a review of Section 3. Safety and Environment and to solicit nationwide comments on that section. The WWMA forwarded the item to NCWM and recommended it as an Informational item.

At the 2016 CWMA Interim Meeting received a comment from a regulator that a great deal of effort had gone into this draft. He is hoping for additional reviews from FALS, other regions, state regulators, and industry. The CWMA forwarded the item to NCWM and recommended it as an Informational item.

The SWMA forwarded the item to NCWM with the modifications that were submitted by the submitter of the proposal (shown below) and recommended it as an Informational status.

III. SAFETY AND ENVIRONMENT

C. Static Electricity

The movement or separation of materials, including liquids, generates static electricity. When these materials are different, such as when fuel moves through a nozzle or a piece of clothing is separated from a car seat as a driver leaves the seat of a car, there is often a transfer of free electrons. If either or both of the materials are poor conductors, the potential for a static discharge can build as one material becomes negative and the other positive, depending on which accumulates excess electrons. When there is no bond or ground in place to dissipate the charges, the voltage builds and the static electricity seeks an outlet. High humidity does not prevent static electricity, and lightning, the strongest example of static electricity, is common during rainstorms.

<u>Learn about Lightning Safety and use safe work practices when working outdoors by studying the National Oceanic and Atmospheric Administration (NOAA) factsheet on Lightning Safety at</u>

www.lightningsafety.noaa.gov/resources/OSHA_FS-3863_Lightning_Safety_05-2016.pdf. Additional Informational on lightning safety is available at www.lightningsafety.noaa.gov/.

Never underestimate the danger posed by static electricity when taking samples. Even though a specific fuel and air combination must be present for a spark to cause ignition, those conditions cannot be measured with the senses. Think and act as if a very hazardous situation exists whenever carrying out the tasks described in this handbook. Study and use good grounding practices and bonding equipment, noting that nothing completely eliminates the hazard presented by the accumulation of static electricity, which can build up rapidly for a wide variety of reasons in different sources (e.g., on clothing or the flow of fuel from the nozzle into a sampling container). Before pouring fuel into another container or from a nozzle into a container, be sure they are bonded or grounded to each other. For example, place the nozzle against the opening of the container and insert it as deep as possible (use a fill tube if available) to reduce splash filling and to maintain a smooth flow so that droplets do not form. Remember to ground equipment in accordance with the instructions of the manufacturer.

Sampling procedures can introduce spark promoters into storage tanks or transport compartments so extra caution, good grounding procedures and special non-sparking equipment and tools, must be used (e.g., cords made from synthetic materials such as nylon could cause charges as it rubs against a glove or other objects). When working around rusted steel, a spark hazard can be created if equipment made of aluminum or magnesium is used.

Be aware of the notices placed on and around dispensers and ensure compliance with any warnings (e.g., such as not filling a container while it is sitting on a plastic bed liner or while it is in an enclosed space such as the trunk of a car). After getting out of a vehicle, touch a metal part of the dispenser housing to discharge any electrostatic charge before going to the dispenser island.

~~**Do not take samples during hail and thunderstorms or when lightning is observed.**~~

Do not take samples from a dispenser connected to a storage tank being filled by a tanker truck because the filling process generates an electrostatic charge. Wait for 30 minutes after the delivery is completed before sampling from the tank or opening its fill ports.

It is a good habit to ground the static charge on one's body by touching a metal part of the dispenser or support structure of a tank before taking a sample. On tanks and drums, touch the structure at a point at least 1 m (39 in) away from an opening.

NOTE**:** *To learn more about static electricity as it relates to fuels, visit the Petroleum Equipment Institute's "Stop Static" URL* at **www.pei.org/static**. Also, view the U.S. Chemical Safety and Hazard Investigation Board's video on one static caused explosion of non-conductive liquids to understand why reviewing SDSs periodically is essential: **www.youtube.com/watch?v=tVZzdtnZaJk** (see also: **www.speedway.com/About/FuelSafety**).

D. Personal Protective Equipment

1. **Clothing:** Outer garments should be made from anti-static materials such as cotton (avoid wool and synthetics which, when moving against each other, can rapidly build up static charges). The color of the clothing should be suitable for the working environment and brightly colored or covered with a vest with light reflecting elements that conform to the Class 2 or 3 requirements in the latest edition of ANSI/ISEA 107 "High-Visibility Safety Apparel and Headwear."[1] This type of high-visibility safety apparel alerts motorists and other equipment operators to an official's presence in high traffic areas around fuel dispensers and storage tanks.

2. **Shoes:** Steel toed shoes or boots manufactured to be static dissipative and slip resistant with oil/gas resistant soles should be worn. Footwear capable of causing sparks should not be worn.

3. **Eye/Face Protection:** Safety glasses or goggles should be worn whenever samples are handled and especially during collection where splashing or spraying could occur.

4. **Skin:** Avoid skin contact with all fuels, oils, and other chemicals. Hand protection should be worn whenever handling samples. Gloves should be made of Nitrile2, or coated with Neoprene or Tychem2. Materials such as Nitrile2 offer chemical resistance, are considered to be strong disposable gloves, and are generally safe for people who are allergic to latex. PVC-coated gloves are recommended for use with biodiesel.

~~**5. Toxic Materials: Avoid breathing toxic vapors. When fuel, oil vapors or mists are present, wear a National Institute for Occupational Safety and Health (NIOSH) - approved organic vapor/mist respirator and maintain it in accordance with the manufacturer's instructions.**~~

<u>**5.**</u> <u>Toxic Vapors</u>: <u>**Avoid breathing toxic vapors by taking samples only when there is adequate ventilation. As most fuel and oil samples are taken outdoors or in services bays, which are well ventilated, the use of a respirator is typically not required.**</u>

<u>**NOTE 1: This section is for Informational purposes and should not be taken as the basis for requiring the use of a respirator. An Industrial Hygienist can determine compliance with state or federal safety requirements by sampling the environment to determine if concentrations of vapor or mists are within occupational exposure limits. Sometimes additional ventilation or engineering controls can be used to reduce concentrations or if not, a National Institute for Occupational Safety and Health (NIOSH) approved respirator should be worn.**</u>

At the 2016 NEWMA Interim Meeting NIST OWM stated that this new handbook was mailed to all state directors, and is a published document available on the NIST website. She said NIST is asking that FALS maintain this handbook, so changes to the document would be submitted on a Form 15 for consideration by NCWM. NEWMA forwarded the item to NCWM, but did not recommend a status for possible adoption by NCWM. Instead, NEWMA recommended the NCWM L&R Committee accept the publication and refer it to FALS for continued maintenance.

Mr. Ethan Bogren, Westchester County, New York | Committee Chair
Mr. Louis Sakin, Towns of Hopkinton/Northbridge
Mr. John Albert, Missouri
Ms. Michelle Wilson, Arizona
Mr. Hal Prince, Florida
Ms. Rebecca Richardson, Marc IV Consulting | AMC Representative
Mr. Lance Robertson, Measurement Canada | Canadian Technical Advisor
Ms. Lisa Warfield, NIST OWM | Technical Advisor
Mr. David Sefcik, NIST OWM | Technical Advisor

Laws and Regulations Committee

Appendix A

Item: 2700-3, NIST Handbook 158

"Field Sampling Procedures for Fuel and Motor Oil Quality Testing"

NOTE: The handbook text that follows retains its original page numbering.

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FIELD SAMPLING PROCEDURES FOR FUEL AND MOTOR OIL QUALITY TESTING

A HANDBOOK FOR USE BY FUEL AND OIL QUALITY REGULATORY OFFICIALS

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Carol Hockert, Chief
Office of Weights and Measures
Physical Measurements Laboratory

http://dx.doi.org/10.6028/NIST.HB.158

April 2016

U.S. Department of Commerce
Penny Pritzker, Secretary

National Institute of Standards and Technology
Willie May, Under Secretary of Commerce for Standards and Technology and Director

NIST Handbook 158
2016 Edition

National Institute of Standards and Technology Handbook 158, 2016 Edition
Natl. Inst. Stand. Technol. Handb. 158, 2016 Ed., 68 pages (April 2016)
CODEN: NIHAE2

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The staff of the Office of Weights and Measures of the National Institute of Standards and Technology expresses sincere appreciation to the remarkable program directors, field officials, laboratory staff and other personnel from the States of California, Colorado, Georgia, Missouri, North Carolina and Virginia who shared their expertise, enthusiasm, knowledge and technical resources to make this handbook possible.

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Table of Contents

I. PURPOSE AND SCOPE

Fuel and motor oil quality programs are implemented to provide an official presence in the marketplace and to verify that sellers of engine fuels and motor oils have control systems in place which ensure the products they sell conform to the quality specifications in federal and state laws and regulations. Routine, unannounced verification of fuel and motor oil quality enables the programs to identify sellers and their suppliers who have quality control systems in place and to focus enforcement resources on those who do not. This handbook outlines how samples are to be taken, identified, protected and transported to a laboratory for testing. It also provides information on safety and sampling equipment and includes illustrations of the equipment and forms described in the text.

> ***NOTE:*** *This handbook only covers the sampling of products stored at or near atmospheric pressure. For instance, the procedures for sampling fuels stored under pressure (e.g., LPG & CNG) are not included.*

II. TERMINOLOGY

A. Chain-of-Evidence (custody)

A record keeping system documenting the history of the collection, movement, storage location(s), custody (who possessed or controlled it), and other conditions (e.g., environmental and storage conditions, if critical to protecting the product) of a sample from the time it was obtained to the time it is accepted and logged into the laboratory management system for testing. See ASTM D4840 "Standard Guide for Sample Chain-of-Custody Procedures" for more information.

B. Sample

An amount of fuel or motor oil taken from a storage tank or dispenser that is representative of a larger amount of product. A majority of the samples collected are classified as either "open," "routine," or "regular" samples which means they are periodically collected through "announced" inspection visits (that is the official identifies his or her self and notifies the seller that an inspection will be made and samples collected). A sample collected specifically in response to a complaint can be taken after announcing the purpose of the visit or as an unannounced or "undercover" investigation. References to other names for samples are mentioned in the section on sampling but those terms (i.e., nozzle sample versus bottom sample) only refer to the point of collection of the sample and should not be confused with this definition.

Complaint/Undercover Investigation Sample: The collection of a sample(s) of the product(s) in question without announcing its collection to the station operator/owner. This can be done by means of a "trap tank" in an undercover vehicle or by purchasing the product and putting it in an Underwriters Laboratory or Factory Mutual listed, approved container.

User Collected Sample: A sample that was not collected by a regulatory official following the prescribed sampling procedures. This sample can be tested but no immediate enforcement action can be taken on negative results because the sample may have been contaminated or mishandled by the user. However, the test results may indicate the need to take an official sample.

> ***NOTE:*** *Evidence is something that tends to prove or disprove the existence of an alleged fact. A sample is "evidence" (and must be treated as such) but, it is typically called a "sample." A sample that is not collected in accordance with prescribed procedures, or which has an undocumented chain of custody, will have little chance of being admitted as evidence in legal proceedings.*

> ***NOTE:*** *For evidentiary purposes the collection of samples and related activities should be noted and documented either on paper or in digital data systems (these systems are acceptable for use only if there is a real-time continuous data back-up in operation and the data is maintained on a*

remote server) and all documents should bear the seal of the state or local authority as well as the identity of the agency collecting the sample. On each official document there should be a space for the placement of an official's signature of attestation or execution along with the individual's title and date of signing. Notes about an inspection should answer the questions who, what, when, where, why and how. This documentation allows for an independent evaluation of the work conducted and will allow an official to refresh his or her memory should he or she be asked to testify about an inspection at a later time.

C. Sampled Lot

The amount of fuel or motor oil represented by a particular sample (i.e., the volume of product in the storage tank).

III. SAFETY AND ENVIRONMENT

The procedures in this handbook require the handling of harmful and flammable materials in hazardous work locations. This handbook cannot encompass all of the dangers that may be present while taking fuel and motor oil samples. Officials must identify and comply with the health and safety practices for each work location, following all notices and local requirements. Both short term and long term effects can impact health so being proactive is essential.

The safety and physical well-being of officials and other individuals at the site is the first priority. This handbook does not address all of the safety issues that need to be considered before collecting samples. It is the official's duty to obey the safety rules in effect in the work environment in which samples are collected and to seek out advice and training on good working practices. Officials must work safely so that their actions do not harm others. Collecting samples requires working in hazardous environments with dangerous materials, which means that even a minor incident could result in serious injury or death. Samples should never be transported in the passenger compartment of a vehicle. Samples must be transported in closed metal boxes designed to contain a spill when secured in the trunk of a car, pickup or van should an accident occur. Never smoke or allow open flames around a vehicle used to transport samples.

A. Awareness

The best safety tools are the senses of sight, smell, and hearing, and they should be used throughout the collection process to alert the official of potential dangers. The traits of vanity, apathy, and laziness have resulted in many injuries while common sense, patience, and safe work habits help to avoid them. Obtain and use available Personal Protective Equipment (PPE) regardless of appearance, such as safety glasses, fuel and oil resistant gloves, bright orange or yellow safety vests or respirators. The job of sampling these products increases the frequency of exposure to the inhalation of harmful fumes; and fuel splashes or spills may contaminate clothing, result in flash fires, or cause other hazards such as slippery walking and climbing surfaces. (**Note:** It is a good idea to carry a change of clothing in case clothes do get soaked with fuel or motor oil). In retail locations for example, there is the added danger of vehicular traffic and exposure to accidents caused by careless or distracted motorists or customers who may disregard safety rules and endanger others. No sample is worth an injury. Follow safety protocols and stop sampling immediately if safety cannot be controlled in the work environment. When working alone, extra precaution should be taken, such as advising the business personnel about the work that is being done and reminding them of their responsibility to ensure a safe working environment for those present on their property.

B. Safety Data Sheet (SDS)

Read the SDS for each type of fuel (e.g., gasoline, gasohol, kerosene, E-85, diesel, marine fuel, aviation fuel) or motor oil that is sampled and periodically review (e.g., every six months) updated SDSs to learn new information on the product.

NOTE: *To learn more see the American Petroleum Institute's "Safety Data Sheets: Petroleum Industry Practices" at this URL: http://www.api.org/~/media/Files/EHS/Health_Safety/SDS_Petroleum_Industry_Practices_Feb2009.pdf).*

Additional information is available from OSHA at: https://www.osha.gov/Publications/HazComm_QuickCard_SafetyData.html and information on Safety Data Sheets is available at: https://www.osha.gov/Publications/OSHA3514.html

A detailed explanation of hazardous pictograms and symbols is available from OSHA at: https://www.osha.gov/Publications/OSHA3636.pdf

C. Static Electricity

The movement or separation of materials, including liquids, generates static electricity. When these materials are different, such as when fuel moves through a nozzle or a piece of clothing is separated from a car seat as a driver leaves the seat of a car, there is often a transfer of free electrons. If either or both of the materials are poor conductors, the potential for a static discharge can build as one material becomes negative and the other positive, depending on which accumulates excess electrons. When there is no bond or ground in place to dissipate the charges, the voltage builds and the static electricity seeks an outlet. High humidity does not prevent static electricity, and lightning, the strongest example of static electricity, is common during rainstorms.

Never underestimate the danger posed by static electricity when taking samples. Even though a specific fuel and air combination must be present for a spark to cause ignition, those conditions cannot be measured with the senses. Think and act as if a very hazardous situation exists whenever carrying out the tasks described in this handbook. Study and use good grounding practices and bonding equipment, noting that nothing completely eliminates the hazard presented by the accumulation of static electricity, which can build up rapidly for a wide variety of reasons in different sources (e.g., on clothing or the flow of fuel from the nozzle into a sampling container). Before pouring fuel into another container or from a nozzle into a container, be sure they are bonded or grounded to each other. For example, place the nozzle against the opening of the container and insert it as deep as possible (use a fill tube if available) to reduce splash filling and to maintain a smooth flow so that droplets do not form. Remember to ground equipment in accordance with the instructions of the manufacturer.

Sampling procedures can introduce spark promoters into storage tanks or transport compartments so extra caution, good grounding procedures and special non-sparking equipment and tools, must be used (e.g., cords made from synthetic materials such as nylon could cause charges as it rubs against a glove or other objects). When working around rusted steel, a spark hazard can be created if equipment made of aluminum or magnesium is used.

Be aware of the notices placed on and around dispensers and ensure compliance with any warnings (e.g., such as not filling a container while it is sitting on a plastic bed liner or while it is in an enclosed space such as the trunk of a car). After getting out of a vehicle, touch a metal part of the dispenser housing to discharge any electrostatic charge before going to the dispenser island.

Do not take samples during hail and thunderstorms or when lightning is observed.

Do not take samples from a dispenser connected to a storage tank being filled by a tanker truck because the filling process generates an electrostatic charge. Wait for 30 minutes after the delivery is completed before sampling from the tank or opening its fill ports.

It is a good habit to ground the static charge on one's body by touching a metal part of the dispenser or support structure of a tank before taking a sample. On tanks and drums, touch the structure at a point at least 1 m (39 in) away from an opening.

NOTE**:** *To learn more about static electricity as it relates to fuels, visit the Petroleum Equipment Institute's "Stop Static" URL* at http://www.pei.org/static Also view the U.S. Chemical Safety and Hazard Investigation Board's video on one static caused explosion of non-conductive liquids to understand why reviewing SDSs periodically is essential: *https://www.youtube.com/watch?v=tVZzdtnZaJk* (see also: *https://www.speedway.com/About/FuelSafety).*

D. Personal Protective Equipment

1. **Clothing:** Outer garments should be made from anti-static materials such as cotton (avoid wool and synthetics which, when moving against each other, can rapidly build up static charges). The color of the clothing should be suitable for the working environment and brightly colored or covered with a vest with light reflecting elements that conform to the Class 2 or 3 requirements in the latest edition of ANSI/ISEA 107 "High-Visibility Safety Apparel and Headwear."[1] This type of high-visibility safety apparel alerts motorists and other equipment operators to an official's presence in high traffic areas around fuel dispensers and storage tanks.

2. **Shoes:** Steel toed shoes or boots manufactured to be static dissipative and slip resistant with oil/gas resistant soles should be worn. Footwear capable of causing sparks should not be worn.

3. **Eye/Face Protection:** Safety glasses or goggles should be worn whenever samples are handled and especially during collection where splashing or spraying could occur.

4. **Skin:** Avoid skin contact with all fuels, oils and other chemicals. Hand protection should be worn whenever handling samples. Gloves should be made of Nitrile2, or coated with Neoprene or Tychem2. Materials such as Nitrile2 offer chemical resistance, are considered to be strong disposable gloves, and are generally safe for people who are allergic to latex. PVC-coated gloves are recommended for use with biodiesel.

5. **Toxic Materials:** Avoid breathing toxic vapors. When fuel, oil vapors or mists are present, wear a National Institute for Occupational Safety and Health (NIOSH) – approved organic vapor/mist respirator and maintain it in accordance with the manufacturer's instructions.

E. Other Safety and Accessory Equipment

1. **Eye Wash:** Portable eye wash station or emergency eye flush solution kit (e.g., Eyesaline[2] or equivalent).

2. **Flashlight:** Use an explosion proof flashlight, Class I Division 1 C&D, Class I Division 2 A, B, C, D, Class II Division 2 G, T3C Operating Temperature.

3. **Tools:** Set of non-sparking tools (including screwdrivers, adjustable wrenches, hammer and pry tools).

4. **Traffic Cones:** Four or more – 90 cm (36 in) fluorescent traffic cones (for blocking sampling area and tank openings).

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[1] This ANSI Standard "High-Visibility Safety Apparel and Headwear (ANSI/ISEA 107-2010) was established by American National Standards Institute (**http://ansi.org/**) and the International Safety Equipment Association (**http://www.safetyequipment.org/**). Officials and other workers are routinely exposed to the hazards of low visibility while on the job. This standard provides guidelines for the selection and use of high-visibility safety apparel such as shirts, rainwear, outerwear, safety vests and headwear to improve worker visibility during the day, in low-light conditions, and also at night.

[2] NOTICE: The mention of trade or brand names does not imply endorsement or recommendation by the U.S. Department of Commerce over similar products which provide equivalent or better protection that may be available from other manufacturers.

5. **Fire Extinguishers:**

   a. **Fire Extinguisher 5 kg (10 lb) or larger:** B type extinguishers are best suited for petroleum fires but a multi-purpose fire extinguisher labeled A, B, C or any combination of those letters is recommended since any type of fire may be encountered. Assure that portable fire extinguishers with current, valid inspection dates are maintained in a fully charged and operable condition and kept in their designated places at all times except during use.

   b. **Foam extinguishers for samples with more than 10 % ethanol by volume:** AR Foam Fire Extinguisher – 6 L (2.5 gal): When the ethanol content of fuels is E10 or higher, an Alcohol Resistant (AR) foam must be used on gasoline fires as traditional AFFF foams have minimal effect.

6. **First Aid:** A first aid kit that meets or exceeds American National Standard (ANSI) Z308.1-1998 "Minimum Requirements for Workplace First-aid Kits."

7. **Fuel Containers:** 9.4 L to 19 L (2.5 gal to 5 gal) capacity metal fuel containers. These are used to hold fuel from nozzle flushes and to obtain undercover samples, and these must conform to “7-29 - Ignitable Liquid Storage in Portable Containers” from Factory Mutual - Global Property Loss Prevention Data Sheets and Underwriters Laboratory # 30 “Standard for Metal Safety Cans.” These requirements cover metal safety cans that have nominal capacities of 19 L (5 gal) or less and that are primarily intended to store and handle flammable and combustible liquids, such as gasoline, naphtha, kerosene, acetone, MEK, and similar liquids in accordance with the Flammable and Combustible Liquids Code, NFPA 30.

8. **Digital Evidence Data:** Digital camera that is waterproof and shock resistant with GPS and wireless functions. This is for use in collecting photographic evidence such as signs, device markings, totalizer indications and other information.

9. **Spill Clean-Up Materials**

   a. **“Fuel/Oil Spill Kit”:** Kit is used to contain, clean up, and dispose of spilled liquids such as water, oil, and chemicals. Spill kits typically include absorbent products (such as socks, pillows, and pads), a disposal bag, a steel self-closeable container for storage, and absorbent wipes for cleaning up spills.

   b. **Wiping Cloths:** Lint free wiping cloths or disposable wipes for wiping down sample containers and tools. Vehicles should be equipped with a self-closing steel trash can, stored outside the driver compartment, and used to hold disposable rags and wipes.

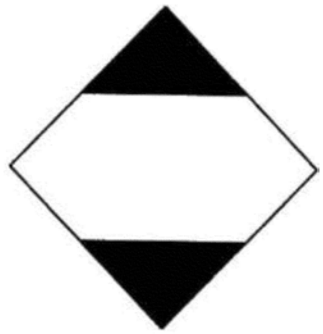
F. Vehicle and Sample Case Markings for Hazardous Materials Transportation – Alerting Emergency Responders

1. **Vehicles:** A vehicle used to transport limited quantities of hazardous material (less than 454 kg [1001 lb] aggregate gross weight) is not required to display hazardous material placards under U.S. Department of Transportation Hazardous Material Regulations. However, under that regulation, voluntary placarding is permitted to alert emergency responders that the vehicle’s cargo compartment may contain containers of flammable or combustible liquids. This information may be valuable in case the vehicle is involved in an accident or other emergency.

   For the exemption see: 49 CFR §172.504 “General Placarding Requirements.”

   > ***(c) Exception for less than 454 kg (1,001 pounds****).* *Except for bulk packagings and hazardous materials subject to §172.505, when hazardous materials covered by table 2 of this section are transported by highway, placards are not required on (1) A transport vehicle which contains less than 454 kg (1001 pounds) aggregate gross weight of hazardous materials covered by table 2 of paragraph (e) of this section; The exceptions provided in paragraph (c) of this section do not prohibit the display of placards in the manner prescribed in this subpart, if not otherwise prohibited (see §172.502), on transport vehicles which are not required to be placarded.*

2. **Sample Cases:** When "limited quantities" of flammable liquids are contained in carrying cases or shipping cartons, other exceptions and labeling requirements apply. Under this exemption, officials are permitted to transport Class 3 Flammable and Combustible Liquids without a special driver's license and shipping papers are not required. However, individual container capacity must not exceed certain limits (for Packing Group II it is 1 L (0.3 gal) and carrying cases and shipping cartons must be labeled with a "limited quantities" placard which conforms to 49 CFR 172.315 such as shown below:



For the exemption see: 49 CFR §173.150 Exceptions for (Limited Quantities) of Class 3 (Flammable and Combustible Liquids).

§173.150 Exceptions for Class 3 (flammable and combustible liquids).

> ***(a) General.*** *Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the §172.101 Table of this subchapter.*
>
> ***(b) Limited quantities.*** *Limited quantities of flammable liquids (Class 3) and combustible liquids are excepted from labeling requirements, unless the material is offered for transportation or transported by aircraft, and are excepted from the specification packaging requirements of this subchapter when packaged in combination packagings according to this paragraph. A limited quantity package that conforms to the provisions of this section is not subject to the shipping paper requirements of subpart C of part 172 of this subchapter, unless the material meets the definition of a hazardous substance, hazardous waste, marine pollutant, or is offered for transportation and transported by aircraft or vessel, and is eligible for the exceptions provided in §173.156 of this part. In addition, shipments of limited quantities are not subject to subpart F (Placarding) of part 172 of this subchapter. Each package must conform to the packaging requirements of subpart B of this part and may not exceed 30 kg (66 pounds) gross weight. Except for transportation by aircraft, the following combination packagings are authorized: (1) For flammable liquids in Packing Group I, inner packagings not over 0.5 L (0.1 gallon) net capacity each, packed in a strong outer packaging; (2) For flammable liquids in Packing Group II, inner packagings not over 1.0 L (0.3 gallons) net capacity each, packed in a strong outer packaging. (3) For flammable liquids in Packing Group III and combustible liquids, inner packagings not over 5.0 L (1.3 gallons) net capacity each, packed in a strong outer packaging.*

Reference: Find the latest version of these regulations at *Code of Federal Regulations at:* http://www.ecfr.gov.

G. Safety and Health Checklist and Periodic Review

Reorder replacement supplies immediately after use so adequate supplies are available to do the job. Also, during the first week of each month, safety and health related supplies should be inventoried and inspected to ensure that they are undamaged, any expiration of use dates are current and that equipment is ready for use. By setting a specific time to do the inspection, it will become a habit. Anticipate the need for replacement supplies so that they can be ordered to allow ample time to obtain them and have them delivered. A sample checklist for inspecting safety and health equipment is presented in Appendix A. "Safety and Health Equipment Checklist."

H. Training

Prior to performing any sampling activities, officials should attend training courses or webinars in these subjects:

1. **Fire Extinguishers:** Use of fire extinguishers in fighting fires (a live fire demonstration is recommended).

   For example see: Fire Extinguisher Training at http://emergency.yale.edu/sites/default/files/files/TMS-Fire-Extinguisher-Training.pdf

2. **U.S. Department of Labor:** Occupational Safety and Health Administration (OSHA) Training on Flammable and Combustible Materials and Emergency spill response including how to clean up small spills.

   For example see: OSHA Flammable Liquids at https://www.osha.gov/dte/library/flammable_liquids/flammable_liquids.html

   For example see: How Fire Departments Respond to Small Fuel Spills - Self Study at https://www.pca.state.mn.us/sites/default/files/c-er4-05.pdf

3. **Ladder Safety:** Sometimes climbing may be required to obtain samples, so courses on ladder safety and cargo tanker safety are recommended.

   For example see: Ladder Safety - Self Study at http://www.laddersafetytraining.org/ and Climbing on Tankers at http://www.cargotanksafety.org/wp-content/uploads/2014/03/ctrmctrailerclimbingtrainingoutline3-28-2011-110330091455-phpapp02.pdf

4. **First Aid Training:** This is required under OSHA First Aid Standard 29 CFR 1910.151 which requires that in the absence of an infirmary, clinic or hospital in close proximity to the workplace, a person or persons shall be adequately trained to render first aid. The First Aid, CPR, and AED Training must conform to OSHA First Aid Standard 29 CFR 1910.151 and should be provided by an instructor certified by the National Safety Council.

   For example, see First Aid OSHA Compliance Training at http://www.nsc.org/learn/Safety-Training/Pages/first-aid-train-your-employees.aspx

5. **Driver Training:** It is recommended that officials take an on-line or self-study Professional Truck Driver training course by the National Safety Council. The training covers defensive driving techniques to help avoid collisions, injuries and violations, and teaches personal responsibility for driving decisions.

   For example see: Professional Truck Driver Defensive Driving Course at http://www.nsc.org/learn/Safety-Training/Pages/professional-truck-driver-training.aspx

6. **Other Training Resources**: https://www.osha.gov/dte/library/index.html

7. **OSHA Laboratory Safety Guidance:** https://www.osha.gov/Publications/laboratory/OSHA3404laboratory-safety-guidance.pdf

IV. SAMPLING PROCEDURE OVERVIEW

Specific quality assurance guidelines must be established within every fuel or motor oil inspection program to facilitate the implementation of a sampling program. However, the following general quality assurance procedures apply:

A. Data

All data must be documented on standardized primary inspection reports and sample collection worksheets or entered into a digital equivalent.

B. Instruments and Sampling Equipment

All instruments and sampling equipment must be operated in accordance with the operating instructions supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation and they must be documented.

C. Sampling Procedures

Sampling procedures should be identical to those used by the Environmental Protection Agency (see 40 CFR 80.8) to collect samples of gasoline, diesel fuel, blendstocks, fuel additives, and renewable fuels for purposes of determining compliance with applicable laws and regulations.

1. **Manual Sampling:** Manual sampling of retail/wholesale fuel dispensers and storage tanks shall be performed according to the applicable procedures specified in the latest edition of ASTM International (ASTM) D4057 "Standard Practice for Manual Sampling of Petroleum and Petroleum Products."

2. **Automatic Sampling (not addressed in this handbook):** Automatic sampling of petroleum products in pipelines shall be performed according to the applicable procedures specified in the latest edition of ASTM D4177 "Standard Practice for Automatic Sampling of Petroleum and Petroleum Products."

3. **Sampling and Sample Handling for Volatility Measurement:** Samples to be analyzed for Reid Vapor Pressure (RVP) shall be collected and handled according to the applicable procedures specified in the latest edition of ASTM D5842 "Standard Practice for Sampling and Handling of Fuels for Volatility Measurement."

4. **Sample Compositing:** Composite samples shall be prepared using the applicable procedures specified in ASTM D5854 "Standard Practice for Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products."

5. **Sampling Plans:** The collection of fuel and motor oil samples should be carried out under a directed work plan that ensures that these products are subject to periodic verification throughout the jurisdiction. Sampling is typically carried out without advance notice so there is no opportunity for the seller to alter either the product or labeling on the dispensing device. Variances from a plan are permitted (e.g., when new installations or new sellers or suppliers enter a marketplace). Increased frequency of inspections can be initiated on sellers whose products fail, but this decision should be based on the circumstances of each failure and should not be an automatic response. For example, if the cause of the failure was due to the mis-drop of a product by a new or part-time truck driver, then the likelihood of a repeat of this type of error is much less and may not merit a diversion of inspection resources. That is especially true if corrective actions and preventative measures are taken by the delivery company and seller.

V. FUEL SAMPLING

A sample is a small amount of fuel taken from a storage tank or dispenser that is representative of a larger amount of fuel. The sample will be tested to determine if the fuel quality is in compliance with fuel quality standards. Sampling can be done manually or automatically with automatic systems. This handbook only addresses manual sampling. There are many "types" of samples defined by the location in a tank from where they are collected.

A. Types of Manual Sampling

1. **Nozzle/Outlet Sampling:** Taking a sample from the outlet nozzle of a fuel dispenser or pump. This is the most common type of sample taken by officials. It is presumed to be representative of the fuel sold to consumers through all of the dispensers piped to the same storage tank.

   <u>Tank Sampling Positions</u>

   When there is a need to collect a sample from a storage tank, a weighted bottle is used to collect the following samples from various levels of fuel in the tank:

   Top Sample: A sample taken 152 mm (6 in) below the top level of fuel.

   Upper Sample: A sample taken from the middle of the top third level of fuel.

   Middle Sample: A sample taken from the middle level of fuel (or a level halfway between the upper and lower sampling points).

   Lower Sample: A sample taken from the middle of the bottom third level of fuel.

   Bottom Sample: A sample taken on the bottom of a tank.

2. **All-Level Sample (sometimes called a "composition sample"):** A sample taken by submerging a closed-weighted bottle sampler to a point as near as possible to a tank's outlet point. The sampler is then opened and raised at a constant rate so that it is between 70 % and 80 % full when it emerges from the top level of fuel.

3. **Average Sample:** A sample consisting of proportionate parts from all levels of the fuel (e.g., an average sample from a horizontal, cylindrical, or a spherical tank should contain more material from the middle of the tank where the diameter is greatest.)

B. Samplers

The most frequently used containers for collecting fuel samples from retail engine fuel dispensers are clear or amber glass bottles (PVC coated safety bottles that reduce spills if broken are available) or metal cans such as shown below. Typically, samples used for quality testing at the wholesale level are taken from storage tanks and tank trucks. There are also times when samples must be taken from bulk storage as part of an investigation or follow-up to a consumer complaint. The safe collection of a representative sample should be the criteria for selecting sample locations. A representative sample can be collected using techniques or equipment designed for obtaining fuels from various fuel depths. The structure and characteristics of some storage tanks present access problems with collection of samples from more than one location; therefore, the selection of sampling devices is an important consideration. Depending on the type of storage vessel, the official can choose a bacon bomb sampler, subsurface grab sampler, or a glass thief to collect the sample. Other custom-made samplers may be used depending on the specific application. Sometimes samples are taken from fuel storage tanks, tanker trucks and even barges. To collect samples from these sources, specialized fuel sampling equipment must be used. These include a weighted bottle (see Figure 1), a submerged sampler or bacon-bomb thief (see Figures 2, 3, and 5), and tank and drum thieves (see Figures 4 and 6). There are many other types of sampling equipment of many different designs so the following are only examples of a few of the different tools available to the official for use in fuel sampling. The drop line and other lines used on samplers is 100 % cotton rope with a brass end hook for attaching the rope to the sampler.

***NOTE:** If a sampler is used to take the fuel sample for microbiological testing, it must be cleaned and sterilized prior to use.*

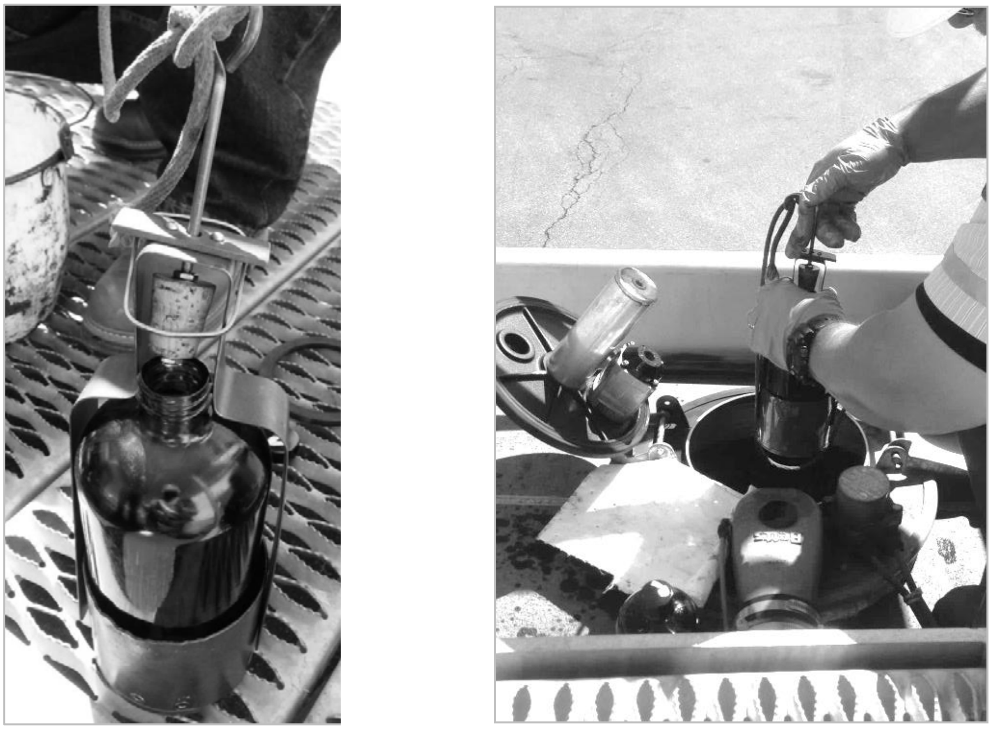


Figure 4. A Weighted Bottle for use in sampling Stationary Tanks and Tanker Trucks.

Photo courtesy of Chevron Products Company and the California Division of Measurement Standards.

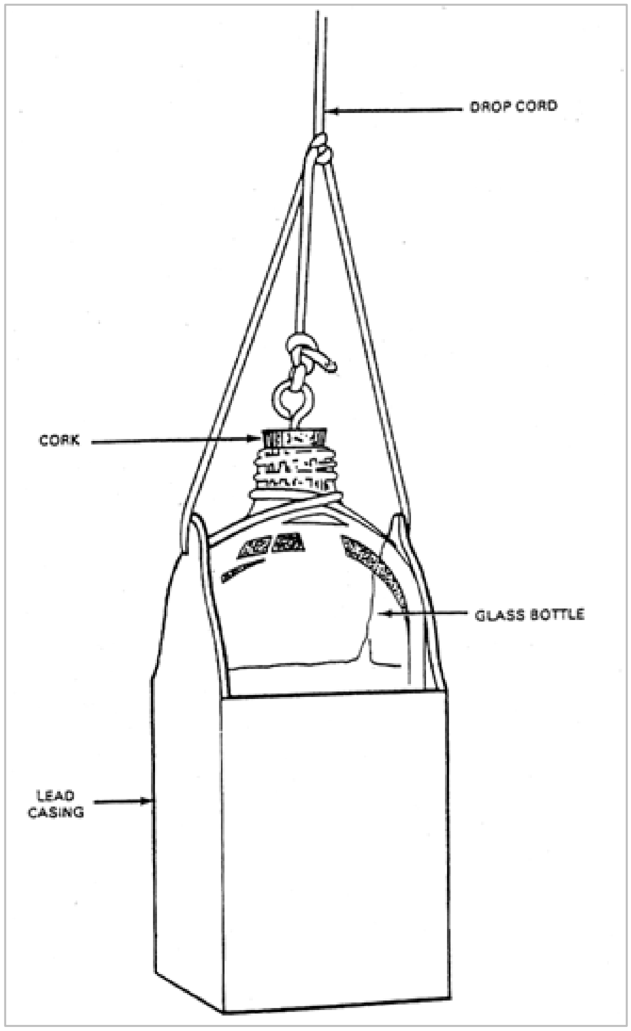


Figure 5. Weighted Sampling Bottle.

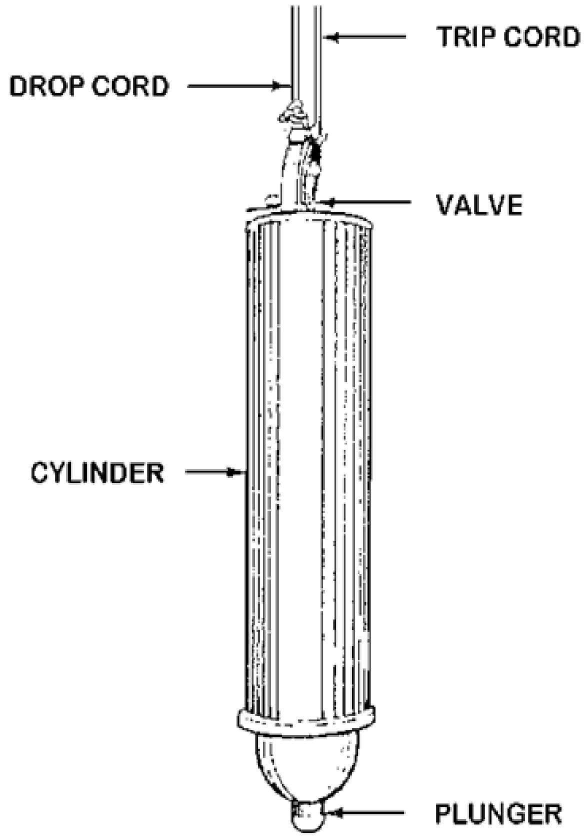


Figure 6. Bacon Bomb Thief.

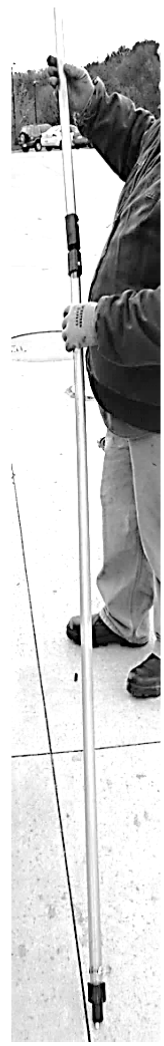


Figure 7. Tank Thief Sampler.

Photo courtesy of the Missouri Department of Agriculture.

Figure 8. Submerged Samplers (Bacon Bomb Thieves) of Different Capacities.

Photo courtsey of Koehler Instruments (2015)

Figure 9. Drum Thief.

1. **Weighted Bottle Sampler:** The weighted bottle sampler (see Figures 1 and 2) consists of a bottle permanently attached to a base. (Some of these types of samplers use a copper cylinder or beaker.) A drop cord is attached to the handle through a ring in the stopper so that a short, quick pull on the cord opens the bottle at any desired point beneath the surface of the liquid. This sampler is used to take an upper, middle, lower, or all-level sample of liquid product. It is used for sampling tanker or barge compartments, shore-tanks, tank cars, and tank trucks.

<u>Typical Procedures for Taking an All-Level Sample Using a Weighted Bottle Sampler:</u>

NOTE: *To ground a static buildup the person taking the sample should touch the tank at a point not less than 1 m (39 in) away from the sampling opening before starting the sampling process.*

Recommended Steps: Place an appropriate disposable fuel/oil spill pad (sometimes called a "soaker pad") next to the tank sampling point.

NOTE: *Fill the sampler with fuel and drain it completely before taking a sample.*

a. Assemble the weighted bottle sampler and open the tank access port.

b. If the weighted bottle sampler is to be used to obtain samples at specific depths, then estimate the depth to be sampled and mark the sampling line at the desired depth. In some cases, a storage tank gauge stick may be lowered to the bottom of the tank, removed, and then used to measure the actual depth of the fuel as indicated on the stick. Using the sample line, slowly lower the sampler until the desired level is reached.

c. When the sampler is at the required depth, pull out the bottle stopper with a sharp jerk of the sampler line and allow the bottle to fill completely (usually evidenced by the cessation of air bubbles).

d. Retrieve the sampler by the sample line. Position it over the fuel/oil spill pad and wipe off the exterior of the sampler body with a disposable rag.

e. Position the sampler over the sample container and release its contents by pulling up on the plunger line. Fill the sample container to 80 % of capacity.

f. Cap the sample container tightly, and (if used in your jurisdiction, attach a security seal) place it in transport carrier.

g. Properly dispose of any excess fuel in the sampling device; then clean, dry, and store it.

h. Reseal the tank access port and properly dispose of any contaminated soaker pads or rags.

2. Submerged Samplers (Bacon-Bomb-Thief) (Figures 3 and 5)**:** These samplers are typically used to take bottom samples but can be modified to take samples at different levels. They consist of a nickel-plated brass cylinder tapered at both ends and fitted with an internal, plunger-type valve. The valve opens automatically when the sampler strikes the bottom of a storage tank and allows the fuel to enter the container and closes when lifted. A drop cord is attached to a ring at the top of the sampler.

Typical Procedures for Use of a Submerged Sampler:

NOTE: *To ground a static buildup, the person taking the sample should touch the tank at a point at least 1 m (39 in) away from the sampling opening before starting the sampling process.*

Recommended steps: place an appropriate disposable fuel/oil spill pad (sometimes called a “soaker pad”) next to the tank sampling point.

NOTE: *Fill the sampler with fuel and then rinse and drain it before taking a sample.*

a. Attach the sample line and the plunger line to the sampler.

b. Estimate the depth to be sampled and then mark the sampling line with the desired depth. In most cases, a storage tank gauge stick may be lowered to the bottom of the tank, removed, and then used to measure the actual depth of the fuel as indicated on the stick.

c. Open the tank access port. Using the sample line, slowly lower the sampler until the desired level is reached.

d. Pull up on the plunger line and allow the sampler to fill before releasing the plunger line to close the seal.

e. Retrieve the sampler by the sample line being careful not to pull up on the plunger line and thereby prevent accidental opening of the bottom valve.

f. Position it over the fuel/oil spill pad and wipe off the exterior of the sampler body with a disposable rag.

g. Position the sampler over the sample container and release its contents by pulling up on the plunger line. Fill the sample container to 80 % of capacity.

h. Cap the sample container tightly and, (if used in your jurisdiction, attach a security seal) place in transport carrier.

i. Properly dispose of any excess fuel in the sampling device and then clean, dry, and store it.

j. Reseal the tank access port and properly dispose of any contaminated soaker pads or rags.

3. Tank or Drum Thief Sampler (Plastic Cylinder): Typically these are plastic cylinder (tube type) samplers which consist of a multi-piece, plastic tube, 1 m (39 in) to 5 m (195 in) long and 38.1 mm (1½ in) at maximum diameter. The tubes are typically fitted with two finger rings at the upper end and three supporting legs at the bottom. Both ends are tapered with openings. The top opening of the sampler is closed with a stopper (or gloved thumb) or valve until the sampler is submerged in the liquid. Then the stopper is removed from the opening or the valve is opened, allowing the fuel to fill the sampler. It is used in tanks drums, barrels, or cans.

Typical Procedures for Use:

***NOTE:** To ground a static buildup, the person taking the sample should touch the tank at a point at least 1 m (39 in) away from the sampling opening before starting the sampling process.*

***NOTE:** Fill the sampler with fuel and then rinse and drain it before taking a sample.*

a. Remove cover from sample container and place it on a solid level surface at a conveniently located height so that it is easily accessible when holding a filled thief tube (typically a clean, dry jar with a large opening is use to collect this fuel sample so that the tube thief can be easily inserted.)

b. Open the tank access port. Slowly insert thief tube into storage tank. Hold it firmly with a wiping cloth while sampling and use the cloth to dry the tube as you remove it from the tank. Keep the cloth in contact with the tube throughout the process to reduce the buildup of static electricity.

c. Open the tube or valve and allow the fuel in the storage tank to reach an equal level in the tube. Once the tube is filled close the tube or valve firmly.

d. Remove the thief tube from the storage tank slowly to confirm that there is no fuel leaking and then insert the tube into the receiving jar. Wipe the tube dry.

e. Release the fuel into the sampling container until it is filled to 80 % of capacity.

f. Close the tube or valve firmly and remove the sampler from the sample container. Close the sample container. Dispose of any excess fuel in the tube and then clean, dry, and secure the sampler.

g. Reseal the tank access port and properly dispose of any contaminated soaker pads or rags.

C. Fuel Sample Containers

Types of sample containers may include clear or amber colored borosilicate glass bottles (laboratory grade) or metal cans. (**Note:** Shatter resistant glass bottles are available from a variety of vendors.) Only cans with seams soldered on the exterior surface may be used for fuel samples. (If they are not properly soldered, minute traces of flux may contaminate the sample and interfere with tests for dielectric strength, resistance to oxidation, and sludge formation.) There are several reasons that clear bottles may be preferred. Glass prevents permeation and allows a visual inspection of the sample for cleanliness and to see if there is free water or solid impurities present. However, samples of gasoline, jet fuel, and kerosene must be protected from direct sunlight so amber bottles or cans are recommended for those fuels. Clear glass bottles covered with paper or foil may also be used, and immediately placing a clear bottle in a transport box (described elsewhere in this handbook) also provides protection. Screw caps made of either plastic or metal may be used; the caps should provide a vapor tight closure seal. The screw caps must be protected with liners made of metal foil, Teflon, polyethylene, or other material that will not be destroyed by or affect the sample product. Plain cork stoppers and lids with cardboard inner-liners are not acceptable. If samples are shipped, see the U.S. Department of Transportation requirements in §49 Code of Federal Regulations. Containers may be reused indefinitely but must be cleaned and resealed to reduce the possibility of contamination. See Table 1. Suggested Container Types and Minimum Sample Sizes and Figures 7 through 12 for examples of the containers typically in use and minimum sample sizes. For a more detailed statement on specifications for sampling containers see ASTM D5854 "Standard Practice for the Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products."

Table 1.
Suggested Container Types and Minimum Sample Sizes for Fuel

Product		Container Material				Minimum Sample Size
		Glass	Aluminum	Metal	FHDPB "Plastic"	
1.	**Gasoline –** General[4]	**X**	**X**	**X**	NO	2 L
	Alcohol/Ether	**X**	**X**	**X**	NO	2 L
	Vapor Pressure	**X**	**X**	**X**	NO	1 L
	Trace Lead	**X**	**X**	**X**	NO	1 L
2.	**Diesel Fuel –** General	**X**	**X**	**X**	NO	2 L
3.	**Kerosene –** General	**X**	**X**	**X**	NO	2 L
4	**Fuel Oil –** General	**X**	**X**	**X**	NO	2 L
5.	**Aviation Gas –** General[2,3]	**X**	**X**	**X**	NO	2 L
6.	**Aviation Turbine Fuel –** General[2, 3]	**X**	**X**	**X**	NO	2 L
7.	**Biodiesel –** General	**X**	**X**	**X**	NO	1 L
8.	**E85 –** General	**X**	**X**	**X**	NO	1 L
9.	**Hydrogen –** General	**X**	**X**	**X**	NO	1 L
10.	**Methanol –** General	**NO**	**NO**	**X**[1]	NO	1 L

NOTE 1: *Methanol (also known as methyl or wood alcohol) is used as a fuel primarily in race cars. It is also available in gasoline-methanol blends that range from 10 % to 30%. If samples are taken of these fuels do not use aluminum containers because there is a potential for corrosion to occur. It is recommended that containers constructed of 316L series stainless steel be used to hold samples of this fuel or blends containing methanol. See the "Methanol Safe Handling Manual" at Methanol Institute* (www.methanol.org) *for specific guidance on handling this product.*

NOTE 2: *See ASTM D4306 "Standard Practice for Aviation Fuel Sample Containers for Tests Affected by Trace Contamination" for more guidance on containers and their preparation prior to placing fuel in them. Generally, borosilicate glass bottles are adequate if wrapped in aluminum foil or stored in a sealed sample box to protect the fuel from light.*

NOTE 3: *When collecting samples of aviation gasoline and aviation turbine fuel for thermal stability, water separation, trace metal and other tests refer to ASTM 4306 for special container requirements and guidance on cleaning, preparation and handling procedures. The sample must be tested within 24 hours of taking.*

NOTE 4: *According to Section 6. Interferences in ASTM D2699 "Standard Test Method for Research Octane Number of Spark-Ignition Engine Fuel" and ASTM D2700 "Standard Test Method for Motor Octane Number of Spark-Ignition Engine Fuel" exposing fuels to UV wavelengths shorter than 550 nm for a short period of time may significantly affect octane number ratings. For this reason, fuel samples must be protected from damaging light. Collect and store fuels to be tested for research or motor octane in an opaque container, such as a dark brown glass bottle or metal can to minimize exposure to UV emissions from sources such as sunlight or fluorescent lamps.*

Figure 10. Clear Bottles.

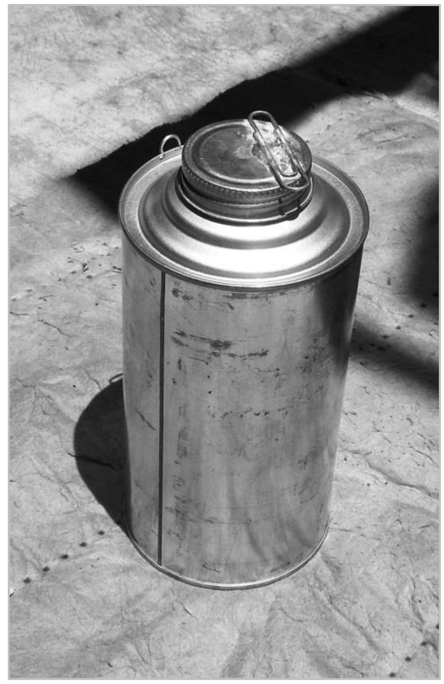


Figure 11. Can with Provision for Security Seal.

Figure 12. Amber Brown Bottle with Label.

Photo courtesy of the State of Colorado, Div. of Oil and Public Safety.

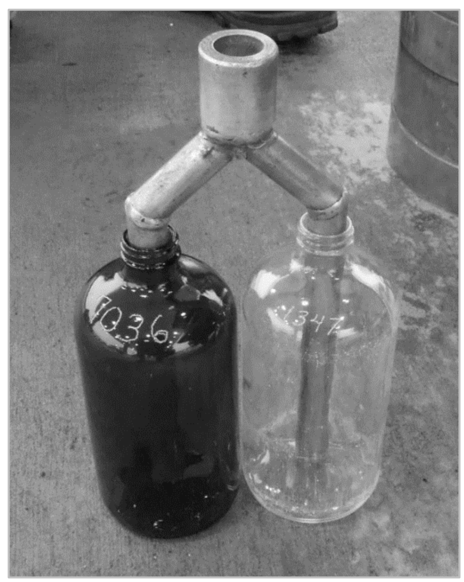


Figure 13. Bottles with Etched Identity Numbers.

Photo courtesy of the Missouri Department of Agriculture.

Figure 14. One Quart – Metal Container with Label.

Figure 15. One Liter - Stainless Round Container with Wire Security Seal Loops.

D. Washing and Drying Sample Containers (one example)

After each use, the sample container should be cleaned using the following procedure or one that provides equivalent or better results:

1. Rinse with a solvent. Discard solvent in accordance with good environmental practice.

2. Wash with a strong soap solution.

3. Rinse with distilled water.

4. Dry in a dust-free cabinet at a temperature of at least 40 °C (104 °F) or warmer.

5. Close container immediately after it is dry.

6. Store in a location specifically designated for clean-ready to use, sample containers.

NOTE: Samples Containers for Microbiological Testing: *A sterilized glass or polypropylene bottle must be used to hold the sample. If a sampler is used to take the fuel sample, it too must be cleaned and sterilized before use. Sterilization can be accomplished by placing the bottle (and cap if heat resistant) in an oven at 160 °C (320 °F) for one hour. Alternatively, an autoclave may be used as long as the bottle and cap are dried prior to use. Microbiological sampling requires procedures not covered in this handbook. Refer to ASTM D7464 - 14 "Standard Practice for Manual Sampling of Liquid Fuels, Associated Materials and Fuel System Components for Microbiological Testing" for guidance on sampling methods and handling procedures.*

NOTE: Sample Containers for Trace Analysis*: Use procedures that ensure sampling equipment and containers are made with materials known not to interfere with the analysis. It is also important to ensure that every component of the sampling process is clean and dry so that the fuel sample is not contaminated or tainted.*

NOTE: *To avoid potential rust contamination, metal containers may be cleaned using Varsol or acetone.*

E. Capacities

The capacity of the most common sample bottles and containers are typically 937 mL (1 QT) and they have sealing caps compatible with fuel. Bottles and sealing caps must be clean and dry prior to use.

F. Identifying Samples for Traceability

The information shown in Table 2 illustrates the type of information typically collected on a fuel sample. In many jurisdictions, the sample container is permanently marked with a unique identifying number and no label is applied. In other jurisdictions, a label is applied to the container which bears a unique identifier number. In most jurisdictions, a Fuel Sample Data Sheet (FSDA) is included with the sample in the shipping case. Some information may be stored in a database while other data is entered on a data sheet.

Table 2.
Examples of Entries on a Fuel Sample Data Sheet

	Item	Entry
1.	Sample number/unique container identity	Enter the sample container's unique identifier number. Each sample must have a unique identifier such as a number or alpha numeric code so its handling can be traceable, and so that all collection reports and laboratory tests are linked to the original sample.
2.	Product identification	Obtained from device product label, tank marking, or bill of lading.
3.	Ethanol content	Indicate if device label or signage reads (e.g., "up to 10 %" or "contains 10 %" or other claim).
4.	Sampling location identity	Enter business name, identifier number (this may be assigned by the fuel regulatory agency), address of sample location, business mail address, agent name, telephone, fax, and e-mail. This information may be used to immediately notify the seller to remove the product from sale should the sample fail.
5.	Special test to be conducted on sample	This item is entered if there is a reason to call for a specific test to be conducted on a sample. This may be used in cases where the testing laboratory does not routinely conduct the requested test on all samples (e.g., in case of a consumer complaint).
6.	Sampled lot	Amount of fuel that the sample represents. Total liters or gallons in the source fuel storage tank represented by the sample.
7.	Supplier(s) of fuel	Enter the name of the supplier or suppliers of the fuel in the source fuel storage tank.
8.	Date of last fuel delivery to storage tank.	Enter the day of the latest delivery of the fuel into the storage tank from which the sample was taken.
9.	Sample Taken by	Name (or identifier number) of the official who took the fuel sample.
10.	Source of sample	Identify the specific source of the sample (e.g., dispenser or storage tank identity, number or location, or license or vehicle number of tank truck and compartment number).

Table 2.
Examples of Entries on a Fuel Sample Data Sheet

	Item	Entry
11.	Date/Time sample collected	Enter the time of day, day, month and year indicating when the sample was collected.
12.	Sampling Equipment Used	Enter weighted bottle or other sampling tool, if applicable.
13.	Type of Sample (when taken with a Sampler)	Enter outlet sample, or upper, middle, lower, bottom or all level sample depending on the collection method used.
14.	Notes/Safety Warning Label	Enter weather conditions and any remarks necessary to accomplish the analysis of the sample. Provide Required Safety Warnings. 
15.	Security Seal(s)	Enter the identification number of any security seal applied to a sample container or transport case.

G. Sample Transport Cases

Most jurisdictions place fuel samples in sealable insulated containers immediately after they are taken. These cases (see examples in Figure 13) hold the fuel sample safely for transport while protecting them from sunlight and heat. A sample case must bear a label indicating that it contains gasoline or oil samples to alert anyone who handles it that it contains flammable liquids. (See also Section I., F. Vehicle and Sample Case Markings for Hazardous Materials Transportation – Alerting Emergency Responders, Item 3. Sample Cases.)

Figure 13a.- Sample Box.

Photo courtesy of the North Carolina Department of Agriculture and Consumer Services.

Figure 16b. Sample Box Showing Insulation.

Photo courtesy of the Missouri Department of Agriculture.

Figure 13c. Sample Box showing Security Seal in Place

Photo courtesy of the Missouri Department of Agriculture.

Figure 13d. Sample Box containing Collection Reports as received at the Fuel Laboratory.

Photo courtesy of the Georgia Department of Agriculture.

1. Procedure for Use of Transport Boxes:

Once samples have been collected:

a. Recheck that the sample container is not overfilled and confirm tightness of the cap/seal on the container and check for leakage.

b. Ensure a unique sample identification number is on the can. Place sample container in the transport box.

c. Ensure that the custody record for each transport box is complete, placed in a plastic protective cover, and placed in the container or affixed to the inside lid.

d. Secure and custody seal the lid of the transport box and record the security seal number on the primary inspection report.

I. Security Seals for Containers and Boxes

A container holding a fuel sample should be sealed as part of the chain of custody system but this sealing is not mandatory if other safeguards are in place. For example, if the fuel is held under the secure control and possession of the fuel official who collected the sample from time it was collected until it is delivered to the fuel laboratory, sealing is unnecessary. Another exception to sealing is permitted if the container is placed in a sealed sample transport box for storage and transportation to the fuel laboratory.

J. Recommended Sampling Equipment - Nozzle Extender

It is recommended that all fuel samples taken from a dispenser nozzle be collected using a nozzle extender. These tubes are typically constructed of Schedule 80 non-ferrous metal. They can be constructed of a single tube (See Figure 14.) or made for bi-furcated filling (See Figure 15.). See ASTM D5842 for detailed instruction on fabricating these extenders.

17. Single Nozzle Extender.

18. Dual Nozzle Extender.

Photo courtesy of the Missouri Department of Agriculture.

VI. SAMPLING PROCEDURE FOR TAKING FUEL SAMPLES AT RETAIL FUELING LOCATIONS

A. Preparation

1. **Conduct:** Officials must conduct themselves in a professional manner at all times when taking samples. This includes being aware of what is going on around them so that a safe working environment prevails. Officials should park vehicles in a suitable location until management of the sampling location have been notified of the identity, authority, and nature of the visit. When sampling at retail locations, it is often necessary to have the fuel dispensers authorized for operation so that samples can be taken. Officials must establish contact with the authorized management representative and explain how samples will be taken to ensure that the console operator(s) understands what is expected in assisting the official. It is management's right to observe sampling procedures and be present during the sample collection process if they choose to do so. This will allow the person to confirm the source of the fuel and identity of the container and enable them to satisfy themselves that the sample container was properly sealed and purged fuel was returned to the proper storage.

2. **Business Identity:** Obtain the business ownership and other identity information.

3. **Storage Tank:** To ensure that purged fuel is returned to the correct storage tank, verify that the markings on the storage tank are understood, and that they match the fuel identity chart. If there is any doubt about the proper storage tank, the official should ask the location manager to indicate the appropriate tank access point.

   NOTE: *For reference see NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices," Section 3.30. Liquid-Measuring Devices Code, U.R.2.5. Product Storage Identification. (See also NIST Handbook 130, Uniform Engine Fuels and Automotive Lubricants Regulation, Section 4.4. Product Storage Identification.):*

Source: NIST Handbook 44 – Section 3.30.

UR.2.5. Product Storage Identification.

(a) The fill connection for any petroleum product storage tank or vessel supplying motor-fuel devices shall be permanently, plainly, and visibly marked as to product contained.

(b) When the fill connection device is marked by means of a color code, the color code key shall be conspicuously displayed at the place of business.

4. **Avoid Disrupting Normal Business Operations:** The official should select a dispenser lane for sampling and either block the lane around the dispenser with safety cones or park their vehicle in the lane. The vehicle should be positioned to allow ample access to the dispenser. The official should turn off lights, radios and the vehicle engine and set its parking brake. A walk-around inspection should be conducted to ensure there is easy access to sampling equipment and a fire extinguisher. At the end of the sampling and before the vehicle is moved another walk-around inspection should be made to ensure that all equipment has been collected and all samples and the dispenser are secured (e.g., that the dispenser housing is reclosed if it was opened for inspection.)

5. **Payment for Samples**: In most jurisdictions, the official is obligated to pay the retail value of the product if a fuel sample is taken from a place of business where it can be sold legally unless the sample is being collected pursuant to a search warrant, or the fuel's owner surrenders the sample at no cost.

A sample of a payment receipt is shown below:

<table>
<tr><td colspan="4" align="center">PAYMENT RECEIPT
Agency Responsible for Engine Fuel Quality
Address,
City, State, Zip
Telephone, E-mail, URL</td></tr>
<tr><td>Seller's Name:</td><td colspan="2">Address:</td><td>Date:</td></tr>
<tr><td colspan="4">Received $____________________as payment for the fuel or oil samples described below taken for inspection purposes as provided for by Chapter xxxxx of the Code of the State of ____________________.

____
Signature of Business Representative</td></tr>
<tr><td colspan="2">Sample Taken:</td><td colspan="2">Official:</td></tr>
</table>

6. **Documentation:** Throughout an official visit, it is important that information about device labeling and signage related to the fuel be recorded to document the product identity and other claims made by the seller. The official should make a brief record of actions taken and his or her observations as well as details of any relevant information provided by the seller or the seller's representative. Taking notes, photographs, and keeping logs provide permanent records of a fuel sampling activity and facilitate enforcement.

B. Sample and Containers

1. **Sample Size:** A fuel sample of at least 1 L (1 qt) should be taken. If a vapor pressure test is to be performed, an additional fuel sample of the same volume should be taken. As a general rule, a sufficient amount of product should be collected to allow for the initial test, a repeat test, and retention of some product for evidence in case of legal action. For reasons of due process, irreplaceable evidence, whether favorable or unfavorable to a regulated business, should not be discarded prior to the conclusion of legal proceedings, including the time allowed for the filing of appeals.

2. **Sample Container Fill Levels:** To allow for thermal expansion, sample containers should not be filled to more than 80 % of their capacity. Samples taken for vapor pressure testing **MUST** be filled between the 70 % to 80 % level. The official should always close sample containers tightly immediately after filling and check for leaks by tilting the container up and holding it in the inverted position for 10 seconds. The most widely used method for the collection of fuel samples is to fill a clean sample bottle with fuel from a dispenser nozzle/outlet. This eliminates the use of other sampling equipment and reduces the risk of contamination. The sample container should be of the type best suited to the product and to the purpose of the test. It must be visually inspected immediately prior to use to ensure it is clean, dry, and lint-free. Only use clean and dry sampling equipment and containers to prevent contamination of the fuel sample.

Table 3.
Sample Size – Container Fill Levels Based on Dispenser Readings

Sample Container Capacity 1 Fl Qt*	70 % Capacity	80 % Capacity
	Dispenser Readings from Zero (0)	
0.25 gal	0.175 gal	0.200 gal
0.946 L*	0.662 L	0.756 L
Sample Container Capacity 1 L	0.700 L	0.800 L

*These values are provided for situations where a one fluid quart container is used to take a sample from a retail dispenser which delivers in liters.

3. **Recommended Sampling Practice:** It is recommended that the sample container be placed on the island next to the dispenser (or on a grounded cart such as the one pictured below) to avoid the possibility that the container will be dropped or that a spill might result in the official's clothes being soaked with fuel. Submerged filling of an open container is critical to ensuring safety and to reduce the loss of light ends [3] The official should use a cotton rag to wipe and clean the parts of the nozzle and extension piece that come into contact with the sample container and fuel sample. Use of an extension tube constructed of conductive metal (e.g., copper) that reaches to the bottom of the sample container to ensure submerged filling of the container (see Figure 16) is recommended for taking all samples. The official should place the metal nozzle spout in contact with the extension piece or container to prevent build up and discharge of static electricity and then manually control the nozzle and fill the container slowly to decrease the build-up of static electricity. It is recommended that the sample container be kept at least 1 m (3 ft) away from any vehicle during filling to prevent ignition of fumes by hot engines or catalytic converters during filling.

[3]The term "light ends" means hydrocarbons from crude distillation that are low density (lighter weight than gasoline) and have low boiling temperatures. Butanes are the most common light end hydrocarbons used in gasoline.

Figure 19. Sample Bottles Empty and Filled with Bifurcated Tube.

Photos Courtesy of Missouri Department of Agriculture

*20. Fuel Sampling Cart with Transport Case and Safety Gasoline Can to hold fuel from nozzle-hose flushes.**

*21. Fuel Sampling Cart with Sample Container bonded to cart and ground.**

**This cart is used by the State of North Carolina. Photos courtesy of the North Carolina Department of Agriculture and Consumer Services*

C. Sampling

1. **Sample Taken from a Measuring Device that Dispenses a Single Product:** No flushing is required for this nozzle-hose combination. The official should:

   a. Place the sample container on the concrete drive-way, a grounded cart, or on the island next to the dispenser so it is grounded or bonded.

   b. Use a cotton rag to wipe the parts of the nozzle and extension tube that come into contact with the sample container and fuel sample.

   c. Authorize the dispenser and place the nozzle/outlet and extension tube in the sample container and fill it slowly to reduce foaming and light end loss and so that air leaves the container without splashing fuel droplets. Continue until it is filled to the specified volume (or the dispenser indicates the quantity specified for the sample). See Table above for dispenser readings when the delivery begins at 0.000.

   d. Close the sample container and mark as required.

2. **Sample Taken from a Multi-Product or Blended Product Dispenser (See Section 3. for recommended procedures for use in taking an E15 sample.):**

   Background: *In 2000, the National Conference on Weights and Measures (NCWM) Laws and Regulations (L&R) Committee issued a guideline recommending that the minimum flush quantity to be at least 1.1 L (0.3 gal).*[4] *Since that time, data from a number of states indicates that this amount (1.1 L) is not sufficient. NIST recommends that a minimum flush quantity of 1.8 L (0.5 gal) be used for most installations unless the installation indicates that a larger purge is justified. The fuel used for flushing the nozzle of the dispensers should be collected in an approved container and then be returned to the storage tank containing the lowest octane fuel but do not return flex-fuel blends of ethanol above 10 % to the source storage tank.*[5] *Provision must be made by the seller for disposing of blended products which cannot be returned to storage tanks. The amount of fuel flushed from each dispenser must be recorded on the primary inspection report and a copy presented to the seller.*

   The official should:

   a. Select the lowest grade. Authorize the dispenser and run 1.8 L (0.5 gal) slowly into an approved container (e.g., a 19 L [5 gal] safety can or test measure).

   NOTE: *When a sample is taken from a measuring device that is capable of blending different grades of fuel for delivery through a single nozzle, the official must flush the hose and nozzle prior to taking a sample. NIST recommends that a minimum flush quantity of 1.8 L (0.5 gal) be taken from a typical dispenser installation equipped with a standard length hose.*

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[4]Based on data from several programs, when a 1.1 L flush is used, many samples failed because the amount of fuel retained in dispensers varies depending on the installation. In some instances, the use of a 1 gal flush may be required to eliminate the possibility that hose and nozzle contamination can cause a sample to fail or that a failure can be called into question. By increasing the flush quantity to a minimum of 1.8 L (0.5 gal) programs were successful in addressing issues where installations requiring additional piping would fail due to inadequate purge of 1.1 L (0.3 gal) value. Based on this information, NIST recommends a minimum flush quantity of 1.8 L (0.5 gal) be used for most installations unless the installation indicates that a larger purge is justified.

[5]From Draft "Blending and Dispensing Flex Fuels" by the Colorado Department of Labor and Employment – Division of Oil and Public Safety at: **https://www.colorado.gov/pacific/sites/default/files/Guidance%20-%20Blending%20And%20Dispensing%20Flex%20Fuels.pdf.** Accessed 8/12/2015. See also "Missouri Guidelines for Blending Flex Fuels Pilot Program" at **http://www.blenderpumps.org/factors-to-consider/state-guidelines-a-programs/103-guidelines-for-blending-flex-fuels-pilot-program.html.** Accessed 8/12/15.

b. Use a cotton rag to wipe the parts of the nozzle and extension tube that come into contact with the container and fuel sample. (See Table 3. Sample Size – Container Fill Levels Based on Dispenser Readings when the delivery begins at zero [0]).

c. Place the nozzle/outlet and extension tube in the sample container and fill it slowly to reduce foaming and light end loss and so that air leaves the container without splashing fuel droplets. Continue until it is filled to the specified volume (or the dispenser indicates the quantity specified for the sample).

d. Seal the sample container and mark as required. The exterior of the sample container must be wiped to ensure it is clean and dry prior to placement in a sample transport case.

e. Reset and reauthorize the dispenser, select the next grade, flush the nozzle and hose and fill the sample container as described above. Continue this process until samples of all grades have been taken.

f. Return purged fuel to proper storage and record quantities on inspection report. Do not return flex-fuel blends of ethanol above 10 % to the source storage tank. Provision must be made by the seller for disposing of blended products which cannot be returned to storage tanks.

NOTE: *Where mid-grade flex fuels are blended using Multiple Product Dispensers (MPD), adjustments MUST be made to the blend ratio of each dispenser at different times throughout the year to ensure that the blend contains the required amount of ethanol. The time at which these changes are made is dependent on the geographic location of the dispenser. The blend ratio required to achieve the correct blend depends on the amount of ethanol contained in the unleaded gasoline and E85. The amount of ethanol contained in these components will vary with the provider. Each grade of mid-grade flex fuel dispensed through blending dispensers must be independently tested for ethanol content at the time the dispenser (or group of dispensers) is installed at a facility, and prior to use.*

3. Recommended Sampling Procedures for Taking an E15 Sample from a Multiple Product Dispenser (MPD).

Background*: Multiple Product Dispensers (MPDs) or blender pumps are designed to deliver a single grade of product or to combine two grades at the dispenser in predetermined ratios by drawing fuel from different storage tanks and using sensors and flow rate controllers that ensure the targeted blend is dispensed. These pumps have been used for many years to create mid-octane fuels by blending the low and high octane fuels at the dispenser. The typical MPD uses a feedback system to adjust the blend delivered at the nozzle. To do that, two grades of fuel from two different inlets are fed through individual meters with their quantities controlled by a variable flow valve located after each meter. The dispenser senses the amount of product going through each meter and adjusts the opening of each valve to conform to the ratio for the selected product. At the beginning of the transaction and during re-starts (i.e., the blend ratio mechanism is reset every time the user closes and reopens the nozzle and when the nozzle's automatic shutoff kicks in and the nozzle is then restarted), the dispenser makes adjustments to attain the correct blend ratio as it relates to the entire transaction and to deliveries made at normal speed. It is important to recognize that the fuel blend is also affected by both the flow rate of the dispenser and system pressure, which vary depending on the number of dispensers on the system drawing from the different fuel storage tanks. The blend ratios will be different when using a MPD to produce E15 and mid-level ethanol blends (Exx). Because the normal fuel sampling process involves taking a small quantity of fuel at a slow flow rate (and that may involve re-starts), it is likely that the fuel blend in these samples are not representative of the fuel delivered in a typical customer transaction. The Environmental Protection Agency (EPA) has recognized that this operational characteristic of MPDs for blending E15 may result in the inadvertent mis-fueling of E15 in vehicles, engines, and equipment not covered under the EPA's E15 waiver to the Clean Air Act. To help ensure that customers do not inadvertently mis-fuel vehicles, engines, and equipment not covered underE15 waiver, the EPA requires retailers to dispense E15 at a MPD only through EPA-approved MPD configurations. (See pages 43 and 45 in the "E-15 Retailer Handbook" by the Renewable Fuels Association at http://ethanolrfa.3cdn.net/643f311e9180a7b1a8_wwm6iuulj.pdf.)*

For these reasons, it is recommended that a fuel quality sample (e.g., 1 L) be taken from a larger sample of between 7.5 L (2-Gal) and 9.4 L (2.5- Gal) or more. The sample should be collected in a clean container (e.g., a 9.4 L (2.5- Gal) or 19 L (5-Gal) safety can under a continuous flow delivered at or near the full-flow rate of the device because this allows the dispenser adequate time to account for system variations in making its adjustments to the blend ratio. If the flow is interrupted prior to collecting at least 7.5 L (2–gal) the product must not be used in a fuel sample. By following the recommended procedures to collect samples for fuel quality determinations, an official should obtain an accurate representation of the fuel that the dispenser has delivered.

Important: For samples to be tested for conformance to volatility standards during the VOC season (June 1- Sept 15) additional steps and procedures will need to be followed. See NOTICES section for appropriate ASTM International Standards.

E15 Sampling Procedure

There are several methods that can be used to obtain a sample of the product that is representative of the fuel going into the customer's tank in a typical delivery. Here are three suggestions based on whether the official is simply taking a fuel sample or taking a fuel sample in conjunction with testing the dispenser for accuracy according to NIST Handbook 44.

There are three acceptable Methods for procuring samples for quality testing.

Method #1 (Taking a Fuel Sample)

1. Flush the dispenser with a minimum of 1.8 L (0.5-Gal) using E15 (or with the blend being tested) into a separate container using a continuous flow at or near the full-flow rate of the device and dispose of the flushed fuel.

2. Place the nozzle into the can against the opening at a level to avoid overfilling but positioned to reduce the possibility of prematurely activating the automatic shut-off mechanism. If practical, maintain a continuous flow by avoiding manual restarts of the nozzle. Start a new transaction with the E15 setting (or whatever blend is under test), dispense at least 7.5 L (2-Gal) into a clean 9.4 L (2.5-Gal) or larger safety can using a continuous flow at or near the full-flow rate of the dispenser. If the flow is stopped for any reason prior to the collection of 7.5 L (2-Gal) dispose of the fuel and repeat this step.

3. Take the sample from the fuel in the container.

Method #2 – (Taking a Fuel Sample)

1. Flush the dispenser with a minimum of 7.5 L (2-Gal) with continuous flow at or near the full-flow rate of the device using E15 (or whatever blend is being tested). If there is a flow interruption prior to delivering 2-Gallons do not restart the flow, dispose of the fuel. Repeat this step until more than 7.5 L (2-Gal) is delivered without interruption. Proceed to next step.

2. Pull a sample from what is left in the hose (residual) into an appropriate clean sampling container. The sample should not exceed 0.49 L (0.13-Gal).

3. Dispose of the flushed fuel.

Method #3 (Taking a Fuel Sample in conjunction with a device accuracy test)

1. Flush the dispenser with a minimum of 1.8 L (0.5-Gal) using E15 (or whatever blend is being tested) into a separate container using a continuous flow at or near the full-flow rate of the device. Dispose of the flushed fuel.

2. Place the nozzle in the test measure and against the opening at a level to avoid overfilling the test measure and but positioned to reduce the possibility of prematurely activating the automatic shut-off mechanism. Conduct a device accuracy test in the E15 setting (or whatever blend is being tested), and dispense 19 L (5-Gal) into a test measure to check the accuracy of the dispenser. Operate the nozzle at or near the

full-flow rate of the device and, if practical, maintain a continuous flow by avoiding manual restarts of the nozzle.

3. After the accuracy test is completed, take the fuel sample directly from the test measure by filling the sample container using a clean dry funnel.

NOTICE: It is recommended that the following ASTM International Standards be utilized to procure fuel quality samples and to determine the ethanol content of E15 (or whatever blend is being tested) samples.

- ASTM D5599 - 15 "Standard Test Method for Determination of Oxygenates in Gasoline by Gas Chromatography and Oxygen Selective Flame Ionization Detection"
- ASTM D5501-12$^{\varepsilon 1}$ "Standard Test Method for Determination of Ethanol and Methanol Content in Fuels Containing Greater than 20% Ethanol by Gas Chromatography"
- ASTM – D4057 - 12 "Standard Practice for Manual Sampling of Petroleum and Petroleum Products"
- ASTM - D5842 - 14 "Standard Practice for Sampling and Handling of Fuels for Volatility Measurement"

$^{\varepsilon 1}$ Note – Editorial corrections were made to 7.4.3. and 7.5. in July 2013

4. NIST Handbook 44, Section 3.30. Liquid Measuring Devices, User Requirements (UR).

NOTE: Alternative Flush Quantities: *The recommended minimum flush amount is based on the internal volume of a 3 m (10 ft) hose. In NIST Handbook 44, "Specifications Tolerances and other Technical Requirements for Commercial Weighing and Measuring Devices," Section 3.30. Liquid Measuring Device Code, U.R.1.1. User Requirement (shown below) permits discharge hose lengths up to 5.5 m (18 ft) on most retail fuel dispensers, but dispensers at marinas are permitted to extend to 15 m (50 ft).*

UR.1.1. Discharge Hose.

UR.1.1.1. Length. *– The length of the discharge hose on a retail motor-fuel device:*

(a) shall be measured from its housing or outlet of the discharge line to the inlet of the discharge nozzle;

(b) shall be measured with the hose fully extended if it is coiled or otherwise retained or connected inside a housing; and

(c) shall not exceed 5.5 m (18 ft) unless it can be demonstrated that a longer hose is essential to permit deliveries to be made to receiving vehicles or vessels.

An unnecessarily remote location of a device shall not be accepted as justification for an abnormally long hose.

UR.1.1.2. Marinas and Airports.

UR.1.1.2.1. Length. *– The length of the discharge hose shall be as short as practicable, and shall not exceed 15 m (50 ft) unless it can be demonstrated that a longer hose is essential.*

The following Table 5. provides the approximate volume contained in various internal diameters of fuel hoses with the length of 3 m (10 ft). The recommended purge is adequate for the most commonly used hose with an internal diameter up to 22.2 mm ($^7/_8$ in) hose diameter. If an official encounters hoses with larger internal diameters or lengths of greater than 3 m (10 ft) the flush amount can be adjusted to fully purge the hose and reduce the chance for contamination. If 3 m (10 ft) lengths of the larger interior diameters hoses are found, increase the flush to the quantities stated in Column 2. If longer lengths of any of the discharge hoses are found, the official should measure its length and multiply that value by the volume contained in 304 mm (1 ft) by the volume in Column 3. For example, if a blending dispenser with a 18 ft discharge hose with an interior diameter of $^{7}/_{8}$ in is found, multiply 18 × 0.030 gal = flush volume of 0.540 gal.

Table 5.
Approximate Volume Contained in Various Internal Diameters of Fuel Hoses
(based on the hose length of 3 m [10 ft])

Column 1. Discharge Hose Interior Diameter	Column 2. Approximate Volume in 3 m (10 ft)	Column 3. Approximate Volume in 304 mm (1 ft)
12.7 mm ($^{1}/_{2}$ in)	0.370 L (0.10 gal)	0.037 L (0.010 gal)
15.9 mm ($^{5}/_{8}$ in)	0.600 L (0.16 gal)	0.056 L (0.015 gal)
19.1 mm ($^{3}/_{4}$ in)	0.870 L (0.23 gal)	0.075 L (0.020 gal)
22.2 mm ($^{7}/_{8}$ in)	1.170 L (0.31 gal)	0.113 L (0.030 gal)
25.4 mm (1 in)	1.552 L (0.41 gal)	0.151 L (0.040 gal)
31.8 mm ($1^{1}/_{4}$ in)	2.422 L (0.64 gal)	0.227 L (0.060 gal)

NOTE: *Except for the ethanol blends noted above, return the accumulated flush fuel for all of the sampled blends to the lowest grade storage tank.*

NOTE: *If a weights and measures official is testing dispensers for compliance with NIST Handbook 44 using a 19 L (5 gal) test measure, the flush procedure can be skipped and the fuel sample taken after the official has filled the measure and determined the device error.*

NOTE: *Officials should verify and document the dispenser's programed blend ratio if they have the appropriate access equipment and training from the device manufacturer. This is a good practice to carry out on new installations and devices where there is a suspected problem with fuel grades. Instructions for accessing the blend ratio of a device are included in the Certificate of Conformance for a blending device from the NCWM. The NCWM Certificate of Conformance Search Engine is located at this URL: http://www.ncwm.net/ntep/cert_search.*

5. Taking a Sample of Fuel for Volatility Measurement

The vapor pressure of a fuel is affected by evaporation and composition so special handling and filling equipment is required. This nozzle sampling procedure is based on ASTM D5842 "Standard Practice for Sampling and Handling of Fuels for Volatility Measurement."

a. If the sample is taken from a blending dispenser, flush the nozzle with 1 L (0.3 gal) of the grade of product being sampled. This step is taken to ensure the hose and nozzle is not contaminated with a blend of fuel different from that intended to be tested.

The official should then:

b. Rinse the sample container (and sampling device if used) with fuel and allow it to drain before filling. This step is taken to ensure the container is not contaminated and it cools the container which may help to reduce evaporation.

c. Use a nozzle extender to fill the sample container slowly to 70 % to 80 % of its capacity. The slow filling time and nozzle extension are used to reduce evaporation.

d. Immediately seal the sample container and check it for leaks. If a leak is found discard the sample and container and take another sample using a new container. It is recommended that a sealing tape be wrapped around the container lid to further reduce the chance of evaporation (See Figure 4 below for an example of bottles sealed in this manner).

NOTE: *When glass bottles are used in collecting samples for vapor pressure testing, it is recommended that container sealing tape be used to seal the lower edge of the cap to the neck of the bottle to prevent evaporation. (This is usually a stretchable tape that reduces the chance for gas exchange and prevents the entry of contaminants. These tapes remain flexible in most temperatures and they are waterproof and resistant to most chemicals.) If the containers are properly sealed and leak free, they can also be inverted during shipment to prevent evaporation.*

Figure 22. Sealing Tape Applied to Amber Sample Bottles

Photos courtesy of the Missouri Department of Agriculture.

D. Protecting Fuel Samples

Extreme care and good judgment are necessary to ensure the samples obtained are representative of the product being sold, assuring the test results are the same as if the sample had been tested immediately after it was taken. Samples should be kept cool or be cooled and protected from sunlight in order to minimize any potential reaction due to the light sensitivity of the sample. Samples of gasoline and JP-4 (which is not widely used) should be kept cool to prevent “light ends” from evaporating. Also, samples of fuels with lead additives must be protected from sunlight. It is necessary to protect all volatile samples of petroleum products from evaporation. In every situation the product sampled should be put directly into a sample container as soon as it is obtained. This must be done with vapor pressure samples. When it is necessary to obtain product with a sampling apparatus (or it is an undercover purchase in a consumer type gas can), or from an underground storage tank, transfer the product to a sample container immediately. If applicable, keep the containers and samplers closed except when material is being transferred. Never completely fill any container; allow adequate room for expansion by filling them to no more than 80 % capacity. To prevent the loss of liquid and vapors during transport, screw the caps of containers down tightly and check for leakage (check for leakage by tilting the container on its side and looking for fuel leaks around the cap or air bubbles entering the fuel).

NOTE: *Control temperature conditions. According to ASTM D4814 fuels should not be cooled below their dispensed temperatures or 15 °C (59 °F) because cooling of gasoline-oxygenate fuels can produce changes in appearance (e.g., hazing) that are not reversed on rewarming.*

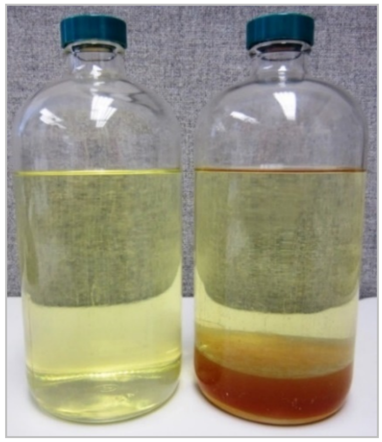
E. Visual Inspection – (Per ASTM D6751 and ASTM D4814-16a - 6. Workmanship)

Immediately examine the fuel sample to determine if it is clear and bright at the ambient temperature, at the fuel temperature at the point of custody transfer, or at a lower temperature agreed upon by the purchaser and seller. The fuel must be visually free of undissolved water, sediment, or suspended matter. If the fuel does not pass this visual inspection, a stop-sale order should be issued immediately.

Label and seal the containers immediately after the sample is obtained and place in a secure sample transport box for transportation to the fuel laboratory for testing. The official should RECHECK that every sample is accurately identified and documents are completed. If the lab receives a sample with missing or incomplete labels or documents, it will be rejected and disposed of without testing.

Figure 23. Visual Inspection of Samples.

PASS



FAIL

Clean, Bright Sample Passes **Sample with Water Fails**

PASS

FAIL

FAIL

PASS

F. Transporting Samples to Laboratory

There are several approaches used to transport fuel and oil samples to a fuel laboratory. All are acceptable as long as the integrity of the chain-of-custody is documented.

1. **Direct Delivery:** The official who collects the sample transports it directly to the laboratory and presents it for testing.

2. **Public Carrier Delivery:** The official who collects the sample packs it in appropriate shipping cartons, labels them and delivers them to a public carrier who then transports the sample to the fuel laboratory for testing (or to a delivery point where a representative from the laboratory picks up the samples).

3. **Laboratory Courier:** The officials who collect samples deliver them to a central consolidation point where a courier collects the samples and transports them to the fuel laboratory. These couriers are almost always employees of the fuel laboratory.

The collection of fuel samples requires that the fuel official receives a continuous supply of fresh sample containers, so it is important to set up a cost effective system that simplifies the transportation of fuel samples to the laboratory while at the same time ensures that it resupplies the field official.

G. Chain of Evidence (Custody) and Transfer

A chain of evidence (custody) is a record of each person who has come into possession of the fuel sample from the time it is taken until the time the test results on the sample are presented as evidence in an administrative or judicial proceeding. A sample is in custody if it is in the official's possession or if it is under his or her control, or the control of another authorized person while stored in a secure location. A chain of evidence is the only means to prove that the sample presented in the proceeding is the one obtained at the location in question.

A record must be maintained which lists all those persons coming in possession of the evidence. This is particularly true when an analysis of fuel samples is to be made. It must be proven that there was no tampering with, alteration, or substitution of the sample between the time it was collected and the time of analysis by the fuel laboratory. The burden of proof is on the party offering the sample into evidence.

Fuel samples must be passed from the field person who obtained them to the laboratory personnel through a controlled process. When this takes place, the record must indicate to whom and when the sample was released. In other words, the chain of custody must be maintained. This means that the transfer of the sample must be documented each time, and that the record must remain with the sample. If this proof is not available, the sample and its analysis may be excluded from evidence.

Although an accurate and complete record is maintained of the chain of custody, it is still advisable that the samples go through as few people as possible. The fewer involved, the less chance there is the sample may be tampered with, altered, or lost. Also, should a case end up in court or administrative hearing, fewer witnesses will be needed to be called to establish the fact that the sample analyzed is the same fuel sample collected at the location. See ASTM D4840 "Standard Guide for Sample Chain-of-Custody Procedures" for more information. A sample of a Chain-of-Custody document is presented in Appendix C.

H. Timeliness of Samples

Due to the velocity at which fuel is sold from a seller's tanks, a sample that is not analyzed and the results provided within 24 hours to 48 hours of its collection is of little value in stopping the sale of nonconforming fuel.

I. Respond to Test Results – Time is of the Essence.

If a sample fails any laboratory test, immediate action must be taken to ensure the product is removed from sale. Follow-up oversight must verify that the seller has taken the appropriate corrective actions including determining and documenting the cause of the failure so it can be included in a program assessment to identify possibilities for changes in quality standards or handling and storage procedures. Timely testing of all samples is a critical factor because, after subsequent deliveries occur, the sample is no longer representative of the product in the storage tank.

1. **If the Sample Passes:** No enforcement action is taken. The test reports are stored according to the record keeping requirements of the enforcement agency and the results are added to the compliance history of the seller and cross-referenced to the supplier. All test results are also incorporated into a summary of test results which can be analyzed and presented in (annual) reports detailing the benefits of fuel quality testing.

2. **If the Sample Fails:**

   a. Recommended Engine Fuel Off-Sale Guidance: Upon notification from the laboratory that a product sample did not meet specifications, the official should go to the location where the sample was obtained and contact the manager. It is also appropriate to issue an initial notification of an off-sale order by e-mail or by telephone to the location manager and, if appropriate, the corporate office if the retailer is a chain store outlet. E-mail notifications of test failures to the seller are the fastest way to prevent the sale of out of specification product and initiating corrective actions.

   b. Report the test results for the sample, what the specifications for that product are, and what action is going to be taken. Refer questions about the test results to the management of the fuel program. Do not recommend how to correct or bring the failed fuel into compliance because the agency may be held liable should advice be found to be improper.

The official should:

(1) If applicable, read and record the pump totalizers and determine the amount of product in the storage tank from which the sample was originally taken.

(2) If additional product has been added to the storage tank since the original sample was taken, resample the product, label and seal it and then send it to the laboratory for testing (or if applicable retest on-site).

(3) If additional product has not been added to the storage tank since the sample was collected, label and seal the storage tank fill pipe(s) and/or dispenser(s) in accordance with agency policy.

(4) Explain the agency's policy on the disposition of off-sale product (e.g., off-sale fuel cannot be sold and must be corrected or disposed of within 10 days of off-sale action). Leave a written copy of any instructions with the manager.

(5) If the agency requires the official to be present when the off-sale product is to be removed from the tanks, the official should advise the seller to contact his or her office to make an appointment. When fuel storage tank(s) are to be pumped out, the official should check the tags and seals applied when the product was ordered off sale to see that they are intact. If they are not secure, the official should document his or her findings and take action according to agency policy or notify management. Also, the official should check the totalizer readings and measure the amount of product in the tank to determine if any has been removed. Break the seals and allow the product to be pumped out of the storage tank. Have the lines and filters flushed with sufficient compliant product to assure all off-specification product is removed before releasing the dispensers for use. It is sound procedure to obtain a sample of replacement product from the delivery truck and of the new product through the dispenser after it has been emptied into the storage tank so they can be tested to ensure the problem has been corrected.

(6) Verify Product Disposition: The official should require the seller to provide a written explanation of how the off-sale product was disposed of. Some questions that may be asked are: How was sale of volatile product prevented? Was the product disposed of or returned to supplier? What documents or processes confirm the disposition? Was the process completed within 30 days of notice?

NOTE: Examples of a Notice of Violation and a Stop Sale Order are provided in Appendix C.

VII. TESTING FOR WATER IN A FUEL STORAGE TANK

A. Storage Tanks

According to the Steel Tank Institute, the installation of storage tanks and lax maintenance procedures used for water monitoring and removal can lead to a number of problems, from degradation of fuel quality and subsequent vehicle performance to damage of the storage system. This concern pertains to all storage systems, both underground and aboveground, regardless of the material used for their construction and irrespective of the fuel stored in the tank. According to Clean-Diesel Org (see http://www.clean-diesel.org/), not only is water a problem in itself, but it also creates the environment for biological growth within the fuel. Studies have revealed that less than 6.35 mm (0.25 in) of water is more than sufficient to promote microbial growth. Microorganisms live at the level of the fuel-water interface and feed on the fuel. The presence of microorganisms can lead to filter plugging, pump and injector problems, deactivation of the water monitor, and buildup within the tank, which is costly to remove.

It is recommended that a manual inspection for water be made on each storage tank at a location, and that every jurisdiction enforce the maximum water limits specified in their jurisdiction's laws or regulations such as those specified in NIST Handbook 130, Uniform Engine Fuels and Automotive Lubricants Regulation, Section 4. "Retail Storage Tanks and Dispenser Filters." While most modern storage tank monitoring systems have water monitoring features, those may not be accurate, so a manual measurement using a gauge stick with water finding paste and calibration chart are recommended. Officials should inspect each automatic system for the level of water in each storage tank and document the results on the inspection reports, and compare the automatic indication with the manual readings to indicate any significant differences that exist. Officials should take action based on the level determined using the stick and water paste that exceed the specified limits (i.e., order the water removed by a specified deadline and require seller to report completion of the removal). Whatever measuring device the official uses must be capable of measuring the fuel level over the full range of the tank's height to the nearest 3 mm ($^{1}/_{8}$ in). If the storage system does not have an automatic monitoring system, it is recommended that the official conduct a manual inspection for water in each storage tank at each sample location and enforce the maximum water limits specified in their jurisdiction's laws or regulations such as those specified in NIST Handbook 130, Uniform Engine Fuels and Automotive Lubricants Regulation, Section 4. "Retail Storage Tanks and Dispenser Filters."

Section 4. Retail Storage Tanks

4.1. Water in Gasoline-Alcohol Blends, Biodiesel Blends, Ethanol Flex Fuel, Aviation Gasoline, and Aviation Turbine Fuel. *–No water phase greater than 6 mm (¼ in) as determined by an appropriate detection paste or other acceptable means, is allowed to accumulate in any tank utilized in the storage of gasoline-alcohol blend, biodiesel, biodiesel blends, ethanol flex fuel, aviation gasoline, and aviation turbine fuel.*

4.2. Water in Gasoline, Diesel, Gasoline-Ether, and Other Fuels. *–Water shall not exceed 25 mm (1 in) in depth when measured with water indicating paste or other acceptable means in any tank utilized in the storage of diesel, gasoline, gasoline-ether blends, and kerosene sold at retail except as required in Section 4.1. Water in Gasoline-Alcohol Blends, Biodiesel Blends, Ethanol Flex Fuel, Aviation Gasoline, and Aviation Turbine Fuel.*

1. **Equipment:** The Environmental Protection Agency specifies the following requirement for gauge sticks and other water measuring systems:

2. **Gauge Stick or Other Gauges:** The gauge stick used to measure the depth of liquid in an underground tank must be clearly labeled in 3 mm ($^{1}/_{8}$ in) graduations starting with zero at the bottom end. Inspect the stick to ensure the end has not been worn or cut off and that the stick is not warped. The stick should be

made of non-sparking material, such as wood, and varnished to minimize the creeping of fuel above the actual fuel level in the tank. Whatever measuring device the official uses must be capable of measuring the fuel level over the full range of the tank's height to the nearest 3 mm ($^1/_8$ in).

3. **Water Finding Paste:** The best way to measure water is to use water-finding paste that is applied to the bottom of a gauge stick (when testing fuel that contains ethanol, use a water paste that is formulated for use with blend gasolines). Follow the paste manufacturer's directions for using the water paste, especially the amount of time the stick needs to be immersed in the fuel and what color change indicates the presence of water.

***NOTE:** It is a good idea to take a photograph of the stick after applying the paste and another photo with the stick and a measuring tape laid next to it to indicate the water level if excessive water is found.*

***NOTE:** Read the paste manufacturer's Safety Data Sheet for warnings and storage requirements, and follow the exposure controls and personal protection equipment requirements.*

4. **Procedure:** The manual way of measuring the amount of water in an underground tank is with a wooden gauge stick. To take a reading, apply a thin film of the water finding paste on one side of the stick and its bottom and spread it uniformly over the surface to a height of 100 mm (4 in). Lower the stick gently to the bottom of the tank and let it sit for 5 seconds to 10 seconds (or follow the paste manufacturer's instructions if they differ from this recommendation) and then raise it quickly. Locate the paste and determine if there is any change in the color of the paste which would indicate that water is present. Record the number of millimeters (inches) of water indicated to the nearest 3 mm ($^1/_8$ in).

   For manual gauging, if there is no separate gauge opening, the tank-fill drop tubes must have no obstruction at the end of the tube which will interfere with gauging of water. Be aware of drop tubes with "floating striker plates" – these devices won't show the lowest 19 mm (0.75 in) of the tank.

5. Ac**tion:** If the permitted water limit is exceeded, issue an order that the seller have the water removed.

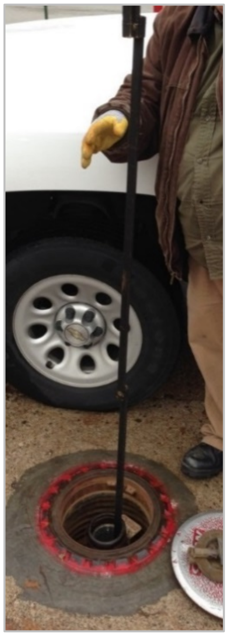


Figure 24. Testing for Water.

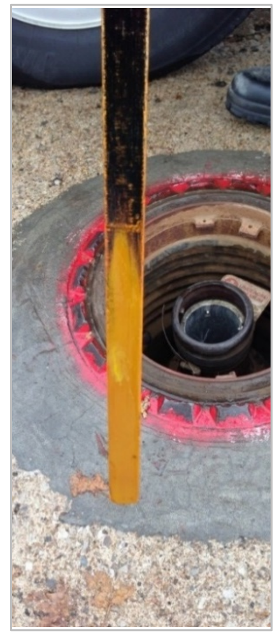


Figure 25. Stick with Paste – No Water Indicated.

Figure 26. Sticks with Red Coloring that Shows Water Levels in Different Storage Tanks.

VIII. LABELING ENFORCEMENT CHECKLIST AND SAMPLING PROCEDURE OUTLINE FOR TAKING SAMPLES OF MOTOR OIL AT SERVICE LOCATIONS

A. Preparation

1. **Contact:** Officials should park their vehicle in a suitable location until they have notified the management of the business where sampling will occur of their identity, authority, and nature of the visit. When sampling at retail locations, is it often necessary to have the oil dispensers unlocked or air compressors started so samples can be taken. Officials must establish contact with the authorized management representative and explain how samples will be taken and ensure that employees understand what is

expected of them in assisting the official. It is management's right to observe sampling procedures and to be present during the sample collection process if they choose to do so. This will allow the person to confirm the source of the oil and identity of the container and enable them to satisfy themselves that the sample container was properly sealed and purged product was returned to the proper storage.

2. **Business Information:** Obtain the business ownership and other identity information.

3. **Labeling:** Ensure that the label on any vehicle engine (motor) oil container, receptacle, dispenser, or storage tank is properly labeled. In addition, if remote tank filling ports are used, it is recommended that they be properly marked and secured. If there is any doubt, the official should ask the manager to indicate the location of the appropriate storage tank for each grade or brand of oil.

B. Labeling and Documentation

If the official's state adopts the Uniform Method of Sale of Commodity Regulation in NIST Handbook 130, carry out an inspection according to Section 2.33 "Labeling of Vehicle Engine (Motor) Oil."

2.33. Oil.

2.33.1. Labeling of Vehicle Engine (Motor) Oil. *– Vehicle engine (motor) oil shall be labeled.*

2.33.1.1. Viscosity. *– The label on any vehicle engine (motor) oil container, receptacle, dispenser, or storage tank, and any invoice or receipt from service on an engine that includes the installation of vehicle engine (motor) oil dispensed from a receptacle, dispenser, or storage tank, shall contain the viscosity grade classification preceded by the letters "SAE" in accordance with SAE International's latest version of SAE J300, "Engine Oil Viscosity Classification."*

NOTE: *If an invoice or receipt from service on an engine has limited room for identifying the viscosity, brand, and service category, then abbreviated versions of each may be used on the invoice or receipt and the letters "SAE" may be omitted from the viscosity classification.*

2.33.1.1. Viscosity – Are the following labeled with the viscosity grade classification preceded by the letters "SAE" in accordance with SAE International's latest version of SAE J300, "Engine Oil Viscosity Classification?"		**Yes**	**No**	**Comments**
a.	Containers			
b.	Receptacles			
c.	Dispensers			
d.	Storage Tanks			
e.	Invoice or Receipts			

2.33.1.2. Brand. *– The label on any vehicle engine (motor) oil container and the invoice or receipt from service on an engine that includes the installation of bulk vehicle engine (motor) oil dispensed from a receptacle, dispenser, or storage tank shall contain the name, brand, trademark, or trade name of the vehicle engine (motor) oil.*

2.33.1.2. Brand. – Are the following labeled with the name, brand, trademark, or trade name of the vehicle engine (motor) oil?		**Yes**	**No**	**Comments**
a.	Containers			
b.	Receptacles			
c.	Dispensers			
d.	Storage Tanks			
e.	Invoice or Receipts			

2.33.1.3. Engine Service Category. – *The label on any vehicle engine (motor) oil container, receptacle, dispenser, or storage tank and the invoice or receipt from service on an engine that includes the installation of bulk vehicle engine (motor) oil dispensed from a receptacle, dispenser, or storage tank shall contain the engine service category, or categories, displayed in letters not less than 3.18 mm (1/8 in) in height, as defined by the latest version of SAE J183, "Engine Oil Performance and Engine Service Classification (Other than "Energy Conserving")," API Publication 1509, "Engine Oil Licensing and Certification System," European Automobile Manufacturers Association (ACEA), "European Oil Sequences," or other Vehicle or Engine Manufacturer standards as approved in Section 2.33.1.3.1. "Vehicle or Engine Manufacturer Standard."*

2.33.1.3. Engine Service Category. – Are the following labeled with the engine service category, or categories?		**Yes**	**No**	**Comments**
a.	Containers			
	Height of the letters at least 3.18 mm (1/8 in)?			
b.	Receptacles			
	Height of the letters at least 3.18 mm (1/8 in)?			
c.	Dispensers			
	Height of the letters at least 3.18 mm (1/8 in)?			
d.	Storage Tanks			
	Height of the letters at least 3.18 mm (1/8 in)?			
e.	Invoice or Receipts			
	Height of the letters at least 3.18 mm (1/8 in)?			

2.33.1.3.1. Vehicle or Engine Manufacturer Standard. – *The label on any vehicle engine (motor) oil container, receptacle, dispenser, or storage tank and the invoice or receipt from service on an engine that includes the installation of vehicle engine (motor) oil dispensed from a receptacle, dispenser, or storage tank shall identify the specific vehicle or engine manufacturer standard, or standards, met in letters not less than 3.18 mm (1/8 in) in height. If the vehicle (motor) oil only meets a vehicle or engine manufacturer standard, the label must clearly identify that the oil is only intended for use where specifically recommended by the vehicle or engine manufacturer.*

2.33.1.3.1. Vehicle or Engine Manufacturer Standard. – Are the following labeled with the specific vehicle or engine manufacturer standard, or standards the oil meets? **NOTE**: If the oil only meets a vehicle or engine manufacturer standard, the label must clearly identify that the oil is only intended for use where specifically recommended by the vehicle or engine manufacturer.		Yes	No	Comments
a.	Containers			
	Height of the letters at least 3.18 mm (1/8 in)?			
b.	Receptacles			
	Height of the letters at least 3.18 mm (1/8 in)?			
c.	Dispensers			
	Height of the letters at least 3.18 mm (1/8 in)?			
d.	Storage Tanks			
	Height of the letters at least 3.18 mm (1/8 in)?			
e.	Invoice or Receipts			
	Height of the letters at least 3.18 mm (1/8 in)?			

2.33.1.3.2. Inactive or Obsolete Service Categories. – *The label on any vehicle engine (motor) oil container, receptacle, dispenser, or storage tank and the invoice or receipt from service on an engine that includes the installation of bulk vehicle engine (motor) oil dispensed from a receptacle, dispenser, or storage tank shall bear a plainly visible cautionary statement in compliance with the latest version of SAE J183, Appendix A, whenever the vehicle engine (motor) oil in the container or in bulk does not meet an active API service category as defined by the latest version of SAE J183, "Engine Oil Performance and Engine Service Classification (Other than "Energy Conserving")." If a vehicle engine (motor) oil is identified as only meeting a vehicle or engine manufacturer standard, the labeling requirements in Section 2.33.1.3.1. Vehicle or Engine Manufacturer Standard applies.*

2.33.1.3.2. Inactive or Obsolete Service Categories. – Do the following bear a cautionary statement in compliance with the latest version of SAE J183, Appendix A, whenever the vehicle engine (motor) oil in the container or in bulk does not meet an active API service category as defined by the latest version of SAE J183, "Engine Oil Performance and Engine Service Classification (Other than "Energy Conserving")." If a vehicle engine (motor) oil is identified as only meeting a vehicle or engine manufacturer standard, the labeling requirements in Section 2.33.1.3.1. Vehicle or Engine Manufacturer Standard applies.		**Yes**	**No**	**Comments**
a.	Containers			
	Is the cautionary statement plainly visible?			
b.	Receptacles			
	Is the cautionary statement plainly visible?			
c.	Dispensers			
	Is the cautionary statement plainly visible?			
d.	Storage Tanks			
	Is the cautionary statement plainly visible?			
e.	Invoice or Receipts			
	Is the cautionary statement plainly visible?			

__2.33.1.4. Tank Trucks or Rail Cars.__ – Tank trucks, rail cars, and other types of delivery trucks that are used to deliver bulk vehicle engine (motor) oil are not required to display the SAE viscosity grade and service category or categories on such tank trucks, rail cars, and other types of delivery trucks.

__2.33.1.5. Documentation.__ – When the engine (motor) oil is sold in bulk, an invoice, bill of lading, shipping paper, or other documentation must accompany each delivery. This document must identify the quantity of bulk engine (motor) oil delivered as defined in Sections 2.33.1.1. Viscosity; 2.33.1.2. Brand; 2.33.1.3. Engine Service Category; the name and address of the seller and buyer; and the date and time of the sale. For inactive or obsolete service categories, the documentation shall also bear a plainly visible cautionary statement as required in Section 2.33.1.3.2. Inactive or Obsolete Service Categories. Documentation must be retained at the retail establishment for a period of not less than one year.

2.33.1.5. Documentation Requirements		**Yes**	**No**	**Comments**
a.	**Invoice**			
i.	Does the seller provide an invoice?			
ii.	Is the date and time of sale included?			
iv.	Is the seller name and address included?			
v.	Is the buyer name and address included?			
vi.	Does it identify the quantity of bulk oil delivered?			
vii.	2.33.1.1. Viscosity. – Does it include the viscosity grade classification preceded by the letters "SAE" in accordance with			

2.33.1.5.	**Documentation Requirements**	**Yes**	**No**	**Comments**
	SAE International's latest version of SAE J300, "Engine Oil Viscosity Classification"?			
viii.	2.33.1.2. Brand. – Does it include the name, brand, trademark, or trade name of the vehicle engine (motor) oil?			
ix.	2.33.1.3. Engine Service Category. – Does it include engine service category, or categories?			
x.	2.33.1.3.2. Inactive or Obsolete Service Categories. – If applicable, includes a cautionary statement in compliance with the latest version of SAE J183, Appendix A.			
xi.	Is the document retained at retail business for at least one year?			
b.	**Bill of Lading**			
i.	Does the seller provide a Bill of Lading?			
ii.	Is the date and time of sale included?			
iv.	Is the seller name and address included?			
v.	Is the buyer name and address included?			
vi.	Does it identify the quantity of bulk oil delivered?			
vii.	2.33.1.1. Viscosity. – Does it include the viscosity grade classification preceded by the letters "SAE" in accordance with SAE International's latest version of SAE J300, "Engine Oil Viscosity Classification"?			
viii.	2.33.1.2. Brand. – Does it include the name, brand, trademark, or trade name of the vehicle engine (motor) oil?			
ix.	2.33.1.3. Engine Service Category. – Does it include the engine service category, or categories?			
x.	2.33.1.3.2. Inactive or Obsolete Service Categories. – If applicable, includes a cautionary statement in compliance with the latest version of SAE J183, Appendix A.			
xi.	Is the document retained at retail business for at least one year?			
c.	**Shipping paper or other documentation.**			
i.	Does the seller provide other shipping paper?			
ii.	Is the date and time of sale included?			
iv.	Is the seller name and address included?			
v.	Is the buyer name and address included?			
vi.	Does it identify the quantity of bulk oil delivered?			
vii.	2.33.1.1. Viscosity. – Does it include the viscosity grade classification preceded by the letters "SAE" in accordance with SAE International's latest version of SAE J300, "Engine Oil Viscosity Classification"?			
viii.	2.33.1.2. Brand. – Does it include the name, brand, trademark, or trade name of the vehicle engine (motor) oil?			
ix.	2.33.1.3. Engine Service Category. – Does it include the engine service category, or categories?			

2.33.1.5. Documentation Requirements		**Yes**	**No**	**Comments**
x.	2.33.1.3.2. Inactive or Obsolete Service Categories. – If applicable, includes a cautionary statement in compliance with the latest version of SAE J183, Appendix A.			
xi.	Is the document retained at retail business for at least 1 year?			
xii.	Does the seller provide an invoice?			

3.13.2. Labeling of Recreational Motor Oil.

3.13.2.1. Viscosity. *– The label on each container of recreational motor oil shall contain the viscosity grade classification preceded by the letters "SAE" in accordance with the SAE International's latest version of SAE J300, "Engine Oil Viscosity Classification."*

3.13.2.2. Intended Use. *– The label on each container of recreational motor oil shall contain a statement of its intended use in accordance with the latest version of SAE J300, "Engine Oil Viscosity Classification."*

3.13.2. Labeling of Recreational Motor Oil. **3.13.2.1. Viscosity.** –The label on each container of recreational motor oil shall contain the viscosity grade classification preceded by the letters "SAE" in accordance with the SAE International's latest version of SAE J300, "Engine Oil Viscosity Classification."		**Yes**	**No**	**Comments**
a.	Containers: Is the viscosity grade classification provided and is it preceded by the letters "SAE."			

3.13.2. Labeling of Recreational Motor Oil. **3.13.2.2. Intended Use.** – The label on each container of recreational motor oil shall contain a statement of its intended use in accordance with the latest version of SAE J300, "Engine Oil Viscosity Classification."		**Yes**	**No**	**Comments**
a.	Containers: Does the label contain a statement of its intended use?			

C. Payment for Samples

In most jurisdictions, the official is obligated to pay the retail value of the product if an oil sample is taken from a place of business where it can be sold legally unless the sample is being collected pursuant to a search warrant, or the product's owner surrenders the sample at no cost.

PAYMENT RECEIPT

Agency Responsible for Engine Fuel Quality

Address,
City, State, Zip

Telephone, E-mail, URL

Seller's Name:	**Address:**	**Date:**

Received $___________________as payment for the fuel or oil samples described below taken for inspection purposes as provided for by Chapter xx-xx of the Code of the State of ___________________.

____
Signature of Business Representative

Sample Taken:	**Official:**

D. Taking Oil Samples

1. **Packaged Engine (Motor) Oil:** Motor oil is typically packaged in 946 mL (1 qt) and larger containers. Sample packages are usually taken at retail locations from a lot of containers offered for sale on the shelf. To obtain a sample of packaged motor oil, select one package from the lot and either purchase it or provide the seller with an evidence receipt. Apply a sample identity label (do not cover label information) to the package and document the business location, date, time of purchase, identity, and other information about the sample on an official report form, and document the chain-of-custody. Secure, protect, and ship or transfer to the quality laboratory.

2. **Nozzle Samples.**

   a. **Sample Container and Sample Size:** Use a clean sample container that has a secure cap. See the following table.

Suggested Container Types and Minimum Sample Sizes for Motor Oil					
Product	**Container Material**				**Minimum Sample Size**
	Glass	**Aluminum**	**Metal**	**FHDPB "Plastic"**[1]	
Engine (motor) Oil – General	**YES**	**YES**	**YES**	**YES**	**1 L**
NOTE 1: *Fluorinated High-Density Polyethylene Bottles (FHDPB) are available in wide mouth sizes and are fluorinated inside and outside for improved barrier properties and reduced solvent absorption and penetration. Fluorination enhances long-term container performance and prevents or reduces permeation loss. Useful with most aggressive organic solvents, they are durable and puncture-resistant.*					

b. Sample Collection

c. Identifying Samples for Traceability: The following information illustrates the type of information typically collected for an oil sample. It is acceptable to either permanently mark the sample container with a unique identifying number or to apply a label to the container with a unique number. An Oil Sample Data Sheet should be prepared and included with the sample in a shipping container or sample case. This information can also be collected directly in a database or entered on a data sheet. Regardless of the system used, the following is a compilation of the information usually collected for an oil sample.

Examples of Entries on an Oil Sample Data Sheet

	Item	**Entry**
1.	Sample number/unique container identity	Enter the sample container's unique identifier number. Each sample must have a unique identifier such as a number or alpha numeric code so that its handling can be traceable and so that all collection reports and laboratory tests are linked to the original sample.
2.	Product Identification – Viscosity grade, Service Category	} Obtained from device label, tank marking, or bill of lading.
3.	Brand	
4.	Sampling location identity	Enter business name, identifier number (this may be assigned by the fuel regulatory agency), address of sample location, business mail address, agent name, telephone, fax, and email. This information may be used to immediately notify the seller to remove the oil from sale if the sample fails.
5.	Sampled lot	Amount of oil that the sample represents. Total liters or gallons in the source oil storage tank represented by the sample.
6.	Supplier(s) of oil	Enter the name of the supplier or suppliers of the oil in the source storage tank.
7.	Date of last oil delivery to storage tank.	Enter the day of the latest delivery of the oil into the storage tank from which the sample was taken.
8.	Sample Taken by	Name (or identifier number) of the official who took the sample.
9.	Source of sample	Identify the specific source of the sample (e.g., dispenser number, storage tank number or location, or license number of tank truck and compartment number).
10.	Date/Time sample collected	Enter the time of day, day, month and year indicating when the sample was collected.
11.	Sample Type	Nozzle or other collection method
12.	Notes/Safety Notice 	Enter weather conditions and any remarks necessary to accomplish the analysis of the sample. Safety warning label.
13.	Security Seal(s)	Enter the identification number of any security seal applied to a sample container or transport case.

Figure 27. Brand and Viscosity on a Dispenser.

Figure 28. Taking Oil Samples – Metal Cans.

Photo courtesy of North Carolina Department of Agriculture and Consumer Services.

d. Sampling

(1) Sample Taken from a Measuring Device that Dispenses a Single Product: Typically no flushing is required for these single product nozzle-hose combinations if they are protected from contamination. If the official is taking a sample from an oil dispenser covered with an accumulation of dirt and oil, take care to clean the nozzle to ensure that dirt and debris are not introduced to the container. It may be necessary to first run enough oil into another container to ensure the nozzle is dispensing uncontaminated oil.

When bulk storage is used, one aspect to look at is the accuracy and clarity of the markings of storage tanks and remote fill openings to avoid the possibility of cross-mixing or contamination. Storage conditions affect the shelf-life of most lubricants so officials should determine if the seller is aware of the manufacturer's recommendations. If no shelf-life guidance is provided and the lubricant is greater than two-years old, the seller should contact the manufacturer for guidance about the suitability of the oil for use. Most oils are not affected by normal storage temperatures but sometimes storage tanks can be located too near heat sources, which may create situations that cause oil additives to oxidize prematurely.

- Operate oil meters/fillers manually and do not use automatic pre-set delivery features when collecting oil samples.

- If the oil meter/filler control is equipped with a totalizing device, the official should record the product identity and the before and after readings on the sample collection report.

CAUTION

SKIN INJECTION HAZARD: Some oil delivery systems operate under high-pressure. Fluids spraying from dispenser valves, hose leaks, or ruptured components may send out spray that may pierce skin and cause serious injuries and long-term health consequences (e.g., oil, chemicals and dirt can be injected under the skin). The official should wear personal protective equipment and, should an injury occur, he or she should seek immediate medical attention. The official should never point a dispenser valve at anyone or at any part of his or her body or put a hand over the end of a nozzle while opening or operating the flow valve regardless of its operating pressure.

i. The official may hold the sample container or place it on a solid level surface adjacent to the dispenser.

The official should then:

ii. Use a cotton rag to wipe and clean the parts of the nozzle that comes into contact with the sample container and oil sample.

iii. Ensure the dispenser is operational (e.g., air supply is turned on) and, if required, have the dispenser authorized.

iv. Place the nozzle/outlet in the sample container and fill it slowly. Continue until it is filled to the specified volume (or the dispenser indicates the quantity specified for the sample).

v. Seal the sample container and mark as required.

vi. Record the sample information on an official report and document the details needed to start the chain of custody process.

vii. Issue a Notice of Violation for any labeling violations found during the inspection. An example of a Notice of Violation is provided in Appendix C.

e. Protecting and Transporting the Sample

(1) Protecting Samples: The samples should be kept cool and be protected from ultraviolet light to prevent deterioration and mishandling. A shipping carton or hard-shell sample transport case similar to those used to protect fuel samples may be used.

(2) Transporting Samples: Transport the sample and related documentation to the quality laboratory in a timely manner in accordance with agency procedures. This is important because, after subsequent deliveries occur, the sample is no longer representative.

f. Documentation – Collecting Information: Throughout a visit, it is important that officials collect information about device labeling and other signage to document the identity and other claims made by a seller about the oil being sampled. It is good to record a brief description of actions and observations as well as recording any relevant information provided by the seller. Taking notes, photographs and keeping logs, provide permanent records of a sampling activity and facilitate enforcement.

g. Follow through actions: See **IX**. "**Respond to Test"** In the fuel sampling outline for guidance on how to respond to test results and initiating stop sale actions.

APPENDIX A. – MONTHLY SAFETY AND HEALTH EQUIPMENT CHECKLIST

Safety and Health Equipment Checklist

Notice: Reorder replacements immediately after they are used or damaged.

Date:	**Official:**

	Item:	**Inspected**	**Replace**	**Comment:** • Condition? • What type or brand is needed and how many?
		✔	✖	
1.	Safety Clothing/Vest			
2.	Steel-Toed Shoes or Boots			
3.	Eye/Face Protection			
4.	Gloves			
5.	Respirator/Filters, Dust Mask			
6.	Eye-Wash Kit and Solution			
7.	Safety Flashlight/Batteries			
8.	Safety/Non-sparking Tools			
9.	Traffic Cones			
10.	Fire Extinguisher (recharge or replace immediately after use)			Expiration Date:
11.	First-Aid Kit			
12.	Safety Fuel Storage Can			
13.	Digital Camera (data card/battery)			
14.	Oil Spill Kit – (absorbent, wipes)			
15.	Lint Free Wiping Cloths			
16.	Vehicle Emergency Triangles			
17.	Rain Suit/Weather Clothing			
18.	Hardhat			
19.				
20.				
21.				
22.				
23.				

Safety and Health Equipment Checklist

Notice: Reorder replacements immediately after they are used or damaged.

24.	Other Equipment Needed:			
25.	Other Supplies Needed:			

Questions:

- Does the equipment fit properly and is it clean, sanitary and serviceable?
- Are there rips, tears, or cuts that reduce usability of the item?
- Does it require regular replacement or recharging? Is it stored properly and is it easily accessible?
- Have you been trained in proper use?
- Have you read the Safety Data Sheets (SDSs) for fuel products within the last 180 days?

APPENDIX B. – EXAMPLES OF FUEL SAMPLING AND CHAIN-OF-CUSTODY REPORTS

GEORGIA DEPARTMENT OF AGRICULTURE
FUEL OIL LABORATORY
3150 HWY 41 SOUTH TIFTON, GA 31794 (229) 386-3486

PAGE ___ OF ___

Sample Priority: ROUTINE	Facility Name: FOOD MART		Supplier Name: BILL's PETROLEUM PRODUCTS		# Tanks: 2 / # Pumps: 6
Collection Date: 12/4/13	Street Address: 2091 W ROBINSON ROAD		Street Address:		# Products: 3 / # Brands: 1
Inspector: F. Official	Mailing Address:		Mailing Adress:		Special Mailing:
Inspection area: 20	City: LEOVILLE / State: GA / Zip Code: 31637		City: MARYDALE / State: GA / Zip Code: 31792		Changes Needed:
County #: 037-COOK / Facility #:	Telephone #: 229-654-1909	Facility Code #: 134332542	Telephone #: 240-216-8354	Supplier Code #:	
Lab Sample Date:	1 Lab Number:	2 Lab Number:	3 Lab Number:	4 Lab Number:	5 Lab Number:
Est. Type: 832	Prod Code: 50-Reg.E-10 / Brand Code:	Prod Code: 51-Mid.E-10 / Brand Code:	Prod Code: 52-Prem.E-10 / Brand Code:	Prod Code: / Brand Code:	Prod Code: / Brand Code:
	Results Code:	Results Code:	Results Code:	Results Code:	Results Code:
Bottle # (s)	SAMPLE #11 H117	SAMPLE #12 386	SAMPLE #13 794A		
Product / Posted Octane	REGULAR - 87 E-10	MIDGRADE - 89 E-10	PREMIUM - 93 E-10		
Brand	INDEPENDENT	INDEPENDENT	INDEPENDENT		
Clear & Bright / Sampled VIA	C & B / G410A	C & B / G410A	C & B / G410A		
Inspector Remarks	SINGLE HOSE DISPENSER	SINGLE HOSE BLEND	SINGLE HOSE DISPENSER		
Additional Remarks					
Lab Results					
Chemist Remarks					
Copy Mailed Date & Party					
Telephone Notification Date & Party					
Follow-Up Remarks					

Sample Collection and Summary Report
AG FORM 007 - (08/2010)

COLORADO DEPARTMENT OF LABOR AND EMPLOYMENT
DIVISION OF OIL AND PUBLIC SAFETY
CHAIN OF CUSTODY (COC)

Facility ID:______________
Tank ID:____________

Site Name: ____________ **Site Address:**____________ ____________ **Contact:**____________ **Telephone #**	**Inspector**: ____________ **Phone Number**: (_____) _____-________ **Priority:** **Normal** **Rush** (CIRCLE PRIORITY RATING)	**FOR LAB USE ONLY** Sample Containers Damaged: Y_____ N ____ Sample container filled Appropriately: Y____ N ____	ORI – OGL OCP – OTA Routine Retail Routine Bulk Non Retail Refinery Pipeline CDPHE **(Circle Sample Type & Loc.)**

Sample Number:	Date Collected and Time	Pump Number	% Mix on Label ETOH - MTBE	Sample Matrix: Product: Unleaded	Unleaded+	Premium	Diesel	Bio-Diesel	E-85	Kerosene	Other (specify)	Environmental: Soil	Water	Other (specify)	Oxy Fuel	Analysis Requested: 8260	8015	8270	Other (specify)	Comments: (include posted Octane #)

Relinquished by:	Date and time:	Received by:	Date and Time:
Relinquished by:	Date and time:	Received by:	Date and Time:

Page _____ of _____

MISSOURI DEPARTMENT OF AGRICULTURE
DIVISION OF WEIGHTS AND MEASURES

MOTOR FUEL QUALITY INSPECTION

TELEPHONE (573) 751-2922 FAX: (573) 751-8307

TYPE OF INSPECTION
- ☐ ROUTINE
- ☐ FOLLOW UP
- ☐ COMPLAINT
- ☐ OFFICE REQUEST
- ☐ OTHER

FACILITY TYPE:
- ☐ Service Station
- ☐ Key/Card Attended
- ☐ Key/Card Unattended
- ☐ Bulk Plant
- ☐ Marina
- ☐ Airport
- ☐ Other

FOR OFFICE USE ONLY
DATE RECEIVED
SEALS INTACT
RECEIVED BY
NOTES

ID NO.	STATUS	SALES TAX NO.	DNR UST NO.	LATITUDE	LONGITUDE

BUSINESS NAME	BUSINESS CONTACT / TITLE	SUPPLIER
ADDRESS	BUSINESS NAME	CITY / TELEPHONE
CITY / STATE / ZIP CODE	ADDRESS	SUPPLIER
COUNTY	CITY / STATE / ZIP CODE	CITY / TELEPHONE
TELEPHONE / FAX	TELEPHONE / FAX	BRAND
EMAIL	EMAIL	WEATHER CONDITIONS

LAB NUMBER	CONTAINER NUMBERS	PROD. CODE	NAME OF ADV. PRODUCT	FILTERS		ALC/BIO LABELING			POSTED OCTANE	TANK OR PUMP NO.	GALLONS ON HAND	WATER/STORAGE		LAST DELIVERY	PRICE PER GALLON	QTY. PURGED		SAMPLE QTY.	
				NO.	SIZE	NO	ETH	BIO				AST	UST			GAL.	$	TAKEN	$

REMARKS

- ☐ STOP SALE
- ☐ NOTICE OF VIOLATION

LAB NOTES

INSPECTOR SIGNATURE	INSPECTION DATE	TIME	REPORT RECEIPT ACKNOWLEDGMENT

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APPENDIX C. – EXAMPLES OF NOTICE OF VIOLATION AND STOP SALE REPORTS

NORTH CAROLINA DEPARTMENT OF AGRICULTURE & CONSUMER SERVICES
STANDARDS DIVISION

Station Name ______________________

Address ______________________

Inspection No. ____________ Date ____________

In order to secure representative samples for inspection purposes, quantities of product as indicated below were drawn through dispensers and returned to the appropriate storage tanks.

	Product	Amount	
1.		( ) gal.	($.)
2.		( ) gal.	($.)
3.		( ) gal.	($.)
4.		( ) gal.	($.)
5. **Total**		( ) gal.	($.)

Remarks: ______________________

Signed: ______________________
Owner or Agent

____
Inspector

STATE OF MISSOURI
DEPARTMENT OF AGRICULTURE
FUEL QUALITY PROGRAM
NOTICE OF VIOLATION

INSTRUCTIONS:
1) CORRECT INDICATED PROBLEM
2) SIGN REPORT BELOW
3) MAIL REPORT TO:
MO DEPARTMENT OF AGRICULTURE
FUEL QUALITY PROGRAM
P.O. BOX 630
JEFFERSON CITY, MO 65102
4) QUESTIONS?
CALL: 573-751-2922

STATION NAME	COUNTY	I.D. NUMBER
ADDRESS, CITY, STATE, ZIP		

The following fuel quality and labeling violations were found. Missouri state law sections 414.012 and 414.152 RSMo. Code of State Regulations, 2 CSR 90-30.040 through 90-30.110.

☐ 1. Products containing ethanol must have a suitable filter of 10 microns or less installed in the meter inlet or discharging line and immediately adjacent to the meter.

☐ 2. Dispenser(s) shall identify name of product being sold. (Dispenser No. ____________________)

☐ 3. Dispenser(s) shall identify octane rating of product in accordance with FTC Automotive Fuel Ratings, Certification and Posting Rule. (Dispenser No.____________________)

☐ 4. Dispenser(s) shall display grade of product being sold. (Dispenser No. ____________________)
☐ Aviation gasoline, grade 80, grade 100, or grade 100LL. ☐ Aviation turbine fuel, Jet A, Jet A-1, or Jet B.
☐ Diesel fuel, No. 1-D or No. 2-D.
☐ Kerosene, No. 1-K, or No. 2-K. Grade No. 2-K requires a warning label stating "WARNING - NOT SUITABLE FOR USE IN UNVENTED HEATERS REQUIRING NO. 1-K" in letters 1/2" high and 1/16" stroke.

☐ 5. Water in storage tank shall not exceed (1") one inch. The __________ inches in __________ storage shall be removed within 48 hours.

☐ 6. All storage tanks shall be clearly posted with the name of the product they contain.

☐ 7. All fill connections shall be identified by the product for which they contain.

☐ 8. Blending dispenser(s) do not comply with the Federal Trade Commission's Octane Posting Rule. These dispensers blend __________ octane premium with 87 octane regular unleaded to obtain a midgrade product(s). Blenders must be set at no less than __________% premium, and no more than ________% regular unleaded to obtain an ________ octane blend. The blend ratios on all dispensers must be changed immediately to comply with state and federal law.

☐ 9. Blend valves shall be sealed & tagged with percentage of each blended product.

☐ 10. Spill basins shall have:
☐ proper fitting & sealing caps ☐ broken caps replaced ☐ seals replaced
☐ debris removed from spill basins ☐ functional drains ☐ water removed from spill basins

☐ 11. All totalizers shall be functional. (Dispenser No.____________________)

☐ 12. Diesel nozzle spout end should be 0.930 inch or larger in diameter.

☐ 13. ____________________

☐ 14. ____________________

☐ 15. ____________________

☐ 16. ____________________

☐ 17. ____________________

☐ 18. ____________________

Corrections to be completed on or before, or as otherwise noted. MAIL FORM TO ADDRESS ABOVE. ▶		DATE
INSPECTOR	INSPECTION DATE	RECIPIENT'S SIGNATURE

I hereby declare all fuel quality and labeling violations have been corrected to comply with Missouri state laws.

SIGNATURE (OWNER, STORE MGR, CERTIFIED REPAIRMAN, ETC.)	DATE OF CORRECTION
PRINT NAME AND TITLE	

SUBMITTING FALSE OR MISLEADING INFORMATION IS A VIOLATION OF MISSOURI STATE LAW SECTION 575.060 RSMo.

MO 350-1075N (12-04) DISTRIBUTION: WHITE - OFFICE CANARY - INSPECTED PREMISES

MISSOURI DEPARTMENT OF AGRICULTURE
DIVISION OF WEIGHTS AND MEASURES
TELEPHONE: (573) 751-2922 FAX: (573) 751-8307

STOP SALE NOTICE

STATION NAME		ID NUMBER	DATE	TIME
ADDRESS		CITY		
STATE	ZIP	COUNTY	TELEPHONE NUMBER	

You are hereby notified to immediately stop the sale of the product(s) listed below.

PRODUCT AND GRADE	PUMP, TANK NUMBER OR OTHER I.D.	TOTALIZER READINGS	QUANTITY	WIRE SEALED

REASON FOR STOP SALE

INSTRUCTIONS

SIGNATURE OF INSPECTOR	RECEIPT OF NOTICE ACKNOWLEDGED BY OWNER OR OPERATOR

WARNING: Disposal or removal of any rejected product contrary to law is prohibited. RMSo 414.141

MO 350-0968N (10-04)

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Appendix B

Item 2301-1: NIST Handbook 130 – Uniform Packaging and Labeling Regulation

11.XX. Multi-Unit Fresh Fruit and Vegetable Packages.

Presentation by United Fresh Produce Association, Western Growers Association, Produce Marketing Association and Presentation by California Agriculture Commissioners and Sealers Association

Labeling of Master Produce Cartons and RPCs

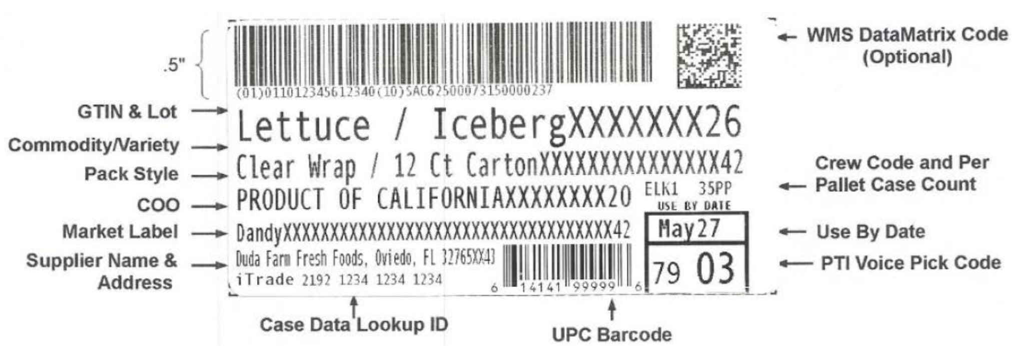
Produce Traceability Initiative (PTI)

- PTI requires standardization of corrugated shipping container and Returnable Plastic Container (RPC) labeling
- 55-60% of all produce shipping containers cases in the US are currently labeled
- RPCs allow for a 2″ x 4″ label
    - Limited space on the label
    - Industry requirements occupy 100% of label space
- Total net quantity of shipping container is understood between buyers and sellers.
    - i.e. 16 – 16oz is understood to be a total carton quantity of 16 lbs.

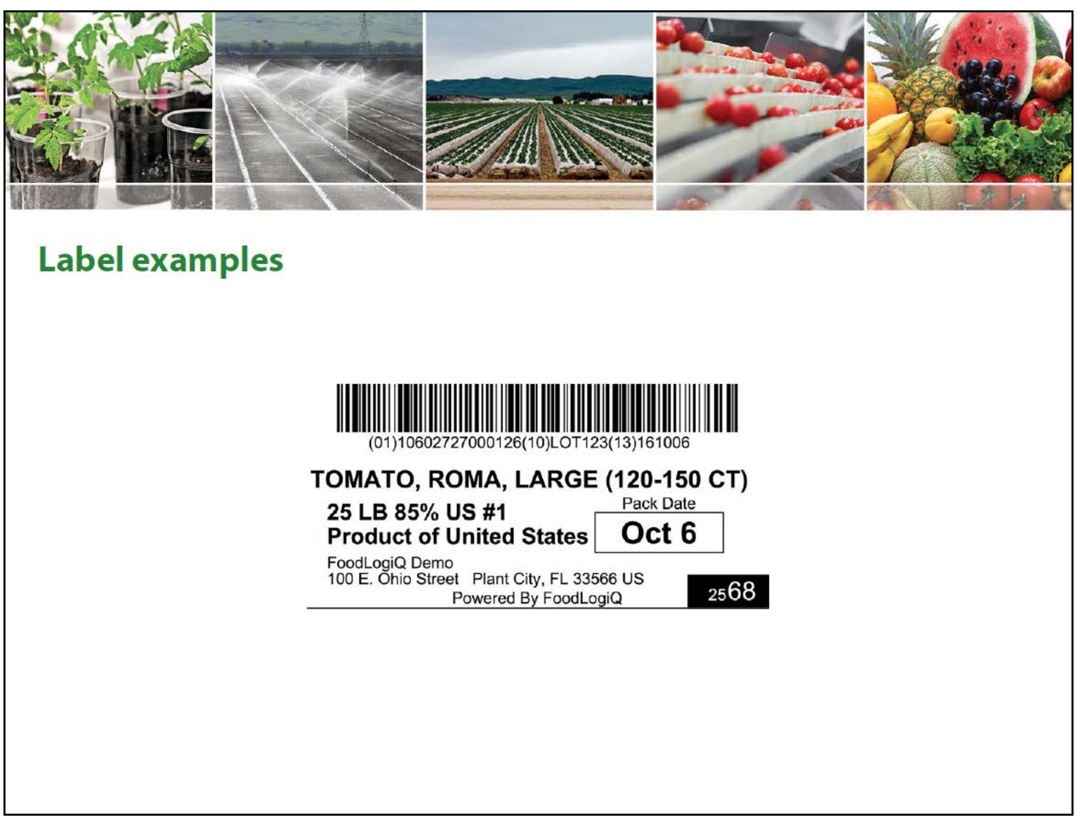
Total net quantity challenges

- Total net quantity inclusion on label would require a redesign of all labels in circulation (~3.6 billion)
- Label size would have to be increased
  - RPCs would have to be redesigned and or modified as packers use same label for corrugated shipping containers and RPCs
- Could increase price of fresh produce to consumers
- Total Net Quantity is not a trade issue between buyers and sellers
- Total Net Quantity does not affect consumers
- Perishable Agricultural Commodities Act (PACA) covers all trade disputes between fresh produce buyers and sellers

Label examples




Label examples
(01)10078783010322(10)0857917
CARROTS BABIES
24/12 Oz. RPC
BEST IF USED BY
Jan 13
Product of USA
Grimmway Farms Bakersfield, CA 93380
010322
25 61
(01)10078783005861(10)0857917
CARROT BABIES - YELLOW
ORGANIC
24/1 Lb. COF
BEST IF USED BY
Jan 13
Product of USA
Grimmway Farms Bakersfield, CA 93380
21 42


Label examples
(01)10602727000126(10)LOT123(13)161006
TOMATO, ROMA, LARGE (120-150 CT)
25 LB 85% US #1
Pack Date
Oct 6
Product of United States
FoodLogiQ Demo
100 E. Ohio Street Plant City, FL 33566 US
Powered By FoodLogiQ
2568

Proposed Solution

- An exemption to exempt multi-unit, non-consumer packages of fresh fruit and vegetable from Section 10.4 (c)

Questions?

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Produce Marketing Association
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Western Growers Association
Office: 949.885.2263
mmcinerney@wga.com

NCWM

National Conference on Weights and Measures

2017 NCWM Interim Meeting: San Antonio, TX
January 8th - 11th, 2017

Laws and Regulations Committee Agenda
Item 2301-1

California Agricultural Commissioners & Sealers Association

1

10.4. Multi-unit Package Regulation

3

Any package containing more than one individual "commodity in package form" (see Section 2.1. Package) of the same commodity shall bear on the outside of the package a declaration of:

(a) the number of individual units;
(b) the quantity of each individual unit; and
(c) <u>the total quantity of the contents of the multi-unit package.</u>

Background

4

- Routine regulatory inspections revealed increasing use of Product Traceability Initiative (PTI) labeling without total net quantity.
- Industry practice of utilizing PTI labeling in the US has evolved, especially over the last decade, largely in response to food safety requirements - Food Safety Modernization Act (FSMA).
- PTI labeling allows:
  - Compliance with FSMA
  - Flexibility for ever-changing product packaging
  - Has evolved to become de facto IRQ in many cases
- While PTI labeling for multi-pack, non-consumer containers are technically out of compliance (Section 10.4(c)), we are not aware of ANY industry, trade or marketplace complaints or concerns.

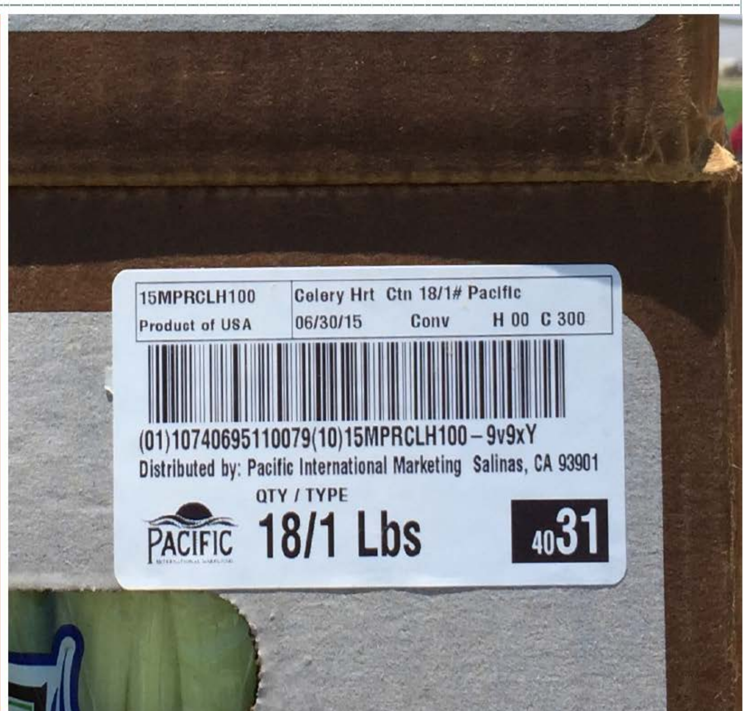
5

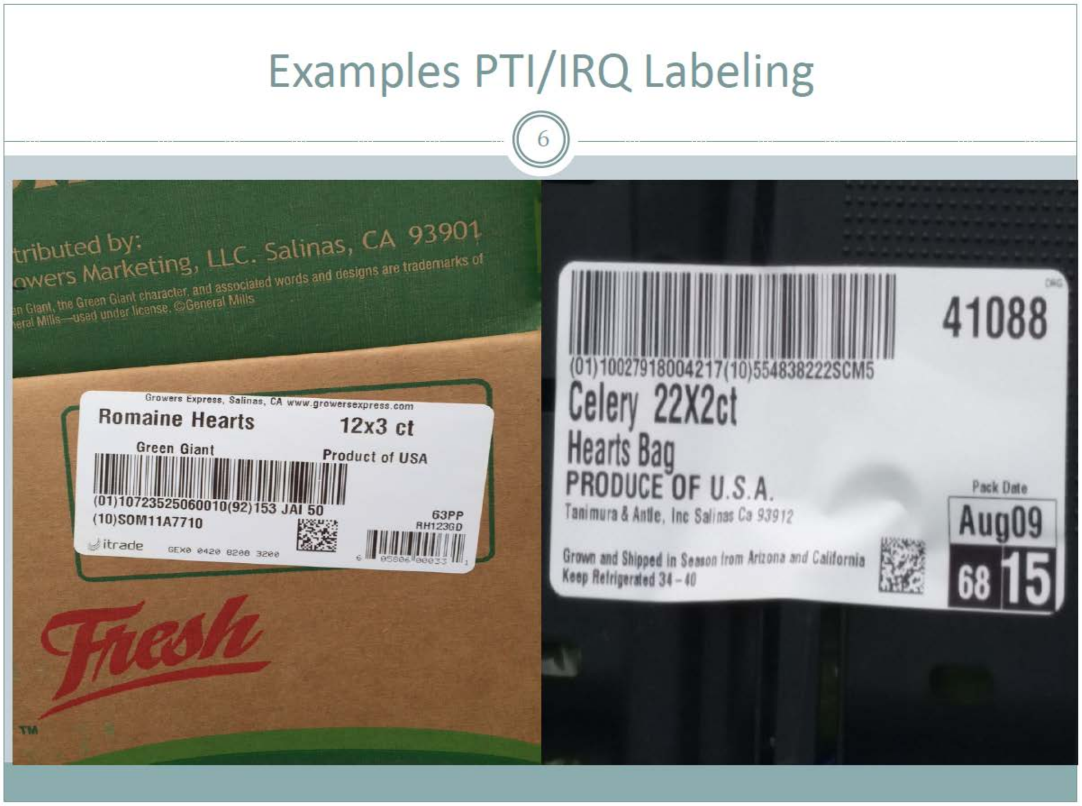
PTI LABELING

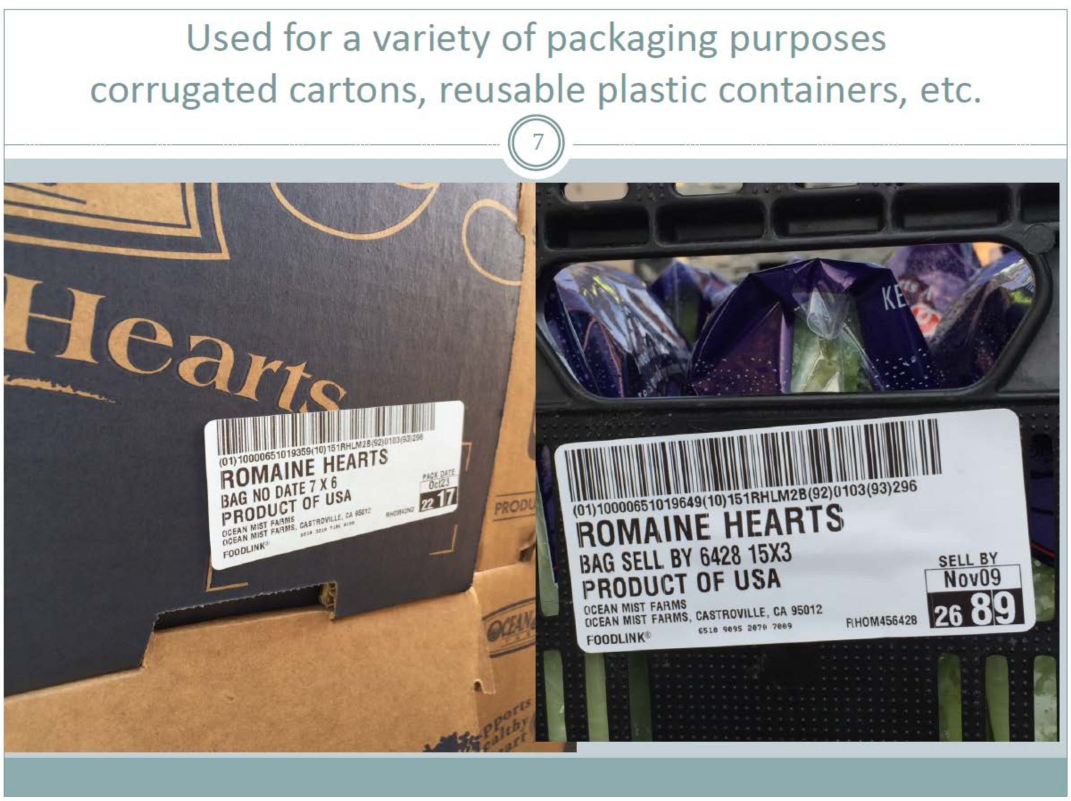
Product Traceability Initiative (PTI) Label

Created in a large part to meet requirements of 2016 Food Safety Modernization Act (FSMA)

PTI labeling has evolved to become the de facto IRQ label and is unique to fresh fruits and vegetables industries




Examples PTI/IRQ Labeling
6
Romaine Hearts
12x3 ct
Green Giant
Product of USA
(01)10723525060010(92)153 JAI 50
(10)SOM11A7710
Fresh
41088
(01)10027918004217(10)554838222SCM5
Celery 22X2ct
Hearts Bag
PRODUCE OF U.S.A.
Tanimura & Antle, Inc Salinas Ca 93912
Grown and Shipped in Season from Arizona and California
Keep Refrigerated 34 – 40
Pack Date
Aug09
68 15


Used for a variety of packaging purposes
corrugated cartons, reusable plastic containers, etc.
7
Hearts
ROMAINE HEARTS
BAG NO DATE 7 X 6
PRODUCT OF USA
(01)10000651019649(10)151RHLM2B(92)0103(93)296
ROMAINE HEARTS
BAG SELL BY 6428 15X3
PRODUCT OF USA
OCEAN MIST FARMS
OCEAN MIST FARMS, CASTROVILLE, CA 95012
FOODLINK
RHOM456428
SELL BY
Nov09
26 89

Examples PTI/IRQ Labeling

8

9

PTI Labels

With the use of a handheld device and thermal printer, PTI Labels are printed and applied to boxes in both the field and packing facilities

10

PTI Labels Cont.

PTI Onsite Field Application

Workers affixing PTI Labels to corrugated cartons.

Mobile PTI label printing allows container and pack flexibility.

Regulatory Response & Proposals

11

1. Amend language to 10.4, NOTE 7, exempting <u>non-consumer</u> multi-unit <u>produce packaging</u> from subsection (c) "the total quantity of the contents of the multi-unit package": ***<u>A multi-unit produce package declaring the contents of the number of individual units(a), the quantity of each individual unit(b) and labeled in full compliance with this regulation are not required to declare the total quantity(c) of the multi-unit package</u>***.

2. After consulting with NIST staff, efforts were redirected to amend the Title of 10.4 to apply "**<u>Retail</u>**", which would exempt <u>all non-consumer</u> multi-unit packaging from the requirements of Section 10.4: ***10.4. Multi-unit <u>Retail</u> Packages.*** *(exempt non-consumer packs)*

3. Proposal went to Regional Conferences on Weights and Measures:
   - Western and Central Weights & Measures Associations – recommended withdrawal
   - Southern and Northeastern Weights & Measures Associations - recommended further development.

4. Questions and concerns raised from deliberations lead to the proposal before you.

Recommendation to the National Conference on Weights and Measures

12

Pursue an exemption for multi-unit, non-consumer packages of fresh fruits and vegetables from Section 10.4 (c) by amending NIST Handbook 130 Uniform Packaging and Labeling Regulation Section 11 to add "**11.34 Multi-unit Fresh Fruit and Vegetable Package**."

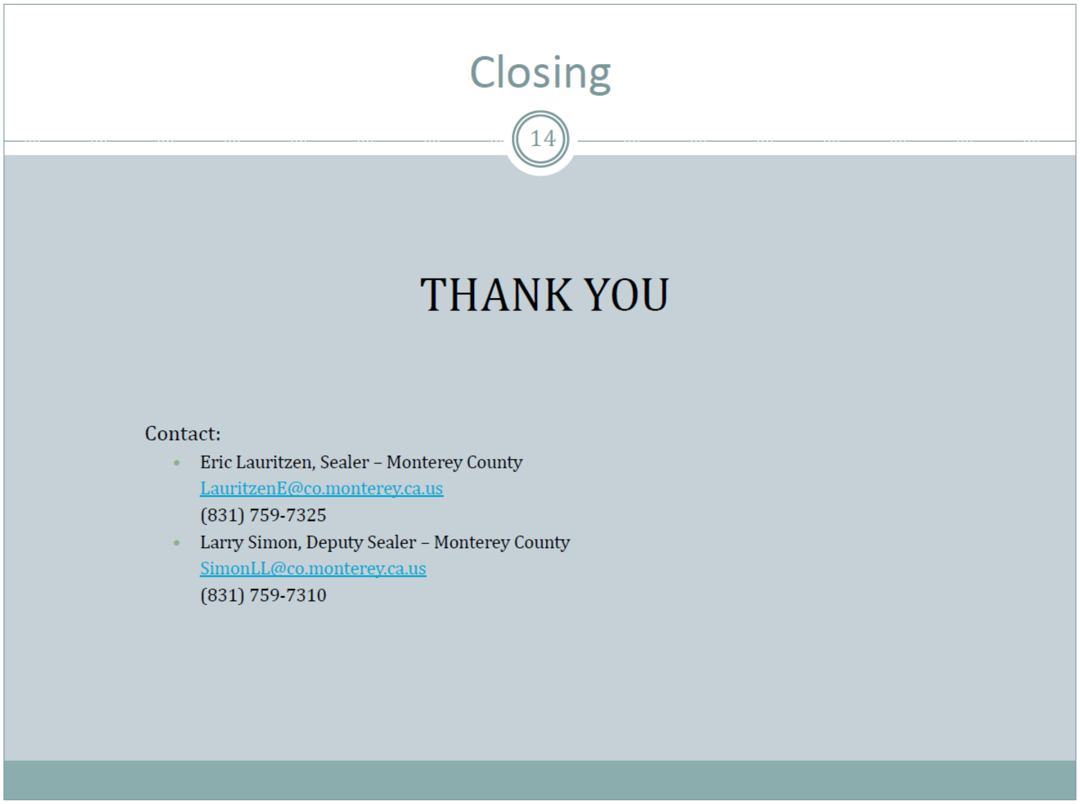
Proposed Exemption Language:

11.34 Multi-unit Fresh Fruit and Vegetable Package. – A multi-unit, non-consumer package of fresh fruits and vegetables bearing (a) the number of the individual units and (b) the quantity of each individual unit are exempt from 10.4 (c) declaration of the total quantity of the contents of the multi-unit package.

California Agricultural Commissioners and Sealers Association (CACASA)

13

- Item was originally brought to Regional Associations by Monterey and Ventura Counties in California.
- On December 15, 2016, the Laws & Regulations (L&R) Committee of the California Agricultural Commissioners & Sealers Association (CACASA) met in Sacramento, CA to discuss Item 2301-1. After discussion and deliberation, the Committee recommended CACASA support the development of NCWM L&R Committee Item-2301-1 with the modified language above.
- On December 16, 2016, CACASA's Board of Directors supported the L & R Committee recommendation for development of an exemption for multi-unit, non-consumer packages of fresh fruit and vegetable.
- Support is now requested from the NCWM L&R Committees to advanced Item 2301-1 to formulate a change of law for this unique industry practice.


Closing
14
THANK YOU
Contact:
Eric Lauritzen, Sealer – Monterey County
LauritzenE@co.monterey.ca.us
(831) 759-7325
Larry Simon, Deputy Sealer – Monterey County
SimonLL@co.monterey.ca.us
(831) 759-7310

Report of the Specifications and Tolerances (S&T) Committee

Dr. Matthew Curran, Committee Chair
Florida

3000 INTRODUCTION

This is the final report of the Committee on Specifications and Tolerances (S&T) (hereinafter referred to as the "Committee") for the 102nd Annual Meeting of the National Conference on Weights and Measures (NCWM). This report is based on the Interim Report offered in the NCWM Publication 16, "Committee Reports," testimony at public hearings, comments received from the regional weights and measures associations and other parties, the addendum sheets issued at the Annual Meeting, and actions taken by the membership at the voting session of the Annual Meeting. The Informational items shown below were adopted as presented when this report was approved. This report contains those recommendations to amend National Institute of Standards and Technology (NIST) Handbook 44 (2017), "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices."

Table A identifies the agenda and appendix items by reference key, title of item, page number, and the appendices by appendix designations. The acronyms for organizations and technical terms used throughout the agenda are identified in Table B. The first four digits of the Reference Key Numbers of the items are assigned from the Subject Series List. The status of each item contained in the report is designated as one of the following: **(D) Developing Item:** the Committee determined the item has merit; however, the item was returned to the submitter or other designated party for further development before any action can be taken at the national level; **Informational (I) Item:** the item is under consideration by the Committee but not proposed for Voting; **(V) Voting Item:** the Committee is making recommendations requiring a vote by the active members of NCWM; **(W) Withdrawn Item:** the item has been removed from 9consideration by the Committee.

Table C provides a summary of the results of the voting on the Committee's items and the report in its entirety. Some Voting Items are considered individually; others may be grouped in a consent calendar. Consent calendar items are Voting Items that the Committee has assembled as a single Voting Item during their deliberation after the open hearings on the assumption that the items are without opposition and will not require discussion. The Voting Items that have been grouped into consent calendar items will be listed on the addendum sheets. Prior to adoption of the consent calendar, the Committee entertains any requests from the floor to remove specific items from the consent calendar to be discussed and voted upon individually.

Proposed revisions to the handbook(s) are shown as follows: 1) deleted language is indicated with a **bold face font using ~~strikeouts~~** (e.g., **~~this report~~**), 2) proposed new language is indicated with an **underscored bold-faced font** (e.g., **new items**), and 3) nonretroactive items are identified in *italics*. When used in this report, the term "weight" means "mass."

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

Subject Series List

Table A
Table of Contents

Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
ABWS	Automatic Bulk Weighing System	NEWMA	Northeastern Weights and Measures Association
AAR	Association of American Railroads	NIST	National Institute of Standards and Technology
API	American Petroleum Institute	NTEP	National Type Evaluation Program
CNG	Compressed Natural Gas	OIML	International Organization of Legal Metrology
CWMA	Central Weights and Measures Association	OWM	Office of Weights and Measures
EPO	Examination Procedure Outline	RMFD	Retail Motor Fuel Dispenser
FHWA	Federal Highway Administration	S&T	Specifications and Tolerances
GMM	Grain Moisture Meter	SD	Secure Digital
GPS	Global Positioning System	SI	International System of Units
HB	Handbook	SMA	Scale Manufactures Association
LMD	Liquid Measuring Devices	SWMA	Southern Weights and Measures Association
LNG	Liquefied Natural Gas	TC	Technical Committee
LPG	Liquefied Petroleum Gas	USNWG	U.S. National Work Group
MMA	Meter Manufacturers Association	VTM	Vehicle Tank Meter
MDMD	Multiple Dimension Measuring Device	WIM	Weigh-in-Motion
NCWM	National Conference on Weights and Measures	WWMA	Western Weights and Measures Association

Table C
Summary of Voting Results

Reference Key Number	***House of State Representatives***		***House of Delegates***		***Results***
	Yeas	***Nays***	***Yeas***	***Nays***	
Consent Calendar: 3300-1, 3301-1, 3301-3, 3302-3, 3305-1, 3306-1, 3307-1, 3508-1	38	0	57	2	Adopted
3200-1	22	14	33	27	Returned to Committee
3200-2	35	0	61	1	Adopted
3200-3	26	11	48	13	Returned to Committee
*3504-1	36	0	57	4	Adopted
3504-2	36	0	54	8	Adopted
*3600-6	36	0	57	4	Adopted
To Accept the Report	Voice Vote				Adopted

* Items 3504-1 and 3600-6 were voted upon as a block.

Details of All Items
(In order by Reference Key)

3100 GENERAL CODE

3100-1 D G-S.5.2.2. DIGITAL INDICATION AND REPRESENTATION (SEE RELATED ITEMS 3200-5 AND 3600-2)

Source:
Ross Andersen, Retired (2017)

Purpose:
Address the application of the code requirements across multiple devices.

Item under Consideration:
Amend NIST Handbook 44 General Code as follows**:**

G-S.5.2.2. Digital Indication and Representation. – Digital elements shall be so designed that:

(a) All digital values of like value in a system agree with one another.

(b) A digital value coincides with its associated analog value to the nearest minimum graduation.

(c) A digital value "rounds off" to the nearest minimum unit that can be indicated or recorded.

(d) A digital zero indication includes the display of a zero for all places that are displayed to the right of the decimal point and at least one place to the left. When no decimal values are displayed, a zero shall be displayed for each place of the displayed scale division.
[Nonretroactive as of January 1, 1986]

(e) A digital value that is electronically summed from the digital indications of multiple independent devices shall be mathematically correct.
[Nonretroactive as of January 1, 20XX]

(Amended 1973**,** ~~**and**~~ 1985**, and 20XX**)

Background/Discussion:
The submitter provided the following comments:

> Some are now coming to understand that the NCWM made a mistake in 1990 in interpreting how we apply the code requirements to the three-platform, three-indicator truck scale with a fourth summed indication. In any suggestion that a Code should be changed or reinterpreted, there is an unstated requirement that there must be some conflict that needs resolution. Often the difficult part is in just identifying the conflict or in finding the right question to expose the conflict to others and, in doing so, possibly point to the resolution. Some might think there is no conflict and there is no issue, but I must disagree.
>
> What stands out on this issue to me is the huge divide between the public sector and private sector on this issue. It was black and white in 1989, good guys vs the bad guys. The public sector, me included, saw the issue one way, while the scale industry almost unilaterally saw it differently. As I think back over my career, I find it hard to find many issues where consensus between the two sides eluded the NCWM as it did for this issue. In my experience, the scale industry works toward consensus as earnestly as the public sector. If there is no consensus here, this should bother us all and encourage us to try to understand why.

If we ask the question on our current issue, as Henry Oppermann has, it goes like this: How do we apply the Scales Code requirements to a three-platform scale with three independent weight indications and a fourth indication of the sum of the three independent platforms? His answer follows his logic of the "duck test." Quoting him, "if a scale looks like truck scale, operates like a truck scale, and weighs trucks, then it is a truck scale."

It is important to note that a parallel issue was on the 2016 S&T agenda dealing with the v_{min} requirement for these three-platform scales with three independent indicators. However, in dealing with this small part of the larger issue, the Committee has chosen to ignore the larger issue for now. In my testimony at the 2016 Interim Meeting, I pointed out that the v_{min} change would result in a mixed state of being. Part of our interpretation for v_{min} would treat the three scales as three, but treat them as one for all other requirements. Does this make sense?

I see an immediate problem here, as Henry's quote is based on thinking from 1989; and I'll suggest much earlier, pre-1986 to be exact. We can see this in Tables 7b. and 7a. in the Scales Code. These tables deal with selection requirements for unmarked scales and marked scales. Table 7b. reflects that pre-1986 thought process where the application of the unmarked device determined what technical and performance requirements would apply. This is the model implied in Henry's comment and in the thought process we see from the S&T Committee as it wrestled with this issue in 1990. Quoting from page 157 of the 1990 S&T Final Report: "The classification of a scale or weighing system into an accuracy class should be based upon its application and method of use, not on the design of the device." In the same paragraph the report also notes, "The significance of this interpretation is that not only must each independent weighing device meet the requirements of Handbook 44, but the entire weighing system must meet all requirements that would apply <u>if the device were a single scale</u>" (emphasis added). This was voted on and approved by the public-sector voters of the NCWM with strong opposition from the (non-voting) scale industry.

Looking at that last statement in the S&T report today, does it even make sense? Table 7a. made a radical departure from the pre-1986 way of thinking. Under the "New" Scales Code which took effect January 1, 1986, the technical and performance requirements were determined by the class designation that was chosen and marked on the device by the manufacturer. In the wording of the table, it is a typical application of the class. Thus, the requirements apply based on the class designation as marked by the manufacturer and the device is adapted to the application. To me this contradicts the S&T conclusions in 1990.

I'm suggesting that a "duck test" is not valid for marked devices. For example, there is no single set of requirements for a marked truck scale. By this, I mean one can use a class III or a class IIIL scale to weigh trucks and the requirements are, therefore, very different. This was impossible to imagine prior to 1986 under the "Old" Scales Code. It is the manufacturer, in the design and production phases, who determines and marks the class. It is the marked class that determines which technical requirements will be applied to the device, and this is done before it leaves the plant. The code recognizes that the manufacturer has no means to limit the application once the purchaser buys the device. Whether a device is suitable is a separate question and has a separate requirement; that is, General Code Paragraph G-UR.1. Selection Requirements.

I believe the "duck test" is not valid for the entire Handbook. For me, the critical issue we have to address is how to apply code requirements in general. The simple, direct answer is: we apply code requirements to <u>a</u> device. That is how the requirements are written; in the singular. Why is this singularity important? The answer lies in unstated, general principles in Handbook 44 which we can elicit by asking, "How do we measure quantities of things in commerce, generally?" By generally, I mean across all codes. My answer is that the codes clearly allow multiple solutions to that question. I'll state this more specifically:

A commodity exchanged in commerce may be measured:

A. as a single draft measured using a single measuring instrument;

B. as the sum of measurements of sub-parts of the whole using multiple drafts on a single measuring instrument; or

C. as the sum of measurements of sub-parts of the whole using multiple drafts of multiple measuring instruments.

It must be noted that the instrument used in any of the options A through C, must be suitable for service when measuring the whole or the sub-part in conformance with G-UR.1. For the purposes of this discussion we will stipulate that all measuring instruments involved are suitable for service, whether measuring the whole or the sub-part. For example, all weighments are stipulated to be greater than the recommended minimum load in Table 8 or liquid quantities in conformance with G-UR.1.3.

A couple of examples might help. I don't think I need to illustrate option A, as it is the most common solution. Option B can be seen with an Automatic Bulk Weighing system which operates by summing multiple drafts weighed on the same scale to provide a total weight of the whole commodity. But I could also do option B using VTMs. I could make multiple deliveries from a single VTM unit to fill a large customer order; that is, larger than the tank capacity of the single VTM. Alternatively, I could fill that order using drafts from multiple VTM units, option C.

Our assumption in accepting each of these options is that the <u>sum of measurements from multiple compliant instruments is *de facto* compliant.</u> In fact, the reason that we use multiple drafts in the first place is that the total will probably exceed our ability to verify the quantity of the whole, even if we wanted to! Going back to our examples, how could we verify, after the fact, that the 1,000 tons of grain loaded on a barge from an ABWS system with a 50 000 lb capacity scale is accurate? That's at least 40 drafts.

What becomes very clear to me in the general case is that the technical and performance requirements are applied to the individual device without regard to the summed total. It seems this summed total has always been the crux of the issue. Does this summed indication now link the three independent platforms with their independent indication in a way that makes them one device for legal purposes? This is what the S&T Committee decided in 1990. Some would continue to say "yes" and some would say "no." However, there is the law to consider. By law, I mean the general rules of construction of legal requirements. In construction, we must not be arbitrary and capricious. I believe those that say the three scales are one scale are being arbitrary and capricious.

To see how this is so, consider what UR.3.3. Single-Draft Weighing means. Below is the current HB44 text.

> **UR.3.3. Single-Draft Vehicle Weighing.** – A vehicle or a coupled-vehicle combination shall be commercially weighed on a vehicle scale only as a single draft. That is, the total weight of such a vehicle or combination shall not be determined by adding together the results obtained by separately and not simultaneously weighing each end of such vehicle or individual elements of such coupled combination. However, the weight of:
>
> (a) a coupled combination may be determined by uncoupling the various elements (tractor, semitrailer, trailer), weighing each unit separately as a single draft, and adding together the results; or
>
> (b) a vehicle or coupled-vehicle combination may be determined by adding together the weights obtained while all individual elements are resting simultaneously on more than one scale platform.

The first sentence makes it clear that this is not a general provision as it limits the scope of the requirement to "a vehicle or a coupled-vehicle combination." It now goes on to say that any entity fitting one of those two descriptions shall be weighed as a single draft. Note that this is "option A" from the general case above. The paragraph goes on to provide more explanation of what "single-draft" means.

Then we come to a "However," indicating there are viable alternatives to the single-draft requirement. Alternative (a) allows the coupled combination to be divided into sub-parts that are weighed separately and the weight of the coupled combination is found by summing the individual weights of the sub-parts. Alternative (b) says that a vehicle or a coupled combination may be suspended simultaneously on more than one scale and the weight is found by summing the indications of the multiple scales.

On first glance, we might think that alternative (a) is option B from the general case, and alternative (b) is option C. However, closer reading will show that is not the case. Look carefully at the wording of alternatives (a) and (b). You cannot equate (a) with option B since (a) does not limit you to a single scale. You might assume that the multiple parts would be weighed on the same scale, but the code does not stipulate that. To do that, the code would have to add the words, "on the same scale;" that is, weighing each unit separately on the same scale and adding together the results." What I'm pointing out is that (a) as it is now written allows either general option B or C. By this I am considering the case where there are multiple scales available at the site. Each of those scales might have a capacity and division size of 200 000 × 20 lb. For example, think about one of those three component trucks (tractor, trailer, and pup). Alternative (a) allows you to uncouple and weigh the three sub-parts on three scales, two scales, or one scale in full compliance with the code.

Now it becomes clear that UR.3.3. is addressing the real issue with weighing large vehicles and coupled-vehicle combinations, and that is shifting loads and coupler interactions. In alternative (a) you eliminate both interferences by isolating each part on its own scale. In alternative (b) by supporting the vehicle or combination on multiple scales, any shift in the load or coupler interaction cancels out. If load shift or coupler interference reduces the weight on one platform, it increases it on another. Of critical importance, the three-platform scale that is the focus of this discussion, is an application of (b) where the load is supported simultaneously on more than one platform and the individual indications of the three scales are summed to get a total. There is no other way to describe what is happening since the total indication is, in fact, a sum of the weights from the three separate platforms. Also of critical importance, there should be no expectation whatsoever that the sum valued obtained in alternative (a) will be identical to alternative (b).

However, getting back to the question about three scales or one, it should now be clear that the Handbook clearly allows summed indications from multiple devices using options B or C. If the S&T statement is correct, then the code requirements must be applied across two scales or three scales in the example of multiple scales at a site. Thus, the three, one hundred-ton scales have a combined 30 000 divisions according to that interpretation. This would virtually preclude having multiple scales at the same site as they might be used to weight a single coupled-vehicle combination in pieces. Even going to 50 lb divisions still puts them out of compliance. Also, you have to consider the shift test requirements, which now require agreement of sections across all three scales!

Finally, we have to consider other cases of three independent scale platforms configured to weigh trucks. In case one, each platform has a stand-alone independent indicator and the three indications are manually summed by the operator. In case two, each platform has an individual indicator but all three indicators are housed in a single enclosure. Again, the summing is done manually by the operator. In both of these cases, the three independent instruments remain independent under the 1990 decision. This is what I mean by arbitrary and capricious.

Now, suppose I can weigh a coupled-vehicle combination on three platforms with three separate indicators and manually add the indications to obtain a total weight for the combination. As I understand the 1990 decision, those three scales do not have to meet requirements like the number of scale divisions extended across all three scales. That extension only applies if there is a single weight display for the three scale indications and a fourth electronic indication for the sum. The results obtained are absolutely identical in function (adding manually on paper or having the system add them up) yet you are applying different requirements to the three scales depending on whether you are doing it manually or electronically. Isn't that being blatantly arbitrary and capricious?

Move over to the VTM example, and the three VTM units used to fill that order, must those three meters be treated as one meter, think about repeatability tests. It doesn't make sense for scales, nor does it make sense for any of the other codes. Thus, I argue that options B and C allow the summing of multiple devices without forcing them to be considered one instrument for applying code requirements. I believe the handbook needs to say that explicitly to avoid confusion.

I offer one additional item of support. I found reference that this issue has been raised internationally. Sections of the 2009 WELMEC Guide to Non-Automatic Weighing Instruments addresses this issue quite clearly (see pertinent sections on the final pages of this document). Point 3.1.16. in the Guide addresses the same issues as UR.3.3. where multiple platforms are used. The applications coincide with those I expressed in this discussion paper. Also, I believe point 3.1.54. addresses the use of multiple axle-load scales to weigh a vehicle. It also supports the conclusion that the individual axle-load scales do not become a single instrument for compliance purposes. In extension, if 3.1.54. does not apply MPE (tolerances) to the summed indication, it also does not extend other technical requirements such as v_{min} [which the NCWM has addressed], n_{max}, shift test, etc.

The Fundamental Considerations change is necessary to spell out clearly that code requirements do not extend across multiple devices unless specifically stated. A good example is the application of the code to wheel-load weighers designated as and used in pairs. For those scales designated as pairs, many authorities apply the tolerances only to the combined indication of the pair. None of the other requirements applicable to the wheel-load weigher are affected by this exception. For example, the combined number of divisions for the pair is not limited to 1200 as in Table 3. Other requirements like identification markings, rules for indicators, zero-load adjustments, etc., remain applicable only to the individual wheel-load weigher and not to the pair.

The addition to G-S.5.2.2. is necessary since you can't write requirements into the Fundamental Considerations. That section is there to help understand how to apply what is written in the codes. You must have a specification that the electronic sum be mathematically correct to reference if there is non-compliance. That is, readings from three scales of 107, 206, and 98 must result in an electronic sum of 411.

Note 4 in Table 3 has to be changed, since the last two sentences address these instances of multiple independent scales and reflect the 1990 decision. The removal of the last sentence removes the summed indicator from consideration under the classification system as discussed above, since the summed indication is not a directly measured quantity and is not subject to class requirements. The summed indication is also not subject to requirements for n_{max}, tolerances, etc. When this last sentence is removed, it makes the next to last sentence unnecessary for each independent scale is already covered under the general provisions of the Table.

There is a small side issue regarding multiple devices using option C where the division size is not the same for all the devices. The general principle (i.e., summing the indications from compliant devices is a valid way to measure a commodity) does not necessarily require that division sizes of the individual devices be identical. Note that you might want to apply UR.1.3. to printed records from the three scales. However, the proposed new Fundamental Considerations paragraph exempts the summed indication since code requirements do not apply to the summed indication except the mathematical correctness. Also, the summed indication is a sum, not a representation of a scale division. It is just a sum of the values obtained from the individual compliant devices. The individual weights are also required to be shown on any record of the transaction. While the different division sizes may offend our sensibilities a little bit, on what objective basis can we say it violates the general principle; that is, the sum of multiple compliant measurements is also *de facto* compliant. It is this compilation of original sources for the sum and the sum that provides the transparency for the transaction. Note the WELMEC reference indicates this is the position taken by many internationally.

I can think of another possible situation in the case of multiple ABWS systems. Suppose you are loading to a single barge from two sources where the two ABWS scales have different division sizes. The scale controller interfaced to the two scales now can print each of the weighments from each of the two scales and a single total for the entire transaction. The sum need only be mathematically correct since it is a mathematical sum of independent, compliant weighments.

The following is taken from the May 2009 version of WELMEC Directive 90/384/EEC: Common Application Non-Automatic Weighing Instruments (available at **www.welmec.org/latest/guides/**):

3.1.2 Calculated weight (Meeting 10, Decision 10)

Where the indication represents an actual determination of the weight then the indication must respect the error allowance and be presented in the correct format.

When gross, net and tare are printed together, weight may be calculated from two actual determinations of weight. In the case of a multi-interval instrument it would be allowed to print a calculated value with the least significant digit which need not be rounded to the relevant scale interval.

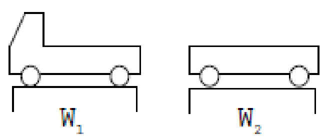
Any printout of the calculated weight values should be identified as calculated weight values.

(See also Sections 3.1.16 and 3.1.54)

3.1.16 Combined and multi-plate weighbridges (Meeting 14, Point 4, Meeting 15, Point 2 and Meeting 18, Point 9)

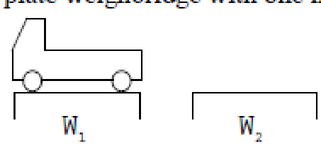
This concerns weight obtained by using adjacent weighbridges. Acceptable solutions, with examples, are shown below:

Two weighbridges, each with its own indicator:

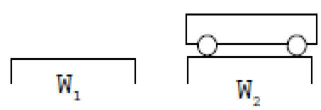


W_1 = 30 t x 10 kg
W_2 = 30 t x 10 kg
(Two indicators; simultaneous indication necessary)
Calculated weight 60 t x 10 kg
(mpe does not apply to calculated weight)

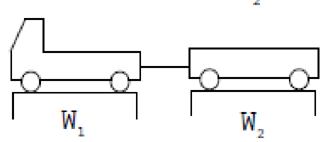
Multi-plate weighbridge with one indicator:



W_1 = 30 t x 10 kg



W_2 = 30 t x 10 kg



W_{1+2} = 60 t x 20 kg

W_{1+2} is a weighing range (Compatibility of modules and mpe must be satisfied for it)

(See also Sections 3.1.2 and 3.1.54)

> **3.1.54 Vehicle weighing by summation of individual wheel load NAWIs ("axle weighers") (Meeting 25, Point 9)**
>
> If the total weight of a vehicle is calculated automatically by summing the individual weight values produced by individual wheel load NAWIs ("axle weighers"), the system is not to be regarded as being one single NAWI. The mpe does not apply to calculated weight.
>
> (See also Sections 3.1.2 and 3.1.6)
>
> **3.1.6 Load cells**
>
> (Note that throughout this guide, "load cells" refers to analogue load cells rather than digital load cells unless stated otherwise.)

At the 2017 NCWM Interim Meeting, the Committee grouped agenda Items 3100-1, 3200-5, and 3600-2 together and took comments on these items simultaneously because it considered them related.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported that the SMA opposes these items as it believes they restrict the use of multiple scales operating using internal resolution to create an additional scale that provides the total weight.

Mr. Henry Oppermann (Weights and Measures Consulting, LLC) submitted written comments in opposition to the items stating "I am opposed to these items and the items should be Withdrawn. The proposed changes go against the principles of NIST Handbook 44, the principles of OIML R 76, and violate the WELMEC guideline. The adoption of accuracy classes for scales established relationships among accuracy classes; scales within accuracy classes; the number of scale divisions in scales; and the sizes of scale divisions. The adoption of accuracy classes DID NOT CHANGE the suitability of equipment criteria used to determine which scales are acceptable for use in specific applications."

Mr. Ross Andersen (New York, Retired) stated he submitted these items to address what he considers to be a "multiple scale array." He said that he had voted in support of the 1990 S&T Committee's interpretation of how NIST Handbook 44 requirements are to apply to these systems, but now questions that decision. He indicated that the code doesn't dictate testing the scale the way it's used, but that's what regulators do. He also indicated that NIST Handbook 44 tolerances are not intended to apply to summed indications and questioned how it could be that the v_{min} formula only applies to the independent scales of a system and all other Handbook 44 requirements apply not only to the independent scales, but also to the whole system. He asked, "How can we tell a manufacturer to tell us what the scale is, but we then change that in the field?" Mr. Andersen noted that the fourth indicator only provides a summed indication of the individual scales in the system, and is not to be considered a fourth scale because it is the combined total and is acceptable under the code. Mr. Andersen made note of the following to support his position on this issue:

Nowhere in NIST Handbook 44 code does it specify that a summed indication must comply with Handbook 44 tolerances.

1. Scales Code paragraph UR.3.3. Single-Draft Vehicle Weighing allows for the summing of indications to weigh a vehicle when different portions of the vehicle are resting simultaneously on more than one scale.

2. The Fundamental Considerations section is to clarify for "all times" that a device is a singular device.

Mr. Andersen acknowledged that his proposals are not ready for voting this year, but need discussion.

Mr. Rick Harshman (NIST, OWM) provided the following comments and recommendations on behalf of OWM:

- The changes proposed by this group of items, if adopted, would have the effect of loosening the current tolerances applicable to those vehicle scales that are equipped with multiple independent weighing/load-receiving elements, each with its own digital weight display and an additional display that provides an electronic summed indication of all elements. It is possible because of how the tolerance bands in NIST Handbook 44, Table 6 are structured and due to the effect of digital rounding of the different indications provided by such a system, that each independent scale within the system could be within applicable tolerance, yet the summed total may not. Mr. Harshman noted that OWM had provided an example in its analysis of this item to the Committee that shows this to be true. Thus, if you are willing to buy into the concept that Handbook 44 requirements should not apply to summed indications, then you must also be willing to accept some additional allowable error in the results obtained from these systems. OWM doesn't think this is necessary nor does it believe that the submitter has provided any technical justification for doing so. OWM's expectation of any commercial vehicle scale, regardless of how it is configured, is that it performs to within the current tolerances specified in NIST Handbook 44.

In commercial applications where these systems are used, it is the summed indication that serves as the basis for commercial transaction. Not only do truckers rely on the weights obtained from these systems to verify compliance of their loads with legal load limits for individual axles, tandem axles, and gross vehicle weight, but oftentimes so do small local businesses needing to determine the weight of vehicles for commercial purposes. The various truck stops providing these scale systems normally charge a fee for the weight determination, which includes a printed receipt of the load applied to each individual weighing/load-receiving element and the summed result. The expectation of those receiving this service is that each weight, including the summed indication, accurate to the tolerances specified in NIST Handbook 44. Additionally, many of the truck stops throughout the country offering this weighing service post signs visible from the roadway indicating "Certified Scale." OWM considers a "certified scale" to be one that provides indications and recorded representations that are certifiable. OWM's interpretation of a certifiable weight is one that meets or exceeds the applicable tolerance specified in Handbook 44. Failure to apply code requirements to the summed indications of these systems would, in OWM's view, cause such advertising to be deceptive. That is, it could no longer be claimed, nor would it be necessary for officials to verify, that a load applied to the scale when positioned on more than one independent weighing/load-receiving element is accurate to within applicable tolerance specified in Handbook 44 for that load. OWM notes too, that many of these systems are used by truck weight enforcement agencies and the weights obtained are used to determine fines for exceeding legal load limits. The expectation of their accuracy is the same regardless of the application; each individual scale must be accurate and the summed total must also be accurate to within the tolerances specified in Handboook 44.

In conclusion, OWM believes the interpretation provided by the 1990 S&T Committee was reasonable and accurate, and it is still appropriate today. It would be unfair to apply a different performance standard to one vehicle scale over another (that is, a single platform scale used to make the same kind of weighment) when the application of those scales is the same. The requirements as described have been applied to these systems for more than 25 years (i.e., since the date the Committee's interpretation took effect) and scale manufactures and service agencies have been installing these systems into commercial and law enforcement applications with no apparent issues concerning their accuracy when applying tolerances based on the 1990 Committee's interpretation. The total vehicle weight determined from these weighing systems is being represented as a weight that complies with HB 44.

Ms. Julie Quinn (Minnesota) stated that this addresses uniformity and further noted that some states are already doing what is contained in the proposal, whereas other states are not.

In considering this group of items, the Committee agreed to assign them a "Developing" status to allow the submitter additional opportunity to address the comments and concerns of OWM and others.

At the 2017 NCWM Annual Meeting, S&T Committee Chair, Dr. Matthew Curran (Florida), stated the Committee would only hear comments/updates from the submitter on developing items during open hearings. The Committee grouped agenda Items 3100-1, 3200-5, and 3600-2 together because it considered them related. Mr. Ross Andersen (New York, retired) provided an update on the development of this group of items, as their submitter. Mr. Andersen reported he had received some good feedback at the NEWMA Annual Meeting in May 2017. He later met with members of the Scale Manufacturers Association (SMA) to work on advantages and clarification of his proposal. He stated, he would like to develop these items electronically, "off line," and that he is nearing completion of a draft

PowerPoint presentation to serve as a "walk through" to his proposals. Once completed, he plans to forward it to OWM's S&T Committee Technical Advisor, Mr. Rick Harshman, to share with the Committee. His presentation slides will include notes and thoughts on each point. Mr. Andersen also indicated that he hopes to have a second draft of his proposals completed by the 2017 fall regional meetings for the different regions to consider.

The Committee agreed to carry over this group of items on its agenda as Developing items to allow Mr. Andersen the opportunity to further develop and garner support for his proposals.

Regional Association Comments and Recommendations:
At its 2016 Annual Meeting, the WWMA only heard comments from NIST, OWM. There was a concern that this would increase the tolerance applied to this type of device and may also cause conflicting tolerances. The WWMA heard Items 3100-1 and 3600-2 together. The WWMA forwarded this item to the NCWM, recommending a "Developing" status.

At its fall 2016 Interim Meeting, the CWMA reported that while the appendix related to this item was very informative, but due to the volume of information, it was unable to determine the issue this item was addressing. The CWMA would welcome a concise explanation regarding this item. At its spring 2017 Annual Meeting, the CWMA reported that the SMA opposes the item, but noted that the item's submitter had agreed to rewrite portions of the proposal to address SMA's concerns. The CWMA recommended at both meetings, the item be forwarded to the NCWM as a Developing item.

The SWMA batched items 3100-1, 3200-5, and 3600-2 together at its 2016 Annual Meeting and heard comments for all at the same time. Mr. Henry Oppermann (Weights and Measures Consulting) disagrees with these items and opposes them. He recommends withdrawing all three items in this batch. Mr. Oppermann contends they violate the principles of NIST Handbook 44. He further contends this should be on performance and not design. Mr. Oppermann concluded by saying the submitter misinterpreted the WELMEC guidelines and multi-platform truck scales used together must function as a single scale. The Committee did not forward these items to the NCWM and recommends they be Withdrawn because the proposed language is unnecessary.

At its fall 2016 Interim Meeting, NEWMA reported it believes this item has merit, but would like an example of how this applies to independent/multiple devices. At its spring 2017 Annual Meeting, NEWMA reported the item was not ready for vote with impending changes to be proposed by the item's submitter. NEWMA forwarded the item to the NCWM and recommended Developing status at both meetings.

3100-2 W G-UR.3.3. POSITION OF EQUIPMENT

(This item was Withdrawn.)

Source:
Illinois (2017)

Purpose:
Eliminate the interpretation differences, while also demonstrating a need for customer readability and giving the official with statutory authority permission to require visible indications for ease of test procedures.

Item under Consideration:
Amend NIST Handbook 44, 1.10. General Code as follows**:**

> **G-UR.3.3. Position of Equipment. –** A device or system equipped with a primary indicating element and used in direct sales, except for prescription scales, shall be positioned so that its indications may be accurately read and the weighing or measuring operation may be observed from some reasonable "customer" and "operator" position. The permissible distance between the equipment and a reasonable customer and operator position shall be determined in each case **~~upon the basis of the individual circumstances~~** **<u>by the official with statutory authority, who shall base the determination on "customer readability" and ease of testing procedures</u>,** particularly the size, character, and **<u>position</u>** of the indicating element **<u>(e.g., A deli customer shall be able to</u>**

read the indications from the patron side of the deli counter, whereas a truck driver shall be able to read the indications from the cab of the vehicle.). (Also see G-UR.4.4. Assistance in Testing Operations and Appendix D. direct sales.)

Background/Discussion:
Over the years, due to the verbiage of the current G-UR 3.3. Position of Equipment regulation, there has been a variety of different interpretations of which devices require indicating elements (e.g., scoreboards/remote indicators) located outside with the load-receiving element and which do not. Some businesses believe if they allow their customers to get out of their vehicles to come into the office/scale house, this satisfies the regulation. However, many inspectors, service people, and customers believe that any device that requires indications to be accurately read from the position the load-receiving element is located needs to have outside indicating elements installed.

With the terms more specifically defined, remote indicators/scoreboards would be required to be installed on most vehicle scales. This would not only help the inspectors, but would be a convenience for the service companies and in the long run save the businesses money due to the amount of time it takes to walk from the weigh load-receiving element to the indicating element. Safety is another important reason. Fewer drivers leaving their vehicle to verify indications would result in fewer accidents.

The cost of installing remote indicators/scoreboards is primarily the only reason against this proposal.

During open hearings at the 2017 NCWM Interim Meeting, the Committee received numerous comments from industry, NIST, and regulatory officials expressing concern and opposition to this item including:

- The proposal does not provide clarification to existing requirements for visibility.

- It was noted the proposed changes are retroactive and it was questioned how compliance could be met for existing mechanical-type scales, such as a vehicle scale with a beam indication.

- The changes proposed fail to consider that some (particularly older) devices will be unable to comply without significant and potentially costly modifications.

- The use of examples in NIST Handbook 44 is not recommended.

- The item could have overreaching impacts to existing installations for various device types.

The Committee did not receive any comments in support of the item. During its work session, members of the Committee reviewed existing paragraph G-UR.3.3. Position of Equipment, and it was agreed that the current paragraph already provides officials the necessary discretion to decide on a case-by-case basis, whether a particular device used in a direct sale complies with the provisions of this paragraph. For this reason, and in consideration of the comments received in opposition to the item during the open hearings, the Committee agreed to Withdraw this item.

Regional Association Comments and Recommendations (Fall 2016 Conferences):
The WWMA believed the proposed changes to G-UR.3.3. will influence all devices and is over reaching. It will require currently approved (even currently in use) devices/systems to be modified if any regulator desires supplementary readouts. If the submitter believes a specific device type (such as truck scales) should have additional readouts, it would be better addressed in the specific device code sections, not the General Code. WWMA did not forward this item to NCWM, recommending that it be Withdrawn.

The CWMA believes this strengthens the requirement and will promote consistency in enforcement. CWMA forwarded this item to the NCWM and recommended a Voting status.

The SWMA received comment from Mr. Hal Prince (FL) that the State of Florida already interprets this item the way it is written. Mr. Prince also stated that "ease of testing" applies to all types of devices since this proposal is for the General Code and could result in increased testing costs. The SWMA did not forward this item to NCWM and recommends that it be withdrawn because the language is unnecessary.

NEWMA believes, based on the comments heard, that this item allows more stringent authority to the official, requiring devices ranging from jewelry scale indicators to remote scoreboards at truck scale sites to be positioned for the customer. NEWMA forwarded the item to NCWM, recommending a Voting status.

3200 SCALES

3200-1 V S.1.2. VALUE OF SCALE DIVISION UNITS AND APPENDIX D – DEFINITIONS: BATCHING SCALE

(This item was returned to Committee.)

Source:
Richard Suiter Consulting (2017)

Purpose:
Recognize batching systems as a device type in the Scales Code to help officials differentiate between them and automatic bulk weighing systems.

Item under Consideration:
Amend NIST Handbook 44, Scales Code as follows:

> ***S.1.2. Value of Scale Division Units.*** *– Except for* ~~***batching scales and***~~ *weighing systems used exclusively for weighing in predetermined amounts, the value of a scale division "d" expressed in a unit of weight shall be equal to:*
>
> *(a) 1, 2, or 5; or*
>
> *(b) a decimal multiple or submultiple of 1, 2, or 5; or*
>
> *Examples: scale divisions may be 10, 20, 50, 100; or 0.01, 0.02, 0.05; or 0.1, 0.2, 0.5, etc.*
>
> *(c) a binary submultiple of a specific unit of weight.*
>
> *Examples: scale divisions may be ½, ¼, ⅛, 1/16, etc.*
> *[Nonretroactive as of January 1, 1986]*

And add a new definition for the term "batching scale" into NIST Handbook 44, Appendix D – Definitions as follows:

> **<u>batching scale. – Any scale which by design or construction, lends itself readily to use in proportioning ingredients by weight. [2.20]</u>**

Background/Discussion:
Item 360-3 on the 2016 agenda of the NCWM S&T Committee was carried over as an Informational item at the 2016 Annual Conference. The item was opposed by NIST, OWM and the SMA because the Scales Code does not include the specific words "Batching System." The submitter of the item believed that the wording "batching scales and weighing systems" in paragraph S.1.2. was sufficient; however, the submitter agreed to work with the S&T Committee to submit an additional proposal to clarify the language. At the 2015 NCWM Interim Meeting the SMA had voiced support for the definition of "batching system" and suggested that a definition for "batching scale" be added to NIST Handbook 44, Appendix D. The proposed definition for batching scale is taken directly from the SMA book of "Terms and Definitions" published in their 1981 Fourth Edition.

There are many "batching scales" and "batching systems" already in the marketplace, some of which have an NTEP Certificate of Conformance. The proposed change to paragraph S1.2. and accompanying definitions will assist weights and measures officials in identifying some devices as falling under the Scales Code for evaluation and testing purposes.

Some individuals believe that all automated systems utilizing a hopper scale belong in the Automatic Bulk Weighing Systems Code (ABWS). The submitter believes NTEP and the marketplace have already demonstrated there are devices and systems that do not need to meet some of the stringent requirements of the ABWS Code. These devices and systems can provide accurate net weight determinations without the necessity of some of the added requirements of the ABWS Code. Those requirements add unnecessary additional manufacturing costs and testing burdens for weights and measures field officials.

At the 2017 NCWM Interim Meeting, the Committee grouped agenda Items 3200-1 and 3600-3 together and took comments on these items simultaneously because it considered these items related.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported the SMA opposes both items in this batch because it feels there are no specifications and tolerances defined to support the definition of either "batching scale" or "batching system." He also reported the SMA would not be opposed to the creation of a new NIST Handbook 44 code to address some of the weighing systems that prompted the submitter to initiate these proposals.

Mr. Henry Oppermann (Weights and Measures Consulting, LLC) submitted written comments in opposition to this item stating, "I am opposed to these items and the items should be Withdrawn. The proposed definitions will confuse the categorization of scales, rather than clarify the distinction between batching scales, hopper scales, and automatic bulk weighing systems. What type of scale is a scale that automatically weighs a single commodity in multiple drafts for a single transaction? I hope that the answer is that this type of scale is an automatic bulk weighing system."

Mr. Rick Harshman (NIST, OWM) stated that OWM could not think of anything unique about a scale used in a batching operation necessitating the need for the terms "batching scale" and "batching system" to be defined in NIST Handbook 44 or for the Scales Code be amended to include the term "batching system" as proposed. OWM questioned whether the exemption provided in Scales Code Paragraph S.1.2. applicable to "batching scales" and "weighing systems used exclusively for weighing in predetermined amounts" should still be provided for batching scales. Mr. Harshman noted that the term "batching scale" refers to some older mechanical scales used in batching operations that are unlikely to still be in commercial service today. To this point, OWM proposed deleting the term from the Scales Code in the only two places that it appears; that is, in paragraphs S.1.2. and T.3. Mr. Harshman further noted that OWM believes the definition proposed for "batching scale" is ambiguous and could be applied to just about any scale manufactured today; inserting the term into paragraph S.1.2., as proposed, would allow manufacturers to design scales with weight units other than those specified in the paragraph.

Mr. Richard Suiter (Richard Suiter Consulting), noting his intention to address the comments made by the SMA, reported that the two definitions in his proposals came from a handbook of definitions, which had been developed and published previously by the SMA. He further noted that the "batching system" definition in the proposal was only expanded very slightly and that the definition of "batching scale" was taken directly from the SMA's handbook. He went on to address comments made by a NIST representative, which contended that batching scales are older mechanical scales and possibly not being used in the marketplace. He stated there are, in fact, suspended hoppers in existence and in commercial use. Mr. Suiter stated that the ABWS Code is an older code and that the State of Nebraska was a key developer, so he was familiar with much of the history of its development. In countering comments submitted in writing by Mr. Oppermann, Mr. Suiter indicated that Mr. Oppermann appears to be of the opinion any weighing system that can be operated in an automatic mode and weighs more than one draft to obtain some targeted amount for loadout is to be considered an ABWS and that the ABWS Code applies. This is not the case. There are systems that can weigh multiple drafts accurately while in automatic operation, returning to zero after each load is discharged. Mr. Suiter also clarified the comment that his proposals were submitted on behalf of KSi, "when, in fact, they were not." However, he stated he did notice it when he was affiliated with KSi. Mr. Suiter also said in response to Mr. Oppermann's comments that a lot of the scales used to weigh grain require a higher NIST Handbook 44 accuracy class, which may be true; however, that was based on grain being a valuable commodity, which is no longer the case in relation to other commodities. He noted that the current commodity prices for grain are literally cents per pound. Mr. Suiter concluded by stating that he believes these proposals are ready for vote, but would like to keep the items alive if the Committee feels otherwise.

During the Committee's work session, Mr. Harshman stated that he favored following through on a comment made during the open hearings by Mr. Vires to possibly develop an entire new NIST Handbook 44 code to address these systems. Mr. Harshman said he questions now whether it is appropriate to try and expand the application of the ABWS Code to address some of these automatic systems known to be in commercial service because a number of these systems weigh more than one product at a time. The ABWS Code was developed to address a particular automatic weighing system intended to weigh only one product at a time in multiple drafts to achieve some targeted amount. Mr. Suiter, who was in attendance, was asked what he thought of this idea. Mr. Suiter indicated that he too favored the concept of developing a new code, but that would take a long time and he, therefore, suggested the Committee present the current proposals for vote to help alleviate existing confusion.

Upon reviewing the current proposals, one member of the Committee asked other members if they considered "batching scales" and "batching systems" a weighing system used exclusively for weighing in predetermined amounts. The same Committee member indicated that if others agreed this were the case, these terms could be eliminated from paragraph S.1.2. of the proposal. Other members agreed they believed this to be true. Mr. Suiter, who was present during the session, was asked if the Committee removed these terms from the paragraph and kept the proposed definition of "batching scale" as part of the proposal would this satisfy his objective. He indicated that it would. In consideration of these discussions and the comments received during the open hearings on this group of items, the Committee amended the original proposal shown below to that which now appears in the Item Under Consideration for this item and agreed to present the item for Vote at the 2017 NCWM Annual Meeting.

***Original proposal presented in the "Item under Consideration" in the 2017 S&T Publication 15*:**

Amend NIST Handbook 44, Scales Code as follows:

S.1.2. Value of Scale Division Units. *– Except for batching scales**, batching systems** and **other** weighing systems used exclusively for weighing in predetermined amounts, the value of a scale division "d" expressed in a unit of weight shall be equal to:*

(a) 1, 2, or 5; or

(b) a decimal multiple or submultiple of 1, 2, or 5; or

Examples: scale divisions may be 10, 20, 50, 100; or 0.01, 0.02, 0.05; or 0.1, 0.2, 0.5, etc.

(c) a binary submultiple of a specific unit of weight.

Examples: scale divisions may be ½, ¼, ⅛, 1/16, etc.
[Nonretroactive as of January 1, 1986]

And amend NIST Handbook 44, Appendix D – Definitions as follows:

batching scale. – Any scale which by design or construction, lends itself readily to use in proportioning admixtures by weight. [2.20]

The Committee also agreed to Withdraw agenda Item 3600-3 at the recommendation of the submitter, which was discussed at the same time as this item.

At the 2017 NCWM Annual Meeting, the Committee received very similar comments during its open hearings as those provided during the 2017 Interim Meeting. Mr. John Barton (NIST, OWM) stated the changes proposed to Scales Code Paragraph S.1.2. address a requirement that excluded some scales used in the production of a product based upon a specific recipe that called for amounts of ingredients in values not in synch with customary scale division sizes (i.e., concrete & cement, etc.). It is questionable whether these older systems are still in service. He further stated that OWM believes the term "batching scales" could be eliminated (appearing only in paragraphs S.1.2. and T.3. SR, Equilibrium Change Required) from NIST Handbook 44 without having any significant effect.

Mr. Barton acknowledged there may be some confusion among regulatory officials when classifying automated weighing systems (e.g., Are they an ABWS or simply a system comprised of scales used in a batching operation?). Proper classification is necessary to determine which NIST Handbook 44 Code paragraphs to apply. OWM fails to see any unique qualities that are consistent with various scales used in a batching operation that would prompt the need for a definition of the term "batching scales." The definition proposed does not clearly and definitively identify any particular type or class of scale. This definition is not seen as a benefit to an inspector trying to determine which NIST Handbook 44 Code requirements are appropriate. As OWM has noted previously, if there is a perceived gap that exists in the Handbook 44 Scales Code regarding the application of that code to a specific use of scales, then a proposal that positively identifies the specific type of device and appropriate requirements should be submitted.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported that the SMA opposes the item. The SMA does not support adding the submitter's provided definition of "batching scale" to NIST Handbook 44. The SMA feels this definition is for the application of a scale and not a performance specification.

Mr. Henry Oppermann (Weights and Measures Consulting, LLC) submitted written comments to the Committee in advance of the Annual Meeting opposing this item. During the open hearings, Mr. Oppermann stated he is opposed to the item, particularly the proposed definition, and he encouraged a Vote against the proposed changes. He noted that the proposed definition describes a batching scale as "Any scale which … lends itself to use in proportioning ingredients by weight." Mr. Oppermann asked, "What is meant by 'use in proportioning ingredients'?" He further indicated the proposed definition incorrectly and inappropriately defines a batching scale in terms of how the weighed commodity is processed subsequent to the weighing operation. He said that NIST Handbook 44 categorizes scales based upon a combination of factors, including the design of the scale (e.g., hopper scale and monorail scale), use (e.g., as a grain hopper scale and animal or livestock scale), method of operation (e.g., static weighing or in-motion weighing) and commodity weighed (e.g., grain or aggregate). How a commodity is processed after the weighing operation is completed is irrelevant to the categorization of the scale.

Mr. Oppermann also said he believes the objective of the submitter is to get automatic bulk-weighing systems used in seed treatment systems classified as batching scales so these scales do not have to comply with the Automatic Bulk Weighing Systems Code. He noted all scales that automatically weigh individual commodities in multiple successive drafts of predetermined amounts should be required to comply with the Automatic Bulk Weighing Systems Code. He further indicated the submitter wants to call scales that automatically weigh a single commodity in multiple drafts a "batching scale." For an individual customer order, these scales weigh a single commodity (one of various seed grains used for different customer orders), which is then delivered into a mixer, into which other seed treatment ingredients are added and mixed. The critical aspect of the weighing operation is the automatic weighing a single commodity in multiple drafts; not by how the grain is processed after weighing.

Mr. Richard Suiter (Richard Suiter Consulting) provided some background information relating to the historical use of batching scales in the United States, and concluded his historical account by saying batching scales are ingrained in our weights and measures system. He noted that the definition submitted in his proposal was developed by the SMA years ago and was copied from an older SMA publication of weights and measures terms and definitions. Mr. Suiter, in countering Mr. Oppermann's statements concerning the objective of his proposal, he reported the intent of his proposal was not to primarily address seed treatment scales. He came to realize, rather, in working with a manufacturer of seed treatment systems, the difficulty officials sometimes have in classifying the scales used in some automated weighing systems, and just because a scale system completes multiple drafts, it is not necessarily an ABWS. There are thousands of scales used for recipes that make greater than a single draft (e.g. asphalt and aggregate scales, etc.) that are not an ABWS. There are smaller scales too that are used for weighing multiple drafts for recipes. The intent of my proposal is to provide officials with another tool to help identify the different types of devices.

In discussing this item during the Committee's work session, members of the Committee acknowledged there remained opposing positions concerning whether the changes proposed to this item are appropriate or would benefit officials. Members of the Committee agreed the item was fully developed and further agreed to present the item for Vote to allow the voting body the opportunity to decide whether the changes were appropriate.

Regional Association Comments and Recommendations:
The WWMA heard Items 3200-1 and 3600-3 together at its 2016 Annual Meeting. The Committee did not believe the language submitted agrees with the submitter's goal and believes further development is needed by the source. WWMA sent this item to NCWM and recommended "Developing" status.

At its fall 2016 Interim Meeting, the CWMA reported it believes this may provide clarification when determining if a device is operating as a batching system or as an Automatic Bulk Weighing System. The CWMA forwarded the item to NCWM and recommended Voting status. At its spring 2017 Annual Meeting, the CWMA reported, based on the comments received in opposition to this item, it believes this item is an unnecessary addition to the handbook and recommends it be Withdrawn.

The SWMA batched Items 3200-1 and 3600-3 together at its 2016 Annual Meeting and heard comments on all items at the same time. Mr. Henry Oppermann (Weights and Measures Consulting) stated he was opposed to these items because they'll make it more difficult for the weights and measures official because the definition is not specific enough. These scales are "automatic bulk weighting systems" and this proposal was designed to exempt some scales from the automatic bulk weighing code. It was also stated that, "many are already in the marketplace, some of which have an NTEP certificate," but the submitter doesn't want to bring them into compliance with the automatic bulk weighing system code. Further, Mr. Oppermann stated this device has an unsealed parameter allowing the user to program a tolerance on the return to zero, which should not be allowed. The SWMA forwarded the item to NCWM and recommended Developing status. The SWMA asks the submitter to address why this is not covered in the bulk weighing code and present the overall picture of the items necessity.

At its fall 2016 Interim Meeting, NEWMA reported receiving a comment indicating Mr. Suiter (Richard Suiter Consulting) was asked by the NCWM S&T Committee to clarify the language for the Scales Code. NEWMA believes the language is pertinent to defining a batching scale. NEWMA forwarded the item to NCWM and recommended Voting status. At its spring 2017 Annual Meeting, NEWMA reported it believes the submitter has finished developing this item and that it is at an appropriate stage to be Voted on.

3200-2 V S.1.2.2. VERIFICATION SCALE INTERVAL

(This item was Adopted.)

Source:
Oregon (2017)

Purpose:
Reduce confusion for the buyer and seller by prohibiting the display of a "d" value that is smaller than an "e" value for Class I and II scales when used in direct sales.

Item under Consideration:
Add a new Scales Code Paragraph S.1.2.2.2. to NIST Handbook 44 and renumber existing paragraph S.1.2.2.2. as follows:

S.1.2.2. Verification Scale Interval.

S.1.2.2.1. Class I and II Scales and Dynamic Monorail Scales. – If e ≠ d, the verification scale interval "e" shall be determined by the expression:

…

S.1.2.2.2. Class I and II Scales used in Direct Sales. – When accuracy class I and II scales are used in direct sale applications the value of the displayed division "d" shall be equal to the value of the verification scale interval "e."
[Nonretroactive as of January 1, 2020 to become retroactive January 1, 2023]

(Added 2017)

S.1.2.2.~~2~~3. Class III and IIII Scales. – The value of "e" is specified by the manufacturer as marked on the device. Except for dynamic monorail scales, "e" must be less than or equal to "d."

(Added 1999) **(Amended 2017)**

Background/Discussion:
With the massive increase of the direct sale of precious metals, cannabis, and other high value commodities in the marketplace a large number of high-resolution scales are entering the market place. Many of these scales have a display that displays a "d" value that is smaller than the "e" value. This creates confusion for both parties in the transaction. The "d" value should not be used in any direct sale transaction since it is not evaluated during device examinations and is not considered during NTEP evaluations. Conflict ensues when one of the two parties demands that the "d" value be used in the transaction while the other party, understanding the device requirements, refuses to do so. Should both parties agree to use the non-validated "d" value, the accuracy of the transaction is very much in doubt.

During performance testing of the device, the evaluator essentially "ignores" the smallest displayed number when "d" is less than "e." This applies even when the "e" value would round up or down if the device were not displaying the smaller "d" value. This can lead to an evaluation that is potentially not as accurate as it could be.

Oregon officials have found rampant misuse of the non-validated "d" value on devices that have a verification scale interval ("e" that is greater than "d") used in direct sale applications.

During the 2017 NCWM Interim Meeting S&T Committee open hearings, the Committee heard comments from Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA. Mr. Vires reported that the SMA supported the item with clarification to the order in which "e" and "d" appear in proposed new paragraph S.1.2.2.2. He stated that the order appeared reversed and further indicated that the SMA recommends the paragraph be made non-retroactive as of January 1, 2020, if adopted.

Mr. Steven Harrington (Oregon), submitter of the item, agreed to the SMA's requests to change the order of "e" and "d" in the proposal and to recommend the paragraph be assigned a nonretroactive date of January 1, 2020. Following the Committee's open hearings, Mr. Harrington submitted amended language to the Committee for consideration that addressed these issues.

Mr. Rick Harshman (NIST, OWM) stated that there may be some misunderstanding concerning how NIST Handbook 44 tolerances and other requirements are intended to apply to Class I and Class II scales equipped with a value of "d" that differs from "e." He provided an overview of how NIST Handbook 44 tolerances are intended to apply such scales. He acknowledged users of the scales are going to read the displays to the smallest increment "d" and the tolerances and test loads specified in Scales Code, Table 6, are based on the value of "e." He noted that, even though the tolerances and test loads are based on "e," the scales should be considered by officials to be noncompliant if during testing the applicable tolerance is exceeded by as little as 1 "d." With respect to the disabling of the smaller value as proposed, Mr. Harshman noted that OWM raised the following questions:

- What must the scale display look like when "d" has been disabled?
- How are officials to test the scale and should "d" be enabled when testing occurs?
- Should the switch that enables and disables "d" be a sealable parameter?

During the Committee's work session, the amended language that had been submitted by Mr. Harrington shortly after the Committee's open hearings, was reviewed by members of the Committee. The revised language reversed the order in which "d" and "e" had previously appeared in the proposal and eliminated a portion of the proposal that addressed how the smaller value "d" could be disabled.

Mr. Josh Nelson (Oregon) was asked by another Committee member to identify the issue the State of Oregon was attempting to resolve from its submission of the original proposal. Mr. Nelson stated Oregon had discovered in its inspections of scales used commercially to weigh cannabis, that users of the scales were reading them to and basing transactions on the closest value of "d." He stated the value of "d" on a Class I and Class II scale equipped with a value of "d" that differs from "e" was never intended to be used in commercial trade. Mr. Darrell Flocken (NTEP Specialist and NCWM Technical Advisor to the Committee) and Mr. Luciano Burtini (Measurement Canada's Technical Advisor to the Committee) voiced agreement that scale manufacturers did not intend for commercial transactions to be based on the value of "d" on scales equipped with a value of "d" that differed from "e." It is the value of "e" that is intended for use in commercial trade. Mr. Flocken and Mr. Burtini also confirmed agreement with the assessment Mr. Harshman had provided during the Committee's open hearings regarding how Scales Code Table 6. Maintenance Tolerances are to be applied to Class I and Class II scales equipped with a value of "d" that differs from "e."

The discussion of these issues by members of the Committee resulted in a suggestion being made to 1) simplify the proposal by amending it to require only that the value of "d" be equal to "e" on all Class I and II scales used in direct sale applications; and 2) assigning a nonretroactive enforcement date of January 1, 2020, (this being the date suggested by the SMA in comments provided during open hearings). The Committee believed that by assigning a 2020 enforcement date, scale manufacturers would be provided sufficient time to decide how best to design scales to comply with the revised proposal given a particular scale's intended application. Other Committee members agreed this suggestion was a good idea. Mr. Harrington, who was also present during these deliberations, was asked his opinion, and he too voiced agreement. Consequently, the Committee agreed to replace the original proposal with that shown in the "Item under Consideration" and present the item for Vote at the 2017 NCWM Annual Meeting.

During the Committee's open hearings at the 2017 NCWM Annual Meeting, the Committee received mixed comments on this item. There were those who commented that they supported the proposal. Others questioned the rationale and benefit for making changes, with one concern being that the new paragraph, if adopted, might result in the use of a scale with a lower resolution.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported that the SMA supported the item.

Mr. Ross Andersen (New York, Retired) expressed concern that this was "much ado about nothing," stating that there are always issues between resolution and accuracy. Mr. Andersen stated that he doesn't see why the difference between "d" and "e" would cause confusion to anyone in actual use; buyers or sellers. He spoke to there being an advantage to "d" displaying finer than "e," in that it reduced the cost of the value ten times, and that the customer didn't need to know that the tolerance was based on "e." He later returned to the microphone to add that when "d" is smaller than "e," officials can use "d" to refine the tolerance, and he gave some mathematical examples. He wondered if the confusion wasn't more with weights and measures officials than users.

Mr. John Barton said NIST, OWM recognizes Class I and II scales are being used more and more frequently to weigh high-cost items and displaying different increment values for "d" and "e" could very well cause confusion to the customer concerning which value is to be used when determining charges. OWM recommended the Committee, in consideration of the January 1, 2020, nonretroactive date proposed, specify a date to be added to the proposal in which the paragraph is to become retroactive. This is to avoid allowing owners of "pre-2020" Class I or II Scales from being able to use the "d" value (on scales in which "d" and "e" are different) in direct sale applications indefinitely. It would also make possible the elimination of all Class I and II scales equipped with a value of "d" that differs from "e" from direct sale applications at some specified date in the future.

Mr. Barton noted NIST, OWM's understanding of proposed new subparagraph S.1.2.2.2. is that it would require the value of the scale division (d) to be equal to the value of the verification scale interval (e) on Class I and II scales manufactured as of January 1, 2020, when these scales are used in direct sale application. It is also OWM's understanding that deactivation of a "d" resolution on a Class I or II scale equipped with a value of "d" that differs from "e" causes a scale roundoff problem on some scales. That is, once the "d" resolution has been deactivated, "e" values do not round to the nearest minimum increment, which paragraph G-S.5.2.2. Digital Indication and

Representation requires. Due to this possible roundoff problem, NIST, OWM suggested the Committee draft a new proposal to be considered in the next (2018) NCWM cycle prohibiting the deactivation of a "d" resolution on a Class I and II scale equipped with a value of "d" that differed from "e," if such action affects a scale's ability to round digital values to the nearest minimum unit that can be indicated or recorded. NIST, OWM presented the written draft proposal it had developed for the Committee to consider should members of the Committee decide to follow through on NIST, OWM's recommendation.

Mr. Steven Harrington (Oregon), submitter of the item, had reviewed NIST, OWM's suggestions and stated he supported the proposed recommended changes.

Mr. Ken Ramsburg (Maryland) supported the item and reported Maryland is starting into medical marijuana, and he believes this is an important issue.

Ms. Fran Houston (Ohio) stated she initially considered fully supporting the item, but in consideration of the comments offered by Mr. Andersen, she is now able to support only a portion of it. She agreed with Mr. Andersen that viewing of the "d" resolution is important during the testing of such scales and questioned why the "d" resolution couldn't be displayed only on the operator's side of the scale so officials could see it when performing tests. She also reported that Ohio is moving towards allowing medical marijuana and this issue will be of importance.

During the Committee's work session, Ms. Tina Butcher (NIST, OWM's Technical Advisor to the Committee) reiterated NIST, OWM's recommendation provided by Mr. Barton during Committee open hearings that a retroactive date be added to the proposal so all commercial equipment would eventually have to comply with the proposed new requirement (i.e., proposed new paragraph S.1.2.2.2.). Members of the Committee agreed with OWM's assessment that it would be important to include a retroactive date to avoid the indefinite allowance made evident by OWM. Members of the Committee, in considering an appropriate date to include, agreed to the date "2023," with the understanding this date would provide an adequate amount of time for those most affected by this change to comply. Consequently, members of the Committee agreed to amend the proposal to include a date that paragraph S.1.2.2.2. is to become retroactive as shown in the Item Under Consideration and present the item for Vote as amended. The Committee also considered NIST, OWM's recommendation for the Committee to submit a new NCWM proposal prohibiting the deactivation of a "d" resolution on Class I and II scales that fail to round properly once the "d" resolution has been deactivated. Members of the Committee agreed that it would be beneficial to include such a requirement in NIST Handbook 44, but preferred OWM submit the proposal.

Regional Association Comments and Recommendations:
At its 2016 Annual Meeting, the WWMA reported it believes this item may have merit. Per request of the submitter, the WWMA forwarded the item to NCWM and recommended a "Developing" status.

At its fall 2016 Interim Meeting, the CWMA reported it believes it is necessary to clarify which indication shall be used when commercial transactions are conducted using weights from a Class II device. The CWMA forwarded the item to the NCWM and recommended Voting status at both its 2016 Interim and 2017 Annual Meetings.

The SWMA, at its 2016 Annual Meeting, heard comment from Mr. Henry Oppermann (Weights and Measures Consulting) that he appreciates attempting to address the confusion in transactions when *d* is smaller than *e*, but the submitter has a misunderstanding in the relationship between the two. He stated that he is opposed to this item and made a recommendation to keep this item developing; he would not support a Voting status. The SWMA forwarded this item to the NCWM recommending a "Developing" status based on comments received.

NEWMA requested clarification on the "disabling" language in S.1.2.2.2. Class I and II Scales Used in Direct Sales at its fall 2016 Interim Meeting and forwarded this item to NCWM, recommending a "Developing" status. At its 2016 Annual Meeting, NEWMA reported the item has been fully developed and recommended it move forward as a Voting item.

3200-3 V S.1.8.5. RECORDED REPRESENTATIONS, POINT OF SALE SYSTEMS

(This item was returned to Committee.)

Source:
Kansas, Minnesota, and Wisconsin (2017)

Purpose:
Provide verification to consumers through recorded representation that tare has been taken at point of sale for sales from bulk.

Item under Consideration:
Amend NIST Handbook 44, Scales Code as follows:

S.1.8.5. Recorded Representations, Point-of-Sale Systems. – The sales information recorded by cash registers when interfaced with a weighing element shall contain the following information for items weighed at the checkout stand:

(a) the net weight;[1]

(b) the tare weight;[1]

(~~b~~**c**) the unit price;[1]

(~~c~~**d**) the total price; and

(~~d~~**e**) the product class or, in a system equipped with price look-up capability, the product name or code number.

[Non-retroactive January 1, 2020]

(Amended 20XX)

[1] For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams. Weight values shall be identified by kilograms, kg, grams, g, ounces, oz, pounds, or lb. *The "#" symbol is not acceptable.*
[Nonretroactive as of January 1, 2006]
(Amended 1995 and 2005)

Background/Discussion:
This proposal would help consumers by enabling them to see at a glance that tare is being taken on the commodities they purchase. It would also educate the public about tare and make them better and more aware consumers.

Retailers would benefit because this proposal would aid their quality control efforts behind the counter and at the cash register. Retailers would be able to see their employees are taking tare on packages, and the tare employees take is an appropriate tare. For example, a meat manager would be able to spot packages of 1 lb hamburger, which had been packaged on the night shift mistakenly using the tare for family packs of chicken, just by walking down the meat counter and noticing a 0.06 lb tare on a package size that would normally have a 0.02 or 0.03 lb tare. The manager could also spot a 0.03 lb tare on packages that should have a 0.06 lb tare. Either way, the manager would be able to remove the items from the shelf and make corrections before the store or its customers were harmed. The manager would also be able to re-educate the employees responsible for the error. This improved quality control and transparency would build consumer confidence in retailers' establishments. It might even reduce the time and disruption retailers experience from official package inspections.

Package checking inspections could potentially be reduced because weights and measures officials could make risk-based assessments on the need to do package checking inspections at any given location. If an official notes gross weights or tares are visible on all random-weight packages and the tares seem appropriate to the package sizes, the official may be able to skip that location and focus package checking efforts on locations where tares are absent or seem inappropriate for the package sizes. That would be more efficient for both retailers and weights and measures jurisdictions.

Finally, this proposal would aid weights and measures officials investigating complaints about net contents of items by creating written proof of how much tare was taken on a given package or transaction.

Scale manufacturers will need to modify software, label, and receipt designs before the non-retroactive date. Retailers with point-of-sale systems and packaging scales may feel pressured to update software or purchase new devices in response to consumer demand for tare information on labels and receipts. The amount of paper needed to print customer receipts may increase depending on the formatting of the information and the size of the paper being used. Some retailers may not want consumers to have this information as it will allow consumers and weights and measures officials to hold them accountable and would be written proof tare was not taken when, and if, that happens.

During the 2017 NCWM Interim Meeting S&T Committee open hearings, Mr. Doug Musick (Kansas), one of three co-submitters of this item, proposed splitting the item into two separate items: Item 3200-3A and 3200-3B. He suggested Item 3200-3A contain only the changes proposed to existing Scales Code Paragraph S.1.8.5. Recorded Representations, Point-of-Sale Systems, and Item 3200-3B contain only proposed new Scales Code Paragraph S.1.9.3. Recorded Representations, Random Weight Package Labels. Mr. Musick also proposed, for the sake of clarity, removing the term “gross weight” from proposed new subsection “(b)” of paragraph S.1.8.5. Recorded Representation, Point-of-Sale Systems, leaving the term “tare weight” in the subsection and assigning the subsection a non-retroactive enforcement date of January 1, 2020. Mr. Musick commented that the changes proposed to paragraph S.1.8.5., if adopted, would provide consumers the additional sales transaction information needed to determine if an adequate amount of tare was taken on weighed items.

The Committee received numerous comments in support of amending NIST Handbook 44, Scales Code Paragraph S.1.8.5., some of which proposed additional changes to those proposed by the submitters of the item. Ms. Tina Butcher (NIST, OWM), in presenting OWM’s comments and recommendations regarding this item, emphasized the need for additional information to be provided on the receipt. She stated it is very difficult for customers at a checkout stand to determine if tare has been taken on products weighed by a store cashier in their presence on POS systems. The display shows only a gross weight when the net weight of each package weighed is the only weight information appearing on the sales receipt. This is especially true, she said, when there are multiple items in a customer’s shopping cart to be weighed. Consumers are not always able to focus their attention on the indication when individual items are being weighed and, for systems that do not display both a gross and net weight, to recall those indications when reviewing a sales receipt.

Ms. Butcher noted too, that by allowing either gross weight or tare weight to be recorded on the receipt as proposed, stores would be provided the option of selecting one method over the other. Consequently, competing stores in an area might opt to provide different information on the receipts, thereby, causing customer confusion to those customers that frequent different stores. For this reason, OWM suggested amending the proposal that the receipt provide the gross, tare, *and* net weight. As an alternative to requiring additional information be recorded on the sales receipt, OWM suggested the Committee may wish to draft language to require the *net weight* also be displayed on the indicator of such systems and provide some future date in which these systems must comply.

Officials from several different states highlighted, in comments provided to the Committee, the need for additional information to be provided on the sales receipt to make it possible for consumers to ensure tare had been taken on items weighed at a POS checkout.

Ms. Julie Quinn (Minnesota), co-submitter of the item, in response to OWM’s suggestion to alternatively require the net weight be displayed on the indicator, stated that even if a customer can view the tare indication from a POS display, there still needs to be a paper trail of the recorded transaction information for enforcement purposes. She said that she was supportive of splitting the item into two parts so as not to derail moving forward with the changes proposed to paragraph S.1.8.5. She also made note of the existence of labels on packages currently being offered for sale in the marketplace that include recorded tare values.

The Committee received several comments in opposition to adding the proposed new paragraph S.1.9.3. Recorded Representations, Random Weight Package Labels and to agenda Item 3200-3 as a whole.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported that the SMA opposes the agenda item and feels it would be too costly with little benefit.

Mrs. Butcher reported that OWM recommends deleting the proposed new paragraph S.1.9.3. from the proposal because it conflicts with NIST Handbook 130, Uniform Packaging and Labeling Regulation, which requires a declaration of the "net" quantity of contents. Mrs. Butcher made note of a few additional points to consider relating to this portion of the item as follows:

- Those who package products in advance of sale often increase tare values to take into account moisture loss and good distribution practices. Thus, it cannot be determined from a tare value specified on a package how much of the value represents the packaging material and how much represents additional deduction.
- Tare values on packages cannot be enforced and do not provide indication of whether or not the declaration of net contents specified on a package is correct.
- Displaying a declaration of both gross weight and net weight on a package would confuse consumers.

Mr. Ross Andersen (New York, retired) commented that he didn't see a great amount of benefit to Item 3200-3B.

Additionally, the Committee acknowledged receiving written comments from Ms. Elizabeth K. Tansing, on behalf of the Food Marketing Institute (FMI), opposing the item and requesting that the Committee withdraw it (i.e., the item as a whole).

During the Committee's work session, members of the Committee agreed, based on comments received during open hearings, to simply delete proposed new paragraph S.1.9.3. from the proposal, rather than split the agenda item into two separate items as suggested by Mr. Musick during the Committee's open hearings. Members of the Committee also agreed to amend proposed new subsection (b) of paragraph S.1.8.5. by deleting the words "gross weight or" from the proposal and assigning subsection (b) a nonretroactive enforcement date of January 1, 2020. The Committee agreed to present the item, as amended by the Committee, for Vote at the 2017 NCWM Annual Meeting. All the changes agreed to by the Committee are included in the proposal as shown in the Item Under Consideration.

At the 2017 NCWM Annual Meeting open hearings, Ms. Tansing reported the FMI opposes Item 3200-3. Ms. Tansing stated that all tare weights would be required on the receipt, regardless of if it were 1 or 100 weight transactions. FMI could not find one customer that wants tare printed on the receipt. The requirement would be costly to industry (e.g., increased costs for software development, employee training, and consumer education) and the added costs would be passed on to the consumer. Customers have not asked for this information. Chain and single store operators would suffer in trying to comply. In addition to the cost concern, Ms. Tansing stated other consequences of the proposal would be more paper used in receipts and longer wait times for customers.

Mr. Russ Vires (Mettler-Toledo, LLC) speaking on behalf of the SMA reported that the SMA opposes Item 3200-3. The implementation cost would be prohibitive for industry and retailers, and the cost would be passed on to consumers who would receive little or no benefit.

Mr. John Barton (NIST, OWM) commented that it is extremely difficult for customers at a checkout stand to determine whether tare has been taken on packages weighed by a store cashier in their presence when the weight display of the POS system provides only an indication of the gross weight and the net weight of those same packages gets recorded on the sales receipt, which is provided to the customer after all items have been priced. Consumers are not always able to focus their attention on the indication when individual items are being weighed and recall those indications when reviewing a sales receipt. This is especially true when there are multiple items in a customer's shopping cart to be weighed. The proposed item would benefit consumers and provide more information for investigations of consumer complaints.

Mr. Tim Chesser (Arkansas) stated his concerns with this requirement resulting in requirements for all packages to have tare weights printed on the package label. Arkansas receives very few complaints on net weight and for these reasons Arkansas opposes this item.

Mr. Matthew Morris (Nebraska Grocers Association) opposes this item. The requirement places a burden on retailers and would be costly for consumers. Very few complaints have been received, and this would create mass confusion for consumers.

Ms. Julie Quinn (Minnesota) commented that printing tare values on POS register receipts is a tool for regulators and store managers to audit how personnel are doing with taking tares. Consumers deserve to be protected. This is a non-retroactive requirement that impacts equipment installed after the non-retroactive date.

One of the original submitters, Mr. Doug Musick (Kansas), showed a video with mathematical examples of the overcharges for several produce transactions. The video highlighted how difficult it is to tell if tare was taken and if taken correctly. Mr. Musick stated the proposed requirement is simple, inexpensive to implement, and would provide equity in the marketplace. Mr. Loren Minnich (Kansas) also commented on the video, stating that if customers were asked if they wanted to be charged correctly they would say "yes," regardless if they knew what the term "tare" meant. Mr. Minnich also said that many grocers deliver products from the store to customers' homes and customers are not present during the weighment of these items to witness whether tare was taken or not during the transaction.

Mr. Bart O'Toole (Nevada) supports the item and commented that this requirement also involves other retailers outside of grocery stores. He gave a personal example of being overcharged at a frozen yogurt store because they failed to deduct tare for cup containers.

The Committee heard numerous comments from regulatory jurisdictions and consumers in support of this item.

No changes were made to the item. However, the Committee elected to delete S.1.9.3. Recorded Representations, Random Weight Package Labels from the title of the item since the Committee had earlier agreed at the 2017 NCWM Interim Meeting to delete proposed new paragraph S.1.9.3. from the proposal. Consequently, the paragraph name should also no longer appear as part of the title of the proposal. The Committee agreed to present the item for Vote.

Technical Advisor's Note: Shortly following the 2017 NCWM Annual Meeting, the Committee received a request from Kansas and Minnesota (two of the three original submitters of the item) to amend the proposal to better clarify "the tare weight" portion of the information to be included on the receipt is being proposed as a nonretroactive requirement. That is, the "tare weight" information on items weighed at a checkout stand would be required to be recorded on the receipts generated from POS systems that meet any of the four conditions specified in paragraph G-A.6. nonretroactive requirements as of the effective date of the requirement. The two states, to clarify that the change to paragraph S.1.8.5. is nonretroactive, proposed repositioning item (b), in the list of information required to be printed, to (d) so that "the tare weight" portion of the information required would appear at the very bottom of the list and directly above the nonretroactive date proposed. The submitters also requested the enforcement date specified in the original proposal be extended an additional two years (i.e., until 2022); this extension is proposed in consideration of some of the concerns raised by FMI and other industry representatives during the Committee's open hearings relating to the cost of implementation and the burden the changes would impose on grocery businesses having to comply with them. The submitters reported they had decided to extend the effective date of enforcement so that the cost of implementation could be spread over a longer period. A final suggested change was to amend the "Purpose" section of the item in the Committee's agenda to better reflect the true intent of the proposal; that is, to provide consumers the same opportunity afforded them by other scales that are used for direct sales (e.g., a retail-computing scales used to weigh lunch meat, cheeses, etc.) to be able to easily recognize that a tare deduction for packaging material, etc., is taken on items weighed in their presence. The State of Wisconsin, upon being contacted by Kansas and Minnesota and asked to consider these changes, reported that it wished to bow out of further involvement with the item.

The Committee, in considering the changes proposed to the item and the rationale provided by the submitters for requesting them, concurred that they were appropriate. Consequently, the Committee agreed to amend the proposal and replace the text in the "Purpose Section" as requested by the submitters and recommend the item move forward for consideration as follows:

Purpose:
Provide consumers the same opportunity to be able to easily verify whether tare is taken on items weighed at a checkout stand using a POS system, which is currently afforded to them when witnessing items being weighed and priced in their presence using other scales in the store.

Item under Consideration:
Amend NIST Handbook 44, Scales Code as follows:

> **S.1.8.5. Recorded Representations, Point-of-Sale Systems.** – The sales information recorded by cash registers when interfaced with a weighing element shall contain the following information for items weighed at the checkout stand:
>
> (a) the net weight;[1]
>
> (b) the unit price;[1]
>
> (c) the total price; and
>
> (d) the product class or, in a system equipped with price look-up capability, the product name or code number.
>
> **(e)** ***the tare weight[1]***
>
> ***[Non-retroactive January 1, 2022]***
>
> **(Amended 20XX)**

[1] For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams. Weight values shall be identified by kilograms, kg, grams, g, ounces, oz, pounds, or lb. *The "#" symbol is not acceptable.*
[Nonretroactive as of January 1, 2006]
(Amended 1995 and 2005)

Regional Association Comments and Recommendations:
At its 2016 Annual Meeting, the WWMA reported it believes the addition to section S.1.8.5. has merit and should be considered as a voting item. However, it also believed Section S.1.9.3. should be withdrawn and perhaps a better place for this consideration would be with the L&R Committee. The WWMA forwarded the item to NCWM and recommended that it be a voting item as modified below.

> **S.1.8.5. Recorded Representations, Point-of-Sale Systems. –** The sales information recorded by cash registers when interfaced with a weighing element shall contain the following information for items weighed at the checkout stand:
>
> (a) the net weight;[1]
>
> ***(b) the gross weight or tare weight;[1]***
>
> (~~b~~**c**) the unit price;[1]
>
> (~~c~~**d**) the total price; and
>
> (~~d~~**e**) the product class or, in a system equipped with price look-up capability, the product name or code number.
>
> ***[Non-retroactive January 1, 20XX]***

[1] For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams. Weight values shall be identified by kilograms, kg, grams, g, ounces, oz, pounds, or lb. *The "#" symbol is not acceptable.*
[Nonretroactive as of January 1, 2006]
(Amended 1995 and 2005)

And

~~S.1.9.3. Recorded Representations, Random Weight Package Labels. – A prepackaging scale or a device that produces a printed ticket as the label for a random weight package shall produce labels which must contain the following information:~~

~~(a) the net weight;~~[1]

~~(b) the gross weight or tare weight;~~[1]

~~(c) the unit price;~~[1]

~~(d) the total price; and~~

~~(e) the product class or, in a system equipped with price look-up capability, the product name or code number.~~
~~[Non-retroactive as of January 1, 20XX]~~

At its fall 2016 Interim Meeting, the CWMA reported it believes that this code requirement provides consumers with the necessary information to determine if tare is taken when an item is pre-packaged or at the point of sale. At its spring 2017 Annual Meeting, the CWMA reported it believes this will be a benefit to consumers and regulatory officials as well. CWMA forwarded this item to NCWM and recommended Voting status at both its 2016 Interim and 2017 Annual Meetings.

The SWMA, at its 2016 Annual Meeting, did not receive comments on this item and requested the submitters provide information based on costs involved, in particular for the POS component. The SWMA forwarded the item to NCWM and recommended Developing status.

At its fall 2016 Interim Meeting, NEWMA reported it believes the upgrade to POS systems, education to all store owners – large and small grocery stores, time to implement, and confusion of the customer are a concern. NEWMA did not forward this item to NCWM and recommended it be Withdrawn. At its 2017 Annual Meeting, NEWMA reported there was some discussion questioning the benefit of the item; however, it agreed to recommend it move forward as a Voting item.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

3200-4 D TABLE 3, PARAMETERS FOR ACCURACY CLASSES (SEE RELATED ITEM 3200-8)

Source:
Meridian Engineers Pty Ltd. (2017)

Purpose:
Reduce the required minimum scale division value for coupled-in-motion railroad weighing systems that are not used for static reference weighing.

Item under Consideration:
Amend NIST Handbook 44, Scales Code as follows:

Table 3.
Parameters for Accuracy Classes

Class	***Value of the Verification Scale Division (d or e[1])***	***Number of Scale[4] Divisions (n)***	
		Minimum	***Maximum***
SI Units			
I	*equal to or greater than 1 mg*	*50 000*	*--*
II	*1 to 50 mg, inclusive*	*100*	*100 000*
	equal to or greater than 100 mg	*5 000*	*100 000*
III[2,5]	*0.1 to 2 g, inclusive*	*100*	*10 000*
	equal to or greater than 5 g	*500*	*10 000*
III L[3]	*equal to or greater than 2 kg*	*2 000*	*10 000*
IIII	*equal to or greater than 5 g*	*100*	*1 200*
U.S. Customary Units			
III[5]	*0.0002 lb to 0.005 lb, inclusive*	*100*	*10 000*
	0.005 oz to 0.125 oz, inclusive	*100*	*10 000*
	equal to or greater than 0.01 lb	*500*	*10 000*
	equal to or greater than 0.25 oz	*500*	*10 000*
III L[3]	*equal to or greater than 5 lb*	*2 000*	*10 000*
IIII	*greater than 0.01 lb*	*100*	*1 200*
	greater than 0.25 oz	*100*	*1 200*

[1] *For Class I and II devices equipped with auxiliary reading means (i.e., a rider, a vernier, or a least significant decimal differentiated by size, shape, or color), the value of the verification scale division "e" is the value of the scale division immediately preceding the auxiliary means.*

[2] *A Class III scale marked "For prescription weighing only" may have a verification scale division (e) not less than 0.01 g*.
(Added 1986) (Amended 2003)

[3] *The value of a scale division for crane and hopper (other than grain* ***hopper*** **and coupled-in-motion railroad weighing systems (not used for static reference weighing**) *scales shall be not less than 0.2 kg (0.5 lb). The minimum number of scale divisions shall be not less than 1000.*

[4] *On a multiple range or multi-interval scale, the number of divisions for each range independently shall not exceed the maximum specified for the accuracy class. The number of scale divisions, n, for each weighing range is determined by dividing the scale capacity for each range by the verification scale division, e, for each range. On a scale system with multiple load-receiving elements and multiple indications, each element considered shall not independently exceed the maximum specified for the accuracy class. If the system has a summing indicator, the* n_{max} *for the summed indication shall not exceed the maximum specified for the accuracy class.*
(Added 1997)

[5] *The minimum number of scale divisions for a Class III Hopper Scale used for weighing grain shall be 2000.*)

[*Nonretroactive as of January 1, 1986*]
(Amended 1986, 1987, 1997, 1998, 1999, 2003, and 2004)

Background/Discussion:

The content of NIST Handbook 44 has been driven by the ongoing development of weighing devices. This is quite apparent when viewed for the purpose of certifying in-motion rail weighing systems. These devices have been developed from static, platform-type scales, which utilize one or more very accurate load cells, and the handbook seems to assume the devices will also be used for static reference weighing.

Meridian Engineers asks the NCWM to consider Meridan's in-motion rail weighing system, which has been in production and development for 15 years. It already has trade approval in Australia (National Measurement Institute) and the EU (National Measurement Regulation Office), and they are now looking to gain NTEP Certification.

The product utilizes what they refer to as bolt-on transducers, which make the rail a pseudo load cell. They are not designed to be used as a conventional load cell, which can be connected to a standard load cell indicator. They are only designed for the end application; that is, coupled-in-motion train weighing. Furthermore, their product is not attempting to perform static reference weighing.

Because Meridian bolts their transducers onto an existing railway line, they cannot change its sectional properties to increase performance or accuracy. Also, their transducers do not carry zero-shift compensation because the overall system is constantly digitally zeroing the system typically after every fourth axle weighed. Hence, there has been no need to incorporate conventional zero-shift compensation into the manufacturing of our transducers.

In this application, the errors from the quality of the rolling stock, the track foundation condition, as well as how smoothly the locomotive drives across the system are significantly higher than the individual class IIIL permissible errors.

All this means the accuracy of their "load cell" would struggle to meet Class IIIL requirements as they currently stand. Yet the submitter states the accuracy of their system is as good as any system designed with Class IIIL load cells for coupled in-motion weighing.

The requirement to have load cells pass IIIL accuracy requirements for coupled in-motion train weighing is not appropriate and restricts the design of the final system to more conventional platform style systems, which is detrimental to innovation. This requirement is too stringent, and the submitter would argue the final accuracy of the complete system should dictate how accurate the load cells need to be.

At the 2017 NCWM Interim Meeting, the Committee grouped agenda Items 3200-4 and 3200-8 together and took comments on these items simultaneously because it considered them related.

Mr. Richard Suiter (Richard Suiter Consulting) gave a short presentation on behalf of Meridian Engineers Pty Ltd. that provided an indication how the Meridian Engineering equipment functioned and showed some of the test data Meridian had collected to support the changes proposed. Mr. Suiter said the proposed changes would harmonize the tolerances for in-motion railroad weighing systems in NIST Handbook 44 with those in OIML R 106, Automatic Rail-Weighbridges. Mr. Suiter acknowledged that the impact of changing the Handbook 44 tolerances is not yet fully known and needed further study. Mr. Anthony Pruiti (Meridian Engineers Pty Ltd.) stated he intended to continue working on this item and planned to have more information available at the upcoming NCWM Annual meeting.

Ms. Tina Butcher (NIST, OWM) noted, while establishing different accuracy classes for weighing devices would not be unprecedented, if this were done specifically for coupled-in-motion railroad weighing systems as proposed, each accuracy class would also need to define the application of the weighing systems assigned that accuracy class. She further noted, while OWM could envision this possibly being done, it questioned the need for the proposed changes and wished to defer opinion until more information has been made known justifying the reason.

Mr. Rafael Jimenez (Association of American Railroad Transportation Technology Center [AAR]) commented that the AAR takes no position on this item and the American Railway Engineering and Maintenance-of-Way Association's (AREMA) Committee 34 planned to review and analyze the test data, which had been collected on the Meridian systems.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, stated that the SMA takes no position on this group of items. This is a significant change to the code, and the impacts are not fully known. The proposal introduces new classes and changes the concept of a scale being comprised of an NTEP-certified indicator, a weighing/load receiving element, and load cell(s). The SMA looks forward to the review and input from other interested stakeholders.

A regulatory official from Oregon cautioned against "relaxing" the tolerances and the negative impact such action would have on customers.

Mr. Steve Beitzel (Systems Associates, Inc.) stated the railroad weighing systems offered by Systems Associates can consistently pass the current tolerances in NIST Handbook 44. Adoption of these proposals would create an unfair playing field and an imbalance in the market. He said when Systems Associates installs a railroad weighing system outside the United States, it tests those weighing systems using U.S. tolerances.

It was noted, during the Committee's work session, this item did not appear on the regional agendas of the S&T Committee in three of the four regional weights and measures association meetings. In consideration of the comments received during the open hearings, the Committee agreed to assign a "Developing" status to the two items in this group.

At the Committee's 2017 NCWM Annual Meeting open hearings, the Committee grouped agenda Items 3200-4 and 3200-8 together and took comments on the two items at the same time. A rather lengthy presentation was given by the item's submitter, Mr. Anthony Pruity (Meridian Engineers Pty Ltd.). The presentation provided an explanation for the changes being proposed and Meridian's perspective supporting the changes. The changes, if adopted, would align the performance requirements corresponding to coupled-in-motion (CIM) railroad weighing systems in NIST Handbook 44 with those in OIML R 106 Automatic rail-weighbridges. OIML R 106 provides multiple accuracy classes for CIM railroad weighing, whereas, Handbook 44 currently provides only a single accuracy class. The Committee received few comments after Mr. Pruiti's presentation, and these were mostly questions repeated from one or more of the recent regional weights and measures association meetings. Examples of questions include:

- If this scale in not capable of meeting NIST Handbook 44 (Table 3) Parameters for Accuracy Classes, what can of worms will we be opening? What will be changed?
- Will this be beneficial?
- Does this tighten accuracy classes?

The Committee agreed to maintain the Developing status of this item based on the comments received.

Regional Association Comments and Recommendations:
At its 2017 Annual Meeting, the CWMA recommended Withdrawing this item based on input received from industry representatives, the lack of data associated with this system, and the possible inequity among similar systems that this item could create. The CWMA reported it believes this is an unnecessary change to the handbook.

NEWMA reported at its 2016 Interim Meeting that the item is not so pertinent in the Northeast, but other regions may benefit from the proposal. So, NEWMA forwarded the item to NCWM and recommended a Developing status. This item did not appear on the Committee's agenda at NEWMA's fall 2016 Interim Meeting. At its 2017 Annual Meeting, NEWMA reported this item requires further development from the submitter, or the submitter needs to specify they are not willing to develop the item any further in order for it to be moved to Voting. Consequently, NEWMA recommended the item move forward as a Developing item on the NCWM agenda.

3200-5 D TABLE 3, PARAMETERS FOR ACCURACY CLASSES (SEE RELATED ITEMS 3100-1 AND 3600-2)

Source:
Ross Andersen, Retired (2017)

Purpose:
Address application of the code requirements across multiple devices.

Item under Consideration:
Amend NIST Handbook 44, Scales Code as follows:

Table 3.
Parameters for Accuracy Classes

Class	***Value of the Verification Scale Division (d or e[1])***	***Number of Scale[4] Divisions (n)***	
		Minimum	***Maximum***
	SI Units		
I	*equal to or greater than 1 mg*	*50 000*	*--*
II	*1 to 50 mg, inclusive*	*100*	*100 000*
	equal to or greater than 100 mg	*5 000*	*100 000*
III[2,5]	*0.1 to 2 g, inclusive*	*100*	*10 000*
	equal to or greater than 5 g	*500*	*10 000*
III L[3]	*equal to or greater than 2 kg*	*2 000*	*10 000*
IIII	*equal to or greater than 5 g*	*100*	*1 200*
	U.S. Customary Units		
III5	*0.0002 lb to 0.005 lb, inclusive*	*100*	*10 000*
	0.005 oz to 0.125 oz, inclusive	*100*	*10 000*
	equal to or greater than 0.01 lb	*500*	*10 000*
	equal to or greater than 0.25 oz	*500*	*10 000*
III L3	*equal to or greater than 5 lb*	*2 000*	*10 000*
IIII	*greater than 0.01 lb*	*100*	*1 200*
	greater than 0.25 oz	*100*	*1 200*

[1] *For Class and II devices equipped with auxiliary reading means (i.e., a rider, a vernier, or a least significant decimal differentiated by size, shape, or color), the value of the verification scale division "e" is the value of the scale division immediately preceding the auxiliary means.*

[2] *A Class III scale marked "For prescription weighing only" may have a verification scale division (e) not less than 0.01 g.*
(Added 1986) (Amended 2003)

[3] *The value of a scale division for crane and hopper (other than grain hopper) scales shall be not less than 0.2 kg (0.5 lb). The minimum number of scale divisions shall be not less than 1000.*

[4] *On a multiple range or multi-interval scale, the number of divisions for each range independently shall not exceed the maximum specified for the accuracy class. The number of scale divisions, n, for each weighing range is determined by dividing the scale capacity for each range by the verification scale division, e, for each range.* ~~***On a scale system with multiple load-receiving elements and multiple indications, each element considered shall not independently exceed the maximum specified for the accuracy class. If the system has a summing indicator, the n_{max} for the summed indication shall not exceed the maximum specified for the accuracy class.***~~
(Added 1997) **(Amended 20XX)**

[5] *The minimum number of scale divisions for a Class III Hopper Scale used for weighing grain shall be 2000.*)

[*Nonretroactive as of January 1, 1986*]
(Amended 1986, 1987, 1997, 1998, 1999, 2003, and 2004)

Background/Discussion:
This item was submitted as a companion item to agenda Items 3100-1 and 3600-2. See agenda Item 3100-1 of this report for additional Background/Discussion information for this item.

As reported under agenda Item 3100-1, the Committee agreed to carryover this group of items on its agenda as Developing items to allow Mr. Andersen the opportunity to further develop and garner support for his proposals.

Regional Association Comments and Recommendations:
This item did not appear on the (regional) Committee's agenda at the WWMA's 2016 Annual Meeting.

At the CWMA's fall 2016 Interim Meeting, the Committee believed this item to be fully developed and forwarded it to NCWM with the recommendation of Voting status. At its spring 2017 Annual Meeting, the CWMA reported, based on the amount of opposition to this item as written, it recommends this to remain a Developing item, and for the submitter to rewrite portions of this item to address the possible restrictions related to the use of multiple scales operating using internal resolution to create an additional scale that provides the total weight value.

The SWMA batched items 3100-1, 3200-5, and 3600-2 together at its 2016 Annual Meeting and heard comments for all at the same time. Mr. Henry Oppermann (Weights and Measures Consulting) disagrees with these items and opposes their use. He recommends Withdrawing all three items in this batch. Mr. Oppermann contends they violate the principles of NIST Handbook 44. He further contends this should be based on performance and not design. Mr. Oppermann concluded by stating the submitter misinterpreted the WELMEC guidelines and multiplatform truck scales used together must function as a single scale. The Committee did not forward these items to NCWM and recommends they be Withdrawn because the proposed language is unnecessary.

At its fall 2016 Interim Meeting, NEWMA reported the Committee believes this item has merit but would like an example of how this applies to independent/multiple devices. At its spring 2017 Annual Meeting, NEWMA reported the item was not ready for Vote given impending changes agreed to by the item's submitter. NEWMA forwarded the item to NCWM and recommended Developing status at both meetings.

3200-6 W N.1. TEST PROCEDURES

(This item was Withdrawn.)

Source:
RAVAS Europe b.v. (2017)

Purpose:
Provide safe test procedures for one-side supported mobile weighing systems such as forklift scales.

Item under Consideration:
Amend NIST Handbook 44, Scales Code as follows:

> **N.1.1. Increasing-Load Test. –** The increasing-load test shall be conducted on all scales with the test loads approximately centered on the load-receiving element of the scale **<u>or for forklift scales approximately centered on the load-gravity point as prescribed by the typeplate of the truck</u>,** except on a scale having a nominal capacity greater than the total available known test load. When the total test load is less than the nominal capacity, the test load is used to greatest advantage by concentrating it, within prescribed load limits, over the main load supports of the scale.
>
> **N.1.2. Decreasing-Load Test (Automatic Indicating Scales –** The decreasing-load test shall be conducted with the test load approximately centered on the load-receiving element of the scale **<u>or for forklift scales approximately centered on the load-gravity point as prescribed by the typeplate of the truck.</u>**
>
> > **N.1.3.2. Equal-Arm Scales.** – A shift test shall be conducted with a half-capacity test load centered successively at four points positioned equidistance between the center and the front, left, back, and right edges of each pan as shown in the diagrams below. An equal test load shall be centered on the other pan.
> >
> > **<u>For forklift scales front and back shift test shall be conducted with a half-capacity test load centered successively at the front and back edges of the pallet. For safety reasons the shift test shall not be</u>**

performed for the left and right sides of the pallet since the pallet is hanging in the air and has no support on those sides.

Background/Discussion:
During an NTEP evaluation of a forklift scale, a dangerous situation arose during the shift test when the "left" and "right" side shift tests were performed with a half-capacity test load. The pallet on which the test weights were placed was not supported adequately in that direction and tended to tip over. To prevent accidents from happening with inspectors in the field, the submitter advises skipping this side-shift test and concentrating on the front/back shift test because that's more in accordance with the practical use of the forklift truck.

Safety should be a priority. In practice, forklifts are never loaded sideways because the load could be dropped when turning the vehicle, possibly damaging valuable goods.

During the Committee's opening hearings at the 2017 NCWM Interim Meeting, comments were heard from representatives of NIST and the SMA.

Mr. John Barton (NIST, OWM) stated NIST, OWM recognizes the unique design characteristics of the load-receiving elements associated with on-board weighing systems (which include forklift scales), and believes it is appropriate for testing be performed in consideration of the design of a device. He noted the proposal omits testing involving centering the test load to either side (right or left) of the load-receiving element due to safety concerns; testing needs to encompass the usual and customary manner in which a device is used. Normal use would predictably include loads concentrated on either side of the load-receiving element and if so, practical procedures that do not compromise safety should be developed and provided. He further noted NCWM Publication 14 contains procedures for conducting shift tests on forklift scales and said it may be appropriate to include those procedures in the proposal.

With respect to the two-sentence paragraph proposed for addition to existing paragraph N.1.3.2. Equal-Arm Scales, Mr. Barton noted it is more appropriately associated with paragraph N.1.3.6. Vehicle On-Board Weighing Systems, which already includes some details regarding shift-tests for this type of device. Mr. Barton also noted some of the verbiage in the proposal (e.g., "load-gravity point") is not clearly understood and may need to be defined in NIST Handbook 44.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported that the SMA supports this item with the following recommended change:

- remove the proposed language in N.1.1. and N. 1.2.; and
- create a new subsection N.1.3.X. for the proposed paragraph currently listed under N.1.3.2 Equal-Arm Scales.

In consideration of the discrepancies identified by those offering comments to the Committee on this item and the need to further develop the proposal, the Committee agreed to assign this item a "Developing" status.

Prior to the 2017 NCWM Annual Meeting, the Committee received an e-mail from Mr. Michel Rijk (RAVAS) requesting clarification on the out-of-level calculations, specifically converting percentage off level to degrees of tilt. He also asked that the proposal be Withdrawn from the Committee's agenda.

The Committee agreed to Withdraw this item during the 2017 NCWM Annual Meeting after receiving a request to do so from the submitter of the item.

Regional Association Comments and Recommendations (Fall 2016 Conferences):
The WWMA reported at its 2016 Annual Meeting that it recognizes safety is important and perhaps the concept of the submission has merit. However, this submission uses several names for forklift scales, none of which are believed to be correct or defined. It asks for information be added to the nameplate that is not regulated by NIST Handbook 44. How to safely test this type of device could be explained in the Examination Procedure Outline (EPO). The WWMA recommended Withdrawing the item.

The CWMA reported at its fall 2016 Interim Meeting it believes this item has merit, but additional tests may need to be developed to evaluate the ability of these devices to adjust the weighing element from side to side and in a tilting motion forward and back. The CWMA recommended at its spring 2017 Annual Meeting removing the proposed language shown in N.1.1. and N.1.2. and creating a new subsection N.1.3.X for the proposed paragraph currently listed under N.1.3.2 Equal Arm Scales. The CWMA recommended at both meetings for this item to be forwarded to the NCWM as a Developing item.

The SWMA did not receive comments on this item at its 2016 Annual Meeting and reported it believes it would be better addressed in an EPO. The SWMA did not send this item to NCWM and recommended for it be Withdrawn.

NEWMA reported at its fall 2016 Interim Meeting that it believes the test procedures are adequate in this section. NEWMA did not forward this item to NCWM and recommended it be Withdrawn. At its spring 2017 Annual Meeting NEWMA recommended the item move forward as Developing and reported that the item requires further development from the author, or the author needs to state he is not willing to develop it any further for it to be moved to voting.

3200-7 W T.1. GENERAL AND T.N.2.1. GENERAL (SEE RELATED ITEMS 3201-1, 3204-1, 3205-2, 3508-2, 3509-1 AND 3600-4)

(This item was Withdrawn.)

Source:
Mr. Ross Andersen, Retires (2017)

Purpose:
Provide language in this code that is consistent with the General Code.

Item under Consideration:
Amend NIST Handbook 44 Scales Code as follows**:**

T.1. General. – **The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.** The tolerances applicable to devices not marked with an accuracy class shall have the tolerances applied as **are as** specified in Table T.1.1. Tolerances for Unmarked Scales.

T.N.2.1. General. – The tolerance values are positive (+) and negative (−) **hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration** with the weighing device adjusted to zero at no load. When tare is used, the tolerance values are applied from the tare zero reference (zero net weight indication); the tolerance values apply to the net weight indication for any possible tare load using certified test loads.'

(Amended 2008)

Background/Discussion:
The submitter (Mr. Ross Andersen) provided the following comments:

General Code Paragraph **G-T.3. Application** explains that tolerances in the Handbook are expressed either in excess/in deficiency or, on overregistration/on underregistration. For the most part, one of these two formats are used in each code as applicable. Specifically, one of the Tolerance paragraphs in each code has a specific statement along the lines of:

> The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration or the tolerances hereinafter prescribed shall be applied equally to errors in excess and errors in deficiency.

However, I was reviewing tolerances in a few codes and noticed that there were codes that were not consistent with these two formats. I am proposing the S&T Committee amend the code where necessary to make all codes consistent with G-T.3. I have identified those codes in the table below. In all cases the tolerances are clearly meant to be or overregistration/underregistration in these codes, but the text in the code either has no specified format or just describes the tolerances as positive and negative.

2.20.	Scales	not specified & positive/negative
2.21.	Belt-Conveyor	not specified
2.24.	AWS	positive/negative
2.25.	Weigh-in-Motion	not specified
5.58.	MDMD	not specified
5.59.	Electronic Livestock, Meat, etc.	not specified

I note that describing tolerances as positive and negative is relative and can mean different things to different people. One person's plus can be another's minus. That is not a desirable situation. The use of "in excess," "in deficiency, "on overregistration," or "on underregistration" eliminate that ambiguity.

Note that our convention in the United States is to express LMD errors as "errors in delivery" while most other codes we express "errors in indication." G-T.3. is referring solely to errors in indication. For example, a dispenser test at 5 gal that is in error by − 3 in^3 is overregistering. In contrast, a scale test at 5 lb that is in error by − 0.03 lb is underregistering. The distinction is most critical when the code does not apply tolerances equally to overregistration and underregistration.

It turns out the codes that do not specify the tolerance application format all apply the tolerances equally to overregistration/underregistration, so I believe these changes would be entirely editorial. I would further recommend that any "+/−" designation in the tolerance values or tables be eliminated as they are redundant and inconsistent with the principles in G-T.3.

In a related item, I believe it is necessary to bring the definition of overregistration/underregistration in line with modern measurement terminology. The definition now uses the expression "true value" in its examples. My understanding is that the expression "true value" is highly discouraged mainly because no one knows what it really is. I am suggesting that we replace "true value" with "verified value" as indicated below. I opted for "verified" since we added the term verification to the HB44 definitions just a few years ago.

The proposed changes would make the Handbook treatment of tolerances consistent with G.T.3. It might be possible to make these changes editorially if the Committee agrees. However, because the deadline for proposals for the 2017 cycle nears, I am submitting this as a formal proposal.

At the 2017 NCWM Interim Meeting, the Committee grouped agenda Items 3200-7, 3201-1, 3204-1, 3205-2, 3508-2, 3509-1, and 3600-4 together and took comments on these items simultaneously because it considered them related.

The Committee received comments from Ms. Tina Butcher (NIST, OWM), who reported OWM believes the application of tolerances is already adequately addressed in the General Code of NIST Handbook 44 and the changes being proposed to the different device codes is unnecessary. She also indicated that perhaps a more practical solution, should the concepts of overregistration and underregistration not be understood, would be to amend the definitions of these terms in Handbook 44.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported that the SMA took no position on this group of items.

Mr. Ross Andersen (New York, retired) stated he had submitted these proposals in an attempt to make the language in the different codes of NIST Handbook 44 consistent. The meaning of the terms "underregistration" and "overregistration" is confusing to officials because of the way they typically view the errors observed during the testing of different device types. He offered the following two examples to substantiate his comment that the meaning of the two terms is confusing:

1. The direction of error observed during a scale test is typically determined relative to the indication (i.e., error of indication) when a test weight is applied. Thus, a plus error occurs when a scale provides an indication greater than the value of the test weights applied, and for this reason, the scale is said to be "*overregistering*" (i.e., registering more than the amount of test weight applied).

2. In contrast, the direction of error observed during the testing of a liquid-measuring device using a volumetric prover is typically determined relative to the amount of product delivered (i.e., error of delivery) into the prover during a test. Thus, a plus error occurs when the amount of product delivered into the prover is more than the amount indicated by the device being tested, and for this reason, the device is said to be "*underregistering*" (i.e., registering less than the amount delivered).

Mr. Andersen noted that all errors in OIML Recommendations are considered "errors of indication," thus, providing for a uniform way of expressing errors.

During the Committee's work session, the Committee agreed that uniform language in the codes is good when the application is such that there is enough commonality to permit it. However, with this proposal, the Committee felt the changes would potentially lead to confusion in codes, which currently have adequate language to facilitate application and the changes were unnecessary. Ultimately, the Committee agreed to Withdraw these items.

Regional Association Comments and Recommendations (Fall 2016 Conferences):
The CWMA believes the existing language is sufficient, and this item should be Withdrawn. The CWMA did not forward this item to the NCWM.

The SWMA batched Items 3200-7, 3201-1, 3204-1, 3205-2, 3508-2, 3509-1, and 3600-4 together and heard comments for all items at the same time. Mr. Rick Kimsey (Florida) stated Florida doesn't disagree with the items in the batch, but doesn't think they are necessary. He further stated the intent is already implied in the existing codes as written and adoption of these items could lead to confusion. The SWMA did not forward these items to the NCWM and recommended they be Withdrawn because the intent already exists.

The NEWMA believes this proposal has merit with making language uniform but the interpretation when applying errors of "overregistration" and errors of "underregistration" or in excess/in deficiency could lead to confusion. NEWMA forwarded the item to the NCWM and recommended a Developing status.

3200-8 D T.N.3.6. COUPLED-IN-MOTION RAILROAD WEIGHING SYSTEMS (SEE RELATED ITEM 3200-4)

Source:
Meridian Engineers Pty Ltd. (2017)

Purpose:
Align the acceptance tolerance values and assign accuracy classes for coupled-in-motion railroad weighing systems with OIML R 106-1 Edition 2011 (E) Automatic rail-weighbridges.

Item under Consideration:
Amend NIST Handbook 44, Scales Code as follows:

T.N.3.6. Coupled-In-Motion Railroad Weighing Systems. ~~**– The maintenance and acceptance tolerance values for the group of weight values appropriate to the application must satisfy the following conditions:**~~

~~**T.N.3.6.1. For any group of weight values, the difference in the sum of the individual in-motion** car weights of the group as compared to the sum of the individual static weights shall not exceed 0.2 %.~~

~~**T.N.3.6.2. If a weighing system is used to weigh trains of five or more cars, and if the individual car weights are used, any single weight value within the group must meet the following criteria:**~~

~~**(a) no single error may exceed three times the static maintenance tolerance;**~~

~~**(b) not more than 5 % of the errors may exceed two times the static maintenance tolerance; and**~~

~~**(c) not more than 35 % of the errors may exceed the static maintenance tolerance.**~~

~~**(Amended 1990 and 1992)**~~

~~**T.N.3.6.3. For any group of weight values wherein the sole purpose is to determine the sum of the group, T.N.3.6.1. alone applies.**~~

~~**(Amended 1990)**~~

~~**T.N.3.6.4. For a weighing system used to weigh trains of less than five cars, no single car weight within the group may exceed the static maintenance tolerance.**~~

~~**(Amended 1990 and 1992)**~~

T.N.3.6.1. Accuracy Classes Systems are divided into four accuracy classes as follows:

0.2 0.5 1 2

A system may be in a different accuracy class for wagon weighing than that for train weighing.

T.N.3.6.2. Tolerance Values – The acceptance and maintenance tolerance values shall be as specified in Table T.N.3.6. below:

Table T.N.3.6.
Percentage of Mass of Single Wagon or Train as Appropriate

Accuracy Class	Acceptance Tolerance	Maintenance Tolerance
0.2	0.10 %	0.20 %
0.5	0.25 %	0.50 %
1	0.50 %	1.00 %
2	1.00 %	2.00 %

T.N.3.6.3. Wagon Weighing – The tolerance value for uncoupled or coupled wagon weighing shall be one of the following values, whichever is greater:

(a) the value calculated according to the appropriate accuracy class in Table T.N.3.6., rounded to the nearest scale interval;

(b) the value calculated according to the appropriate accuracy class in Table T.N.3.6., rounded to the nearest scale interval for the mass of a single wagon equal to 35 % of the maximum wagon mass (as inscribed on the descriptive markings); or

(c) 1 d.

On initial verification of an instrument weighing coupled wagons, the errors of not more than 10 % of the weighing results taken from one or more passes of the test train may exceed the appropriate tolerance value given in Table T.N.3.6.but shall not exceed two times that value.

T.N.3.6.4. Train Weighing – The tolerance value for train weighing shall be one of the following values, whichever is greater:

a) the value calculated according to the appropriate accuracy class in Table T.N.3.6., rounded to the nearest scale interval;

b) the value calculated according to the appropriate accuracy class in Table T.N.3.6., for the mass of a single wagon equal to 35 % of the maximum wagon mass (as inscribed on the descriptive markings) multiplied by the number of reference wagons in the train (not exceeding 10 wagons) and rounded to the nearest scale interval, or

c) 1 d for each wagon in the train but not exceeding 10 d.

Background/Discussion:

The proposed changes to NIST Handbook 44 come directly from OIML R 106-1 Edition 2011 (E) Automatic rail-weighbridges. Introducing a range of accuracy classes is more appropriate for these types of weighing systems, given they are mounted on continuous rail and are highly influenced by track conditions, the quality of the rolling stock as well as locomotive driving.

While clause T.N.3.6.1. can be achieved, the submitter contends that clause T.N.3.6.2. as it appears currently is simply not achievable for the vast majority of installations. Using a typical example of a weighing system required to weigh in the range of 15 t to 100 t and a 50 kg scale division, this clause essentially states that 65 % of individual wagons must have no more than 0.2 % error and no single wagon have an error of more than 0.6 %. According to the submitter, this is not possible for most real-life applications. The only way this could be achieved is with perfect track conditions; perfect locomotive driving; and perfect rolling stock couplers. The real word typically achieves 90 % of wagons at no more than 1 % error. The permissible errors currently detailed in T.N.3.6.2. are more akin to weighing wagons uncoupled statically on isolated rail, not for coupled-in-motion train weighing systems on continuous, uncut rail.

The submitter's equipment, when installed on the best tracks with best rolling stock achieves 0.1 % accuracy. However, the same equipment installed on substandard tracks and rolling stock will only achieve 1 % accuracy. Unless the client spends significant time and money on upgrading track and rolling stock, there is no way they can get a coupled in-motion train weighing system to weigh better than 1 %. So, in most cases this would not be financially viable.

Aligning NIST Handbook 44 with OIML R 106 also has wider advantages, which can be appreciated. That is, systems developed for NTEP certification will also be able to achieve certification in other countries, which have adopted the OIML R 106 standard and vice versa.

Establishing a range of accuracy classes will encourage innovation and bring a wider range in design and type of products to the table. There are also opportunities to establish the "lesser" classes as being suitable for infrastructure protection and safety.

The submitter stated the current requirements would mean far greater overall costs to implement an NTEP certified system. It would also typically be far less flexible, in terms of speed range and modes of weighing, than if the tolerances were widened as we are proposing. The submitter believes if the proposal is adopted, more efficient weighing systems would become available, which would be installed at a lesser cost, with a minimum reduction in accuracy.

At the 2017 NCWM Interim and Annual Meetings, the Committee grouped agenda Items 3200-4 and 3200-8 together and took comments on these items simultaneously because it considered them related. See agenda Item 3200-4 for a summary of the comments received and the resulting actions taken by the Committee on these items at these two meetings.

Regional Association Comments and Recommendations:

At its 2017 Annual Meeting, the CWMA recommended Withdrawing this item based on input received from industry representatives; the lack of data associated with this system; and the possible inequity among similar systems that this item could create. The CWMA reported it believes this is an unnecessary change to NIST Handbook 44. NEWMA reported at its 2016 Interim Meeting the item is not so pertinent in the Northeast, but other regions may benefit from the proposal, so NEWMA forwarded the item to NCWM and recommended Developing status. At its 2017 Annual Meeting, NEWMA reported this item requires further development from the submitter, or the submitter needs to state they are not willing to develop the item any further for it to be moved to Voting. Consequently, NEWMA recommended the item move forward as a Developing item on the NCWM agenda.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

3201 BELT-CONVEYOR SCALE SYSTEMS

3201-1 W T.1. TOLERANCE VALUES (SEE RELATED ITEMS 3200-7, 3204-1, 3205-2, 3508-2, 3509-1 AND 3600-4)

(This item was Withdrawn.)

Source:

Ross Andersen, Retired (2017)

Purpose:

Provide language in this code that is consistent with the General Code.

Item under Consideration:

Amend NIST Handbook 44 Belt-Conveyor Scale Systems Code as follows**:**

> **T.1. Tolerance Values.**[1] **– The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.** Maintenance and acceptance tolerances on material tests, relative to the weight of the material, shall be ~~±~~ 0.25 % of the test load.
>
> (Amended 1993)

[Note the "±" is stricken near the end of the second sentence.]

Background/Discussion:

This item was submitted as one of a group of items that includes agenda Items 3200-7, 3201-1, 3204-1, 3205-2, 3508-2, 3509-1, and 3600-4. The Background/Discussion information is the same for these items and included in agenda Item 3200-7 of this report. At the 2017 NCWM Interim Meeting, the Committee agreed to Withdraw these items in consideration of the comments received during the meeting.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

3202 AUTOMATIC BULK WEIGHING SYSTEMS

3202-1 D A. APPLICATION, S. SPECIFICATIONS, N. NOTES, UR. USER REQUIREMENTS

Source:
Kansas (2016)

Purpose:
Modernize the ABWS code to more fully the reflect the types of systems in use and technology available while still maintaining the safeguards of the current code.

Item under Consideration:
Amend NIST Handbook 44, Automatic Bulk Weighing Systems Code as follows:

A. Application

A.1. General. – This code applies to ~~**automatic bulk**~~ weighing systems, ~~**that is, weighing systems**~~ **capable of**~~**adapted to the automatic**~~ **automatically** weighing ~~**of a commodity in**~~ successive drafts of **a bulk commodity without human intervention.**~~**predetermined amounts automatically recording the no-load and loaded weight values and accumulating the net weight of each draft.**~~

(Amended 1987)

S. Specifications

S.1. Design of Indicating and Recording Elements and Recorded Representations.

S.1.1. Zero Indication. – ~~**Provisions**~~ **An Automatic Bulk Weighing System (ABWS)** shall ~~**be made to**~~indicate and record a no-load reference value and, if the no-load reference value is a zero value indication, to indicate and record an out-of-balance condition on both sides of zero.

S.1.5. Recording Sequence. – ~~**Provision**~~ **An ABWS** shall ~~**be made so that**~~ **indicate** all weight values ~~**are indicated**~~ until ~~**the completion of the**~~ recording of the indicated value **is completed**.

S.1.6. Provision for Sealing Adjustable Components on Electronic Devices. – Provision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of the device.

S.1.7. No Load Reference Values. – An ABWS shall indicate and record weight values with no load in the load-receiving element. No load reference values must be recorded at a point in time after product flow from the load receiving element is stopped and before product flow into the load receiving element has started. Systems may be designed to stop operating if a no load reference value falls outside of user designated parameters. If this feature is designed into the system then the no load reference value indicated when the system is stopped must be recorded, an alarm must activate, weighing must be inhibited, and some type of human intervention must be required to restart the system after it is stopped.

S.1.8. Loaded Weight Values. – An ABWS shall indicate and record loaded weight values for each weighment.

S.1.9. Net Weight Values. – An ABWS shall calculate and record net weight for each weighment.

S.1.10. Net Weight Accumulation. – An ABWS shall automatically accumulate and record the sum of all net weight values for each weighing process.

S.3. Interlocks and ~~Gate Control~~Product Flow Control.

S.3.1. ~~Gate Position~~Product Flow Control. – ~~Provision~~ An ABWS shall **~~be made to~~** clearly indicate to the operator **product flow status** **~~the position of the gates leading directly~~** to and from the **~~weigh hopper~~load receiving element. Many types of equipment can be used to control the flow of product into and out of a load receiving element automatically including but not limited to gates, conveyors, augers, robots, pipes, tubes, elevators, buckets, etc.**

S.3.2. Interlocks. – Each automatic bulk weighing system shall have operating interlocks to provide for the following:

(a) Product cannot be cycled and weighed if the weight recording element is disconnected or subjected to a power loss.

(b) The recording element **can only** **~~cannot print~~** **record** a weight if **~~either of the gates~~** **equipment controlling product flow to or from the load-receiving element is in a condition that allows product to enter or leave the load receiving element.** **~~leading directly to or from the weigh hopper is open.~~**

S.3.3. Overfill ~~Sensor~~and Interference Detection.

(a) **The system must have a means to detect when ~~T~~t**he **~~weigh hopper~~load-receiving element ~~shall be equipped with an~~is** overfill**ed. When an overfill condition exists** **~~sensor which will cause the feed~~product flow to the load receiving element must be stopped,** **~~gate to close,~~**an alarm must activate,**~~activate an alarm, and inhibit~~** weighing **must be inhibited** until the overfill condition has been corrected**, and some type of human intervention must be required to restart the system. An alarm could be many things including a flashing light, siren, horn, flashing computer screen, etc. The intent of an alarm is to make the operator aware there is a problem which needs corrected.**

(Added 1993)

(b) **~~If the system is equipped with a~~Downstream storage devices and other equipment, permanent or temporary,** **~~lower garner or surge bin, that garner~~** **~~shall also~~** **which have the potential to interfere with weighment when overfilled or not functioning properly must have a means to prevent interference. When interference exist the system must stop, an alarm must activate, product flow must stop, weighing must be inhibited until the interference has been corrected, and some type of human intervention is required to restart the system.~~be equipped with an overfill sensor which will cause the gate of the weigh hopper to remain open, activate an alarm, and inhibit weighing until the overfill condition has been corrected.~~**

[Nonretroactive as of January 1, 1998]

(Amended 1997)

N. Notes

N.1. Testing Procedures.

N.1.1. Test Weights. – The increasing load test shall be conducted using test weights equal to at least 10 % of the capacity of the system:

(a) on automatic **~~grain~~** bulk**-**weighing systems installed after January 1, 1984**, used to weigh grain**; and

UR. User Requirements

UR.4. System Modification. – Components of ~~T~~the weighing system, shall not be modified except when the modification has been approved by a competent engineering authority, preferably that of the engineering department of the manufacturer of the scale, and the official with statutory authority having jurisdiction over the scale.

(Amended 1991)

Background/Discussion:
The submitter provided the following points of discussion:

- There are many systems in use that don't meet the definition for a "scale" or an "Automatic Bulk Weighing System" or anything else in NIST Handbook 44. These changes will make it easier for regulators/inspectors to determine if a system should be evaluated as an "ABWS."
- The wording "automatic bulk weighing systems" should not be used in the definition of the same.
- The no-load and loaded weight recordings are important, but they are specifications and should not be included in the Application Section of the code.
- The current code does not clearly define at what level of automation a system would be considered an ABWS versus a scale with some accessory equipment (hopper, tank, etc.). This is an attempt to more clearly distinguish which systems should be considered ABWS's.
- Human intervention could be many things. Some examples include, but are not limited to, pushing a reset button; turning power off then back on; typing a password; or entering a statement into a system log. The intent of including the term "human intervention" is to not include all systems, which have a high degree of automation, only the ones that cycle repeatedly and can potentially operate without anyone present to observe weighing malfunctions.
- There are many types of load receiving elements that will work with an ABWS, including, but not limited to tanks and hoppers so the previous language referring to hoppers was removed and replaced with the generic but accurate term "load receiving element."
- The old language implied separate overfill sensors (e.g., bindicators) were required. Newer systems have already bypassed the use of separate overfill sensors and utilize the weight indications to identify an overfilled condition, similar to how the indications are used to regulate product flow into the load receiving element for some devices. Concerns for this approach have been raised for situations when an indicator is not functioning properly. That is a legitimate concern, but my reply then is: What is the backup for an indicator not indicating properly on any other type of device? This is something we know happens with other devices and commonly may not be detected until a device inspection and test is completed. Thus, one reason routine inspections and testing are required.
- Many types of equipment can be used to control the flow of product into and out of a load receiving element automatically, including but not limited to gates, conveyors, augers, robots, pipes, tubes, elevators, and buckets. Examples would be a conveyer delivering product – in such a case the recording element should not record if the conveyer is still moving or in the case of a pneumatic transfer tube the recording element should not record if the blower forcing air through the tube is still operating. Therefore, the old language referring to gates was removed and replace with more generic terminology that can be applied to any equipment used to control product flow – not just gates.
- Many types of equipment can be used for downstream commodity storage, including, but not limited to, hoppers, tanks, bins, flat storage, trucks, totes, rail cars, and pits. The language referring to "lower garner," "surge bin," etc. has been removed and replaced with a more terms such as "downstream storage devices" to allow for all potentials types of product handling equipment.
- A downstream storage device itself may not interfere with the weighing process directly, but it also cannot create a situation in which an overfill condition or some other malfunction of the equipment interferes with the weighing process. An example would be a grain storage hopper located under a weigh hopper in a

position which, when grain is mounded up above the storage hopper, the grain touches the bottom of the weigh hopper and interferes with the weighing process. For this example, if the storage hopper can be lowered far enough below the weigh hopper so that the mounded grain, when it reaches its maximum potential height, cannot touch the weigh hopper, then it would not need the capability to detect an overfill condition. The same scenario would apply to a truck parked under the load receiving element or a conveyer under the load receiving element. Wording was added to ensure interference does not occur and if it does that the system activates controls to prevent weighment errors.

The original code was written for very specific equipment for a very specialized use. This is a drastic change from the original and introduces some new terminology that may present some confusion or uncertainty to those who were familiar with the existing code. Some individuals feel the proposed changes may add some uncertainty as to what systems should or shouldn't be considered an ABWS.

At the 2016 Interim Meeting, the Committee received an update on this item from its submitter, Mr. Doug Musick (Kansas). Mr. Musick indicated that the current proposal is an initial attempt to update the current ABWS Code to address some newer automated weighing systems known to exist in the marketplace. Some of these newer systems are not able to comply with the existing ABWS Code, which provides indication of the need to update the current code.

NIST, OWM commented that it recognized the need for NIST Handbook 44 to include requirements that address some ***automated*** weighing systems currently in the marketplace but for one reason or another, fail to meet the definition of an ABWS or the application of the ABWS Code. As is the case with an ABWS, these systems are also used to weigh bulk commodities in an automatic operation. A number of these weighing systems do ***<u>not</u>*** consistently return to zero following discharge of a draft load due to:

- the density of the commodity being weighed and its susceptibility to cling;
- structural deformations in the load-receiving element (which trap and prevent product from being completely discharged);
- venting issues;
- system vibration; etc.

OWM gave the example of *some* seed treatment systems known to exist in the commercial marketplace that will automatically fill to a load value targeted by the system operator by weighing multiple drafts *automatically* and *without* operator intervention. When these systems are operational, not all the weighed product necessarily gets discharged with the draft load. The remaining product is typically referred to as a "heel." Some of these systems only record the gross weight of the different drafts weighed; yet, the "heel" remaining for each draft load cycled through the system needs to be considered for an accurate determination of the net quantity to be made.

OWM noted the single-most important factor in determining if an automated weighing system needs to consider the no-load reference and gross-load reference to determine an accurate net weight for individual drafts weighed is the system's ability to consistently return to zero following discharge of the load. This determination must be made on a case-by-case basis and will vary depending on the design of the system and the products being weighed.

The Committee agreed more work was needed to develop the item and assigned it a "Developing" status. The Committee recommended the item's submitter review the 2015 SWMA S&T Annual Report for additional proposed revisions to the proposal by that region's S&T Committee.

The Committee received an update on this item at the 2016 Annual Meeting from Mr. Doug Musick. Mr. Musick reported that work on the proposal is ongoing, and he soon planned to submit an updated version of proposal to the Committee. He reiterated a comment made at the 2016 Interim Meeting that the proposal is an attempt to update the current ABWS Code to address some newer automated weighing systems known to exist in the marketplace today, which are not able to comply with the existing ABWS Code.

NIST, OWM reported it looked forward to being able to review an updated proposal to "modernize" the ABWS Code to more fully reflect the different types of systems currently in the marketplace.

The Committee agreed to recommend this item move forward as Developing to allow for additional time to fully develop the proposal. See the Committee's 2016 Final Report for additional details and background information.

At the 2017 NCWM Interim Meeting open hearings, the item's submitter, Mr. Doug Musick, noted he had submitted an amended version of the proposal following the 2016 NCWM Annual Meeting. Mr. Musick commented he felt the proposal was now fully developed and asked the Committee to move this item to a Vote.

Mr. Rick Harshman (NIST, OWM) recommended that the item remain Developing. He questioned whether the proposed changes belonged in the ABWS code or possibly in an entirely separate code intended to address some automatic weighing systems known to exist in the marketplace for which the Scales Code nor the ABWS Code seem to fit their design and operational characteristics. He noted the existing ABWS Code is intended to apply to systems that weigh only one commodity at a time in successive drafts. He asked if the proposed changes are intended to expand the existing code to include a wider range of systems and, if so, which additional systems is the submitter intending to address by expanding the ABWS Code? Mr. Musick answered that it addresses weighing systems capable of operating without human intervention.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported that the SMA takes no position on this item at this time and looks forward to more data.

Mr. Richard Suiter (Richard Suiter Consulting) urged the Committee to exercise caution in considering this item. He stated that he had concerns about striking the language for overfill sensors and described how the sensors are not just for over capacity of the container. He noted that they are also for sensing when the height of the product reaches a point higher than the edge of the container, even though the container may not be at capacity. He advised that this redefining be done with careful consideration.

In consideration of the comments received, the Committee agreed that this item remain as Developing to allow time to determine the impact of the changes on systems in this code.

At the 2017 NCWM Annual Meeting, S&T Committee Chair, Dr. Matthew Curran (Florida), stated the Committee will only hear comments/updates from the submitter on Developing items during open hearings. The Committee received an update on the item from Mr. Doug Musick (Kansas). Mr. Musick reported that work on the item is ongoing, and he expects to have the proposal completed and ready for review at the 2018 NCWM Interim Meeting. Based on the update provided and in consideration of the ongoing work on this item, the Committee agreed to carryover the item on its agenda as a Developing item.

Regional Association Comments and Recommendations:
At its 2016 Annual Meeting, the WWMA received one comment expressing that this item has merit and should remain a developing item. WWMA forwarded the item to the NCWM and recommended Developing status.

At the fall 2016 Interim Meeting, the CWMA reported it believes the submitter has developed this item to its full extent, and it is ready for input from the NCWM S&T Committee and other stakeholders. The CWMA recommended the item be upgraded to Informational status. At its spring 2017 Annual Meeting, the CWMA reported it supported the item but believes is should remain a Developing item.

At its 2016 Annual Meeting, the SWMA received no comments on this item. The Committee recommended the item remain in Developing status for continued progress by the submitter.

NEWMA forwarded this item to NCWM and recommended Developing status at both its spring 2016 Interim and fall 2017 Annual Meetings; noting it was still being developed by its submitter.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

3204 AUTOMATIC WEIGHING SYSTEMS

3204-1 W T.N.2.1. GENERAL (SEE RELATED ITEMS 3200-7, 3201-1, 3205-2, 3508-2, 3509-1, AND 3600-4)

(This item was Withdrawn.)

Source:
Mr. Ross Andersen, Retired (2017)

Purpose:
Provide language in this code that is consistent with the General Code.

Item under Consideration:
Amend NIST Handbook 44, Automatic Weighing Systems Code as follows**:**

> **T.N.2.1. General.** – The tolerance values ~~**are positive (+) and negative (-)**~~ <u>**hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration**</u> with the weighing device adjusted to zero at no load. When tare is used, the tolerance values are applied from the tare zero reference (zero net weight indication); the tolerance values apply to the net weight indication for any possible tare load using certified test loads.
>
> (Amended 2008)

Background/Discussion:
This item was submitted as one of a group of items that includes agenda Items 3200-7, 3201-1, 3204-1, 3205-2, 3508-2, 3509-1, and 3600-4. The Background/Discussion information is the same for these items and included in agenda Item 3200-7 of this report. At the 2017 NCWM Interim Meeting, the Committee agreed to Withdraw these items in consideration of the comments received during that meeting.

3205 WEIGH-IN-MOTION SYSTEMS USED FOR VEHICLE ENFORCEMENT SCREENING

3205-1 I A. APPLICATION AND SECTIONS THROUGHOUT THE CODE TO ADDRESS COMMERCIAL AND LAW ENFORCEMENT APPLICATIONS

Source:
Rinstrum, Inc. and Right Weigh Innovations (2016)

Purpose:
The original purpose of this item was to recognize a higher accuracy class and appropriate requirements in Section 2.25. Weigh-In-Motion Systems Used for Vehicle Enforcement Screening – Tentative Code by adding commercial and law enforcement applications. In particular, WIM vehicle scale systems capable of performing to within the tolerances specified for a higher accuracy class would be permitted for use in commercial applications and for highway law enforcement. The WIM Task Group (TG), however, agreed in 2016 that it would be more appropriate to address these higher accuracy WIM systems by proposing changes to Section 2.20. Scales Code, which remains the current focus of the TG.

Item under Consideration:
Amend the Scales Code of NIST Handbook 44 to recognize commercial WIM vehicle scale systems. A marked-up draft of the 2017 version of the Scales Code containing proposed changes by the WIM Task Group has been inserted into Appendix A of this report for consideration.

Background/Discussion:
Rinstrum and Right Weigh Innovation submitted a proposal in 2016 to modify the tentative WIM Code for Screening and Sorting. The idea was to keep all WIM applications within the same code section of Handbook 44. Rinstrum proposed to add slow-speed devices to the existing code (which is presently limited to screening and sorting with two separate applications; one for commercial (legal-for-trade) and one for law enforcement. Considering the changes proposed, there would be three different applications covered by the same Code, which would cause some confusion. Because the proposed changes were to include a legal-for-trade application, it was suggested that that modification probably belonged in the Scales Code.

Rinstrum manufactures the axleWEIGHr in-motion scale, which is a slow speed WIM axle scale system capable of being able to perform to within Class IIIL maintenance tolerance, according to Rinstrum. Rinstrum has indicated that the axleWEIGHr is a niche product, which creates a new segment for axle weighing devices. The axleWEIGHr calculates the Gross Vehicle Weight (GVW) and weighs individual axles while a truck crosses the scale at 1 mph to 3 mph. Rinstrum has also indicated the most common applications for its device will be agricultural farmers, small trucking companies, or manufacturers interested in determining GVW and axle weights before the vehicle enters the public roadway. The proposed requirements are based in part on requirements in OIML R 134, "Automatic instruments for weighing road vehicles in motion and measuring axle loads." The submitter stated they have test data and experience at multiple test sites that demonstrate this system can meet the proposed performance requirements.

At the 2016 NCWM Interim Meeting, Rinstrum requested the NCWM Chairman form a WIM TG to bring together regulators and private sector stakeholders to discuss Weigh-In-Motion technology. Rinstrum sought a Developing status so it could maintain ownership of the proposal and continue to work on its development.

During the 2016 NCWM Interim Meeting, Mr. John Lawn (Rinstrum) gave a short slide presentation on a slow speed WIM system, which Rinstrum manufactures. A copy of the slides from his presentation was inserted into Appendix B of the Committee's 2016 Final Report and is available from the following link:

nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.

Mr. Lawn explained he had originally hoped the proposal could be considered for Vote in 2016, but had decided to request it move forward as Developing in 2016 to allow time for Rinstrum to address some of the concerns, which had been raised through the review process and to better familiarize the weights and measures community with the equipment. He also indicated he understood the need for Rinstrum to provide data in support of their claim that the equipment is capable of conforming to the tolerances specified in the proposal. At that time, Mr. Lawn stated Rinstrum's plan going forward is to amend the current proposal to address all the issues and have a new proposal ready in time that it can be considered for Vote in 2017.

OWM noted that the adoption of this proposal would, for the first time ever, make it permissible for WIM vehicle systems installed in the United States to be used not only for direct law-enforcement applications, but also for commercial applications. While encouraging the expansion of the code to recognize such applications, NIST, OWM further noted the proposal needs to be thoroughly vetted by all the different parties affected by the proposed changes, including (but not necessarily limited to):

- truck weight enforcement officials;
- representatives from the judicial system;
- WIM equipment manufacturers;
- weights and measures officials;
- FHWA and other transportation officials; and

- members of the trucking industry.

OWM also identified several areas of the proposal needing additional development including:

- The procedures developed by the WIM WG for establishing reference test loads for testing WIM systems used in law enforcement screening may not provide the level of accuracy needed (i.e., combined error and uncertainty less than one-third applicable tolerance) for testing commercial and law-enforcement WIMs given the more stringent tolerances proposed for these applications.
- Studies have shown that axle and tandem axle weights fluctuate depending on the position of a truck on a scale. How will this be addressed in the procedures for establishing the reference test loads for testing axle and axle-groups?
- Under what conditions are officials willing to accept a single tolerance (i.e., Class III L maintenance tolerance) for commercial applications?
- Why is there not an acceptance tolerance proposed? Is it because the amount of error in the WIM system is not expected to change as a result of routine, continued use?
- If a single tolerance is accepted, will this be limited to certain applications?

The Committee agreed with the submitter's request and recommended the item move forward as Developing.

In February 2016, the NCWM agreed to form a task group (TG), at the recommendation of the Committee, to consider a proposal that would expand the new NIST Handbook 44, Weigh-In-Motion Systems Used for Vehicle Enforcement Screening – Tentative Code to also apply to commercial use. Mr. Alan Walker (Florida) agreed to serve as chairman of the new TG.

The Committee received an update on this item during the 2016 NCWM Annual Meeting from Mr. John Lawn (Rinstrum). Mr. Lawn reported the TG had agreed the proposal needed to be changed to separate the requirements for WIM systems used in commercial application from those used for enforcement. Given the current proposal was no longer being considered, he requested the Committee replace the proposal included in the Item Under Consideration with a synopsis, which he offered to prepare and provide to the Committee.

In consideration of Mr. Lawn's request to do so, the Committee agreed to replace the proposal in the Item Under Consideration with the synopsis to be developed by him. The submitter's original proposal was replaced following the 2016 NCWM Annual Meeting and is available for review, as is the synopsis developed by Mr. Lawn, in the Committee's 2016 Final Report from the following link:

nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf

The Committee also changed the status of the item to Informational because an NCWM TG, under the direction of the Committee, is now assisting in the development of the proposal. This change in status is an indication the Committee has taken responsibility for the additional development of this item. (See the **S&T Committee's Final Report in the 2016 NCWM Annual Report, SP1212**.)

An update was given at the 2017 NCWM Interim Meeting on this Developing item by Mr. Alan Walker (Florida), Chairman of NCWM's Weigh-In-Motion TG and Mr. Lawn. Mr. Walker reported that the TG is currently reviewing the different paragraphs in the Scales Code of NIST Handbook 44 to determine needed amendments to address WIM vehicle scale systems. The review started with the "Application" section of the code and has now progressed to the "Notes" section of the code. Mr. Walker noted that there are few weights and measures regulatory officials participating on the TG and encouraged anyone who might be interested in participating, to please contact him. Mr. Lawn provided an update on some recent testing of a Rinstrum WIM vehicle scale system by the State of Illinois and witnessed by some members of the TG. Mr. Lawn indicated that the results of this testing proved inconclusive due to poor weather conditions on the day of the test.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported the SMA takes no position on this item at this time and looks forward to recommendations from the Weigh-In-Motion TG.

Mr. Rick Harshman (NIST, OWM) complimented the TG on its progress, while noting too, that OWM believes a significant amount of work remains to be done (particularly in defining appropriate test procedures) before the proposal would be ready for consideration as a Voting item.

The Committee agreed to maintain an Informational status on this item to allow the TG time to complete its work.

Mr. Walker, Chairman of the NCWM WIM TG gave an update to the Committee at the 2017 NCWM Annual Meeting on this Informational item and the status of the work. Mr. Walker reported the TG has made considerable progress this past year and has reached a point where it believes it would be of value to submit the revised document and ask for feedback. Mr. Walker also mentioned the TG will develop a ‘white paper’ identifying specific changes for which the TG is hoping to receive feedback. Mr. Walker asked the Committee to maintain the item’s Informational status.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, stated the SMA takes no position on this item at this time and looks forward to recommendations from the recently formed Weigh-In-Motion TG.

Mr. Lawn supported the comments made by Mr. Walker. Mr. Lawn further reported that the TG needed feedback to determine the best way to test WIM vehicle scale systems intended for commercial application. He felt, if the device was tested statically, the tolerance values should be based on acceptance and maintenance tolerances currently defined for a Class III L device. He then indicated that testing for dynamic operation is different from static operation and that dynamic testing should consist of three consecutive test runs with the vehicle loaded with test weights followed by three consecutive test runs with the vehicle unloaded. Mr. Lawn stated WIMs tested dynamically should be required to comply with tolerances where acceptance and maintenance tolerances are the same and the rationale for this is the fact that dynamic tests on systems such as CIM RR scales and dynamic monorail systems use the same values for acceptance and maintenance tolerance. He further stated that tolerance values should only be applied to the value of the test weights used in the vehicle during the first three test runs. Mr. Lawn explained that the procedure consisting of three consecutive runs of a loaded vehicle followed by three consecutive runs of the vehicle unloaded would produce satisfactory results and would better avoid the introduction of unknown errors that may be incorporated if the testing involved a reference scale that was not installed at the same location as the WIM under test.

The Committee agreed with TG chairman’s recommendation to keep the item “Informational.”

Regional Association Comments and Recommendations:

The WWMA received one comment on the item during its 2016 Annual meeting relating to a concern with paragraph N.1.3. for the reference scale. WWMA recommended that the item be Informational as it is being worked on by a NCWM task group and looks forward to updates.

The CWMA supported the item as an Informational item at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting and reported it looks forward to the changes proposed by the national WG.

At its 2016 Annual Meeting, the SWMA heard comment from Ms. Tina Butcher (NIST, OWM) that there are many things needing to be resolved still and this item should remain as a Developing item until the TG has time to make a proposal. Mr. Tim Chesser (Arkansas) stated the item is closer to getting this system to meet the requirements of the existing Scales Code but not the recently passed Weigh-in-Motion Code, which applies to law enforcement scales. Mr. Lou Straub (Fairbanks Scales), speaking as a member of the TG, stated they have had multiple conference calls already and another one scheduled for later October 2016; by January 2017 the TG should have something to present, although it may not be ready for a Vote in July. Mr. Straub also reiterated Mr. Chesser’s comments and noted this is more likely to be a separate code rather than a modification of the existing Weigh-in-Motion Code. The SWMA recommended the item remain in Developing status for continued progress by the submitter. The SWMA would also like to see a proposal for consideration at the NCWM Interim Meeting in January.

NEWMA recommended this item remain in a Developing status at its spring 2016 Interim Meeting. NEWMA recommended the item move forward as an Informational item at its 2017 Annual Meeting, to allow time for the Task Group to complete its development.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

3205-2 W T.1.1. DESIGN (SEE RELATED ITEMS 3200-7, 3201-1, 3204-1, 3508-2, 3509-1 AND 3600-4)

(This item was Withdrawn.)

Source:
Ross Andersen, Retired (2017)

Purpose:
Provide language in this code that is consistent with the General Code.

Item under Consideration:
Amend NIST Handbook 44, Automatic Weighing Systems Code as follows**:**

> **T.1.1. Design.** – The tolerances for a weigh-in-motion system is a performance requirement independent of the design principle used. **The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration**.

Background/Discussion:
This item was submitted as one of a group of items that includes agenda Items 3200-7, 3201-1, 3204-1, 3205-2, 3508-2, 3509-1, and 3600-4. The Background/Discussion information is the same for these items and included in agenda Item 3200-7 of this report. At the 2017 NCWM Interim Meeting, the Committee agreed to Withdraw these items in consideration of the comments received during that meeting.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

3300 LIQUID MEASURING DEVICES

3300-1 V S.2.1. VAPOR ELIMINATION (SEE RELATED ITEMS 3301-1, 3305-1, 3306-1 AND 3307-1)

(This item was Adopted.)

Source:
Liquid Controls and NIST, OWM (2017)

Purpose:
Align other measuring device codes with the changes adopted in 2016 under S&T LPG & NH_3 Code Item 332-3 (S.2.1. Vapor Elimination).

Item under Consideration:
Amend NIST Handbook 44, Liquid-Measuring Devices Code as follows:

S.2. Measuring Elements.

S.2.1. Air/Vapor Elimination.

~~**(a)**~~ A ~~**liquid-measuring device**~~ **measuring system** shall be equipped with a**n effective** ~~**vapor or**~~ air**/vapor** eliminator or other automatic means to prevent the passage of ~~**vapor and**~~ air**/vapor** through the meter.

~~**(b)**~~ Vent lines from the air ~~**or**~~ **/**vapor eliminator shall be made of ~~**metal tubing or other rigid**~~ **appropriate non-collapsible** material.

(Amended 1975 **and 2017**)

S.2.1.1. Air/Vapor Elimination on Loading Rack ~~Metering~~ Measuring Systems.

(a) A loading rack ~~**metering**~~ **measuring** system shall be equipped with ~~**a vapor or air**~~ **an effective air/vapor** eliminator or other automatic means to prevent the passage of **air/**vapor and air through the meter unless the system is designed or operationally controlled by a **means** ~~**method, approved by the weights and measures jurisdiction having control over the device,**~~ such that air**/**~~**and/or**~~ vapor cannot enter the system.

(b) Vent lines from the air ~~**or**~~ /vapor eliminator ~~**(if present)**~~ shall be made of ~~**metal tubing or other rigid**~~ **appropriate non-collapsible** material.

(Added 1994) **(Amended 2017)**

Background/Discussion:
The proposed changes would ensure consistency across the various measuring device codes in NIST Handbook 44. This would help ensure more uniform interpretation of the requirements and facilitate application by officials and industry.

The proposed changes will align other codes with the following changes that were made to the LPG code at the 2016 NCWM Annual Meeting.

S.2.1. Vapor Elimination.

(a) A device shall be equipped with an effective **automatic** ~~**vapor eliminator or other effective**~~ means to prevent the passage of vapor through the meter.

(b) Vent lines from the vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 20XX)

The proposed changes make the requirement less design-specific and more focused on ensuring that the means for eliminating air or vapor are effective, including that the vent lines not be susceptible to restriction. The proposed changes also clarify that the provision for vapor elimination must be automatic in nature to be considered effective.

NIST, OWM in its analysis of the 2016 S&T agenda item referenced above suggested a similar change be proposed, where necessary, to corresponding requirements in other measuring codes and encouraged the Committee to consider including such an item on its agenda in the 2016 - 2017 NCWM cycle.

Note that the Mass Flow Meters Code states "means to prevent the measurement of vapor and air" while other codes state "means to prevent the passage of vapor and air through the meter," but such distinction is probably justified.

Consequently, no modifications are proposed to align this portion of the language in the MFM Code with that in other codes.

During the 2017 NCWM Interim Meeting, the Committee grouped agenda Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and took comments on these items simultaneously because it considered these items related.

During open hearings, the Committee received several comments from industry in support of the grouped items, with one minor change requested to paragraph S.2.1. Vapor Elimination in "Item under Consideration" for agenda Item 3300-1. It was suggested the word "device" in part (a) of the paragraph be replaced with the word "system" so it reads:

(a) A liquid-measuring **~~device~~** **system** shall be equipped with **an effective,** ~~a vapor or air eliminator or other~~ automatic means to prevent the passage of vapor and air through the meter.

Others speaking in support of this group of items, also agreed with this change.

Ms. Tina Butcher (NIST, OWM) stated Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 Vapor Elimination were submitted jointly by Liquid Controls and NIST, OWM based on a suggestion made to the S&T Committee at the 2016 NCWM Annual Meeting. At that meeting, changes were made to the LPG and NH_3 Code to clarify vapor elimination means must be effective and automatic in nature and to update the language relative to ensuring the materials used for vent lines from the vapor/air eliminator prevent the lines from being restricted. When these changes were adopted, a suggestion was made to modify other measuring codes to align the language in those codes with that adopted in the LPG and NH_3 code. OWM believes these changes are appropriate and provide better alignment and consistency across the measuring codes. OWM concurs with the SWMA's suggestion to change the term "device" to "system" in Item 3300-1 (SWMA's reference agenda Item New 13), believing this broad reference would be more appropriate and less limiting. OWM asks that this change be made to the proposed language presented in the Item Under Consideration for 3300-1.

Mr. Michael Keilty (Endress + Hauser Flowtec AG USA) commented that he would prefer to see the language the same in all the codes, and he would be willing to support the items fully if this were the case. It was suggested the Committee develop additional draft proposals to align the vapor/air elimination paragraphs in all the measuring codes. Upon hearing this suggestion, the NIST Technical Advisor questioned whether those making such a suggestion might do this work and present completed drafts to the Committee for consideration. Committee members agreed those suggesting and/or supporting this action should complete this work rather than the Committee. Ms. Butcher and Mr. Dmitri Karimov (Liquid Controls) agreed to review the vapor/air elimination paragraphs in all the measuring codes and draft consistent language to propose for all the codes, which they completed and provided to the Committee the next morning. In addition to proposing changes to the vapor/air elimination paragraph(s) in Sections 3.30., 3.31., 3.35., 3.36., and 3.37. of NIST Handbook 44, for which there were already current proposals on the Committee's agenda, there were also proposed changes to align the vapor/air elimination paragraph(s) in Sections 3.32., 3.33., 3.34., and 3.38., which were new and not a part of the Committee's current agenda.

During the Committee's work session, all the draft proposals were reviewed and members of the Committee agreed that all should be presented for Vote at the upcoming Annual Meeting. The Committee believed it was within its discretion to create new agenda items, which were needed for the draft changes being proposed in the vapor/air elimination paragraph(s) of Sections 3.32., 3.32., 3.34., and 3.38., because it considered the proposed changes simply a continuation of the effort to align the language in the different measuring code sections of NIST Handbook 44. Consequently, the Committee agreed to create a new agenda item to be included in NCWM Publication 16 for each of these Sections, and Dr. Matthew Curran (Florida), S&T Committee Chairman, announced to the NCWM membership at the 2017 NCWM Interim Meeting, the Committee's plans to add new voting items to its agenda to harmonize the vapor/air elimination language in all the codes.

Shortly following the 2017 Interim Meeting, the NIST Technical Advisor drafted a document for Committee review that included the five current items on the Committee's agenda and four newly added items. The text of the four new items was highlighted in yellow to differentiate the new items from those already appearing on the Committee's agenda. Each of the new items appearing in this document also included a draft paragraph specifying that the item was new and a summary of why the item was being added by the Committee. The document was distributed to members of the Committee to seek approval of the text shown in the Item under Consideration portion of each item. Mr. Don Onwiler (NCWM) was copied to make him aware of the Committee's intention of adding the new items to its agenda. Upon reviewing the document, Mr. Onwiler made it known to the Committee that he was concerned whether the NCWM bylaws would allow a Standing Committee to add new items to its agenda at the NCWM Interim Meeting. Mr. Onwiler agreed to ask the NCWM Board of Directors (BOD) for an opinion on the matter and subsequently hosted a teleconference involving members of the NCWM BOD, Dr. Curran, Mr. Rick Harshman (NIST Technical Advisor to the S&T Committee), additional staff of OWM, and others. During the teleconference, Dr. Curran was asked to provide a summary of the Committee's discussion at the Interim Meeting leading to the Committee's desire to add these new items to its agenda. Members of the BOD, upon hearing Dr. Curran's explanation of the discussion and rationale, while they understood the intent they expressed concern to adding the items to the agenda as they believed such action could violate the current bylaws of the NCWM. Since these items did not fall under the "priority" classification as agreed upon by Dr. Curran and the Committee, which would allow for the addition of such items, there was mutual agreement to remove these new items from this year's agenda and allow them to be submitted in fall 2017.

Members of the Committee were subsequently made aware of the BOD's concern for adding the new items and asked whether the five original items appearing on the Committee's current Interim Meeting agenda, as amended by the Committee during the 2017 NCWM Interim Meeting, should be presented for Vote at the upcoming NCWM Annual Meeting or held back until all proposals could be presented for Vote at the same time. Members of the Committee agreed to present the five current agenda items (as shown in Item under Consideration for each item) for Vote at the upcoming 2017 NCWM Annual Meeting.

At the 2017 NCWM Annual Meeting, the Committee grouped agenda Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and took comments on these items at the same time.

Ms. Tina Butcher (NIST, OWM) noted the OWM had submitted these items jointly with Liquid Controls, LLC. She then provided the Committee a summary of the changes proposed in each of the items and explained these changes were being recommended to harmonize the air/vapor elimination paragraphs in each of these codes with the changes that had been made to the LPG and NH_3 Code in 2016.

The MMA voiced support for the group of items but suggested retaining the word "measurement" in the first sentence of Mass Flow Meters Code Paragraph S.3.3. of agenda Item 3307-1 rather than replacing it with the word "passage" as proposed. The MMA noted it is not necessary to prevent air/vapor from passing through a mass flow meter to achieve accurate measurement. It is only necessary to require there be means to prevent the measurement of the air/vapor. Ms. Butcher and others supported the MMA's suggestion.

Hearing only comments in support of these items, the Committee agreed to the change proposed by the MMA to agenda Item 3307-1, which is reflected in the Item Under Consideration for this item, and to present the items for Vote.

Regional Association Comments and Recommendations:
The WWMA, at its 2016 Annual Meeting, considered Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 at the same time. NIST, OWM will update language adopted at the 2016 NCWM Annual Meeting to these additional devices. The WWMA considered these items developed and forwarded them to NCWM, recommending Voting status.

The CWMA reported at its fall 2016 Interim Meeting that it recognized the value of aligning the measuring device codes and forwarded this item to NCWM, recommending Voting status. The CWMA grouped Items 3300-1, 3301-1, 3301-1, 3306-1, and 3307-1 together and took comments at the same time on these items, which the Committee considered related, at its spring 2017 Annual Meeting. The CWMA reported it believes this group of items is sufficiently developed and recommended them be presented for Vote at the upcoming NCWM Annual Meeting.

The SWMA batched Items 3300-1, 3301-1, 3305-1, 3306-1 and 3307-1 together and heard comments for all items at the same time during its 2016 Annual Meeting. The SWMA agreed to amend the proposal in agenda Item 3300-1 by replacing the word "device" with the word "system" in subparagraph S.2.1.(a) after receiving comment from Mr. Gordon Johnson (Gilbarco). The change was necessary because the dispenser doesn't need the air eliminator, but rather, it is the system that does the air elimination and not the dispenser itself. The following reflects the change agreed to by the SWMA:

S.2.1. Vapor Elimination.

(a) A liquid-measuring ~~**device**~~ **system** shall be equipped with **an effective,** ~~**a vapor or air eliminator or other**~~ automatic means to prevent the passage of vapor and air through the meter.

(b) Vent lines from the air or vapor eliminator shall be made of **appropriate non-collapsible** ~~**metal tubing or other rigid**~~ material.

(Amended 1975 **and 2017**)

S.2.1.1. Vapor Elimination on Loading Rack Metering Systems.

(a) A loading rack metering system shall be equipped with **an effective,** ~~**a vapor or air eliminator or other**~~ automatic means to prevent the passage of vapor and air through the meter unless the system is designed or operationally controlled by a method, approved by the weights and measures jurisdiction having control over the device, such that air and/or vapor cannot enter the system.

(b) Vent lines from the air or vapor eliminator (if present) shall be made of **appropriate non-collapsible** ~~**metal tubing or other rigid**~~ material.

(Added 1994) **(Amended 2017)**

The SWMA then agreed to recommend all the batch items be forwarded as Voting items on the NCWM agenda.

NEWMA recommended adding the word "system" following the words, "a liquid measuring device," at its fall 2016 Interim Meeting and forwarded the item to the NCWM with the recommendation it be a Voting item with this change. At its spring 2017 Annual Meeting, NEWMA recommended the item be a Voting item on the NCWM agenda.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

3300-2 D UR.3.4. PRINTED TICKET

(The status of this item was changed from Voting to Developing.)

Source:
Morrow County, Ohio (2017)

Purpose:
Require that printed receipts declare an alpha or numeric pump designation that coincides with the dispensing device used for a specific transaction.

Item under Consideration:
Amend NIST Handbook 44, Liquid Measuring Devices Code as follows:

UR.3.4. Printed Ticket. – This requirement applies only to devices that are capable of issuing a printed ticket. The total price, the total volume of the delivery, **a corresponding alpha or numeric dispenser designation** and the price per liter or gallon shall be shown, either printed by the device or in clear hand script, on any printed ticket issued by a device and containing any one of these values.

(Amended 2001 **and 2017)**

Background/Discussion:
The consumer as well as the weights and measures official would be able to verify that all transaction information corresponds accurately at locations with multiple dispensers on site. If no pump designation is on the receipt, it hinders the consumer's ability to know they were given the correct receipt for the transaction. Similarly, a pump designation on the receipt will asset weights and measures officials in verifying correct communication between devices as well as follow up as needed in case of a consumer complaint.

The submitter recognizes software updates would be required for those establishments that do not already meet this proposed requirement.

During the 2017 NCWM Interim Meeting at the S&T Committee's open hearings, Ms. Tina Butcher (NIST, OWM) noted that paragraph UR.3.4. Printed Ticket was originally added to NBS Handbook 44 in 1967 at the request of industry to address technology limitations, which would have made it impractical from a cost perspective to print all three values (i.e., total price, total volume of delivery, and the price per liter or gallon). She said one question that might be considered given today's technology is whether the provision to allow values to be written in hand script is still appropriate or if a system that can provide a printed ticket should be required to print all the values. She also noted this item didn't propose corresponding amendments to paragraphs S.1.6.7. or S.1.6.8. To this point, she indicated that the Committee may want to consider recommending changes to those two requirements to align the requirements for printed receipts. As a final comment, she said should the Committee decide to recommend paragraph UR.3.4. be changed, it may want to reorganize the paragraph so it is clearer and intended only to apply to devices that issue a printed ticket. She provided the Committee a revised version of the paragraph, which had been developed by members of OWM's Legal Metrology Devices Program for the Committee to consider.

Mr. Dmitri Karimov (Liquid Controls), speaking on behalf of the MMA, reported that the MMA supported the NIST observations.

In discussing this item during the Committee's work session, members of the Committee agreed the way paragraph UR.3.4. is currently structured it needs improvement. Some members of the Committee described the paragraph as being "messy" and difficult to follow. The Committee reviewed the revised version of the paragraph developed by members of OWM's LMDP, and it was agreed that, although still not ideal, it was an improvement over the version included under this item. Consequently, members of the Committee agreed to replace the submitter's version of the proposal with the revised version offered by NIST shown in Item under Consideration and present this item for Vote at the upcoming NCWM Annual Meeting.

At the Committee's 2017 NCWM Annual Meeting open hearings, Ms. Tina Butcher reiterated comments provided by OWM during the 2017 Interim Meeting. She said, OWM understands the benefit of identifying the alpha or numeric designation of the dispenser on printed receipts, but, questions given today's technology, why a provision for providing the customer the required information in hand script is needed. She suggested specification paragraphs S.1.6.7. and S.1.6.8 (which include requirements for printed receipts) should also include provisions for the dispenser designation, providing this information is deemed beneficial to inspectors and consumers. The proposed paragraph UR.3.4. would require users to hand print this information on receipts even on devices which comply with the current S.1.6.7. and S.1.6.8. The printer should be capable of printing all the values.

Mr. Dimitri Karimov (Liquid Controls), speaking on behalf of the MMA, recommended the item status be changed to "Informational" so the specification and existing user requirement paragraphs can be revised. Additional consideration needs to be given in the drafting of the changes proposed to paragraph UR.3.4. to wholesale versus retail applications.

Based on comments received during the open hearings the Committee felt the submitter should consider modifying specification paragraphs S.1.6.7. and S.1.6.8. of the LMD code and the existing user requirement. Based on these needed amendments, the Committee decided to change the status of the item from Voting (V) to Developing (D).

Regional Association Comments and Recommendations:
This item did not appear on the WWMA or SWMA Committees' agendas in 2016 and, therefore, was not considered during their 2016 Annual Meetings.

This item was not on the NEWMA Committee's agenda in 2016 and, therefore, not considered at its Interim Meeting. At its 2017 Annual Meeting, NEWMA recommended the item be changed from Voting to Developing; the item requires further development with proposed amendments as "specifications" in addition to "user requirements," and also be included in POS applications (as well as the current RMFD in the item as written). The CWMA fully supported this item at its 2016 Interim Meeting, reporting that it believes this will be beneficial when investigating complaints. CWMA forwarded the item to NCWM and recommended Voting status. At its 2017 Annual Meeting, the CWMA also supported the item, agreeing that the addition of the pump number will be beneficial to the consumer and regulatory officials. While recognizing the current version of the item proposed by the OWM LMDP, the CWMA believes its structure is difficult to follow and recommended a Developing status.

3300-3 W RECOGNIZED THE USE OF DIGITAL DENSITY METERS

(This item was Withdrawn.)

Source:
Missouri (2016)

Purpose:
Allow the use of digital density meters for inspections of meters used to measure viscous fluids such as motor oils, diesel exhaust fluid (DEF), and antifreeze.

Item under Consideration:
Amend NIST Handbook 44, Liquid Measuring Devices Code as follows:

Develop provisions in various LMD Codes of NIST Handbook 44 that would recognize the use of digital density meters in lieu of volumetric provers, or the use of flasks and thermometers in the case of gravimetric testing when testing meters used to dispense certain viscous fluids such as motor oil, DEF, antifreeze, syrups, etc.

"Digital density meters may be a solution for testing motor oil, DEF, and anti-freeze meters."

Background/Discussion:
Current test procedures are slow and awkward due to the need of using borosilicate glassware for package checking. Digital density meters are fast, use small samples size (2 ml), and have built in thermometers.

When conducting volumetric testing of meters used for dispensing viscous fluids such as motor oil, DEF, antifreeze, syrups, etc., air becomes entrapped in the fluid and clings to the sides of the prover, which adversely affect the results of the test. To conduct gravimetric tests, it is necessary to determine the density of the product. Digital density meters are fast and accurate in comparison with recognized gravimetric testing procedures using flasks and thermometers. There is no need to "wet down" volumetric flasks before each measurement. Most non-food products may be recovered without contamination. Only a small sample size (2 ml) of the product is needed for testing. Using digital density meters equipped with built-in API density tables will not require cooling samples to 60 ºF. There is no need for a partial immersion thermometer or volumetric flasks.

Well-established ASTM and other international standard test methods are available with precision statements.

The Committee agreed, at the 2016 NCWM Interim Meeting, to assign a "Developing" status to this item and to maintain that status at the 2016 NCWM Annual Meeting based on comments heard in support of the concept of recognizing the use of digital density meters in testing metering systems. The submitters request time to complete work on the item.

OWM reported, during the 2016 NCWM Annual Meeting, its Laboratory Metrology Program had previously conducted some testing of portable density meters in 2006. The results from the testing showed the units do not work very well for liquids that are likely to produce air bubbles, for example, oils or any product with carbonation. At the time, NIST, OWM was considering their use in determining density for package checking and found the accuracy is suspect with products that form bubbles. Measurements are inaccurate when there are bubbles present in the oscillating tube and repeatability suffers when some samples have bubbles and others do not.

See the Committee's 2016 Final Report for additional details and background information.

At the Committee's 2017 NCWM Interim Meeting open hearings, Mr. Ron Hayes (Missouri), submitter of the item, reported he is still actively working to further develop the proposal. He noted the existence of a portable density meter that is currently available on the market, which contains a built-in camera aimed at a vibrating tube inside of the meter. When a photo is taken, it captures the amount of bubbles suspended in the product in which the density is being measured and records the time of the photo. He indicated the device is *not* inexpensive.

Mr. Michael Keilty (Endress + Hauser Flowtec AG USA), stated he too has been studying density meters, although his focus has been on high-end density meters.

Ms. Tina Butcher (NST, OWM) reported OWM supports the concept of using digital density meters in testing metering systems and looks forward to the further development of this item. She suggested the Fundamental Considerations of NIST Handbook 44 be considered in defining the suitability criteria of any density meter used in testing. She also suggested it may be that the NIST EPOs, training materials, or other guidance documents might be a more appropriate place(s) to specify details regarding the selection and use of this equipment and to provide details on its specifications.

During the Committee's work session, it was noted this item has been on the Committee's agenda since 2016 and yet, the item still lacks a definitive proposal. A motion initiated by a Committee member recommending the item be Withdrawn with the understanding that such action by the Committee would not prevent the submitter from continuing efforts to develop a more definitive proposal and submitting it later as a new proposal. Given the lack of progress to develop this item, the Committee agreed to recommend it be Withdrawn from its agenda.

Regional Association Comments and Recommendations (Fall 2016 Conferences):
The WWMA did not receive comments on this Developing item.

The CWMA believed this item has merit but does not belong in NIST Handbook 44. The item should be included in other documents such as NIST Handbooks 112 and 105. CWMA recommends that this item be Withdrawn.

The SWMA received no comments on this item and looks forward to the development of this item by the submitter. The SWMA recommended this item remain in Developing status.

NEWMA recommended this item remain a Developing item.

3301 VEHICLE-TANK METERS

3301-1 V S.2.1. VAPOR ELIMINATION (SEE RELATED ITEMS 3300-1, 3305-1, 3306-1 AND 3307-1)

(This item was Adopted.)

Source:
Liquid Controls and NIST, OWM (2017)

Purpose:
Align other measuring device codes with the changes adopted in 2016 under S&T LPG and NH_3 Code Item 332-3 (S.2.1. Vapor Elimination).

Item under Consideration:
Amend NIST Handbook 44, Vehicle-Tank Meters Code as follows:

S.2. Design of Measuring Elements.

S.2.1. Air/Vapor Elimination. – A ~~**metering**~~ **measuring** system shall be equipped with an effective ~~**vapor or**~~ air**/vapor** eliminator or other automatic means to prevent the passage of ~~**vapor and**~~ air**/vapor** through the meter. Vent lines from the air ~~**or**~~**/**vapor eliminator shall be made of ~~**metal tubing or some other suitable rigid**~~ **appropriate non-collapsible** material.
(Amended 1993 **and 2017**)

Background/Discussion:
The proposed changes would ensure consistency across the various measuring device codes in NIST Handbook 44. This would help ensure more uniform interpretation of the requirements and facilitate application by officials and industry.

The proposed changes will align other codes with the following changes made to the LPG code at the 2016 NCWM Annual Meeting.

S.2.1. Vapor Elimination.

(a) A device shall be equipped with an effective **automatic** ~~**vapor eliminator or other effective**~~ means to prevent the passage of vapor through the meter.

(b) Vent lines from the vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 20XX)

The proposed changes make the requirement less design-specific and more focused on ensuring the means for eliminating air or vapor are effective, including that the vent lines not be susceptible to restriction. The proposed changes also clarify the provision for vapor elimination must be automatic in nature to be considered effective.

NIST, OWM in its analysis of the 2016 S&T agenda item referenced above suggested a similar change be proposed, where necessary, to corresponding requirements in other measuring codes and encouraged the Committee to consider including such an item on its agenda in the 2016 - 2017 NCWM cycle.

Note the Mass Flow Meters Code states, “means to prevent the measurement of vapor and air” while other codes state “means to prevent the passage of vapor and air through the meter,” but such distinction is probably justified. Consequently, no modifications are proposed to align this language with other codes.

During the 2017 NCWM Interim and Annual Meetings, the Committee grouped agenda Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and took comments on these items simultaneously because it considered these items related. See agenda Item 3300-1 for a summary of the comments received and the resulting actions taken by the Committee on these items.

Regional Association Comments and Recommendations:
The WWMA considered Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 at the same time at its 2016 Annual Meeting. NIST, OWM will update language adopted at the 2016 NCWM Annual Meeting to these additional devices. The WWMA considered these items developed and forwarded them to NCWM, recommending Voting status.

The CWMA reported at its fall 2016 Interim Meeting the Committee recognized the value of aligning the measuring device codes and forwarded this item to the NCWM, recommending Voting status. The CWMA grouped Items 3300-1, 3301-1, 3301-1, 3306-1, and 3307-1 together and took comments at the same time on these items at its spring 2017 Annual Meeting because the Committee considered them related. The CWMA believes this group of items is sufficiently developed and recommended they be presented for Vote at the upcoming NCWM Annual Meeting.

The SWMA, at its 2016 Annual Meeting, batched Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and heard comments for all items at the same time. The only comments received were for Item 3300-1. See Item 3300-1 for details. The SWMA forwarded this item to NCWM and recommended Voting status.

NEWMA grouped Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and heard comments for all items at the same time. NEWMA forwarded the items in the group to the NCWM and recommended Voting status at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting.

3301-2 W S.3.7. MANIFOLD HOSE FLUSH SYSTEM

(This item was Withdrawn.)

Source:
New York (2016)

Purpose:
Recognize the use of hose flush systems in the NIST Handbook 44, Vehicle Tank-Meter (VTM) code**.**

Item under Consideration:
Amend NIST Handbook 44, Vehicle Tank Meter Code as follows:

S.3.7. Manifold Hose Flush System. – A hose flush system to clear the hose of product may be installed in the manifold when multiple products are dispensed through a single meter and hose under the following conditions:

(a) the inlet valves for the system are conspicuously located above the bottom framework of the truck; and

(b) the inlet valves for the system are not connected to any hose or piping (dust covers are permitted) when not in use; and

(c) the discharge hose remains of the wet hose type; and

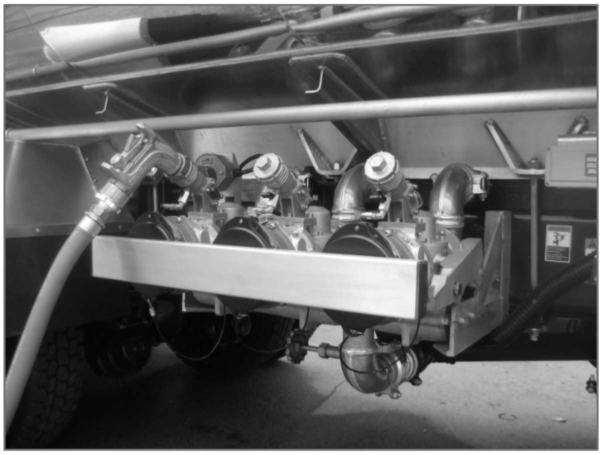
(d) the direction of flow for which the system may be set at any time is definitely and conspicuously indicated; and

(e) a recorded representation of each flush is maintained for inspection.

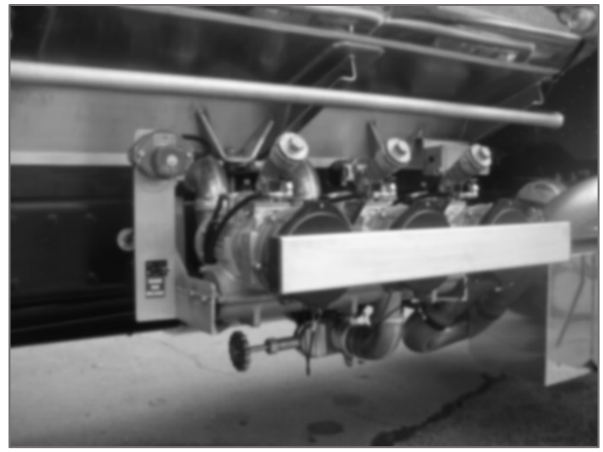
Background/Discussion:
Hose flush systems allow drivers to flush product where a truck is set-up to deliver multiple products through a single meter and hose. The system is particularly popular because it allows drivers to flush product without having to climb up on top of the truck, which is a common practice in the industry but one that can be dangerous. These systems are considered a significant safety advancement; however, without safeguards in place the systems could also be used to facilitate fraud.

These systems are being used country-wide, and there is no uniformity in what is and what is not acceptable by weights and measures jurisdictions. Some states have developed their own policies for acceptance, but this has led to problems when trucks have been moved from one state to another. Some states are considering prohibiting these systems, citing facilitation of fraud; however, they are also concerned that such prohibition may lead to drivers being unnecessarily injured or even killed. We want to do our job, but we also want drivers to be able to do their jobs in the safest way possible.

These systems make returning product after weights and measures testing very easy. These systems are also very good for preventing contamination of product.



Three-Compartment Manifold with Nozzle



Three-Compartment Manifold

2016 NCWM Interim Meeting:

The Committee heard comments on this item from Mr. Mike Sikula (New York), Mr. Hal Prince (Florida), Mr. Steve Giguere (Maine), Mr. John McGuire (New Jersey), Mr. Charlie Carroll (Massachusetts), Ms. Tina Butcher (NIST, OWM), Mr. Dmitri Karimov (Liquid Controls), and Mr. Dick Suiter (Richard Suiter Consulting). Mr. Sikula indicated some newer trucks were designed with manifold hose flush systems that need controls to prevent fraud; he also pointed out this is a nationwide issue, not just a New York issue.

Ms. Butcher mentioned a need to provide additional safeguards; mark the direction of flow on inlet and outlet valves; and add user requirements on when and how these systems should be used. Mr. Karimov advocated the addition of a second meter. Mr. Carroll said manifold flush systems should not be allowed.

There was general consensus in the comments heard that the hose flush back systems have arisen from a desire to minimize safety concerns with the delivery drivers having to climb up on top of trucks to flush hoses; however, these systems could enable fraud as fuel could be diverted after the meter and documentation of the flushing is typically not maintained. The Committee believes this item has merit, needs further development, and is interested in hearing from other states and manufacturers on this issue.

At the 2016 NCWM Annual Meeting, the Committee received an update on this item from its submitter, Mr. Mike Sikula (New York). Mr. Sikula reported manifold hose flush systems continue to be an issue in New York, and work on this item is ongoing.

NIST, OWM reiterated several comments and recommendations presented at the 2016 NCWM Interim Meeting. The following is a shortened summary of the comments and recommendations provided:

- There are undoubtedly safety and time advantages to being able to flush product from a hose using this system; however, there are also obvious concerns about the possibility of facilitation of fraud.
- It is presumably very easy to pump metered product back into the tank with this system, and this is much less obvious and less difficult than climbing to the top of the truck with a charged hose and returning it through the hatches. Particularly in an environment where customers are often not present during the delivery; this creates serious concerns about its potential misuse and the ease with which that misuse can occur.
- If manifold hose flush systems are permitted, it would be essential to have certain safeguards in place to help prevent misuse; yet still allow the operator to benefit from improved safety and ease of use offered by the system.
- The system does not appear to violate the diversion of product requirements outlined in VTM Code Paragraph S.3.1. Diversion of Measured Liquid since the manifold equipment is not part of the discharge line or piping connected to the metering system.

- The process of diverting already-measured product through the use of the system would not be obvious to an untrained observer and is much more easily accomplished than having to climb to the top of a truck and flushing product back into one of the storage compartments.

NIST, OWM also provided a list of key points, questions, and recommendations for an alternative version of the original proposal in written comments to the Committee. Additionally, OWM recommended the inclusion of a proposed new "User Requirement" to help ensure proper application and use of such flush systems. See the Committee's 2016 Final Report for details.

In consideration of the comments received, the Committee agreed to maintain the Developing status of the item to allow additional time for its further development

2017 NCWM Interim Meeting:
At the Committee's 2017 NCWM Interim Meeting open hearings, Ms. Tina Butcher) reported NIST, OWM believes additional work is needed to develop this proposal. Ms. Butcher reiterated many of the comments OWM provided on this item at the 2016 NCWM Interim Meeting, including the need to provide additional safeguards; mark direction of flow on inlet and outlet valves; and add user requirements on when and how these systems should be used. Ms. Butcher asked if there were any updates on this item.

NEWMA's Committee Chair, Ms. Jane Zulkiewicz (Barnstable, Massachusetts), reported Mr. Mike Sikula (New York), submitter of the item, was not present at the 2017 NCWM Interim Meeting. She stated that Mr. Sikula had requested, at the 2016 NEWMA Fall Interim Meeting, another year cycle to allow time for him to address the recommendations and concerns regarding safety, misuse, clear marking of valves, and safeguards for fraud provided to him by the NIST, OWM at the 2016 NCWM Annual Meeting.

In consideration of the submitter's request for additional time to work on the proposal and OWM's acknowledgement that additional development of the proposal is still needed, the Committee agreed to recommend this item be maintained as a Developing item.

During the Committee's 2017 NCWM Annual Meeting open hearings, Ms. Jane Zulkiewicz (Town of Barnstable, Massachusetts), speaking as the NEWMA's Committee Chair, announced that Mr. Mike Sikula (New York) wished to Withdraw this item. This had been indicated in an e-mail to Ms. Zulkiewicz following the 2017 NCWM Interim Meeting in San Antonio, Texas. Ms. Zulkiewicz reported Mr. Sikula indicated he sees similar issues regarding his proposal pertaining to a manifold hose flush system in the LPG Code, but he has not yet developed a viable solution. It was further reported he intends to submit a new proposal once progress has been made.

The Committee agreed to Withdraw this item at the request of the submitter.

Regional Association Comments and Recommendations (Fall 2016 Conferences):
The WWMA believes this item needs further development, including but not limited to what type of product(s) may be allowed or may not be allowed in such a system. An example of what type product(s) that should not be allowed in such a system would be ATF and motor oil.

The CWMA agrees with the NIST, OWM concern that these devices may facilitate fraud and further development is needed to address these concerns. CWMA recommended that this item remain in Developing status.

The SWMA received comment from Mr. Hal Prince (Florida) who believed this proposal was a good start but falls short. He feels stronger safeguards regarding fraud need to be in place before this item is ready for a vote and encourages the submitter to incorporate much stronger safeguards in the proposal to protect the consumer.

Ms. Butcher (NIST, OWM) recommended this item remain developmental and has provided comments to the submitter and further stated this item has merit but needs additional safeguards. The Committee heard several express concerns over consumer protection with this proposal and looks forward to those issues being addressed by the submitter. The SWMA recommended that the item remain in Developing status.

NEWMA received a request from the submitter to allow one more year to further develop this item. NEWMA recommended that this item remain in Developing status.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

3301-3 V S.5.7. METER SIZE

(This item was Adopted.)

Source:
City of Madison, Wisconsin (2017)

Purpose:
Remove a marking requirement that is no longer necessary due to changes in the product depletion test tolerance**.**

Item under Consideration:
Amend NIST Handbook 44, Vehicle Tank Meter Code as follows:

> ~~***S.5.7. Meter Size. – Except for milk meters, if the meter model identifier does not provide a link to the meter size (in terms of pipe diameter) on an NTEP Certificate of Conformance, the meter shall be marked to show meter size.***~~
> ~~***[Nonretroactive as of January 1, 2009]***~~
> ~~**(Added 2008)**~~

Background/Discussion:
The meter size is no longer pertinent information to the inspector because of changes to the product depletion test tolerance.

This requirement was added because the product depletion test tolerance was based on the meter size and without a marking requirement it is often difficult to determine the meter size; the inspector could make a mistake and apply the incorrect tolerance. The product depletion test was changed as of 2013, and the tolerance is now based on the marked flow rate of the meter.

> **T.4. Product Depletion Test. –** The difference between the test result for any normal test and the product depletion test shall not exceed 0.5 % of the volume delivered in one minute at the maximum flow rate marked on the meter for meters rated higher than 380 Lpm (100 gpm) or 0.6 % of the volume delivered in one minute at the maximum flow rate marked on the meter for meters rated 380 Lpm (100 gpm) or lower. Test drafts shall be of the same size and run at approximately the same flow rate.
>
> Note: The result of the product depletion test may fall outside of the applicable test tolerance as specified in Table 1. Accuracy Classes and Tolerances for Vehicle-Tank Meters.
> (Amended 2013)

The meter size is no longer necessary for the inspector to know and, therefore, shall not be required to be marked.

At the 2017 NCWM Interim Meeting S&T Committee open hearings, Mr. Dmitri Karimov (Liquid Controls), speaking on behalf of the MMA, reported the MMA supports deletion of paragraph S.5.7. Mrs. Tina Butcher (NIST, OWM) stated since the product depletion test has changed and is currently based on the maximum flow rate marked on the device, paragraph S.5.7. should be deleted.

The Committee did not receive any comments opposing the item and considering the comments heard in support, the Committee agreed to present the item for Vote at the upcoming 2017 NCWM Annual Meeting.

At the Committee's 2017 NCWM Annual Meeting open hearings, Ms. Tina Butcher (NIST, OWM) acknowledged it would be appropriate to remove paragraph S.5.7. Meter Size from the Vehicle-Tank Meters Code. She stated the paragraph was added to the code at a time when the product depletion test tolerances were based on meter size. Product depletion test tolerances are no longer based on meter size. There may be other benefits to marking meter size on the meter. For example, at the 2016 NTEP Measuring Sector meeting, a comment was made that meter size markings may assist officials in determining if a particular meter is covered by an NTEP CC. Additionally, some small volume prover test procedures limit the number of passes per run based on meter size. Thus, a similar requirement may be beneficial in other metering codes.

Mr. Dmitri Karimov (Liquid Controls), speaking on behalf of the MMA, supported the proposal.

Hearing no comments in opposition to the proposal and in consideration of the comments heard in support of it, the Committee agreed to place the item on the Voting Consent (VC) calendar.

Regional Association Comments and Recommendations:
This item was not submitted to the WWMA for consideration at its 2016 Annual Meeting.

The CWMA agrees with the submitter that this specification is no longer relevant and should be removed from NIST Handbook 44 because the product depletion tolerance for these devices is no longer based on meter size. CWMA forwarded the item to the NCWM and recommended Voting status at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting.

This item was not submitted to the SWMA for consideration at its 2016 Annual Meeting.

This item was not submitted to NEWMA for consideration at its fall 2016 Interim Meeting. NEWMA did consider the item during its spring 2017 Annual Meeting and reported it believed the item is fully developed and recommended it be forwarded to the NCWM as a Voting item.

3301-4 W N.4.X. AUTOMATIC STOP MECHANISM, T.X. AUTOMATIC STOP MECHANISM AND UR.2.6. AUTOMATIC STOP MECHANISM

(This item was Withdrawn.)

Source:
City of Madison, Wisconsin (2017)

Purpose:
Incorporate the automatic stop mechanism test requirement in NIST Handbook 112, EPO 23 Vehicle-Tank Meters, Power Operated into NIST Handbook 44 so that it is enforceable**.**

Item under Consideration:
Amend NIST Handbook 44 Vehicle Tank Meter Code as follows:

N.4.X. Automatic Stop Mechanism. – The automatic stop mechanism shall stop the flow within one-half the minimum interval indicated.

T.X. Automatic Stop Mechanism. – The automatic stop mechanism shall stop the flow within one-half the minimum interval indicated.

UR.2.6. Automatic Stop Mechanism. – The automatic stop mechanism shall stop the flow within one-half the minimum interval indicated.

Background/Discussion:
Examination Procedure Outline (EPO) 23 states the automatic stop mechanism should stop the flow within one-half the minimum interval indicated. This requirement of the automatic stop mechanism is specific to VTMs and has a precise tolerance not addressed in NIST Handbook 44, Section 3.31. or G-UR.4.1. If it is to be enforced by weights and measures personnel, the automatic stop requirement should be stated in NIST Handbook 44.

2017 NCWM Interim Meeting:
At the 2017 NCWM Interim Meeting S&T Committee open hearings, several industry representatives and an NIST, OWM representative voiced opposition to the item. Mr. Dmitri Karimov (Liquid Controls), speaking on behalf of the MMA, commented that the auto-stop mechanism is a convenience and the MMA opposes the item. Ms. Tina Butcher (NIST, OWM) stated that the one-half minimum division tolerance specified NIST Publication 112, EPO 23 is from an unknown source and it was included in EPO 23 to provide guidance on a non-metrological function to inspectors. Mr. Michael Keilty (Endress & Hauser Flowtec AG USA) commented that the automatic-stop mechanism is *not* an NTEP-evaluated item.

In consideration of the comments received and at the recommendation of item's submitter, the Committee agreed to Withdraw this item.

Regional Association Comments and Recommendations (Fall 2016 Conferences):
The CWMA agrees the Automatic Stop Mechanism tests specified in EPO 23 should be incorporated into NIST Handbook 44. CWMA forwarded this item to the NCWM and recommended Voting status.

3302 LPG AND ANHYDROUS AMMONIA LIQUID-MEASURING DEVICES

3302-1 D N.3. TEST DRAFTS.

(The status of this item was changed from Voting to Developing.)

Note: This agenda item previously appeared on the Committee's agenda as Item 332-2 in 2015 and Item 332-5 in 2016.

Source:
Endress + Hauser Flowtec AG USA (2015)

Purpose:
Allow transfer standard meters to be used to test and place into service dispensers and delivery system flow meters.

Item under Consideration:
Amend NIST Handbook 44, LPG and Anhydrous Ammonia Liquid-Measuring Devices as follows:

N.3. Test Drafts.

<u>N.3.1. Minimum Test.</u> – Test drafts should be equal to at least the amount delivered by the device in one minute at its normal discharge rate.
(Amended 1982 **<u>and 2017</u>**)

<u>N.3.2. Transfer Standard Test. – The minimum quantity for any test draft shall be equal to or greater than the amount delivered in one minute at the flow rate being tested.</u>

Background/Discussion:
The Committee initially considered a proposal to modify paragraph N.3. Test Drafts and to add a new paragraph N.3.2. Transfer Standard Test as shown below. Note that, in the fall of 2016, Mr. Keilty provided an update to this proposal as shown in the Item Under Consideration above.

N.3. Test Drafts.

N.3.1. Minimum Test. – Test drafts should be equal to at least the amount delivered by the device in one minute at its normal discharge rate.
(Amended 1982)

N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the test draft shall be equal to at least the amount delivered by the device in two minutes at its maximum discharge rate.

The submitter noted the use of transfer standards (or "master meters" as some people refer to them) is recognized in Sections 3.34. Cryogenic Liquid-Measuring Devices Code, 3.38. Carbon Dioxide Liquid-Measuring Devices Code and 3.39. Hydrogen Gas-Measuring Devices – Tentative Code. Field evaluation of LPG meters, CNG dispensers, and LNG dispensers is very difficult using volumetric and gravimetric field standards and methods. The tolerances for these applications are such that using transfer meter standards are more efficient and safer. With CNG, LNG, and LPG applications, the transfer standard meters are placed in-line with the delivery system as it is used to fill tanks and vehicles. The use of transfer standards eliminates return to storage issues. The use of transfer standard meters is easier and faster compared to the use of traditional field standards. The cost of using transfer standards and transporting them is much less than the cost of traditional field provers and standards. Recognition in NIST Handbook 44 will enable states to allow transfer standard meters to place systems into service and for field enforcement. The amended language is made to clarify the minimum test quantity for using transfer standard meters accommodating both large quantity and low quantity delivery systems. Volumetric field provers and gravimetric field proving are susceptible to environmental influences. The states commonly use meters as transfer standards to test rack meters. In some applications, transfer standard meters are not more accurate than the meters used in the dispenser. For this reason, longer test drafts and possibly more tests need to be run.

The State of California is purported to have conducted a short study of master meters in the past. The conclusion did not lead to wide adoption of the practice. However, the State of California uses a mass flow meter as a master meter for carbon dioxide flowmeter enforcement.

Section 3.37. Mass Flow Meters user requirement UR.3.8. Return of Product to Storage, Retail Compressed Natural Gas Dispensers requires the natural gas, which is delivered into the test container, to be returned to storage. This is difficult and most often not complied with when the test vessel contents are released to atmosphere.

The submitter recommends that NIST update EPO 28 for CNG dispensers and EPO 26 for LPG Liquid Measuring Systems to include transfer standard meter tests. NIST Handbook 105-4 should also be revised to specifically address the transfer standard meter and the requirements for use.

The S&T Committee might also consider amending Sections 3.30. Liquid-Measuring Devices Code and 3.31. Vehicle-Tank Meters Code to allow transfer standard meters.

2015 Interim and Annual Meetings:
The Committee heard comments both in support of and in opposition to the proposal outlined in this item and a corresponding item in the Mass Flow Meters Code. Mr. Mike Keilty (Endress + Hauser Flowtec AG USA), submitter of these two items, outlined the benefits of using a master meter as a standard in testing application such as CNG, LNG, and LPG. The Committee heard comments in opposition to the proposal from Mr. Henry Oppermann (Weights and Measures Consulting, LLC), speaking on behalf of himself, as well as Seraphin Test Measure, Co. Mr. Oppermann noted there are significant differences between a transfer standard and a field standard. Ms. Tina Butcher (NIST, OWM) acknowledged the advantages to identifying and developing alternate test methods such as this, but noted that simply adding the proposed language doesn't address the multiple other elements, which needed to be in place, to ensure traceability. OWM provided a list of those elements along with other suggestions. OWM noted the USNWG on Alternative Test Methods might be a better venue to develop the elements to support the use of these devices. This was echoed by Mr. Dmitri Karimov (Liquid Control, LLC) who also commented that the regulatory authority must assess the suitability of a given standard. The Committee also heard from Ms. Kristin Macey (California) who commented that if the proposal were adopted, it would allow use of a transfer standard and California

would not be able to fully support it, citing results of comparison testing conducted by California in which the master meter performed worst of the three methods examined. Mr. Keilty, in response to Ms. Butcher and Mr. Oppermann's comments, stated he agreed completely and noted by adding the paragraph to these two codes is a step towards allowing the use of transfer standards. It's understood there are many things that need to be in place in order for it to be considered suitable for use in testing. The Committee also heard other comments from regulators and industry supporting the continued development of this issue. The Committee agreed the item has merit, but it needs further development and suggested the submitter work with NIST, OWM by providing data for the USNWG to consider.

See the Committee's 2015 Final Report for details.

2016 NCWM Interim and Annual Meetings:
The Committee again heard comments both in support of and in opposition to this item and the corresponding item in the Mass Flow Meters Code. Mr. Michael Keilty (Endress + Hauser Flowtec), the submitter, stated he supported this item as a Voting item as did Mr. Alan Walker (Florida). Others expressed support of the item, but noted the need for additional development. The Committee heard again from Ms. Tina Butcher and Mr. Henry Oppermann, who reiterated their 2015 detailed comments regarding the tasks needing to be completed before considering changes to NIST Handbook 44. Both echoed the need to collect data to properly evaluate whether or not a master meter could be considered a suitable standard.

During its Interim Meeting work session, the Committee acknowledged comments suggesting the need for additional test data. It was also acknowledged that there was a lot of support for the proposal. Those supporting the proposal had indicated using a transfer standard is much easier and faster than testing gravimetrically and eliminates the need to discharge product from a prover into the atmosphere, which is viewed by many as a safety concern. Given the addition of the proposed language would not dictate the method of testing and the decision on whether or not to use a particular method of testing would remain with each jurisdiction, the Committee agreed to present both items for Vote at the Annual Meeting.

At the 2016 Annual Meeting, the Committee received numerous comments from industry and regulators alike, predominantly in support of the proposals. These comments cited benefits such as safety, faster and more efficient testing, and lack of problems with using master meters. Mr. Marc Buttler (Emerson Process Management – Micro Motion) also expressed supports of the items, but suggested replacing the words "maximum discharge rate" with "maximum test rate" in proposed paragraph N.3.2.; the submitter agreed with the suggestion.

The Committee also heard comments in opposition to the item and comments emphasizing the need for further development and data. A new comment offered by Ms. Butcher (NIST, OWM) noted the proposed new paragraph N.3.1. would create a conflict with the minimum test procedures outlined in the NIST EPO for CNG dispensers since tests conducted at the MMQ and at some other quantities are frequently completed in less than one minute. There was also some debate regarding the application of the Fundamental Considerations regarding the allocation of error and uncertainty associated with a given test method, and Mr. Henry Oppermann clarified the proper application of these criteria. Mr. Oppermann noted transfer standards, in some cases, are no more accurate than the meter being tested and the proposals lack a specification associated with the performance of the standard. He recommended the items be changed to Informational or Developmental.

During the Committee's work session, members of the Committee agreed that the comments received during the open hearings were mostly in support of the two proposals. The Committee discussed the proposed changes to the text, including the errors in the transcription of the text in the Item Under Consideration. The Committee discussed the potential impact on testing CNG dispensers, acknowledging that the proposed requirement cannot be met by someone wanting to apply the procedures in the NIST EPO (which were developed through a WG comprised of industry and regulatory officials). Some Committee members familiar with CNG testing concurred a test run typically takes less than one minute to complete. The Committee was concerned with the potential conflict and questioned whether the submitter had fully considered the impact of the proposed language. These discussions led the Committee to decide to change the status of the item from Voting to Developmental and return them to the submitter for further development.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

2017 NCWM Interim Meeting:

Just prior to the 2017 NCWM Interim Meeting, the Committee agreed to amend the proposal in agenda Item 3302-1 to that shown in Item under Consideration at the request of Mr. Michael Keilty (Endress & Hauser Flowtec AG USA), submitter of the item. The Committee Chairman, Dr. Matthew Curran (Florida), announced during open hearings of the Committee at the 2017 NCWM Interim Meeting that the proposal had been changed and the revised version had been posted on NCWM's website.

During the 2017 NCWM Interim Meeting, the Committee grouped agenda Items 3302-1 and 3307-2 together and took comments on these items simultaneously because the Committee considered these items related.

Mr. Michael Keilty (Endress & Hauser Flowtec AG USA), submitter of the item, stated this was a Voting item at the 2016 NCWM Annual Meeting during which it was downgraded to a Developing status. He further offered the opinion that there was not a good mechanism for relaying back to the submitter what an item needs in the way of development. Having now submitted the item with amended language, he said that he would like to see this item put to a vote.

Ms. Tina Butcher (NIST, OWM) spoke of the need for standards used in testing to comply with the tolerances for standards specified in NIST Handbook 44, Appendix A. Fundamental Considerations …, which she noted requires the combined error and uncertainty of any standard used without correction to be less than one-third the applicable device tolerance. She also made evident the potential for more than one type of standard to be used in testing, noting the tolerances specified the Carbon Dioxide Liquid-Measuring Devices Code of Handbook 44 increase for different test methods. She stated the proposal seemed to address only one particular type of transfer standard (i.e., a master meter) and, as a result, the proposal could have a very limiting effect on the types of transfer standards that can be used. She also questioned the use of the term "transfer standard" and suggested the term, "field standard" may be a more appropriate term. As a final comment, she reiterated a previous OWM comment that more data is needed of comparisons to known standards.

Mr. Bruce Swiecicki (National Propane Gas Association) reported the National Propane Gas Association supported the item and noted its potential for efficiencies and safety benefits.

Mr. Constantine Cotsoradis (Flint Hills Resources) asked for this item be moved forward, citing the need for it due to there being systems already in use for this purpose.

Mr. Hal Prince (Florida) asked for the item be moved forward.

Mr. Ross Andersen (New York, retired) gave an example of alternative test methods being used for like applications, such as what the ASTM does. He stated different test methods will have different results and the variables of those methods need to be evaluated. He commented that the proposal is currently evaluating only one variable.

In consideration of the comments heard on these two items, the Committee agreed to present them for Vote at the 2017 NCWM Annual Meeting.

2017 NCWM Annual Meeting:

At the 2017 Annual Meeting, the Committee grouped this item with agenda Item 3307-2 and took comments on the two items at the same time. Several industry and regulatory officials voiced support to presenting the two items for Vote. Some of those speaking in support of the items acknowledged a lot of additional work still needed to be completed to confirm the adequacy of alternative test measures, such as a master meter, for use as a standard in testing commercial devices. The Committee was urged by some, however, to present the items for Vote, noting some states are already using alternative standards for testing and the additional work needed to confirm their adequacy can be completed post adoption of the proposals.

There were several who spoke in favor of maintaining the Developing status of the items. Mr. Steve Harrington (Oregon), for example, reported the State of Oregon is pursuing the use of a mass flow meter standard for use in testing LPG meters. He noted additional work is needed to develop procedures that will confirm the adequacy of the mass flow meter (standard) for use in testing LPG meters used in commercial applications. He recommended maintaining the Developing status of the items.

Ms. Tina Butcher (NIST, OWM) reported OWM believes the proposed changes are premature. More work is needed and OWM recommends maintaining the items as Developing. Ms. Butcher provided an update on some ongoing work relating to alternative test methods and the current proposals under consideration as follows:

- The NTEP Measuring Sector is developing guidelines for type-evaluation laboratories when conducting type evaluation using alternative types of standards.
- NIST, OWM has established a USNWG to examine alternative test methods.
  - The USNWG subgroup has been working to establish uncertainties for select test methods and examining data from some field tests.
  - The USNWG has developed guidelines for collecting measurement data.
  - The guidelines can be used by equipment manufacturers and/or weights and measures jurisdictions to collect data to examine different test methods and types of test standards.
  - Guidelines include tasks such as:
    - Developing a test protocol for collecting data and for identifying testing factors that may contribute the largest uncertainties in testing;
    - Following guidelines for data collection;
    - Collecting sufficient data under a similar variety of user conditions;
    - Identifying the major factors that could affect test results and contribute the largest uncertainties in testing;
    - Ensuring that NIST Handbook 44 and EPOs are updated and available for its use;
    - Making all results and assessments accessible to states and other enforcement agencies; and
    - Publishing and/or updating a NIST 105 Series Handbook and calibration procedures, if needed.
- OWM is in the process of developing a proposal to address the use of the term “transfer standard” throughout NIST Handbook 44. According to NIST Handbook 130 (“Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality”); the International Vocabulary of Metrology; and references in Handbook 44 (“Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices”), Fundamental Considerations, the reference in the current proposals should be “field standard.” OWM plans to submit the proposal for consideration during the 2018 NCWM cycle.

Ms. Butcher also noted OWM has a significant concern with the proposal in agenda Item 3307-2 because proposed new paragraph N.3.1. conflicts with the minimum test of a CNG RMFD being performed today in accordance with the NIST EPO. A test conducted at the MMQ typically takes far less than a minute to complete. Additionally, the test drafts performed at one-third, two-thirds, and three-thirds test tank capacity often are completed in less than a minute’s time.

Ms. Butcher also reiterated many of the points OWM had provided in previous NCWM Meetings relating to these two proposals. The following is a short summary of these points:

- The development of alternative methods of testin**g** commercial metering systems is an important issue. Many applications, in which using currently recognized test methods, may be not be feasible because of product characteristics, safety, cost, access to equipment, and other factors.

- Modifying NIST Handbook 44 as proposed doesn't ensure approval of any proposed test method. The decision on whether or not to accept a particular test method rests with the regulatory authority.
- Many things must be considered when selecting and determining the suitability of field standards to provide traceable measurements. These are sometimes referred to as the "essential elements of traceability." The following are some examples:
    - accuracy of a particular test standard relative to the applicable tolerance;
    - demonstrated reliability of the device over time;
    - device repeatability;
    - how well it duplicates actual use;
    - existence of documentary standards for the test equipment;
    - availability of equipment/facilities within a state lab to test the equipment; and
    - whether training has been provided for the lab staff, field officials, and users of the equipment.
- NIST Handbook 44, Appendix A. Fundamental Considerations, Section 3.2. Tolerances for Standards, specify that when a standard is used without correction, its combined error and uncertainty must be less than one-third of the applicable tolerance.
- The current proposal seems to simply borrow from other codes without technical rationale. There is a potential for more than one type of alternative test method. The current proposal may unintentionally limit other types.
- Even within the category of "master meters," different requirements may be needed for different master meter technologies in order to comply with this requirement.
- Should consideration be given to providing a larger tolerance when conducting tests using a particular test method as is done in the carbon dioxide and hydrogen codes? Testing would need to be conducted to demonstrate the magnitude of the additional tolerance.
- Weights and measures needs a system that results in:
    - manufacturers knowing the requirements for the design of the standard;
    - systematic and appropriate collection of measurement data on proposed standards;
    - states (regulatory authorities) having access to the measurement data; and
    - side-by-side testing to compare results with existing test methods.
- Additional data and analysis is needed prior to recommending specific language for adoption in NIST Handbook 44.

Mr. Henry Oppermann, (Weights and Measures Consulting, LLC) speaking on his own behalf as well as consultant for Seraphin Test Measure, Co., stated there is no clear understanding of the terms "field standard" and "transfer standard." Any standard proposed for use in testing must meet the tolerances for standards specified in the Fundamental Considerations (Appendix A) of NIST Handbook 44, and there must be proof that the standard is able to comply with the tolerance over a range of field conditions. He raised the question, "without data to support the accuracy of a standard, how do you know it is accurate enough to use in testing a commercial device?" Mr. Oppermann expressed the need for the development of a test method (or procedures) that can be used to identify meters, performs well enough, and can be used as a standard in testing. Mr. Robert Murnane (Seraphin Test Measure, Co.) stated that he echoed Mr. Oppermann's comments. He acknowledged the existence of the USNWG, which NIST had created for the purpose of identifying the variables and parameters over which a proposed alternate standard must be tested and evaluated to ensure the methodologies and standards facilitate measurements with metrological traceability. He also noted jurisdictions could already use alternative standards if controls were in place to validate their traceability. Mr. Oppermann and Mr. Murnane both forwarded written comments to the Committee in advance of the meeting opposing the adoption of these two items and recommending their status be changed from Voting to Developing.

Mr. Michael Keilty (Endress + Hauser Flowtec AG USA) stated he would entertain a change to the terminology (transfer standard) in his proposals. He reported some jurisdictions will not allow the use of a transfer standard unless it is mentioned in NIST Handbook 44. He agreed with Mr. Murnane and Ms. Butcher that procedures would still need to be in place to ensure the adequacy of the standard for use in testing a commercial device. He recommended the Committee present the two items for Vote.

Based on the concerns raised by numerous members during the open hearings and recommendations from all four regional associations, the Committee felt the two items in the group had merit, but more work is necessary to move them forward. The Committee agreed to downgrade them to a Developing status.

Regional Association Comments and Recommendations:
The WWMA reported at its 2016 Annual Meeting, it believes this item should remain Developing until such time data is supplied to verify the test equipment can meet accuracy considerations as a standard.

At its 2016 Interim Meeting, the CWMA reported it recognizes the need for transfer standards, but until requirements are in place regarding their use, the CWMA recommends this item be Withdrawn. At its 2017 Annual Meeting, the CWMA reported it supports the use of alternative test methods but believes the procedures must be in place to ensure the standards meet the fundamental considerations for field standards. The CWMA recommended the item be moved to Developing status until the procedures are in place.

The SWMA batched Items 3302-1 and 3307-1 together at its 2017 Annual Meeting and heard comments on both items at the same time. Mr. Hal Prince (Florida) stated he supports these items and would like to see them move forward as Voting items. Mr. Henry Oppermann (Seraphin) stated he was opposed to the adoption of these items, and they should be Withdrawn. He further stated they are not legally acceptable standards and referred to his written submission in opposition to these items. Mr. Oppermann further stated the transfer standards must meet the one-third requirement, and there has not been any data provided showing they meet the one-third requirement. Ms. Tina Butcher (OWM) stated NIST submitted several comments in opposition of this item as written. She said the use isn't merely recognized by putting it in print and these devices need traceability. Further, Ms. Butcher stated the proposal appears to be lifting language from other codes and specifically asked where the two minutes came from. She concluded by stating NIST doesn't oppose the use of master meters, but a lot more work needs to be done before they can be used. Mr. Tim Chesser (Arkansas) stated he was in full support of using master meters but can't defend their use. He added that the operating conditions need to identify products and limits. The SWMA recommends this item remain in Developing status, but urges the submitter and those opposed to it to reach a resolution as the Committee believes the item has merit and could be beneficial in the field.

NEWMA recommended, at its 2016 Interim Meeting, that this item remain in a Developing status for another year. At its 2017 Annual Meeting, NEWMA grouped items 3302-1 and 3307-2 together and reported it believes these items should be further developed to include definitions of terms (transfer standards).

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

3302-2 D N.4.1.2. REPEATABILITY TESTS AND N.4.2.4. REPEATABILITY TESTS FOR TYPE EVALUATION

Source:
Ross Andersen, Retired (2017)

Purpose:
Address differences between NIST Handbook44 and NCWM Publication 14 practices for LPG Liquid Meter testing.

Item under Consideration:
Amend NIST Handbook 44, Liquid Measuring Devices Code as follows:

N.4.1.2. Repeatability Tests. – Tests for repeatability should include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors such as temperature, pressure, and flow rate are reduced to the extent that they will not affect the results obtained. **Repeatability tests shall be based on the uncompensated volume (e.g., with the temperature compensator deactivated). Both field tests and type evaluation tests shall be run at flow rates consistent with normal tests as specified in N.4.1.**

(Amended 20XX)

Add a new Paragraph N.4.2.4. as follows:

N.4.2.4. Repeatability Tests for Type Evaluation. – Tests for repeatability should include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors such as temperature, pressure, and flow rate are reduced to the extent that they will not affect the results obtained. Repeatability tests shall be based on the uncompensated volume (e.g., with the temperature compensator deactivated). Type evaluation tests shall be run at flow rates consistent with special tests as specified in N.4.2., N.4.2.1., N.4.2.2., or N.4.2.3. as appropriate.

(Added 20XX)

Background/Discussion:
This proposal is aimed to correct a number of areas of confusion. The inclusion of repeatability in the N.4.1. series indicates that repeatability is to be run at normal flow rates. The submitter believes there is some confusion as to whether this was the actual intent and notes running the tests only at normal flow rates is consistently how the test was performed in the field. The proposed amendment to N.4.1.2. clarifies this explicitly for field tests and type evaluation tests.

The new paragraph regarding type evaluation is proposed because NTEP has, for a long time, required repeatability on tests over the entire range of flow rates conducted under controlled conditions during type evaluation testing. This means these tests are conducted anywhere between rated maximum and minimum flow rates. The proposed addition would formalize and legitimize what has been done for a long time.

Another question that has arisen is whether gross or net results could be used in repeatability tests. Obviously, you can't compare net to gross, but you can compare three consecutive gross results or three consecutive net results. As the practice in NIST Handbook 44 is to test one variable at a time to the extent possible, the proposed revision would clarify that repeatability is assessed on gross meter performance only. This can be accomplished by deactivating the ATC and conducting the repeatability tests or just using gross values where both gross and net are available from the same test draft.

At the Committee's 2017 Interim Meeting open hearings, the Committee heard support for the item from Mr. Dmitri Karimov (Liquid Controls) on behalf of the MMA.

Ms. Tina Butcher (NIST, OWM) clarified that, although it is common for repeatability to be conducted at the normal flow rate, there is nothing precluding an inspector from running these tests at any valid flow rate. The meter should be expected to be repeatable at any flow rate throughout the approved range. OWM concurs with the submitter that the specific tolerances for "repeatability" found in the specific codes are located under the heading of "normal tests." There was also some discussion as to whether or not repeatability should only be applicable to gross or uncompensated meter readings. Some felt the same requirements should also be applicable when testing a meter in net or compensated mode. OWM suggested this may have unintended consequences. These may include errors or stability issues in the temperature compensation being interpreted as apparent repeatability issues.

Mr. Constantine Cotsoradis (Flint Hills Resources) also questioned whether or not repeatability requirements may be applied to the compensated, net registrations.

Mr. Michael Keilty (Endress & Hauser Flowtec AG) commented that the proposal should be further evaluated by the NTEP laboratories.

Mr. Karimov reminded the group that any changes to the requirements must consider all meter technologies and not just positive displacement (PD) meters.

Ultimately, the Committee agreed more work was needed to develop the item and assigned it a "Developing" status. During its open hearings at the 2017 NCWM Annual Meeting, the Committee received comments from the submitter of this item, Mr. Ross Andersen (New York, retired), supporting further development of this item. Mr. Andersen noted he submitted this item because he wanted to make it clear in NIST Handbook 44 that for field evaluation, repeatability tests are only to be conducted at normal flow rates (i.e., at flow rates consistent with paragraph N.4.1. Normal Tests). NIST Handbook 44 also needs to clarify whether repeatability tests are to be conducted using temperature compensation or without temperature compensation. He further noted that NTEP evaluates these meters across all flow rates, and he would work with the MMA and the Measuring Sector to further develop this item.

In written comments submitted to the Committee, NIST, OWM concurred with the need to make modifications to the measuring codes to clarify the application of repeatability criteria. NIST, OWM believes it is not clear whether the original intent was to limit the application of the repeatability tolerances in the specific codes to only certain types of tests. During discussion at the MMA meeting, it was noted the 2001 Measuring Sector discussion included no reference to limiting repeatability tests to only normal tests, which causes question as to whether or not the location in the code is appropriate. Prior to the addition of repeatability tolerances in the measuring codes, only G-S.5.4. applied. When considering the addition of the repeatability requirements to the specific measuring codes, the weights and measures community felt strongly that a measuring device should be able to repeat its indications within a much smaller limit. Field officials should be able to verify a device is capable of repeating its indications at other flow rates and use conditions. Repeatability testing at other than normal flow rates should not be limited to type evaluation.

During the Committee's work session, the NIST Technical Advisor further noted that, initially, OWM had questioned whether the 40 percent of the absolute value of maintenance tolerance was too stringent to apply to the results of "Special Tests." However, during the MMA meeting at the 2017 Annual Meeting, it was noted that "Special Tests" are granted a larger tolerance. Thus, applying the "40 percent" value to the maintenance tolerances applied to special tests would result in applying a larger repeatability tolerance to those tests. Additionally, there was no mention of restricting the tolerances to only normal tests in either the S&T Committee or Measuring Sector reports when the tolerances were initially added. Consequently, testing at multiple flow rates seems appropriate and the code needs to be changed to clarify the intent.

Based on the comments heard and its work session discussions, the Committee agreed to recommend this item be further Developed.

Regional Association Comments and Recommendations:
At its 2016 Interim Meeting, the CWMA reported it believes this item needs further clarification. CWMA did not forward this item to NCWM and recommended that it be Withdrawn. At its 2017 Annual Meeting, the CWMA reported it believes the item has merit and recommended it move forward as a Developing item.

The SWMA, at its 2016 Interim Meeting, heard comment from Mr. Henry Oppermann (Weights and Measures Consulting) that he doesn't understand why there should be a difference in repeatability between compensated and uncompensated tests. He further stated the repeatability should be the same for both tests. The SWMA did not forward this item to NCWM and recommended that it be Withdrawn as it is already specified in NCWM Publication 14.

NEWMA forwarded this item to NCWM and recommended it be a Developing item at both its 2016 Interim and 2017 Annual Meetings. At the 2017 Annual Meeting, NEWMA reported the submitter was still developing the item and accepting feedback.

3302-3 V N.4.2.3. FOR WHOLESALE DEVICES

(This item was Adopted.)

Source:
NIST Office of Weights and Measures (2016)

Purpose:

- To specify the purpose of special tests conducted on Wholesale LPG and Anhydrous Ammonia Liquid-Measuring Devices;
- To specify the special tests are to be conducted at or slightly above the designated flow rates in the referenced paragraph; and
- To specify the special tests are not to be conducted below the device's marked minimum discharge rate.

Item under Consideration:
Amend NIST Handbook 44, Liquefied Petroleum Gas and Anhydrous Liquid-Measuring Devices Code as follows:

N.4.2.3. **~~For~~Wholesale Devices. –** **<u>"Special" tests on </u>**~~A~~ **<u>a</u>** wholesale device shall **<u>include a test at or slightly above the minimum discharge rate marked on the device.</u>** **~~be so tested at a minimum discharge rate of:~~**

(**~~a) 40 L (10 gal) per minute for a device with a rated maximum discharge less than 180 L (50 gal) per minute.~~**

~~(b) 20 % of the marked maximum discharge rate for a device with a rated maximum discharge of 180 L (50 gal) per minute or more, or~~

~~(c) the minimum discharge rate marked on the device, whichever is least.~~

<u>In no case shall the test be performed at a flow rate less than the minimum discharge rate marked on the device.</u>

(Amended 1987 **<u>and 20XX</u>**)

Background/Discussion:
In 2014, the Liquid-Measuring Devices (LMD) Code of NIST Handbook 44 was modified to clarify testing requirements for special tests of wholesale LMDs and to help to ensure that those tests were not conducted at flow rates less than the minimum flow rates marked by the manufacturers of the metering systems. The proposed changes outlined above would align the special test requirements for LPG and Anhydrous Ammonia Liquid-Measuring Devices with those adopted in 2014 in the LMD Code and provide consistency in testing procedures across measuring codes.

During training seminars for weights and measures officials and service personnel, NIST, OWM and other trainers instruct students to conduct special tests slightly above the marked minimum flow rate. While an official or service agent is not precluded from setting the flow rate exactly at the marked minimum flow rate, special care must be taken to ensure that the flow rate does not drop below the marked minimum during the test. This can sometimes be difficult in field environments. Flow rates can vary slightly during a test draft due to factors such as changes in system pressure and the number of other devices in use within the system. If the inspector or service agent sets the flow rate exactly at the marked minimum flow rate, such variations can result in the flow rate dropping below the marked minimum flow rate for portions of the test. This could potentially result in an unfair test to the metering system. Additionally, it is sometimes difficult to control the flow rate during the entire test or to even set the flow rate at "exactly" the marked minimum rate. The proposed language would provide flexibility to the inspector or service agent to conduct a special test "at" or "near" the marked minimum and still consider such a test to be valid.

This proposal would provide consistency with 2015 NIST Handbook 44, Section 3.30. Liquid-Measuring Devices Code, Special Tests, paragraph N.4.2.4. Special Tests, Wholesale Devices.

See the Committee's 2016 Annual Report to review previous language and positions to amend NIST Handbook 44 LPG and Anhydrous Ammonia Liquid Measuring Devices Code Paragraph N.4.2.3.

In December 2016, the MMA submitted an amended version of paragraph N.4.2.3. For Wholesale Devices to the Committee to replace the original proposal submitted by NIST. The MMA, in written comments provided to the Committee, noted all LPG devices must have a minimum discharge rate marked on the device. Options (a) and (b) of paragraph N.4.2.3. would never apply because the requirement is to always choose the least of Options (a), (b), or (c), but never to go below the minimum marked flow rate. Since Option (c) is the minimum discharge rate marked on the device, it is the only possible choice. If Options (a) and/or (b) are greater than (c), then they would not be the least of the three. If they are less than (c), they cannot be applied because to do so would be to drop below the minimum marked rate. Therefore, MMA saw an opportunity to shorten the paragraph in a way that would have no change on the final meaning or outcome.

During the Committee's open hearings at the 2017 NCWM Interim Meeting, Mr. Dmitri Karimov (Liquid Controls), speaking on behalf of the MMA, reported the MMA supported the amended version it had submitted to the Committee.

Ms. Tina Butcher (NIST, OWM) commented that OWM agreed with the MMA's assessment of this paragraph and believes the proposed changes to shorten the paragraph are appropriate.

In consideration of the comments received in support of the revised version of the proposal submitted by the MMA, the Committee agreed to replace the original proposal with the one revised by the MMA as shown in "Item under Consideration" and present the item for Vote at the upcoming NCWM Annual Meeting.

During the 2017 NCWM Annual Meeting, the Committee received numerous comments in support of this item (i.e., the amended version of paragraph S.4.2.3., which was submitted by the MMA in December 2016) and no comments in opposition to it.

Ms. Butcher reiterated many of the same points offered by OWM during previous open hearings of the Committee from past NCWM Interim and Annual Meetings to include:

- OWM submitted the proposal to align the requirements in paragraph N.4.2.3. with the changes made to corresponding requirements in the LMD Code in 2015. That code was modified to make it more "real world" with respect to how special tests are conducted on wholesale devices.
- The LMD code paragraph was modified to specify that the special test include a test "at or slightly above" the slower of two rates specified in the paragraph but never shall the test be conducted at a flow rate less than the minimum flow rate marked on the device.
- It is very difficult for field officials to control the flow of product during testing to a constant flow. This proposed change to the LPG and Anhydrous Liquid Measuring Code takes into account the difficulty encountered by field officials to be able to control the flow of product when performing special tests, and makes clear that at no time during the test shall the flow be less than the minimum flow rate marked on the device being tested.
- It has been suggested by a few people that more clarity is needed to better define what is meant by "slightly" in the proposed changes to the paragraph. This terminology is already used in the LMD Code. OWM concurs that improvements could be made, but suggests this be considered as a future change. MC has set a flow rate limit of no more than 10 percent of the marked minimum flow rate for these tests.

Mr. Dmitri Karimov (Liquid Controls, LLC), speaking on behalf of the MMA, voiced support for the proposal, including use of the term "slightly." A few others (i.e., officials and industry representatives) also voiced support for the proposal with an added suggestion that consideration possibly be given to better define the term "slightly" at some future date.

Hearing only comments in support of the proposal, with no immediate changes proposed by those providing comment, the Committee agreed to present the item for Vote as shown in the Item under Consideration.

Regional Association Comments and Recommendations:
The WWMA reported, at its 2016 Annual Meeting, this item should be given Informational status since the MMA is currently working on changes to this item.

The CWMA reported, at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting, this item is fully developed and recommended a Voting status.

At its 2016 Annual Meeting, the SWMA received comment from Ms. Butcher who reported that last year NIST submitted changes as a "housekeeping" measure to align with similar changes to other codes. The Committee believes this item is fully developed and recommended Voting status.

NEWMA reported at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting that the Committee believes this item is fully developed and recommended Voting status.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

3305 MILK METERS

3305-1 V S.2.1. VAPOR ELIMINATION (SEE RELATED ITEMS 3300-1, 3301-1, 3306-1 AND 3307-1)

(This item was Adopted.)

Source:
Liquid Controls and NIST, OWM (2017)

Purpose:
Align other measuring device codes with the changes adopted in 2016 under S&T LPG and NH_3 Code Item 332-3 (S.2.1. Vapor Elimination).

Item under Consideration:
Amend NIST Handbook 44, Milk Meters Code as follows:

S.2. Design of Measuring Elements.

S.2.1. Air/Vapor Elimination. – A ~~**metering**~~ **measuring** system shall be equipped with an effective **air/**vapor eliminator or other ~~**effective means**~~ automatic **means** ~~**in operation**~~ to prevent the passage of **air/**vapor ~~**and air**~~ through the meter. Vent lines from the air ~~**or**~~**/**vapor eliminator shall be made of ~~**metal tubing or some other suitably rigid material**~~ **appropriate non-collapsible material.**

(Amended 2017)

Background/Discussion:
The proposed changes would ensure consistency across the various measuring device codes in NIST Handbook 44. This would help ensure more uniform interpretation of the requirements and facilitate application by officials and industry.

The proposed changes will align other codes with the following changes made to the LPG code at the 2016 NCWM Annual Meeting.

S.2.1. Vapor Elimination.

(a) A device shall be equipped with an effective **automatic** ~~**vapor eliminator or other effective**~~ means to prevent the passage of vapor through the meter.

(b) Vent lines from the vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 20XX)

The proposed changes make the requirement less design-specific and more focused on ensuring the means for eliminating air or vapor are effective, including the vent lines not be susceptible to restriction. The proposed changes also clarify that the provision for vapor elimination must be automatic in nature to be considered effective.

NIST, OWM in its analysis of the 2016 S&T agenda item referenced above suggested a similar change be proposed, where necessary, to corresponding requirements in other measuring codes and encouraged the Committee to consider including such an item on its agenda in the 2016-2017 NCWM cycle.

Note that the Mass Flow Meters Code states "means to prevent the measurement of vapor and air" while other codes state "means to prevent the passage of vapor and air through the meter," but such distinction is probably justified. Consequently, no modifications are proposed to align this language with other codes.

During the 2017 NCWM Interim and Annual Meetings, the Committee grouped agenda Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and took comments on these items simultaneously because it considered these items related.

See agenda Item 3300-1 for a summary of the comments received and the resulting actions taken by the Committee on these items.

Regional Association Comments and Recommendations:

The WWMA considered Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 at the same time at its 2016 Annual Meeting. NIST, OWM will update language adopted at the 2016 NCWM Annual Meeting to these additional devices. The WWMA considered these items developed and forwarded them to NCWM, recommending Voting status.

The CWMA reported at its fall 2016 Interim Meeting that it recognized the value of aligning the measuring device codes and forwarded this item to the NCWM, recommending Voting status. The CWMA grouped Items 3300-1, 3301-1, 3301-1, 3306-1, and 3307-1 together and took comments at the same time on these items at its spring 2017 Annual Meeting because it considered them related. The CWMA reported it believes this group of items is sufficiently developed and recommended they be presented for Vote at the upcoming NCWM Annual Meeting.

The SWMA, at its 2016 Annual Meeting, batched Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and heard comments for all items at the same time. The only comments received were for Item 3300-1. See this item for details. The SWMA forwarded this item to NCWM and recommended Voting status.

NEWMA grouped Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and heard comments for all items at the same time. NEWMA forwarded the items in the group to the NCWM and recommended Voting status at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

3306 WATER METERS

3306-1 V S.2.2.1. AIR ELIMINATION (SEE RELATED ITEMS 3300-1, 3301-1, 3305-1 AND 3307-1)

(This item was Adopted.)

Source:
Liquid Controls and NIST, OWM (2017)

Purpose:
Align other measuring device codes with the changes adopted in 2016 under S&T LPG and NH_3 Code Item 332-3 (S.2.1. Vapor Elimination).

Item under Consideration:
Amend NIST Handbook 44, Water Meters Code as follows:

S.2.2. Batching ~~Meters~~Measuring Systems Only.

S.2.2.1. Air/Vapor Elimination, Batching Measuring Systems. – Batching **~~meters~~measuring systems** shall be equipped with an effective air**/vapor** eliminator **or other automatic means to prevent the passage of air/vapor through the meter. Vent lines from the air/vapor eliminator shall be made of appropriate non-collapsible material.**
(Amended 2017)

Background/Discussion:
The proposed changes would ensure consistency across the various measuring device codes in NIST Handbook 44. This would help ensure more uniform interpretation of the requirements and facilitate application by officials and industry.

The proposed changes will align other codes with the following changes that were made to the LPG code at the 2016 NCWM Annual Meeting.

S.2.1. Vapor Elimination.

(a) A device shall be equipped with an effective **automatic** **~~vapor eliminator or other effective~~** means to prevent the passage of vapor through the meter.

(b) Vent lines from the vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 20XX)

The proposed changes make the requirement less design-specific and more focused on ensuring that the means for eliminating air or vapor are effective, including the vent lines not be susceptible to restriction. The proposed changes also clarify the provision for vapor elimination must be automatic in nature in order to be considered effective.

NIST, OWM in its analysis of the 2016 S&T agenda item referenced above suggested a similar change be proposed, where necessary, to corresponding requirements in other measuring codes and encouraged the Committee to consider including such an item on its agenda in the 2016 - 2017 NCWM cycle.

Note the Mass Flow Meters Code states “means to prevent the measurement of vapor and air” while other codes state “means to prevent the passage of vapor and air through the meter,” but such distinction is probably justified. Consequently, no modifications are proposed to align this language with other codes.

During the 2017 NCWM Interim and Annual Meetings, the Committee grouped agenda Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and took comments on these items simultaneously because it considered these items related. See agenda Item 3300-1 for a summary of the comments received and the resulting actions taken by the Committee on these items.

Regional Association Comments and Recommendations:
The WWMA considered Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 at the same time at its 2016 Annual Meeting. NIST, OWM will update language adopted at the 2016 NCWM Annual Meeting to these additional devices. The WWMA considered these items developed and forwarded them to NCWM, recommending Voting status.

The CWMA reported at its fall 2016 Interim Meeting that it recognized the value of aligning the measuring device codes and forwarded this item to the NCWM, recommending Voting status. The CWMA grouped Items 3300-1, 3301-1, 3301-1, 3306-1, and 3307-1 together and took comments at the same time on these items at its spring 2017 Annual Meeting because it considered them related. The CWMA reported it believes this group of items is sufficiently developed and recommended they be presented for vote at the upcoming NCWM Annual Meeting.

The SWMA, at its 2016 Annual Meeting, batched Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and heard comments for all items at the same time. The only comments received were for Item 3300-1. See this item for details. The SWMA forwarded this item to NCWM and recommended Voting status.

NEWMA grouped Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and heard comments for all items at the same time. NEWMA forwarded the items in the group to the NCWM and recommended Voting status at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf.**

3307 MASS FLOW METERS

3307-1 V S.3.3. VAPOR ELIMINATION (SEE RELATED ITEMS 3300-1, 3301-1, 3305-1 AND 3306-1)

(This item was Adopted.)

Source:
Liquid Controls and NIST, OWM (2017)

Purpose:
Align other measuring device codes with the changes adopted in 2016 under S&T LPG and NH_3 Code Item 332-3 (S.2.1. Vapor Elimination).

Item under Consideration:
Amend NIST Handbook 44, Mass Flow Meters Code as follows:

> **S.3.3. <u>Air/</u>Vapor Elimination.** – A ~~**liquid-measuring instrument or**~~ measuring system shall be equipped with an effective **<u>air/</u>**vapor ~~**or air**~~ eliminator or other ~~**effective**~~ **<u>automatic</u>** means~~**, automatic in operation,**~~ to prevent the measurement of **<u>air/</u>**vapor. Vent lines from the air**<u>/</u>**~~or~~ vapor eliminator shall be made of ~~**metal tubing or some other suitable rigid**~~ **<u>appropriate non-collapsible</u>** material.
>
> (Amended 1999 **<u>and 2017</u>**)

S.3.3.1. Air/Vapor Elimination on Loading Rack Liquid ~~Metering~~ Measuring Systems.

(a) A loading rack **~~liquid metering~~** **measuring** system shall be equipped with a**n effective air/**vapor **~~or air~~** eliminator or other automatic means to prevent the passage of **air/**vapor **~~and air~~** through the meter unless the system is designed or operationally controlled by a **means** **~~method, approved by the weights and measures jurisdiction having statutory authority over the device,~~** such that neither air nor vapor can enter the system.

(b) Vent lines from the air**/** ~~or~~ vapor eliminator **~~(if present)~~** shall be made of **~~metal tubing or other rigid~~** **appropriate non-collapsible** material.

(Added 1995) **(Amended 2017)**

Background/Discussion:

The proposed changes would ensure consistency across the various measuring device codes in NIST Handbook 44. This would help ensure more uniform interpretation of the requirements and facilitate application by officials and industry.

The proposed changes will align other codes with the following changes that were made to the LPG code at the 2016 NCWM Annual Meeting.

S.2.1. Vapor Elimination.

(a) A device shall be equipped with an effective **automatic** **~~vapor eliminator or other effective~~** means to prevent the passage of vapor through the meter.

(b) Vent lines from the vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 20XX)

The proposed changes make the requirement less design-specific and more focused on ensuring the means for eliminating air or vapor are effective, including the vent lines are not susceptible to restriction. The proposed changes also clarify that the provision for vapor elimination must be automatic in nature to be considered effective.

NIST, OWM in its analysis of the 2016 S&T agenda item referenced above suggested a similar change be proposed, where necessary, to corresponding requirements in other measuring codes and encouraged the Committee to consider including such an item on its agenda in the 2016-2017 NCWM cycle.

Note the Mass Flow Meters Code states “means to prevent the measurement of vapor and air” while other codes state “means to prevent the passage of vapor and air through the meter,” but such distinction is probably justified. Consequently, no modifications are proposed to align this language with other codes.

During the 2017 NCWM Interim and Annual Meetings, the Committee grouped agenda Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and took comments on these items simultaneously because it considered these items related. See agenda Item 3300-1 for a summary of the comments received and the resulting actions taken by the Committee on these items.

At the 2017 NCWM Annual Meeting, the MMA voiced support for the group of items but suggested retaining the word “measurement” in the first sentence of paragraph S.3.3. of agenda Item 3307-1 rather than replacing it with the word “passage” as proposed. The MMA noted it is not necessary to prevent air/vapor from passing through a mass flow meter to achieve accurate measurement. It is only necessary to require there be means to prevent the measurement of the air/vapor. Ms. Butcher and others supported the MMA’s suggestion.

Hearing only comments in support of these items, the Committee agreed to the change proposed by the MMA to agenda Item 3307-1 as shown in Item Under Consideration for this item and present the items for Vote.

Regional Association Comments and Recommendations:
The WWMA considered Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 at the same time at its 2016 Annual Meeting. NIST, OWM will update language adopted at the 2016 NCWM Annual Meeting to these additional devices. The WWMA considered these items developed and forwarded them to NCWM; recommending Voting status.

The CWMA reported at its fall 2016 Interim Meeting it recognized the value of aligning the measuring device codes and forwarded this item to the NCWM; recommending Voting status. At the spring 2017 Annual Meeting, the CWMA grouped Items 3300-1, 3301-1, 3301-1, 3306-1, and 3307-1 together and took all comments on these related items at the same time. The CWMA believes this group of items is sufficiently developed and recommended they be presented for Vote at the upcoming NCWM Annual Meeting.

The SWMA, at its 2016 Annual Meeting, batched Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and heard comments for all items at the same time. The only comments received were for Item 3300-1. See this item for details. The SWMA forwarded this item to NCWM and recommended Voting status.

NEWMA grouped Items 3300-1, 3301-1, 3305-1, 3306-1, and 3307-1 together and heard comments for all items at the same time. NEWMA forwarded the items in the group to the NCWM and recommended Voting status at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

3307-2 D N.3. TEST DRAFTS

(The status of this item was changed from Voting to Developing.)

Note: This agenda item previously appeared on the Committee's agenda as agenda Item 337-3 in 2015 and 2016.

Source:
Endress + Hauser Flowtec AG USA (2015)

Purpose:
Allow transfer standard meters to be used to test and place into service dispensers and delivery system flow meters.

Item under Consideration:
Amend NIST Handbook 44, Mass Flow Meters Code as follows:

N.3. Test Drafts.

N.3.1. Minimum Test. – The minimum test shall be one test draft at the maximum flow rate of the installation and one test draft at the minimum flow rate. More tests may be performed at these or other flow rates. (See T.3. Repeatability.)
(Amended 1982)

N.3.2. Transfer Standard Test. – The minimum quantity for any test draft shall be equal to or greater than the amount delivered in one minute at the flow rate being tested.

Background/Discussion:
In the fall of 2016, Mr. Keilty provided an update to the Item under Consideration. That update appears in the agenda. The previous proposed Item under Consideration was as follows:

N.3. Test Drafts.

<u>N.3.1. Minimum Test.</u> – Test drafts should be equal to at least the amount delivered by the device in one minute at its normal discharge rate.

(Amended 1982)

<u>N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the test draft shall be equal to at least the amount delivered by the device in 2 minutes at its maximum discharge rate.</u>

The use of transfer standards is recognized in Sections 3.34. Cryogenic Liquid-Measuring Devices Code and 3.38. Carbon Dioxide Liquid-Measuring Devices Code and 3.39. Hydrogen Gas-Measuring Devices – Tentative Code. Field evaluation of LPG meters and CNG dispensers and LNG dispensers is very difficult using volumetric and gravimetric field standards and methods. The tolerances for these applications are such that using transfer meter standards are more efficient and safer. With CNG and LNG and LPG applications, the transfer standard meters are placed in-line with the delivery system as it is used to fill tanks and vehicles. The use of transfer standards eliminates return to storage issues. The use of transfer standard meters is easier and faster compared to the use of traditional field standards. The cost of using transfer standards and transporting them is much less than the cost of traditional field provers and standards. Recognition in NIST Handbook 44 will enable states to allow transfer standard meters to place systems into service and for field enforcement. The amended language is made to clarify the minimum test quantity for using transfer standard meters accommodating both large quantity and low quantity delivery systems. Volumetric field provers and gravimetric field proving are susceptible to environmental influences. The states commonly use meters as transfer standards to test rack meters. In some applications, transfer standard meters are not more accurate than the meters used in the dispenser. For this reason, longer test drafts and possibly more tests need to be run.

The State of California is purported to have conducted a short study of master meters in the past. The conclusion did not lead to wide adoption of the practice. However, the State of California uses a mass flow meter as a master meter for carbon dioxide flowmeter enforcement.

Section 3.37. Mass Flow Meters user requirement UR.3.8. Return of Product to Storage, Retail Compressed Natural Gas Dispensers requires that the natural gas which is delivered into the test container must be returned to storage. This is difficult and most often not complied with when the test vessel contents are released to atmosphere.

The submitter recommends that NIST update EPO 28 for CNG dispensers and EPO 26 for LPG Liquid Measuring Systems to include transfer standard meter tests. NIST Handbook 105-4, "Specifications and Tolerances for Reference Standards and Field Standard Weights and Measure: Specifications and Tolerances for Liquefied Petroleum Gas and Anhydrous Ammonia Liquid Volumetric Provers," should also be revised to specifically address the transfer standard meter and the requirements for use.

The S&T Committee might also consider amending Sections 3.30. Liquid-Measuring Devices Code and 3.31. Vehicle-Tank Meters Code to allow transfer standard meters.

2015 Interim and Annual Meetings:

The Committee heard comments both in support of and in opposition to the proposal outlined in this item and a corresponding item in the LPG and Anhydrous Ammonia Liquid-Measuring Devices Code. Mr. Mike Keilty (Endress + Hauser Flowtec AG USA), submitter of these two items outlined the benefits of using a master meter as a standard in testing application such as CNG, LNG, and LPG. The Committee heard comments in opposition to the proposal from Mr. Henry Oppermann (Weights and Measures Consulting, LLC and speaking on behalf of Seraphin Test Measure, Co.) noted there are significant differences between a transfer standard and a field standard. Ms. Tina Butcher (NIST, OWM) acknowledged the advantages to identifying and developing alternate test methods such as this, but noted that simply adding the proposed language doesn't address the multiple other elements needing to be in place to ensure traceability; OWM provided a list of those elements along with other suggestions. NIST, OWM noted the USNWG on Alternative Test Methods might be a better venue to develop the elements to support the use of these devices. This was echoed by Mr. Dmitri Karimov (Liquid Control, LLC) who also commented that the regulatory authority must assess the suitability of a given standard. The Committee also heard from Ms. Kristin Macey

(California) who commented if the proposal were adopted, it would allow use of a transfer standard and California would not be able to fully support it, citing results of comparison testing conducted by California in which the master meter performed the worst of the three methods examined. Mr. Keilty, in response to Ms. Butcher and Mr. Oppermann's comments, stated he agreed completely and noted adding the paragraph to these two codes is a step towards allowing the use of transfer standards. It's understood there are many things that need to be in place to consider them suitable for use in testing. The Committee also heard other comments from regulators and industry supporting the continued development of this issue. The Committee agreed the item has merit, but needs further development and suggested the submitter work with OWM by providing data for the USNWG to consider.

See the Committee's 2015 Final Report for details.

2016 NCWM Interim and Annual Meetings:
The Committee again heard comments both in support of and in opposition to this item and the corresponding item in the LPG and Anhydrous Ammonia Liquid-Measuring Devices Code. Mr. Michael Keilty (Endress + Hauser Flowtec), the submitter, stated he supported this item as a Voting item as did Alan Walker (Florida). Others expressed support of the item, but noted the need for additional development. The Committee heard again from Ms. Butcher and Mr. Henry Oppermann, who reiterated their 2015 detailed comments regarding the tasks that need to be completed before considering changes to NIST Handbook 44. Both echoed the need to collect data to properly evaluate whether or not a master meter could be considered a suitable standard.

During its Interim Meeting work session, the Committee acknowledged comments suggesting the need for additional test data. It was also acknowledged there was a lot of support for the proposal. Those supporting the proposal had indicated that using a transfer standard is much easier and faster than testing gravimetrically and eliminates the need to discharge product from a prover into the atmosphere, which is viewed by many as a safety concern. Given the addition of the proposed language would not dictate the method of testing and the decision on whether or not to use a particular method of testing would remain with each jurisdiction, the Committee agreed to present both items for Vote at the Annual Meeting.

At the 2016 Annual Meeting, the Committee received numerous comments from industry and regulators alike, predominantly in support of the proposals. These comments cited benefits such as safety; faster and more efficient testing; and lack of problems with using master meters. Mr. Marc Buttler (Emerson Process Management – Micro Motion) also expressed supports of the items, but suggested replacing the words "maximum discharge rate" with "maximum test rate" in proposed paragraph N.3.2.; the submitter agreed with the suggestion.

The Committee also heard comments in opposition to the item and comments emphasizing the need for further development and data. A new comment offered by Ms. Butcher noted the proposed new paragraph N.3.1. would create a conflict with the minimum test procedures outlined in the NIST EPO for CNG dispensers since tests conducted at the MMQ and at some other quantities are frequently completed in less than one minute. There was some debate regarding the application of the Fundamental Considerations regarding the allocation of error and uncertainty associated with a given test method, and Mr. Henry Oppermann clarified the proper application of these criteria. Mr. Oppermann noted the transfer standards, in some cases, are no more accurate than the meter being tested and the proposals lack a specification associated with the performance of the standard. He recommended the items be changed to Informational or Developmental.

During the Committee's work session, members of the Committee agreed the comments received during the open hearings were mostly in support of the two proposals. The Committee discussed the proposed changes to the text, including the errors in the transcription of the text in the Item Under Consideration. The Committee discussed the potential impact on testing CNG dispensers, acknowledging the proposed requirement cannot be met by someone wanting to apply the procedures in the NIST EPO (which were developed through a WG comprised of industry and regulatory officials). Some Committee members familiar with CNG testing concurred that a test run typically takes less than one minute to complete. The Committee was concerned with the potential conflict and questioned whether the submitter had fully considered the impact of the proposed language. These discussions led the Committee to decide to change the status of the item from Voting to Developmental and return them to the submitter for further development.

2017 NCWM Interim and Annual Meetings:
During the 2017 NCWM Interim and Annual Meetings, the Committee grouped agenda Item 3302-1 and 3307-2 together and took comments on these items simultaneously because it considered these items related. See agenda Item 3302-1 for a summary of the comments received and the resulting actions taken by the Committee on these items at those meetings.

Regional Association Comments and Recommendations:
The WWMA reported at its 2016 Annual Meeting that it believes this type of device will not allow the time consideration as found in paragraph N.3.1., also this section should be bold and underlined as it is entirely new. The submitter also needs to supply test data to verify the test equipment can meet accuracy considerations as a standard. The WWMA recommends this item remain in a Developing status.

At its 2016 Interim Meeting, the CWMA reported it recognizes the need for transfer standards, but until requirements are in place regarding their use, the CWMA recommends this item be Withdrawn. At its 2017 Annual Meeting, the CWMA reported it supports the use of alternative test methods but believes the procedures must be in place to ensure the standards meet the fundamental considerations for field standards. The CWMA recommended the item be moved to Developing status until the procedures are in place

The SWMA batched Items 3302-1 and 3307-1 together at its 2016 Annual Meeting and heard comments on both items at the same time. Mr. Hal Prince (Florida) stated he supports these items and would like to see them move forward as Voting items. Mr. Henry Oppermann (Seraphin) stated he was opposed to the adoption of these items, and they should be Withdrawn. He further stated they are not legally acceptable standards and referred to his written submission in opposition to these items. Mr. Oppermann further stated transfer standards must meet the one-third requirement, and there has not been any data provided showing they meet this requirement. Ms. Butcher stated NIST submitted many comments in opposition of this item as written. She stated the use isn’t merely recognized by putting it in print, and these devices need traceability. Further, Ms. Butcher stated the proposal appears to be lifting language from other codes and specifically asked where the two minutes came from. She concluded by stating NIST doesn’t oppose the use of master meters, but a lot more work needs to be done before they can be used. Mr. Tim Chesser (Arkansas) stated he was in full support of using master meters but can’t defend their use. He added the operating conditions need to identify products and limits. The SWMA recommend this item remain in Developing status, but urges the submitter and those opposed to it to reach a resolution as the Committee believes the item has merit and could be beneficial in the field.

NEWMA recommended, at its 2016 Interim Meeting, this item remain in a Developing status for another year. At its 2017 Annual Meeting, NEWMA grouped Items 3302-1 and 3307-2 together and reported it believes these items should be further developed to include definitions of terms (transfer standards).

Additional letters, presentations, and data may have been part of the Committee’s consideration. To review the supporting documentation, please refer to the “Report of the 101st National Conference on Weights and Measures” (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

3504 TAXIMETERS

3504-1 V A.2. EXCEPTIONS. (SEE RELATED ITEM 3600-6)

(This item was Adopted.)

Source:
USNWG on Taximeters (2017)

Purpose:
Clarify that the Taximeters Code does not apply to Transportation Network Measuring Systems, which would fall under a new tentative code developed specifically for those systems.

Item under Consideration:
Amend NIST Handbook 44, Taximeters Code as follows:

A.2. Exceptions. – This code does not apply to;

(a) Odometers on vehicles that are rented on a distance basis (for which see Section 5.53. Code for Odometers)**;**

(b) Devices that only display a flat rate or negotiated rate~~.~~**; or**

(c) Transportation Network Measurement Systems (for which see Section 5.XX Transportation Network Measurement Systems).

(Amended 1977 **and 20XX**)

Background/Discussion:
Proposed Change (1):

The appearance of new types of transportation-for-hire services that use location services (such as GPS) and software applications as an interface for the user and provider of the service has created a need for regulatory standards that could be applied to these types of systems. These systems, being referred to as Transportation Network Measurement Systems (TNMS) do not use a conventional "taximeter" or other dedicated hardware device(s) that conform to the more traditional design of taximeters; however, they provide a similar transportation-for-hire service. Regulatory officials have met with little or no success in attempts to apply existing standards (including those in Section 5.54. Taximeters Code) to TNMS due to differences in the design of these systems and other, existing types of transportation-for-hire services. The hardware components used in TNMS are devices (cellular telephones, computers, and tablets) are typically owned/possessed by the drivers and passengers using the systems and are not designed, sold, issued, or otherwise provided by the Transportation Network Companies. Since there is an absence of dedicated physical hardware used in these systems and because the primary components that are integral to the TNMS consist of various software programs, many members of the weights and measures community and transportation industry have concluded that a new code, separate from the existing Taximeters Code, is needed.

TNMS have established a large customer base in the transportation-for-hire marketplace, and these systems are used extensively in the United States as well as internationally. There is a preponderance of public and political support to recognize and accept TNMS as fair-market competition to traditional taxi services. To this point, reasonable and appropriate standards that can be applied for the evaluation of TNMS as commercial systems must be developed and implemented. Primary goals of the implementation of a TNMS code (as well as corresponding changes to the Taximeters code) are to ensure a level playing field within this industry, ensure fair and equitable transactions, ensure transparency for consumers, and to facilitate value comparisons.

The USNWG on Taximeters has worked on updating the NIST Handbook 44, Taximeters Code as well as the development of appropriate requirements for transportation systems using location services and software applications since the later portion of 2012. More recently, Transportation Network Companies (TNCs) that are the providers of TNMS have joined this effort and added their input into the standards development process. Because there are instances where taximeters are now being designed to operate using similar features and functionality as TNMS, the USNWG on Taximeters has also developed corresponding changes to the NIST Handbook 44, Taximeters Code in an effort to provide a regulatory parity between these transportation-for-hire industry competitors. Those proposed changes to the Taximeters Code will be submitted under a separate item, which already appears on the Committee's agenda (Item 3504-1 on the Committee's 2017 draft agenda) as a "carryover" item.

Proposed Change (2):

Anticipating that the proposal to add a new Transportation Network Measurement Systems Code into NIST Handbook 44 will be adopted, there will be a corresponding need to clarify the existing Handbook 44, 5.54. Taximeters Code will not be applicable to these types of systems. The addition of an exemption under paragraph A.2. in the current Taximeters Code for TNMS will make this clear. While this amendment to provide an exemption for TNMS in the current Taximeters Code is to be proposed also under a different agenda item (Item 3504-1, as described above), it is essential that this proposed change be a part of the TNMS item as well. This will help avoid any conflict and confusion regarding the application of the proposed tentative code should a decision be made to reject or delay Item 3504-1.

Some in the weights and measures community and the transportation-for-hire industry have opposed the development of a new separate NIST Handbook 44 Code for TNMS, stating since those systems perform the same function as a taximeter, TNMS should be assessed based on requirements already existing in the Handbook 44, Taximeters Code. Additional arguments cite the lack of regulatory standards for TNMS are pointing out the loss of revenue of the traditional-type taxi services due to the increase of competition from TNMS operating in the same jurisdiction. The loss of business being reported by some in the taxi industry has also reportedly resulted in a severe decrease of the value of "medallions" (roughly equivalent to a permit to operate a taxicab) in many areas where medallions are purchased by taxi companies as a prerequisite to operate in those jurisdictions.

Because the design and functions of these systems are considerably different from those used in today's taximeters, there are differences between the proposed new NIST Handbook 44, TNMS Code and requirements that are already in (or are proposed to be added to) the existing Handbook 44 Taximeters Code. Some may view the differences between these standards as being unfair and as providing advantages to one over the other; however, the changes being proposed under Item 3504-1 should bring the two codes into closer alignment. Additionally, this does not preclude the possibility of a future proposal to merge the two codes as technology evolves.

At the 2017 NCWM Interim Meeting, the Committee agreed to group agenda Items 3504-1 and 3600-6 together and take comments on these items simultaneously because it considered these items related.

The Committee received numerous comments from participants of the USNWG on Taximeters and others, including industry representatives and regulatory officials alike, indicating the two items were fully developed and recommending they be presented for Vote at the upcoming NCWM Annual Meeting.

Mr. John Barton (NIST, OWM and Technical Advisor to the USNWG on Taximeters) commented that he agreed with the WWMA's changes to paragraph A.2 of the Taximeters Code, which provide for an exception of that code applying to TNMS. He noted OWM recognizes the importance and the urgent need for regulatory standards applicable to TMNS since these types of transportation services have been in use for some time and existing Handbook 44, requirements do not sufficiently address this type of system. He also acknowledged the efforts of the USNWG on Taximeters for the development of this proposal to meet the needs of this industry and the officials responsible for their regulation.

The new draft TNMS code is proposed as a tentative NIST Handbook 44 code and is not intended for enforcement use at this time. He further stated OWM acknowledges the challenges in the development of regulatory standards for these systems based on their extensive use of software and location services such as GPS and cellular networks. Because there is no precedent for these types of transportation systems, OWM believes it is important to introduce regulatory standards for TNMS on a "trial" basis. This will allow for the identification of any necessary modifications to the tentative code prior to being used as an enforcement tool.

The Committee also received comments from Mr. Stan Toy (Santa Clara County Weights and Measures, California) requesting amendments to the following draft tentative code paragraphs:

- **S.1.1. General Indicating Elements and N.1. Distance Tests. –** *Summary of the comments provided:* The model, age, and condition of a cell phone, which serves as primary indicator in a TNMS, can affect its performance capabilities. I would suggest amending the note in proposed paragraph N.1. by specifying 100 percent of the devices used in a TNMS be tested or at least a sample of them that are in use.

- **N.1.2.2. Additional Tests. –** *Summary of the comments provided:* Why do so many tests need to be completed before taking action? There are no other devices that we test where this is required. Officials should be permitted to take a device out of service with one test that fails to comply. How many failures does it take before officials can reject: 2 out of the 4; 3 out of the 4, etc. Each test must be done on a road and takes about 30 - 45 minutes to complete. How are officials to schedule a work day given how much time it might take to test a particular device that fails one or more tests? I recommend changing the word “shall” to “may” in this paragraph.

- **N.1.3.2. Roads.** – *Summary of the comments provided:* The paragraph requires tests to be conducted on public roads that are in good repair. What is “good repair?” Another concern is requiring the tests to be conducted on public roads. Mapping systems are based on public roads. In rural areas, Uber claims their system can calculate charges on driveways of customers. These are not public roads.

- **S.3.2. Significant Trip Data Loss.** – *Summary of the comments provided:* The paragraph needs to include limits on how frequently this can occur; for example, 10 percent of the time; 90 percent of the time, etc. A loss signal allows a different rate structure to be charged.

Mr. Barton, in response to Mr. Toy’s concerns, noted the draft code, if adopted, would be added to NIST Handbook 44 as a tentative code, during which time, it could be determined whether changes to any of the paragraphs were needed before the status was changed to a permanent code. Regarding verifying repeatability of these devices, the WG considered this issue extensively and concluded there is no need to test each and every driver’s cell phone.

Mr. Bob O'Leary (Uber Technologies, Inc.) stated he supported Item 3600-6 as a tentative code and said he would like to address some of Mr. Toy’s concerns. He reported the WG had extensively debated the issues being raised. With respect to suggesting all devices be tested, a TNMS uses data from all phones to determine which road segment a driver drove on. Plug in any IOS or Android phone and get good results. There is no evidence to support the regulatory burden of requiring all devices to be tested. Regarding the need to test on public roads, it is important the tests be conducted on public roads. The system can’t function when off public roads. Mr. O’Leary also stated there is a misconception that Uber is unregulated, when, in fact, most states do regulate Uber.

In consideration of the comments received, the Committee agreed to present both items in the group for Vote at the upcoming NCWM Annual Meeting.

At the 2017 NCWM Annual Meeting, the Committee agreed to group agenda Items 3504-1 and 3600-6 together and take comments on these items simultaneously because it considered these items related.

The Committee received numerous comments from participants of the USNWG on Taximeters and others, including industry representatives and regulatory officials alike.

Mr. John Barton (NIST, OWM and Technical Advisor to the USNWG on Taximeters) reiterated comments from the 2017 NCWM Interim Meeting and noted the USNWG acknowledged the comments made about the use of the term “transfer standard” from Items 3302-1 and 3307-2. He noted the workgroup would not object to the removal of the definition in the tentative code if it helped the item move forward. Mr. Barton also stated that all tests for these devices must be made on public roads and supported striking, “which are in good repair” from paragraph N.1.3.2. of the tentative (TNMS) code and its corresponding paragraph in the Taximeters Code (N.1.3.2.1.). Mr. Barton, speaking on behalf of NIST, OWM reiterated comments from the Interim Meeting about Item 3600-6, and stated since there are currently no regulatory standards in place, it would be appropriate to allow this tentative code to be adopted. He further stated OWM recognized the concerns with the use of the term “transfer standard,” and its use in this tentative code may need to be revisited; however, that should not prevent the proposed tentative code from moving forward.

Mr. James Cassidy (City of Cambridge, Massachusetts) spoke as a member of the USNWG and stated he supported the work of the USNWG and supported this tentative code moving forward.

The Committee also received comments from Mr. Stan Toy (Santa Clara County Weights and Measures, California) who reiterated the amendments he suggested at the 2017 NCWM Interim Meeting. Mr. Toy stated that he could not support adoption of this tentative code if these changes were not incorporated.

Mr. Bob O’Leary (Uber) stated he was also a member of the workgroup and supported adoption of Item 3600-6. He further stated that he supported removal of the term “transfer standard” and supported other amendments proposed by

NIST, OWM. Mr. O'Leary also stated the workgroup discussed extensively the comments and concerns raised by Mr. Toy, but the WG did not move those suggestions forward.

Mr. Jeff Brandt (Lyft) noted that he too was a member of the USNWG and supported adoption of Item 3600-6. He also echoed the comments made by Mr. O'Leary.

Ms. Kristin Macey (California) echoed the comments made by Mr. Barton and Mr. O'Leary. She noted California has been the jurisdiction working with industry and highlighted they have been pursing type evaluation at the state level. Ms. Macey further stated she agreed with the proposed changes to remove the term "transfer standard" from the tentative code. Ms. Macey concluded she would work to provide test data in the future to move this from a tentative code to a permanent code.

Mr. Henry Oppermann (Weights and Measures Consulting) stated he did not have a problem with the tentative code as proposed, but did agree with the suggestions to remove the term "transfer standard" from the tentative code.

Ms. Fran Elston-Houston (Ohio) added that in Ohio their legislature removed from the weights and measures jurisdiction the authority to regulate these types of devices and if this tentative code was not adopted this same scenario could happen in other states.

Mr. Marco Mares (San Diego County, California) spoke in support of the tentative code and echoed Ms. Kristin Macey's comments.

Mr. Keith Walsh (New York City Taxi Commission) added his support of this tentative code.

Mr. Mike Sikula (New York) provided written comments in support of the tentative code.

Based upon the comments received in support of amending the draft tentative (TNMS) code by deleting the definition of "transfer standard" from that code and amending paragraph N.1.3.2. by deleting the words "which are in good repair," the Committee agreed to these changes. The Committee also agreed to present the two items in this group for Vote. The changes to the draft tentative code agreed to by the Committee are reflected in the Item Under Consideration for agenda Item 3600-6.

Regional Association Comments and Recommendations:
The WWMA noted during its 2016 Annual Meeting the original proposal did not reflect an amendment to A.2. Exceptions, which was adopted at the 2016 NCWM Annual Meeting. The Item under Consideration now reflects the updated paragraph. The WWMA considered this item with Item 3600-6 and forwarded these items to the NCWM, recommending them as Voting items. The WWMA further recommended that both items be voted upon in a single Vote of NCWM.

The CWMA supports the USNWG and believes this item is fully developed. The CWMA recommended this item be a Voting item at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting.

The SWMA batched Items 3504-1 and 3600-6 together at its 2016 Annual Meeting and heard comments for both items at the same time. Mr. Bob O'Leary (Uber) stated the USNWG had developed a new code over the last year. He further stated that the USNWG has come to consensus with this draft code and believes it is ready for a Vote. Mr. O'Leary concluded by stating he is looking forward to its adoption in July. Mr. James Cassidy (Cambridge, Massachusetts) spoke in support of these items and noted the code is a tentative code, which needs to be adopted. Ms. Kristin Macey (California) noted that both she and Mr. Cassidy were a part of this process within the WG and stated the code has been vetted at all levels of government, in particular those who conduct taximeter testing. She further noted this new technology is a system and not a device. Ms. Macey concluded by stating this new type of system must be tested using transfer standards. The SWMA believes this item is fully developed and forwarded it to NCWM, recommending Voting status.

At its fall 2016 Interim Meeting, NEWMA reported it believes the item is ready for adoption and forwarded it to the NCWM, recommending Voting status. At its spring 2016 Annual Meeting NEWMA recommended removing the proposed definition of a transfer standard and that the item then be forwarded to the NCWM as a Voting item.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

3504-2 V USNWG ON TAXIMETERS – TAXIMETER CODE REVISIONS AND GLOBAL POSITIONING SYSTEM-BASED SYSTEMS FOR TIME AND DISTANCE MEASUREMENT

Note: This item was originally titled "Item 360-5, S.5. Provision for Security Seals" in the Committee's 2013 Interim Agenda. At the 2013 NCWM Interim Meeting, the Committee combined that item with "Item 354-1, Global Positioning Systems for Taximeters" and "Item 360-6, Global Positioning Systems for Taximeters" to create this new, consolidated item to address the development of recommendations on multiple topics related to taximeters and GPS-based time and distance measuring systems.

(This item was adopted.)

Source:
NIST USNWG on Taximeters

Purpose:
Revise the Taximeters Code to be applicable and appropriate for current technology and eliminate disparities between this code and the newly proposed Transportation Network Measuring Systems (TNMS) Code.

Item under Consideration:
Amend NIST Handbook 44, Taximeters Code as follows:

Section 5.54. Taximeters

A. Application

A.1. General. – This code applies to taximeters; that is, to devices that automatically calculates at a predetermined rate or rates and indicate the charge for hire of a vehicle.

A.2. Exceptions. – This code does not apply to:

(a) Odometers on vehicles that are rented on a distance basis (for which see Section 5.53. Code for Odometers).

(b) Devices that only display a flat rate or negotiated rate.

<u>(c) Transportation Network Measurement Systems (for which see Section 5.XX. Transportation Network Measurement Systems).</u>

(Amended 1977**<u>,</u>** ~~**and**~~ 2016**<u>, and 20XX</u>**)

A.3. Additional Code Requirements. – In addition to the requirements of this code, Taximeters shall meet the requirements of Section 1.10. General Code.

S. Specifications

S.1. Design of Indicating and Recording Elements.

S.1.1. General. – A taximeter shall be equipped with a primary indicating element.
(Amended 1988 and 2015)

S.1.1.1. Recording Elements. *– A receipt providing information as required in S.1.9. Recorded Representations shall be available from a taximeter or taximeter system through an integral or separate recording element for all transactions conducted.*
[Nonretroactive January 1, 2016]
(Added 2015)

S.1.2. Advancement of Indicating Elements. – Except when a taximeter is being cleared, the primary indicating and recording elements shall be susceptible of advancement only by the movement of the vehicle or by the time mechanism.

At the conclusion of a transaction (e.g., following the totalizing of all accrued charges and having a customer receipt made available), no other advancement of fare, extras or other charges shall occur until the taximeter has been cleared.
[Nonretroactive as of January 1, 2017]

Where permitted, a flat rate or negotiated rate shall be displayed in the "fare" indicating mechanism, provided that once a flat rate or negotiated rate is entered the fare may no longer be advanced by movement of the vehicle or the time mechanism.
(Amended 1988 and 2016)

S.1.2.1. Time Mechanism. – Means shall be provided on all taximeters designed to calculate fares based on a combination of time elapsed and distance traveled, to enable the vehicle operator to render the time mechanism either operative or inoperative with respect to the fare-indicating mechanism.
(Added 20XX)

S.1.2.2. Distance Mechanism. – Means shall be provided on all taximeters designed to calculate fare based on a combination of time elapsed and/or distance traveled to enable the vehicle operator to render the distance mechanism either operative or inoperative with respect to the fare-indicating mechanism.
[Nonretroactive as of January 1, 20XX]
(Added 20XX)

S.1.3. Visibility of Indications.

S.1.3.1. Taximeter Indications. – The indications of fare, including extras, and the mode of operation, such as "time" or "hired," shall be constantly displayed whenever the meter is in operation. All indications of passenger interest shall be easily read from a distance of 1.2 m (4 ft) under any condition of normal operation. **This includes any necessary lighting, shading or other means necessary to make displayed indications clearly visible to operator and passenger.**
(Amended 1977, 1986, ~~and~~ 1988 **and 20XX**)

S.1.3.~~1~~2. Minimum Height of Figures, Words, and Symbols. – The minimum height of the figures used to indicate the fare shall be 10 mm and for extras, 8 mm. The minimum height of the figures, words, or symbols used for other indications, including those used to identify or define, shall be 3.5 mm.
(Added 1986)

~~***S.1.3.2. Lighting of Indications. – Integral lighting shall be provided to illuminate the fare, extras, the rate or rate code, and the taximeter status (i.e., vacant, hired, and time off).***~~
~~***[Nonretroactive as of January 1, 1989]***~~

~~**(Added 1988) (Amended 1990)**~~

S.1.3.3. Passenger's Indications. *– A supplementary indicating element installed in a taxi to provide information regarding the taxi service to the passenger* ***(i.e., Passenger Information Monitor or PIM)****, shall clearly display the current total of all charges incurred for the transaction. The accruing total of all charges must remain clearly visible on the passenger's display (unless disabled by the passenger) at all times during the transaction.*
[Nonretroactive as of January 1, 2016]

(Added 2015) **(Amended 20XX)**

S.1.3.3.1. Additional Information. – *Additional information shall be displayed or made available through a passenger's indicating element (as described in S.1.3.3. Passenger's Indications) and shall be current and reflect any charges that have accrued. This additional information shall include:*

(a) an itemized account of all charges incurred including fare, extras, and other additional charges; and

(b) the rate(s) in use at which any fare is calculated.

Any additional information made available must not obscure the accruing total of charges for the taxi service. This additional information may be made accessible through clearly identified operational controls (e.g., keypad, button, menu, touch-screen).
[Nonretroactive as of January 1, 2016]

(Added 2015)

S.1.3.3.2. Fare and Extras Charges. – *The indication of fare and extras charges on a passenger's indicating element shall agree with similar indications displayed on all other indicating elements in the system.*
[Nonretroactive as of January 1, 2016]

(Added 2015)

S.1.4. Actuation of Fare-Indicating Mechanism. – When a taximeter designed to calculate fares upon the basis of a combination of distance traveled and time elapsed **but not both time and distance used concurrently to calculate fare,** is operative with respect to fare indication, the fare-indicating mechanism shall be actuated by the distance mechanism whenever the vehicle is in motion at such a speed that the rate of distance revenue equals or exceeds the time rate, and may be actuated by the time mechanism whenever the vehicle speed is less than this and when the vehicle is not in motion. ~~**Means shall be provided for the vehicle operator to render the time mechanism either operative or inoperative with respect to the fare-indicating mechanism.**~~

(Amended 1977 **and 20XX**)

S.1.5. Operating Condition.

S.1.5.1. General. – When a taximeter is cleared, the indication "Not Registering," "Vacant," or an equivalent expression shall be shown. Whenever a taximeter is set to register charges, it shall indicate "Registering," "Hired," or an equivalent expression and the rate at which it is set shall be automatically indicated (Rate 1 or Rate A, for example).

(Amended 1988)

S.1.5.2. Time not Recording. – When a taximeter is set for fare registration with the time mechanism inoperative, it shall indicate "Time Not Recording" or an equivalent expression.

(Amended 1988)

S.1.5.3. Distance not Recording. – When a taximeter is set for fare registration with the distance mechanism inoperative, it shall indicate "Distance Not Recording" or an equivalent expression. [Nonretroactive as of January 1, 20XX]

(Added 20XX)

S.1.6. Fare Identification. – Fare indications shall be identified by the word "Fare" or by an equivalent expression. Values shall be defined by suitable words or monetary signs.

S.1.7. Extras. – Extras shall be indicated as a separate item and shall not be included in the fare indication. They shall be identified by the word "Extras" or by an equivalent expression. Values shall be defined by suitable words or monetary signs. Means may be provided to totalize the fare and extras if the totalized amount returns to separate indications of fare and extras within 5 seconds or less.

(Amended 1988)

S.1.7.1. Nonuse of Extras. – If and when taximeter extras are prohibited by legal authority or are discontinued by a vehicle operator, the extras mechanisms shall be rendered inoperable or the extras indications shall be effectively obscured by permanent means.

S.1.8. Protection of Indications. – All indications of fare and extras shall be protected from unauthorized alteration or manipulation.

(Amended 2015)

S.1.9. Recorded Representation. *– A printed **or electronic** receipt issued from a taximeter, whether through an integral or separate recording element, shall include as a minimum, the following information when processed through the taximeter system:*

(a) date;

*(b) unique vehicle identification number, such as the medallion number, taxi number, vehicle identification number (VIN), permit number, or other identifying information as specified by the statutory authority;**

*(c) start and end time of the trip;**

*(d) distance traveled, maximum increment of 0.1 km (0.1 mi);**

(e) fare in $;

*(f) each rate at which the fare was computed and the associated fare at that rate;**

*(g) additional charges (in $) where permitted such as extras, any surcharges, telecommunication charges, and taxes shall be identified and itemized;**

*(h) total charge for service in $ (inclusive of fare, extras, and all additional charges);**

*(i) trip number, if available;** ~~and~~*

*(j) telephone number (or other contract information) for customer assistance~~.~~**;**** **and***

(k) a statement of chargeable time and chargeable distance for taximeters that calculate fare using time and distance concurrently.***

Note: When processed through the taximeter or taximeter system, any adjustments (in $) to the total charge for service including discounts, credits, and tips shall also be included on the receipt.**
*[Nonretroactive as of January 1, 1989] *[Nonretroactive as of January 1, 2000]*
[Nonretroactive as of January 1, 2016] ******[Nonretroactive as of January 1, 20XX]***

(Added 1988) (Amended 1999**, ~~and~~** 2015**, and 20XX**)

S.1.9.1. Multiple Recorded Representations.

S.1.9.1.1. Duplicate Receipts. *– A recording element may produce a duplicate receipt for the previous transaction provided the information printed is identical to the original with the exception of time issued. The duplicate receipt shall include the words "duplicate" or "copy." The feature to print a duplicate receipt shall be deactivated at the time the meter is hired for the next fare.*
[Nonretroactive as of January 1, 2000]

(Added 1999)

S.1.10. Non-fare Information. *– The fare and extras displays may be used to display auxiliary information provided the meter is in the vacant condition and such information is only displayed for10 seconds, or less. If the information consists of a list of information, the list may be displayed one item after another, provided that each item is displayed for 10 seconds, or less.*
[Nonretroactive as of January 1, 2002]

(Added 2000)

S.2. Basis of Fare Calculations. – A taximeter shall calculate fares only upon the basis of:

(a) distance traveled;

(b) time elapsed; or

(c) a combination of distance traveled and time elapsed.

A taximeter may utilize more than one rate to calculate the fare during a trip. Any change in the applied rate must occur at the completion of the current interval.
(Amended 1977 and 2016)

S.2.1. Initial Time and Distance Intervals. – The time and distance intervals of a taximeter **that does not calculate fares based on distance travelled and time elapsed used concurrently** shall be directly proportional as expressed in the following formula:

$$\frac{\textit{Seconds of Initial Time Interval}}{\textit{Seconds per Non-Initial Time Interval}} = \frac{\textit{Distance of Initial Mileage Interval}}{\textit{Distance per Non-Initial Mileage Interval}}$$

(Added 1990) **(Amended 20XX)**

S.3. Design of Operating Control.

S.3.1. Positions of Control. – The several positions of the operating controls shall be clearly defined and shall be so constructed that accidental or inadvertent changing of the operating condition of the taximeter is improbable. Movement of the operating controls to an operating position immediately following movement to the cleared position shall be delayed enough to permit the taximeter to come to a complete rest in the cleared position.
(Amended 1988)

S.3.2. Control for Extras Mechanism. – The knob, handle, or other means provided to actuate the extras mechanism shall be inoperable whenever the taximeter is cleared.

S.4. Interference. – The design of a taximeter shall be such that **when a fare is calculated by using time and/or by using distance (but not used concurrently)** there will be no interference between the time and the distance portions of the mechanism device at any speed of operation.

(Amended 1977**,** ~~**and**~~ 1988 **and 20XX**)

~~**S.5. Provision for Security Seals. – Adequate provision shall be made to provide security for a taximeter. Security may be provided either by:**~~

~~**(a) Affixing security seals to the taximeter and to all other components required for service operation of a complete installation on a vehicle, so that no adjustments, alterations, or replacements affecting accuracy or indications of the device or the assembly can be made without mutilating the seal or seals; or**~~

~~**(b) Using a combination of security seals described in paragraph (a) and, in the case of a component that may be removed from a vehicle (e.g., slide mounting the taximeter), providing a physical or electronic link between components affecting accuracy or indications of the device to ensure that its performance is not affected and operation is permitted only with those components having the same unique properties.**~~

~~**The sealing means shall be such that it is not necessary to disassemble or remove any part of the device or of the vehicle to apply or inspect the seals.**~~

~~**(Amended 1988 and 2000)**~~

S.5. Provisions for Security Sealing. – Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that requires the security seal to be broken before an adjustment or interchange can be made of:

(a) any metrological parameter affecting the metrological integrity of the taximeter and associated equipment; or

(b) any metrological parameter controlled by software residing in the taximeter or an associated external computer network.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

[Audit trails shall use the format set forth in Table S.5.]

(Added 20XX)

S.5.1. Taximeters Connected to Networked Systems. – Metrological features that are not located on the taximeter device installed in the vehicle (i.e., accessed through a computer network, server, or "cloud") shall be secured by means that will:

(a) protect the integrity of metrological data and algorithms used to compute fares from such data against unauthorized modification; and

(b) use software-based access controls or equivalent technological protections that limit access to metrological data and algorithms used to compute fares from such data only to authorized persons.

(Added 20XX)

S.5.2. Taximeters Calibrated to Specific Vehicles. – In the case of taximeters where the proper performance and calibration of the device has been verified when used in a specific vehicle and which may be removed from the vehicle (e.g., slide mounting the taximeter), means shall be provided through a physical seal or electronic link between components affecting accuracy or indications of the device to ensure

that its performance is not affected and operation is permitted only with those components having the same unique properties.

(Added 20XX)

Table S.5. Categories of Devices and Methods of Sealing

Categories of Device	***Methods of Sealing***
Category 1: No remote configuration capability.	***Seal by physical seal or a combination of physical seals and for components that may be removed from the vehicle, a physical or electronic link as described in S.5.3. Taximeters Calibrated to Specific Vehicles***
Category 2: Remote access to adjustable parameters, but access is controlled by physical hardware. ***The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode. The device shall not operate as normal when in the configuration mode.***	***The hardware enabling access for remote access to calibration functions must be at the device and sealed using a physical seal and also include an event logger.*** ***An event logger must also be used to record changes to configuration parameters made through remote access.*** ***The event loggers must include event counters (minimum count of 1000 events), the parameter ID, the date and time of the change, and the new value of the parameter. A printed or electronic copy of the information must be available through the device. The event loggers shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1000 records are required.*** ***(Note: Does not require 1000 changes to be stored for each parameter.)***
Category 3: Remote access to adjustable parameters. ***Remote access to adjustable parameters may be unlimited or controlled through a software switch (e.g., password).*** ***The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode. The device shall not operate as normal when in the configuration mode.***	***An event logger must also be used to record changes to adjustable parameters that are made through remote access and which is accessible only by authorized persons (using an internet web browser or other such secure software.*** ***The event logger shall include event counters, the date and time of the change, the parameter ID and the new value of the parameter. A printed or electronic copy of the information must be available through the device. The event loggers shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1000 records are required.*** ***(Note: Does not require 1000 changes to be stored for each parameter.)*** ***The device shall become inoperable when access to the system's metrological parameters is made through unapproved or unauthorized means. The device shall remain inoperable until cleared by the official having statutory authority.***

[Nonretroactive as of January 1, 20XX]

S.6. Power Interruption, Electronic Taximeters.

(a) After a power interruption of 3 seconds or less, the fare and extras indications shall return to the previously displayed indications and may be susceptible to advancement without the taximeter being cleared.

(b) After a power interruption exceeding 3 seconds, the fare and extras indications shall return to the previously displayed indications and shall not be susceptible to advancement until the taximeter is cleared.

*After restoration of power following an interruption exceeding 3 seconds, the previously displayed fare shall be displayed for a maximum of 1 minute at which time the fare shall automatically clear and the taximeter shall return to the vacant condition.**
*[*Nonretroactive as of January 1, 2002]*

(Added 1988) (Amended 1989, 1990, and 2000)

S.7. Measurement Signal Loss. – In the event that the measurement signal is interrupted, the taximeter shall be capable of determining any information needed to complete a transaction in progress at the time of signal loss/interruption.

Note: If the meter ceases to increment fare based on distance, the taximeter may continue to increment fare based on elapsed time if the time mechanism is not affect by signal loss.

(Added 20XX)

S.7.1. Intermittent Trip Data Loss. – When the measurement signal is lost intermittently during a trip (e.g., traveling through a tunnel) but recovered prior to the end of the trip, the taximeter shall be capable of calculating an accurate fare in accordance with T.1. Tolerance Values.

(Added 20XX)

S.7.2. Significant Trip Data Loss. – When the signal is lost for a significant portion of the trip, the taximeter shall calculate the total charge utilizing recorded time and distance measurements and other charges (e.g., tolls and airport fees), and may also include other means in accordance with the terms of service (or other agreement) the passenger has agreed to.

Note: Significant trip data loss refers to instances when the measurement signal is lost to the extent that the taximeter cannot perform an accurate measurement or when the signal is not regained by the end of the trip.

(Added 20XX)

S.~~7~~8. Anti-Fraud Provisions, Electronic Taximeters. – An electronic taximeter may have provisions to detect and eliminate distance input that is inconsistent with **~~output of the vehicle's distance sensor~~the taximeters's source(s) of distance measurement data**. When a taximeter equipped with this feature detects input inconsistent with the distance **~~sensor~~measurement data source(s)**:

(a) The meter shall either filter out the inconsistent distance input signals or cease to increment fare based on distance until the distance input signal **~~returns to normal~~ is restored to normal operation**. If the meter ceases to increment fare based on distance, the taximeter may continue to increment fare based on elapsed time **where permitted by the statutory authority and if the time mechanism is not affected by inconsistent signals**;

(b) The taximeter shall povide a visible or audible signal that inconsistent input signals are being detected; and

(c) The taximeter shall record the occurrence in an event logger. The event logger shall include an event counter **~~(000 to 999)~~**, the date, and the time of at least the last 1000 occurrences.

(Added 2001) **(Amended 20XX)**

N. Notes

N.1. Distance Tests.

N.1.1. Test Methods. – To determine compliance with distance tolerances, a distance test of a taximeter shall be conducted utilizing one or more of the following test methods:

(a) **Road Test. –** A road test consists of driving the vehicle over a precisely measured road course.

(b) **Fifth-Wheel Test.** – A fifth-wheel test consists of driving the vehicle over any reasonable road course and determining the distance actually traveled through the use of a mechanism known as a "fifth wheel" that is attached to the vehicle and that independently measures and indicates the distance.

(c) **Simulated-Road Test.*** – A simulated road test consists of determining the distance traveled by use of a roller device, or by computation from rolling circumference and wheel-turn data.

***Simulated-road testing is not appropriate for taximeters using measurement data from sources other than signal(s) generated by rotation of the wheels of the vehicle.**

(Amended 1977 **and 20XX**)

N.1.2. Test Procedures. – The distance test of a taximeter, whether a road test, a simulated-road test, or a fifth-wheel test, shall include at least duplicate runs of sufficient length to cover at least the third money drop or 1 mi, whichever is greater, and shall be at a speed approximating the average speed traveled by the vehicle in normal service. In the case of metric-calibrated taximeters, the test should cover at least the third money drop or 2 km, whichever is greater.

(Amended 1977)

N.1.2.1. Taximeters Using Measurement Data Sources from Other Than Rotation of the Wheels. – Repeatability testing shall be conducted if during testing a taximeter registers a distance measurement that does not comply with the tolerance values in T.1.1. Distance Tests. A minimum of three additional tests shall be conducted at the same location and where all test variables are reduced to the greatest extent practicable to verify the sytems ability to repeat transaction indications. Repeatability testing performed in excess of these three additional tests is done at the discretion of the official with statutory authority.

Testing of taximeters with metrologically significant parameters that do not completely reside within the taximeter device shall include tests performed under variable conditions to verify that any non-compliant issue is generated from a network system rather than a single taximeter device. The variability tests shall include a minimum of three consecutive tests of varying lengths, locations, and/or environmental conditions.

(Added 20XX)

N.1.3. Test Conditions.

N.1.3.1. Measurement Data Based on the Rotation of the Vehicle's Wheels. – For taximeters that receive input of measurement data generated (directly or indirectly) from rotation of the vehicle's wheels, the test of the taximeter shall be performed under the following conditions.

(Added 20XX)

N.1.3.1.1. Vehicle Lading. – During the distance test of a taximeter, the vehicle shall carry two persons, or in the case of a simulated-road test, 70 kg or 150 lb of test weights may be substituted in lieu of the second person.

N.1.3.1.2. Tire Pressure. – At the completion of test run or runs, the tires of the vehicle under test shall be checked to determine that the tire pressure is that operating tire pressure posted in the vehicle. If not, the tire pressure should be adjusted to the posted tire pressure and further tests may be conducted to determine the operating characteristics of the taximeter.

(Amended 1977 **and 20XX**)

N.1.3.2. Taximeters Using Other Measurement Data Sources. - Except during type evaluation, all tests shall be performed under conditions that are considered usual and customary for the location(s) where the system is normally operated and as deemed necessary by the statutory authority.

(Added 20XX)

N.1.3.2.1. Roads. - All tests shall be conducted on public roads.

(Added 20XX)

N.1.3.2.2. Testing for Environmental Influences. – During type evaluation, the distance test may be performed on a route traveled by the vehicle that exposes the system to conditions possibly contributing to the loss of, or interference with the signal(s) providing measurement data. This may include:

(a) Objects that may obstruct or reflect signals such as tall buildings/structures, forestation, tunnels, etc.;

(b) Routes that do not follow a straight-line path;

(c) Significant changes in altitude; and

(d) Any other relevant environmental conditions.

(Added 20XX)

N.2. Time Test. – If a taximeter is equipped with a timing device through which charges are made for time intervals, the timer shall be tested at the initial interval, four separate subsequent intervals, and an average time test of at least four consecutive subsequent time intervals.

(Amended 1988)

N.3. Interference Test. – ~~**If a taximeter is equipped with a timing device through which charges are made for time intervals**~~**For taximeters that calculate fares based on time and/or distance but not simultaneously**, a test shall be conducted to determine whether there is interference between the time and distance elements. During the interference test, the vehicle's operating speed shall be 3 km/h or 4 km/h, or 2 mi/h or 3 mi/h faster**, and then 3 km/h or 4 km/h (2mi/h or 3 mi/h) slower** than the speed at which the basic distance rate equals the basic time rate. The basic rate per hour divided by the basic rate per mile is the speed (km/h or mi/h) at which the basic time rate and basic distance rate are equal.

Note: Performance of the interference test may not be considered appropriate as a field test while travelling in a vehicle equipped with a taximeter. This test may be performed during type evaluation under controlled conditions for practicality and for safety concerns.

(Amended 1988 **and 20XX**)

T. Tolerances

T.1. Tolerance Values.

T.1.1. On Distance Tests. – Maintenance and acceptance tolerances for taximeters shall be as follows:

(a) On Overregistration: 1 % of the interval under test.

(b) On Underregistration: 4 % of the interval under test, with an added tolerance of 30 m or 100 ft whenever the initial interval is included in the interval under test.

T.1.2. On Time Tests.

T.1.2.1. On Individual Time Intervals. – Maintenance and acceptance tolerances on individual time intervals shall be as follows:

(a) On Overregistration: 3 seconds per minute (5 %).

(b) On Underregistration: 9 seconds per minute (15 %) on the initial interval, and 6 seconds per minute (10 %) on subsequent intervals.

T.1.2.2. On Average Time Interval Computed After the Initial Interval. – Except for the initial interval, maintenance and acceptance tolerances on the average time interval shall be as follows:

(a) On Overregistration: 0.2 second per minute (0.33 %).

(b) On Underregistration: 3 seconds per minute (5 %).

(Amended 1991)

T.1.3. On Interference Tests. – For taximeters designed to calculate fares upon the basis of a combination of distance traveled and time elapsed, but not using both simultaneously.

(Added 1998) (Amended 20XX)

T.1.3.1. The **distance** registration of a taximeter in the "time on" position shall agree within 1 % of its ~~**performance**~~ **distance registration** in the "time off" position.

(Amended 20XX)

T.2. Tests Using Transfer Standards. – To the basic tolerance values that would otherwise be applied, there shall be added an amount equal to two times the standard deviation of the applicable transfer standard (i.e., fifth-wheel) when compared to a basic reference standard.

(Added 20XX)

UR. User Requirements

UR.1. Inflation of Vehicle Tires. – For taximeters that receive input of measurement data generated (directly or indirectly) from rotation of the vehicle's wheels, ~~T~~**t**he operational tire pressure of passenger vehicles and truck tires shall be posted in the vehicle and shall be maintained at the posted pressure.

(Amended 1977 **and 20XX**)

UR.2. Position and Illumination of Taximeter. – A taximeter shall be so positioned and illuminated that its indications, operational markings, and controls of passenger interest can be conveniently read by a passenger seated

~~in the back seat of the vehicle~~ **in a position of up to 1.2 meters (4 ft.) away from the taximeter under any condition of normal operation.**

(Amended 1985**,** ~~and~~ 1986 **and 20XX**)

UR.3. Statement of Rates. – The distance and time rates for which a taximeter is set, including the initial distance interval and the initial time interval, the local tax rate, and the schedule of extras when an extras indication is provided shall be conspicuously displayed inside the front and rear passenger compartments. The words "Rate," "Rates," or "Rates of Fare" shall precede the rate statement. The rate statement shall be fully informative, self-explanatory, and readily understandable by the ordinary passenger, and shall either be of a permanent character or be protected by glass or other suitable transparent material.

(Amended 1977, 1988, 1990, and 1999)

Appendix D

location services. – any of the various technologies used to determine the geographical location of a receiving unit in or physically attached to a vehicle. These technologies may include but are not limited to: Global Positioning Service; cellular networks; wi-fi networks. [5.54., 5.XX.]

Background/Discussion:

The Committee has received multiple proposals over the past several years related to updating the NIST Handbook 44, Taximeters Code to reflect current technology as well as a request to establish criteria for GPS-based time and distance measuring systems used in transportation and other applications. In April 2012, NIST, OWM established a U.S. National Working Group to work on these issues.

The USNWG on Taximeters has submitted a number of proposed changes to the NIST Handbook 44, Taximeters Code over the past two to three years. These initial changes were focused primarily on updating the code to account for the use of more advanced equipment (e.g., Passenger Information Monitors or PIMs, Mobile Data Terminals or MDTs, credit card readers, printers).

More recently, the WG's efforts were focused on the development of standards intended for "transportation network measurement systems" (TNMS) that calculate passenger fares based on time and distance derived from location services. A characteristic of TNMS that prompted the WG to develop separate requirements was the manner in which the consumer (rider) acquired this type of service and the means provided as an interface between rider, driver, and transportation network company. This interface is typically in the form of a software application program or "app." The recognition that the TNMS are almost entirely software-based was another factor that moved the USNWG to develop a separate set of requirements for these systems. The proposal for this new TNMS code has been submitted for consideration as a new item in the S&T Committee.

During the USNWG meeting discussions, the WG members recognized when developing new requirements for TNMS or modifying requirements for taximeters, there was a potential risk of creating unintended, unfair advantages for either type of device. Since these devices are used to calculate charges for the same type of service, the WG believed there should be a parallel set of requirements.

The USNWG members also recognized the traditional-type of taximeters were evolving in such a way that would incorporate some of the technologies used within TNMS and the differences between the two types of devices/system were becoming less clearly defined. This prompted the WG to develop the two separate codes in some ways where they will mirror each other in certain sections. The USNWG has now finalized a draft for proposed changes in the NIST Handbook 44, Taximeters Code which is being submitted for consideration as a Voting item.

During the 2017 NCWM Interim Meeting, the Committee received numerous comments in support of this item from industry representatives and regulatory officials alike recommending it be presented for Vote at the upcoming NCWM Annual Meeting.

Mr. John Barton (NIST, OWM and NIST Technical Advisor to the USNWG on Taximeters) stated this proposal is intended to address the use of evolving technologies in the taxi industry and these proposed changes were also developed to mitigate or eliminate any possible disparity between NIST Handbook 44 requirements applicable to taximeters and the new requirements being proposed in the Transportation Network Measurement Systems (TNMS) Code under S&T Item 3600-6. Mr. Barton noted NIST, OWM acknowledges the importance of establishing parallel standards that facilitate fair and equal regulation of devices and systems being used in the same or similar types of services, such as taximeters used by the traditional taxi industry and the use of TNMS by Transportation Network Companies (TNCs). OWM believes that if a new Handbook 44, TNMS Code is adopted (as is being proposed under Item 3600-6), the changes being recommended in the existing Handbook 44, Taximeters Code are necessary to maintain an equitable balance in the application of regulatory standards for both types of transportation services.

Mr. Barton noted many of the changes being proposed are intended to facilitate the use of location services (such as GPS) by taximeters to determine distance travelled. Other proposed changes would allow taximeters to calculate fare charges using time elapsed and distance travelled simultaneously. These features are characteristically found in TNMS and the changes, if adopted, would also allow this in taximeters and would permit taximeters to compete on a more equal basis. Other changes proposed in this item would account for the use of software applications or “apps” installed on passenger-owned devices as a convenience to customers of taxi services. Reportedly, some taxi services are already offering this type of feature, and OWM believes taxi services should be permitted to use the same type of technology being used by TNCs in their products.

Mr. Barton also stated OWM sees a benefit in the changes proposed that would allow taximeters to be sealed by other than physical means. Other commercial weighing and measuring devices have been permitted to use electronic forms of security seals and, recognizing the technological evolution of taximeters and their increasing use of software (as in all other types of devices), it is considered reasonable to permit this method of sealing in taximeters.

Many of the proposed changes will expressly permit taxis to expand their functionality by using non-traditional technologies. Some changes being proposed in the existing NIST Handbook 44, Taximeters Code are restrictive in nature and would require taximeters to comply with requirements that correspond to requirements found in the proposed new TNMS Code.

Mr. Barton also reported that OWM believes adding a definition in Handbook 44, Appendix D as proposed in this item would be of benefit and will provide a clear understanding for the use of the term “location services.” It is recognized there are a number of systems and networks, which can be used in place of or in conjunction with GPS, to locate a geographical position of a for-hire vehicle. Simply using “GPS” to refer to any of services/systems that could be used to calculate distance travelled is overly simplistic and likely often incorrect. Since this term is being proposed to be included in both the amended Taximeters Code and the proposed new TNMS Code, it is considered a necessary change to NIST Handbook 44.

Mr. Stan Toy (Santa Clara County Weights and Measures, California) stated he had concerns similar to those made evident in comments he had provided regarding the draft tentative TNMS code proposed in agenda Item 3600-6 with some of the proposed requirements in the existing Taximeters Code. He reiterated concerns he had with:

- the number of tests required under proposed new paragraph N.1.2.1. Taximeters Using Measurement Data Sources Other Than Rotation of Wheels to be able to reject a device for failing performance requirements;
- having to conduct tests on “public roads” that are in “good repair” as specified in proposed new paragraph N.1.3.2.1. Roads; and
- neglecting to include limits on the frequency of signal loss in proposed new paragraph S.7.2. Significant Trip Data Loss.

Mr. Barton noted that significant trip data loss is invariably going to occur in places where the signal is lost, to which Mr. Toy responded he understands there will be instances where the signal is lost; his concern is how often it occurs.

In consideration of the comments received on this item, the Committee agreed to present if for Vote at the upcoming 2017 NCWM Annual Meeting.

At the 2017 NCWM Annual Meeting, the Committee received numerous comments in support of this item from industry representatives and regulatory officials alike recommending it to remain Voting.

Mr. John Barton (NIST, OWM) provided background information from the USNWG on taximeters and stated the workgroup supports this item. He further noted that, if it would move the item forward, the workgroup agreed to remove the term "transfer standard" from the definitions section and to remove the words, "which are in good repair" from paragraph N.1.3.2.1.

Mr. Henry Oppermann (Weights and Measures Consulting, LLC) noted the term "transfer standard" was used three times throughout the item but wasn't terribly concerned.

Ms. Kristin Macey stated California allows taxi companies to use any technology for the determination of time and distance, so long as the device is approved.

Mr. Stan Toy (Santa Clara County Weights and Measures, California) stated that he had concerns similar to those made evident in comments he had provided regarding the draft tentative TNMSs code proposed in agenda Item 3600-6. He then reiterated concerns he had expressed at the 2017 NCWM Interim Meeting.

Mr. Curt Floren (Los Angeles County, California) asked questions about the validity or necessity of three additional tests if the first one fails. Mr. Barton responded that the multiple tests would demonstrate repeatability. Mr. Floren then asked if we allow taxis to use similar technology, which code would they fall under? Mr. Barton noted there were no proposed changes to the general application and that the code applies to taximeters, which the USNWG felt was sufficient. Mr. Floren noted that he supported moving the tentative code for transportation network companies forward, but asked for everyone to take a look at paragraph S.5.1 and determine if that language could possibly create confusion regarding which code would apply.

Mr. Bob O'Leary (Uber) responded to Mr. Floren's questions noting the definitions attempt to differentiate from "taximeters" and "transportation network devices." He further noted taxis are based on a relationship with the driver (e.g., have to directly contact the driver), but with a transportation network company, the user has to download an app to use the service.

Mr. James Cassidy (City of Cambridge, Massachusetts) spoke in support of the item.

Mr. Mike Sikula (New York) provided written comments in support of this item.

The Committee, agreed to delete the words, "which are in good repair" from paragraph N.1.3.2.1. as suggested by the USNWG because it felt the determination of whether a road is in good repair would be too arbitrary. The Committee, however, did not believe deletion of the term "transfer standard" from the code, as was also suggested by the USNWG, was a necessary change and, therefore, elected not to delete it anywhere in which it appears in the code. Based on all the comments heard in support of this item, the Committee agreed to present the item for Vote as shown in Item Under Consideration.

Regional Association Comments and Recommendations:
The WWMA did not have the opportunity to review and comment on the updated language for this item at its 2016 Annual Meeting because the USNWG was still considering final language during the WWMA Conference.

The CWMA recommended at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting that this item remain in Developing status. At its 2017 Annual Meeting, an additional recommendation was for this item to remain in a Developing status until such time that paragraph T.2. has been removed. Numerous issues must be resolved regarding the use of transfer standards. Among these issues, the criteria and procedures are needed to specify how the standard deviation of the transfer standard is to be determined.

The SWMA received no comments for this item during its 2016 Annual Meeting. The Committee believes this item is fully developed and recommended Voting status.

NEWMA reported at its fall 2016 Interim Meeting it supports the USNWG and recommended this item be a Voting item. At its spring 2017 Annual Meeting, NEWMA again recommended the item move forward as a Voting item, but without the proposed definition of a "transfer standard."

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

3508 MULTIPLE DIMENSION MEASURING DEVICES

3508-1 V S.1.7. MINIMUM MEASUREMENT ~~LENGTHS~~ AND S.1.8. INDICATIONS BELOW MINIMUM AND ABOVE MAXIMUM

(This item was Adopted.)

Source:
Multiple Dimension Measuring Device (MDMD) WG (2017)

Purpose:
Clarification of the application of the minimum measurement and tare operation.

Item under Consideration:
Amend NIST Handbook 44, Multiple Dimension Measuring Devices Code as follows:

S.1.7. Minimum Measurement ~~Lengths~~. – Except for entries of tare, the minimum **measurement** ~~**length to be measured**~~ by a device is 12 **d** ~~**divisions**~~. The manufacturer may specify a longer minimum **measurement** ~~**length**~~. **For multi-interval devices, this applies only to the first measuring range (segment) of each measurement axis (length, width, and height).**

(Amended 2017)

S.1.8. Indications Below Minimum and Above Maximum. – When objects are smaller than the minimum dimensions identified in paragraph S.1.7. Minimum **Measurement** ~~**Lengths**~~ or larger than any of the maximum dimensions plus 9 d, and/or maximum volume marked on the device plus 9 d, or when a combination of dimensions**, including tare,** for the object being measured exceeds the measurement capability of the device, the indicating or recording element shall either:

(a) not indicate or record any usable values; or

(b) identify the indicated or recorded representation with an error indication.

(Amended 2004 **and 2017**)

Background/Discussion:
The MDMD WG believes that the expansion of S.1.7. to include multi-interval devices with the additional proposed changes provides a better explanation of how to apply the 12-d minimum measurement specification and the application of tare with respect to marked maximum dimension for the axes in which tare was applied.

This proposal also addresses the change in the use of the word "length" and recommends the use of the word "measurement." The WG feels that "measurement" is better suited for all axes.

These proposed changes better harmonize the device specifications with those of Measurement Canada.

2017 NCWM Interim Meeting
At the 2017 NCWM Interim Meeting, the Committee heard comments of support for this item as written from Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA; Ms. Fran Elson-Houston (Ohio Department of Agriculture); and Mr. Richard Suiter (Richard Suiter Consulting).

Mr. Richard Harshman (NIST, OWM) commented that OWM believes the proposed changes to both paragraphs in this proposal are appropriate. The 12-division minimum specified in paragraph S.1.7. is intended to apply not only to the length of an item being measured as is currently specified in the paragraph, but also the width and height of the item. Replacing the word "length" with "measurement" in these two paragraphs will make clear the application of the 12-division minimum measurement to each axis (L, W, and H).

In consideration of the comments received in support of this item, the Committee agreed to recommend the item for a Vote.

At the 2017 NCWM Annual Meeting, the Committee received comments from several interested parties.

Mrs. Tina Butcher (NIST, OWM) clarified that, for multi-interval devices, the minimum measurement (12 d) requirements for each of the measured axis are only applicable to the first measuring range (segment). She further suggested that replacing the word "length" with "measurement" clarifies that the requirements are applicable to each of the measured axis (length, width, and height).

The Committee again heard comments of support for this item as written from Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA; and Ms. Fran Elson-Houston (Ohio Department of Agriculture). Mr. Robert Kennington (Quantronix, Inc.), who is the chair of the MDMD WG, also expressed support for the changes as drafted.

In consideration of the comments heard in support of the item, the Committee agreed to present the item for Vote.

Regional Association Comments and Recommendations:
The WWMA considered this item to be fully developed at its 2016 Annual Meeting and forwarded it to the NCWM, recommending it as a Voting item.

The CWMA believes this item is fully developed and recommended that it be a Voting item at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting.

The SWMA received no comments on this item at its 2016 Annual Meeting. The Committee believes this item is fully developed and recommended Voting status.

NEWMA forwarded this item to the NCWM and recommended Voting status at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting.

3508-2 W T.3. TOLERANCE VALUES (SEE ALSO ITEMS 3200-7, 3201-1, 3204-1, 3205-2, 3509-1 AND 3600-4)

(This item was Withdrawn.)

Source:
Ross Andersen, Retired (2017)

Purpose:
Provide language in this code that is consistent with the General Code.

Item under Consideration:
Amend NIST Handbook 44, Multiple Dimension Measuring Devices (MDMD) Code as follows**:**

> **T.3. Tolerance Values. – The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration**. The maintenance and acceptance tolerance values shall be ~~±~~1 division.

[Note the ± is stricken near the end of the second sentence.]

Background/Discussion:
This item was submitted as one of a group of items that includes agenda Items 3200-7, 3201-1, 3204-1, 3205-2, 3508-2, 3509-1, and 3600-4. The Background/Discussion information is the same for these items and included in agenda Item 3200-7 of this report. At the 2017 NCWM Interim Meeting, the Committee agreed to Withdraw these items in consideration of the comments received during that meeting.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

3509 ELECTRONIC LIVESTOCK, MEAT, AND POULTRY EVALUATION SYSTEMS

3509-1 W T.1. TOLERANCES ON INDIVIDUAL MEASUREMENTS (SEE RELATED ITEMS 3200-7, 3201-1, 3204-1, 3205-2, 3508-2 AND 3600-4)

(This item was Withdrawn.)

Source:
Ross Andersen, Retired (2017)

Purpose:
Provide language in this code that is consistent with the General Code.

Item under Consideration:
Amend NIST Handbook 44, Electronic Livestock, Meat, and Poultry Evaluation Systems Code as follows**:**

> **T.1. Tolerances on Individual Measurements. – The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.** Maintenance and acceptance tolerances on an individual measurement shall be as shown in Table T.1. Tolerances.

Background/Discussion:
This item was submitted as one of a group of items that includes agenda Items 3200-7, 3201-1, 3204-1, 3205-2, 3508-2, 3509-1, and 3600-4. The Background/Discussion information is the same for these items and included in agenda Item 3200-7 of this report. At the 2017 NCWM Interim Meeting, the Committee agreed to Withdraw these items in consideration of the comments received during that meeting.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

3600 OTHER ITEMS

3600-1 D ELECTRIC WATTHOUR METERS CODE UNDER DEVELOPMENT

Source:
NIST, OWM (2016)

Purpose:

- Make the weights and measures community aware of work being done within the U.S. National Work Group (USNWG) on Electric Vehicle Fueling and Submetering to develop proposed requirements for electric watthour meters used in submeter applications in residences and businesses;
- Encourage participation in this work by interested regulatory officials, manufacturers, and users of electric submeters.
- Allow an opportunity for the USNWG to provide regular updates to the S&T Committee and the weights and measures community on the progress of this work;
- Allow the USWNG to vet specific proposals as input is needed.

Item under Consideration:
There is presently no specific item for consideration. This Developing Item is included on the Committee's agenda (and a corresponding item is proposed for inclusion on the L&R Committee agenda) to keep the weights and measures community apprised of USNWG current projects, including the following:

- The USNWG continues to develop recommended test procedures for inclusion in a new EPO 30 for Electric Vehicle Refueling Equipment along with proposed requirements for field test standards.
- The USWNG is continuing work to develop a proposed code for electricity-measuring devices used in sub-metering electricity at residential and business locations. This does not include metering systems under the jurisdiction of public utilities. The USNWG hopes to have a draft code for consideration by the community in the 2016-2107 NCWM cycle.

The USNWG will provide regular updates on the progress of this work and welcomes input from the community.

For additional information, contact USNWG Chairman Tina Butcher at tbutcher@nist.gov or (301) 975-2196 or Technical Advisor, Juana Williams at juana.williams@nist.gov or (301) 975-3989.

Background/Discussion:
In 2012, NIST, OWM formed the USNWG on Electric Vehicle Fueling and Submetering to develop proposed requirements for commercial electricity-measuring devices (including those used in sub-metering electricity at residential and business locations and those used to measure and sell electricity dispensed as a vehicle fuel) and to ensure the prescribed methodologies and standards facilitate measurements that are traceable to the International System of Units (SI).

In 2013, the NCWM adopted changes recommended by the USNWG to the NIST Handbook 130 requirements for the Method of Sale of Commodities to specify the method of sale for electric vehicle refueling. At the 2015 NCWM Annual Meeting, the NCWM adopted NIST Handbook 44, Section 3.40 Electric Vehicle Refueling Systems developed by the USNWG.

The creation of Developing Items on both the L&R and S&T Committee agendas will provide for a venue to allow the USNWG to update the weights and measures community on continued work to develop test procedures and test equipment standards. This item will also provide a forum for reporting on work to develop proposed method of sale requirements for electric watthour meters and a tentative device code for electric watthour meters in residential and business locations and serve as a placeholder for eventual submission of these proposals for consideration by NCWM.

The Committee received an update on this item from Ms. Tina Butcher (NIST, OWM), Chairman of the USNWG on Electric Refueling and Submetering at both the 2016 NCWM Interim and Annual Meetings. See the Committee's 2016 Final Report for details of those updates.

During the 2017 NCWM Interim Meeting, Ms. Tina Butcher, Chairman of the USNWG on Electric Vehicle Refueling and Submetering, provided an update on the progress of the USNWG. She noted that, when the USNWG was initially created, it was charged with addressing *all* electric submeters, including commercial electric vehicle refueling systems as well as commercial utility-type electric watthour meters under the purview of weights and measures jurisdictions (rather than public utility commissions or similar entities). Shortly after beginning its work, the USNWG agreed to focus its initial efforts on developing proposed requirements, test procedures, and field standard criteria for commercial electric vehicle refueling metering systems. In July 2015, after several years of intensive work by the USNWG, a tentative code for electric vehicle refueling systems was presented to and adopted by the NCWM.

In December 2015, the USNWG discussed plans to resume work on electric watthour meter requirements, including the development of a proposed NIST Handbook 44 code. A draft code derived from one initially circulated in 2014 was re-distributed to the USNWG in December 2015, with a deadline for comments in February 2016. This deadline was ultimately extended to March 2016 at the request of some WG members. The USNWG recently agreed upon revisions to its charter, which includes dividing the larger USNWG into two parts: one to address Electric Vehicle Refueling Equipment and the other to address Electric Watthour Metering Systems. NIST, OWM continues to analyze and compile comments received on the draft code.

Work continues on test equipment standards and test procedures for Electric Vehicle Refueling Equipment, under a subcommittee, Chaired by Mr. Ted Bohn, (Argonne National Laboratory), within the original USNWG. The USNWG's next step is to reconvene the USNWG and begin review of the comments on the draft watthour meters code. The Technical Advisor to the USNWG, Ms. Juana Williams, will be polling members on dates for 1) a short, web-based conference to review the overall plan for drafting requirements and procedures for watthour meters; and 2) an in-person meeting to begin reviewing and discussing comments received on the draft NIST Handbook 44 watthour meters code and agreeing upon needed changes. NIST, OWM appreciates the diligent work of the USNWG members in collaborating on the development of these much-needed standards.

Those interested in the work can contact Ms. Tina Butcher, Chairman, at tbucher@nist.gov or Ms. Juana Williams, Technical Advisor, at jwilliams@nist.gov.

At the 2017 NCWM Annual Meeting, the Committee received an update on this item from Ms. Tina Butcher (NIST, OWM and Chairman of the USNWG on Electric Vehicle Refueling and Submetering) very similar to the one she provided during the 2017 NCWM Interim Meeting. In addition to explaining the charge of the USNWG on Electric Vehicle Refueling and Submetering and providing an historical account of its significant accomplishments and its current focus, she also announced that the first face-to-face meeting of the Watthour Type Electric Meter (WHE) Subgroup will be held September 12 - 14, 2017, in Sacramento, California, and the work continues on test equipment standards and test procedures for Electric Vehicle Refueling Systems.

The Committee agreed to maintain its developing status on this item based on the update provided and the ongoing work of the USNWG.

Regional Association Comments and Recommendations:
The WWMA believes this item should remain a Developing item as the USNWG continues its work.

The CWMA supports the continued development of this item and recommends it remain in a Developing status.

The SWMA received a request from Ms. Tina Butcher (NIST, OWM) that the item remain Developing and provided a history of the USNWG. The SWMA looks forward to the progress of the USNWG and recommended the item remain in Developing status.

NEWMA supports the continued development of this item.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

3600-2 D APPENDIX A FUNDAMENTAL CONSIDERATIONS: SECTION 4.4. GENERAL CONSIDERATIONS (SEE RELATED ITEMS 3100-1 AND 3200-5)

Source:
Ross Andersen, Retired (2017)

Purpose:
Address the application of the code requirements across multiple devices.

Item under Consideration:
Amend NIST Handbook 44, Appendix A. Fundamental Considerations as follows:

> **4.4. General Considerations.** – The simpler the commercial device, the fewer are the specification requirements affecting it, and the more easily and quickly can adequate inspection be made. As mechanical complexity increases, however, inspection becomes increasingly important and more time consuming, because the opportunities for the existence of faulty conditions are multiplied. It is on the relatively complex device, too, that the official must be on the alert to discover any modification that may have been made by an operator that might adversely affect the proper functioning of the device. **Code requirements in the Handbook are applied only to a single device or system, unless specifically stated in the code. An electronic sum of measured values from multiple devices is not subject to code requirements, except that it be mathematically correct (i.e., add up to the proper sum) – See General Code G-S.5.2.2.(e).**
>
> It is essential for the officials to familiarize themselves with the design and operating characteristics of the devices that he inspects and tests. Such knowledge can be obtained from the catalogs and advertising literature of device manufacturers, from trained service persons and plant engineers, from observation of the operations performed by service persons when reconditioning equipment in the field, and from a study of the devices themselves.
>
> Inspection should include any auxiliary equipment and general conditions external to the device that may affect its performance characteristics. To prolong the life of the equipment and forestall rejection, inspection should also include observation of the general maintenance of the device and of the proper functioning of all required elements. The official should look for worn or weakened mechanical parts, leaks in volumetric equipment, or elements in need of cleaning.

Background/Discussion:
The submitter modified the proposal after the 2016 WWMA meeting. The Item under Consideration now represents the revised version. The original was presented at WWMA was as follows:

> **4.4. General Considerations. – Code requirements are applied only to a single device or system, unless specifically stated in the code. The official may encounter equipment where the digital indications from more than one device are electronically summed. This may be done in multiple ways. Each device may have its own indicating element and the sum is indicated on a separate, associated indicator which is interfaced directly with each device (i.e., a computer or console via cable or even Bluetooth wireless communication). The indicating elements of the individual devices may be enclosed in a single housing, with separate indicators for each device and a separate indicator for the electronic sum. An electronic sum of measured values from multiple devices is not subject to code requirements, except that it be mathematically correct (i.e., add up to the proper sum) – See General Code G-S.5.2.2.(e).**

The submitter provided the following comments:

The simpler the commercial device, the fewer are the specification requirements affecting it, and the more easily and quickly can adequate inspection be made. As mechanical complexity increases, however, inspection becomes increasingly important and more time consuming, because the opportunities for the existence of faulty conditions are multiplied. It is on the relatively complex device, too, that the official must be on the alert to discover any modification that may have been made by an operator that might adversely affect the proper functioning of the device.

It is essential for the officials to familiarize themselves with the design and operating characteristics of the devices that they inspect and test. Such knowledge can be obtained from the catalogs and advertising literature of device manufacturers, from trained service persons and plant engineers, from observation of the operations performed by service persons when reconditioning equipment in the field, and from a study of the devices themselves.

Inspection should include any auxiliary equipment and general conditions external to the device that may affect its performance characteristics. In order to prolong the life of the equipment and forestall rejection, inspection should also include observation of the general maintenance of the device and of the proper functioning of all required elements. The official should look for worn or weakened mechanical parts, leaks in volumetric equipment, or elements in need of cleaning.

Some are now coming to understand that the NCWM made a mistake in 1990 in interpreting how we apply the code requirements to the three-platform, three-indicator truck scale with a fourth summed indication. In any suggestion that a Code should be changed or reinterpreted, there is an unstated requirement that there must be some conflict that needs resolution. Often the difficult part is in just identifying the conflict or in finding the right question to expose the conflict to others and, in doing so, possibly point to the resolution. Some might think there is no conflict and there is no issue, but I must disagree.

What stands out on this issue to me is the huge divide between the public sector and private sector on this issue. It was black and white in 1989, good guys vs the bad guys. The public sector, me included, saw the issue one way, while the scale industry almost unilaterally saw it differently. As I think back over my career, I find it hard to find many issues where consensus between the two sides eluded the NCWM as it did for this issue. In my experience, the scale industry works toward consensus as earnestly as the public sector. If there is no consensus here, this should bother us all and encourage us to try to understand why.

If we ask the question on our current issue, as Henry Oppermann has, it goes like this: How do we apply the Scales Code requirements to a three-platform scale with three independent weight indications and a fourth indication of the sum of the three independent platforms? His answer follows his logic of the "duck test." Quoting him, "if a scale looks like truck scale, operates like a truck scale, and weighs trucks, then it is a truck scale."

It is important to note that a parallel issue was on the 2016 S&T agenda dealing with the v_{min} requirement for these three-platform scales with three independent indicators. However, in dealing with this small part of the larger issue, the Committee has chosen to ignore the larger issue for now. In my testimony at the 2016 Interim Meeting, I pointed out that the v_{min} change would result in a mixed state of being. Part of our interpretation for v_{min} would treat the three scales as three, but treat them as one for all other requirements. Does this make sense?

I see an immediate problem here, as Henry's quote is based on thinking from 1989; and I'll suggest much earlier, pre-1986 to be exact. We can see this in Tables 7b. and 7a. in the Scales Code. These tables deal with selection requirements for unmarked scales and marked scales. Table 7b. reflects that pre-1986 thought process where the application of the unmarked device determined what technical and performance requirements would apply. This is the model implied in Henry's comment and in the thought process we see from the S&T Committee as it wrestled with this issue in 1990. Quoting from page 157 of the 1990 S&T Final Report: "The classification of a scale or weighing system into an accuracy class should be based upon its application and method of use, not on the design of the device." In the same paragraph the report also notes, "The significance of this interpretation is that not only must each independent weighing device meet the requirements of Handbook 44, but the entire weighing system must meet all requirements that would apply <u>if the device were a single scale</u>" (emphasis added). This was voted on and approved by the public-sector voters of the NCWM with strong opposition from the (non-voting) scale industry.

Looking at that last statement in the S&T report today, does it even make sense? Table 7a. made a radical departure from the pre-1986 way of thinking. Under the "New" Scales Code which took effect January 1, 1986, the technical and performance requirements were determined by the class designation that was chosen and marked on the device by the manufacturer. In the wording of the table, it is a typical application of the class. Thus, the requirements apply based on the class designation as marked by the manufacturer and the device is adapted to the application. To me this contradicts the S&T conclusions in 1990.

I'm suggesting that a "duck test" is not valid for marked devices. For example, there is no single set of requirements for a marked truck scale. By this, I mean one can use a class III or a class IIIL scale to weigh trucks and the requirements are, therefore, very different. This was impossible to imagine prior to 1986 under the "Old" Scales Code. It is the manufacturer, in the design and production phases, who determines and marks the class. It is the marked class that determines which technical requirements will be applied to the device, and this is done before it leaves the plant. The code recognizes that the manufacturer has no means to limit the application once the purchaser buys the device. \Whether a device is suitable is a separate question and has a separate requirement; that is, General Code Paragraph G-UR.1. Selection Requirements.

I believe the "duck test" is not valid for the entire Handbook. For me, the critical issue we have to address is how to apply code requirements in general. The simple, direct answer is: we apply code requirements to <u>a</u> device. That is how the requirements are written; in the singular. Why is this singularity important? The answer lies in unstated, general principles in Handbook 44 which we can elicit by asking, "How do we measure quantities of things in commerce, generally?" By generally, I mean across all codes. My answer is that the codes clearly allow multiple solutions to that question. I'll state this more specifically:

A commodity exchanged in commerce may be measured:

D. as a single draft measured using a single measuring instrument;

E. as the sum of measurements of sub-parts of the whole using multiple drafts on a single measuring instrument; or

F. as the sum of measurements of sub-parts of the whole using multiple drafts of multiple measuring instruments.

It must be noted that the instrument used in any of the options A through C, must be suitable for service when measuring the whole or the sub-part in conformance with G-UR.1. For the purposes of this discussion we will stipulate that all measuring instruments involved are suitable for service, whether measuring the whole or the sub-part. For example, all weighments are stipulated to be greater than the recommended minimum load in Table 8 or liquid quantities in conformance with G-UR.1.3.

A couple of examples might help. I don't think I need to illustrate option A, as it is the most common solution. Option B can be seen with an Automatic Bulk Weighing system which operates by summing multiple drafts weighed on the same scale to provide a total weight of the whole commodity. But I could also do option B using VTM's. I could make multiple deliveries from a single VTM unit to fill a large customer order; that is, larger than the tank capacity of the single VTM. Alternatively, I could fill that order using drafts from multiple VTM units, option C.

Our assumption in accepting each of these options is that the sum of measurements from multiple compliant instruments is *de facto* compliant. In fact, the reason that we use multiple drafts in the first place is that the total will probably exceed our ability to verify the quantity of the whole, even if we wanted to! Going back to our examples, how could we verify, after the fact, that the 1 000 tons of grain loaded on a barge from an ABWS system with a 50 000 lb capacity scale is accurate? That's at least 40 drafts.

What becomes very clear to me in the general case is that the technical and performance requirements are applied to the individual device without regard to the summed total. It seems this summed total has always been the crux of the issue. Does this summed indication now link the three independent platforms with their independent indication in a way that makes them one device for legal purposes? This is what the S&T Committee decided in 1990. Some would continue to say "yes" and some would say "no." However, there is the law to consider. By law, I mean the general rules of construction of legal requirements. In construction, we must not be arbitrary and capricious. I believe those that say the three scales are one scale are being arbitrary and capricious.

To see how this is so, consider what UR.3.3. Single-Draft Weighing means. Below is the current NIST Handbook 44 text.

UR.3.3. Single-Draft Vehicle Weighing. – A vehicle or a coupled-vehicle combination shall be commercially weighed on a vehicle scale only as a single draft. That is, the total weight of such a vehicle or combination shall not be determined by adding together the results obtained by separately and not simultaneously weighing each end of such vehicle or individual elements of such coupled combination. However, the weight of:

(a) a coupled combination may be determined by uncoupling the various elements (tractor, semitrailer, trailer), weighing each unit separately as a single draft, and adding together the results; or

(b) a vehicle or coupled-vehicle combination may be determined by adding together the weights obtained while all individual elements are resting simultaneously on more than one scale platform.

The first sentence makes it clear that this is not a general provision as it limits the scope of the requirement to "a vehicle or a coupled-vehicle combination." It now goes on to say that any entity fitting one of those two descriptions shall be weighed as a single draft. Note that this is "option A" from the general case above. The paragraph goes on to provide more explanation of what "single-draft" means.

Then we come to a "However," indicating there are viable alternatives to the single-draft requirement. Alternative (a) allows the coupled combination to be divided into sub-parts that are weighed separately and the weight of the coupled combination is found by summing the individual weights of the sub-parts. Alternative (b) says that a vehicle or a coupled combination may be suspended simultaneously on more than one scale and the weight is found by summing the indications of the multiple scales.

On first glance, we might think that alternative (a) is option B from the general case, and alternative (b) is option C. However, closer reading will show that is not the case. Look carefully at the wording of alternatives (a) and (b). You cannot equate (a) with option B since (a) does not limit you to a single scale. You might assume that the multiple parts would be weighed on the same scale, but the code does not stipulate that. To do that, the code would have to add the words, "on the same scale;" that is, weighing each unit separately on the same scale and adding together the results." What I'm pointing out is that (a) as it is now written allows either general option B or C. By this I am considering the case where there are multiple scales available at the site. Each of those scales might have a capacity and division size of 200,000 × 20 lb. For example, think about one of those three component trucks (tractor, trailer, and pup). Alternative (a) allows you to uncouple and weigh the three sub-parts on three scales, two scales, or one scale in full compliance with the code.

Now it becomes clear that UR.3.3. is addressing the real issue with weighing large vehicles and coupled-vehicle combinations, and that is shifting loads and coupler interactions. In alternative (a) you eliminate both interferences by isolating each part on its own scale. In alternative (b) by supporting the vehicle or combination on multiple scales, any shift in the load or coupler interaction cancels out. If load shift or coupler interference reduces the weight on one platform, it increases it on another. Of critical importance, the three-platform scale that is the focus of this discussion, is an application of (b) where the load is supported simultaneously on more than one platform and the individual indications of the three scales are summed to get a total. There is no other way to describe what is happening since the total indication is, in fact, a sum of the weights from the three separate platforms. Also of critical importance, there should be no expectation whatsoever that the sum valued obtained in alternative (a) will be identical to alternative (b).

However, getting back to the question about three scales or one, it should now be clear that the Handbook clearly allows summed indications from multiple devices using options B or C. If the S&T statement is correct, then the code requirements must be applied across two scales or three scales in the example of multiple scales at a site. Thus, the three, one hundred-ton scales have a combined 30,000 divisions according to that interpretation. This would virtually preclude having multiple scales at the same site as they might be used to weight a single coupled-vehicle combination in pieces. Even going to 50 lb divisions still puts them out of compliance. Also, you have to consider the shift test requirements, which now require agreement of sections across all three scales!

Finally, we have to consider other cases of three independent scale platforms configured to weigh trucks. In case one, each platform has a stand-alone independent indicator and the three indications are manually summed by the operator. In case two, each platform has an individual indicator but all three indicators are housed in a single enclosure. Again, the summing is done manually by the operator. In both of these cases, the three independent instruments remain independent under the 1990 decision. This is what I mean by arbitrary and capricious.

Now suppose I can weigh a coupled-vehicle combination on three platforms with three separate indicators and manually add the indications to obtain a total weight for the combination. As I understand the 1990 decision, those three scales do not have to meet requirements like the number of scale divisions extended across all three scales. That extension only applies if there is a single weight display for the three scale indications and a fourth electronic indication for the sum. The results obtained are absolutely identical in function (adding manually on paper or having the system add them up) yet you are applying different requirements to the three scales depending on whether you are doing it manually or electronically. Isn't that being blatantly arbitrary and capricious?

Move over to the VTM example, and the three VTM units used to fill that order, must those three meters be treated as one meter, think about repeatability tests. It doesn't make sense for scales, nor does it make sense for any of the other codes. Thus, I argue that options B and C allow the summing of multiple devices without forcing them to be considered one instrument for applying code requirements. I believe the handbook needs to say that explicitly to avoid confusion.

I offer one additional item of support. I found reference that this issue has been raised internationally. Sections of the 2009 WELMEC Guide to Non-Automatic Weighing Instruments addresses this issue quite clearly (see pertinent sections on the final pages of this document). Point 3.1.16. in the Guide addresses the same issues as UR.3.3. where multiple platforms are used. The applications coincide with those I expressed in this discussion paper. Also, I believe point 3.1.54. addresses the use of multiple axle-load scales to weigh a vehicle. It also supports the conclusion that the individual axle-load scales do not become a single instrument for compliance purposes. In extension, if 3.1.54. does not apply MPE (tolerances) to the summed indication, it also does not extend other technical requirements such as v_{min} [which the NCWM has addressed], n_{max}, shift test, etc.

The Fundamental Considerations change is necessary to spell out clearly that code requirements do not extend across multiple devices unless specifically stated. A good example is the application of the code to wheel-load weighers designated as and used in pairs. For those scales designated as pairs, many authorities apply the tolerances only to the combined indication of the pair. None of the other requirements applicable to the wheel-load weigher are affected by this exception. For example, the combined number of divisions for the pair is not limited to 1200 as in Table 3. Other requirements like identification markings, rules for indicators, zero-load adjustments, etc., remain applicable only to the individual wheel-load weigher and not to the pair.

The addition to G-S.5.2.2. is necessary since you can't write requirements into the Fundamental Considerations. That section is there to help understand how to apply what is written in the codes. You must have a specification that the electronic sum be mathematically correct to reference if there is non-compliance. That is, readings from three scales of 107, 206, and 98 must result in an electronic sum of 411.

Note 4 in Table 3 has to be changed, since the last two sentences address these instances of multiple independent scales and reflect the 1990 decision. The removal of the last sentence removes the summed indicator from consideration under the classification system as discussed above, since the summed indication is not a directly measured quantity and is not subject to class requirements. The summed indication is also not subject to requirements for n_{max}, tolerances, etc. When this last sentence is removed, it makes the next to last sentence unnecessary for each independent scale is already covered under the general provisions of the Table.

There is a small side issue regarding multiple devices using option C where the division size is not the same for all the devices. The general principle (i.e., summing the indications from compliant devices is a valid way to measure a commodity) does not necessarily require that division sizes of the individual devices be identical. Note that you might want to apply UR.1.3. to printed records from the three scales. However, the proposed new Fundamental Considerations paragraph exempts the summed indication since code requirements do not apply to the summed indication except the mathematical correctness. Also, the summed indication is a sum, not a representation of a scale division. It is just a sum of the values obtained from the individual compliant devices. The individual weights are also required to be shown on any record of the transaction. While the different division sizes may offend our sensibilities a little bit, on what objective basis can we say it violates the general principle; that is, the sum of multiple compliant measurements is also *de facto* compliant. It is this compilation of original sources for the sum and the sum that provides the transparency for the transaction. Note the WELMEC reference indicates this is the position taken by many internationally.

I can think of another possible situation in the case of multiple ABWS systems. Suppose you are loading to a single barge from two sources where the two ABWS scales have different division sizes. The scale controller interfaced to the two scales now can print each of the weighments from each of the two scales and a single total for the entire transaction. The sum need only be mathematically correct since it is a mathematical sum of independent, compliant weighments.

3.1.2 Calculated weight (Meeting 10, Decision 10)

Where the indication represents an actual determination of the weight then the indication must respect the error allowance and be presented in the correct format.

When gross, net and tare are printed together, weight may be calculated from two actual determinations of weight. In the case of a multi-interval instrument it would be allowed to print a calculated value with the least significant digit which need not be rounded to the relevant scale interval.

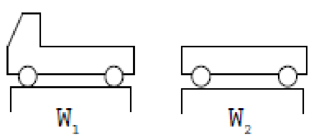
Any printout of the calculated weight values should be identified as calculated weight values.

(See also Sections 3.1.16 and 3.1.54)

3.1.16 Combined and multi-plate weighbridges (Meeting 14, Point 4, Meeting 15, Point 2 and Meeting 18, Point 9)

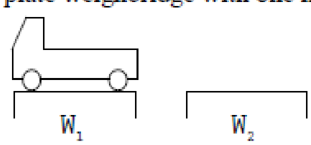
This concerns weight obtained by using adjacent weighbridges. Acceptable solutions, with examples, are shown below:

Two weighbridges, each with its own indicator:

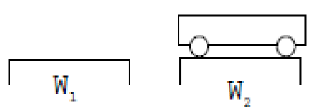


W_1 = 30 t x 10 kg
W_2 = 30 t x 10 kg
(Two indicators; simultaneous indication necessary)
Calculated weight 60 t x 10 kg
(mpe does not apply to calculated weight)

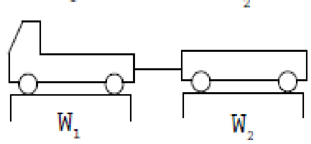
Multi-plate weighbridge with one indicator:



W_1 = 30 t x 10 kg



W_2 = 30 t x 10 kg



W_{1+2} = 60 t x 20 kg

W_{1+2} is a weighing range (Compatibility of modules and mpe must be satisfied for it)

(See also Sections 3.1.2 and 3.1.54)

> **3.1.54 Vehicle weighing by summation of individual wheel load NAWIs ("axle weighers") (Meeting 25, Point 9)**
>
> If the total weight of a vehicle is calculated automatically by summing the individual weight values produced by individual wheel load NAWIs ("axle weighers"), the system is not to be regarded as being one single NAWI. The mpe does not apply to calculated weight.
>
> (See also Sections 3.1.2 and 3.1.6)

> **3.1.6 Load cells**
>
> (Note that throughout this guide, "load cells" refers to analogue load cells rather than digital load cells unless stated otherwise.)

At the 2017 NCWM Interim Meeting, the Committee grouped agenda Items 3100-1, 3200-5 and 3600-2 together and took comments on these items simultaneously because it considered them related. See agenda Item 3100-1 for a summary of the comments received and the resulting actions taken by the Committee on these items at the 2017 NCWM Interim Meeting.

At the 2017 NCWM Annual meeting, the Committee grouped agenda Items 3100-1, 3200-5, and 3600-2 together because it considered them related. Mr. Ross Andersen (New York, retired) spoke on the updates to this group of items as the submitter. See agenda Item 3100-1 for a summary of the updated information provided by him. The Committee agreed to carryover this group of items on its agenda as Developing items to allow Mr. Andersen the opportunity to further develop and garner support for his proposals.

Regional Association Comments and Recommendations:

At its 2016 Annual Meeting, the WWMA only heard comments from the NIST, OWM. There was a concern this would increase the tolerance applied to this type of device and may also cause conflicting tolerances. The WWMA heard new Items 3100-1 and 3600-2 together. The WWMA forwarded this item to NCWM, recommending a Developing status.

At its 2016 Interim Meeting, the CWMA reported it believes that without the addition of G-S.5.2.2.(e) this change is not relevant. CWMA did not forward this item to NCWM and recommended that it be Withdrawn. At its 2017 Annual Meeting, the CWMA reported it agrees with concerns raised by the SMA and believes this item needs more development.

At its 2016 Annual Meeting, the SWMA batched Items 3100-1, 3200-5, and 3600-2 together and heard comments for all at the same time. Mr. Henry Oppermann (Weights and Measures Consulting) disagrees with these items and opposes them. He recommends Withdrawing all three items in this batch. Mr. Oppermann contends they violate the principles of NIST Handbook 44. He further contends this should be on performance and not design. Mr. Oppermann concluded by stating the submitter misinterpreted the WELMEC guidelines and multiplatform truck scales used together must function as a single scale. The Committee did not forward these items to NCWM and recommends they be Withdrawn because the proposed language is unnecessary.

At its 2016 Interim Meeting, NEWMA reported it believes this item has merit; but would like an example of how this applies to independent/multiple devices. At its 2017 Annual Meeting, NEWMA reported the item was not ready for vote with impending changes agreed by the item's submitter. NEWMA forwarded the item to NCWM and recommended Developing status at both meetings.

3600-3 W APPENDIX D – DEFINITIONS: BATCHING SYSTEM

(This item was Withdrawn.)

Source:
Richard Suiter Consulting (2016)

Purpose:
Add a definition to NIST Handbook 44, Appendix D to differentiate batching systems from other types of weighing and measuring systems.

Item under Consideration:
Amend NIST Handbook 44, Appendix D, Definitions as follows:

> **batching system. – One in which materials are measured in pre-determined quantities by weight and/or liquid measure. [2.20]**

Background/Discussion:
At the 2016 Annual Meeting, the Committee changed the status of this item from "Voting" to "Informational" at the request of the submitter.

Even though there are numerous batching systems in the market place and several batching systems (both manual and automated) have an NTEP CC there is no definition in NIST Handbook 44 to differentiate these systems from other types of weighing and measuring systems. Weights and measures officials seeing a system for the first time, particularly if automated, may have difficulty in determining what section of Handbook 44 to apply. This definition will assist those officials in making that determination. The SMA Handbook of Terms and Definitions Fourth Edition 1981 includes a definition for batching systems; however, for some reason that definition has never been added to Handbook 44. The definition for batching scales has also never been added, even though Paragraph S.1.2. Value of Scale Division Units, makes an exception for "batching scales and weighing systems."

2016 NCWM Interim Meeting
At the 2016 NCWM Interim Meeting, the Committee agreed to group Items 320-1 and 360-3 together and receive comments simultaneously on these two items. See Item 320-1 for a summary of the comments received and Committee considerations regarding these two items.

The Committee agreed to amend the proposed definition of "batching system" by deleting the word "raw" as was done by the WWMA S&T Committee at its 2015 Annual Meeting and as was also proposed by the SMA. The Committee further agreed to present the item for vote as shown in "Item Under Consideration" at the upcoming 2016 NCWM Annual Meeting.

2016 NCWM Annual Meeting:
At the 2016 NCWM Annual Meeting, Ms. Tina Butcher (NIST, OWM) indicated the purpose of Appendix D of NIST Handbook 44 is to define terms that are used in one or more of the codes in the handbook and to specify how they are intended to apply in those codes. The term "batching system" does not appear in the Scales Code of Handbook 44 and, therefore, it would be inappropriate to include a definition in Handbook 44 with a reference to that code.

Ms. Butcher stated the term "batching scale" does appear in NIST Handbook 44; however, there is no definition in Handbook 44 for the term. The following definition appears in a 1975 edition of a publication titled, "Terms and Definitions for the Weighing Industry" once made available by the SMA:

> **BATCHING SCALE,** N. Any scale which, by design or construction, lends itself readily to use in proportioning admixtures by weight.

OWM does not consider a "batching scale" and "batching system" the same device, given the differences in the two definitions provided. That is, the definition of the term "batching scale," from the SMA publication differs from the definition of the term "batching system" presented in the proposal.

Ms. Butcher also indicated that NIST, OWM does not understand the purpose of the proposal; that is, what the submitter is trying to achieve by proposing a new definition be added. If adding a definition and referencing it to the Scales Code is to recognize the existence of some automated batching systems in which the scales used in those systems return to zero-load balance after each draft load is discharged from the weighing/load-receiving element when being used in automatic operation, the Scales Code already addresses the operation of those scales. She noted OWM had already acknowledged in earlier comments the existence of some automated weighing systems that, by virtue of their design, fail to meet the definition of an ABWS and, therefore, the application of the ABWS Code; yet, these systems retain a "heel" following the discharge of the product comprised in each draft. The heel is part of the load that has failed to discharge during the discharge cycle of the previous weighment. To determine accurately, the amount of product discharged in each draft, these systems must take into account the weight of each remaining heel and subtract it from the weight indicated for its corresponding load. OWM believes the reason Kansas has submitted a proposal to update the ABWS Code (S&T agenda Item 322-2) is to address these systems. Adding a new definition and referencing it to the Scales Code might tend to confuse some into believing such systems don't necessarily have to start each draft load from a zero-load balance condition or take into account the weight of each remaining heel, which would be a false conclusion.

Ms. Butcher recommended, if the submitter of this proposal believes a gap exists in the Scales Code and the gap is the application of the code to some of the weighing equipment used in a particular type of batching operation, then a proposal, which identifies that equipment, along with corresponding proposed requirements to be applied, should be drafted and submitted for consideration. It would be inappropriate to consider the addition of a new definition into NIST Handbook 44 until a proposal supporting the inclusion of the term into the code has been submitted to the S&T Committee and adopted.

Mr. Richard Suiter (Richard Suiter Consulting, LLC) commented that the term "automated batching systems" appeared in an earlier "companion" proposal to amend the Scales Code of NIST Handbook 44, but the earlier proposal had been Withdrawn by the Committee at the 2016 NCWM Interim Meeting. It was his intent in offering the two proposals, to try and differentiate between the scales used in an automated batching system from those used in other weighing applications. He pointed out that the terms "batching scales" and "weighing systems" appear in Scales Code Paragraph S.1.2., and he believes the definition being proposed would fit these terms. He indicated there was a need for Handbook 44 to define "batching scale" and "batching systems" and asked the Committee to consider agreeing to an Informational status on the item to allow for its further development.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported the SMA opposes the item because there are no current specifications and tolerances defined to support the definition.

Mr. Henry Oppermann, (W&M Consulting, LLC) reported he had submitted written comments to the Committee in opposition to the item. He stated the proposed definition is incorrect and inappropriate based on the written comments provided.

In consideration of 1) the comments received on this item, and 2) the submitter's request to the Committee to assign an Informational status to the item to allow time for him to develop a new Scales Code proposal intended to address scales used in batching systems, the Committee agreed to maintain the item with an Informational status on its agenda.

2017 NCWM Interim Meeting:
During the 2017 NCWM Interim Meeting, the Committee grouped agenda Items 3200-1 and 3600-3 together and took comments on these items simultaneously because it considered these items related. See agenda Item 3200-1 for a summary of the comments received by the Committee on these items at the 2017 NCWM Interim Meeting. The Committee agreed to Withdraw this item (i.e., agenda Item 3600-3) at the recommendation of the submitter during this meeting.

Regional Association Comments and Recommendations (Fall 2016 Conferences):
The WWMA heard Items 3200-1 and 3600-3 together. The WWMA did not believe the language submitted agrees with the submitter's goal and believes further development is needed by the source. WWMA forwarded this item to the NCWM and recommended Developing status.

The CWMA S&T believes this item is fully developed and recommended a Voting status.

The SWMA batched Items 3200-1 and 3600-3 together and heard comments on all items at the same time. Mr. Henry Oppermann (Weights and Measures Consulting) stated he was opposed to these items because they'll make it more difficult for the weights and measures official because the definition is not specific enough. These scales are "automatic bulk weighting systems" and this proposal was designed to exempt some scales from the Automatic Bulk Weighing Systems (ABWS) Code. It was also stated that, "many are already in the marketplace, some of which have an NTEP certificate," but the submitter doesn't want to bring them into compliance with the automatic bulk weighing system code. Further, Mr. Oppermann stated this device has an unsealed parameter allowing the user to program a tolerance on the return to zero, which should not be allowed. The SWMA forwarded the item to NCWM and recommended Developing status. The SWMA asks the submitter to address why this is not covered in the ABWS code and present the overall picture of the item's necessity.

The NEWMA S&T Committee requested clarification from Mr. Suiter (Richard Suiter Consulting) on the language for the Scales Code. The NEWMA S&T Committee believes the language is pertinent to defining a batching scale. NEWMA recommended that this be a Voting item.

3600-4 W APPENDIX D DEFINITIONS: OVERREGISTRATION AND UNDER-REGISTRATION (SEE RELATED ITEMS 3200-7, 3201-1, 3204-1, 3205-2, 3508-2 AND 3509-1)

(This item was Withdrawn.)

Source:
Ross Andersen, Retired (2017)

Purpose:
Provide language that is consistent with the General Code.

Item under Consideration:
Amend NIST Handbook 44, Appendix D as follows**:**

> **overregistration and underregistration. –** When an instrument or device is of such a character that it indicates or records values as a result of its operation, its error is said to be in the direction of overregistration or underregistration, depending upon whether the indications are, respectively, greater or less than they should be. Examples of devices having errors of "overregistration" are: a fabric-measuring device that indicates more than the **verified** ~~**true**~~ length of material passed through it; and a liquid-measuring device that indicates more than the **verified** ~~**true**~~ amount of the liquid delivered by the device. Examples of devices having errors of "underregistration" are: a meter that indicates less than the **verified** ~~**true**~~ amount of product that it delivers; and a weighing scale that indicates or records less than the **verified** ~~**true**~~ weight of the applied load. [1.10]

Background/Discussion:
This item was submitted as one of a group of items that includes agenda Items 3200-7, 3201-1, 3204-1, 3205-2, 3508-2, 3509-1, and 3600-4. The Background/Discussion information is the same for these items and included in agenda Item 3200-7 of this report. At the 2017 NCWM Interim Meeting, the Committee agreed to Withdraw these items in consideration of the comments received during that meeting.

3600-5 D APPENDIX D – DEFINITIONS: REMOTE CONFIGURATION CAPABILITY

Source:
NIST office of Weights and Measures (2013)

Purpose:
Expand the scope of definition to cover instances where the "other device," as noted in the current definition, may be necessary to the operation of the weighing or measuring device or which may be considered a permanent part of that device.

Item Under Consideration:
Modify the General Code by adding the following paragraph to address security for systems adjusted using removable media:

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

<u>(Added 20XX)</u>

In addition to adding new paragraph G-S.8.2., exempt current sealing requirements from applying to devices and systems adjusted using a removable digital storage device by amending the sealing requirements in the following NIST Handbook 44 code Sections: 2.20., 2.21., 2.22., 2.24., 3.30., 3.31., 3.32., 3.33., 3.34., 3.35., 3.36., 3.37., 3.38., 3.39., 3.40., 5.55., 5.56.(a), and 5.58. This exemption is needed because the General Code paragraph being proposed will address the sealing of all device types and systems that can be adjusted using a removable digital storage device. The following additional changes are proposed to provide the exemption noted:

2.20. Scales Code

S.1.11. Provision for Sealing.

<u>S.1.11.1. Devices and Systems Adjusted Using a Removable Digital Storage Device. – For devices and systems in which the calibration or configuration parameters, as defined in Appendix D, can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2.</u>

<u>S.1.11.2. All Other Devices. – *Except on Class I scales and devices specified in S.1.11.1. the following provisions for sealing applies:*</u>

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

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

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

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

(Amended 1989, 1991, ~~**and**~~ 1993**,** and **20XX**)

2.21. Belt-Conveyor Scale Systems Code

S.5. Provision for Sealing. – For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. ***For all other devices, the following provisions for sealing apply:***

A device shall be designed using the format set forth in Table S.5. with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that affects the metrological integrity of the device can be made to any electronic mechanism.
[Nonretroactive as of January 1, 1999]

(Added 1998) **(Amended 20XX)**

2.22. Automatic Bulk Weighing Systems

S.1.6. Provision for Sealing Adjustable Components on Electronic Devices. – For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, p~~P~~rovision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of the device.

(Amended 20XX)

2.24. Automatic Weighing Systems

S.1.3. Provision for Sealing.

(a) **Automatic Weighing Systems, Except Automatic Checkweighers. – For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2.**

For parameters adjusted using other means, a ~~A~~ device shall be designed with provision(s) as specified in Table S.1.3. Categories of Device and Methods of Sealing for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism.

(b) **For Automatic Checkweighers.** – Security seals are not required in applications where it would prohibit an authorized user from having access to the calibration functions of a device.

(Amended 20XX)

3.30. Liquid Measuring Devices

S.2.2. Provision for Sealing. – For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for

those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange can be made of:

(a) any measuring or indicating element;

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries; and

(c) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.
*[Audit trails shall use the format set forth in Table S.2.2.] **
*[*Nonretroactive and Enforceable as of January 1, 1995]*

(Amended 1991, 1993, 1995, ~~**and**~~ 2006**, and 20XX**)

3.31. Vehicle-Tank Meters

S.2.2. Provision for Sealing. – For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before a change or an adjustment or interchange may be made of:

(a) any measuring or indicating element;

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries; and

(c) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.
*[Audit trails shall use the format set forth in Table S.2.2. Categories of Device and Methods Sealing.]**
*[*Nonretroactive as of January 1, 1995]*

(Amended 2006 **and 20XX**)

3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices

S.2.2. Provision for Sealing. – For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for

those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange may be made of:

(a) any measuring or indicating element;

(b) any adjustable element for controlling delivery rate, when such rate tends to affect the accuracy of deliveries; and

(c) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

*[Audit trails shall use the format set forth in Table S.2.2. Categories of Device and Methods of Sealing.]**
*[*Nonretroactive as of January 1, 1995]*
(Amended 2006 **and 20XX**)

3.33. Hydrocarbon Gas Vapor-Measuring Devices

S.2.2. Provision for Sealing. – **For devices or systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for applying security seals in such a manner that no adjustment or interchange may be made of any measurement element.
(Amended 20XX)

3.34. Cryogenic Liquid-Measuring Devices

S.2.5. Provision for Sealing. – **For devices or systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange may be made of:

(a) any measuring or indicating element;

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries;

(c) any automatic temperature or density compensating system; and

(d) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable, any adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

[Audit trails shall use the format set forth in Table S.2.5. Categories of Device and Methods of Sealing]*
[*Nonretroactive as of January 1, 1995]
(Amended 2006 **and 20XX**)

3.35. Milk Meters

S.2.3. Provision for Sealing. – **For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange may be made of any:

(a) measuring element or indicating element;

(b) adjustable element for controlling delivery rate, when such rate tends to affect the accuracy of deliveries; and

(c) metrological parameter that will affect the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

*[Audit trails shall use the format set forth in Table S.2.3. Categories of Device and Methods of Sealing]**
*[*Nonretroactive as of January 1, 1995]*
(Amended 2006 **and 20XX**)

3.36. Water Meters

S.2.1. Provision for Sealing. – **For devices or systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for applying security seals in such a manner that no adjustment or interchange may be made of:

(a) any measurement elements; and

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries.

The adjusting mechanism shall be readily accessible for purposes of affixing a security seal.
(Amended 20XX)

3.37. Mass Flow Meters

S.3.5. Provision for Sealing. – **For devices or systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for**

those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that no adjustment or interchange may be made of:

(a) any measuring or indicating element;

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries;

(c) the zero-adjustment mechanism; and

(d) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.
*[Audit trails shall use the format set forth in Table S.3.5. Categories of Device and Methods of Sealing]**
*[*Nonretroactive as of January 1, 1995]*
(Amended 1992, 1995, 2006**,** and **20XX**)

3.38. Carbon Dioxide Liquid-Measuring Devices

S.2.5. Provision for Sealing. – For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange may be made of:

(a) any measuring or indicating element;

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries;

(c) any automatic temperature or density compensating system; and

(d) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable any adjusting mechanism shall be readily accessible for purposes of affixing a security seal.
*[Audit trails shall use the format set forth in Table S.2.5. Provision for Sealing]**
*[*Nonretroactive as of January 1, 1995]*
(Amended 2006 **and 20XX**)

3.39. Hydrogen Gas-Measuring Devices – Tentative Code

S.3.3. Provision for Sealing. – For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for

those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that no adjustment may be made of:

(a) each individual measurement element;

(b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries;

(c) the zero-adjustment mechanism; and

(d) any metrological parameter that detrimentally affects the metrological integrity of the device or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal. Audit trails shall use the format set forth in Table S.3.3. Categories of Device and Methods of Sealing.

(Amended 20XX)

3.40. Electric Vehicle Fueling Systems – Tentative Code

S.3.3. Provision for Sealing. – **For devices or systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:**

Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that no adjustment may be made of:

(a) each individual measurement element;

(b) any adjustable element for controlling voltage or current when such control tends to affect the accuracy of deliveries;

(c) any adjustment mechanism that corrects or compensates for energy loss between the system and vehicle connection; and

(d) any metrological parameter that detrimentally affects the metrological integrity of the EVSE or system.

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal. Audit trails shall use the format set forth in Table S.3.3. Categories of Device and Methods of Sealing.

(Amended 20XX)

5.55. Timing Devices

S.4. Provisions for Sealing. – For devices or systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, ~~A~~**a**dequate provisions shall be made to provide security for the timing element.

(Added 2015) **(Amended 20XX)**

5.56.(a) Grain Moisture Meters

S.2.5. Provision for Sealing. – **<u>For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:</u>**

~~P~~rovision shall be made for applying a security seal in a manner that requires the security seal to be broken, or for using other approved means of providing security (e.g., audit trail available at the time of inspection as defined in Table S.2.5. Categories of Device and Methods of Sealing) before any change that affects the metrological integrity of the device can be made to any mechanism.

<u>(Amended 20XX)</u>

5.58. Multiple Dimension Measuring Devices

S.1.11. Provision for Sealing. – **<u>For devices and systems in which the configuration or calibration parameters can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2. For parameters adjusted using other means, the following applies:</u>**

(a) **~~A~~** **The** device **<u>or system</u>** shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity **~~of the device~~** can be made to any measuring element.

(b) Audit trails shall use the format set forth in Table S.1.11. Categories of Devices and Methods of Sealing for Multiple Dimension Measuring Systems.

<u>(Amended 20XX)</u>

Background/Discussion:

The Committee initially considered a proposal from the NTEP Grain Analyzer Sector to modify the definition for "remote configuration capability" as follows:

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

(Added 1993) **<u>(Amended 20XX</u>**)

The proposal was intended to address the use of removable digital storage devices in grain moisture meters (GGMs). Removable digital storage devices can be used in GMMs as either data transfer devices that are not necessary to the operation of the GMM or as data storage devices which are necessary to the operation of the GMM. If removable data storage devices are necessary to the operation of the device, they are not covered by the current definition of remote configuration capability in NIST Handbook 44.

A USB flash drive is most likely to be used as a data transfer device. In a typical data transfer application considered by the Grain Sector, the USB flash drive is first connected to a computer with access to the GMM manufacturer's web site to download the latest grain calibrations and then stored in the USB flash drive. The USB flash drive is removed from the computer and plugged into a USB port on the GMM. The GMM is put into remote configuration mode to copy the new grain calibration data into the GMM's internal memory. When the GMM has been returned to normal operating (measuring) mode, the USB flash drive can be removed from the GMM.

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

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

The Committee heard opposition to the proposed changes to the definition, though many comments indicated support for changes to adequately address security for weighing and measuring systems adjusted using removable media. Over the course of several years, multiple proposals were presented and the Grain Analyzer Sector decided to address its concerns through implementation of other requirements specific to grain analyzers. Acknowledging the need to modify sealing requirements to better address systems adjusted using removable media, OWM requested the Committee assign responsibility for this item to NIST, OWM.

At the 2015 and 2016 Interim and Annual Meetings, NIST, OWM provided updates to the Committee on its progress developing this item. Ms. Tina Butcher (NIST, OWM) noted that, after analyzing the issue, OWM was concerned that proposing modifications to the existing sealing requirements might have unintended consequences for some equipment not adjusted using this type of media. Since modifications using removable media that would remain in the device during normal use had not been envisioned when the audit trail criteria were originally developed, NIST, OWM believes it might be best to create sealing requirements that apply more specifically to this technology. At the 2015 Annual Meeting, Ms. Butcher reported members of its LMDP developed a draft General Code paragraph they believe will address the sealing of devices using this technology to make adjustments. The LMDP requested this draft paragraph be included in this item to begin generating feedback to assist in further development of this item and shared the proposed approach with the Committee and NTEP Sectors.

Ms. Butcher also noted the LMDP plans to propose modifications to a number of the individual device codes in NIST Handbook 44 to reference the new General Code sealing requirement and shared an example of such proposed changes in the Scales Code.

See the Committee's 2013 - 2016 Final Reports for additional background information and to review the different proposals considered by the Committee to address security of equipment; the metrological parameters of which can be changed by use of some form of removable digital storage device.

In January 2017, just prior to the 2017 NCWM Interim, NIST, OWM contacted the Committee to make it aware that OWM had prepared additional proposed changes that finalized the proposal. OWM asked the Committee to replace the Grain Analyzer Sector's original proposal with OWM's complete proposal (including the proposed General Code paragraph and proposed changes to specific codes), which was agreed.

At the 2017 NCWM Interim Meeting, OWM requested this item be maintained on the Committee's 2017 agenda as either a "Developing" or "Informational" item to allow for study and comment on the proposed changes between then and the fall 2017 regional weights and measures association meetings. At this point, after considering and incorporating any changes to the proposal, OWM plans to recommend the Committee consider recommending the proposal for adoption by the NCWM in 2018.

Mr. Russ Vires (Mettler-Toledo, LLC), speaking on behalf of the SMA, reported that the SMA is opposed to this item as it currently appears on the Committee's Interim Meeting agenda. Members of the SMA haven't had the opportunity to review OWM's most recent changes, and he was, therefore, unable to render an opinion on the changes.

The Committee agreed to replace the Grain Analyzer Sector's original proposal with OWM's complete proposal as shown in "Item under Consideration" in 2016 NCWM Publication 16 and assign the item a "Developing" status as recommended by NIST, OWM.

At the 2017 NCWM Annual Meeting, the Committee received an update on this item from Ms. Butcher. Ms. Butcher briefly summarized the background of this item as outlined in this item and reiterated that this method of making adjustments was not envisioned when the existing criteria for audit trails and electronic sealing were developed in the early 1990s. NIST, OWM was concerned that attempting to modify the existing criteria for electronic sealing might inadvertently affect existing equipment, which the current requirements adequately address and create overly complex requirements. OWM has developed a new proposal to address devices which are adjusted via means of removable media such as the SD card and has provided the Committee with a copy. The new proposal recommends the addition of a new General Code requirement and recommends revisions to sealing requirements in individual, specific codes to reference the new General Code requirement. OWM circulated an initial draft to the NTEP Sectors and the community and incorporated the feedback it received.

The SMA opposed the item as written because of the inclusion of the term, "configuration" in proposed paragraph S.1.11.1. of the Scales Code portion of the proposal. The SMA noted that the industry-accepted definition of "configuration" includes items that should not be considered sealable. Consequently, the SMA recommended removing the text "configuration or" from paragraph S.1.11.1. as it appears in Item Under Consideration of the Committee's 2017 Interim Report for this item. OWM understands SMA's concern with respect to paragraph S.1.11.1. of the proposal and, in an attempt to address the concern, requests the Committee replace this particular paragraph in the Item Under Consideration of the Committee's 2017 Interim Report with the following:

> **S.1.11.1. Devices and Systems Adjusted Using a Removable Digital Storage Device. – For devices and systems in which the calibration or configuration parameters, as defined in Appendix D, can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2.**

Assuming SMA and others concur with this change, NIST, OWM considers this item fully developed and asks the Committee and regional associations to consider assigning it a Voting status for the 2018 NCWM cycle. As the submitter of this item, OWM also asks the Committee to include the corresponding proposed changes to all the codes with the proposal in the "Carryover Items" to be considered by the regional associations.

Based on the comments and request received by NIST, OWM on this item, the Committee agreed to replace the text for paragraph S.1.11.1. shown in the Committee's 2017 Interim Report with that shown above and to include the additional language in its Carryover Item. These changes are reflected in the Item Under Consideration above.

Regional Association Comments and Recommendations:
The only comment received at WWMA's 2016 Annual Meeting, was to keep this item Developing. WWMA agreed with this recommendation.

The CWMA, at its fall 2016 Interim Meeting reported that it believes this item has merit and supports its further development. At the CWMA's spring 2017 Annual Meeting, the SMA reported it was opposed to this item as written because the industry-accepted definition of "configuration" includes items that should not be considered sealable parameters. The SMA recommended removing the text "configuration or" from paragraph S.1.11.1. During the Committee's work session, Mr. Rick Harshman (NIST, OWM) proposed the following change to paragraph S.1.11.1. of the proposal in an attempt to resolve the concerns of the SMA:

> **S.1.11.1. Devices and Systems Adjusted Using a Removable Digital Storage Device. – For devices and systems in which the calibration or configuration parameters (that is, any of those typically required by**

<u>weights and measured to be sealed) can be changed by use of a removable digital storage device, security shall be provided for those parameters as specified in G-S.8.2.</u>

An SMA member, present at the CWMA meeting commented that the changes proposed by Mr. Harshman seemed a satisfactory solution, but he could not speak for the entire SMA membership. Without being able to confirm the changes proposed by Mr. Harshman will be accepted, the CWMA recommended this to be a Developing item.

The SWMA, at its 2016 Annual Meeting, received comment from Ms. Tina Butcher (NIST, OWM) that this item was originally put forward by the Grain Sector, but NIST recognized there are other devises that could be affected by this language. She stated OWM didn't want to change existing requirements, but wished to put forth new language from what the Grain Sector had proposed. Ms. Butcher asked for this item to remain Developing until at least January. She concluded by stating if no new language had been recommended by then the item should be Withdrawn. Mr. Lou Straub (Scale Manufacturers Association) spoke in opposition of the item as printed in the agenda, but noted that the SMA would revisit any new proposed language and may change their position depending on what changes come forward. The SWMA looks forward to the continued development of this item and acknowledges the comments that the item should be Withdrawn if new language has not been proposed by January 2017.

NEWMA recommended this be a Developing item on the NCWM agenda at both its fall 2016 Interim Meeting and spring 2017 Annual Meeting. NEWMA agreed, at its fall 2017 Annual Meeting, with a recommendation made by the SMA to remove the text "configuration or" from paragraph S.1.11.1. of the proposal.

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

3600-6 V 5.XX. TRANSPORTATION NETWORK MEASUREMENT SYSTEMS – TENTATIVE CODE AND APPENDIX D DEFINITIONS (SEE RELATED ITEM 3504-1)

(This item was Adopted.)

Source:
USNWG on Taximeters (2017)

Purpose:
Add a new tentative code for transportation-for-hire measurement systems being referred to as "Transportation Network Measurement Systems" to NIST Handbook 44.

Item Under Consideration:
Amend NIST Handbook 44 by adding a new code and definitions to Appendix D as follows:

<u>5.XX. Transportation Network Measurement Systems – Tentative Code</u>

<u>This tentative code has only a trial or experimental status and is not intended to be enforced. The requirements are designed for study prior to the development and adoption of a final code. Officials wanting to conduct an official examination of a device or system are advised to see paragraph G-A.3. Special and Unclassified Equipment.</u>

<u>(Tentative Code Added 20XX)</u>

<u>A. Application</u>

<u>A.1. General. – This code applies to a transportation network measurement system used in connection with a digital network that determines the actual time elapsed and/or distance travelled during a network-arranged ride to calculate a fare for transportation services.</u>

Note: The fare is calculated by software services residing on the transportation network company servers using data transmitted by the indicating elements present in the vehicle, which are running software applications or services supplied by the transportation network company. The measurement data is generated from sources not physically connected to the vehicle (e.g., a navigation satellite system such as GPS and/or other location services).

A.2. Exceptions. – This code does not apply to:

(a) any system that charges a flat rate or fixed charge, and/or does not use a measurement of actual time elapsed or distance travelled to calculate a fare for transportation services;

(b) odometers on vehicles that are rented or hired on a distance basis (for which see Section 5.53. Odometers);

(c) taximeters (for which see Section 5.54. Taximeters); or

(d) any system where the fare is calculated by equipment located in the vehicle.

A.3. Additional Code Requirements. – In addition to the requirements of this code, transportation network measurement systems shall meet the requirements of Section 1.10. General Code.

S. Specifications

S.1. Design of Indicating and Recording Elements. – Indicating and recording elements shall provide indications and recorded representations that are clear, definite, accurate, and easily read under any conditions of normal operation of the device(s).

All indicating and recording elements used in a transportation network measurement system shall operate correctly while using the online-enabled technology application service provided by the transportation network company.

S.1.1. General Indicating Elements. – A transportation network measurement system shall include, as a minimum:

(a) an indicating element used by a transportation network company driver that displays information and facilitates the measurements during a network-arranged ride to calculate a fare for transportation services; and

(b) an indicating element used by a transportation network company rider that displays information that allows the rider to review the current rate(s) for the transportation service and request a ride.

S.1.2. General Recording Elements. – A transportation network measurement system shall be capable of:

(a) recording all information necessary to generate a receipt specified in S.1.10. Receipt; and

(b) providing information to transportation network company drivers, including but not limited to a summary of rides given as specified in S.1.11. Driver's Summary; and

(c) providing a copy of all metrological data required by law to be provided to a weights and measures jurisdiction with statutory authority.

S.1.3. Identification. – All transportation network measurement system indicating elements shall display for the purposes of identification the following information:

(a) **the name, initials, or trademark of the transportation network measurement system manufacturer, distributor, or developer; and**

(b) **the current version or revision identifier of the software application service provided by the transportation network company running on the indicating elements identified in S.1.1. General Indicating Elements.**

(1) **The version or revision identifier shall be prefaced by words or an abbreviation that clearly identifies the number as the required version or revision.**

(2) **Abbreviations for the word "Version" shall, as a minimum, begin with the letter "V" and may be followed by the word "Number." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R" and may be followed by the word "Number." The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).**

S.1.4. Location of Identification Information. – The information required by S.1.3. Identification shall be accessible through an easily recognized menu and, if necessary, a submenu or other appropriate means. Examples of menu and submenu identification include, but are not limited to, "Help," "About," "System Identification," "Weights and Measures Identification," or "Identification."

S.1.5. Display of Rates and Additional Charges. – The transportation network measurement system shall be designed to make available to transportation network company riders the rate(s) for transportation services before the beginning of a network-arranged ride. The system shall also be capable of providing an explanation of the basis for calculating a fare including, if applicable, the base fare, rates for time and distance, and the amount of a booking fee, platform fee, or other similar service fee, before a rider submits the request for a network-arranged ride.

S.1.6. Fare Estimates. – The transportation network measurement system shall be capable of displaying a fare estimate to the transportation network company rider before a request for a network-arranged ride is made.

S.1.7. Actuation of Measurement System. – Following the initiation of a network-arranged ride by the transportation network company driver, and prior to the conclusion of that network-arranged ride, the transportation network measurement system shall only indicate and/or record measurements resulting from the movement of the vehicle or by the time mechanism.

S.1.8. Fare Adjustment. – A transportation network measurement system shall be designed with:

(a) a "time off" mechanism and a "distance off" mechanism provided for the transportation network system driver to render the measurement of time and distance either operative or inoperative during the ride; or

(b) the capability to make post-transaction fare adjustments to reduce the amount of the fare, provided that the system creates a record of all location and time data from the time the ride request was accepted by the transportation network company driver.

[Nonretroactive as of January 1, 20XX]

S.1.9. Fare Identification and Other Charges.

S.1.9.1. Fare Identification. – Fare indications shall be identified by the word "Fare" or by an equivalent expression when displayed on the transportation network company system receipt required by S.1.10. Values shall be defined by suitable words or monetary signs.

S.1.9.2. Other Charges. – Other charges shall be indicated as separate line items when displayed on the receipt required by S.1.10. Receipt. Other charges shall be identified using an appropriate descriptive term, including but not limited to "Booking Fee," "Tolls," "Airport Pickup/Dropoff Surcharge" or an equivalent expression. Values shall be defined by suitable words or monetary signs.

S.1.10. Receipt. – A transportation network measurement system shall issue a printed or electronic receipt to a transportation network company rider. This receipt shall include as a minimum the following:

(a) date of the start of the trip;

(b) unique identifying information sufficient for the transportation network company to identify the transaction, or other identifying information as specified by the statutory authority;

(c) start and end time of trip, total time of trip (maximum increment of one second), and if applicable, the total elapsed time during any time-off period;

(d) distance traveled, maximum increment of 0.01 km or 0.01 mi;

(e) the associated fare in $;

(f) other charges where permitted shall be identified and itemized;

(g) total charge in $;

(h) the start and end addresses or locations of the trip;

(i) a map showing the route taken; and

(j) a means to obtain transportation network company rider assistance.

S.1.11. Driver's Summary. – A transportation network measurement system shall be capable of providing a summary of the driver's activity regarding network-arranged rides. The summary shall include, but not be limited to, the following information about each ride:

(a) date and time for start of trip;

(b) unique identifying information sufficient for the transportation network company to identify the transaction, or other identifying information as specified by the statutory authority;

(c) total time of trip, maximum increment of one second;

(d) distance traveled, maximum increment of 0.01 km or 0.01 mi;

(e) the total fare received;

(f) other charges where permitted; and

(g) a means to obtain transportation network company driver assistance.

S.2. Provision for Sealing.

S.2.1. System Security. – Adequate provision shall be made to provide security for a transportation network measurement system. The system shall be designed to:

(a) protect the integrity of metrological data and algorithms used to compute fares from such data against unauthorized modification using industry-standard technological protection mechanisms such as data encryption; and

(b) use software-based access controls or equivalent technological protections that limit access to metrological data and algorithms used to compute fares from such data only to authorized persons.

S.2.2. System Audit. – The transportation network measurement system shall be designed in a manner that permits officials having statutory authority to verify compliance with this transportation network measurement system code.

S.2.3. Change Tracking. – Changes made by the manufacturer, distributor, or developer of a transportation network measurement system to any algorithms or code which have a metrological effect shall be logged and recorded. The period covered by this change record is not required to exceed one year.

S.3. Provision for Trip Data Loss. – In the event that a portion of the trip data is lost due to power or signal interruption by the transportation network company driver's indicating element, the transportation network measurement system shall be capable of determining the information needed to complete any transaction in progress at the time of the power or signal loss.

S.3.1. Intermittent Trip Data Loss. – When the location services signal is lost intermittently during a prearranged ride (e.g., traveling through a tunnel) but recovered prior to the end of the ride, the transportation network measurement system shall be capable of calculating an accurate fare in accordance with T.1. Tolerance Values.

S.3.2. Significant Trip Data Loss. – When the location services signal is lost for a significant portion of the network-arranged ride, the transportation network measurement system shall provide for alternative fare structures.

Note: Significant trip data loss refers to instances when the location services signal is lost to the extent that the transportation network measurement system is not capable of calculating an accurate fare in accordance with T.1. Tolerance Values using actual time and actual distance, or when the signal is not regained by the end of the ride.

S.3.3. Alternative Fare Structures. – In the event the transportation network measuring system is not using actual time and actual distance for a particular trip (e.g., zone-based fares, signal loss), that portion of the fare not based on actual time and actual distance is not subject to this code. Charges not based on actual time and actual distance measurements may be based on the terms of service.

N. Notes

N.1. Distance Tests.

N.1.1. Test Methods. – To determine compliance with distance tolerances, distance test(s) of a transportation network measurement system shall be conducted. The distance test(s) shall consist of a road test unless safety or other practical concerns prohibit road testing. A transfer standard test may be performed in the absence of a road test. At least one test shall be of a length sufficient to exceed the minimum fare.

N.1.1.1. Road Test. – The test consists of operating the conveyance over a precisely measured course calibrated to a traceable linear measure of at least one mile in length

N.1.1.2. Transfer Standard Test. – The test consists of operating the conveyance over an unmeasured course while using a calibrated transfer standard, such as a fifth-wheel, to measure the distance travelled.

Note: Field examinations of transportation network measurement systems need not include testing of all individual devices that are used as driver/passenger indicating elements in connection with the service provided. It is considered sufficient that a representative sample of various indicating elements be incorporated in testing to verify proper operation of the system.

N.1.2. Test Procedures.

N.1.2.1. Test Length. – All tests must be at least one mile in length. If a measured course or testing equipment is not readily available that will enable a test of a length sufficient to exceed the minimum fare, after completing the testing specified in N.1.1. Test Methods, an additional unmeasured test may be conducted. The purpose of this additional unmeasured test is to verify compliance with S.1.10. Receipt.

N.1.2.2. Additional Tests. – If during testing a transportation network measurement system produces a measurement that does not comply with the tolerance values in T.1.1. Distance Tests, a minimum of three additional tests shall be conducted at the same location where all test variables are reduced to the greatest extent practicable to verify the system's ability to repeat transaction indications. Repeatability testing performed in excess of these three additional tests is done at the discretion of the official with statutory authority.

To verify system-wide noncompliance, tests for variability shall be conducted, including a minimum of three consecutive tests of varying lengths, locations, and/or environmental conditions.

N.1.3. Test Conditions.

N.1.3.1. General. – Except during type evaluation, all tests shall be performed under the conditions that are considered usual and customary within the location(s) where the system is normally operated as deemed necessary by the statutory authority.

N.1.3.2. Roads. – All tests shall be conducted on public roads.

N.1.3.3. Testing for Environmental Influences. – During type evaluation, the distance test may include a route traveled by the vehicle that will expose the system to conditions that could contribute to the loss of, or interference with the location service's signal. This may include:

(a) Objects that may obstruct or reflect signals such as tall buildings/structures, forestation, tunnels, etc.;

(b) Routes that do not follow a straight-line path;

(c) Significant changes in altitude;

(d) Any other relevant environmental conditions

N.2. Time Test. – A transportation network measurement system which determines time elapsed shall be tested for compliance with the tolerances values specified in T.1.2. Time Tests, using a certified, traceable standard.

T. Tolerances

T.1. Tolerance Values. – The tolerances will be as specified in T.1.1. Distance Tests and T.1.2. Time Tests. (The following proposed tolerance values will be confirmed based on performance data evaluated by the U.S. National Work Group before the transportation network measurement systems code becomes a Permanent Code.)

T.1.1. Distance Tests. – Maintenance and acceptance tolerances shall be as follows:

(a) On Overregistration: 2.5 %

(b) On Underregistration: 2.5 %

T.1.2. Time Tests. – Maintenance and acceptance tolerances shall be as follows:

(a) On Overregistration: 5 seconds or 0.5 %, whichever is greater

(b) On Underregistration: 5 seconds or 0.5 %, whichever is greater

T.2. Tests Using Transfer Standards. – To the basic tolerance values that would otherwise be applied, there shall be added an amount equal to two times the standard deviation of the applicable transfer standard when compared to a basic reference standard.

UR. User Requirements

UR.1. System Indications. – The indicating elements identified in S.1.1. General Indicating Elements shall display indications and information in a manner such that they can be conveniently read by the user of the device, computer, website, or online-enabled technology application service.

UR.1.1. Statement of Rates. – The transportation network company rider shall be able to view the basis for calculating the fare including, if applicable, the base fare, rates for time and distance, and the amount of a booking fee, platform fee, or other similar service fee.

UR.2. Change Tracking. – Upon request by an official having statutory authority, the transportation network company shall provide an explanation of changes that are logged pursuant to S.2.3. Change Tracking requirement during the time period covered by the request. Any such request shall be answered within two business days, unless extended by the official having statutory authority. Records provided pursuant to S.2.3. Change Tracking shall be treated as confidential and proprietary to the extent permitted by any applicable law.

UR.3. System Installation and Operation. – The transportation network company driver shall use the indicating elements identified in S.1.1. (a) General Indicating Elements in accordance with the requirements of the manufacturer, distributor, or developer.

UR.4. Fare Estimates. – Estimates for fare charges shall be provided by the transportation network measurement system when requested by the transportation network company rider and following the input of a final destination for the trip being requested. The recipient of the fare estimate shall be able to access information about the fare estimate, including key variables that may lead to discrepancies between actual fare charged and the fare estimate provided as required by law.

UR.5. Determination of Total Charges When Location Service Data is Lost. – The transportation network company shall disclose the manner in which total charges are determined when there is significant data loss from location services to the transportation network company rider and driver after the conclusion of the trip.

Appendix D

digital network. – An online-enabled technology application service, website, or system offered or used by a transportation network company that enables a transportation network company rider to arrange a network-arranged ride with a transportation network company driver. [5.XX]

network-arranged ride. – The provision of transportation by a transportation network company driver to a transportation network company rider, or other persons selected by the transportation network company rider, arranged through a digital network. [5.XX]

transportation network measurement system. – The information technology infrastructure and services offered or used by a transportation network company that receives data collected through a digital network and calculates a fare for a network-arranged ride. [5.XX]

transportation network company. – An entity that uses a digital network to connect transportation network company riders with transportation network company drivers who provide network-arranged rides, and offers or provides a transportation network measurement system, subject to an agreement or terms of service between the transportation network company and transportation network company rider or driver. [5.XX]

transportation network company driver. – An individual authorized by the transportation network company to access the digital network and receive connections to transportation network company riders for the purpose of providing network-arranged rides. [5.XX]

transportation network company rider. – An individual who has obtained an account with a transportation network company and uses the transportation network company's digital network to connect with a transportation network company driver who can offer or provide a network-arranged ride to the transportation network company rider or other persons selected by the transportation network company rider. [5.XX]

Background/Discussion:

The rationale, background, etc., for this item is the same as that provided under agenda Item 3504-1 and the Committee grouped the two items together at the 2017 NCWM Interim and Annual Meetings. See the Background/Discussion portion of agenda Item 3504-1 for details.

At the 2017 NCWM Interim Meeting, the Committee agreed to group agenda Items 3504-1 and 3600-6 together and take comments on these items simultaneously because it considered these items related. See agenda Item 3504-1 for a summary of the comments received and the resulting actions taken by the Committee on these items at the 2017 NCWM Interim Meeting.

At the 2017 NCWM Annual Meeting, the Committee agreed to group agenda Items 3504-1 and 3600-6 together and take comments on these items simultaneously because it considered these items related. See agenda Item 3504-1 for a summary of the comments received by the Committee on these items at the 2017 NCWM Annual Meeting.

Based upon the comments received in support of amending the draft tentative (TNMS) code by deleting the definition of "transfer standard" from that code and amending paragraph N.1.3.2. by deleting the words "which are in good repair," the Committee agreed to these changes. The Committee also agreed to present the two items in this group for Vote. The changes to the draft tentative code agreed to by the Committee are reflected in the Item Under Consideration for this item.

Regional Association Comments and Recommendations:

The WWMA received many comments in favor of this item from both industry and regulators at its 2016 Annual Meeting. They also received a few concerns on language and made minor changes to N.1.2.2. and N.1.3.2. as shown below. Since this item will need to coincide with Item 3504-1 (updated version) if adopted, the WWMA recommends that they be Voted upon together by NCWM. WWMA forwarded the item to NCWM and recommended that it be a Voting item with the following changes:

N.1.2. Test Procedures.

N.1.2.1. Test Length. – All tests must be at least one mile in length. If a measured course or testing equipment is not readily available that will enable a test of a length sufficient to exceed the minimum fare, after completing the testing specified in N.1.1. Test Methods, an additional unmeasured test may be conducted. The purpose of this additional unmeasured test is to verify compliance with S.1.10. Receipt.

N.1.2.2. Additional Tests. – If during testing a transportation network measurement system produces a measurement that does not comply with the tolerance values in T.1.1. Distance Tests, a minimum of three additional tests **~~shall~~** **may** be conducted at the same location where all test variables are reduced to the greatest extent practicable to verify the system's ability to repeat transaction indications. Repeatability testing performed in excess of these three additional tests is done at the discretion of the official with statutory authority.

To verify system-wide noncompliance, tests for variability shall be conducted, including a minimum of three consecutive tests of varying lengths, locations, and/or environmental conditions.

N.1.3. Test Conditions.

N.1.3.1. General. – Except during type evaluation, all tests shall be performed under the conditions that are considered usual and customary within the location(s) where the system is normally operated as deemed necessary by the statutory authority.

N.1.3.2. Roads. – All tests shall be conducted on public roads**~~, which are in good repair~~.**

N.1.3.3. Testing for Environmental Influences. **–** During type evaluation, the distance test may include a route traveled by the vehicle that will expose the system to conditions that could contribute to the loss of, or interference with the location service's signal. This may include:

(a) Objects that may obstruct or reflect signals such as tall buildings/structures, forestation, tunnels, etc.;

(b) Routes that do not follow a straight-line path;

(c) Significant changes in altitude;

(d) Any other relevant environmental conditions.

The CWMA reported at its fall 2016 Interim Meeting it supports the work of the USNWG on Taximeters and believes this item is fully developed and should be included in NIST Handbook 44 as a tentative code. CWMA forwarded the item to NCWM and recommended Voting status. At its spring 2017 Annual Meeting, NEWMA reported numerous issues must be resolved regarding the use of transfer standards. Among these issues, criteria and procedures are needed to specify how the standard deviation of the transfer standard is to be determined. If these issues are resolved or if the use of transfer standards is removed from this item, the CWMA would support it as a Voting item. As proposed the CWMA supports the continued development of this code.

The SWMA batched Items 354-1 and 3600-6 together and heard comments for both items at the same time at its 2016 Annual Meeting. Mr. Bob O'Leary (Uber) stated that the USNWG had developed a new code over the last year. He further stated that the USNWG has come to consensus with this draft code and believed it is ready for a Vote. Mr. O'Leary concluded by stating he is looking forward to its adoption in July. Mr. James Cassidy (Cambridge, Massachusetts) spoke in support of these items and noted that the code is a tentative code, which needs to be adopted. Ms. Kristin Macey (California) noted that both Mr. Cassidy and she were a part of this process within the USNWG and stated that the code has been vetted at all levels of government, in particular those that conduct taximeter testing. She further noted this new technology is a system and not a device. Ms. Macey concluded by stating that this new type of system must be tested using transfer standards. The SWMA believes this item is fully developed and forwarded it to NCWM, recommending Voting status.

NEWMA expressed appreciation for the hard work and many meetings of the USNWG on Taximeters. NEWMA forwarded the item to the NCWM and recommended Voting status at both its fall 2016 Interim Meeting (with no changes) and spring 2017 Annual Meeting (after agreeing to delete the definition of "transfer standard" from the proposal).

Additional letters, presentations, and data may have been part of the Committee's consideration. To review the supporting documentation, please refer to the "Report of the 101st National Conference on Weights and Measures" (SP1212, 2016) at: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**.

Dr. Matthew Curran, Florida | Committee Chair
Ms. Jane Zulkiewicz, Town of Barnstable, Massachusetts | Member
Mr. Ivan Hankins, Iowa | Member
Ms. Rachelle Miller, Wisconsin | Member
Mr. Josh Nelson, Oregon | Member
Mr. Luciano Burtini, Measurement Canada | Canadian Technical Advisor
Mr. Rick Harshman, NIST, OWM | NIST Technical Advisor
Mr. Darrell Flocken, NCWM | NTEP Technical Advisor

Specifications and Tolerances Committee

Appendix A

Item 3205-1: NIST Handbook 44 – Scales Code, WIM Task Group's Current Proposed Changes

(Attachment to agenda Item 3205-1)

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Section 2.20. Scales

A. Application

A.1. General. – This code applies to all types of weighing devices other than automatic bulk-weighing systems, belt-conveyor scales, and automatic weighing systems. The code comprises requirements that generally apply to all weighing devices, and specific requirements that are applicable only to certain types of weighing devices.

(Amended 1972 and 1983)

A.2. Wheel-Load Weighers, Portable Axle-Load Weighers, and Axle-Load Scales. – The requirements for wheel-load weighers, portable axle-load weighers, and axle-load scales apply only to such scales in official use for the enforcement of traffic and highway laws or for the collection of statistical information by government agencies.

(Amended 20XX)

A.3. Additional Code Requirements. – In addition to the requirements of this code, devices covered by the Scales code shall meet the requirements of Section 1.10. General Code.

S. Specifications

S.1. Design of Indicating and Recording Elements and of Recorded Representations.

S.1.1. Zero Indication.

(a) On a scale equipped with indicating or recording elements, provision shall be made to either indicate or record a zero-balance condition.

(b) On an automatic-indicating scale or balance indicator, provision shall be made to indicate or record an out-of-balance condition on both sides of zero.

(c) A zero-balance condition may be indicated by other than a continuous digital zero indication, provided that an effective automatic means is provided to inhibit a weighing operation or to return to a continuous digital indication when the scale is in an out-of-balance condition.

(Added 1987) (Amended 1993)

(Amended 1987)

S.1.1.1. Digital Indicating Elements.

(a) A digital zero indication shall represent a balance condition that is within ± ½ the value of the scale division.

(b) A digital indicating device shall either automatically maintain a "center-of-zero" condition to ± ¼ scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero-balance condition to ± ¼ of a scale division or less. A "center-of-zero" indication may operate when zero is indicated for gross and/or net mode(s).
[Nonretroactive as of January 1, 1993]

(c) Weigh-in-Motion Vehicle Scales Zero or Ready Indication.

(1) Provision shall be made to indicate or record either a zero or ready condition.

(2) ***<u>A zero or ready condition may be indicated by other than a continuous digital zero indication, provided that an effective automatic means is provided to inhibit a measuring operation when the device is in an out-of-zero or non-ready condition.</u>***

(Amended 1992**<u>,</u>** ~~**and**~~ 2008**<u>, and 20XX</u>**)

S.1.1.2. No-Load Reference Value. – On a single draft manually operated receiving hopper scale installed below grade, used to receive grain, and utilizing a no-load reference value provision shall be made to indicate and record the no-load reference value prior to the gross load value.

(Added 1983)

S.1.2. Value of Scale Division Units. *– Except for batching scales and weighing systems used exclusively for weighing in predetermined amounts, the value of a scale division "d" expressed in a unit of weight shall be equal to:*

(a) 1, 2, or 5; or

(b) a decimal multiple or submultiple of 1, 2, or 5; or

Examples: scale divisions may be 10, 20, 50, 100; or 0.01, 0.02, 0.05; or 0.1, 0.2, 0.5, etc.

(c) a binary submultiple of a specific unit of weight.

Examples: scale divisions may be ½, ¼, 1/8, 1/16, etc.

[Nonretroactive as of January 1, 1986]

S.1.2.1.~~1~~ Digital Indicating Scales, Units*. – Except for postal scales, a digital-indicating scale shall indicate weight values using only a single unit of measure. Weight values shall be presented in a decimal format with the value of the scale division expressed as 1, 2, or 5, or a decimal multiple or submultiple of 1, 2, or 5.*

The requirement that the value of the scale division be expressed only as 1, 2, or 5, or a decimal multiple or submultiple of only 1, 2, or 5 does not apply to net weight indications and recorded representations that are calculated from gross and tare weight indications where the scale division of the gross weight is different from the scale division of the tare weight(s) on multi-interval or multiple range scales. For example, a multiple range or multi-interval scale may indicate and record tare weights in a lower weighing range (WR) or weighing segment (WS), gross weights in the higher weighing range or weighing segment, and net weights as follows:

55 kg	*Gross Weight*	*(WR2 d = 5 kg)*	*10.05 lb*	*Gross Weight*	*(WS2 d = 0.05 lb)*
− 4 kg	*Tare Weight*	*(WR1 d = 2 kg)*	*− 0.06 lb*	*Tare Weight*	*(WS1 d = 0.02 lb)*
= 51kg	*Net Weight*	*(Mathematically Correct)*	*= 9.99 lb*	*Net Weight*	*(Mathematically Correct)*

[Nonretroactive as of January 1, 1989]

(Added 1987) (Amended 2008)

S.1.2.2. Verification Scale Interval.

S.1.2.2.1. Class I and II Scales and Dynamic Monorail Scales. – If e ≠ d, the verification scale interval "e" shall be determined by the expression:

$$d < e \leq 10\ d$$

If the displayed division (d) is less than the verification division (e), then the verification division shall be less than or equal to 10 times the displayed division.

The value of e must satisfy the relationship, $e = 10^k$ of the unit of measure, where k is a positive or negative whole number or zero. This requirement does not apply to a Class I device with d < 1 mg where e = 1 mg. If e ≠ d, the value of "d" shall be a decimal submultiple of "e," and the ratio shall not be more than 10:1. If e ≠ d, and both "e" and "d" are continuously displayed during normal operation, then "d" shall be differentiated from "e" by size, shape, color, etc. throughout the range of weights displayed as "d."

(Added 1999)

S.1.2.2.2. Class III and IIII Scales. – The value of "e" is specified by the manufacturer as marked on the device. Except for dynamic monorail scales, "e" must be less than or equal to "d."

(Added 1999)

S.1.2.3. Prescription Scale with a Counting Feature. – A Class I or Class II prescription scale with an operational counting feature shall not calculate a piece weight or total count unless the sample used to determine the individual piece weight meets the following conditions:

(a) minimum individual piece weight is greater than or equal to 3 e; and

(b) minimum sample piece count is greater than or equal to 10 pieces.

(Added 2003)

S.1.3. Graduations.

S.1.3.1. Length. – Graduations shall be so varied in length that they may be conveniently read.

S.1.3.2. Width. – In any series of graduations, the width of a graduation shall in no case be greater than the width of the clear space between graduations. The width of main graduations shall be not more than 50 % greater than the width of subordinate graduations. Graduations shall be not less than 0.2 mm (0.008 in) wide.

S.1.3.3. Clear Space Between Graduations. – The clear space between graduations shall be not less than 0.5 mm (0.02 in) for graduations representing money-values, and not less than 0.75 mm (0.03 in) for other graduations. If the graduations are not parallel, the measurement shall be made:

(a) along the line of relative movement between the graduations at the end of the indicator; or

(b) if the indicator is continuous, at the point of widest separation of the graduations.

S.1.4. Indicators.

S.1.4.1. Symmetry. – The index of an indicator shall be of the same shape as the graduations, at least throughout that portion of its length associated with the graduations.

S.1.4.2. Length. – The index of an indicator shall reach to the finest graduations with which it is used, unless the indicator and the graduations are in the same plane, in which case, the distance between the end of the indicator and the ends of the graduations, measured along the line of the graduations, shall be not more than 1.0 mm (0.04 in).

S.1.4.3. Width. – The width of the index of an indicator in relation to the series of graduations with which it is used shall be not greater than:

(a) the width of the narrowest graduation;
[Nonretroactive as of January 1, 2002]

(b) the width of the clear space between weight graduations; and

(c) three-fourths of the width of the clear space between money-value graduations.

When the index of an indicator extends along the entire length of a graduation, that portion of the index of the indicator that may be brought into coincidence with the graduation shall be of the same width throughout the length of the index that coincides with the graduation.

S.1.4.4. Clearance. – The clearance between the index of an indicator and the graduations shall in no case be more than 1.5 mm (0.06 in).

S.1.4.5. Parallax. – Parallax effects shall be reduced to the practicable minimum.

S.1.5. Weighbeams.

S.1.5.1. Normal Balance Position. – The normal balance position of the weighbeam of a beam scale shall be horizontal.

S.1.5.2. Travel. – The weighbeam of a beam scale shall have equal travel above and below the horizontal. The total travel of the weighbeam of a beam scale in a trig loop or between other limiting stops near the weighbeam tip shall be not less than the minimum travel shown in Tables 1M and 1. When such limiting stops are not provided, the total travel at the weighbeam tip shall be not less than 8 % of the distance from the weighbeam fulcrum to the weighbeam tip.

Table 1M.
Minimum Travel of Weighbeam of Beam Scale Between Limiting Stops

Distance from Weighbeam Fulcrum to Limiting Stops (centimeters)	Minimum Travel Between Limiting Stops (millimeter)
30 or less	10
30+ to 50, inclusive	13
50+ to 100, inclusive	18
Over 100	23

Table 1.
Minimum Travel of Weighbeam of Beam Scale Between Limiting Stops

Distance from Weighbeam Fulcrum to Limiting Stops (inches)	Minimum Travel Between Limiting Stops (inch)
12 or less	0.4
12+ to 20, inclusive	0.5
20+ to 40, inclusive	0.7
Over 40	0.9

S.1.5.3. Subdivision. – A subdivided weighbeam bar shall be subdivided by scale division graduations, notches, or a combination of both. Graduations on a particular bar shall be of uniform width and perpendicular to the top edge of the bar. Notches on a particular bar shall be uniform in shape and dimensions and perpendicular to the face of the bar. When a combination of graduations and notches is employed, the graduations shall be positioned in relation to the notches to indicate notch values clearly and accurately.

S.1.5.4. Readability. – A subdivided weighbeam bar shall be so subdivided and marked, and a weighbeam poise shall be so constructed, that the weight corresponding to any normal poise position can easily and accurately be read directly from the beam, whether or not provision is made for the optional recording of representations of weight.

S.1.5.5. Capacity. – On an automatic-indicating scale having a nominal capacity of 15 kg (30 lb) or less and used for direct sales to retail customers:

(a) the capacity of any weighbeam bar shall be a multiple of the reading-face capacity;

(b) each bar shall be subdivided throughout or shall be subdivided into notched intervals, each equal to the reading-face capacity; and

(c) the value of any turnover poise shall be equal to the reading-face capacity.

S.1.5.6. Poise Stop. – Except on a steelyard with no zero graduation, a shoulder or stop shall be provided on each weighbeam bar to prevent a poise from traveling and remaining back of the zero graduation.

S.1.6. Poises.

S.1.6.1. General. – No part of a poise shall be readily detachable. A locking screw shall be perpendicular to the longitudinal axis of the weighbeam and shall not be removable. Except on a steelyard with no zero graduation, the poise shall not be readily removable from a weighbeam. The knife-edge of a hanging poise shall be hard and sharp and so constructed as to allow the poise to swing freely on the bearing surfaces in the weighbeam notches.

S.1.6.2. Adjusting Material. – The adjusting material in a poise shall be securely enclosed and firmly fixed in position; if softer than brass, it shall not be in contact with the weighbeam.

S.1.6.3. Pawl. – A poise, other than a hanging poise, on a notched weighbeam bar shall have a pawl that will seat the poise in a definite and correct position in any notch, wherever in the notch the pawl is placed, and hold it there firmly and without appreciable movement. The dimension of the tip of the pawl that is transverse to the longitudinal axis of the weighbeam shall be at least equal to the corresponding dimension of the notches.

S.1.6.4. Reading Edge or Indicator. – The reading edge or indicator of a poise shall be sharply defined, and a reading edge shall be parallel to the graduations on the weighbeam.

S.1.7. Capacity Indication, Weight Ranges, and Unit Weights.

(a) **Gross Capacity. –** An indicating or recording element shall not display nor record any values when the gross load (not counting the initial dead load that has been canceled by an initial zero-setting mechanism) is in excess of 105 % of scale capacity.

(b) ***Capacity Indication.*** *– Electronic computing scales (excluding postal scales and weight classifiers) shall neither display nor record a gross or net weight in excess of scale capacity plus 9 d.*
[Nonretroactive as of January 1, 1993]

The total value of weight ranges and of unit weights in effect or in place at any time shall automatically be accounted for on the reading face and on any recorded representation.

This requirement does not apply to: (1) single-revolution dial scales, (2) multi-revolution dial scales not equipped with unit weights, (3) scales equipped with two or more weighbeams, nor (4) devices that indicate mathematically derived totalized values.
(Amended 1990, 1992, and 1995)

S.1.8. Computing Scales.

S.1.8.1. Money-Value Graduations, Metric Unit Prices. – The value of the graduated intervals representing money-values on a computing scale with analog indications shall not exceed:

(a) 1 cent at all unit prices of 55 cents per kilogram and less;

(b) 2 cents at unit prices of 56 cents per kilogram through $2.75 per kilogram (special graduations defining 5-cent intervals may be employed but not in the spaces between regular graduations);

(c) 5 cents at unit prices of $2.76 per kilogram through $7.50 per kilogram; or

(d) 10 cents at unit prices above $7.50 per kilogram.

Value figures and graduations shall not be duplicated in any column or row on the graduated chart. (Also see S.1.8.2. Money-Value Computation.)

S.1.8.2. Money-Value Graduations, U.S. Customary Unit Prices. – The value of the graduated intervals representing money-values on a computing scale with analog indications shall not exceed:

(a) 1 cent at all unit prices of 25 cents per pound and less;

(b) 2 cents at unit prices of 26 cents per pound through $1.25 per pound (special graduations defining 5-cent intervals may be employed but not in the spaces between regular graduations);

(c) 5 cents at unit prices of $1.26 per pound through $3.40 per pound; or

(d) 10 cents at unit prices above $3.40 per pound.

Value figures and graduations shall not be duplicated in any column or row on the graduated chart. (Also see S.1.8.2. Money-Value Computation.)

S.1.8.3. Money-Value Computation. – A computing scale with analog quantity indications used in retail trade may compute and present digital money-values to the nearest quantity graduation when the value of the minimum graduated interval is 0.005 kg (0.01 lb) or less. (Also see Sec. 1.10. General Code G-S.5.5. Money-Values, Mathematical Agreement.)

S.1.8.4. Customer's Indications. – Weight indications shall be shown on the customer's side of computing scales when these are used for direct sales to retail customers. Computing scales equipped on the operator's side with digital indications, such as the net weight, unit price, or total price, shall be similarly equipped on the customer's side. Unit price displays visible to the customer shall be in terms of single whole units of weight and not in common or decimal fractions of the unit. Scales indicating in metric units may indicate price per 100 g.

(Amended 1985 and 1995)

S.1.8.4.1. *Scales that will function as either a normal round off scale or as a weight classifier shall be provided with a sealable means for selecting the mode of operation and shall have a clear indication (annunciator), adjacent to the weight display on both the operator's and customer's side whenever the scale is operating as a weight classifier.*
[Nonretroactive as of January 1, 2001]

(Added 1999)

S.1.8.5. Recorded Representations, Point-of-Sale Systems. – The sales information recorded by cash registers when interfaced with a weighing element shall contain the following information for items weighed at the checkout stand:

(a) the net weight;[1]

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[1] For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams. Weight values shall be identified by kilograms, kg, grams, g, ounces, oz, pounds, or lb. *The "#" symbol is not acceptable. [Nonretroactive as of January 1, 2006]*

(Amended 1995 and 2005)

(b) the unit price;[1]

(c) the total price; and

(d) the product class or, in a system equipped with price look-up capability, the product name or code number.

S.1.8.6. Values to be Recorded, Weigh-In-Motion Vehicle Scales. – At a minimum, the following values shall be printed and/or stored electronically for each vehicle weighment:

(a) lane identification (required if more than one lane at the site has the ability to weigh a vehicle in motion);

(b) weight and sequence of each axle;

(c) total vehicle weight;

(d) time and date.

(Added 20XX)

S.1.9. Prepackaging Scales.

S.1.9.1. Value of the Scale Division. – On a prepackaging scale, the value of the intervals representing weight values shall be uniform throughout the entire reading face. The recorded weight values shall be identical with those on the indicator.

S.1.9.2. Label Printer. – A prepackaging scale or a device that produces a printed ticket to be used as the label for a package shall print all values digitally and of such size, style of type, and color as to be clear and conspicuous on the label.

S.1.10. Adjustable Components. – An adjustable component such as a pendulum, spring, or potentiometer shall be held securely in adjustment and, except for a zero-load balance mechanism, shall be located within the housing of the element.
(Added 1986)

S.1.11. Provision for Sealing.

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

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

(c) Except on Class I scales, audit trails shall use the format set forth in Table S.1.11. Categories of Device and Methods of Sealing.
[Nonretroactive as of January 1, 1995]

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

(Amended 1989, 1991, and 1993)

Table S.1.11. Categories of Device and Methods of Sealing

Categories of Device	***Methods of Sealing***
Category 1: *No remote configuration capability.*	*Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.*
Category 2: *Remote configuration capability, but access is controlled by physical hardware.* *The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode.*	*The hardware enabling access for remote communication must be at the device and sealed using a physical seal or two event counters: one for calibration parameters and one for configuration parameters.*
Category 3: *Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).*	*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. 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 10 times the number of sealable parameters in the device, but not more than 1000 records are required. (**Note:** Does not require 1000 changes to be stored for each parameter.)*

[Nonretroactive as of January 1, 1995]

(Table added 1993)

S.1.12. Manual Weight Entries. *– A device when being used for direct sale shall accept an entry of a manual gross or net weight value only when the scale gross or net* weight indication is at zero. Recorded manual weight entries, except those on labels generated for packages of standard weights, shall identify the weight value as a manual weight entry by one of the following terms: "Manual Weight," "Manual Wt," or "MAN WT." The use of a symbol to identify multiple manual weight entries on a single document is permitted, provided that the symbol is defined on the same page on which the manual weight entries appear and the definition of the symbol is automatically printed by the recording element as part of the document.*
*[Nonretroactive as of January 1, 1993] [*Nonretroactive as of January 1, 2005]*

(Added 1992) (Amended 2004)

S.1.13. Vehicle On-Board Weighing Systems: Vehicle in Motion. – When the vehicle is in motion, a vehicle on-board weighing system shall either:

(a) be accurate; or

(b) inhibit the weighing operation.

(Added 1993)

S.1.14. <u>Weigh-In-Motion Vehicle Scale: Operational Limitation. –</u> <u>A weigh-in-motion vehicle scale shall not provide a weight indication or recorded representation if any operational limitation is exceeded.</u>

<u>(Added 20XX)</u>

S.2. Design of Balance, Tare, Level, Damping, and Arresting Mechanisms.

S.2.1. Zero-Load Adjustment.

S.2.1.1. General. – A scale shall be equipped with means by which the zero-load balance may be adjusted. Any loose material used for this purpose shall be enclosed so that it cannot shift in position and alter the balance condition of the scale.

Except for an initial zero-setting mechanism, an automatic zero adjustment outside the limits specified in S.2.1.3. Scales Equipped with an Automatic Zero-Tracking Mechanism is prohibited.
(Amended 2010)

S.2.1.2. Scales used in Direct Sales. – A manual zero-setting mechanism (except on a digital scale with an analog zero-adjustment mechanism with a range of not greater than one scale division) shall be operable or accessible only by a tool outside of and entirely separate from this mechanism, or it shall be enclosed in a cabinet. Except on Class I or II scales, a balance ball shall either meet this requirement or not itself be rotatable.

A semiautomatic zero-setting mechanism shall be operable or accessible only by a tool outside of and separate from this mechanism or it shall be enclosed in a cabinet, or it shall be operable only when the indication is stable within plus or minus:

(a) 3.0 scale divisions for scales of more than 2000 kg (5000 lb) capacity in service prior to January 1, 1981, and for all axle load, railway track, **weigh-in-motion vehicle systems**, and vehicle scales; or

(b) 1.0 scale division for all other scales.

(Amended 20XX)

S.2.1.3. Scales Equipped with an Automatic Zero-Tracking Mechanism.

S.2.1.3.1. Automatic Zero-Tracking Mechanism for Scales Manufactured Between January 1, 1981, and January 1, 2007. – The maximum load that can be "rezeroed," when either placed on or removed from the platform all at once under normal operating conditions, shall be for:

(a) bench, counter, and livestock scales: 0.6 scale division;

(b) vehicle, **weigh-in-motion vehicle systems**, axle load, and railway track scales: 3.0 scale divisions; and

(c) all other scales: 1.0 scale division.

(Amended 2005 **and 20XX**)

S.2.1.3.2. Automatic Zero-Tracking Mechanism for Scales Manufactured on or after January 1, 2007. – The maximum load that can be "rezeroed," when either placed on or removed from the platform all at once under normal operating conditions, shall be:

(a) for vehicle, **weigh-in-motion vehicle systems**, axle load, and railway track scales: 3.0 scale divisions; and

(b) for all other scales: 0.5 scale division.

(Added 2005) **(Amended 20XX)**

S.2.1.3.3. Means to Disable Automatic Zero-Tracking Mechanism on Class III L Devices. – *Class III L devices equipped with an automatic zero-tracking mechanism shall be designed with a sealable means that would allow zero tracking to be disabled during the inspection and test of the device.*
[Nonretroactive as of January 1, 2001]

(Added 1999) (Amended 2005)

S.2.1.4. Monorail Scales. – On a static monorail scale equipped with digital indications, means shall be provided for setting the zero-load balance to within 0.02 % of scale capacity. On a dynamic monorail weighing system, means shall be provided to automatically maintain these conditions.

(Amended 1999)

S.2.1.5. Initial Zero-Setting Mechanism. – Scales of accuracy Classes I, II, and III may be equipped with an initial zero-setting device.

(a) For weighing, load-receiving, and indicating elements in the same housing or covered on the same CC, an initial zero-setting mechanism shall not zero a load in excess of 20 % of the maximum capacity of the scale unless tests show that the scale meets all applicable tolerances for any amount of initial load compensated by this device within the specified range.

(b) For indicating elements not permanently attached to weighing and load-receiving elements covered on a separate CC, the maximum initial zero-setting mechanism range of electronic indicators shall not exceed 20 % of the configured capacity.
[Nonretroactive as of January 1, 2009]

(Added 2008)

(Added 1990) (Amended 2008)

S.2.1.6. Combined Zero-Tare ("0/T") Key. – Scales not intended to be used in direct sales applications may be equipped with a combined zero and tare function key, provided that the device is clearly marked as to how the key functions. The device must also be clearly marked on or adjacent to the weight display with the statement "Not for Direct Sales."

(Added 1998)

S.2.2. Balance Indicator. – On a balance indicator consisting of two indicating edges, lines, or points, the ends of the indicators shall be sharply defined. When the scale is in balance, the ends shall be separated by not more than 1.0 mm (0.04 in).

S.2.2.1. Dairy-Product Test, Grain-Test, Prescription, and Class I and II Scales. – Except on digital indicating devices, a dairy-product test, grain-test, prescription, or Class I or II scale shall be equipped with a balance indicator. If an indicator and a graduated scale are not in the same plane, the clearance between the indicator and the graduations shall be not more than 1.0 mm (0.04 in).

S.2.2.2. Equal-Arm Scale. *– An equal-arm scale shall be equipped with a balance indicator. If the indicator and balance graduation are not in the same plane, the clearance between the indicator and the balance graduation shall be not more than 1.0 mm (0.04 in).*
[Nonretroactive as of January 1, 1989]

(Added 1988)

S.2.3. Tare. – *On any scale (except a monorail scale equipped with digital indications and multi-interval scales or multiple range scales when the value of tare is determined in a lower weighing range or weighing segment), the value of the tare division shall be equal to the value of the scale division.** The tare mechanism shall operate only in a backward direction (that is, in a direction of underregistration) with respect to the zero-load balance

condition of the scale. *A device designed to automatically clear any tare value shall also be designed to prevent the automatic clearing of tare until a complete transaction has been indicated. **
*[*Nonretroactive as of January 1, 1983]*

(Amended 1985 and 2008)

*Note: On a computing scale, this requires the input of a unit price, the display of the unit price, and a computed positive total price at a readable equilibrium. Other devices require a complete weighing operation, including tare, net, and gross weight determination**
*[*Nonretroactive as of January 1, 1983]*

S.2.3.1. Monorail Scales Equipped with Digital Indications. – On a static monorail weighing system equipped with digital indications, means shall be provided for setting any tare value of less than 5 % of the scale capacity to within 0.02 % of scale capacity. On a dynamic monorail weighing system, means shall be provided to automatically maintain this condition.

(Amended 1999)

S.2.4. Level-Indicating Means. – Except for portable wheel-load weighers and portable axle load scales, a portable scale shall be equipped with level-indicating means if its weighing performance is changed by an amount greater than the appropriate acceptance tolerance when it is tilted up to and including 5 % rise over run in any direction from a level position and rebalanced. The level-indicating means shall be readable without removing any scale parts requiring a tool.

[This requirement is nonretroactive as of January 1, 1986, for prescription jewelers', and dairy-product test scales and scales marked Class I and II.]

Note: Portable wheel-load weighers and portable axle-load scales shall be accurate when tilted up to and including 5 % rise over run in any direction from a level position and rebalanced.

(Amended 1991 and 2008)

S.2.4.1. Vehicle On-Board Weighing Systems. – A vehicle on-board weighing system shall operate within tolerance when the weighing system is tilted up to and including 5 % rise over run in any direction from a level position and rebalanced. If the accuracy of the system is affected by out-of-level conditions normal to the use of the device, the system shall be equipped with an out-of-level sensor that inhibits the weighing operation when the system is out of level to the extent that the accuracy limits are exceeded.

(Added 1992) (Amended 2008)

S.2.5. Damping Means. – An automatic-indicating scale and a balance indicator shall be equipped with effective means to damp oscillations and to bring the indicating elements quickly to rest.

S.2.5.1. Digital Indicating Elements. – **Except for weigh-in-motion vehicle systems being operated in a dynamic mode** Digital indicating elements equipped with recording elements shall be equipped with effective means to permit the recording of weight values only when the indication is stable within plus or minus:

(a) 3.0 scale divisions for scales of more than 2000 kg (5000 lb) capacity in service prior to January 1, 1981, hopper (other than grain hopper) scales with a capacity exceeding 22 000 kg (50 000 lb), and for all vehicle, axle load, livestock, and railway track scales; and

(b) 1.0 scale division for all other scales.

The values recorded shall be within applicable tolerances.

(Amended 1995 **and 20XX**)

S.2.5.2. Jewelers', Prescription, and Class I, and Class II Scales. – A jewelers', prescription, Class I, or Class II scales shall be equipped with appropriate means for arresting the oscillation of the mechanism.

S.2.5.3. Class I and Class II Prescription Scales with a Counting Feature. – A Class I or Class II prescription scale shall indicate to the operator when the piece weight computation is complete by a stable display of the quantity placed on the load-receiving element.

(Added 2003)

S.3. Design of Load-Receiving Elements.

S.3.1. Travel of Pans of Equal-Arm Scale. – The travel between limiting stops of the pans of a nonautomatic-indicating equal-arm scale not equipped with a balance indicator shall be not less than the minimum travel shown in Table 2M. and Table 2.

Table 2M.
Minimum Travel of Pans of Nonautomatic Indicating Equal-Arm Scale without Balance Indicator

Nominal Capacity (kilograms)	Minimum Travel of Pans (millimeters)
2 or less	9
2+ to 5, inclusive	13
5+ to 12, inclusive	19
Over 12	25

Table 2.
Minimum Travel of Pans of Nonautomatic Indicating Equal-Arm Scale without Balance Indicator

Nominal Capacity (pounds)	Minimum Travel of Pans (inch)
4 or less	0.35
4+ to 12, inclusive	0.5
12+ to 26, inclusive	0.75
Over 26	1.0

S.3.2. Drainage. – A load-receiving element intended to receive wet commodities shall be so constructed as to drain effectively.

S.3.3. Scoop Counterbalance. – A scoop on a scale used for direct sales to retail customers shall not be counterbalanced by a removable weight. A permanently attached scoop-counterbalance shall indicate clearly on both the operator's and customer's sides of the scale whether it is positioned for the scoop to be on or off the scale.

S.4. Design of Weighing Elements.

S.4.1. Antifriction Means. – Frictional effects shall be reduced to a minimum by suitable antifriction elements. Opposing surfaces and points shall be properly shaped, finished, and hardened. A platform scale having a frame around the platform shall be equipped with means to prevent interference between platform and frame.

S.4.2. Adjustable Components. – An adjustable component such as a nose-iron or potentiometer shall be held securely in adjustment. The position of a nose-iron on a scale of more than 1000 kg (2000 lb) capacity, as determined by the factory adjustment, shall be accurately, clearly, and permanently defined.

(Amended 1986)

S.4.3. Multiple Load-Receiving Elements. – Except for mechanical bench and counter scales, a scale with a single indicating or recording element, or a combination indicating-recording element, that is coupled to two or more load-receiving elements with independent weighing systems, shall be provided with means to prohibit the activation of any load-receiving element (or elements) not in use, and shall be provided with automatic means to indicate clearly and definitely which load-receiving element (or elements) is in use.

S.5. Design of Weighing Devices, Accuracy Class.

S.5.1. Designation of Accuracy Class. *– Weighing devices are divided into accuracy classes and shall be designated as I, II, III, III L, or IIII.*
[Nonretroactive as of January 1, 1986]

S.5.2. Parameters for Accuracy Class. *– The accuracy class of a weighing device is designated by the manufacturer and shall comply with parameters shown in Table 3.*
[Nonretroactive as of January 1, 1986]

S.5.3. Multi-Interval and Multiple Range Scales, Division Value. – On a multi-interval scale and multiple range scale, the value of "e" shall be equal to the value of "d."[2]

(Added 1986) (Amended 1995)

S.5.4. Relationship of Minimum Load Cell Verification Interval Value to the Scale Division. *– The relationship of the value for the minimum load cell verification scale interval, v_{min}, to the scale division, d, for a specific scale using National Type Evaluation Program (NTEP) certified load cells shall comply with the following formulae where N is the number of load cells in a single independent[1] weighing/load-receiving element (such as hopper, railroad track, or vehicle scale weighing/load-receiving elements):*

(a) $v_{\min} \le \dfrac{d^*}{\sqrt{N}}$ *for scales without lever systems; and*

(b) $v_{\min} \le \dfrac{d^*}{\sqrt{N} \times (scale\,multiple)}$ *for scales with lever systems.*

[1] "Independent" means with a weighing/load-receiving element not attached to adjacent elements and with its own A/D conversion circuitry and displayed weight.

*[*When the value of the scale division, d, is different from the verification scale division, e, for the scale, the value of e must be used in the formulae above.]*

This requirement does not apply to complete weighing/load-receiving elements or scales, which satisfy all the following criteria:

- *the complete weighing/load-receiving element or scale has been evaluated for compliance with T.N.8.1. Temperature under the NTEP;*
- *the complete weighing/load-receiving element or scale has received an NTEP Certificate of Conformance; and*
- *the complete weighing/load-receiving element or scale is equipped with an automatic zero-tracking mechanism which cannot be made inoperative in the normal weighing mode. (A test mode which permits the disabling of the automatic zero-tracking mechanism is permissible, provided the scale cannot function normally while in this mode.*

[Nonretroactive as of January 1, 1994]

(Added 1993) (Amended 1996 and 2016)

[2] Footnote 1 to Table 3 Parameters for Accuracy Classes.

Table 3.
Parameters for Accuracy Classes

Class	***Value of the Verification Scale Division (d or e[1])***	***Number of Scale[4] Divisions (n)***	
		Minimum	***Maximum***
SI Units			
I	*equal to or greater than 1 mg*	*50 000*	*--*
II	*1 to 50 mg, inclusive*	*100*	*100 000*
	equal to or greater than 100 mg	*5 000*	*100 000*
III[2,5]	*0.1 to 2 g, inclusive*	*100*	*10 000*
	equal to or greater than 5 g	*500*	*10 000*
III L[3]	*equal to or greater than 2 kg*	*2 000*	*10 000*
IIII	*equal to or greater than 5 g*	*100*	*1 200*
U.S. Customary Units			
III[5]	*0.0002 lb to 0.005 lb, inclusive*	*100*	*10 000*
	0.005 oz to 0.125 oz, inclusive	*100*	*10 000*
	equal to or greater than 0.01 lb	*500*	*10 000*
	equal to or greater than 0.25 oz	*500*	*10 000*
III L[3]	*equal to or greater than 5 lb*	*2 000*	*10 000*
IIII	*greater than 0.01 lb*	*100*	*1 200*
	greater than 0.25 oz	*100*	*1 200*

[1] *For Class I and II devices equipped with auxiliary reading means (i.e., a rider, a vernier, or a least significant decimal differentiated by size, shape, or color), the value of the verification scale division "e" is the value of the scale division immediately preceding the auxiliary means.*

[2] *A Class III scale marked "For prescription weighing only" may have a verification scale division (e) not less than 0.01 g.*

(Added 1986) (Amended 2003)

[3] *The value of a scale division for crane and hopper (other than grain hopper) scales shall be not less than 0.2 kg (0.5 lb). The minimum number of scale divisions shall be not less than 1000.*

[4] *On a multiple range or multi-interval scale, the number of divisions for each range independently shall not exceed the maximum specified for the accuracy class. The number of scale divisions, n, for each weighing range is determined by dividing the scale capacity for each range by the verification scale division, e, for each range. On a scale system with multiple load-receiving elements and multiple indications, each element considered shall not independently exceed the maximum specified for the accuracy class. If the system has a summing indicator, the* n_{max} *for the summed indication shall not exceed the maximum specified for the accuracy class.*

(Added 1997)

[5] *The minimum number of scale divisions for a Class III Hopper Scale used for weighing grain shall be 2000.*)

[*Nonretroactive as of January 1, 1986*]

(Amended 1986, 1987, 1997, 1998, 1999, 2003, and 2004)

S.6. Marking Requirements. – (Also see G-S.1. Identification, G-S.4. Interchange or Reversal of Parts, G-S.6. Marking Operational Controls, Indications, and Features, G-S.7. Lettering, G-UR.2.1.1. Visibility of Identification, and UR.3.4.1. Use in Pairs.)

S.6.1. Nominal Capacity; Vehicle and Axle-Load Scales. *– For all vehicle and axle-load scales, the marked nominal capacity shall not exceed the concentrated load capacity (CLC) times the quantity of the number of sections in the scale minus 0.5.*

As a formula, this is stated as: *nominal capacity* $\leq$ *CLC × (N − 0.5)*
where N = the number of sections in the scale.
[Nonretroactive as of January 1, 1989]

Note: When the device is used in a combination railway track and vehicle weighing application, the above formula shall apply only to the vehicle scale application.

(Added 1988) (Amended 1999 and 2002)

S.6.2. Location of Marking Information. – Scales that are not permanently attached to an indicating element, and for which the load-receiving element is the only part of the weighing/load-receiving element visible after installation, may have the marking information required in Section 1.10. General Code, G-S.1. Identification and Section 2.20. Scales Code, S.6. Marking Requirements located in an area that is accessible only through the use of a tool; provided that the information is easily accessible (e.g., the information may appear on the junction box under an access plate). The identification information for these scales shall be located on the weighbridge (load-receiving element) near the point where the signal leaves the weighing element or beneath the nearest access cover.

(Added 1989)

S.6.3. Scales, Main Elements, and Components of Scales or Weighing Systems. – Scales, main elements of scales when not contained in a single enclosure for the entire scale, load cells for which Certificates of Conformance (CC) have been issued under the National Type Evaluation Program (NTEP), and other equipment necessary to a weighing system, but having no metrological effect on the weighing system, shall be marked as specified in Table S.6.3.a. Marking Requirements and explained in the accompanying notes in Table S.6.3.b. Notes for Table S.6.3.a.

(Added 1990)

Table S.6.3.a.
Marking Requirements

To Be Marked With ⇓	Weighing Equipment				
	Weighing, Load-Receiving, and Indicating Element in Same Housing or Covered on the Same CC[1]	**Indicating Element not Permanently Attached to Weighing and Load-Receiving Element or Covered by a Separate CC**	**Weighing and Load-Receiving Element Not Permanently Attached to Indicating Element or Covered by a Separate CC**	**Load Cell with CC (11)**	**Other Equipment or Device (10)**
Manufacturer's ID (1)	X	X	X	X	X
Model Designation and Prefix (1)	X	X	X	X	X
Serial Number and Prefix (2)	X	X	X	X	X (16)
Certificate of Conformance Number (CC) (23)	X	X	X	X	X (23)
Accuracy Class (17)	X	X (8)	X (19)	X	
Nominal Capacity (3)(18)(20)	X	X	X		
Value of Scale Division, "d" (3)	X	X			
Value of "e" (4)	X	X			
Temperature Limits (5)	X	X	X	X	
Concentrated Load Capacity (CLC) (12)(20)(22)		X	X (9)		
Special Application (13)	X	X	X		
Maximum Number of Scale Divisions (n_{max}) (6)		X (8)	X (19)	X	
Minimum Verification Scale Division (e_{min})			X (19)		
"S" or "M" (7)				X	
Direction of Loading (15)				X	
Minimum Dead Load				X	
Maximum Capacity				X	
Safe Load Limit				X	
Load Cell Verification Interval (v_{min}) (21)				X	
Section Capacity and Prefix (14)(20)(22)(24)		X	X		

Table S.6.3.a. Marking Requirements
Note: For applicable notes, Table S.6.3.b. [1] Weighing/load-receiving elements and indicators which are in the same housing or which are permanently attached will generally appear on the same CC. If not in the same housing, elements shall be hard-wired together or sealed with a physical seal or an electronic link. This requirement does not apply to peripheral equipment that has no input or effect on device calibrations or configurations. (Added 2001)

(Added 1990) (Amended 1992, 1999, 2000, 2001, 2002, ~~and~~ 2004**, and 20XX**)

Table S.6.3.b.
Notes for Table S.6.3.a. Marking Requirements

1. Manufacturer's identification and model designation and *model designation prefix.**
   *[*Nonretroactive as of January 1, 2003*]
   (Also see G-S.1. Identification.) *[Prefix lettering may be initial capitals, all capitals or all lower case]*
   (Amended 2000)

2. *Serial number [Nonretroactive as of January 1, 1968] and prefix [Nonretroactive as of January 1, 1986]*. (Also see G-S.1. Identification.)

3. The device shall be marked with the nominal capacity. *The nominal capacity shall be shown together with the value of the scale division (e.g., 15 × 0.005 kg, 30 × 0.01 lb, or capacity = 15 kg, d = 0.005 kg) in a clear and conspicuous manner and be readily apparent when viewing the reading face of the scale indicator unless already apparent by the design of the device. Each scale division value or weight unit shall be marked on multiple range or multi-interval scales.*
   [Nonretroactive as of January 1, 1983]
   (Amended 2005)

4. *Required only if different from "d."*
   [Nonretroactive as of January 1, 1986]

5. *Required only on Class III, III L, and IIII devices if the temperature range on the NTEP CC is narrower than and within − 10 °C to 40 °C (14 °F to 104 °F). [Nonretroactive as of January 1, 1986]*
   (Amended 1999)

6. *This value may be stated on load cells in units of 1000; e.g., n: 10 is 10 000 divisions.*
   [Nonretroactive as of January 1, 1988]

7. *Denotes compliance for single or multiple load cell applications. It is acceptable to use a load cell with the "S" or Single Cell designation in multiple load cell applications as long as all other parameters meet applicable requirements. A load cell with the "M" or Multiple Cell designation can be used only in multiple load cell applications.*
   [Nonretroactive as of January 1, 1988]
   (Amended 1999)

8. *An indicating element not permanently attached to a weighing element shall be clearly and permanently marked with the accuracy Class of I, II, III, III L, or IIII, as appropriate, and the maximum number of scale divisions, n_{max}, for which the indicator complies with the applicable requirement. Indicating elements that qualify for use in both Class III and III L applications may be marked III/III L and shall be marked with the maximum number of scale divisions for which the device complies with the applicable requirements for each accuracy class.*
   [Nonretroactive as of January 1, 1988]

Table S.6.3.b.
Notes for Table S.6.3.a. Marking Requirements

9. *For vehicle and axle-load scales only. The CLC shall be added to the load-receiving element of any such scale not previously marked at the time of modification.*
[Nonretroactive as of January 1, 1989]
(Amended 2002)

10. Necessary to the weighing system but having no metrological effect, e.g., auxiliary remote display, keyboard, etc.

11. *The markings may be either on the load cell or in an accompanying document; except that, if an accompanying document is provided, the serial number shall appear both on the load cell and in the document. [Nonretroactive as of January 1, 1988] The manufacturer's name or trademark, the model designation, and identifying symbols for the model and serial numbers as required by paragraph G-S.1. Identification shall also be marked both on the load cell and in any accompanying document.*
[Nonretroactive as of January 1, 1991]

12. Required on the indicating element *and the load-receiving element* of vehicle and axle-load scales. *Such marking shall be identified as "concentrated load capacity" or by the abbreviation "CLC." **
*[*Nonretroactive as of January 1, 1989]*
(Amended 2002)

13. *A scale designed for a special application rather than general use shall be conspicuously marked with suitable words, visible to the operator and to the customer, restricting its use to that application, e.g., postal scale, prepack scale, weight classifier, etc.** When a scale is installed with an operational counting feature, the scale shall be marked on both the operator and customer sides with the statement "The counting feature is not legal for trade," except when a Class I or Class II prescription scale complies with all Handbook 44 requirements applicable to counting features.
*[*Nonretroactive as of 1986]*
(Amended 1994 and 2003)

14. Required on *livestock** and railway track scales. When marked on vehicle and axle-load scales manufactured before January 1, 1989, it may be used as the CLC. For livestock scales manufactured between January 1, 1989, and January 1, 2003, required markings may be either CLC or section capacity.
*[*Nonretroactive as of January 1, 2003]*
(Amended 2002)

15. *Required if the direction of loading the load cell is not obvious.*
[Nonretroactive as of January 1, 1988]

16. *Serial number [Nonretroactive as of January 1, 1968] and prefix [Nonretroactive as of January 1, 1986]*. (Also see G-S.1. Identification.) Modules without "intelligence" on a modular system (e.g., printer, keyboard module, cash drawer, and secondary display in a point-of-sale system) are not required to have serial numbers.

17. *The accuracy class of a device shall be marked on the device with the appropriate designation as I, II, III, III L, or IIII.*
[Nonretroactive as of January 1, 1986]

18. The nominal capacity shall be conspicuously marked as follows:
    (a) on any scale equipped with unit weights or weight ranges;
    (b) on any scale with which counterpoise or equal-arm weights are intended to be used;
    (c) on any automatic-indicating or recording scale so constructed that the capacity of the indicating or recording element, or elements, is not immediately apparent;
    (d) on any scale with a nominal capacity less than the sum of the reading elements; and
    *(e) on the load-receiving element (weighbridge) of vehicle, axle-load, and livestock scales.**

Table S.6.3.b. Notes for Table S.6.3.a. Marking Requirements
*[*Nonretroactive as of January 1, 1989]* (Amended 1992)
19. *For weighing and load-receiving elements not permanently attached to indicating element or covered by a separate CC.* *[Nonretroactive as of January 1, 1988]* (Amended 1992)
20. *Combination vehicle/railway track scales must be marked with both the nominal capacity and CLC for vehicle weighing and the nominal capacity and section capacity for railway weighing. All other requirements relating to these markings will apply.* *[Nonretroactive as of January 1, 2000]* (Added 1999)
21. *The value of the load cell verification interval (v_{min}) must be stated in mass units. In addition to this information, a device may be marked with supplemental representations of v_{min}.* *[Nonretroactive as of January 1, 2001]* (Added 1999)
22. *Combination vehicle/livestock scales must be marked with both the CLC for vehicle weighing and the section capacity for livestock weighing. All other requirements relative to these markings will apply.* *[Nonretroactive as of January 1, 2003]* (Added 2002) (Amended 2003) ***Note**: The marked section capacity for livestock weighing may be less than the marked CLC for vehicle weighing.* (Amended 2003)
23. *Required only if a CC has been issued for the device or equipment.* *[Nonretroactive as of January 1, 2003]* (G-S.1. Identification (e) Added 2001)
24. *The section capacity shall be prefaced by the words "Section Capacity" or an abbreviation of that term. Abbreviations shall be "Sec Cap" or "Sec C." All capital letters and periods may be used.* *[Nonretroactive as of January 1, 2005]* (Added 2004)

S.6.4. Railway Track Scales. – A railway track scale shall be marked with the maximum capacity of each section of the load-receiving element of the scale. Such marking shall be accurately and conspicuously presented on, or adjacent to, the identification or nomenclature plate that is attached to the indicating element of the scale. The nominal capacity marking shall satisfy the following:

(a) For scales manufactured from January 1, 2002, through December 31, 2013:

(1) the nominal capacity of a scale with more than two sections shall not exceed twice its rated section capacity; and

(2) the nominal capacity of a two-section scale shall not exceed its rated section capacity.

(b) For scales manufactured on or after January 1, 2014, the nominal scale capacity shall not exceed the lesser of:

(1) the sum of the Weigh Module Capacities as shown in Table S.6.4.M. and Table S.6.4.; or

(2) the Rated Section Capacity (RSC) multiplied by the Number of Sections (Ns) minus the Number of Dead Spaces (Nd) minus 0.5. As a formula this is stated as:

$$RSC \times (Ns - Nd - 0.5);\ \text{or}$$

(3) 290 300 kg (640 000 lb).

(Amended 1988, 2001, 2002, and 2013)

Table S.6.4.M.
Railway Track Scale – Weigh Module Capacity

Weigh Module Length (meters)	**Weigh Module Capacity (kilograms)**
< 1.5	36 300
1.5 to < 3.0	72 600
3.0 to < 4.5	108 900
4.5 to < 7.0	45 100
7.0 to < 9.0	168 700
9.0 to < 10.5	192 300
10.5 to < 12.0	234 100
12.0 to < 17.0	257 600

Note: The capacity of a particular module is based on its length as shown above. To determine the “sum of the weigh module capacities” referenced in paragraph S.6.4.(b)(1): (1) determine the length of each individual weigh module in the scale; (2) find its corresponding “weigh module capacity” in the table above; and (3) add all of the individual weigh module capacities.”

(Table Added 2013)

Table S.6.4.
Railway Track Scale – Weigh Module Capacity

Weigh Module Length (feet)	**Weigh Module Capacity (pounds)**
< 5	80 000
5 to < 10	160 000
10 to < 15	240 000
15 to < 23	320 000
23 to < 29	372 000
29 to < 35	424 000
35 to < 40	516 000
40 to < 56	568 000

Note: The capacity of a particular module is based on its length as shown above. To determine the “sum of the weigh module capacities” referenced in paragraph S.6.4.(b)(1): (1) determine the length of each individual weigh module in the scale; (2) find its corresponding “weigh module capacity” in the table above; and (3) add all of the individual weigh module capacities.”

(Table Added 2013)

S.6.5. Livestock Scales. – A livestock scale manufactured prior to January 1, 1989, or after January 1, 2003, shall be marked with the maximum capacity of each section of the load-receiving element of the scale. Livestock scales manufactured between January 1, 1989, and January 1, 2003, shall be marked with either the Concentrated Load Capacity (CLC) or the Section Capacity. Such marking shall be accurately and conspicuously presented on, or adjacent to the identification or nomenclature plate that is attached to the indicating element of the scale. *The nominal capacity of a scale with more than two sections shall not exceed twice its rated section capacity. The nominal capacity of a two-section scale shall not exceed its rated section capacity.**
*[*Nonretroactive as of January 1, 2003]*

(Added 2002)

Also see Note 14 in Table S.6.3.b. Notes for Table S.6.3.a.

S.6.6. Counting Feature, Minimum Individual Piece Weight, and Minimum Sample Piece Count. – A Class I or Class II prescription scale with an operational counting feature shall be marked with the minimum individual piece weight and minimum number of pieces used in the sample to establish an individual piece weight.

(Added 2003)

N. Notes

N.1. Test Procedures.

N.1.1. Increasing-Load Test. – The increasing-load test shall be conducted on all scales with the test loads approximately centered on the load-receiving element of the scale, except on a scale having a nominal capacity greater than the total available known test load. When the total test load is less than the nominal capacity, the test load is used to greatest advantage by concentrating it, within prescribed load limits, over the main load supports of the scale.

N.1.2. Decreasing-Load Test (Automatic Indicating Scales). – The decreasing-load test shall be conducted with the test load approximately centered on the load-receiving element of the scale.

N.1.2.1. Scales Marked I, II, III, or IIII. – Except for portable wheel load weighers, decreasing-load tests shall be conducted on scales marked I, II, III or IIII and with "n" equal to or greater than 1000 with test loads equal to the maximum test load at each tolerance value. For example, on a Class III scale, at test loads equal to 4000 d, 2000 d, and 500 d; for scales with n less than 1000, the test load shall be equal to one-half of the maximum load applied in the increasing-load test. (Also see Table 6. Maintenance Tolerances.)

(Amended 1998)

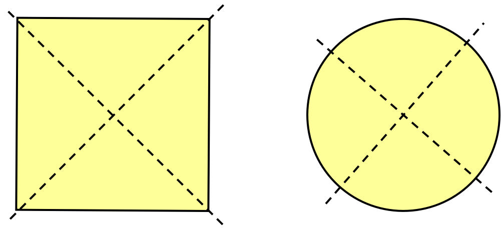
N.1.2.2. All Other Scales. – On all other scales, except for portable wheel load weighers, the decreasing-load test shall be conducted with a test load equal to one-half of the maximum load applied in the increasing-load test.

(Amended 1998)

N.1.3. Shift Test.

N.1.3.1. Dairy-Product Test Scales. – A shift test shall be conducted with a test load of 18 g successively positioned at all points on which a weight might reasonably be placed in the course of normal use of the scale.

N.1.3.2. Equal-Arm Scales. – A shift test shall be conducted with a half-capacity test load centered successively at four points positioned equidistance between the center and the front, left, back, and right edges of each pan as shown in the diagrams below. An equal test load shall be centered on the other pan.



N.1.3.3. Vehicle Scales, Axle-Load Scales, and Livestock Scales.

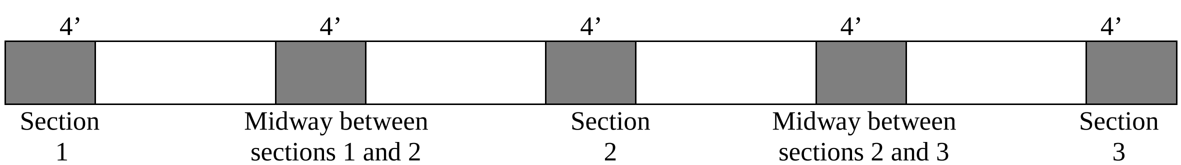
N.1.3.3.1. Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales.

(a) **Minimum Shift Test. –** At least one shift test shall be conducted with a minimum test load of 12.5 % of scale capacity, which may be performed anywhere on the load-receiving element using the prescribed test patterns and maximum test loads specified below. (Combination Vehicle/Livestock Scales shall also be tested consistent with N.1.3.3.2. Prescribed Test Pattern and Test Loads for Livestock Scales with More Than Two Sections and Combination Vehicle/Livestock Scales.)

(Amended 1991, 2000, and 2003)

(b) **Prescribed Test Pattern and Loading for Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales.** – The normal prescribed test pattern shall be an area of 1.2 m (4 ft) in length and 3.0 m (10 ft) in width or the width of the scale platform, whichever is less. Multiple test patterns may be utilized when loaded in accordance with paragraph (c), (d), or (e) as applicable. An example of a possible test pattern is shown in the diagram below.

(Amended 1997, 2001, and 2003)



(c) **Loading Precautions for Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales. –** When loading the scale for testing, one side of the test pattern shall be loaded to no more than half of the concentrated load capacity or test load before loading the other side. The area covered by the test load may be less than 1.2 m (4 ft) × 3.0 m (10 ft) or the width of the scale platform, whichever is less; for test patterns less than 1.2 m (4 ft) in length the maximum loading shall meet the formula: [(wheel base of test cart or length of test load divided by 48 in) × 0.9 × CLC]. The maximum test load applied to each test pattern shall not exceed the concentrated load capacity of the scale. When the test pattern exceeds 1.2 m (4 ft), the maximum test load applied shall not exceed the concentrated load capacity times the largest “r” factor in Table UR.3.2.1. Span Maximum Load for the length of the area covered by the test load. For load-receiving elements installed prior to January 1, 1989, the rated section capacity may be substituted for concentrated load capacity to determine maximum loading. An example of a possible test pattern is shown above.

(Amended 1997 and 2003)

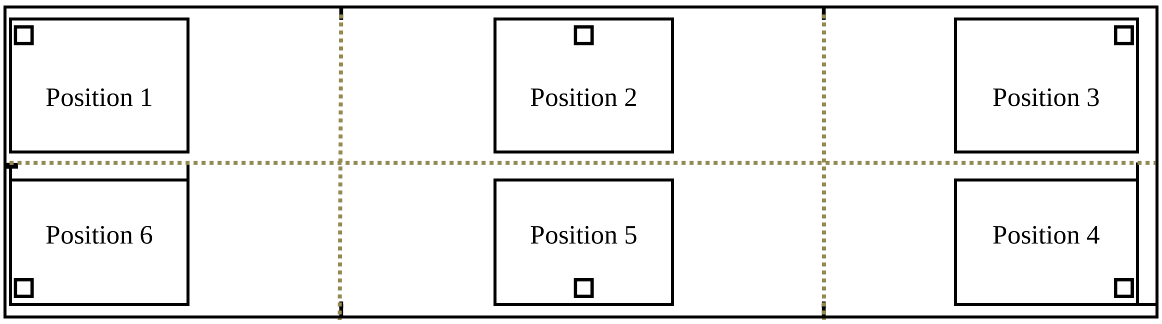
(d) **Multiple Pattern Loading.** – To test to the nominal capacity, multiple patterns may be simultaneously loaded in a manner consistent with the method of use.

(e) **Other Designs.** – Special design scales and those that are wider than 3.7 m (12 ft) shall be tested in a manner consistent with the method of use but following the principles described above.

(Amended 1988, 1991, 1997, 2000, 2001, and 2003)

(Amended 2003)

N.1.3.3.2. Prescribed Test Pattern and Test Loads for Livestock Scales with More Than Two Sections and Combination Vehicle/Livestock Scales. – A minimum test load of 5 000 kg (10 000 lb) or one-half of the rated section capacity, whichever is less, shall be placed, as nearly as possible, successively over each main load support as shown in the diagram below. For livestock scales manufactured between January 1, 1989, and January 1, 2003, the required loading shall be no greater than one-half CLC.



□ = Load Bearing Point

(Added 2003) (Amended 2016)

N.1.3.3.3. Prescribed Test Patterns and Test Loads for Two-Section Livestock Scales. – A shift test shall be conducted using the following prescribed test loads and test patterns: 1) When a single field standard weight is used, the prescribed test load shall be applied centrally in the prescribed test pattern; or 2) When multiple field standard weights are used as the prescribed test load, the load shall be applied in a consistent pattern in the shift test positions throughout the test and applied in a manner that does not concentrate the load in a test pattern that is less than when the same load is a single field standard weights on the load-receiving element.

The shift test load shall not exceed one-half the rated section capacity or one-half the rated concentrated load capacity whichever is applicable, using either:

(a) A one-half nominal capacity test load centered as nearly as possible, successively at the center of each quarter of the load-receiving element as shown in N.1.3.7. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers Figure 1; or

(b) A one-quarter nominal capacity test load centered as nearly as possible, successively over each main load support as shown in N.1.3.7. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers Figure 2.

(Added 2007) (Amended 2016)

N.1.3.4. Railway Track Scales Weighing Individual Cars in Single Drafts. – A shift test shall be conducted with at least two different test loads, if available, distributed over, to the right and left of, each pair of main levers or other weighing elements supporting each section of the scale.

N.1.3.5. Monorail Scales, Static Test. – A shift test shall be conducted with a test load equal to the largest load that can be anticipated to be weighed in a given installation, but never less than one-half scale capacity. The load shall be placed successively on the right end, the left end, and the center of the live rail.

(Added 1985)

N.1.3.5.1. Dynamic Monorail Weighing Systems. – Dynamic tests with livestock carcasses or portions of carcasses shall be conducted during normal plant production. No less than 20 test loads using carcasses or portions of carcasses of the type normally weighed shall be used in the dynamic test. If the plant conveyor chain does not space or prevent the carcasses or portions of carcasses from touching one another, dynamic tests shall not be conducted until this condition has been corrected.

All carcasses or portions of carcasses shall be individually weighed statically on either the same scale being tested dynamically or another monorail scale with the same or smaller divisions and in close proximity. (The scale selected for static weighing of the carcasses or portions of carcasses shall first be tested statically with certified test weights that have been properly protected from the harsh environment of the packing plant to ensure they maintain accuracy.)

If the scale being tested is used for weighing freshly slaughtered animals (often referred to as a "hot scale"), care must be taken to get a static weighment as quickly as possible before or following the dynamic weighment to avoid loss due to shrink. If multiple dynamic tests are conducted using the same carcasses or portions of carcasses, static weights shall be obtained before and after multiple dynamic tests. If the carcass or portion of a carcass changes weight between static tests, the amount of weight change shall be taken into account, or the carcass or portion of a carcass shall be disregarded for tolerance purposes.

Note: For a dynamic monorail test, the reference scale shall comply with the principles in the Fundamental Considerations paragraph 3.2. Tolerances for Standards.

(Added 1996) (Amended 1999 and 2007)

N.1.3.6. Vehicle On-Board Weighing Systems. – The shift test for a vehicle on-board weighing system shall be conducted in a manner consistent with its normal use. For systems that weigh as part of the lifting cycle, the center of gravity of the load may be shifted in the vertical direction as well as from side to side. In other cases, the center of gravity may be moved to the extremes of the load-receiving element using loads of a magnitude that reflect normal use (i.e., the load for the shift test may exceed one-half scale capacity), and may, in some cases, be equal to the capacity of the scale. The shift test may be conducted when the weighing system is out of level to the extent that the weighing system remains operational.

(Added 1992)

N.1.3.7. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers. – A shift test shall be conducted using the following prescribed test loads and test patterns. A single field standard weight used as the prescribed test load shall be applied centrally in the prescribed test pattern. When multiple field standard weights are used as the prescribed test load, the load shall be applied in a consistent pattern in the shift test positions throughout the test and applied in a manner that does not concentrate the load in a test pattern that is less than when that same load is a single field standard weight on the load-receiving element.

(a) For scales with a nominal capacity of 500 kg (1000 lb) or less, a shift test shall be conducted using a one-third nominal capacity test load (defined as test weights in amounts of at least 30 % of scale capacity, but not to exceed 35 % of scale capacity) centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1.

(b) For scales with a nominal capacity greater than 500 kg (1000 lb), a shift test may be conducted by either using a one-third nominal capacity test load (defined as test weights in amounts of at least 30 % of scale capacity, but not to exceed 35 % of scale capacity) centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1, or by using a one-quarter nominal capacity test load centered as nearly as possible, successively, over each corner of the load-receiving element using the prescribed test pattern as shown in Figure 2.

Figure 1

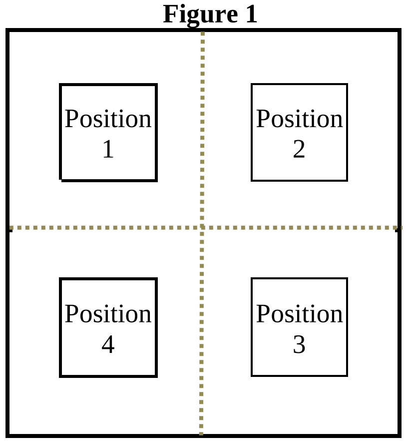
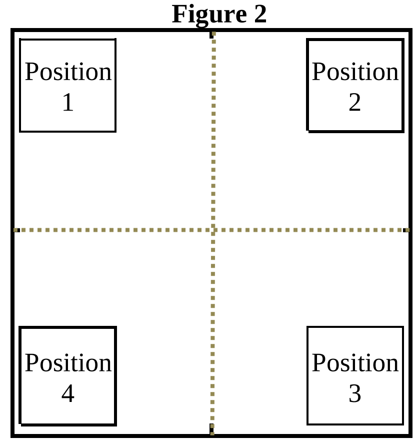


Figure 2



(Added 2003)

(Amended 1987, 2003, and 2007)

N.1.4. Sensitivity Test. – A sensitivity test shall be conducted on nonautomatic-indicating (weighbeam) scales only, with the weighing device in equilibrium at zero-load and at maximum test load. The test shall be conducted by increasing or decreasing the test load in an amount equal to the applicable value specified in T.2. Sensitivity Requirement (SR) or T.N.6. Sensitivity.

N.1.5. Discrimination Test. *– A discrimination test shall be conducted on all automatic indicating scales with the weighing device in equilibrium at or near zero load and at or near maximum test load, and under controlled conditions in which environmental factors are reduced to the extent that they will not affect the results obtained. For scales equipped with an Automatic Zero-Tracking Mechanism (AZT), the discrimination test may be conducted at a range outside of the AZT range.*
[Nonretroactive as of January 1, 1986]

(Added 1985) (Amended 2004)

N.1.5.1. Digital Device. – On a digital device, this test is conducted from just below the lower edge of the zone of uncertainty for increasing load tests, or from just above the upper edge of the zone of uncertainty for decreasing-load tests.

N.1.6. RFI Susceptibility Tests, Field Evaluation. – An RFI test shall be conducted at a given installation when the presence of RFI has been verified and characterized if those conditions are considered "usual and customary."

(Added 1986)

N.1.7. Ratio Test. – A ratio test shall be conducted on all scales employing counterpoise weights and on nonautomatic-indicating equal-arm scales.

N.1.8. Material Tests. – A material test shall be conducted on all customer-operated bulk weighing systems for recycled materials using bulk material for which the device is used. Insert into the device, in a normal manner, several accurately pre-weighed samples (free of foreign material) in varying amounts approximating average drafts.

N.1.9. Zero-Load Balance Change. – A zero-load balance change test shall be conducted on all scales after the removal of any test load. The zero-load balance should not change by more than the minimum tolerance applicable. (Also see G-UR.4.2. Abnormal Performance.)

N.1.10. Counting Feature Test. – A test of the counting function shall be conducted on all Class I and Class II prescription scales having an active counting feature used in "legal for trade" applications. The test should verify that the scale will not accept a sample with less than either the minimum sample piece count or the minimum sample weight of 30 e. Counting feature accuracy should be verified at a minimum of two test loads. Verification of the count calculations shall be based upon the weight indication of the test load.

Note:

(1) The minimum sample weight is equal to the marked minimum individual piece weight times the marked minimum sample piece count.

(2) Test load as used in this section refers to actual calibration test weights selected from an appropriate test weight class.

(Added 2003)

N.1.11. Substitution Test. – In the substitution test procedure, material or objects are substituted for known test weights, or a combination of known test weights and previously quantified material or objects, using the scale under test as a comparator. Additional test weights or other known test loads may be added to the known test load to evaluate higher weight ranges on the scale.

(Added 2003)

N.1.12. Strain-Load Test. – In the strain-load test procedure, an unknown quantity of material or objects are used to establish a reference load or tare to which test weights or substitution test loads are added.

(Added 2003)

N.2. Verification (Testing) Standards. – Field standard weights used in verifying weighing devices shall comply with requirements of NIST Handbook 105-Series standards (or other suitable and designated standards) or the tolerances expressed in Fundamental Considerations, paragraph 3.2. (i.e., one-third of the smallest tolerance applied).

(Amended 1986)

N.3. Minimum Test Weights and Test Loads. – The minimum test weights and test loads for in-service tests (except railway track scales) are shown in Table 4. (Also see Footnote 2 in Table 4. Minimum Test Weights and Test Loads.)

(Added 1984) (Amended 1988)

N.3.1. Minimum Test-Weight Load and Tests for Railway Track Scales.

(Amended 1990 and 2012)

N.3.1.1. Initial and Subsequent Tests. – The test-weight load shall be not less than 35 000 kg (80 000 lb). A strain-load test conducted up to the used capacity of the weighing system is recommended.

(Added 1990) (Amended 2012)

N.3.1.2. Interim Test. – An Interim Test may be used to return a railway track scale into temporary service following repairs that could affect the accuracy of the weighing system providing all of the following conditions are met:

(a) a test weight load of not less than 13 500 kg (30 000 lb) shall be used;

(b) a shift (section) test shall be conducted using a test-weight load of not less than 13 500 kg (30 000 lb);

(c) a strain-load test shall be conducted up to at least 25 % of scale capacity;

(d) all test results shall be within applicable tolerances; and

(e) the official with statutory authority shall be immediately notified when scales are repaired and placed in temporary service with an Interim Test. The length of temporary service following repair is at the discretion of the official with statutory authority.

(Added 1990) (Amended 2012)

N.3.1.3. Enforcement Action for Inaccuracy. – To take enforcement action on a scale that is found to be inaccurate, a minimum test load of 13 500 kg (30 000 lb) must be used.

(Added 1990)

Table 4.
Minimum Test Weights and Test Loads[1]

Devices in Metric Units				Devices in U.S. Customary Units		
Device Capacity (kg)	**Minimums (in terms of device capacity)**			**Device Capacity (lb)**	**Minimums (in terms of device capacity)**	
	Test Weights (greater of)	**Test Loads[2]**			**Test Weights (greater of)**	**Test Loads[2]**
0 to 150 kg	100 %			0 to 300 lb	100 %	
151 to 1 500 kg	25 % or 150 kg	75 %		301 to 3 000 lb	25 % or 300 lb	75 %
1 501 to 20 000 kg	12.5 % or 500 kg	50 %		3001 to 40 000 lb	12.5 % or 1 000 lb	50 %
20 001 kg+	12.5 % or 5 000 kg	25 %[3]		40 001 lb+	12.5 % or 10 000 lb	25 %[3]

Where practicable:

- Test weights to dial face capacity, 1000 d, or test load to used capacity, if greater than minimums specified.
- During initial verification, a scale should be tested to capacity.

[1] If the amount of test weight in Table 4 combined with the load on the scale would result in an unsafe condition, then the appropriate load will be determined by the official with statutory authority.

[2] The term "test load" means the sum of the combination of field standard test weights and any other applied load used in the conduct of a test using substitution test methods. Not more than three substitutions shall be used during substitution testing, after which the tolerances for strain load tests shall be applied to each set of test loads.

[3] The scale shall be tested from zero to at least 12.5 % of scale capacity using known test weights and then to at least 25 % of scale capacity using either a substitution or strain load test that utilizes known test weights of at least 12.5 % of scale capacity. Whenever practical, a strain load test should be conducted to the used capacity of the scale. When a strain load test is conducted, the tolerances apply only to the test weights or substitution test loads.

(Amended 1988, 1989, 1994, and 2003)

Note: GIPSA requires devices subject to their inspection to be tested to at least "used capacity," which is calculated based on the platform area of the scale and a weight factor assigned to the species of animal weighed on the scale. "Used capacity" is calculated using the formula:

Used Scale Capacity = Scale Platform Area × Species Weight Factor

Where species weight factor = 540 kg/m^2 (110 lb/ft^2) for cattle, 340 kg/m^2 (70 lb/ft^2) for calves and hogs, and 240 kg/m^2 (50 lb/ft^2) for sheep and lambs.

N.3.2. Field Standard Weight Carts. – Field Standard Weight Carts that comply with the tolerances expressed in Fundamental Considerations, paragraph 3.2. (i.e., one-third of the smallest tolerance applied) may be included as part of the minimum required test load (Also see Table 4. Minimum Test Weights and Test Loads.) for shift tests and other test procedures.

(Added 2004)

N.4. Coupled-in-Motion Railroad Weighing Systems. [3]

N.4.1. Weighing Systems Used to Weigh Trains of Less Than Ten Cars. – These weighing systems shall be tested using a consecutive-car test train consisting of the number of cars weighed in the normal operation run over the weighing system a minimum of five times in each mode of operation following the final calibration.

(Added 1990) (Amended 1992)

N.4.2. Weighing Systems Placed in Service Prior to January 1, 1991, and Used to Weigh Trains of Ten or More Cars. – The minimum test train shall be a consecutive-car test train of no less than ten cars run over the scale a minimum of five times in each mode of operation following final calibration.

(Added 1990) (Amended 1992)

N.4.3. Weighing Systems Placed in Service on or After January 1, 1991, and Used to Weigh Trains of Ten or More Cars.

(a) These weighing systems shall be tested using a consecutive-car test train of no less than ten cars run over

(b) if the official with statutory authority determines it necessary, the As-Used Test Procedures outlined in N.4.3.1. shall be used.

(Added 1990) (Amended 1992)

N.4.3.1. As-Used Test Procedures – A weighing system shall be tested in a manner that represents the normal method of operation and length(s) of trains normally weighed. The weighing systems may be tested using either a:

(a) consecutive-car test train of a length typical of train(s) normally weighed; or

(b) distributed-car test train of a length typical of train(s) normally weighed.

However, a consecutive-car test train of a shorter length may be used, provided that initial verification test results for the shorter consecutive-car test train agree with the test results for the distributed-car or full-length consecutive-car test train as specified in N.4.3.1.1. Initial Verification.

The official with statutory authority shall be responsible for determining the minimum test train length to be used on subsequent tests.

(Added 1990) (Amended 1992)

N.4.3.1.1. Initial Verification. – Initial verification tests should be performed on any new weighing system and whenever either the track structure or the operating procedure changes. If a consecutive-car test train of length shorter than trains normally weighed is to be used for subsequent verification, the shorter consecutive-car test train results shall be compared either to a distributed-car or to a consecutive-car test train of length(s) typical of train(s) normally weighed.

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[3] A test weight car that is representative of one of the types of cars typically weighed on the scale under test may be used wherever reference weight cars are specified.

(Added 1991)

The difference between the total train weight of the train(s) representing the normal method of operation and the weight of the shorter consecutive-car test train shall not exceed 0.15 %. If the difference in test results exceeds 0.15 %, the length of the shorter consecutive-car test train shall be increased until agreement within 0.15 % is achieved. Any adjustments to the weighing system based upon the use of a shorter consecutive-car test train shall be offset to correct the bias that was observed between the full-length train test and the shorter consecutive-car test train.

(Added 1990) (Amended 1992 and 1993)

N.4.3.1.2. Subsequent Verification. – The test train may consist of either a consecutive-car test train with a length not less than that used in initial verification, or a distributed-car test train representing the number of cars used in the normal operation.

(Added 1990)

N.4.3.1.3. Distributed-Car Test Trains.

(a) The length of the train shall be typical of trains that are normally weighed.

(b) The reference weight cars shall be split into three groups, each group consisting of ten cars or 10 % of the train length, whichever is less.

(Amended 1991)

(c) The test groups shall be placed near the front, around the middle, and near the end of the train.

(d) Following the final adjustment, the distributed-car test train shall be run over the scale at least three times or shall produce 50 weight values, whichever is greater.

(e) The weighing system shall be tested in each mode of operation.

(Added 1990) (Amended 1992)

N.4.3.1.4. Consecutive-Car Test Trains.

(a) A consecutive-car test train shall consist of at least ten cars.

(b) If the consecutive-car test train consists of between ten and twenty cars, inclusive, it shall be run over the scale a minimum of five times in each mode of operation following the final calibration.

(c) If the consecutive-car test train consists of more than twenty cars, it shall be run over the scale a minimum of three times in each mode of operation.

(Added 1990) (Amended 1992)

N.5. Uncoupled-in-Motion Railroad Weighing System. – An uncoupled-in-motion scale shall be tested statically before being tested in motion by passing railroad reference weight cars over the scale. When an uncoupled-in-motion railroad weighing system is tested, the car speed and the direction of travel shall be the same as when the scale is in normal use. The minimum in-motion test shall be three reference weight cars passed over the scale three times. The cars shall be selected to cover the range of weights that are normally weighed on the system and to reflect the types of cars normally weighed.

(Added 1993)

N.6. Nominal Capacity of Prescription Scales. – The nominal capacity of a prescription scale shall be assumed to be one-half apothecary ounce, unless otherwise marked. (Applicable only to scales not marked with an accuracy class.)

N.7. Weigh-in-Motion Vehicle Scale.

N.7.1. Static Testing. – A Weigh-in-Motion Vehicle Scale shall be tested statically, whenever possible, using field standard weights/test loads in accordance with Table 4, uniformly distributed on the scale platform. Additionally, for scale platforms with a length of less than 4 ft a test load not greater than one half of section capacity shall be positioned between the centerline and left and right side respectively. Scale platforms with a length of 4 ft or greater shall be tested in accordance with N.1.3.3.1. Class III L acceptance and maintenance tolerance as shown in Table 6. shall apply.

N.7.2. Dynamic Testing. – The Dynamic test for a Weigh-in-Motion-Vehicle Scale shall simulate the normal intended use as closely as possible (i.e., test as used). The minimum test shall consist of a vehicle(s), loaded with known field standards, dynamically weighed three consecutive times. The known field standards should then be unloaded and three additional dynamic weighments of the empty vehicle(s) should be recorded. Additionally, for scale platform widths greater than 11 ft, at least one of the loaded vehicle runs and empty vehicle runs shall be made near the left edge and right edge of the scale platform respectively. Class III L maintenance tolerance as shown in Table 6 shall apply to the known field test standards load minus the calculated value (loaded weight − unloaded weight = calculated value) the Table 6 tolerance values shall be based on the value of the known test load.

(Added 20XX)

T. Tolerances Applicable to Devices not Marked I, II, III, III L, or IIII

T.1. Tolerance Values.

T.1.1. General. – The tolerances applicable to devices not marked with an accuracy class shall have the tolerances applied as specified in Table T.1.1. Tolerances for Unmarked Scales.

(Amended 1990)

T.1.2. Postal and Parcel Post Scales. – The tolerances for postal and parcel post scales are given in Table T.1.1. Tolerances for Unmarked Scales and Table 5. Maintenance and Acceptance Tolerances for Unmarked Postal and Parcel Post Scales.

(Amended 1990)

Table T.1.1. Tolerances for Unmarked Scales

Type of Device	Subcategory	Minimum Tolerance	Acceptance Tolerance	Maintenance Tolerance	Decreasing-Load Multiplier[1]	Other Applicable Requirements
Vehicle, axle-load, livestock, railway track (weighing statically), crane, and hopper (other than grain hopper)		Class III L, T.N.3.1 (Table 6) and T.N.3.2.			1.0	T.N.2., T.N.3., T.N.4.1., T.N.4.2., T.N.4.3., T.N.4.4., T.N.5., T.N.7.2., *T.N.8.1.4.*[4], T.N.9.
Grain test scales	n ≤ 10 000 n > 10 000	Class III, T.N.3.1. (Table 6) and T.N.3.2. Class II, T.N.3.1. (Table 6) and T.N.3.2.			1.0	*T.N.8.1.4.*[4], T.N.9.
Railway track scales weighing in motion		T.N.3.6. except that for T.N.3.6.2. (a), no single error shall exceed four times the maintenance tolerance.			1.0	*T.N.8.1.4.*[4], T.N.9.
Monorail scales, in-motion		T.N.3.8.			1.0	*T.N.8.1.4.*[4], T.N.9.
Customer-operated bulk-weighing systems for recycled materials		± 5 % of applied material test load. Average error on 10 or more test loads ≤ 2.5 %.			1.0	*T.N.8.1.4.*[4], T.N.9.
Wheel-load weighers and portable axle-load scales	Tested individually or in pairs[2]	0.5 d or 50 lb, whichever is greater	1 % of test load	2 % of test load	1.5^3	*T.N.8.1.4.*[4], T.N.9.
Prescription scales		0.1 grain (6 mg)	0.1 % of test load	0.1 % of test load	1.5	*T.N.8.1.4.*[4], T.N.9.
Jewelers' scales	Graduated	0.5 d	0.05 % of test load	0.05 % of test load	1.5	*T.N.8.1.4.*[4], T.N.9.
	Ungraduated	Sensitivity or smallest weight, whichever is less				
Dairy-product test scale	Loads < 18 g 18 g load	0.2 grain 0.2 grain	0.2 grain 0.3 grain	0.2 grain 0.5 grain	1.5	*T.N.8.1.4.*[4], T.N.9.
Postal and parcel post scales designed/used to weigh loads < 2 lb	Loads < 2 lb	15 grain, 1 g, $^1/_{32}$ oz, 0.03 oz, or 0.002 lb	15 grain, 1 g, $^1/_{32}$ oz, 0.03 oz, or 0.002 lb	15 grain, 1 g, $^1/_{32}$ oz, 0.03 oz, or 0.002 lb	1.5	*T.N.8.1.4.*[4], T.N.9.
	Loads ≤ 2 lb	Table 5	Table 5	Table 5		
Other postal and parcel post scales		Table 5	Table 5	Table 5	1.5	*T.N.8.1.4.*[4], T.N.9.
All other scales (including grain hopper)	n > 5000	0.5 d or 0.05 % of scale capacity, whichever is less	0.05 % of test load	0.1 % of test load	1.5	T.N.2.5., T.N.4.1., T.N.4.2., T.N.4.3., T.N.5., T.N.7.2., *T.N.8.1.4.*[4], T.N.9.
	n ≤ 5000	Class III, T.N.3.1., Table 6 and T.N.3.2.			1.0	T.N.2., T.N.3., T.N.4.1., T.N.4.2., T.N.4.3., T.N.5., T.N.7.2., *T.N.8.1.4.*[4], T.N.9.

[1] The decreasing load test applies only to automatic indicating scales.
[2] If marked and tested as a pair, the tolerance shall be applied to the sum of the indication.
[3] The decreasing load test does not apply to portable wheel load weighers.
[4] *T.N.8.1.4. Operating Temperature. is nonretroactive and effective for unmarked devices manufactured as of January 1, 1981.*

(Table Added 1990; Amended 1992, 1993, and 2012)

Table 5.
Maintenance and Acceptance Tolerances for Unmarked Postal and Parcel Post Scales

Scale Capacity (lb)	Test Loads (lb)	Maintenance Tolerance (±) (oz)	Maintenance Tolerance (±) (lb)	Acceptance Tolerance (±) (oz)	Acceptance Tolerance (±) (lb)
0 to 4, inclusive*	0 to 1, inclusive	1/32	0.002	1/32	0.002
	over 1	1/8	0.008	1/16	0.004
over 4*	0 to 7, inclusive	3/16	0.012	3/16	0.012
	7+ to 24, inclusive	3/8	0.024	3/16	0.012
	24+ to 30, inclusive	½	0.030	¼	0.015
	over 30	0.1 % of Test Load		0.05 % of Test Load	

*Also see Table T.1.1. Tolerances for Unmarked Scales for scales designed and/or used to weigh loads less than 2 lb.

T.2. Sensitivity Requirement (SR).

T.2.1. Application. – The sensitivity requirement (SR) is applicable to all nonautomatic-indicating scales not marked I, II, III, III L, or IIII, and is the same whether acceptance or maintenance tolerances apply.

T.2.2. General. – Except for scales specified in paragraphs T.2.3. Prescription Scales through T.2.8. Railway Track Scales: 2 d, 0.2 % of the scale capacity, or 40 lb, whichever is least.

T.2.3. Prescription Scales. 6 mg (0.1 grain).

T.2.4. Jewelers' Scales.

T.2.4.1. With One-Half Ounce Capacity or Less. – 6 mg (0.1 grain).

T.2.4.2. With More Than One-Half Ounce Capacity. – 1 d or 0.05 % of the scale capacity, whichever is less.

T.2.5. Dairy-Product Test Scales.

T.2.5.1. Used in Determining Butterfat Content. – 32 mg (0.5 grain).

T.2.5.2. Used in Determining Moisture Content. – 19 mg (0.3 grain).

T.2.6. Grain Test Scales. – The sensitivity shall be as stated in T.N.6. Sensitivity.
(Amended 1987)

T.2.7. Vehicle, Axle-Load, Livestock, and Animal Scales.

T.2.7.1. Equipped with Balance Indicators. – 1 d.

T.2.7.2. Not Equipped with Balance Indicators. – 2 d or 0.2 % of the scale capacity, whichever is less.

T.2.8. Railway Track Scales. – 3 d or 100 lb, whichever is less.

T.3. Sensitivity Requirement, Equilibrium Change Required.

The minimum change in equilibrium with test loads equal to the values specified in T.2. Sensitivity Requirements (SR) shall be as follows:

(a) **Scale with a Trig Loop but without a Balance Indicator.** – The position of rest of the weighbeam shall change from the center of the trig loop to the top or bottom, as the case may be.

(b) **Scale with a Single Balance Indicator and Having a Nominal Capacity of Less Than 250 kg (500 lb). –** The position of rest of the indicator shall change 1.0 mm (0.04 in) or one division on the graduated scale, whichever is greater.

(c) **Scale with a Single Balance Indicator and Having a Nominal Capacity of 250 kg (500 lb) or Greater. –** The position of rest of the indicator shall change 6.4 mm (0.25 in) or one division on the graduated scale or the width of the central target area, whichever is greater. However, the indicator on a batching scale shall change 3.2 mm (0.125 in) or one division on the graduated scale, whichever is greater.

(d) **Scale with Two Opposite-Moving Balance Indicators.** – The position of rest of the two indicators moving in opposite directions shall change 1.0 mm (0.04 in) with respect to each other.

(e) **Scale with Neither a Trig Loop nor a Balance Indicator.** – The position of rest of the weighbeam or lever system shall change from the horizontal, or midway between limiting stops, to either limit of motion.

T.N. Tolerances Applicable to Devices Marked I, II, III, III L, and IIII.

T.N.1. Principles.

T.N.1.1. Design. – The tolerance for a weighing device is a performance requirement independent of the design principle used.

T.N.1.2. Accuracy Classes. – Weighing devices are divided into accuracy classes according to the number of scale divisions (n) and the value of the scale division (d).

T.N.1.3. Scale Division. – The tolerance for a weighing device is related to the value of the scale division (d) or the value of the verification scale division (e) and is generally expressed in terms of d or e.

T.N.2. Tolerance Application.

T.N.2.1. General. – The tolerance values are positive (+) and negative (−) with the weighing device adjusted to zero at no load. When tare is in use, the tolerance values are applied from the tare zero reference (zero net weight indication); the tolerance values apply to the net weight indication for any possible tare load using certified test loads.

(Amended 2008)

T.N.2.2. Type Evaluation Examinations. – For type evaluation examinations, the tolerance values apply to increasing and decreasing load tests within the temperature, power supply, and barometric pressure limits specified in T.N.8.

T.N.2.3. Subsequent Verification Examinations. – For subsequent verification examinations, the tolerance values apply regardless of the influence factors in effect at the time of the conduct of the examination. (Also see G-N.2. Testing with Nonassociated Equipment.)

T.N.2.4. Multi-Interval and Multiple Range (Variable Division-Value) Scales. – For multi-interval and multiple range scales, the tolerance values are based on the value of the scale division of the range in use.

T.N.2.5. Ratio Tests. – For ratio tests, the tolerance values are 0.75 of the applicable tolerances.

T.N.3. Tolerance Values.

T.N.3.1. Maintenance Tolerance Values. – The maintenance tolerance values are as specified in Table 6. Maintenance Tolerances.

T.N.3.2. Acceptance Tolerance Values. – The acceptance tolerance values shall be one-half the maintenance tolerance values.

T.N.3.3. Wheel-Load Weighers and Portable Axle-Load Weighers of Class IIII. – The tolerance values are two times the values specified in T.N.3.1. Maintenance Tolerance Values and T.N.3.2. Acceptance Tolerance Values.

(Amended 1986)

T.N.3.4. Crane and Hopper (Other than Grain Hopper) Scales. – The maintenance and acceptance tolerances shall be as specified in T.N.3.1. Maintenance Tolerance Values and T.N.3.2. Acceptance Tolerance Values for Class III L, except that the tolerance for crane and construction materials hopper scales shall not be less than 1 d or 0.1 % of the scale capacity, whichever is less.

(Amended 1986)

Table 6.
Maintenance Tolerances
(All values in this table are in scale divisions)

Tolerance in Scale Divisions				
	1	**2**	**3**	**5**
Class	**Test Load**			
I	0 - 50 000	50 001 - 200 000	200 001 +	
II	0 - 5 000	5 001 - 20 000	20 001 +	
III	0 – 500	501 - 2 000	2 001 - 4 000	4 001 +
IIII	0 - 50	51 - 200	201 - 400	401 +
III L	0 - 500	501 - 1 000	(Add 1 d for each additional 500 d or fraction thereof)	

T.N.3.5. Separate Main Elements: Load Transmitting Element, Indicating Element, Etc. – If a main element separate from a complete weighing device is submitted for laboratory type evaluation, the tolerance for the main element is 0.7 that for the complete weighing device. This fraction includes the tolerance attributable to the testing devices used.

(Amended 2015)

T.N.3.6. Coupled-In-Motion Railroad Weighing Systems. – The maintenance and acceptance tolerance values for the group of weight values appropriate to the application must satisfy the following conditions:

(Amended 1990 and 1992)

T.N.3.6.1. – For any group of weight values, the difference in the sum of the individual in-motion car weights of the group as compared to the sum of the individual static weights shall not exceed 0.2 %.

(Amended 1990)

T.N.3.6.2. – If a weighing system is used to weigh trains of five or more cars, and if the individual car weights are used, any single weight value within the group must meet the following criteria:

(a) no single error may exceed three times the static maintenance tolerance;

(b) not more than 5 % of the errors may exceed two times the static maintenance tolerance; and

(c) not more than 35 % of the errors may exceed the static maintenance tolerance.

(Amended 1990 and 1992)

T.N.3.6.3. – For any group of weight values wherein the sole purpose is to determine the sum of the group, T.N.3.6.1. alone applies.

(Amended 1990)

T.N.3.6.4. – For a weighing system used to weigh trains of less than five cars, no single car weight within the group may exceed the static maintenance tolerance.

(Amended 1990 and 1992)

T.N.3.7. Uncoupled-in-Motion Railroad Weighing Systems. – The maintenance and acceptance tolerance values for any single weighment within a group of non-interactive (i.e., uncoupled) loads, the weighment error shall not exceed the static maintenance tolerance.

(Amended 1992)

T.N.3.8. Dynamic Monorail Weighing System. – Acceptance tolerance shall be the same as the maintenance tolerance shown in Table 6. Maintenance Tolerances. On a dynamic test of twenty or more individual test loads, 10 % of the individual test loads may be in error, each not to exceed two times the tolerance. The error on the total of the individual test loads shall not exceed ± 0.2 %. (Also see Note in N.1.3.5.1. Dynamic Monorail Weighing Systems.) *For equipment undergoing type evaluation, a tolerance equal to one-half the maintenance tolerance values shown in Table 6. Maintenance Tolerances shall apply.*
[Nonretroactive January 1, 2002]

(Added 1986) (Amended 1999 and 2001)

T.N.3.9. Materials Test on Customer-Operated Bulk Weighing Systems for Recycled Materials. – The maintenance and acceptance tolerance shall be ± 5 % of the applied materials test load except that the average error on ten or more test materials test loads shall not exceed ± 2.5 %.

(Added 1986)

T.N.3.10. Prescription Scales with a Counting Feature. – In addition to Table 6. Maintenance Tolerances (for weight), the indicated piece count value computed by a Class I or Class II prescription scale counting feature shall comply with the tolerances in Table T.N.3.10. Maintenance and Acceptance Tolerances in Excess and in Deficiency for Count.

Table T.N.3.10.
Maintenance and Acceptance Tolerances
in Excess and in Deficiency for Count

Indication of Count	Tolerance (piece count)
0 to 100	0
101 to 200	1
201 or more	0.5 %

(Added 2003)

T.N.3.11. Tolerances for Substitution Test. – Tolerances are applied to the scale based on the substitution test load.

(Added 2003)

T.N.3.12. Tolerances for Strain-Load Test. – Tolerances apply only to the test weights or substitution test loads.

(Added 2003)

T.N.3.XX. Tolerances for Weigh in Motion Vehicle Scales.

T.N.3.XX.1. Static Weighing. – Acceptance tolerance shall be one-half maintenance tolerance.

T.N.3.XX.2. Dynamic Weighing. – Acceptance tolerance shall be the same as the maintenance tolerance shown in Table 6. Maintenance Tolerances.

(Added 20XX)

T.N.4. Agreement of Indications.

T.N.4.1. Multiple Indicating/Recording Elements. – In the case of a scale or weighing system equipped with more than one indicating element or indicating element and recording element combination, where the indicators or indicator/recorder combination are intended to be used independently of one another, tolerances shall be applied independently to each indicator or indicator/recorder combination.

(Amended 1986)

T.N.4.2. Single Indicating/Recording Element. – In the case of a scale or weighing system with a single indicating element or an indicating/recording element combination, and equipped with component parts such as unit weights, weighbeam and weights, or multiple weighbeams that can be used in combination to indicate a weight, the difference in the weight value indications of any load shall not be greater than the absolute value of the applicable tolerance for that load, and shall be within tolerance limits.

(Amended 1986)

T.N.4.3. Single Indicating Element/Multiple Indications. – In the case of an analog indicating element equipped with two or more indicating means within the same element, the difference in the weight indications for any load other than zero shall not be greater than one-half the value of the scale division (d) and be within tolerance limits.

(Amended 1986)

T.N.4.4. Shift or Section Tests. – The range of the results obtained during the conduct of a shift test or a section test shall not exceed the absolute value of the maintenance tolerance applicable and each test result shall be within applicable tolerances.

(Added 1986)

T.N.4.5. Time Dependence. – A time dependence test shall be conducted during type evaluation and may be conducted during field verification, provided test conditions remain constant.

(Amended 1989 and 2005)

T.N.4.5.1. Time Dependence: Class II, III, and IIII Non-Automatic Weighing Instruments. – A non-automatic weighing instrument of Classes II, III, and IIII shall meet the following requirements at constant test conditions. During type evaluation, this test shall be conducted at 20 °C ± 2 °C (68 °F ± 4 °F):

(a) When any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 30 minutes shall not exceed

0.5 e. However, the difference between the indication obtained at 15 minutes and the indication obtained at 30 minutes shall not exceed 0.2 e.

(b) If the conditions in (a) are not met, the difference between the indication obtained immediately after placing the load on the instrument and the indication observed during the following four hours shall not exceed the absolute value of the maximum permissible error at the load applied.

(Added 2005) (Amended 2006 and 2010)

T.N.4.5.2. Time Dependence: Class III L Non-Automatic Weighing Instruments. – A non-automatic weighing instrument of Class III L shall meet the following requirements:

(a) When any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 30 minutes shall not exceed 1.5 e. However, the difference between the indication obtained at 15 minutes and the indication obtained at 30 minutes shall not exceed 0.6 e.

(b) If the conditions in (a) are not met, the difference between the indication obtained immediately after placing the load on the instrument and the indication observed during the following four hours shall not exceed the absolute value of the maximum permissible error at the load applied.

(Added 2005) (Amended 2010)

T.N.4.5.3. Zero Load Return: Non-automatic Weighing Instruments. – A non-automatic weighing instrument shall meet the following requirements at constant test conditions. During type evaluation, this test shall be conducted at 20 °C ± 2 °C (68 °F ± 4 °F). The deviation on returning to zero as soon as the indication has stabilized, after the removal of any load which has remained on the instrument for 30 minutes shall not exceed:

(a) 0.5 e for Class II and IIII devices,

(b) 0.5 e for Class III devices with 4000 or fewer divisions,

(c) 0.83 e for Class III devices with more than 4000 divisions, or

(d) one-half of the absolute value of the applicable tolerance for the applied load for Class III L devices.

For a multi-interval instrument, the deviation shall not exceed 0.83 e_1 (where e_1 is the interval of the first weighing segment of the scale).

On a multiple range instrument, the deviation on returning to zero from Max_i (load in the applicable weighing range) shall not exceed 0.83 e_i (interval of the weighing range). Furthermore, after returning to zero from any load greater than Max_1 (capacity of the first weighing range) and immediately after switching to the lowest weighing range, the indication near zero shall not vary by more than e_1 (interval of the first weighing range) during the following five minutes.

(Added 2010)

T.N.4.6. Time Dependence (Creep) for Load Cells during Type Evaluation. – A load cell (force transducer) marked with an accuracy class shall meet the following requirements at constant test conditions:

(a) **Permissible Variations of Readings**. – With a constant maximum load for the measuring range (D_{max}) between 90 % and 100 % of maximum capacity (E_{max}), applied to the load cell, the difference between the initial reading and any reading obtained during the next 30 minutes shall not exceed the absolute value of the maximum permissible error (mpe) for the applied load. Also see Table T.N.4.6. Maximum Permissible Error (mpe) for Load Cells During Type Evaluation.) The difference between the reading obtained at 20 minutes and the reading obtained at 30 minutes shall not exceed 0.15 times the absolute value of the mpe. (Also see Table T.N.4.6. Maximum Permissible Error (mpe) for Load Cells During Type Evaluation)

(b) **Apportionment Factors.** – The mpe for creep shall be determined from Table T.N.4.6. Maximum Permissible Error (mpe) for Load Cells During Type Evaluation using the following apportionment factors (pLC):

p_{LC} = 0.7 for load cells marked with S (single load cell applications),
p_{LC} = 1.0 for load cells marked with M (multiple load cell applications), and
p_{LC} = 0.5 for Class III L load cells marked with S or M.

(Added 2005, Amended 2006)

Table T.N.4.6.
Maximum Permissible Error (mpe)* for Load Cells During Type Evaluation

mpe in Load Cell Verifications Divisions (v) = p_{LC} × Basic Tolerance in v			
Class	**p_{LC} × 0.5 v**	**p_{LC} × 1.0 v**	**p_{LC} × 1.5 v**
I	0 - 50 000 v	50 001 v - 200 000 v	200 001 v +
II	0 - 5 000 v	5 001 v - 20 000 v	20 001 v +
III	0 - 500 v	501 v - 2 000 v	2 001 v +
IIII	0 - 50 v	51 v - 200 v	201 v +
III L	0 - 00 v	501 v - 1 000 v	(Add 0.5 v to the basic tolerance for each additional 500 v or fraction thereof up to a maximum load of 10 000 v)

v represents the load cell verification interval
p_{LC} represents the apportionment factors applied to the basic tolerance
p_{LC} = 0.7 for load cells marked with S (single load cell applications)
p_{LC} = 1.0 for load cells marked with M (multiple load cell applications)
p_{LC} = 0.5 for Class III L load cells marked with S or M
*mpe = p_{LC} × Basic Tolerance in load cell verifications divisions (v)

(Table Added 2005) (Amended 2006)

T.N.4.7. Creep Recovery for Load Cells During Type Evaluation. – The difference between the initial reading of the minimum load of the measuring range (D_{min}) and the reading after returning to minimum load subsequent to the maximum load (D_{max}) having been applied for 30 minutes shall not exceed:

(a) 0.5 times the value of the load cell verification interval (0.5 v) for Class II and IIII load cells;

(b) 0.5 times the value of the load cell verification interval (0.5 v) for Class III load cells with 4000 or fewer divisions;

(c) 0.83 times the value of the load cell verification interval (0.83 v) for Class III load cells with more than 4000 divisions; or

(d) 2.5 times the value of the load cell verification interval (2.5 v) for Class III L load cells.

(Added 2006) (Amended 2009 and 2011)

T.N.5. Repeatability. – The results obtained from several weighings of the same load under reasonably static test conditions shall agree within the absolute value of the maintenance tolerance for that load, and shall be within applicable tolerances.

T.N.6. Sensitivity. – This section is applicable to all nonautomatic-indicating scales marked I, II, III, III L, or IIII.

T.N.6.1. Test Load.

(a) The test load for sensitivity for nonautomatic-indicating vehicle, axle-load, livestock, and animal scales shall be 1 d for scales equipped with balance indicator, and 2 d or 0.2 % of the scale capacity, whichever is less, for scales not equipped with balance indicators.

(b) For all other nonautomatic-indicating scales, the test load for sensitivity shall be 1 d at zero and 2 d at maximum test load.

T.N.6.2. Minimum Change of Indications. – The addition or removal of the test load for sensitivity shall cause a minimum permanent change as follows:

(a) for a scale with trig loop but without a balance indicator, the position of the weighbeam shall change from the center to the outer limit of the trig loop;

(b) for a scale with balance indicator, the position of the indicator shall change one division on the graduated scale, the width of the central target area, or the applicable value as shown below, whichever is greater:

Scale of Class I or II: 1 mm (0.04 in),
Scale of Class III or IIII with a maximum capacity of 30 kg (70 lb) or less: 2 mm (0.08 in),
Scale of Class III, III L, or IIII with a maximum capacity of more than 30 kg (70 lb): 5 mm (0.20 in);

(c) for a scale without a trig loop or balance indicator, the position of rest of the weighbeam or lever system shall change from the horizontal or midway between limiting stops to either limit of motion.

(Amended 1987)

T.N.7. Discrimination.

T.N.7.1. Analog Automatic Indicating (i.e., Weighing Device with Dial, Drum, Fan, etc.). – A test load equivalent to 1.4 d shall cause a change in the indication of at least 1.0 d. (Also see N.1.5. Discrimination Test.)

T.N.7.2. Digital Automatic Indicating. – A test load equivalent to 1.4 d shall cause a change in the indicated or recorded value of at least 2.0 d. This requires the zone of uncertainty to be not greater than three-tenths of the value of the scale division. (Also see N.1.5.1. Digital Device.)

T.N.8. Influence Factors. – The following factors are applicable to tests conducted under controlled conditions only, provided that:

(a) types of devices approved prior to January 1, 1986, and manufactured prior to January 1, 1988, need not meet the requirements of this section;

(b) new types of devices submitted for approval after January 1, 1986, shall comply with the requirements of this section; and

(c) all devices manufactured after January 1, 1988, shall comply with the requirements of this section.

(Amended 1985)

T.N.8.1. Temperature. – Devices shall satisfy the tolerance requirements under the following temperature conditions:

T.N.8.1.1. If not specified in the operating instructions for Class I or II scales, or if not marked on the device for Class III, III L, or IIII scales, the temperature limits shall be: − 10 °C to 40 °C (14 °F to 104 °F).

T.N.8.1.2. If temperature limits are specified for the device, the range shall be at least that specified in Table T.N.8.1.2. Temperature Range by Class.

Table T.N.8.1.2.
Temperature Range by Class

Class	Temperature Range
I	5 ºC (9 °F)
II	15 ºC (27 °F)
III, III L, and IIII	30 ºC (54 °F)

T.N.8.1.3. Temperature Effect on Zero-Load Balance. – The zero-load indication shall not vary by more than:

(a) three divisions per 5 °C (9 °F) change in temperature for Class III L devices; or

(b) one division per 5 °C (9 °F) change in temperature for all other devices.

(Amended 1990)

T.N.8.1.4. Operating Temperature. – Except for Class I and II devices, an indicating or recording element shall not display nor record any usable values until the operating temperature necessary for accurate weighing and a stable zero balance condition have been attained.

T.N.8.2. Barometric Pressure. – Except for Class I scales, the zero indication shall not vary by more than one scale division for a change in barometric pressure of 1 kPa over the total barometric pressure range of 95 kPa to 105 kPa (28 in to 31 in of Hg).

T.N.8.3. Electric Power Supply.

T.N.8.3.1. Power Supply, Voltage and Frequency.

(a) Weighing devices that operate using alternating current must perform within the conditions defined in paragraphs T.N.3. Tolerance Values through T.N.7. Discrimination, inclusive, when tested over the range of − 15 % to + 10 % of the marked nominal line voltage(s) at 60 Hz, or the voltage range marked by the manufacturer, at 60 Hz.

(Amended 2003)

(b) Battery operated instruments shall not indicate nor record values outside the applicable tolerance limits when battery power output is excessive or deficient.

T.N.8.3.2. Power Interruption. – A power interruption shall not cause an indicating or recording element to display or record any values outside the applicable tolerance limits.

T.N.9. Radio Frequency Interference (RFI) and Other Electromagnetic Interference Susceptibility. – The difference between the weight indication due to the disturbance and the weight indication without the disturbance shall not exceed one scale division (d); or the equipment shall:

(a) blank the indication; or

(b) provide an error message; or

(c) the indication shall be so completely unstable that it cannot be interpreted, or transmitted into memory or to a recording element, as a correct measurement value.

The tolerance in T.N.9. Radio Frequency Interference (RFI) and Other Electromagnetic Interference Susceptibility is to be applied independently of other tolerances. For example, if indications are at allowable basic tolerance error limits when the disturbance occurs, then it is acceptable for the indication to exceed the applicable basic tolerances during the disturbance.

(Amended 1997)

UR. User Requirements

UR.1. Selection Requirements. – Equipment shall be suitable for the service in which it is used with respect to elements of its design, including but not limited to, its capacity, number of scale divisions, value of the scale division or verification scale division, minimum capacity, and computing capability.[4]

UR.1.1. General.

(a) For devices marked with a class designation, the typical class or type of device for particular weighing applications is shown in Table 7a. Typical Class or Type of Device for Weighing Applications.

(b) For devices not marked with a class designation, Table 7b. Applicable to Devices not Marked with a Class Designation applies.

Table 7a.
Typical Class or Type of Device for Weighing Applications

Class	Weighing Application or Scale Type
I	Precision laboratory weighing
II	Laboratory weighing, precious metals and gem weighing, grain test scales
III	All commercial weighing not otherwise specified, grain test scales, retail precious metals and semi-precious gem weighing, grain-hopper scales, animal scales, postal scales, vehicle on-board weighing systems with a capacity less than or equal to 30 000 lb, and scales used to determine laundry charges

[4] Purchasers and users of scales such as railway track, hopper, and vehicle scales should be aware of possible additional requirements for the design and installation of such devices.

(Footnote Added 1995)

Table 7a. **Typical Class or Type of Device for Weighing Applications**	
III L	Vehicle scales, ***<u>weigh in motion vehicle scales,</u>*** vehicle on-board weighing systems with a capacity greater than 30 000 lb, axle-load scales, livestock scales, railway track scales, crane scales, and hopper (other than grain hopper) scales
IIII	Wheel-load weighers and portable axle-load weighers used for highway weight enforcement
Note: A scale with a higher accuracy class than that specified as "typical" may be used.	

(Amended 1985, 1986, 1987, 1988, 1992, 1995, ~~and~~ 2012***<u>, and 201X</u>***)

Table 7b. **Applicable to Devices Not Marked with a Class Designation**	
Scale Type or Design	**Maximum Value of d**
Retail Food Scales, 50 lb capacity and less	1 oz
Animal Scales	1 lb
Grain Hopper Scales Capacity up to and including 50 000 lb Capacity over 50 000 lb	 10 lb (not greater than 0.05 % of capacity) 20 lb
Crane Scales	not greater than 0.2 % of capacity
Vehicle and Axle-Load Scales Used in Combination Capacity up to and including 200 000 lb Capacity over 200 000 lb	 20 lb 50 lb
Railway Track Scales With weighbeam Automatic indicating	 20 lb 100 lb
Scales with capacities greater than 500 lb except otherwise specified	0.1 % capacity (but not greater than 50 lb)
Wheel-Load Weighers	0.25 % capacity (but not greater than 50 lb)
Note: For scales not specified in this table, G-UR.1.1. and UR.1. apply.	

(Added 1985) (Amended 1989)

UR.1.2. Grain Hopper Scales. – Hopper scales manufactured as of January 1, 1986, that are used to weigh grain shall be Class III and have a minimum of 2000 scale divisions.

(Amended 2012)

UR.1.3. Value of the Indicated and Recorded Scale Division. *– The value of the scale division as recorded shall be the same as the division value indicated.*
[Nonretroactive as of January 1, 1986]

(Added 1985) (Amended 1999)

UR.1.3.1. Exceptions. – The provisions of UR.1.3. Value of the Indicated and Recorded Scale Division shall not apply to:

(a) Class I scales, or

(b) Dynamic monorail weighing systems when the value of d is less than the value of e.

(Added 1999)

UR.1.4. Grain-Test Scales: Value of the Scale Divisions. – The scale division for grain-test scales shall not exceed 0.2 g for loads through 500 g, and shall not exceed 1 g for loads above 500 g through 1000 g.

(Added 1992)

UR.1.5. Recording Element, Class III L Railway Track Scales. *– Class III L Railway Track Scales must be equipped with a recording element.*
[Nonretroactive as of January 1, 1996]

(Added 1995)

UR.1.6. Recording Element, Class III L Weigh In Motion Vehicle Scales. – Class III L Weigh In Motion Vehicle Scales must be equipped with a recording element.

(Added 20XX)

UR.2. Installation Requirements.

UR.2.1. Supports. – A scale that is portable and that is being used on a counter, table, or the floor shall be so positioned that it is firmly and securely supported.

UR.2.2. Suspension of Hanging Scale. – A hanging scale shall be freely suspended from a fixed support when in use.

UR.2.3. Protection from Environmental Factors. – The indicating elements, the lever system or load cells, and the load-receiving element of a permanently installed scale, and the indicating elements of a scale not intended to be permanently installed, shall be adequately protected from environmental factors such as wind, weather, and RFI that may adversely affect the operation or performance of the device.

UR.2.4. Foundation, Supports, and Clearance. – The foundation and supports of any scale installed in a fixed location shall be such as to provide strength, rigidity, and permanence of all components, and clearance shall be provided around all live parts to the extent that no contacts may result when the load-receiving element is empty, nor throughout the weighing range of the scale. An in-motion railway track scale is not required to provide clearance using rail gaps to separate the live rail portion of the weighing/load-receiving element from that which is not live if the scale is designed to be installed and operated using continuous rail. *On vehicle and livestock scales, the clearance between the load-receiving elements and the coping at the bottom edge of the platform shall be greater than at the top edge of the platform.**
*[*Nonretroactive as of January 1, 1973]*

(Amended 1985)

UR.2.5. Access to Weighing Elements. – Adequate provision shall be made for ready access to the pit of a vehicle, livestock, animal, axle-load, or railway track scale for the purpose of inspection and maintenance. Any of these scales without a pit shall be installed with adequate means for inspection and maintenance of the weighing elements.

(Amended 1985)

UR.2.6. Approaches.

UR.2.6.1. Vehicle Scales. *– On the entrance and exit end(s) of a vehicle scale, there shall be a straight approach as follows:*

(a) the width at least the width of the platform,

(b) the length at least one-half the length of the platform but not required to be more than 12 m (40 ft), and

(c) not less than 3 m (10 ft) of any approach adjacent to the platform shall be in the same plane as the platform. Any slope in the remaining portion of the approach shall ensure (1) ease of vehicle access, (2) ease for testing purposes, and (3) drainage away from the scale.

In addition to (a), (b), and (c), scales installed in any one location for a period of six months or more shall have not less than 3 m (10 ft) of any approach adjacent to the platform constructed of concrete or similar durable material to ensure that this portion remains smooth and level and in the same plane as the platform; however, grating of sufficient strength to withstand all loads equal to the concentrated load capacity of the scale may be installed in this portion.
[Nonretroactive as of January 1, 1976]

(Amended 1977, 1983, 1993, 2006, and 2010)

UR.2.6.2. Axle-Load Scales. – At each end of an axle-load scale there shall be a straight ~~paved~~ approach in the same plane as the platform. The approaches shall be the same width as the platform and of sufficient length to insure the level positioning of vehicles during weight determinations.

UR.2.6.3. Weigh in Motion Vehicle Scales. – At each end of a Weigh in Motion Vehicle Scale there shall be a straight approach in the same plane as the platform. The approaches shall be the same width as the platform and of sufficient length to insure the level positioning of vehicles during weight determinations. Both approaches shall be made of concrete or similar durable material (e.g., steel).
[Nonretroactive January X, XXXX]

(Added 201X)

UR.2.7. Stock Racks. – A livestock or animal scale shall be equipped with a suitable stock rack, with gates as required, which shall be securely mounted on the scale platform. Adequate clearances shall be maintained around the outside of the rack.

UR.2.8. Hoists. – On vehicle scales equipped with means for raising the load-receiving element from the weighing element for vehicle unloading, means shall be provided so that it is readily apparent to the scale operator when the load-receiving element is in its designed weighing position.

UR.2.9. Provision for Testing Dynamic Monorail Weighing Systems. – *Provisions shall be made at the time of installation of a dynamic monorail weighing systems for testing in accordance with N.1.3.5.1. Dynamic Monorail Weighing Systems (a rail around or other means for returning the test carcasses to the scale being tested).*
[Nonretroactive as of January 1, 1998]

(Added 1997) (Amended 1999)

UR.3. Use Requirements.

UR.3.1. Recommended Minimum Load. – A recommended minimum load is specified in Table 8 since the use of a device to weigh light loads is likely to result in relatively large errors.

Table 8.
Recommended Minimum Load

Class	Value of Scale Division (d or e*)	Recommended Minimum Load (d or e*)
I	equal to or greater than 0.001 g	100
II	0.001 g to 0.05 g, inclusive	20
	equal to or greater than 0.1 g	50
III	All**	20
III L	All	50
IIII	All	10

*For Class I and II devices equipped with auxiliary reading means (i.e., a rider, a vernier, or a least significant decimal differentiated by size, shape or color), the value of the verification scale division "e" is the value of the scale division immediately preceding the auxiliary means. For Class III and IIII devices the value of "e" is specified by the manufacturer as marked on the device; "e" must be less than or equal to "d."

**A minimum load of 10 d is recommended for a weight classifier marked in accordance with a statement identifying its use for special applications.

(Amended 1990)

UR.3.1.1. Minimum Load, Grain Dockage Determination. – When determining the quantity of foreign material (dockage) in grain, the weight of the sample shall be equal to or greater than 500 scale divisions.

(Added 1985)

UR.3.2. Maximum Load. – A scale shall not be used to weigh a load of more than the nominal capacity of the scale.

UR.3.2.1. Maximum Loading for Vehicle Scales. – A vehicle scale shall not be used to weigh loads exceeding the maximum load capacity of its span as specified in Table UR.3.2.1. Span Maximum Load. **(**Added 1996)

Note: UR.3.2.1. is not applicable to Weigh In Motion Vehicle Scales.

(Added 20XX)

Table UR.3.2.1.
Span Maximum Load

Distance in Feet Between the Extremes of any Two or More Consecutive Axles	Ratio of CLC to Maximum Load ("r" factor) Carried on Any Group of Two or More Consecutive Axles.							
	2 axles	**3 axles**	**4 axles**	**5 axles**	**6 axles**	**7 axles**	**8 axles**	**9 axles**
4[1]	1.000		INSTRUCTIONS: 1. Determine the scale's CLC. 2. Count the number of axles on the vehicle in a given span and determine the distance in feet between the first and last axle in the span. 3. Multiply the CLC by the corresponding multiplier in the table.* 4. The resulting number is the scale's maximum concentrated load for a single span based on the vehicle configuration. * note and formula on next page.					
5[1]	1.000							
6[1]	1.000							
7[1]	1.000							
8 and less[1]	1.000	1.000						
More than 8[1]	1.118	1.235						
9	1.147	1.257						
10	1.176	1.279						
11	1.206	1.301						
12	1.235	1.324	1.471	1.632				
13	1.265	1.346	1.490	1.651				
14	1.294	1.368	1.510	1.669				
15	1.324	1.390	1.529	1.688	1.853			
16	1.353	1.412	1.549	1.706	1.871			
17	1.382	1.434	1.569	1.724	1.888			
18	1.412	1.456	1.588	1.743	1.906			
19	1.441	1.478	1.608	1.761	1.924			
20	1.471	1.500	1.627	1.779	1.941			
21	1.500	1.522	1.647	1.798	1.959			
22	1.529	1.544	1.667	1.816	1.976			
23	1.559	1.566	1.686	1.835	1.994			
24	1.588	1.588	1.706	1.853	2.012	2.176		
25	1.618	1.610	1.725	1.871	2.029	2.194		
26		1.632	1.745	1.890	2.047	2.211		
27		1.654	1.765	1.908	2.065	2.228		
28		1.676	1.784	1.926	2.082	2.245	2.412	
29		1.699	1.804	1.945	2.100	2.262	2.429	
30		1.721	1.824	1.963	2.118	2.279	2.445	
31		1.743	1.843	1.982	2.135	2.297	2.462	
32		1.765	1.863	2.000	2.153	2.314	2.479	2.647
33			1.882	2.018	2.171	2.331	2.496	2.664
34			1.902	2.037	2.188	2.348	2.513	2.680
35			1.922	2.055	2.206	2.365	2.529	2.697
36			2.000[2]	2.074	2.224	2.382	2.546	2.713
37			2.000[2]	2.092	2.241	2.400	2.563	2.730
38			2.000[2]	2.110	2.259	2.417	2.580	2.746
39			2.000	2.129	2.276	2.434	2.597	2.763
40			2.020	2.147	2.294	2.451	2.613	2.779
41			2.039	2.165	2.312	2.468	2.630	2.796
42			2.059	2.184	2.329	2.485	2.647	2.813
43			2.078	2.202	2.347	2.502	2.664	2.829
44			2.098	2.221	2.365	2.520	2.681	2.846

Table UR.3.2.1.
Span Maximum Load

Distance in Feet Between the Extremes of any Two or More Consecutive Axles	Ratio of CLC to Maximum Load ("r" factor) Carried on Any Group of Two or More Consecutive Axles.							
	2 axles	3 axles	4 axles	5 axles	6 axles	7 axles	8 axles	9 axles
45			2.118	2.239	2.382	2.537	2.697	2.862
46			2.137	2.257	2.400	2.554	2.714	2.879
47			2.157	2.276	2.418	2.571	2.731	2.895
48			2.176	2.294	2.435	2.588	2.748	2.912
49			2.196	2.313	2.453	2.605	2.765	2.928
50			2.216	2.331	2.471	2.623	2.782	2.945
51			2.235	2.349	2.488	2.640	2.798	2.961
52			2.255	2.368	2.506	2.657	2.815	2.978
53			2.275	2.386	2.524	2.674	2.832	2.994
54			2.294	2.404	2.541	2.691	2.849	3.011
55			2.314	2.423	2.559	2.708	2.866	3.028
56			2.333	2.441	2.576	2.725	2.882	3.044
57			2.353[3]	2.460	2.594	2.742	2.899	3.061
58				2.478	2.612	2.760	2.916	3.077
59				2.496	2.629	2.777	2.933	3.094
60				2.515	2.647	2.794	2.950	3.110

***Note:** This table was developed based upon the following formula. Values may be rounded in some cases for ease of use.

$$W = r \times 500\left[\left(\frac{LN}{N-1}\right) + 12N + 36\right]$$

[1] Tandem Axle Weight.
[2] Exception – These values in the third column correspond to the maximum loads in which the inner bridge dimensions of 36, 37, and 38 ft are considered to be equivalent to 39 ft. This allows a weight of 68 000 lb on axles 2 through 5.
[3] Corresponds to the Interstate Gross Weight Limit.

UR.3.3. Single-Draft Vehicle Weighing. – A vehicle or a coupled-vehicle combination shall be commercially weighed on a vehicle scale only as a single draft. That is, the total weight of such a vehicle or combination shall not be determined by adding together the results obtained by separately and not simultaneously weighing each end of such vehicle or individual elements of such coupled combination. However, the weight of:

(a) a coupled combination may be determined by uncoupling the various elements (tractor, semitrailer, trailer), weighing each unit separately as a single draft, and adding together the results; or

(b) a vehicle or coupled-vehicle combination may be determined by adding together the weights obtained while all individual elements are resting simultaneously on more than one scale platform.

Note: This paragraph does not apply to ***weigh-in-motion vehicle scales,*** highway-law-enforcement scales and scales used for the collection of statistical data.

(Added 1992) **(Amended 20XX)**

UR.3.4. Wheel-Load Weighing.

UR.3.4.1. Use in Pairs. – When wheel-load weighers or portable axle-load weighers are to be regularly used in pairs, both weighers of each such pair shall be appropriately marked to identify them as weighers intended to be used in combination.

UR.3.4.2. Level Condition. – A vehicle of which either an axle-load determination or a gross-load determination is being made utilizing wheel-load weighers or portable axle-load weighers, shall be in a reasonably level position at the time of such determination.

UR.3.5. Special Designs. – A scale designed and marked for a special application (such as a prepackaging scale or prescription scale with a counting feature) shall not be used for other than its intended purpose.[5]

(Amended 2003)

UR.3.6. Wet Commodities. – Wet commodities not in watertight containers shall be weighed only on a scale having a pan or platform that will drain properly.

(Amended 1988)

UR.3.7. Minimum Load on a Vehicle Scale *or Weigh in Motion Vehicle Scale*. – A vehicle scale ***or weigh in motion vehicle scale*** shall not be used to weigh net loads smaller than:

(a) 10 d when weighing scrap material for recycling or weighing refuse materials at landfills and transfer stations; and

(b) 50 d for all other weighing.

As used in this paragraph, scrap materials for recycling shall be limited to ferrous metals, paper (including cardboard), textiles, plastic, and glass.

(Amended 1988, 1992, ~~**and**~~ 2006**, and 20XX**)

UR.3.8. Minimum Load for Weighing Livestock. – A scale with scale divisions greater than 2 kg (5 lb) shall not be used for weighing net loads smaller than 500 d.

(Amended 1989)

UR.3.9. Use of Manual Weight Entries. – Manual gross or net weight entries are permitted for use in the following applications only when:

(a) a point-of-sale system interfaced with a scale is giving credit for a weighed item;

(b) an item is pre-weighed on a legal for trade scale and marked with the correct net weight;

(c) a device or system is generating labels for standard weight packages;

(d) postal scales or weight classifiers are generating manifests for packages to be picked up at a later time; or

(e) livestock and vehicle scale ***or weigh-in-motion vehicle scale*** systems ***that*** generate weight tickets to correct erroneous tickets.

(Added 1992) (Amended 2000 and 2004) **(Amended 20XX)**

[5] Prepackaging scales and prescription scales with a counting feature (and other commercial devices) used for putting up packages in advance of sale are acceptable for use in commerce only if all appropriate provisions of NIST Handbook 44 are met. Users of such devices must be alert to the legal requirements relating to the declaration of quantity on a package. Such requirements are to the effect that, on the average, the contents of the individual packages of a particular commodity comprising a lot, shipment, or delivery must contain at least the quantity declared on the label. The fact that a prepackaging scale may overregister, but within established tolerances, and is approved for commercial service is not a legal justification for packages to contain, on the average, less than the labeled quantity.

(Amended 2003)

UR.3.10. Dynamic Monorail Weighing Systems. – When the value of d is different from the value of e, the commercial transaction must be based on e.

(Added 1999)

UR.3.11. Minimum Count. – A prescription scale with an operational counting feature shall not be used to count a quantity of less than 30 pieces weighing a minimum of 90 e.

(Added 2003)

Note: The minimum count as defined in this paragraph refers to the use of the device in the filling of prescriptions and is different from the minimum sample piece count as defined in S.1.2.3. and as required to be marked on the scale by S.6.6.

(Note Added 2004)

UR.3.12. Correct Stored Piece Weight. – For prescription scales with a counting feature, the user is responsible for maintaining the correct stored piece weight. This is especially critical when a medicine has been reformulated or comes from different lots.

(Added 2003)

UR.4. Maintenance Requirements.

UR.4.1. Balance Condition. – The zero-load adjustment of a scale shall be maintained so that, with no load on the load-receiving element and with all load-counterbalancing elements of the scale (such as poises, drop weights, or counterbalance weights) set to zero, the scale shall indicate or record a zero balance condition**.**. A scale not equipped to indicate or record a zero-load balance shall be maintained in balance under any no-load condition.

UR.4.2. Level Condition. – If a scale is equipped with a level-condition indicator, the scale shall be maintained in level.

UR.4.3. Scale Modification. – The dimensions (e.g., length, width, thickness, etc.) of the load receiving element of a scale shall not be changed beyond the manufacturer's specifications, nor shall the capacity of a scale be increased beyond its design capacity by replacing or modifying the original primary indicating or recording element with one of a higher capacity, except when the modification has been approved by a competent engineering authority, preferably that of the engineering department of the manufacturer of the scale, and by the weights and measures authority having jurisdiction over the scale.

(Amended 1996)

UR.5. Coupled-in-Motion Railroad Weighing Systems. – A coupled-in-motion weighing system placed in service on or after January 1, 1991, should be tested in the manner in which it is operated, with the locomotive either pushing or pulling the cars at the designed speed and in the proper direction. The cars used in the test train should represent the range of gross weights that will be used during the normal operation of the weighing system. Except as provided in N.4.2. Weighing Systems Placed in Service Prior to January 1, 1991, and Used to Weigh Trains of Ten or More Cars and N.4.3.(a) Weighing Systems Placed in Service on or After January 1, 1991, and Used to Weigh Trains of Ten or More Cars, normal operating procedures should be simulated as nearly as practical. Approach conditions for a train length in each direction of the scale site are more critical for a weighing system used for individual car weights than for a unit-train-weights-only facility, and should be considered prior to installation.

(Added 1990) (Amended 1992)

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Report of the Professional Development Committee (PDC)

Stacy Carlsen, Marin County, California
Committee Chair

4000 INTRODUCTION

This is the final report of the Professional Development Committee (PDC) (hereinafter referred to as the "Committee") for the 102nd Annual Meeting of the National Conference on Weights and Measures (NCWM) held in Pittsburgh, Pennsylvania, July 16 - 20, 2017. This report is based on the Interim Report offered in the NCWM Publication 16, "Committee Reports," testimony at public hearings, comments received from the regional weights and measures associations and other parties, the addendum sheets issued at the Annual Meeting, and actions taken by the membership at the voting session of the Annual Meeting. The Informational items shown below were adopted as presented when this report was approved.

Table A identifies the agenda items by reference key, title of item, page number and the appendices by appendix designations. The acronyms for organizations and technical terms used throughout the agenda are identified in Table B. The first four digits of an item's reference key are assigned from the Subject Series List The status of each item contained in the report is designated as one of the following: **(D) Developing Item:** the Committee determined the item has merit; however, the item was returned to the submitter or other designated party for further development before any action can be taken at the national level; **(I) Informational Item:** the item is under consideration by the Committee but not proposed for Voting; **(V) Voting Item:** the Committee is making recommendations requiring a vote by the active members of NCWM; **(W) Withdrawn Item:** the item has been removed from consideration by the Committee.

Table C provides a summary of the results of the voting on the Committee's items and the report in its entirety. Some Voting Items are considered individually; others may be grouped in a consent calendar. Consent calendar items are Voting Items that the Committee has assembled as a single Voting Item during their deliberation after the Open Hearings on the assumption that the items are without opposition and will not require discussion. The Voting Items that have been grouped into consent calendar items will be listed on the addendum sheets. Prior to adoption of the consent calendar, the Committee will entertain any requests from the floor to remove specific items from the consent calendar to be discussed and voted upon individually.

Proposed revisions to the handbook(s) are shown as follows: 1) deleted language is indicated with a **bold face font using ~~strikeouts~~** (e.g., **~~this report~~**), and 2) proposed new language is indicated with an **underscored bold-faced font** (e.g., **new items**). When used in this report, the term "weight" means "mass".

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

Subject Series List

Table A
Table of Contents

Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
ADDIE	Analysis, Design, Development, Implementation, and Evaluation	NIST	National Institute of Standards and Technology
ANSI	American National Standards Institute	OWM	Office of Weights and Measures
BOK	Body of Knowledge	PDC	Professional Development Committee
CWMA	Central Weights and Measures Association	RSA	Registered Service Agents
ISO	International Standardization Organization	SIM	Inter-American Metrology System
ICE	Institute for Credentialing Excellence	SME	Subject Matter Expert
NCWM	National Conference on Weights and Measures	SWMA	Southern Weights and Measures Association
NEWMA	Northeastern Weights and Measures Association	WWMA	Western Weights and Measures Association

Table C
Voting Table

Reference Key Number	***House of State Representatives***		***House of Delegates***		***Results***
	Yeas	***Nays***	***Yeas***	***Nays***	
To accept the Report	Voice Vote				Adopted

Details of All Items
(In order by Reference Key)

4100 EDUCATION

4100-1 I Professional Certification Program

Professional certifications are offered in many industries as a means of demonstrating competence in a field of expertise. Certification may be a means of qualifying an individual for employment or a higher pay grade within a profession. The NCWM Professional Certification Program provides confidence that an individual has a strong understanding of U.S weights and measures standards as adopted by NCWM and published in NIST Handbooks 44, “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices; 130, “Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality,” and 133, “Checking the Net Contents of Packaged Goods.”

Professional certification is available to NCWM members and non-members in the private sector and in government positions. Please note that the person taking the test must be an NCWM member to take the exams for free. Professional Certifications are now available in six areas covering (in order of deployment): Retail Motor-Fuel Devices, Small Capacity Scales Class III, Package Checking – Basic, Medium Capacity Scales, Large Capacity Scales, and Vehicle-Tank Meters.

In December 2016, the Certification Coordinator delivered the materials for two new, basic competency exams. The NCWM staff is in the process of posting these exams to the testing website. The basic competency exams were created to provide an objective measure of development of new hires among regulatory officials and potentially test service agents for basic knowledge of weights and measures requirements. However, deployment of these new exams is on hold until the NCWM can establish a proctoring system to better ensure the integrity of the testing process. (See discussion later in this item.)

Work continues on additional certification exams. Priorities had been set to complete Liquid Petroleum Gas (LPG) Meters and Price Verification next. However, the Committee is elevating the priority of the Precision Scales exam ahead of the Price Verification exam considering comments heard at the 2017 Interim Meeting.

The PDC is always looking for additional subject matter experts (SME) volunteers for all active projects. Any interested parties should contact Mr. Andersen through the NCWM Headquarters at **info@ncwm.net**. The SME volunteers are the real heart of the certification program. The successful creation of these exams is dependent on willing volunteers.

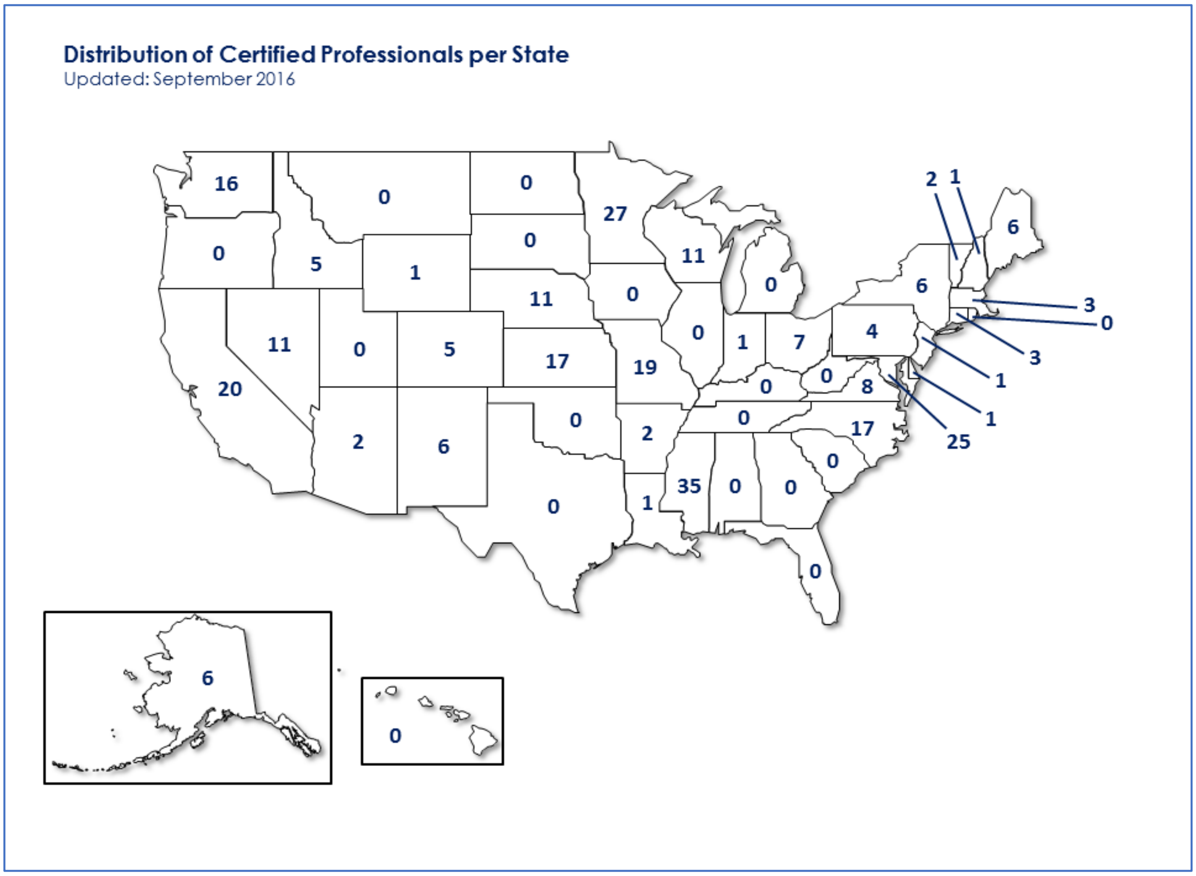
Status of Current Tests
The NCWM has issued 638 professional certificates from inception of the Professional Certification Program to September 30, 2016. Of the certificates issued, six have been issued to individuals in the private sector (three for small scales, two for package checking, and one for retail motor-fuel dispensers). The balance of the certificates has been issued to regulators. It is important to note that some of the early certificates issued for Retail Motor-Fuel Devices have reached their five-year expiration. Those who earned certificates over five years ago will need to seek

recertification. This will also begin to impact certifications for Small Scales and Package Checking that will reach five years of activity this August. The Committee is working with NCWM staff to find ways to alert certificate holders of expiration in advance so they can plan for recertification.

Number of Certificates NCWM Has Issued as of the end of Fiscal Year 2016 (September 30)					
	FY 11-12	**FY 12-13**	**FY 13-14**	**FY14-15**	**FY 15-16**
Count in Year	94	106	60	199	135
Cumulative	138	244	304	503	638

Certification (posted)	**Certificates**
RMFD (5/2010)	272
Small Scales (8/2012)	153
Package Checking (8/2012)	97
Medium-Capacity Scales (4/2015)	48
Large-Capacity Scales (4/2015)	30
Vehicle-Tank Meters (4/2015)	38

The following map includes 31 states with individuals holding an active certificate in one or more disciplines. Please note that the six-active certificates issued to private sector individuals are included in these figures, for example, the two certificates in Arkansas are private sector individuals. This data only includes certificates that have not expired as of September 30, 2016.

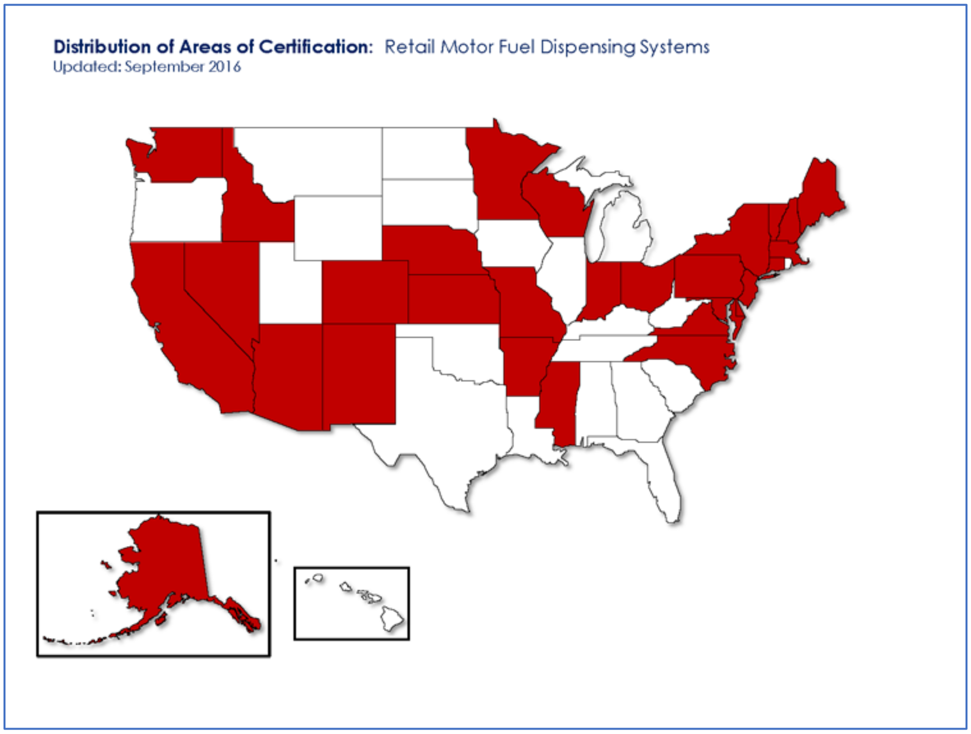


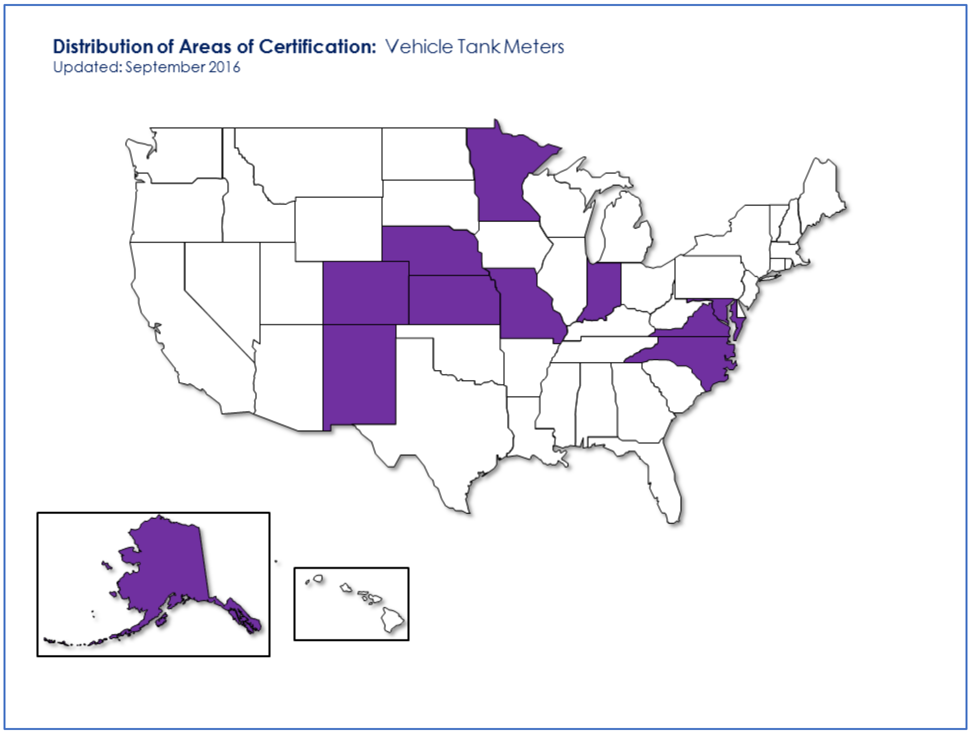
Number of Certificates Issued by State Since Program Inception*			
State	**Certificates**	**State**	**Certificates**
Missouri	100	Idaho	8
Minnesota	92	Maine	8
Maryland	65	Colorado	6
Mississippi	40	Pennsylvania	6
Nebraska	33	New York	5
Washington	26	Vermont	5
Wisconsin	26	Wyoming	5
North Carolina	24	Arkansas	3
Alaska	22	Delaware	3
Nevada	22	Arizona	2
California	21	Michigan	2
Virginia	21	Oregon	2
New Mexico	18	Georgia	1
Kansas	17	Louisiana	1

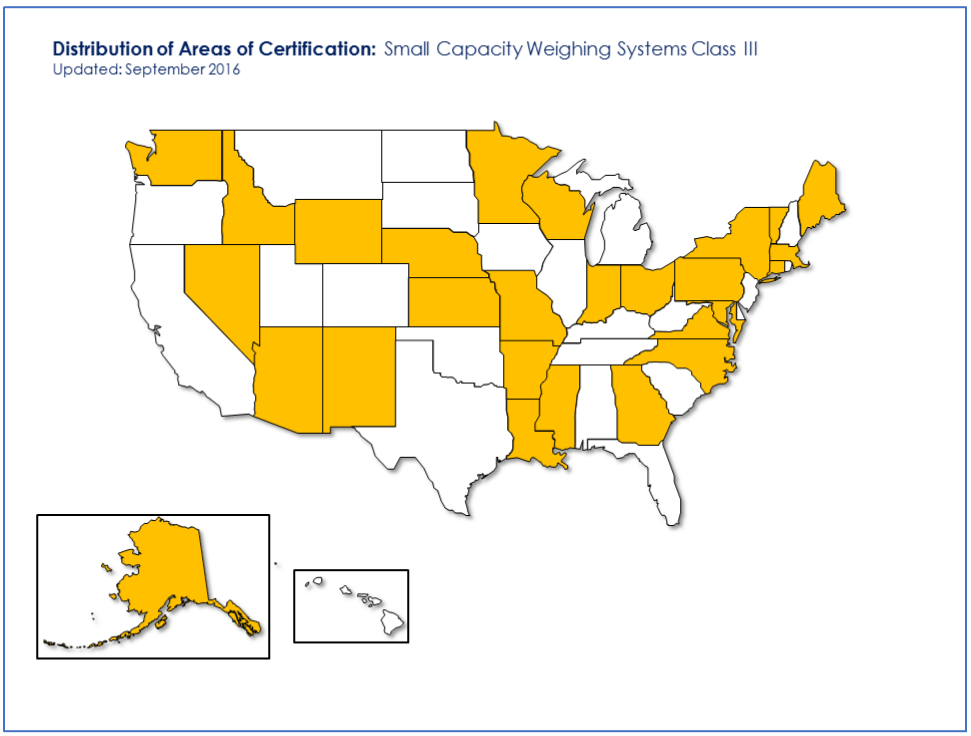
Number of Certificates Issued by State Since Program Inception*			
State	**Certificates**	**State**	**Certificates**
Connecticut	15	Montana	1
Ohio	13	New Hampshire	1
Indiana	12	West Virginia	1
Massachusetts	11		

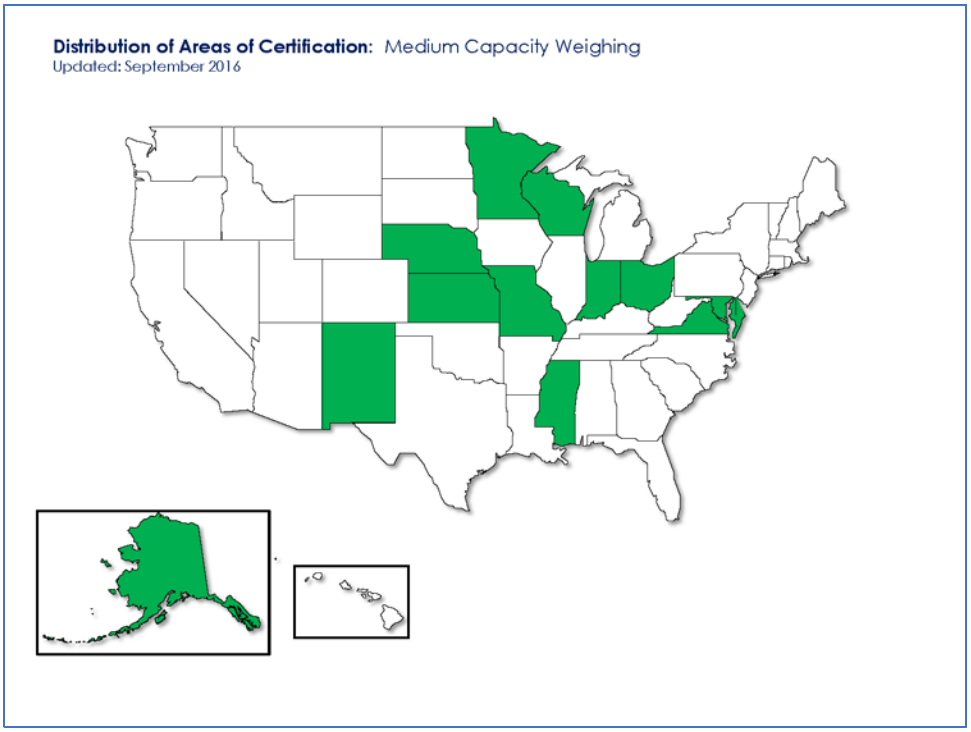
* Includes expired certificates

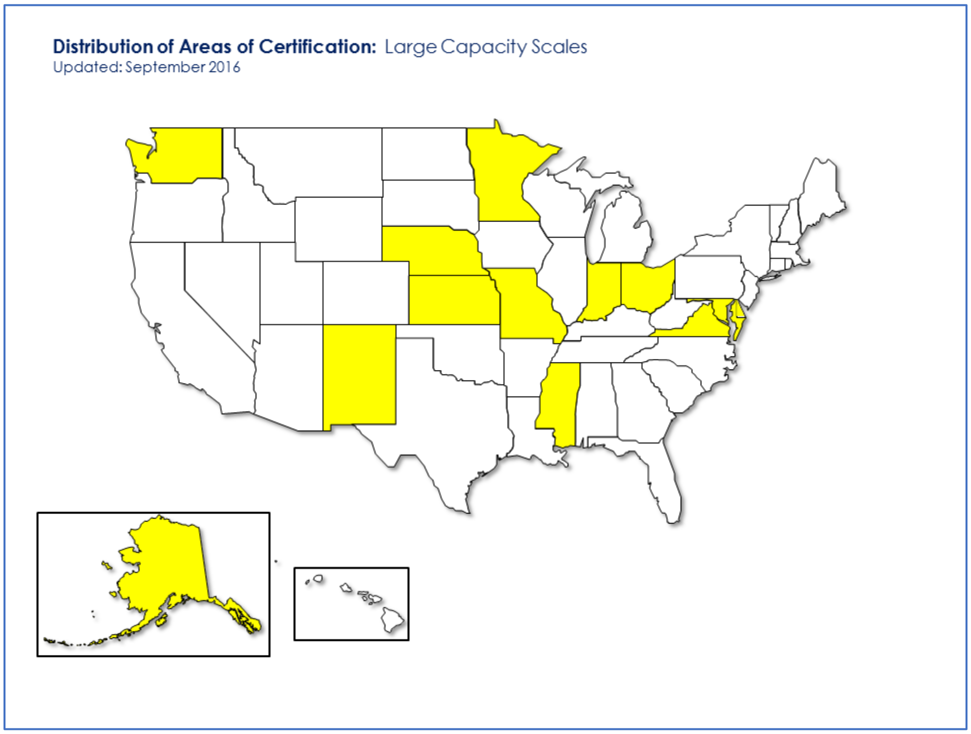
The following maps show the states with individuals presently holding professional certification.

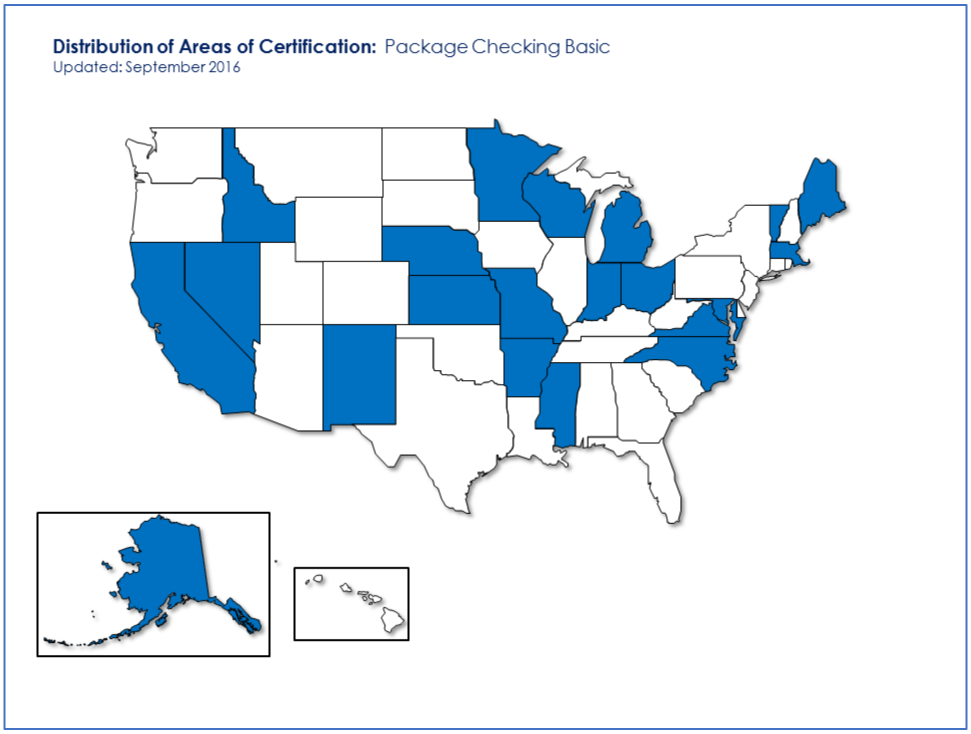



Distribution of Areas of Certification: Vehicle Tank Meters
Updated: September 2016


Distribution of Areas of Certification: Small Capacity Weighing Systems Class III
Updated: September 2016


Distribution of Areas of Certification: Medium Capacity Weighing
Updated: September 2016


Distribution of Areas of Certification: Large Capacity Scales
Updated: September 2016



The Committee continually works to improve the exams and the exam experience. The key goal is to make sure the exams stay meaningful and current as handbook changes are made. This includes an annual review of the current exams by the Certification Coordinator. The Committee considered adding a short entry survey to each exam to capture meta-data on who is taking the exams. Examples of meta-data would have included the candidate's level of experience, whether the candidate is a regulatory official or a service agent, and so forth. The plan was to place the entry survey questions in an untimed, unscored portion of the exam. However, we could not implement the plan because of limitations in the exam hosting software. Any questions added, even unscored, get counted in the total number of questions for calculation of the percentage. Since no correct answers were possible, these survey questions would have counted as wrong answers for the percent correct.

In order to obtain valuable feedback on the Certification Program, the Committee has been working to create an exit survey, which will be implemented using Survey Monkey. The questions on the exit survey will address the meta-data mentioned earlier, mechanics of taking the exam, preparation for taking the exam, and general feedback (e.g., How did the candidate react to the content of the exam? Was it challenging? Was it too easy? Did the candidate feel the exam was fair?). The Committee has prepared a series of survey questions and will be working with the NCWM staff to deploy the survey. When it is ready, we will create links to the survey from the NCWM website. We highly encourage candidates to take the survey after their exam experience.

Status of Current Projects

The Committee keeps the goal of accrediting the Professional Certification Program as an important long-term objective. The PDC endeavors to create an infrastructure that will eventually support accreditation. Proctoring is one of those infrastructure items we believe is necessary to accreditation. The Committee worked on a set of guidelines for proctoring. These guidelines impact both the candidate and the proctor. For the candidate, the guidelines will prohibit bringing materials into or taking materials out of the exam, having a cell phone activated, accessing the internet, or other computer programs while taking the exam, etc. For the proctor, the guidelines will establish who can serve as a proctor (with approval of the NCWM). The Committee is looking at allowing state weights and measures divisions to provide the proctor but is recommending the proctor be someone other than an immediate supervisor. It could be someone from the personnel department or some independent third party. The Committee is still considering using private proctoring services. The guidelines specify what the proctor must provide the candidate, items such as scrap paper, clean copies of pertinent NIST Handbooks, computer access, and a quiet environment to take the exam, etc. It further requires the proctor to collect all scrap paper, as no written materials may be removed from the testing site to protect the integrity of the questions. The current draft of the guidelines appears in Appendix A.

A decision was made in the fall of 2016 to establish cooling-off periods. We found that some candidates were taking the exam three or more times in rapid succession. The candidates were originally allowed two attempts to pass the exam for one fee. Candidates were simply paying the fee again and retaking the exam, and for those who were members, the fee was zero. The Committee recommended to the NCWM Executive Director that we establish a cooling-off period of four weeks for professional certifications and two weeks for the basic competency exams. This will allow additional preparation time for the candidate before taking the exam again.

As mentioned earlier, the two basic competency exams were delivered to NCWM by the Certification Coordinator and are awaiting the proctoring piece before being implemented. Each two-part exam has a general component covering NIST Handbook 44 and a specific part covering the basic elements of the measurement type. Each exam is based on 30 questions with a one-hour time limit. The exams are almost entirely multiple-choice questions, but candidates will find it beneficial to understand how to search NIST Handbook 44 to find pertinent code sections. The weighing exam includes those devices in the Scales Code. The measuring exam includes devices in the Liquid-Measuring Devices Code and the Vehicle-Tank Meters Code. Based on guidance from the Board, the exams apply equally to regulatory officials and service agents. The Committee hopes the states may use the exams in their Service Person Registration Programs.

While awaiting the implementation on proctoring, the Committee is working with NCWM to get the modules for the basic competency exams up on the website. The modules contain the learning objectives on which the exam is based. You can find all the existing modules on the NCWM website by pointing to Professional Certification on the top navigation bar. Then select Body of Knowledge, and this page shows the curriculum workplan. You will find the active modules are hyperlinked. Click the module you want and download it to your computer. The NCWM modules are intended for wide distribution and may be freely copied.

The Committee appreciates the comments received at the 2017 Interim Meetings. Of note, Mr. Steve Giguere (Maine) asked if there was a mechanism that would notify the supervisor with the results when an employee takes a certification exam? The Committee explained the log-in credentials permit a candidate to go to the test site and access copies of all active certificates earned. Currently, this places the responsibility on the candidate to alert their supervisors. The Committee further committed to consider options to notify second parties.

A comment was received from Ms. Kristen Macey (California) asking to upgrade the priority of the Precision Scale certification based on the new phenomenon of cannabis as a legally traded commodity. The Committee deliberated and, as noted above, directed the Certification Coordinator to move the priority for this exam ahead of Price Verification.

Regional Association Comments:
The WWMA PDC continues to support this item as Informational. The Committee heard comments supportive of the testing programs during the open hearings and suggestions for using the program in RSA licensing.

The CWMA reported that the bulk of the comments were from people wanting to know the area of competency the participant got wrong for further study. People also said they wanted the results to be forwarded to state jurisdictions and employers. There was consensus that taking basic competency tests would make both service agents and regulatory officials more proficient in NIST handbooks, because instead of knowing just the details of a specific device, they will know where to look for the answers.

4100-2 I Training

The purpose of this item is to share best practices and approaches to training in response to the broad training needs of the weights and measures jurisdictions and to serve as a link to various training materials on the web.

At the 2016 NCWM Annual Meeting, the Committee heard an update on NIST OWM Training provided over the past 12 months. Ms. Tina Butcher (NIST OWM) noted that OWM provided 47 classes in the past 12 months, resulting in the awarding of more than 1340 Continuing Education Units (CEUs). These classes involved both public and private sector participants (including other countries in the Inter-American Metrology System [SIM]) and focused on the following areas.

- Laboratory Metrology (more than 470 students participated)
  - Seminars on Fundamentals on Mass and Volume Metrology and Lab Administration
  - Webinars for students from state and industry metrology laboratories on subjects such as document control, contract review, and procedures for documenting traceability, and calibration intervals
- Weighing and Measuring Devices
  - Seminar in North Carolina on LPG Liquid-Measuring Systems (22 students from 13 states)
  - Seminar in South Dakota (held concurrently with the CWMA) on Retail Motor-Fuel Dispensers (24 students from 10 states)
  - Webinars on Pour and Drain Procedures (27 students from 16 states)
- Package Control
  - Seminars in Nevada, California, Texas, Nebraska, Kentucky, and other states on the inspection of packages for accurate labeling and net weight (105 students)
  - Seminar in Nevada on Price Verification procedures in retail stores (19 students)

Ms. Butcher also reported that the following OWM training was scheduled for the remainder of 2016:

- August 2016 – NIST Trainer Seminar – Packaging
- October 2016 – Liquefied Petroleum Gas Liquid-Measuring Systems (Alaska)
- October 2016 – Compressed Natural Gas Metering Systems (Utah)*

**__Editor's Note__: This training on CNG Metering Systems has since been delayed until spring 2017 at the request of the host jurisdiction.*

At the 2017 Interim Meeting, Ms. Tina Butcher (NIST OWM) provided an overview of NIST training courses planned in the coming year. She noted information regarding these classes, including whether space is still available, which can be found on NIST's website under NIST OWM's "Calendar of Events."

Ms. Butcher reported that NIST will be hosting two Weights and Measures Administrators' Workshops on March 27 - 31, 2017, and 10 - 14, 2017. The workshops will be structured to cover information primarily of interest to new administrators at the beginning of each workshop, and information relevant to experienced administrators will be during the latter portion of each workshop with a day of overlap in between. However, all experience levels are encouraged to attend the entire workshop, and this wide range of participation would greatly enhance the experience for all participants. The agenda will include industry panels and presentations of best practices from current administrators.

Ms. Kristin Macey (California) commented that many jurisdictions are dealing with the sale of legalized marijuana as well as other new technologies and applications. She asked Ms. Butcher if NIST has considered this and other areas regarding the availability of NIST training and technical materials. She also asked Mr. Ross Andersen (NCWM Certification Coordinator) if this has been considered within the NCWM Certification Program. Ms. Butcher and Mr. Andersen reported that this area isn't currently addressed but could be considered in the future. Both acknowledged the need to continually consider new areas when prioritizing work and expressed appreciation for the ideas.

At the 2017 Annual Meeting, Ms. Butcher provided a brief update on the courses planned for the coming year and noted that a full listing will be included in the Committee's Final Report; the full listing appears below. She also noted that scheduled training is contingent on NIST OWM's budget, and anyone interested in these courses should consult OWM's "Calendar of Events" at: **www.nist.gov/pml/weights-and-measures/about-owm/calendar-events.**

Packaging & Price Verification

NIST Handbook 133 – "Checking the Net Contents of Packaged Goods," Basic:

- March 2017 – Illinois and North Carolina (complete)
- October 23 - 27, 2017 – Sonoma, California
- November 27 - 28, 2017 – Gaithersburg, Maryland (Industry Only)
- February 5 - 8, 2018 – San Diego, California
- March 26 - 29, 2018 – Lebanon, Missouri
- April 16 - 19, 2018 – Montgomery, Alabama
- May 14 - 17, 2018 – Pompano Beach, Florida

NIST Handbook 130 – "Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality," Packaging and Labeling

- April 2017 – Texas and June 2017 – Maryland (complete)
- September 25 - 28, 2017 – Burnsville, Minnesota
- March 12 - 15, 2018 – Orange County, California
- June 5 - 7, 2018 – Cleveland, Ohio

Price Verification

- May 2017 – NEWMA Annual Meeting (complete)
- October 10 - 11, 2017 – SWMA Annual Meeting, Little Rock, Arkansas,

Laboratory Metrology

Fundamentals of Metrology

- December 4 - 8, 2017 – Gaithersburg, Maryland

Mass Metrology Seminar

- October 23 - November 3, 2017

Advanced Mass Seminar

- August 21 - 31, 2017 – Gaithersburg, Maryland

Balance & Scale Calibration & Uncertainties (User Uncertainties

- January 9 - 12, 2018 – Gaithersburg, Maryland

Webinars – August 2017 through October 2018

- Multiple webinars are being offered; see OWM Calendar of Events for a complete listing with dates. Topics include:
  - Contract Review
  - Document Control and Record Keeping
  - State Lab Annual Submission Process
  - Internal Auditing Best Practices
  - Conducting an Effective Management Review

Regional Measurement Assurance Programs

- Northeast Measurement Assurance Program (NEMAP)
  - September 18 - 21, 2017 – Charleston, West Virginia
- Southwestern Assurance Program (SWAP)
  - October 2 - 5, 2017 – Topeka, Kansas
- Mid-America Measurement Assurance Program (MidMAP)
  - October 16 - 19, 2017 – Lansing, Michigan

Weighing and Measuring Devices

Compressed Natural Gas Metering Systems

- April 2017 – Utah and June 2017 – Indiana (complete)
- Spring 2018 – Sacramento, California

LPG Liquid-Measuring Systems

- April 2017 – Oregon (complete)
- Spring 2018 – Sacramento,California
- June 11 - 15, 2018 – Ohio

Retail Motor-Fuel Dispensers

- June 2017 – California (complete)
- October 23 - 26, 2017 – Harrisburg, Pennsylvania, Pennsylvania Weights and Measures Association

Livestock and Animal Scales

- May 2017 – Kansas (complete)
- September 26 - 28, 2017 – WWMA Annual Meeting - Arizona

Medium Capacity Scales

- May 2017 – CWMA Annual Meeting (complete)

Ms. Butcher reported that based on the number of registrants, only one of the Administrator Workshops (referenced at the 2017 Interim Meeting) was held in spring 2017.

Regional Association Comments:
The WWMA recommended keeping this item Informational, recognizing the continued effort to increase our professional skills. The Committee appreciates the financial support and partnership between NIST OWM and NCWM.

The CWMA received comment that Nebraska would be hosting NIST OWM Medium Capacity Scale Training in conjunction with the CWMA Annual Meeting with fourteen seats available at the time of their fall meeting. Registration can be completed on the NIST OWM site. Participants must attend all sections of the two-day training to receive credit.

At the May 2017 CWMA Annual Meeting, a representative of Minnesota mentioned that a NIST Packaging and Labeling class is being offered in September in Burnsville, Minnesota. Registration for this class may be found at **www.nist.gov/owm**. A comment was made that people would like to see NIST administrator trainings happen more frequently or at least every two years.

4100-3 I Instructor Improvement

NIST OWM has provided legal metrology training for weights and measures jurisdictions and industry for many years but does not have the resources to respond to the numerous training requests it receives. OWM has long recognized there are many individuals with extensive legal metrology experience who have the skills needed to provide this type of training, and, in some cases, those individuals are already training within their own jurisdictions or regions. Drawing from this pool of individuals, OWM hopes to develop trainers who can present schools on behalf of NIST, thus leveraging NIST resources; providing access to NIST training on a timetable that can meet jurisdictions' needs; and providing a way to more broadly share the valuable expertise these individuals possess.

Several years ago, OWM renewed its efforts to develop trainers by providing a grant to the NCWM that is intended to pay travel costs of individuals to travel within their regions to conduct training and to participate in NIST training for trainers. This partnership has enabled NIST to bring in candidates for NIST-sponsored training such as "train the trainer" classes and to participate in NIST technical training schools. Through an application process, in collaboration with weights and measures directors and nominated training candidates, NIST has identified a group of people who are now working with NIST to develop the knowledge, skills, and abilities to present specific technical schools on behalf of NIST. Candidates not only participate in "train the trainer" seminars, but also work with NIST staff to participate in technical training schools, assist in teaching seminars, and develop materials for use in NIST training schools.

NIST training seminars on field inspection topics are only held a limited number of times each year. This poses a challenge in sustaining regular interaction and involvement of NIST trainer candidates. OWM is considering how to ensure timely mentoring and continuity for individual instructors who will provide training on behalf of NIST. A number of candidates in the NIST Trainer Program have already served as co-instructors for NIST technical training schools and have done an excellent job. OWM sincerely appreciates the willingness of those trainers and their directors who have supported their participation to devote time to making these seminars successful.

A list of all people who have attended a "Train the Trainer" class has been posted on the NCWM website, whether or not they have worked with NIST as co-trainers or attended NIST technical training schools. OWM has not yet certified anyone (external to NIST) as a "NIST Trainer," but looks forward to doing so once the structure of the Trainer Program is finalized and candidates have satisfied all requirements. At this point, a list of "NIST Trainers" will be posted along with the courses they are authorized to teach on behalf of OWM, and this list will be periodically updated as new trainers and technical areas are authorized. NIST does not have the resources to develop and sustain the development of all the trainers it invites to participate in NIST trainer program activities and events; however, even if a candidate is not designated to present on behalf of NIST, they and their jurisdictions can benefit from the experience, and the candidate can still provide valuable training in their jurisdiction and region.

OWM is also looking at ways to enhance and streamline its training and help prepare students prior to a training class. Students are currently required to complete a self-study course on NIST Handbook 44 prior to attending NIST device-related training seminars. NCWM has graciously agreed to offer an exam for this self-study course through the NCWM Certification Program system and is awaiting feedback from NIST on a beta version of the online exam. As an additional measure, NIST contracted with Mr. Henry Oppermann (Weights and Measuring Consulting) who developed a Basic Measuring Course. NIST plans to offer this course as a self-study course and may require it as a prerequisite to participating in NIST seminars on measuring devices. OWM plans to develop a similar course for weighing devices.

OWM appreciates the strong support of the NCWM, the PDC, the volunteer trainers, and their administrators in continuing to develop the NIST Trainer Program. OWM will continue to provide the Committee with updates on its progress as well as continue to collaborate with and support the Committee in its work.

The Committee continues to hear comments from states expressing appreciation for the NCWM Professional Certification Program and the NIST Training Program. The Committee also heard favorable comments about the training materials and tools provided by NIST, including a video on testing retail motor-fuel dispensers

Regional Association Comments:
The WWMA supports the ongoing efforts of the NIST, OWM Train the Trainer Program.

The CWMA reported that members expressed the desire for NIST to complete certification of some of the Train-the-Trainer participants so they would be available to independently lead more trainings in more settings. Comments were also heard that jurisdictions would like multiple routes to meet NIST OWM advanced course prerequisites. Examples would be equivalent training from other trainers, training organizations, or competency tests.

4100-4 I Recommended Topics for Conference Training

The Board of Directors has charged the Committee with recommending appropriate topics for the technical sessions at future Annual Meetings. The Board of Directors asks the PDC to review and prioritize possible presentation topics and to submit those to the NCWM Chairman. The Chairman will coordinate with the NCWM staff to secure presenters.

The following is a list of technical presentations made at the NCWM since 2009. Presentations given since 2010 are available at **www.ncwm.net/meetings/annual/archive**.

- Planning and Coordinating a National Market Place Survey (Ms. Rachelle Miller, Wisconsin, 2017);
- The Life Cycle of Petroleum from Well to Retail (Mr. Prentiss Searles, API, 2017);
- The United States Mint at Denver, Colorado – Gold, Coins, and Embezzlement (Mr. Thomas Fesing, 2016)
- Understanding Transportation Network Systems (Ms. Andrea Ambrose Lobato, Lyft and Mr. Bob O' Leary, Uber, 2016)
- Regulatory Consideration for Legalized Marijuana (Ms. Julie Quinn, Minnesota, and Mr. Nick Brechun, Colorado, 2016)
- Motor Oil Quality Violations (Mr. Tom Glenn, Petroleum Quality Institute of America, 2014);
- Making Sense of Electronic Receipts (Mr. Justin Hotard, Vice President and General Manager, NCR Corporation, 2014);
- LNG and CNG Motor Fuel – A Technical Briefing from Industry (Mr. Doug Horne, President CVEF, Mr. Zack Wester, Blu and Mr. Jeff Clarke, NGVA, 2014);
- Taximeter Technology Advancements (Mr. Matt Daus, International Association of Transportation Regulators, 2013);
- Advanced Vehicles and Fuel Quality (Mr. John M Cabaniss, Jr., Association of Global Automakers, 2013);
- Economic Justification and Demonstrating Value of Weights and Measures (Mr. Tim Chesser, Arkansas Bureau of Standards, 2012);
- Conducting Effective Marketplace Surveys and Investigations (Ms. Judy Cardin, Wisconsin Weights and Measures, 2012);
- Public Relations and Customer Service as Regulators (Mr. Doug Deiman, Alaska Division of Measurement Standards/CVE, 2012);
- An Overview of Unit Pricing in the United States (Mr. David Sefcik, NIST OWM, 2011);
- Grocery Unit Pricing in Australia (Mr. Ian Jarratt, Queensland Consumers Association, 2011);
- Grocery Unit Pricing in Canada (Mr. Ian Jarratt, Queensland Consumers Association, 2011);
- The U.S. Hydrogen Measuring System: The Turning Point? (Ms. Kristin Macey, California Division of Measurement Standards, 2011);

- Corrosion in Ultra Low Sulfur Diesel Underground Storage Systems (Mr. Prentiss Searles and Ms. Lorri Gainawi, American Petroleum Institute, 2010);
- Risk-Based Inspection Schemes (Mr. Henry Oppermann, Weights and Measures Consulting, LLC, 2010);
- Diesel Exhaust Fluid (DEF) (Mr. Gordon Johnson, Gilbarco, Inc., and Mr. Randy Moses, Wayne, 2009);
- Fuel Volatility and Ethanol Blending (Mr. Jim McGetrick, BP Products, 2009);
- Investigative Techniques (Mr. Michael Cleary, Retired, 2009);

During open hearings at the 2016 Interim Meeting, the Committee heard a suggestion from Ms. Kristin Macey (California Division of Measurement Services) for a training session on transportation network systems. Mr. Doug Musick (Kansas) commented that this type of technology is showing up in applications other than just passenger transportation and suggested that training in GPS-based measuring systems in general would be beneficial. He noted his jurisdiction is encountering large numbers of GPS-based measuring systems being used in assessing charges for the sale, application of crop fertilizers, and other treatments. He noted that the monetary impact is significant.

The Committee also heard comments from Mr. Jim Pettinato (FMC), Chairman of the NTEP Software Sector, who noted that training on issues related to inspection of software-based systems may be beneficial to weights and measures jurisdictions. He noted that, with the current progress of proposals through the NCWM process, the Sector is wrapping up its initial work and suggested the Sector and its members might be able to assist in training on legal metrology issues relative to software-based weighing and measuring systems. Ms. Julie Quinn (Minnesota) commented that this assistance might be particularly helpful in assisting weights and measures jurisdictions in understanding and educating inspectors and service personnel on audit trails used in these devices. She noted the audit trail training is the most frequently requested training topic in her jurisdiction.

The Committee appreciates the input and ideas it has received regarding suggested training topics. Based on the comments received during its open hearings, comments from the fall 2015 regional association meetings, past suggestions, and discussions during its Interim Meeting work sessions, the Committee proposes that the BOD consider offering technical presentations on the following topics:

- Verifying Compliance of Software-Controlled Weighing and Measuring Systems
    - This might include the verification of software versions, security, and other metrologically significant issues.
- Understanding Transportation Network Systems
- GPS-Based Measuring Systems Used in Applications Other Than Passenger Transport
- Vehicle-Tank Metering Systems “Flush Systems”
- Credit/Debit Card Skimmers

The Committee also discussed the audience that is typically present at NCWM Annual and Interim Meetings, noting that inspectors and service personnel are not always able to participate in these meetings. The Committee believes it would be beneficial not only to offer training on key issues such as those listed above at the NCWM meetings, but to have the training made available at regional and state weights and measures association meetings where more inspectors and service personnel would be likely to attend. Some aspects of the training might need to be tailored more toward field inspection than weights and measures administration, but much of the content should be the same. The Committee would like to collaborate with regional weights and measures associations to suggest that similar training be provided at the regional level.

At the 2016 NCWM Annual Meeting, the Committee suggested that technical training on safety programs be included at Regional and National Meetings, including an update provided by Ms. Julie Quinn at the 2016 Annual Meeting. The Committee received no additional suggestions or comments regarding proposed training topics.

Regional Association Comments:
The WWMA PDC recommends continued support for ongoing training opportunities.

The CWMA recommended two topics for the CWMA Annual Meeting, which might also be of interest to the NCWM:

1. A panel on blender pumps relating to flex fuel and biodiesel blending. Topics to include dispenser labeling, blend ratios, proper sampling, flow rates, and other mechanical issues affecting accuracy.

2. Protecting employees from active shooters and interpersonal violence in remote locations.

Mr. Prentiss Searles from API also volunteered to provide a presentation at the 2017 Annual Meeting on "The Life Cycle of Petroleum from Well to Retail" if there is interest from the group. Mr. Paul Lewis from Rice Lake recommended that the local OSHA inspector be asked to talk at the NCWM Annual Meeting about what OSHA standards apply to weights and measures work.

The SWMA received comment from Mr. Russ Lewis, representing API, who offered to provide A to Z distribution awareness training on petroleum fuels to all regions. This offer was received well by the Committee and members.

NEWMA received a suggestion for "Software Systems" training. At a minimum, the regulator was interested in a basic training for audit trails since there is advancing and changing technologies.

4200 PROGRAM MANAGEMENT

4200-1 I Safety Awareness

One of the goals of the PDC is to educate jurisdictions on safety issues and to provide resources to help them implement effective safety and health management programs. The Committee intends to use the safety page on the NCWM website (**www.ncwm.net/resource/safety**) as a place for states to share information and resources to help them address each of the major steps in creating and maintaining an effective safety program.

One such resource is the recently published draft of OSHA's Safety and Health Management Program Guidelines (**www.osha.gov/shpmguidelines/SHPM_guidelines.pdf**). This 44-page document is written in plain language and is aimed at helping small organizations establish, maintain, and improve safety and health management programs. It provides guidance on the seven-core elements of safety and health program management:

- Management Leadership
- Worker Participation
- Hazard Identification and Assessment
- Hazard Prevention and Control
- Education and Training
- Program Evaluation and Improvement
  - Coordination and Communication on Multi-Employer Worksites

Ms. Julie Quinn (Minnesota), PDC Safety Liaison, reported on the results of the 2017 safety survey, which covers incidents occurring in 2016. The top three causes of lost or restricted time for the second year in a row were:

- **Lifting/twisting/bending 54.5 % – 6 incidents**
  - Soft tissue injuries (3), Back or neck injuries (3)
  - Lost days – 60 + days (2), 21 - 60 days (2), 0 - 5 days (2)
  - Restricted days – 60 + days (1), 16 - 20 days (1), 6 - 10 days (1), 0 - 5 days (3)

- **Slips/trips/falls 18.2 % – 2 incidents**
  - Soft tissue injuries (1), broken bones (1)
  - Lost days – 21 - 60 days (1), 6 - 10 days (1)
  - Restricted days – 16 - 20 days (1), 6 - 10 days (1)
- **Vehicle accidents 18.2 % – 2 incidents**
  - Soft tissue injuries (2)
  - Lost days – 0 - 5 days (2)
  - Restricted days – none

Ms. Quinn also reported the NCWM Safety Task Group had its inaugural meeting on Sunday, July 16. Their first meeting focused on the economic impact of safety. At this meeting, the Task Group decided to add one more question to the 2018 survey to track those "near-miss" incidents which had property damage costs or other expenses associated with them. The Task Group also began developing a spreadsheet that will help agencies track information to be included in the survey. This includes information such as the cost of incidents resulting in lost and restricted days; near-miss incidents, which do not result in lost or restricted time beyond the initial day of injury but result in property damage, medical expenses, or other costs; and other information.

The Committee expresses appreciation to the members of the Safety Task Group for their willingness to volunteer for this important work.

- Ms. Julie Quinn (Minnesota), Chair
- Mr. Jason Flint (New Jersey)
- Ms. Georgia Harris (NIST OWM)
- Ms. Elizabeth Koncki (Maryland)
- Mr. Matt Maiten (Santa Barbara County, California)
- Ms. Brenda Harkey (South Dakota)
- Mr. Mike Sikula (New York)
- Ms. Tisha Arriaga (Marathon Petroleum)
- Mr. Bill Callaway (Crompco)
- Mr. Remy Cano (Northwest Tank and Environmental Services, Inc.)
- Mr. Joe Grell (Rice Lake Weighing Systems, Inc.)
- Mr. Brad Fryburger (Rinstrum, Inc.)
- Mr. Robert LaGasse (Mulch and Soil Council)
- Mr. John Lawn (Rinstrum, Inc.)

Other potential items for future inclusion on the safety page include links to resources on:

- OSHA consultation services
- Job hazard analysis
- Field level hazard analysis
- Hierarchies of hazard control
- Safety training resources

Each safety program is unique to its organization. Each agency is responsible for designing, implementing, and maintaining its own safety program. Resources provided on the web page are intended only to assist agencies as they develop and improve their own safety programs. Safety is not only first; it is first, last, and always. The work of maintaining and improving a safety program never ends.

Currently the NCWM safety page houses the list of regional safety liaisons and an archive of past safety articles.

Regional Safety Liaisons:

Central Weights and Measures Association (CWMA):
Ms. Julie Quinn, Minnesota Weights and Measures Division

Northeastern Weights and Measures Association (NEWMA):
Mr. Michael Sikula, New York Bureau of Weights and Measures

Southern Weights and Measures Association (SWMA):
Ms. Elizabeth Koncki, Maryland Department of Agriculture

Western Weights and Measures Association (WWMA):
Mr. Brett Gurney, Utah Department of Agriculture and Food

Regional Association Comments:
The WWMA PDC continues to support the importance of safety and the work being done by NCWM. The CWMA received comment that people would like to hear from an OSHA consultant at the NCWM meeting. The Committee encouraged all states to participate in the next safety survey. Private companies are also urged to participate. Government agencies will be invited to participate via the Director's list service or private companies should contact Mr. Don Onwiler at the NCWM so they can be included in the e-mail invitation.

NEWMA expressed appreciation to Ms. Julie Quinn (Minnesota) for the fine job she did compiling the safety information she received, and the report she presented at the 2016 NCWM Annual Meeting. Individuals from NEWMA that were in attendance, agreed that Julie's presentation was very well done and contained valuable information. It was stated that it was disappointing that the PDC agenda review took place so late in the day and there were so few individuals in attendance. Because of this situation, NEWMA heard several comments in favor of changing the order of the Standing Committee's agenda reviews so Committees have equal exposure. Mr. Jimmy Cassidy, NCWM Chair-Elect, was in attendance and supported the concept of changing the order of the Committee's agenda reviews.

Mr. Stacy Carlsen, Marin County, California | Committee Chair
Ms. Lori Jacobson, South Dakota | Member
Mr. Gene Robertson, Mississippi | Member
Ms. Cheryl Ayer, New Hampshire | Member
Mr. Marco Mares, San Diego County, California | Member
Mr. Richard Shipman, Rice Lake Weighing Systems | Associate Membership Representative
Ms. Julie Quinn, Minnesota | Safety Liaison
Ms. Tina Butcher | NIST Liaison
Mr. Ross Andersen | Certification Coordinator

Professional Development Committee

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Appendix A
Draft Guidelines for Proctoring Professional Certification Exams

Revised December 9, 2016

Rules for the Candidate

- Exams are Open Book but limited to the following:
  - o NIST Handbooks 44 ("Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices"), 133 ("Checking the Net Contents of Packaged Goods"), and/or 130 ("Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality"), as appropriate to the exam. Handbooks must be clean copies without margin notes or highlights.
  - o NIST Examination Procedure Outlines (EPOs) must also be clean copies.
- All questions on the exam are copyrighted by the NCWM. NO copying or sharing of the questions or answers is permitted in any form without expressed written approval of NCWM.
- Calculators may be used for the exam if they have been approved or supplied by the proctor. Approved models may have scientific and statistical functions and be capable of storing numeric values. Programmable calculators are not permitted, that is, those capable of storing multiple operation functions and calculation sequences.
- While taking the NCWM exam, candidates are not permitted to:
  - o Receive assistance from any other person in answering questions;
  - o Access e-mail, software applications, apps, or websites other than the NCWM testing service;
  - o Use or operate cameras, cell phones, or memory devices, such as flash drives; or
  - o Rewrite or copy questions or answers, in whole or in part. Candidates may use note paper, provided by the proctor, to perform calculations. All paper will be collected by the proctor at the end of the exam and will be destroyed.
- Candidates shall not write in the reference materials provided by the proctor and shall return any computers, calculators, or reference materials provided by the proctor in good condition.

Qualifications for Proctors

- Independent party, for example, a Human Resources representative, or an individual with limited conflict of interest and is removed from direct weights and measures training responsibilities, (e.g., Administration);
- Chosen by the State or local jurisdiction; and
- Approved by NCWM.

Rules for the Proctor

- Sign an agreement with NCWM acknowledging responsibilities and duties as a proctor.
- Provide a suitable environment for the candidate to take the exam and where the candidate's activities can be closely monitored. Space should be free from outside noise, interruptions, etc.
- Provide a computer with internet capability for the exam. Under certain conditions, an approved and suitable computer may be provided by the candidate for exam use.
- Verify that the copies of reference materials used by the candidate are clean and free of margin notes or highlights. Exams are Open Book but limited to the following:

- NIST Handbooks 44, 133, and/or 130, as appropriate to the exam
- NIST Examination Procedure as applicable to the test, and the EPO(s) for devices included in the exam Announcement covered by the exam.

- Provide three sheets of blank copy paper for calculations. Additional sheets may be requested if required.
- Approve candidate's calculator or supply an eight-digit scientific calculator with statistical functions for mean and standard deviation. Approved models may have scientific and statistical functions and may store values in memory. Programmable calculators are not permitted, that is, those capable of storing multiple operation functions and calculation sequences. If the calculator is provided by the proctor, ensure the candidate has time to become familiarized with the operations before the exam begins.
- Access the NCWM testing service through the NCWM website and enter the log-in credentials for the candidate.
- During the exam, the proctor shall ensure the candidate:
  - Does not receive assistance from any other person in answering the exam questions;
  - Does not access e-mail, software applications, apps, or websites other than the NCWM testing service;
  - Does not use or operate cameras, cell phones, or memory devices such as flash drives while taking the NCWM exam;
  - Does not rewrite or copy questions or answers, in whole or in part; or
  - Uses only note paper provided by the proctor to perform calculations.
- Answer questions from the candidate only with regard to the operation of the computer or the calculator provided by the proctor.
- After the candidate completes the exam, collect and account for all paper provided to the candidate and destroy any paper written on by the candidate.
- Ensure all computers, calculators, and reference materials provided by the proctor are returned in good condition.

Report of the National Type Evaluation Program (NTEP) Committee

Mr. Jerry Buendel, Chairman
Washington

5000 INTRODUCTION

This is the report of the NTEP Committee (hereinafter referred to as the "Committee") for the 102nd Annual Meeting of the National Conference on Weights and Measures (NCWM). This report is based on the Interim Report offered in the NCWM Publication 16, testimony heard at public hearings, comments received from the regional weights and measures associations and other parties, the addendum sheets issued at the Annual Meeting, and actions taken by the membership at the voting session of the Annual Meeting. The informational items presented below were adopted as presented when the Committee's report was approved.

Table A identifies the agenda items and appendix items. The agenda items in the Report are identified by Reference Key Number, title, page number and the appendices by appendix designations. The acronyms for organizations and technical terms used throughout the agenda are identified in Table B. The first four digits of the Reference Key Numbers of the items are assigned from The Subject Series List. The status of each item contained in the report is designated as one of the following: **(D) Developing Item:** the Committee determined the item has merit; however, the item was returned to the submitter or other designated party for further development before any action can be taken at the national level; **Informational (I) Item:** the item is under consideration by the Committee but not proposed for Voting; **(V) Voting Item:** the Committee is making recommendations requiring a vote by the active members of NCWM; **(W) Withdrawn Item:** the item has been removed from consideration by the Committee.

Table C provides a summary of the results of the voting on the Committee's items and the report in its entirety. Some Voting Items are considered individually; others may be grouped in a consent calendar. Consent calendar items are Voting Items that the Committee has assembled as a single Voting Item during their deliberation after the Open Hearings on the assumption that the items are without opposition and will not require discussion. The Voting Items that have been grouped into consent calendar items will be listed on the addendum sheets. Prior to adoption of the consent calendar, the Committee entertains any requests from the floor to remove specific items from the consent calendar to be discussed and voted upon individually.

Proposed revisions to the handbook(s) are shown as follows: 1) deleted language is indicated with a **bold face font using ~~strikeouts~~** (e.g., **~~this report~~**), 2) proposed new language is indicated with an **underscored bold-faced font** (e.g., **new items**), and 3) nonretroactive items are identified in *italics*. When used in this report, the term "weight" means "mass."

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

Table A
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Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
CC	Certificate of Conformance	NISA	National Industrial Scale Association
CIML	International Committee of Legal Metrology	NIST	National Institute of Standards and Technology
DoMC	Declaration of Mutual Confidence	NTEP	National Type Evaluation Program
IV	Initial Verification	OIML	International Organization of Legal Metrology
MAA	Mutual Acceptance Arrangement	OWM	Office of Weights and Measures
MC	Measurement Canada	R	Recommendation
MDMD	Multiple Dimension Measuring Devices	USNWG	U.S. National Work Group
MRA	Mutual Recognition Arrangement	VCAP	Verification Conformity Assessment Program
NCWM	National Conference on Weights and Measures	WG	Work Group

Table C
Summary of Voting Results

Reference Key Number	***House of Senate Representatives***		***House of Delegates***		***Results***
	Yeas	***Nays***	***Yeas***	***Nays***	
To Accept the Report	Voice Vote				Adopted

Details of All Items
(In order by Reference Key)

5100 INTERNATIONAL

5100-1 I MUTUAL RECOGNITION ARRANGEMENT (MRA)

Background/Discussion:
The MRA between Measurement Canada (MC) and NTEP labs originated April 1, 1994. Since that time, the original MRA has expanded, and a second MRA covering measuring devices was developed. On Tuesday, July 26, 2016, NCWM Chairman, Jerry Buendel, and Measurement Canada President, Alan Johnston, signed a renewal MRA that provides for continued cooperation between the two organizations and the continuation of the 22-year beneficial partnership. The new MRA will be effective for five years.

The scope of the current MRA includes:

- gasoline and diesel dispensers;
- high-speed dispensers;
- gasoline and diesel meters intended to be used in fuel dispensers and truck refuelers;
- electronic computing and non-computing bench, counter, floor, and platform scales with a capacity up to 1000 kg (2000 lb);
- weighing/load receiving elements with a capacity of up to 1000 kg (2000 lb);
- electronic weight indicating elements (except those that are software based, that is, programmed by downloading parameters); and
- mechanical scales up to 10 000 kg (20 000 lb).

MC, NTEP, and all our mutual stakeholders agree that the MRA is a benefit for the North American weights and measures industry. The NTEP Committee appreciates the efforts and cooperation of Measurement Canada and is working with MC to continue and expand the arrangement.

5100-2 I MUTUAL ACCEPTANCE ARRANGEMENT (MAA)

Background/Discussion:
Information regarding the International Organization of Legal Metrology (OIML) MAA can be found at **www.oiml.org/maa.** NCWM has signed the OIML MAA Declaration of Mutual Confidence (DoMC) for Recommendation (R) 60 Load Cells as a Utilizing Participant. A Utilizing Participant is a participant that does not

issue any OIML Certificate of Conformance (CC) nor OIML Test Reports and/or Test Reports under a DoMC but does utilize the reports issued by issuing participants.

The U.S. (NTEP) supported the OIML B 10 documents for the MAA with the provision that the use of manufacturer test data was clearly identified on the MAA test report because NTEP cannot use manufacturer test data towards issuance of an NTEP certificate. Consequently, the CIML voted and approved the Amendment to B 10 to allow the inclusion of test data from manufacturers, on a strictly voluntary basis, at its October 2012 meeting in Bucharest, Romania. Dr. Chuck Ehrlich, National Institute of Standards and Technology (NIST), Office of Weights and Measures (OWM), gave an update to the Committee reviewing the history of the above discussions, deliberations, and CIML votes, confirming that the outcomes aligned with the NTEP Committee's recommendations, and the instructions provided by the NCWM Board of Directors.

Dr. Ehrlich requested, on multiple occasions, that NCWM review its MAA policy regarding participation in R 76. The NCWM Board recapped the decision process to participate as a Utilizing Participant for R 60. Existing policy from 2006 is not to participate in R 76 until NCWM can do so as an Issuing Participant. The Board has revisited the 2006 discussions leading to that decision, including considerations for NTEP labs' work load, potential lost expertise, concerns with quality of evaluations at some foreign labs, etc. Dr. Ehrlich wanted NCWM to reconsider, and, if there was no possibility in sight that the NCWM could become an Issuing Participant, then it should consider becoming a Utilizing Participant for OIML R 76. Some U.S. manufacturers support the NCWM policy, but others would like to have one-stop shopping. The MAA also includes R 49 (water meters), and R 117 (RMFD) may be added. Since there are no new developments to affect the decision, the NCWM Board of Directors agreed to maintain the existing policy at this time.

From January 2011 to March 2017, 64 NTEP certificates for load cells were issued under the MAA. The NTEP Administrator reviewed all MAA test data and drafted the NTEP certificates. Because of the more recent difficulties encountered by the International Bureau of Legal Metrology (BIML) in adequately obtaining and summarizing peer review and/or accreditation data from the MAA test laboratories, it was proposed that a more robust OIML Certification System (OIML-CS) be developed that has a Management Committee to develop policy (subject to approval by the International Committee on Legal Metrology, or CIML) and oversee operations. A preliminary Framework Document for developing the OIML-CS was prepared and presented to the CIML and approved at the 2016 CIML Meeting (in Strasbourg, France). On this basis, an OIML-CS Preliminary Management Committee (PrMC) has been formed, which will continue the work of developing additional OIML-CS documents. Dr. Ehrlich will represent the United States on the PrMC, with anticipated assistance from NCWM/NTEP (Mr. Jim Truex and Mr. Darrell Flocken). The first PrMC meeting is tentatively scheduled for February 2017. It is anticipated that the OIML-CS will go into effect in January 2018, but until then the MAA will remain operational.

A meeting of the MAA Committee on Participation Review (CPR) for R 60 and R 76 was held on March 22 and 23, 2016, in Denmark. Dr. Chuck Ehrlich, NIST, OWM, Mr. John Barton, NIST, OWM; and Mr. Darrell Flocken, NCWM attended the meeting. Another CPR meeting might be held in 2017, but this might be cancelled and instead the work subsumed into the OIML-CS work.

Dr. Ehrlich represented the U.S. interests in this work and will update the Board at the NCWM Annual Meeting in July 2017 in Pittsburgh, Pennsylvania.

5200 ACTIVITY REPORTS

5200-1 I NTEP PARTICIPATING LABORATORIES AND EVALUATIONS REPORTS

Background/Discussion:
The NTEP weighing and measuring laboratories held a joint meeting March 28 - 30, 2017, in Annapolis, Maryland.

The NTEP weighing laboratories also met in August 2016 prior to the NTEP Weighing Sector meeting and the measuring laboratories met in September prior to the NTEP Measuring Sector meeting in Denver, Colorado, to discuss current issues.

NTEP continues to routinely survey customers pertaining to NTEP administration and laboratories' customer service. The survey is released to active CC holders. The board routinely reviews the results of the survey to form a continuous improvement plan for NTEP. With any survey, the challenge is to develop a document concise enough that customers will respond, while also providing a meaningful set of data. To date, the NCWM Board of Directors is finding general approval of NTEP services.

During the 2017 Interim Meeting, the Committee reviewed NTEP statistics through December 2016. The review of statistics shows incoming applications are relatively comparable to normal, and there exist no significant laboratory backlog issues.

5200-2 I NTEP SECTOR REPORTS

Background/Discussion:
All NTEP Sector reports were available to members at the time NCWM Publication 15 was published. The NTEP Committee is committed to ensuring that electronic versions of sector reports are available with NCWM Publication 15. Please note that the sector reports will only be available in the electronic version of NCWM Publication 15 at **ncwm.net/meetings/interim/archive**; they will not be available in the printed versions of NCWM Publication 15.

NTEP Belt-Conveyor Scale (BCS) Sector:
The NTEP Belt-Conveyor Scale Sector met February 23, 2016, in Pittsburgh, Pennsylvania. A final draft of the meeting summary was provided to the Committee prior to the 2017 NCWM Interim Meeting for review and approval (See Appendix B.)

The National Weighing and Sampling Association (NW&SA) has dissolved and rejoined with National Industrial Scale Association (NISA). The BCS USNWG and BCS Sector had been meeting simultaneously with the NW&SA for several years. The next meeting of NISA is scheduled for October 22 - 24, 2017, in Memphis, Tennessee. Resent contact with sector Chair, Peter Sirrico (Thayer Scale), and Technical Advisor, Mr. John Barton (NIST, OWM), leads us to believe that an NTEP BCS Sector meeting may not be necessary this year due to a lack of NCWM Publication 14 agenda items. Sector members will be notified if the situation changes. For questions on the status of Sector work or to propose items for a future meeting, please contact the sector Technical Advisor:

Technical Advisor
Mr. John Barton
NIST, OWM
100 Bureau Drive, MS 2600
Gaithersburg, MD 20899
Phone: (301) 975-4002
Fax: (301) 975-8091
E-mail: john.barton@nist.gov

NTEP Grain Moisture Meter and NIR Protein Analyzer Sectors:
The NTEP Grain Analyzer Sector met September 13 - 14, 2016, in Kansas City, Missouri. The second day was a joint meeting with the NTEP Software Sector (SS). A draft of the final summary was provided to the Committee prior to the 2017 NCWM Interim Meeting for review and approval. (See Appendix C.)

The next meeting of the NTEP Grain Moisture Meter and NIR Protein Analyzer Sectors is scheduled for August 16 - 17, 2017, in Kansas City, Missouri. For questions on the status of sector work or to propose items for a future meeting, please contact the Technical Advisor:

NTEP Measuring Sector (MS):
The NTEP MS met September 20 - 21, 2016, in Denver, Colorado. A draft of the final summary was provided to the Committee prior to the 2017 NCWM Interim Meeting for review and approval. (See Appendix D.)

Technical Advisor
Ms. G. Diane Lee
NIST, OWM
100 Bureau Drive, MS 2600
Gaithersburg, MD 20707
Phone: (301) 975-4005
Fax: (301) 975-8091
E-mail: **d iane.lee@nist.gov**

The next meeting of the NTEP MS is scheduled for October 3 - 4, 2017, in Houston, Texas. For questions on the status of sector work or to propose items for a future meeting, please contact the sector Technical Advisor:

Technical Advisor
Ms. Tina Butcher
NIST, OWM
100 Bureau Drive, MS 2600
Gaithersburg, MD 20899
Phone: (301) 975-2196
Fax: (301) 975-8091
E-mail: **tina.butcher@nist.gov**

NTEP Software Sector (SS):
The NTEP SS met September 14, 2016, in Denver, Colorado. It was a joint meeting with the NTEP Grain Analyzer Sector. A final draft of the meeting summary was provided to the Committee prior to the 2017 NCWM Interim Meeting for review and approval. (See Appendix E.)

The next meeting of the NTEP SS is scheduled for May 3, 2017, in Columbus, Ohio. The meeting will be a joint meeting of the NTEP Multiple Dimension Measuring Device (MDMD) WG and SS. For questions on the status of sector work or to propose items for a future meeting, please contact the sector Chair and/or the NTEP Specialist:

Chair
Mr. James Pettinato
FMC Technologies Measurement Solutions, Inc.
1602 Wagner Avenue
Erie, PA 16510
Phone: (814) 898-5250
Fax: (814) 899-3414
E-mail: **jim.pettinato@fmcti.com**

NTEP Specialist
Mr. Darrell Flocken
NCWM
1135 M Street, Suite 110
Lincoln, NE 68508
Phone: (614) 620-6134
E-mail: **darrell.flocken@ncwm.net**

NTEP Weighing Sector (WS):
The NTEP WS met August 23 - 24, 2016, in Denver, Colorado. A final draft of the meeting summary was provided to the Committee prior to the 2017 NCWM Interim Meeting for review and approval. (See Appendix F.)

The next NTEP WS meeting is scheduled for August 22 - 23, 2017, in Houston, Texas. For questions on the status of sector work or to propose items for a future meeting, please contact the sector Technical Advisor:

Technical Advisor
Mr. Rick Harshman
NIST, OWM
100 Bureau Drive, MS 2600
Gaithersburg, MD 20899
Phone: (301) 975-8107
Fax: (301) 975-8091
E-mail: **richard.harshman@nist.gov**

NTEP Multiple Dimension Measuring Devices (MDMD) Work Group:
The NTEP MDMD Work Group met April 26 - 27, 2016, in Reynoldsburg, Ohio. A final draft of the meeting summaries was provided to the Committee prior to the 2017 NCWM Interim Meeting for review and approval. (See Appendix G.)

The next NTEP MDMD WG meeting is scheduled for March 2 - 3, 2017, in Columbus, Ohio. For questions on the status of WG or to propose items for a future meeting, please contact WG Chair, Robert Kennington, or NTEP Specialist Darrell Flocken.

Chair
Mr. Robert Kennington
Quantronix, Inc.
P.O. Box 929
Farmington, UT 84025
Phone: (801) 939-9520
E-mail: **rkennington@cubiscan.com**

NTEP Specialist
Mr. Darrell Flocken
NCWM
1135 M Street, Suite 110
Lincoln, NE 68508
Phone: (604) 620-6134
E-mail: **darrell.flocken@ncwm.net**

The NTEP Committee reviewed and approved all 2016 NTEP Sector and WGreports during the 2017 Interim Meeting.

5300 CONFORMITY ASSESSMENT PROGRAM

5300-1 I CONFORMITY ASSESSMENT PROGRAM (CAP)

Background/Discussion:
The CAP was established to ensure devices produced after the device has been type evaluated and certified by NTEP continue to meet the same requirements. This program has three major elements: 1) Certificate Review (administrative); 2) Initial Verification (inspection and performance testing); and 3) Verified Conformity Assessment (influence factors). This item is included on the Committee’s agenda to provide an update on these elements.

Certificate Review:
Certificates are constantly under review by NTEP staff and laboratories. Many active certificates are amended annually because of manufacturer submission for evaluation or issues reported by the states pertaining to information on the certificate. When the devices are re-evaluated and certificates are amended, all information is reviewed and necessary steps are taken to assure compliance and accurate, thorough information is reported on the certificate.

In an effort to keep certificate information up to date, the Committee continues to offer an opportunity for active certificate holders to update contact information contained in the “Submitted By” box on certificates. This is offered during the payment period of their annual maintenance fee. Many CC holders have taken advantage of the opportunity for hundreds of NTEP certificates.

Initial Verification (IV):
The IV initiative is ongoing. Field enforcement officials perform an initial inspection and test on new installations on a routine basis. The Committee recognized that the states do not want IV reporting to be cumbersome.

An IV report form was developed several years ago. The Committee desired a simple form, perhaps web-based for use by state and local regulators. The form was approved by the Committee and distributed to the states. A completed form can be submitted via mail, e-mail, fax, or online. The form is available to regulatory officials who are members of NCWM at **www.ncwm.net/ntep/conformity/verification**.

During the 2014 Annual Meeting, NTEP acknowledged that the regulators have not bought into the IV report form. Industry representatives said that IV is very important to ensure conformity assessment and the NCWM should push harder for reporting of non-compliance issues found during IV.

VCAP:
NCWM has been concerned about production meeting type and protecting the integrity of the NTEP CC since the inception of NTEP. The board has consistently reconfirmed its belief that conformity assessment is vital to NTEP's continued success.

Load cells traceable to NTEP certificates were selected for the initial assessment effort. NCWM elected to require a systems audit checklist that is to be completed by an outside auditor and submitted to NCWM per Section 221.3.3.3.5 of the VCAP requirements. A VCAP Systems Audit Checklist for Manufacturers and a VCAP Systems Audit Checklist for Private Label Certificate Holders have been developed and are available on the website at **www.ncwm.net/ntep/conformity/vcap/checklists-faqs**. Additionally, the Committee developed a new NCWM Publication 14, administrative policy to distinguish between the requirements for parent NTEP certificate holders (21.3.3.2) and private label certificate holders. The requirements in 21.3.3.7 track the private label checklist requirements: traceability to parent NTEP CC, traceability of the private label cell to a VCAP audit, purchase and sales records, plan to report non-conforming product and non-conforming product in stock, plan to conduct internal audits to verify non-compliance action, and internal audit records.

The Committee was given updated VCAP statistics during the 2016 Annual Meeting. As a result of VCAP activities, 27 load cell certificates, involving 15 different certificate holders, were changed to "inactive" status. As a result of VCAP activities for weighing/load receiving elements 2000 lb capacity and less using load cells not traceable to their own NTEP certificate, 15 certificates, involving 11 different certificate holders, were changed to "inactive" status.

The Committee had discussions about the required number of audits for facilities manufacturing multiple device types. For example, if a company had successful audits for two device types, they might submit a request for a delay from audit requirements for remaining device types, stating they are all subjected to the same processes and will be audited in the next cycle. The Committee agreed to the request in principal and directed the NTEP Administrator to develop NCWM policy language. As a result, the following policy was adopted by the NCWM Board in October 2013.

Adding Device Categories to VCAP:

Policy:

1. When a new device category is added to the VCAP requirement, NTEP will recognize the current VCAP audit certification in effect, submitted by a certificate holder, for the same certificate holder and same production facility(s), to cover the new device category, continue the manufacturing process for devices covered by NTEP certificates in the newly added device category, until the due date of the next VCAP audit.

   Example: If a company had successful audits for two device types, they might submit a request for exemption from audit requirements for remaining device types, stating they are all subjected to the same quality management system and will be included in the next audit cycle. The next VCAP audit must be done within three years of the last audit and address all applicable device types produced within that facility.

Seven weighing device categories subject to influence factors, as defined in NIST Handbook 44, were identified and subject to VCAP audits. The VCAP process requirement is ongoing for load cells, weighing elements that use non-NTEP load cells and indicating elements. Certificate holders for these device types are required to have an on-site audit of the manufacturer's quality system and on-site random and/or review of a production device by an outside auditor to verify compliance with VCAP. The NTEP Committee and NCWM Board agreed not to include weighing/load receiving elements using NTEP load cells in the list of device categories subject to VCAP. However, the Board notified certificate holders that they have no intention of amending the table of devices subject to influence factor testing found in the Weighing Devices Section of NCWM Publication 14.

Certificate holders are encouraged to research the VCAP requirements on the NCWM website under the NTEP, Conformity Assessment section. Certificate holders are encouraged to review the VCAP requirements applicable to their devices and report concerns to the NTEP Committee.

The Committee decided during the 2014 Annual Meeting to include indicating elements and approved developed timeline below.

<table>
<tr><th colspan="6">NCWM/NTEP VCAP Compliance Timeline
Indicating Elements</th></tr>
<tr><th>Jan 2015–
March 2015</th><th>Jan 2015-
May 2016</th><th>Jan 2015-
Nov 2016</th><th>Jan 2015-
Dec 2016</th><th>Jun 2016</th><th>Dec 2016</th></tr>
<tr><td rowspan="3">NTEP notifies active CC holders of VCAP requirements</td><td>Parent CC holders to put VCAP QM system in place</td><td>Private Label CC holders to put VCAP QM system in place</td><td>NTEP evaluates incoming audit reports</td><td rowspan="3">NCWM declares CCs inactive if Parent CC holder fails to comply with VCAP</td><td rowspan="3">NCWM declares CCs inactive if Private Label CC holder fails to comply with VCAP</td></tr>
<tr><td>CC holder to have audit conducted by Certified Body</td><td>CC holder to have audit conducted by Certified Body</td><td rowspan="2">NTEP contacts CC holders not meeting VCAP requirements to encourage compliance</td></tr>
<tr><td>Submit audit report to NCWM/NTEP</td><td>Submit audit report to NCWM/NTEP</td></tr>
</table>

The following disclaimer has been advertised and communicated by NCWM: "NCWM is working to identify all active certificates subject to VCAP compliance. As a courtesy, affected certificate holders are being notified of VCAP requirements and the established timeline. Please note that the NCWM Board of Directors does not consider it to be NCWM's responsibility to notify all certificate holders about affected certificates. Certificate holders are responsible for reviewing their active NTEP certificates and compliance with VCAP."

The Committee has received letters, questions, and many other inquiries pertaining to VCAP. The Committee has worked diligently to answer the questions submitted in a very timely manner. The Committee knows that additional questions will be posed as VCAP progresses. Certificate holders and other interested parties are encouraged to submit written questions to the NTEP Committee. The Committee is pleased to report that it has been successful in answering all the questions to date. Clerical changes and additions have been made to affected VCAP documents as deemed necessary.

The Committee was given the following update VCAP compliance statistics (through June 2017).

- **Load Cells:** Since June 2016 no CCs were made inactive due to VCAP noncompliance.
  - Forty-five new or amended CCs were issued since June 2016. Of the 45, only one was the first CC for the manufacturer and the manufacturer had a VCAP audit performed three months after the CC issue date.
- **W/LRE ≥ 2000 lb w/non NTEP load cells:** Since June 2016 one CC was made inactive due to VCAP noncompliance, however, that manufacturer completed their required VCAP audit in January 2017 and the CC was reactivated.
  - Ten new CCs, within this VCAP device category, were issued in this time frame. Other than the one mentioned above, all were issued to VCAP compliant manufacturers.
  - One manufacturer, which previously had their CC for this device type made inactive, announced it was in the process of satisfying their VCAP requirements and would reapply for these models once VCAP compliance is completed. (The decision to do this was based on the addition of Complete Scales being added to the list of VCAP devices.)

- **Indicating Elements:** Compliance deadline was June 2016 for manufacturers and December 2016 for private label CC holders.
  - Statistics:
    - Ninety-seven CC holders (manufacturers and private labelers) complied by the deadline.
    - Three manufacturers and two private label CC holders chose to let their combined seven CCs go inactive.
    - Two manufacturers and one private label CC holder are currently working to obtain VCAP compliance. The NTEP Specialist is working with all three as the auditor.
- **Complete Scales:** This device category has a compliance deadline of June 2018 for manufacturers and December 2018 for private label CC holders.
  - Fifty-six new CC holding companies added to VCAP by including complete scales to the VCAP device list.
    - Fifty-five are manufacturers
    - One is a private labeler.
  - Eleven companies have completed their VCAP audit as of July 1, 2017.
  - With the addition of Complete Scales to the VCAP device list, two manufacturers, which had previously let CCs for load cells go inactive, informed NTEP that they are going to comply with VCAP requirements and will reapply to NTEP for new certificates for load cell.

Misc. VCAP Information:

1. To date the NTEP Specialist audited 14 companies totaling 17 locations.
2. Current audit backlog for the NTEP Specialist is three companies.

The NTEP Specialist will begin performing re-assessment audits (the three-year cycle schedule) in mid-2018.

5300-2 I TIMELINES FOR REMAINING DEVICE CATEGORIES SUBJECT TO VCAP

Source: NTEP Committee

Item under Consideration:
NCWM decided to include the four remaining device categories subject to VCAP as soon as practical. In 2016, the Committee worked to develop a timeline to include the remaining categories. NTEP has developed the following proposed timelines to phase in the remaining device categories. The timelines identify the inclusion of the remaining device types into the NTEP, Verified Conformity Assessment Program. Each timeline includes both manufacturers and private label holders of Certificates of Conformance for the device type. The NTEP Committee plans to move forward with the following timelines.

Background/Discussion:
During the 2016 Interim Meeting, the Committee heard comments proposing that the remaining device categories be phased in over a several-year period. The Committee appreciates the input from the stakeholders.

When VCAP requirements are applied, the certificate holder is required to have an on-site audit of the manufacturer's quality system and on-site random and/or review of a production device by an outside auditor to verify compliance with VCAP. Certificate holders are encouraged to research the VCAP requirements on the NCWM website under the NTEP, Conformity Assessment section, review the VCAP requirements applicable to their devices and report concerns to the NTEP Committee.

Complete Scales:

This device type includes, but is not limited to, Computing, Non-computing, Point of Sale, Crane, Monorail, and Grain Test Scales with weighing capacities up to and including 2000 lb. It is important to note that the use of an NTEP certified load cell does not qualify the scale for an exemption to the VCAP requirements.

NCWM/NTEP VCAP Compliance Timeline
Complete Scales

Jan 2017–March 2017	Jan 2017-May 2018	Jan 2017-Nov 2018	Jan 2017-Dec 2018	Jun 2018	Dec 2018
NTEP notifies active CC holders of VCAP requirements	Parent CC holders to put VCAP QM system in place	Private Label CC holders to put VCAP QM system in place	NTEP evaluates incoming audit reports	NCWM declares CCs inactive if Parent CC holder fails to comply with VCAP	NCWM declares CCs inactive if Private Label CC holder fails to comply with VCAP
	CC holder to have audit completed by authorized auditing company	CC holder to have audit completed by authorized auditing company	NTEP contacts CC holders not meeting VCAP requirements to encourage compliance		
	Submit audit report to NCWM/NTEP	Submit audit report to NCWM/NTEP			

Automatic Weighing Systems:

NCWM/NTEP VCAP Compliance Timeline
Automatic Weighing Systems

July 2017–Sept 2017	July 2017-Nov 2018	July 2017-May 2019	July 2017-Jun 2019	Dec 2018	Jun 2019
NTEP notifies active CC holders of VCAP requirements	Parent CC holders to put VCAP QM system in place	Private Label CC holders to put VCAP QM system in place	NTEP evaluates incoming audit reports	NCWM declares CCs inactive if Parent CC holder fails to comply with VCAP	NCWM declares CCs inactive if Private Label CC holder fails to comply with VCAP
	CC holder to have audit completed by authorized auditing company	CC holder to have audit completed by authorized auditing company	NTEP contacts CC holders not meeting VCAP requirements to encourage compliance		
	Submit audit report to NCWM/NTEP	Submit audit report to NCWM/NTEP			

Automatic Bulk Weighing Systems:

<table>
<tr><th colspan="6">NCWM/NTEP VCAP Compliance Timeline
Automatic Bulk Weighing Systems</th></tr>
<tr><th>Jan 2018–
March 2018</th><th>Jan 2018-
May 2019</th><th>Jan 2018-
Nov 2019</th><th>Jan 2018-
Dec 2019</th><th>Jun 2019</th><th>Dec 2019</th></tr>
<tr><td rowspan="3">NTEP notifies active CC holders of VCAP requirements</td><td>Parent CC holders to put VCAP QM system in place</td><td>Private Label CC holders to put VCAP QM system in place</td><td>NTEP evaluates incoming audit reports</td><td rowspan="3">NCWM declares CCs inactive if Parent CC holder fails to comply with VCAP</td><td rowspan="3">NCWM declares CCs inactive if Private Label CC holder fails to comply with VCAP</td></tr>
<tr><td>CC holder to have audit completed by authorized auditing company</td><td>CC holder to have audit completed by authorized auditing company</td><td rowspan="2">NTEP contacts CC holders not meeting VCAP requirements to encourage compliance</td></tr>
<tr><td>Submit audit report to NCWM/NTEP</td><td>Submit audit report to NCWM/NTEP</td></tr>
</table>

Belt-Conveyor Scales:

<table>
<tr><th colspan="6">NCWM/NTEP VCAP Compliance Timeline
Bulk-Conveyor Scales</th></tr>
<tr><th>July 2018–
Sept 2018</th><th>July 2018-
Nov 2019</th><th>July 2018-
May 2020</th><th>July 2018-
Jun 2020</th><th>Dec 2019</th><th>Jun 2020</th></tr>
<tr><td rowspan="3">NTEP notifies active CC holders of VCAP requirements</td><td>Parent CC holders to put VCAP QM system in place</td><td>Private Label CC holders to put VCAP QM system in place</td><td>NTEP evaluates incoming audit reports</td><td rowspan="3">NCWM declares CCs inactive if Parent CC holder fails to comply with VCAP</td><td rowspan="3">NCWM declares CCs inactive if Private Label CC holder fails to comply with VCAP</td></tr>
<tr><td>CC holder to have audit completed by authorized auditing company</td><td>CC holder to have audit completed by authorized auditing company</td><td rowspan="2">NTEP contacts CC holders not meeting VCAP requirements to encourage compliance</td></tr>
<tr><td>Submit audit report to NCWM/NTEP</td><td>Submit audit report to NCWM/NTEP</td></tr>
</table>

Background/Discussion:

During the 2016 Annual Meeting, a scale company asked if the Committee had given any thought to expanding the VCAP audit to a five-year period. The NTEP Administrative Policy Section 21.1.3.2.16 allows for a five-year cycle under specific conditions. The NTEP Committee has agreed to explore the issue and develop guidelines and recommendations for the certification bodies.

Another scale company requested that NTEP develop a unified spreadsheet for VCAP. The Committee agreed and has directed NTEP to develop the checklist (spreadsheet) for manufacturers and VCAP auditors use.

Two scale companies requested that NTEP consider exempting Automatic Weighing Systems (AWS) and Automatic Bulk-Weighing Systems (ABWS) from the VCAP audit requirement if they utilize NTEP certified load cells. The

Committee discussed both device categories during their work session. The Committee found that all AWS NTEP certificates were for complete devices per NTEP Technical Policy. Some research also revealed that most ABWS certificate were for the ABWS controller. The hoppers normally used in an ABWS are covered by their own weighing/load-receiving NTEP and are several thousand-pound capacity, hence, already outside the VCAP requirement since they exceed the 2000 lb capacity or less threshold. The Committee was made aware of three NTEP certificates for ABWS that have a capacity of 2000 lb or less, but all three were for complete weighing devices. The Committee concluded that certificates for AWS and ABWS devices are for complete scales or indicating elements/controllers and require a VCAP audit.

Additional comments from affected stakeholders are welcomed and appreciated.

5500 OTHER ITEMS – DEVELOPING ITEMS

5500-1 I ELECTRONIC VEHICLE FUELING SYSTEMS (EVFS)

Source:
California Division of Measurement Standards & NTEP Measuring Laboratories Item under Consideration:
Work with U.S. National Work Group Representatives and other experts to develop an NTEP checklist for electronic vehicle supply equipment (EVSE). Consider establishing an NCWM Work Group or Task Force to complete the project in a timely manner.

Background/Discussion:
In July 2015, the NCWM adopted a tentative code for electronic vehicle fueling systems. The tentative code includes a provision that allows NTEP to accept EVSE for type evaluation to the NIST Handbook 44 code. The USNWG for EVSE developed the tentative code in NIST Handbook 44 and has been working to address evaluation criteria (NTEP checklist) and test standards to be used.

The NTEP Measuring Labs discussed the item during their meeting on September 20, 2016. The consensus of the laboratories was that the examination procedure outline developed by the State of California was not in a proper NCWM Publication 14 checklist format. Another prime issue, which is still being developed, is the test equipment necessary to test these devices. NTEP cannot evaluate without standards for test equipment. Will NIST traceability be required? The Measuring Laboratories concluded that the present NCWM Publication 14 checklist for RMFDs would be a good starting point to use in drafting a NCWM Publication 14 checklist for EVSE. The NTEP Administrator and NTEP Measuring Laboratories recommend the NCWM Board of Directors/NTEP Committee consider establishing an NTEP Work Group (WG) or Task Force to address the EVSE issues.

The NTEP Committee agreed with the recommendations of the NTEP Measuring Laboratories and worked to establish a NTEP EVSE WG. The NTEP EVSE WG was developed with Mr. Andrei Moldoveanu, Senior Program Manager for NEMA, appointed as Chair. The WG consists of seven public sector members and six private sector members representing the associate membership.

THE NTEP EVSE WG had their kick-off web based meeting March 14, 2017. The WG plans monthly web meetings with the initial goal of having a draft checklist ready for NCWM Board/NTEP Committee review this fall. For questions on the status of the WG please contact NTEP Administrator, Jim Truex, at **jim.truex@ncwm.net** .

Mr. Jerry Buendel, Washington State | NTEP Committee Chair
Ms. Kristen Macey, California | NCWM Chair
Mr. James Cassidy, City of Cambridge, Massachusetts | NCWM Chair-Elect
Mr. Kenneth Ramsburg, Maryland | Member
Mr. Craig VanBuren, Michigan | Member
Mr. Jim Truex, NCWM | NTEP Administrator

National Type Evaluation Program Committee

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Appendix A

NTEP Statistics Report

Item 5200-1

General NTEP Statistics	**Last Year**	**This Year to Date**
	10/01/15 - 9/30/16	10/01/16 - 3/31/17
Total Applications Processed	(20) 297	(18) 164
Applications Completed	266	174
Certificates Issued	240	157
Active NTEP Certificates	1961	1998

( ) = Reactivations

Assignments to Labs per Year	10/1/15 - 9/30/16	10/01/16 - 3/31/17
California	37	9
Canada	3	3
GIPSA-IL	1	0
GIPSA-KC	9	0
Maryland	(4) 50	(1) 21
New York	14	(7) 17
NIST Force Group	8	2
North Carolina	10	7
Ohio	(2) 52	45
Oregon	0	0
NTEP Field	(1) 5	1
NTEP Administrator	104	64
Applications Not Yet Assigned to a Lab		3

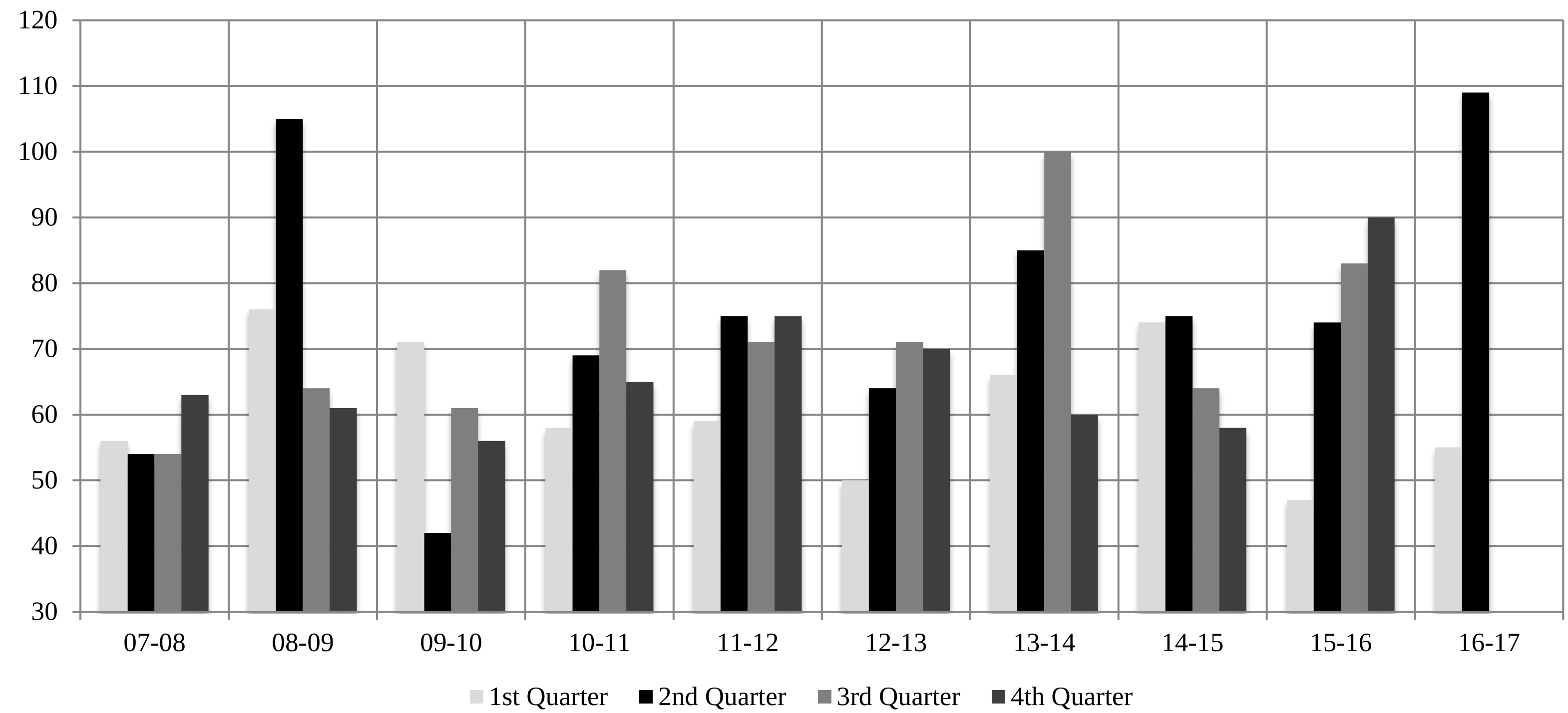
( ) = Reassignments from another lab

Process Statistics	**10/2008 - Present**
Average Time to Assign an Evaluation	4.6 Days
Average Time to Complete an Evaluation	85.7

Report on Evaluations in Progress

Evaluations in Progress	0-3 Months	3-6 Months	6-9 Months	9-12 Months	Over 1 Year	Total
March 31, 2012	36	12	14	12	18	92
June 30, 2013	53	18	6	6	19	102
September 30. 2013	44	32	5	4	21	106
December 31. 2013	41	25	24	2	24	116
March 31, 2014	53	23	13	17	11	117
June 30, 2014	55	30	14	8	19	126
September 30, 2014	44	38	18	6	19	125
December 31, 2014	44	17	17	12	16	106
March 31, 2015	43	24	10	13	17	107
June 30, 2015	39	21	12	5	15	92
September 18, 2015	28	20	8	5	12	73
December 23, 2015	43	14	5	7	13	82
March 31, 2016	48	15	7	6	8	84
June 30, 2016	57	13	7	3	7	87
September 30, 2016	60	31	9	5	7	112
December 22, 2016	34	30	21	6	9	100
March 31, 2017	54	15	8	15	8	100

In Progress by Lab	0-3 Months	3-6 Months	6-9 Months	9-12 Months	Over 1 Year	Total
California	6	2		2	1	11
Canada	3				1	4
GIPSA-IL					1	1
GIPSA-KC			1	8		9
Maryland	9	6	2	3	1	21
New York	11		3	1	1	16
NIST Force Group	2		1			3
North Carolina	5				1	6
Ohio	10	7			1	18
Oregon						
NTEP Staff	5		1	1	1	8
Unassigned	3					3
				Total Pending:		**100**



	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
Oct – Dec	56	76	71	58	59	50	66	74	47	55
Jan – Mar	54	105	42	69	75	64	85	75	74	109
Apr – Jun	54	64	61	82	71	71	100	64	83	
Jul - Sep	63	61	56	65	75	70	60	58	90	
Total	**227**	**306**	**230**	**274**	**280**	**255**	**311**	**271**	**294**	**164**

Average Per Quarter: 10-YR: **68.7**

Average Per Quarter This FY: **82**

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Appendix B

National Type Evaluation Program (NTEP) Belt-Conveyor Scale (BCS) Sector Meeting Summary

February 22, 2016
Pittsburgh, Pennsylvania

5200-2 INTRODUCTION

The charge of the BCS Sector is important in providing appropriate type evaluation criteria based NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices," Sections 1.10. General Code and 2.21. BCS Systems. The Sector's recommendations are presented to the National Type Evaluation Program (NTEP) Committee each January for approval and inclusion in NCWM Publication 14, "Technical Policy, Checklists and Test Procedures" for National Type Evaluation.

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

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

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

Table A
Table of Contents

Table B
Glossary of Acronyms and Terms

Acronym	Term
BCS	Belt-Conveyor Scale
MTL	Minimum Test Load
MWT	Master Weight Totalizer
NCWM	National Conference on Weights and Measures
NIST	National Institute of Standards and Technology
NTEP	National Type Evaluation Program
NTETC	National Type Evaluation Technical Committee
OWM	Office of Weights and Measures
USNWG	U.S. National Work Group

Details of All Items
(In order by Reference)

I. Carry-Over Items

A. Conveyor Belt Profiling

Source:
USNWG on Belt-Conveyor Scales

Proposal:
Develop recommended test procedures for NCWM Publication 14, Belt-Conveyor Scales to evaluate the use of a belt profiling feature to provide a zero-load reference when used in a belt-conveyor scale system.

Background:
This means of establishing a zero-condition prior to a totalization operation involves the ability of the weighing device to establish "tare" weight values associated with distinct individual segments of the belt and synchronizing the application of those values to the movement of the belt segments over the scale portion of the conveyor. A number of sector members have agreed that this feature should receive some level of evaluation, and that at a minimum, the ability to enable or disable any belt profiling feature should be protected by some form of security seal.

In addition, NIST OWM has received inquiries seeking guidance on whether this type of feature is permitted under U.S. standards. It is also being reported by some members of the USNWG that some regulatory field officials will not issue an approval for devices equipped with this feature when it is not listed as a standard feature or an option on the NTEP Certificate of Conformance.

During the 2014 meeting, the BCS Sector was informed that a sub-group from within the sector membership, which was assigned to develop procedures for verifying the operation of a linearization correction, had also been assigned to develop a procedure for testing the function of belt profiling. Sector members acknowledged that this feature could readily be tested in the field and would most likely be costlier to test in a laboratory setting. All sector members agreed this feature must be one protected by a type of security seal; however, no draft procedures had been developed at the time of the 2014 BCS Sector meeting. The sub-group assigned to develop test procedures for the evaluation of this type of feature was asked to continue work on this issue and to have a draft available to be presented to the Sector at its next meeting for review.

Those in attendance at the February 2015 meeting generally acknowledged that those who support the use of this feature also support the testing of BCS using a minimum test load of less than the amount of material totalized in a full belt revolution. The use of belt profiling would facilitate this practice in that a zero-reference value could be established with less than a full revolution of belt travel. The use of a belt profiling feature has been supported by some Sector members and opposed by others. Many who expressed opposition for the use of this feature on commercial devices stated their belief that the use of belt profiling to establish a zero-reference condition could mask inconsistencies in the composition and condition of the conveyor belt.

The participants of the 2015 meeting recognized that some Sector members, who are supporters of the use of belt profiling, were not present at the 2015 meeting and, therefore, their input was not part of this discussion. This was a concern to the participants who were reluctant to develop any conclusions without the input of those that were not present at the meeting and who are considered experts on the operation of this feature. It was agreed that this issue should be tabled until a future meeting when additional members are present who are considered experts in this area.

Discussion:
During the February 2016 meeting of the NTEP Belt-Conveyor Scale (BCS) Sector, Sector Chair, Mr. Peter Sirrico asked the members if they believed there should be test procedures developed and included in NCWM Publication 14 to be used in evaluating the use of "belt profiling" if the device is so equipped. Mr. John Barton explained to the members the basis for NCWM Publication 14 is the requirements that are found in NIST Handbook 44. Mr. Nathan Gardner pointed out, however, the references to linearization are found in NCWM Publication 14 although no corresponding references are made in NIST Handbook 44.

Mr. Bill Ripka stated his company, Thermo Fisher Scientific, produces a device that has been awarded a Certificate of Conformance (CC) from the NTEP. The CC lists the "linearization" and "belt-profiling" as being features that are included on this device, and, yet, there are apparently no specific test procedures to evaluate the proper functioning of those features. Mr. Ripka added it is important that the manufacturer of a device submitted for type evaluation supply ample information about the device to the evaluators so they may perform an adequate test.

Mr. Sirrico asked the Sector if it is appropriate for the manufacturer of a device that has been submitted for type approval to supply the proper testing procedures. Mr. Jim Truex explained the basic need is for the manufacturers to simply provide the information on how the proper function of the device features can be verified. There is no need to explain the design of the device in any detail.

Mr. Gardner suggested a test could simply consist of creating an anomaly on the conveyor belt that would result in a "spike" in the totalizer during a zero test, and then verifying that the profiling function would mitigate the effects of the anomaly. This could be done simply by fastening a weight on to a specific location on the belt and running the conveyor belt with the feature disabled and then again with the feature enabled.

Conclusions:
The Sector was asked if they believe NCWM Publication 14 needs amended to include a minimal statement addressing the evaluation of a belt profiling feature (i.e., the system tested when profiling is enabled and when it is disabled). Some participants of the February 2016 meeting supported including an item in the NCWM Publication 14 Checklist that would provide additional test step(s) (as described above by Mr. Gardner); however, not all Sector members agreed this is needed or belt profiling should be permitted.

While the Sector acknowledged there are NTEP CCs that list belt profiling as a feature on type approved devices, the Sector did not support any proposed change to NCWM Publication 14 regarding the belt-profiling function at this time.

II. New Items

B. Proposed changes to NCWM Publication 14 – Belt-Conveyor Scales

1) NCWM Publication Section: General (Multiple locations)

Ref: NIST Handbook 44 BCS Code Paragraph: A.1. General.

This adopted change to the NIST Handbook 44, BCS Code simply adds wording in paragraph A.1. to indicate that weigh-belt systems will also be included under the existing code as shown below.

A.1. General. – This code applies to belt conveyor scale systems **<u>and weigh-belt systems</u>** used for the weighing of bulk materials.

The primary change that occurred to the NIST Handbook 44, in 2015 was the amendments made to a number of sections that allowed weigh-belt systems to be included under this code. There are numerous locations in NCWM Publication 14 where the terminology "belt-conveyor scale(s)" is used but the terminology "weigh-belt systems" is not included.

It is recommended that since amendments to NIST Handbook 44 have been adopted to include weigh-belt systems within the *Belt-Conveyor Scale Systems Code*, that the BCS Code would now be applied to weigh-belt systems submitted for type evaluation. To ensure that weigh-belt systems may also be evaluated under this NCWM Publication 14, the Sector is asked to determine if the phrase "weigh-belt systems" must also be included wherever the term "belt-conveyor scales" is used in NCWM Publication 14.

One alternative to making this type of change in numerous locations in the NCWM Publication 14 could be to add an informational statement in the "Technical Policy" section of NCWM Publication 14 that would inform the reader that, while not always specifically stated, weigh-belt systems shall also be evaluated using this same NCWM Publication 14. If this approach is favored, it must also be recognized there will be specific amendments needed to indicate where requirements or procedures will differ in the evaluation of these two types of conveyor weighing systems.

Should the Sector concluded it would be best to amend individual references to "belt-conveyor scales" in NCWM Publication 14 to also refer specifically to "weigh-belt systems." There has been a total of 28 locations in the current NCWM Publication 14 that have been identified as not being explicitly inclusive of "weigh-belt systems."

Discussion:
The Sector was given an explanation of why weigh-belt systems need to be recognized in NCWM Publication 14 now that NIST Handbook 44, Section 2.21. explicitly includes those devices under the Belt-Conveyor Scale Systems Code. Mr. Barton pointed out the list of specific locations in NCWM Publication 14 that refer specifically to belt-conveyor scales, and noted changes should be made to each of those sections or, perhaps, a single statement could be added to the NCWM Publication 14 indicating weigh-belt systems would also be covered.

Mr. Truex expressed his belief that a single editorial change could be made and would suffice as declaration that weigh-belt systems will also be covered under the technical policy, checklist, and test procedures for belt-conveyor scales in NCWM Publication 14. This could be accomplished by adding "and Weigh-Belt Systems" to the title of the Belt-Conveyor Scales section in NCWM Publication 14.

Conclusion:
The Sector agreed to recommend rather than making multiple individual changes for the many references of "belt-conveyor scales," a less disruptive means to indicate this in NCWM Publication 14 would also apply to

weigh-belt systems. This would be to simply amend the chapter titles found on pages BCS-1 and BCS-3. On page BCS-1, it is recommended that the title be changed to "National Type Evaluation Program Belt-Conveyor Scales and Weigh-Belt Systems – Technical Policy. Also recommended is that the title on page BCS-3 be changed to National Type Evaluation Program, Belt-Conveyor Scales and Weigh-Belt Systems – Checklists and Test Procedures.

2) NCWM Publication 14 – Section 8.8.3.

This change in the NIST Handbook 44, *Belt-Conveyor Scale Systems Code* was adopted and provides latitude for marking requirements for those systems having adjustable belt speeds.

Ref: NIST Handbook 44, BCS Code Paragraph S.4. Marking Requirements.

> **S.4. Marking Requirements. –** A belt-conveyor scale shall be marked with the following: (See also G-S.1. Identification)
>
> (a)…
>
> (b)…
>
> (c) the belt speed in terms of feet (or meters) per minute at which the belt will deliver the rated capacity**, or the maximum and minimum belt speeds for variable speed ~~weigh~~ belts**;

It is recommended that the NCWM Publication 14, be amended to reflect this change. The following change is suggested:

8.8.3. The belt speed in terms of feet (or meters) per minute at which the belt will deliver the rated capacity**, or the maximum and minimum belt speeds for variable speed belts**;

Discussion/Conclusion:
After explaining the change to NIST Handbook 44, the Sector members were asked if they would support recommending the change to Section 8.8.3. in NCWM Publication 14 as shown above. The Sector agreed to changes being proposed, and this change should take place in the "Checklist," Section 8.8.3., page BCS-10. No further comments were made at this time.

3) NCWM Publication 14, Section 14 - Field Test Procedure, N.2.1. Initial Verification

Ref: NIST Handbook 44, BCS Code N.2.1. Initial Verification

This change to NIST Handbook 44, Belt-Conveyor Scale Systems Code, paragraph N.2.1. is intended to clarify the type and number of test runs needed for an official test performed during the initial verification.

It is recommended that NCWM Publication 14, Section 14 (Field Test Procedures) be amended to reflect these changes in NIST Handbook 44.

N.2.1. Initial Verification. – A belt-conveyor scale system **or a weigh-belt system** shall be ~~**verified with**~~ **tested using of** a minimum of two test runs **performed** at each ~~**of the following flow rates:**~~ **setting for belt speed/belt loading as indicated in Table N.2.1.**

~~**(a) normal use flow rate;**~~

~~**(b) 35 % of the maximum rated capacity; and**~~

~~**(c) an intermediate flow rate between these two points.**~~

Table N.2.1.
Initial Verification

Device Configuration	**Minimum of Two Test Runs at Each of the Following Settings**	**Total Tests (Minimum)**
Constant belt speed/Variable loading	– **belt loading: high (normal)** – **belt loading: medium (intermediate)** – **belt loading: low (35 %)**	**6**
Variable belt speed/Constant loading	– **belt speed: maximum** – **belt speed: medium** – **belt speed: minimum**	**6**
Variable belt speed/Variable loading	– **speed: maximum/belt loading: high (normal)** – **speed: maximum/belt loading: medium (intermediate)** – **speed: maximum/belt loading: low (35 %)** – **speed: minimum/belt loading: high (normal)** – **speed: minimum/belt loading: medium (intermediate)** – **speed: minimum/belt loading: low (35 %)**	**12**

1. Use the device configurations in the left-hand column to identify the scale being tested.
2. Perform two test runs (minimum) at each of the settings shown in the center column.
3. The following terminology applies:

- **Low: 35 % of the maximum rated capacity of the system.**
- **Medium: an intermediate rate between the high and low settings.**
- **High: maximum (normal use) operational rate.**

Results of the individual test runs in each pair of tests shall not differ by more than the absolute value of the tolerance as specified in T.2. Tolerance Values, Repeatability Tests. All tests shall be within the tolerance as specified in T.1. Tolerance Values.

Test runs may also be conducted at any other rate of flow that may be used at the installation. A minimum of four test runs may be conducted at only one flow rate if evidence is provided that the system is used at a ~~**single flow rate**~~ **constant speed/constant loading setting** and that rate does not vary in either direction by an amount more than 10 % of the normal flow rate that can be developed at the installation for at least 80 % of the time.

Discussion/Conclusion:
The Sector agreed with the proposed changes to this item that are being recommended for NCWM Publication 14 and that these changes should be placed under Section 14, Field Performance Test of the Belt-Conveyor Scale, page BCS-33. No additional comments were made at this time.

4) NCWM Publication 14, Section 14 – Field Test Procedure, N.2.3. Minimum Test Load

Ref: NIST Handbook 44, BCS, Code N.2.3.

The following changes to NIST Handbook 44, BCS Code Paragraph N.2.3. will appear in the 2016 edition and corresponding changes are recommended to the "Field Test Procedures" Section of NCWM Publication 14.

N.2.3. Minimum Test Load.

N.2.3.1. Weigh-Belt Systems. – The minimum test load shall not be less than the largest of the following values.

a. 800 scale divisions;

b. the load obtained at maximum flow rate in one revolution of the belt; or

c. at least ~~10~~**one** minute of operation.

(Amended 2015)

N.2.3.2. All Other Belt-Conveyor Scale Systems. – Except for applications where a normal weighment is less than 10 minutes, the minimum test load shall not be less than the largest of the following values.

a. 800 scale divisions;

b. the load obtained at maximum flow rate in one revolution of the belt; or

c. at least ten minutes of operation.

For applications where a normal weighment is less than ten minutes (e.g., belt-conveyor scale systems used exclusively to issue net weights for material conveyed by individual vehicles and railway track cars) the minimum test load shall be the normal weighment that also complies with N.2.3.2.(a) and (b).

The official with statutory authority may determine that a smaller minimum totalized load down to 2 % of the load totalized in one hour at the maximum flow rate may be used for subsequent tests, provided that:

1. the smaller minimum totalized load is greater than the quantities specified in **N.2.3.2.**(a) and (b); and

2. consecutive official testing with the minimum totalized loads described in N.2.3**.2.**(a), (b), or (c) and the smaller minimum test load has been conducted that demonstrates the system complies with applicable tolerances for repeatability, acceptance, and maintenance.

(Added 2004) (Amended 2008 **and 201X)**

In addition to recommending these changes to Section 14, Field Test Procedures on page BCS-34, an additional change is recommended to the Table T.4 on page BCS-27. The second half of Table T.4 contains the headings "Test Conditions" and "Abbrev." and rows numbered 1-3. Row 1 is subdivided into three rows; the last row contains the wording "Time (minutes) to deliver MTL (at least ten minutes). It is recommended that this wording be changed to reflect the minimum operational time required for weigh-belt systems also as follows:

"Time (minutes) to deliver MTL (at least ten minutes for belt-conveyor scales **or one minute for weigh-belt systems**)"

Discussion/Conclusion:
The Sector agreed with the proposed changes to this item, and they are being recommended to be placed in NCWM Publication 14, page BCS-34, under N.2.3. Minimum Test Load. No additional comments were made at this time.

5) NCWM Publication 14, Section 14, Field Test Procedures, N.3.1.1. Determination of Zero

Ref: NIST Handbook 44, BCS Code N.3.1.1.

Changes to NIST Handbook 44, BCS Code Paragraph N.3.1.1. Determination of Zero were adopted and will appear in the 2016 edition. Corresponding changes are recommended to be used in the revision of NCWM Publication 14 as shown below.

N.3.1.1. Determination of Zero. – A zero-load test is a determination of the error in zero, expressed as an internal reference, a percentage of the full-scale capacity, or a change in a totalized load over a whole number of complete belt revolutions. ~~**For belt-conveyor scales with electronic integrators, the test must be performed over a period of at least three minutes and with a whole number of complete belt revolutions. For belt-conveyor scales with mechanical integrators, the test shall be performed with no less than three complete revolutions or 10 minutes of operation, whichever is greater.**~~ **A zero-load test shall be performed as follows:**

(a) For belt-conveyor scales with electronic integrators, the test must be performed over a period of at least three minutes and with a whole number of complete belt revolutions;

(b) For belt-conveyor scales with mechanical integrators, the test shall be performed with no less than three complete revolutions or ten minutes of operation, whichever is greater;

(c) For weigh belt systems the test must be performed over a period of at least one minute and at least one complete revolution of the belt.

(Added 2002) **(Amended 20XX)**

Discussion/Conclusion:
The Sector agreed with the proposed changes to this item, and they are being recommended for NCWM Publication 14. Also, these changes should appear in NCWM Publication 14, Section 14, Field Test Procedures, page BCS-34. No additional comments were made at this time.

III. Additional Items

C. Linearity Correction Feature

The discussion regarding a linearity correction feature by the Sector members is a continuation of the same discussion that began during a USNWG on Belt-Conveyor Scales meeting, which immediately preceded this Sector meeting. This linearization feature would facilitate adjustment of the curve plotted on a graph showing the range of error in the totalization of loads at various flow rates. Using a linearity adjustment, the errors observed during totalizations at different flow rates of the system could be brought closer in line with the other errors observed. The result would be represented as a graph that more resembled a straight line when the errors are plotted according to the flow rate and variance from the reference weight used a test load.

This topic has often been discussed in tandem with the topic of belt-profiling during meetings of the USNWG and the NTEP Sector since the use of both these features are being questioned by field officials when they are encountering systems in the field that are equipped with them. It has been reported that some field officials are not granting approval of systems equipped with these features if those features are not listed on the NTEP Certificate of Conformance.

The Sector has been considering whether devices having these features installed should undergo any specific testing during type evaluation to verify the correct function of the belt-profiling and linearity correction.

Discussion:
During the Sector's February 2016 meeting, Mr. Gardner noted linearization is referred to in NCWM Publication 14, although there is no mention of testing this feature there. Mr. Truex acknowledged this and added that if a manufacturer were to submit a device for type evaluation, there would need to be a procedure for testing that feature provided by the manufacturer. Mr. Truex added that the reference in NCWM Publication 14 to linearization is found in the table that lists sealable parameters and non-sealable parameters. Linearization is listed as a sealable parameter in this table.

The Sector considered what test procedures would be necessary to evaluate the linearization feature. Mr. Truex stated, he believes all that would be needed is to verify the feature works through a performance-based test, which would include the operation of the BCS at different flow rates. Mr. Barton added perhaps all that is needed is for the system to be tested with the linearity correction feature enabled and then again when disabled, it would be obvious whether this feature is working as it should.

Mr. Sirrico added, that during previous discussions regarding this topic, some Sector members advocated placing a limitation of the ability of a linearity correction feature to reduce the degree of variation between errors. Some suggested not permitting this feature affect any totalization results that would exceed a limited range of results (i.e., 5 %). Others supported a linearity correction that did not have those limitations restrict the amount of variation of results that could be acted upon.

Conclusions:
The Sector members agreed the ability to enable or disable a linearity correction feature must be a sealable parameter and acknowledged it is already listed as such in NCWM Publication 14. The sector members could not agree upon any specific testing to recommend being done during type evaluation to verify its operation. No recommended changes for NCWM Publication 14 were offered at this time.

D. VCAP Information:

The Verified Conformity Assessment Program (VCAP) will include mandatory audits to verify the evaluation of certain weighing devices that are subject to compliance with requirements involving their performance when exposed to certain influence factors. BCS systems are one of those weighing devices subject to this type of testing.

Discussion/Conclusion:
Mr. Truex (NTEP Administrator) provided the Sector with information regarding the eventual implementation of the audit process mentioned above. Mr. Truex encouraged the device manufacturers in the Sector to become familiar with this process in that the devices they manufacturer and submit for NTEP evaluation will need to comply. He further explained the devices submitted for type evaluation will need to be tested for compliance with performance requirements during periods when the devices are exposed to certain environmental influence factors (e.g., changes in temperature and humidity, electrical current anomalies, etc.) and eluded to the fact at least some of that testing will involve placing the device into a controlled environmental chamber.

Because of the size of some types of belt-conveyor scale systems, in the past it has been impractical (if not impossible) to enclose the entire system in the confines of the environmental chambers used. Mr. Truex informed the Sector that the existing policy on the VCAP program does not allow for exceptions from this testing, and he suggested Sector members (primarily device manufacturers) develop a proposal to the NCWM Board of Directors to enact some changes in this policy.

The device manufacturers in the Sector agreed that it would be beneficial to collaborate in this effort.

IV. Attendance:

NAME	ORGANIZATION	TELEPHONE	E-MAIL
Peter Sirrico	Thayer Scale	(781) 826-8101 x328	**psirrico@thayerscale.com**
Zacharias Tripoulas	State of Maryland NTEP Lab	(410) 841-5790	**zacharias.tripoulas@maryland.gov**
John Barton	NIST	(301) 975-4002	**john.barton@nsit.gov**
Matthew David	East Kentucky Power Coop	(859) 945-9645	**matthew.david@ekpc.com**
Nathan Gander	Oregon Weights and Measures	(505) 991-4586	**ngardner@oda.state.or.us**
Bill Ripka	Thermo Fisher Scientific	(800) 445-3503	**bill.ripka@thermofisher.com**
Jim Truex	NCWM	(740) 919-4350	**jim.truex@ncwm.net**

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Appendix C

National Type Evaluation Program (NTEP) Grain Analyzer Sector Summary

September 13, 2016

5200-2 INTRODUCTION

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

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

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

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Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
BIML	International Bureau of Legal Metrology	NTEP	National Type Evaluation Program
CD	Committee Draft	NTETC	National Type Evaluation Technical Committee
CIML	International Committee of Legal Metrology	OCP	Ongoing Calibration Program
CIPM	International Committee of Weights and Measures	OIML	International Organization of Legal Metrology
D	Document	OWM	Office of Weights and Measures
EMRP	European Metrology Research Program	R	Recommendation
FGIS	Federal Grain Inspection Service	S&T	Specifications and Tolerances Committee
GA	Grain Analyzer	SC	Subcommittee
GIPSA	Grain Inspection, Packers and Stockyards Administration	SD	Secure Digital
GMM	Grain Moisture Meter	TC	Technical Committee
Handbook 44	“Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices”	TW	Test Weight
MRA	Mutual Recognition Agreement	UGMA	Unified Grain Moisture Algorithm
NCWM	National Conference on Weights and Measures	USB	Universal Serial Bus
NIR	Near Infrared Grain Analyzer	USDA	U.S. Department of Agriculture
NIST	National Institute of Standards and Technology	USNWG	U.S. National Working Group

Details of All Items
(In order by Reference Key)

1. Report on the 2016 NCWM Interim and Annual Meetings

The 2016 NCWM Interim Meeting was held January 10 - 13, 2016, in San Diego, California. The 2016 NCWM Annual Meeting was held July 24 - 28, 2016, in Denver, Colorado. At these meetings there were no Grain Analyzer Sector recommended changes to NCWM Publication 14 or NIST Handbook 44. The Grain Analyzer Sector has an item which remains a developmental item on the S&T agenda. See Grain Analyzer Agenda Item 4 for an update of activities on this item. Two Software Sector proposal for changes to NIST Handbook 44 concerning Software Identification and Metrological Significant Software were reviewed by the Grain Analyzer Sector. S&T Committee agenda Item 310-1 "Software Identification" to amend G-S.1. and S&T agenda Item 310-2 "Metrological Significant Software." Adding G-S.9. was voted on and approved at the 2016 Annual Meeting. These items were reviewed in detail during the Software Sector meeting on September 14, 2016, following the Grain Analyzer Sector meeting.

Mr. Jim Truex, NTEP Administrator, provided an update on the Interim and Annual Meetings. He reviewed the membership status and as per the Board of Directors report in the National Conference on Weights and Measures (NCWM) Publication 16, membership from 2012 to 2016 has shown about a 16 % increase. Mr. Truex also reported the that the Grain Analyzer Sector did not have any voting items at the 2016 Annual Meeting.

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 are enrolled in the Phase II for the 2016 harvest. There are eight grain analyzer models enrolled for the 2016 harvest.

The 8 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
8. MTC Moisture Analyzers – MTC 999 ES

Mr. Jordan provided the Sector with an update on the NTEP Phase I evaluations and reported on the collection and analysis of the OCP (Phase II) data from the 2015 crop year. Mr. Jordan reported that four instruments required updates. He also reported there could be as many as 10 instruments in the NTEP program next year.

Mr. Jordan also mentioned that very little oat samples were received during the request for grains used for Phase II testing. It was suggested that a request be sent to South Dakota, Wisconsin, North Dakota, and Minnesota requesting any oats samples the states could provide.

During Mr. Jordan's report, it was noted that there were complaints with high moisture corn samples on the UGMA meters. Mr. Jordan noted that the UGMA meters have been updated on an annual basis with only small changes needed for these devices. It was noted during further discussion that these complaints were likely from states with increased modified corn used in ethanol production. As such these corn types are likely underrepresented in the grains used to test the calibrations of the NTEP meters.

3. Review of OCP (Phase II) Performance Data for Moisture and Test Weight (TW) 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 provided data for inclusion in the 2016 Grain Analyzer Sector Report showing the performance of NTEP meters compared to the air oven. This data is based on the last three crop years (2013 - 2015) using calibrations updated for use during the 2016 harvest season.

The 2013 - 2015 Grain Moisture Meter (GMM) Phase II comparison graphs are available for view or can be downloaded for printing at the following web address:

www.ncwm.net/_resources/dyn/files/75601146zc793ed4d/_fn/2013-2015+NCWM+Sector+GMM+Biases.pdf

At the Sector's August 2012 meeting, it was agreed that TW comparison and correlation charts should be prepared for the three grains that are most likely to be subject to discounts based on 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 prepared data showing the performance of NTEP meters compared to the GIPSA reference Quart Kettle Test Weight Apparatus. Mr. Jordan provided this information for the Grain Analyzer Sector 2016 report. This data is based on the last three crop years (2013 - 2015) using calibrations updated for use during the 2016 harvest season.

The 2013 - 2015 TW comparison and correlation charts and TW Phase II data are available for view or can be downloaded for printing at the following web address:

www.ncwm.net/_resources/dyn/files/75601147zb094dddb/_fn/2013-2015+NCWM+Sector+TW+plots.pdf

The Sector reviewed the moisture and test weight comparison charts. In conjunction with the review of Agenda Item 3. No comments or further discussion was provided based on the Sectors review of the graphs.

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

Source:
Grain Analyzer Sector

Purpose:
Table S.2.5. *Categories of Device and Methods of Sealing* that appears in §5.56.(a) of NIST Handbook 44 lists acceptable methods of sealing for various categories of GMMs. When the Sector first recommended adding the table to NIST Handbook 44 at their September 1996 meeting, the concept of making a change to a GMM from a remote site involved information "…sent by to the device by modem (or computer)." In 2011, this concept has expanded to include the ability of the measuring device to accept new or revised sealable parameters from a memory chip (e.g., an SD Memory Card that may or may not itself be necessary to the operation of the device), external computer, network, or other device plugged into a mating port (e.g., Universal Serial Bus (USB) port) on the measuring device or connected wirelessly to the measuring device. The changes proposed in Item Under Consideration expand the scope of "remote configuration capability" to cover instances where the "other device" may be necessary to the operation of the weighing or measuring device or which may be considered a permanent part of that device.

Item Under Consideration:

> **remote configuration capability. –** The ability to adjust a weighing or measuring device or change its sealable parameters from or through some other device that ~~**is not**~~ **<u>may or may not</u>** itself **<u>be</u>** necessary to the operation of

the weighing or measuring device or ~~is not~~ **may or may not be** a permanent part of that device. [2.20, 2.21, 2.24, 3.30, 3.37, 5.56(a)]

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

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

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

A USB flash drive is most likely to be used as a "data transfer" device. In a typical "data transfer" application, the USB flash drive is first connected to a computer with access to the web. The computer visits the GMM manufacturer's website and downloads the latest grain calibrations that are then stored in the USB flash drive. The USB flash drive is removed from the computer and plugged into a USB port on the GMM. The GMM is put into "remote configuration" mode to copy the new grain calibration data into the GMM's internal memory. When the GMM has been returned to normal operating (measuring) mode, the USB flash drive can be removed from the GMM.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2014 Grain Analyzer Sector Meeting

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

Update for 2015 Grain Analyzer Sector Report:

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

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

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

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

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

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

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

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

S.1.11. Provision for Sealing.

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

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

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

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

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

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

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

In the 2015 Grain Analyzer (GA) report, sector members were encouraged to review the OWM proposal for changes to NIST Handbook 44 to address devices that use removable storage devices and provide any additional feedback.

Recommendation (2016 Grain Analyzer Sector):
The Sector is asked to comment on the following propose modifications to the Grain Moisture Meter Code Section 5.56.(a) in NIST Handbook 44, which follows the draft example requirement for the scales code that was developed by the NIST, Legal Metrology Device Program.

Proposed Draft General Code Paragraph:

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

Proposed changes to Grain Moisture Meter Code 5.56(a), paragraph S.2.5. Provision for Sealing:

S.2.5. Provision for Sealing.

S.2.5.1. Devices Adjusted Using a Removable Digital Storage Device. – For those devices adjusted using a removable digital storage device, G-S.8.2. applies.

S.2.5.2. All Other Devices. – Provision shall be made for applying a security seal in a manner that requires the security seal to be broken, or for using other approved means of providing security (e.g., audit trail available at the time of inspection as defined in Table S.2.5. Categories of Device and Methods of Sealing) before any change that affects the metrological integrity of the device can be made to any mechanism.

During the 2016 Grain Analyzer Sector Meeting, the Sector reviewed the language proposed by NIST, Legal Metrology Devices Program to address devices the use removeable storage devices in weighing or measuring devices. There was no opposition to the proposed language. But during the discussion it was suggested the proposed language, G-S.8.2. could be simplified to state that devices adjusted using removable digital storage must meet the requirements for Category 3.

During discussion, it was also suggested the Grain Moisture Meter Code could be changed such that all grain moisture meters are required to meet Category 3 sealing requirements; all grain moisture meters must have an event logger, which is what is required for NIR devices in NIST Handbook 44. Manufacturers present at the meeting did not object to the proposal, but it was noted that all manufacturers were not represented at the meeting. Mr. Jim Truex also noted that we may need to consider state laws that require that a commercial device must have a lead and wire seal. It was also mentioned the proposed NIST, LMDP language for the General Code would be redundant for the grain code if language is added to the grain moisture meter code that grain moisture meters be equipped with an event logger.

It was suggested the Technical Advisor, Ms. Diane Lee, develop the proposed changes to the grain moisture meter code and include the information in the Grain Analyzer Sector summary for review and comments at the Grain Analyzer Sector's next meeting. Following the meeting, Ms. Lee researched the status of sealing methods for NTEP meters using the NTEP database. The current status for the sealing methods of grain moisture meters are as follows:

Inactive Certificates of Conformance (CC):

- Nine inactive certificates; an inactive status for grain analyzers means that a CC was previously active for a device, but now the device is no longer being manufactured or remanufactured. Existing devices may be used, sold, or repaired and resold under inactive certificates. As such, these devices are likely still in use.
- Three inactive devices are *not* sealed using an event logger.

Active CC:

- Nine active certificates
- One active device is not sealed using an event logger.

Per the Sector's request, below is proposed language for discussion at the Sector next meeting. In consideration of the current inactive and active NTEP meters in use that do not have an event logger, the proposed draft language is nonretroactive and Table S.2.5. remains in effect for those current inactive and active NTEP meters that do not have event loggers. The proposed draft language also includes a reference to the proposed draft General Code paragraph:

S.2.5. Provision for Sealing.

S.2.5.1. Devices Adjusted Using a Removable Digital Storage Device. – For those devices adjusted using a removable digital storage device, G-S.8.2. applies.

S.2.5.2. All Other Devices. – Provision shall be made for applying a security seal in a manner that requires the security seal to be broken, or for using other approved means of providing security (e.g., audit trail available at the time of inspection as defined in Table S.2.5. Categories of Device and Methods of Sealing) before any change that affects the metrological integrity of the device can be made to any mechanism.

S.2.5.3. *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.)*
[Nonretroactive as of January 1, 20XX]

(Amended 20XX)

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 TCTC 17/SC 1 for the Grain Analyzer Sector and to those sector members that participate on the U.S. National Working Group (USNWG) on grain moisture meters. In addition, the Sector is asked to review a proposal to change the Humidity Test in NCWM Publication 14 to align with the OIML DD 11 and IEC Damp Heat Test Procedure.

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

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

At the July 2013 meeting, it was discussed that the international Damp Heat Test (OIML D 11 and IEC) is significantly different from the NTEP Humidity Test. The international test is more robust and more accurately reflects the environmental conditions an instrument is likely to encounter in field use. The Damp Heat Test is conducted at a maximum temperature of either the manufacturer specified upper ambient temperature or 30 °C and a maximum relative humidity of 85 %. The Damp Heat Test is designed to evaluate the device under the environmental (temperature and relative humidity) conditions it will encounter during operation.

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

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

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

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

2016 Grain Analyzer Sector Meeting:
The OIML R 59 was submitted to BIML for registration as a Draft Recommendation and the BIML distributed the Draft Recommendation to all CIML members for preliminary ballot and comment. The total number of votes cast were 25 – 23 "yes" votes, 2 "no" votes, and 3 abstentions were received, and 32 did not respond. Since a majority of the votes received were in favor of the Recommendation, the TC 17/SC 1 conveners, China and the United States updated OIML R 59 (DR) per the editorial comments received and BIML registered the Recommendation as a Final Draft Recommendation (FDR). The BIML sent the OIML R 59 FDR to CIML members.

Ms. Lee forwarded the FDR and results of the preliminary ballot to the USNWG on Grain Moisture Meters on July 26, 2016, via e-mail for review and comments. Many of the requirements and test in OIML R 59 are similar to tests conducted in the U.S. Type Evaluation Program. Some of the test, which are typically included in OIML Recommendations such as disturbance tests (AC mains voltage dips, short interruptions, and voltage dips, Burst on AC mains, Radiated radiofrequency, electromagnetic fields, conducted radiofrequency, electromagnetic fields, and electrostatic discharge), are included in both documents. Many efforts were made to harmonize the OIML R 59 and the OIML Protein Recommendation, but there remain some differences between the two Recommendations that include but are not limited to the following:

- Damp Heat Test and Humidity Test: OIML R 59 includes the Humidity Test and the procedures used are those that have been used in the U.S. type evaluation testing for many years. The Protein recommendation includes what is called a Damp Heat Test referencing standards IEC 60068-2-78 and IEC 60068-3-4.

- Vibration Test: This test is not included in OIML R 59, but is included in the OIML Protein Recommendation.

- Dry Heat and Cold Tests and Instrument Temperature Sensitivity: The protein Recommendation includes a Dry heat test that references IEC 60068-2-2 and IEC 60068-3-1, and a cold test that reference IEC 60068-2-1 and IEC 60068-3-1. OIML R 59 includes the Instrument Temperature Sensitivity Test that includes testing at a cold and hot temperature and are the test procedures used in U.S. Type evaluation testing for many years

During the 51st CIML Meeting to be held on October 17 - 21, 2016, in Strasbourg, France, a final vote will be taken on OIML R 59 (FDR). The publication will be approved if at least 80 % of the votes cast are in favor. At least 75 %

of the Members must be present or represented for the vote. Below is a link to additional information concerning the CIML meeting and a copy of OIML R 59 FDR.

http://strasbourg.oiml.org/ciml.html

Recommendation:
GA Sector members and members of the USNWG on Grain Moisture are asked to review OIML R 59 FDR and provide any comments during the GA Sector Meeting.

During the 2016 Grain Analyzer Sector Meeting, no additional comments were received on OIML R 59 FDR. Ms. Lee reviewed the difference in the OIML protein Recommendation and OIML R 59 *Moisture Meters for Cereal Grains and Oilseeds* and informed the Sector that OIML R 59 would be voted on at the 51st CIML Meeting. During the review of this item there was a request for the difference in U.S. test procedures and the IEC test procedures included in the OIML protein Recommendation. The following is a link to IEC standards so those interested can obtain and review the IEC test procedures: **www.iec.ch/about/activities/standards.htm?ref=home.**

Following the Grain Analyzer Sector meeting and the October 17 - 21, 2016, CIML meeting, the NIST CIML representatives reported that OIML R 59 *Moisture Meters for Cereal Grains and Oilseeds* was approved at the CIML meeting.

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

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

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

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

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

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

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

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

2016 Grain Analyzer Sector Meeting:
The OIML Protein Recommendation was submitted to BIML for registration as a Draft Recommendation and the BIML distributed the Draft Recommendation to all CIML members for preliminary ballot and comment. The total number of votes cast were 22 – 20 yes votes, 2 no votes, and 1 abstention were received and 38 did not respond. Since many of the votes received were in favor of the Recommendation, theTC17/SC8 convener, Australia, updated the OIML Protein Recommendation (DR) per the editorial comments that were received, and BIML registered the Recommendation as a Final Draft Recommendation (FDR). The BIML sent the FDR to CIML members. Ms. Lee forwarded the FDR and results of the preliminary ballot to the USNWG on Protein Meters on July 26, 2016, via e-mail for review and comments. Many of the requirements and test in the OIML Protein Recommendation are similar to tests conducted in the U.S. Type Evaluation Program. Some of the test, which are typically included in international recommendations such as disturbance tests (AC mains voltage dips, short interruptions, and voltage dips, Burst on AC mains, Radiated radiofrequency, electromagnetic fields, conducted radiofrequency, electromagnetic fields, and electrostatic discharge), are included in both the OIML Protein Recommendation and OIML R 59. Many efforts were made to harmonize the OIML Protein Recommendation and OIML R 59, but there remain some differences between the two Recommendations, that include but are not limited to the following:

- Damp Heat Test and Humidity Test: OIML R 59 includes the Humidity Test and the procedures used are those that have been used in the U.S. type evaluation testing for many years. The Protein recommendation includes what is called a Damp Heat Test Referencing Standards IEC 60068-2-78 and IEC60068-3-4.
- Vibration Test: This test is not included in OIML R 59, but is included in the OIML Protein Recommendation.
- Dry Heat and Cold Tests and Instrument Temperature Sensitivity: The Protein Recommendation includes a Dry Heat Test that references IEC 60068-2-2 and IEC 60068-3-1, and a cold test that reference IEC 60068-2-1 and IEC 60068-3-1. OIML R 59 includes the Instrument Temperature Sensitivity Test that includes testing at a cold and hot temperature and are the test procedures used in U.S. Type Evaluation Testing for many years.

During the 51 CIML Meeting to be held on October 17 - 21, 2016, in Strasbourg, France, a vote will be taken on the OIML Protein Recommendation (FDR) and the publication will be approved if at least 80 % of the votes cast are in favor; at least 75 % of the members must be present or represented for the vote.

Below is a link to additional information concerning the CIML meeting and a copy of the OIML Recommendation on Protein, **strasbourg.oiml.org/ciml.html.**

Recommendation:
Grain Analyzer Sector members and members of the U.S.NWG on Protein Meters are asked to review the OIML Recommendation on Protein FDR and provide any comments during the Grain Analyzer Sector Meeting.

During the 2016 Grain Analyzer Sector Meeting, no additional comments were received on the OIML Protein FDR. Ms. Lee reviewed the difference in the OIML protein Recommendation and OIML R 59, *Moisture Meters for Cereal Grains and Oilseeds,* and informed the Sector that the OIML protein Recommendation would be voted on at the 51st CIML Meeting. During the review of this item, there was a request for the difference in U.S. test procedures and the IEC test procedures included in the OIML Protein Recommendation. The following is a link to IEC standards so that those interested can obtain and review the IEC test procedures: **www.iec.ch/about/activities/standards.htm?ref=home**

Following the Grain Analyzer Sector Meeting and the October 17 - 21, 2016, CIML Meeting, the NIST CIML representatives reported that the OIML Protein Recommendation was approved at the CIML meeting.

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

Source:
Dr. Hurburgh, Iowa State University

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

Ms. Eigenmann provided an update on the Grain Inspection Advisory Committee's Resolutions. The Sector discussed the feasibility of an ongoing calibration program also referred to as a Phase II program for Near Infrared Grain Analyzers (NIR) instruments that measure wheat program. 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 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, which 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 three, four, or five years, as appropriate. In addition, it was noted that there also must be a mechanism to get manufacturer's calibration data for calibration review.

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

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

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

2015 Grain Analyzer Sector Report Update:
The USDA, GIPSA representatives mentioned that they are not aware of a discussion paper from Mr. 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. Mr. Jordan will provide an update of these activities along with others involved in considering Phase II testing for Near Infrared Grain Analyzers.

Recommendation:
Sector members are asked to review the background information on this item in preparation for discussion of the current work in determining the feasibility of 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.
- One-hundred samples for all meters or less per grain type on each meter.
- The program should verify calibrations for basic grains where there is a commercial impact to included protein in wheat, soybeans, barley, and corn and oil in corn and soybeans. (It was noted, during discussion, 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 two-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 device 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 currently, per the states attending the Sector meeting, commercial transactions involving protein measurements are lower than for grain moisture measurements.

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

Source:
G. 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.

Recommendation:
Grain Analyzer Sector members are asked to report on any issues they are having with commercial grain moisture meter inspections for corn. During the discussion of this item at the 2016 Grain Analyzer Sector meeting, it was mentioned that this issue arose 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 the states reported problems with the corn calibrations where states have a 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 United States, 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 Handbook 44 when testing to ensure errors are not introduced due to incorrect test procedures.

Following the discussion of this agenda item, Mr. Jeff McCluer, who had submitted an item to be included on the 2016 sector agenda, which was ultimately not included based on the request to change GIPSA tolerances and is not in the scope of the GA Sector, presented information in reference to tolerance for UGMA meters. Mr. McCluer explained that if the UGMA meter technology can get better measurements, then he recommends a reduction in the tolerances should be made. Mr. Charlie Hurburgh noted the Sector has not conducted a study of the new technology and a task force could be developed to look at the results of these meters. Mr. Hurburgh agreed to chair the task group to look at results from UGMA meters, and after some discussion with Mr. 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.

Next Sector Meeting:
The next meeting is planned for Wednesday, August 16 (1:00 p.m. to 5:00 p.m.). and Thursday, August 17 (8:00 a.m. to 12:00 p.m.), 2017, at the Hyatt Place at the Kansas City Airport.

If you would like to submit an agenda item for the 2017 meeting, please contact any of the following persons by June 1, 2017:

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

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Appendix D

National Type Evaluation Program (NTEP) Measuring Sector Meeting Summary

Annual Meeting
September 20 - 21, 2016
Denver, Colorado

5200-2 INTRODUCTION

The charge of the NTETC Measuring Sector (herein after referred to as "Sector") is to provide appropriate type evaluation criteria based on specifications, tolerances, and technical requirements of NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices," Sections 1.10. General Code and all portions of Section 3 including codes for Liquid Measuring Devices, Vehicle Tanks Meters, Liquid Petroleum Gas and Anhydrous Ammonia Measuring Devices, Cryogenic Liquid Measuring Devices, Milk Meters, Water Meters, Mass Flow Meters, and Carbon Dioxide Liquid Measuring Devices. The Sector's recommendations are presented to the National Type Evaluation Program (NTEP) Committee each January for approval and inclusion in NCWM Publication 14, "Technical Policy, Checklists, and Test Procedures" for national type evaluation.

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

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

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

Table A
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APPENDICES		Page D/
A	**Attendance List – 2016 Measuring Sector Meeting**	**A1**
B	**Field Evaluation and Permanence Tests for Mass Flow Meters - Master Meters – Ref. Agenda Item 1.**	**B1**
C	**Guidance on Empirical Analysis – Ref Agenda Item 2.E.**	**C1**
D	**Draft Publication 14 Checklist for Electric Vehicle Fueling Systems (EVFS) – Ref Agenda Item17**	**D1**

Table B
Glossary of Acronyms

Acronym	Term	Acronym	Term
CC	Certificate of Conformance	NTETC	National Type Evaluation Technical Committee
DMS	Division of Measurement Standards	OIML	International Organization of Legal Metrology
ECR	Electronic Cash Register	OWM	Office of Weights and Measures (NIST)
EVFS	Electric Vehicle Fueling Systems	PD	Positive Displacement
HB 44	NIST Handbook 44 "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices"	Pub 14	NCWM Publication 14
LMD	Liquid Measuring Devices	RMFD	Retail Motor-Fuel Dispenser
mA	milliamp	SI	International System of Units
NCWM	National Conference on Weights and Measures	S&T	Specifications and Tolerances
NIST	National Institute of Standards and Technology	VTM	Vehicle Tank Meter
NTEP	National Type Evaluation Program	W&M	Weights and Measures

This glossary is meant to assist the reader in the identification of acronyms used in this agenda and does not imply that these terms are used solely to identify these organizations or technical topics.

Details of All Items
(In order by Reference Key)

CALL TO ORDER:

Sector Chairman, Mr. Mike Keilty (Endress + Hauser) called the meeting to order; reviewed the Sector's agenda; and described the processes for the meeting. Meeting attendees are shown in Appendix A – Attendance List 2016 Measuring Sector Meeting.

CARRY-OVER ITEMS:

1. Transfer Standards Testing – NIST Handbook 44, Section 3.32. LPG & NH3 Liquid-Measuring Devices Code and Section 3.37. Mass Flow Meters Code.

Source:
Michael Keilty, Endress + Hauser Flowtec AG; *[2014 NCWM S&T Committee Item 332-2 (D)] and [2014 NCWM S&T Committee Item 337-3 (D)] and 2015 Measuring Sector Meeting.*

Recommendation:
The Sector is asked to provide input on two proposals being developed by Mr. Michael Keilty (Endress + Hauser Flowtec AG). These items appeared on the 2014 through 2016 NCWM S&T Committee agendas, most recently appearing as Items 332-5, N.3. Test Drafts and Item 337-3, N.3. Test Drafts.

These proposals recommend the addition of a paragraph to the "Notes" section of the LPG and Anhydrous Ammonia Liquid-Measuring Devices Code and the Mass Flow Meters Code specifying the size of the test draft when using a "transfer standard." The current proposal is outlined below:

Amend NIST Handbook 44, LPG and Anhydrous Ammonia Liquid-Measuring Devices as follows:

N.3. Test Drafts.

N.3.1. Minimum Test – Test drafts should be equal to at least the amount delivered by the device in one minute at its normal discharge rate.
(Amended 1982)

N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the test draft shall be equal to at least the amount delivered by the device in two minutes at its maximum discharge rate.

Amend NIST Handbook 44, Mass Flow Meters Code as follows:

N.3. Test Drafts.

N.3.1. Minimum Test – Test drafts should be equal to at least the amount delivered by the device in one minute at its normal discharge rate.
(Amended 1982)

N.3.2. Transfer Standard Test. – When comparing a meter with a calibrated transfer standard, the test draft shall be equal to at least the amount delivered by the device in two minutes at its maximum discharge rate.

Background:
At its 2014 meeting, the Measuring Sector was asked to discuss and comment on two proposals that were submitted to the four regional weights and measures associations in fall 2014. These proposals would amend NIST Handbook 44, LPG and Anhydrous Ammonia Liquid-Measuring Devices and Mass Flow Meters codes, Notes Section, Test Drafts, to allow transfer standards (master meters) to test and place into service. The Sector thoroughly discussed and vetted this item. There was extensive discussion about the transfer standard (also referred to as a "master meter") itself, such as:

- the need for the master meter to be a superior standard to the meter being examined;
- the verification procedures including the proper reference weighing device's capacity and division size;
- the need to maintain control charts on the master meter;
- the frequency of re-verification for the master meter;
- the need to develop NIST Handbook 105 series specifications, test procedures, and tolerances for "master meters;"
- the development of criteria and the ability of the master meter to assure legal traceability; and
- the training staff in the correct use of master meters in field applications; etc.

The Sector agreed that transfer standards are valuable in verifying measuring systems not readily tested with conventional test methods. Examples include measuring systems used to measure products such as CNG, LNG, viscous products, corrosive products, and other products whose physical properties create challenges in testing. The Sector supported moving these proposals forward as "Voting" items.

At the Sector's 2015 Meeting, this issue was again discussed and the Sector reached the following decision.

> After lengthy discussion on this issue, the Sector did not reach any conclusions on this proposal to share with the submitter or with the S&T Committee. The Sector reiterated points made during its 2014 meeting (see "Background" section earlier in this item). Additionally, while the Sector does not have specific recommendations regarding the proposal, the following "observations" might be useful for further work on this issue.
>
> - The use of master meters has particular appeal for use in testing devices such as CNG metering systems where factors such as product type, safety, environmental factors, and the availability of equipment pose special challenges.
> - Use of gravimetric testing for CNG has been reported to pose challenges such as returning/disposing of product; procuring a suitable scale and test tank; and controlling environmental influences that may affect testing results.
> - Field standards must comply with the general criteria in NIST Handbook 44, Appendix A, Fundamental Considerations includes general criteria for field standards.
> - Recognition of transfer standards in NIST Handbook 44 does not, by itself, ensure recognition or acceptance of these devices as an acceptable test method.
> - Specific types of field standards do not have to be specifically identified in NIST Handbook 44 for a weights and measures jurisdiction to recognize their use in testing measuring devices.
> - Additional provisions must be in place to ensure traceability of measurements using a transfer standard as an official test method. Examples include documentary standards for the field standard (e.g., NIST Handbook 105 applicable to the standard); training for laboratory metrologist in the testing of the field standard; control procedures to ensure continued performance of the transfer standard; training of field staff in the use

> of the transfer standard; and control procedures for maintaining the master meter.
>
> - A master meter must perform better than the meter under test.
>
> The Sector noted the selection of appropriate test methods for type evaluation is an issue that is often faced by NTEP evaluating laboratories. The Sector agreed that guidelines on determining an appropriate test method(s) for an evaluation would be helpful to both the laboratories and manufacturers. Several Sector members including the following expressed an interest in working together to develop such guidelines for inclusion in NCWM Publication 14:
>
> Marc Buttler, Emerson Process Management/Micro Motion
> John Roach, California Division of Measurement Standards
> Michael Keilty, Endress + Hauser Flowtec AG, USA
> Tina Butcher, NIST, OWM
>
> This subgroup agreed to bring any recommendations it develops back to the Sector at its 2016 meeting as a carryover item, either as part of the NIST Handbook 44 item or as a separate item for type evaluation criteria.

At the 2015 and 2016 NCWM Interim and Annual Meetings, the S&T Committee discussed both proposals in the "Recommendation" as a single item. The Committee heard comments from the submitter along with a list of benefits to using a master meter as the standard in testing meters used in applications to measure CNG, LNG, and LPG in comparison to using volumetric or gravimetric standards. The Committee also heard a number of comments, which were reiterated and summarized at its 2015 Annual Meeting regarding additional issues that must be carefully considered. See the Committee's 2016 Interim Report for details on discussions leading up to the 2016 NCWM Annual Meeting. At the NCWM Annual Meeting, the S&T Committee agreed to maintain these two items as developing items to allow the submitter time to address the comments received.

At the 2016 Sector Meeting, the Sector will hear an update on any work that has progressed within the subgroup established at the 2015 Sector Meeting. As of the writing of the agenda, the subgroup did not have any information to report.

Discussion:
Regarding the items before the S&T Committee, Sector Chairman, Mr. Mike Keilty (Endress + Hauser) noted that the items before the S&T Committee were previously "Voting" items on the NCWM S&T Committee's agenda, but are now "Developing" items to allow added discussion and input to be gathered. A number of comments were made at the NCWM Annual meeting regarding the proposals before the S&T Committee. Several Sector members concurred that additional development is needed, including how to establish and demonstrate a sufficient degree of accuracy in the test method. Ms. Tina Butcher noted that there was an issue regarding the presentation of proposed language in NCWM Publication 15 and 16 versus the language that was originally submitted by the submitter and noted that the S&T Committee is working with the submitter for clarification on this point. Other more technical issues with the proposal were the need to clarify the type of transfer standard being referenced and the associated error and uncertainty with the test method. Ms. Butcher, Mr. Randy Moses (Wayne), and others noted that there did not appear to be any opposition to the concept of recognizing transfer standards, only that additional work is needed on the technical concerns that have been raised and the language before the item is ready for adoption. Mr. Marc Buttler (Micro Motion) also noted that there is still a need to address the flow rates and times referenced and commented that he had made a proposal from the floor of the NCWM to specify a time of two minutes at the maximum operating flow rate. Ms. Butcher noted an additional concern about the proposed language for the Mass Flow Meters Code, as currently presented, it would not allow testing of compressed natural gas metering systems at the lower flow rates in accordance with the NTEP Examination Procedure Outline for those systems.

The Sector also discussed the carryover item from the Sector's 2015 agenda regarding the development of guidance for the NTEP Laboratories to use in assessing the appropriateness of transfer standards and other alternative test methods during type evaluation testing. Mr. Buttler noted that he developed proposed criteria drawing on "essential elements of traceability" identified by NIST, OWM's Laboratory Metrology Program and circulated a draft guidelines document to the Sector the night before this Sector meeting. Several members noted they did not feel there was adequate time to review the document before commenting on it, and Mr. Keilty suggested the document be re-distributed to other Sector members for review and comment. Ms. Butcher suggested that the small group established at the last Sector meeting continue to work on this issue; noting that the group hadn't had the opportunity to devote much time to the issue since the last Sector meeting.

Ms. Butcher also suggested the Sector (and perhaps the submitter of the S&T Committee item) consider breaking out the criteria in the draft guidelines to address specific metering technologies, starting with the use of mass flow meters used as transfer standards and, once that language and associated guidelines have been adequately developed, then move on to the use of other technologies. Mr. Buttler stated the draft guidelines he has been working on for type evaluation could also be used in routine field inspections.

Decision:
Sector members were generally in support of the concept of using transfer standards for both type evaluation testing and routine field tests, but acknowledged that additional development and details are needed for both the guidelines for NTEP evaluations and the items before the NCWM S&T Committee. The Sector agreed that the draft document developed by Mr. Buttler should be reviewed by sector members and all sector members should provide input on the draft to the small working group established in 2015. The Sector also agreed that the small group and the NTEP laboratories should continue to work on the guidelines and present an updated draft to the Sector for review by the next Sector meeting. A copy of the draft distributed to the Sector via the NCWM Measuring Sector List Serve is included in Appendix B.

NEW ITEMS:

2. Recommendations to Update NCWM Publication 14 to Reflect Changes to NIST Handbook 44.

Source:
NCWM S&T Committee

Background:
At its 101st Annual Meeting, the National Conference on Weights and Measures (NCWM) adopted the following items that will be reflected in the 2017 edition of NIST Handbook 44. These items were included on the Sector's agenda to inform the Measuring Sector of the NCWM actions and to recommend corresponding changes to NCWM Publication 14.

For full details on this issue, including the submitter's justification and recommendations and other background information, please see Appendix A in the S&T Committee's 2016 Interim Report.

A. G-S.1. Identification (Software)

Background:
At the 2016 NCWM Annual Meeting, the NCWM adopted the following changes to General Code Paragraph G-S.1. Identification:

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

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

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

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

or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lowercase.
[Nonretroactive as of January 1, 2003]

(Added 2000) (Amended 2001)

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

(Amended 2003)

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

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

[Nonretroactive as of January 1, 2001]

(d) the current software version or revision identifier for not-built-for-purpose software-based devices~~;~~ **manufactured as of January 1, 2004 and all software-based devices or equipment manufactured as of January 1, 2022;**
~~***[Nonretroactive as of January 1, 2004]***~~

(Added 2003) **(Amended 2016)**

(1) The version or revision identifier shall be:

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

(Added 2006)

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

(Added 2016)

ii. continuously displayed or be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an alternative, permanently marking the version or revision identifier shall be acceptable providing the device does not always have an integral interface to communicate the version or revision identifier.
[Nonretroactive as of January 1, 2022]

(Added 2016)

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

(Added 2006) **(Amended 2016)**

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

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

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

(Amended 1985, 1991, 1999, 2000, 2001, 2003, ~~**and,**~~ 2006**, and 2016)**

Recommendation:
As a result of the changes to General Code Paragraph G-S.1., the Sector was asked to recommend changes to the following NCWM Publication 14 checklists as outlined in the tables below:

- Liquid-Measuring Devices Checklist;
- Hydrocarbon Gas-Vapor Measuring Devices Checklist;
- Cryogenic Liquid-Measuring Devices Checklist;
- ECR Interfaced with RMFD Checklist in NCWM Publication 14.

Liquid Measuring Devices Checklist, Page LMD-20

1. **General**

Code Reference: G-S.1. Identification

Virtually all weighing and measuring equipment must be clearly and permanently marked with, or display, the manufacturer's name or trademark, model designation, and serial number. Service station dispensers, consoles, cash registers interfaced with dispensers, retrofit computing registers, and customer card-activated terminals must all have these markings. As a practical matter, some equipment need not have a serial number. "Satellite" modules in a modular system (e.g., keyboard module and cash drawer) need not have serial numbers because they do not have any "intelligence." A serial number is required in the following circumstances:

Separate Device

A device is capable of operating as a weighing or measuring device without interfacing with or connecting to other components.

Separate Main Element

Primary indicating elements must be marked. The device is a major element in the weighing or measuring system, which means, it is metrologically significant to the operation and/or performance of the system and interfaces with different compatible main elements. Examples include the following: indicating elements, weighing elements, meter registers, meter measuring elements (vehicle tank meters and loading rack meters).

Component

The device is a component in a system, may be used in different models of devices, and is sufficiently complex to warrant a separate evaluation and a separate CC (e.g., load cells and vapor recovery nozzles). Such a device

Liquid Measuring Devices Checklist, Page LMD-20

may or may not be placed into an enclosure with other components of the system. When installed in an enclosure, the complete device must be marked with a serial number, and the one serial number will suffice for the entire collection of components. If not placed in an enclosure with other components, the component must be marked with a serial number.

The following are examples of the application of these criteria:

Retail Motor Fuel Dispensers:

- Whole unit requires a serial number.
- Indicating elements do not require a separate serial number.
- Measuring element does not require a separate serial number.
- The measuring element is metrologically significant because it affects the operation of the system as a whole; however, it is always enclosed in a housing, which has a S/N for the whole device.

Note: *A conventional nozzle on a retail motor fuel dispenser is not a sufficiently complex device to warrant a special type evaluation or a serial number. The nozzle does not affect the accuracy of the delivery. A separate requirement addresses the anti-drain valve. A vapor recovery nozzle does warrant a separate evaluation because it is a complex device, and it does have the potential to affect the accuracy of the device during the normal operation of the device. One model of vapor recovery nozzle can be used on many models of dispensers. The proper operation of a vapor recovery nozzle and system is "important" as defined by federal regulations. Thus, it is reasonable to require a vapor recovery nozzle to be marked with a serial number.*

Vehicle-Tank Meters

- Serial number is required on the meter; it is a major component of the system since it is required for the system to operate.
- Serial number is required on the indicating elements.

Markings:

Equipment must be marked on a surface that is an integral part of the device, and the marking must be visible after installation. If the required information is not positioned in a visible location after installation, a duplicate, permanent identification badge must be located in a visible location after installation. A removable cover is an acceptable location for the required information only if a permanent ID badge is located elsewhere on the device.

The information may be on a metal or plastic plate that is attached with pop rivets, adhesive, or other means, but removable bolts or screws are not permitted. A foil or vinyl badge may be used provided that it is able to survive wear and tear, remains legible, and is difficult to remove. The printing on a foil badge must be easily readable and not easily obliterated by rubbing with a relatively soft object (e.g., the wood of a pencil.).

Liquid Measuring Devices Checklist, Page LMD-20

Location of the information:

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All equipment shall be clearly and permanently marked on an exterior surface that is visible after installation with the following information (prefix lettering may be initial capitals, all capitals, or all lower case)~~:~~

1.4. **Code Reference: G-S.1. (a)**The name, initials, or trademark of the manufacturer or distributor. ☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (b)

1.5. A model identifier that positively identifies the pattern or design of the device. The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word. ☐ Yes ☐ No ☐ N/A

1.5.1. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.) ☐ Yes ☐ No ☐ N/A

1.5.2. The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lower case. ☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (c)

1.6. Except for equipment with no moving or electronic component parts and ~~**not built for purpose, software-based devices**~~ **software**, a non-repetitive serial number. ☐ Yes ☐ No ☐ N/A

1.6.1. The serial number shall be prefaced by the words "Serial Number" or an abbreviation, or a symbol, that clearly identifies the number as the required serial number. ☐ Yes ☐ No ☐ N/A

1.6.2. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.) ☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (d)

Not built-for-purpose, software based devices **shall be marked with the following.**

Liquid Measuring Devices Checklist, Page LMD-20

Note: Effective January 1, 2022, this will apply to all software-based devices (or equipment).

1.7. the current software version **or revision identifier** designation. ☐ Yes ☐ No ☐ N/A

1.7.1. The version or revision identifier shall be prefaced by the word "Version" or "Revision" as appropriate and either word may be followed by the word "Number." ☐ Yes ☐ No ☐ N/A

If the equipment is capable of displaying the version or revision identifier but is unable to meet the formatting requirement, through the NTEP type evaluation process, other options may be deemed acceptable and described in the CC. ☐ Yes ☐ No ☐ N/A

If this option is used, describe the option below:

____

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1.7.2. **The version or revision identifier shall be continuously displayed or be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an alternative, permanently marking the version or revision identifier shall be acceptable providing the device does not always have an integral interface to communicate the version or revision identifier.** ☐ Yes ☐ No ☐ N/A

If this option is used, describe the option below:

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1.7.3. ~~**The a**~~**A**bbreviations for the word "Version" shall, as a minimum, begin with the letter "V." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R." The abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). **Prefix lettering may be initial capitals, all capitals, or all lowercase.** ☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (e)

1.8. An NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number for devices that have (or will have) a CC. ☐ Yes ☐ No ☐ N/A

Liquid Measuring Devices Checklist, Page LMD-20

1.8.1. The number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation for the word "Number." ☐ Yes ☐ No ☐ N/A

1.8.2. The abbreviation for the word "Number" shall as a minimum begin with the letter "N" (e.g., No or No.) ☐ Yes ☐ No ☐ N/A

The device must have an area, either on the identification plate or on the device itself, suitable for the application of the Certificate of Conformance Number. ☐ Yes ☐ No ☐ N/A

If the area for the CC number is not part of an identification plate, then note its intended location below and how it will be applied.

1.8.3. Location of CC Number if not located with the identification information:

____

____

Hydrocarbon Gas Vapor-Measuring Devices (HGVMD) Checklist, Page HGVMD-2:

Identification:

All equipment shall be clearly and permanently marked on an exterior visible surface after installation. It must contain the following information (prefix lettering may be initial capitals, all capitals, or all lower case):

Code Reference: G-S.1. (a)

1.1. The name, initials, or trademark of the manufacturer or distributor. ☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (b)

1.2. A model identifier that positively identifies the pattern or design of the device. The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word. ☐ Yes ☐ No ☐ N/A

1.2.1. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.) ☐ Yes ☐ No ☐ N/A

1.2.2. The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lower case. ☐ Yes ☐ No ☐ N/A

Hydrocarbon Gas Vapor-Measuring Devices (HGVMD) Checklist, Page HGVMD-2:

Code Reference: G-S.1. (c)

1.3. Except for equipment with no moving or electronic component parts and ~~**not built for purpose, software-based devices**~~ **software**, a non-repetitive serial number. ☐ Yes ☐ No ☐ N/A

1.3.1. The serial number shall be prefaced by the words "Serial Number" or an abbreviation, or a symbol, that clearly identifies the number as the required serial number. ☐ Yes ☐ No ☐ N/A

1.3.2. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.) ☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (d)

For not built-for-purpose, software based devices **and all software-based devices (or equipment) manufactured as of January 1, 2022:**

1.4. The current software version designation. ☐ Yes ☐ No ☐ N/A

1.4.1. The version or revision identifier shall be prefaced by the word "Version" or "Revision" as appropriate and either word may be followed by the word "Number." ☐ Yes ☐ No ☐ N/A

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

If this option is used, describe the option below:

____

____

1.4.2. **The version or revision identifier shall be continuously displayed or be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an alternative, permanently marking the version or revision identifier shall be acceptable providing the device does not always have an integral interface to communicate the version or revision identifier.** ☐ Yes ☐ No ☐ N/A

Hydrocarbon Gas Vapor-Measuring Devices (HGVMD) Checklist, Page HGVMD-2:

If this option is used, describe the option below:

____

____

1.4.3. ~~The a~~**A**bbreviations for the word "Version" shall, as a minimum, begin with the letter "V." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R." The abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.) **Prefix lettering may be initial capitals, all capitals, or all lowercase.** ☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (e)

1.5. An NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number for devices that have (or will have) a CC. ☐ Yes ☐ No ☐ N/A

The number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation for the word "Number." ☐ Yes ☐ No ☐ N/A

The abbreviation for the word "Number" shall as a minimum begin with the letter "N" (e.g., No or No.) ☐ Yes ☐ No ☐ N/A

The device must have an area, either on the identification plate or on the device itself, suitable for the application of the Certificate of Conformance Number. If the area for the CC number is not part of an identification plate, then note its intended location below and how it will be applied.

Location of CC Number if not located with the identification information:

____

Cryogenic Liquid Measuring Devices Checklist, Page CLMD-2:

Code Reference: G-S.1. Identification

All equipment shall be clearly and permanently marked on an exterior visible surface after installation. It must contain the following information (prefix lettering may be initial capitals, all capitals, or all lower case):

Cryogenic Liquid Measuring Devices Checklist, Page CLMD-2:

Code Reference: G-S.1. (a)

1.1.	The name, initials, or trademark of the manufacturer or distributor	☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (b)

1.2.	A model identifier that positively identifies the pattern or design of the device. The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word.	☐ Yes ☐ No ☐ N/A
1.2.1.	The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.)	☐ Yes ☐ No ☐ N/A
1.2.2.	The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lower case.	☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (c)

1.3.	Except for equipment with no moving or electronic component parts and ~~**not built for purpose, software-based devices**~~ **software**, a non-repetitive serial number.	☐ Yes ☐ No ☐ N/A
1.3.1.	The serial number shall be prefaced by the words "Serial Number" or an abbreviation, or a symbol, that clearly identifies the number as the required serial number.	☐ Yes ☐ No ☐ N/A
1.3.2.	Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.)	☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (d)

For not built-for-purpose, software based devices **and all software-based devices (or equipment) manufactured as of January 1, 2022:**

1.4.	The current software version designation.	☐ Yes ☐ No ☐ N/A
1.4.1.	The version or revision identifier shall be prefaced by the word "Version" or "Revision" as appropriate and either word may be followed by the word "Number."	☐ Yes ☐ No ☐ N/A

If the equipment can display the version or revision identifier but is unable to meet the formatting requirement, through the

Cryogenic Liquid Measuring Devices Checklist, Page CLMD-2:

NTEP type evaluation process, other options may be deemed acceptable and described in the CC.

If this option is used, describe the option below:

____

1.4.2. **The version or revision identifier shall be continuously displayed or be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an alternative, permanently marking the version or revision identifier shall be acceptable providing the device does not always have an integral interface to communicate the version or revision identifier.**	☐ Yes ☐ No ☐ N/A

If this option is used, describe the option below:

____

____

1.4.3. ~~The a~~**A**bbreviations for the word "Version" shall, as a minimum, begin with the letter "V." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R." The abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.) **Prefix lettering may be initial capitals, all capitals, or all lowercase.**	☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (e)

1.5. An NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number for devices that have (or will have) a CC.	☐ Yes ☐ No ☐ N/A
1.5.1. The number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation for the word "Number."	☐ Yes ☐ No ☐ N/A
1.5.2. The abbreviation for the word "Number" shall as a minimum begin with the letter "N" (e.g., No or No.)	☐ Yes ☐ No ☐ N/A

The device must have an area, either on the identification plate or on the device itself, suitable for the application of the Certificate of Conformance Number. If the area for the CC number is not part of an identification plate, then note its intended location below and how it will be applied.

Cryogenic Liquid Measuring Devices Checklist, Page CLMD-2:

1.5.3. Location of CC Number if not located with the identification information:

____

Electronic Cash Register Interfaced with Retail Motor-Fuel Dispenser Checklist, Page ECRD-1

1. Identification

Code Reference: G-S.1. General

Each cash register must comply with the appropriate NIST Handbook 44 identification requirements.

All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification with the following information (prefix lettering may be initial capitals, all capitals, or all lower case.)

Location of the information:

____

____

Code Reference: G-S.1. (a)

1.1. The name, initials, or trademark of the manufacturer or distributor. ☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (b)

1.2. A model identifier that positively identifies the pattern or design of the device. The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word. ☐ Yes ☐ No ☐ N/A

1.2.1. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.) ☐ Yes ☐ No ☐ N/A

1.2.2. The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lower case. ☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (c)

1.3. Except for equipment with no moving or electronic component parts and ~~**not built for purpose, software-based devices**~~**software**, a non-repetitive serial number

1.3.1. The serial number shall be prefaced by the words "Serial Number" or an abbreviation, or a symbol, that clearly identifies the number as the required serial number. ☐ Yes ☐ No ☐ N/A

Electronic Cash Register Interfaced with Retail Motor-Fuel Dispenser Checklist, Page ECRD-1

1.3.2. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.) ☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (d)

For not built-for-purpose, software based devices **and all software-based devices (or equipment) manufactured as of January 1, 2022:**

1.4. The current software version designation.

1.4.1. The version or revision identifier shall be prefaced by the word "Version" or "Revision" as appropriate and either word may be followed by the word "Number." ☐ Yes ☐ No ☐ N/A

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

If this option is used, describe the option below:

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1.4.2. **The version or revision identifier shall be continuously displayed or be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an alternative, permanently marking the version or revision identifier shall be acceptable providing the device does not always have an integral interface to communicate the version or revision identifier.** ☐ Yes ☐ No ☐ N/A

____

____

1.4.3. Abbreviations for the word "Version" shall, as a minimum, begin with the letter "V." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R." The abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.) **Prefix lettering may be initial capitals, all capitals, or all lowercase.** ☐ Yes ☐ No ☐ N/A

Code Reference: G-S.1. (e)

1.5. An NTEP Certificate of Conformance (CC) Number or a corresponding CC addendum number for devices that have (or will have) a CC. ☐ Yes ☐ No ☐ N/A

Electronic Cash Register Interfaced with Retail Motor-Fuel Dispenser Checklist, Page ECRD-1

1.5.1. The number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation for the word "Number."

1.5.2. The abbreviation for the word "Number" shall as a minimum begin with the letter "N" (e.g., No or No.)

The device must have an area, either on the identification plate or on the device itself, suitable for the application of the Certificate of Conformance Number.

If the area for the CC number is not part of an identification plate, then note its intended location below and how it will be applied.

1.5.3. Location of CC Number if not located with the identification information:

____

____

1.5.4. The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device. ☐ Yes ☐ No ☐ N/A

…

Discussion:
The Sector reviewed the proposed changes outlined in the Recommendation. Several Sector members commented that the application of the 2022 nonretroactive date in the reference to paragraph G-S.1.(d) in the LMD checklist was not clear and changes need to be made to clarify it.

The Sector reviewed draft language under development by the Software (SW) Sector for possible addition to NCWM Publication 14, including a note regarding the separation of metrologically significant software. NTEP Director, Mr. Jim Truex, noted that the Software Sector summary has not been finalized as of the time of the Measuring Sector's meeting and cautioned that the language is not to be distributed. He noted that software experts within the Software Sector indicated that their equipment is already able to comply with the requirements.

After reviewing this information, the Sector considered a proposal to recommend the addition of the following "note" to the checklist after Code Reference G-S.1.1. Location of Marking Information for Not Built for Purpose SW Based Devices, Section 1.; however, the Sector did not agree with this recommendation. The Sector agreed that individual members are encouraged to provide input directly to the SW Sector.

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

Mr. Truex noted that the SW Sector envisions eventually taking responsibility for the software portions of the checklists in NCWM Publication 14, pulling sections from individual checklists into a single checklist that could be used to evaluate software-based systems. While he hasn't yet determined if he supports this concept, he felt it is important to share these thoughts with the Measuring Sector. He also suggested that the above note be included in NCWM Publication 14 now in the General Section of the LMD Checklist right after Section G-S.1.1. Location of Marking Information for Not Built for Purpose SW Based Devices, Section 1.9. He noted that the other Sectors have agreed to the addition of the note and observed that it would be inappropriate for the Measuring Sector to oppose it. Some members indicated that they didn't believe the note would create an issue, but some felt that there was no point to including it. Mr. Mike Keilty expressed reservations about including things in NCWM Publication 14 that are not reflected in NIST Handbook 44. Mr. Joe Eccleston (Maryland) expressed similar concerns and questioned whether it may create conflicts with the current policy.

Mr. Randy Moses (Wayne Refueling) expressed concerns over how this information will be verified, noting that it appears that it will be left to the integrity of the manufacturers to comply with the requirement. He noted he does not oppose the concept, but felt it is important to acknowledge this is a hole in the process and that it needs to be addressed in some fashion.

Multiple members noted that the NTEP evaluation process already relies on an honor system, whereby manufacturers are expected to notify NTEP of metrologically significant changes to software. Mr. Keilty noted the Measuring Sector has made it clear in past meetings that Measuring Sector members are not (generally) software experts. Members' companies have software experts, but those experts are sent to the SW Sector rather than the Measuring Sector to make the best use of their expertise.

Mr. Keilty suggested that Mr. Moses develop a response/comment to be shared with the SW Sector to share these concerns. Mr. Moses indicated he plans to develop comments and send them to the SW Sector and will share his comments with the Measuring Sector members. This will allow others on the Sector to echo the comments or provide their own, depending on whether or not they agree with his thoughts. Mr. Truex encouraged other Measuring Sector members to also share their thoughts with Jim Pettinato and ask for clarifications where needed. This will enable the SW Sector to address and respond to any concerns and assist them in developing criteria that will be better accepted and implemented.

Decision:
The Sector agreed to recommend the proposed modifications to the checklists to reflect the changes to NIST Handbook 44 adopted at the 2016 NCWM Annual Meeting.

The Sector agreed to make the following corrections to the proposed changes to G-S.1.(d) in the LMD Checklist to make it clear that the reference to the 2022 nonretroactive date only applies to the latter part of the sentence.

> **~~For n~~<u>Not</u> built-for-purpose, software based devices <u>shall be marked with the following</u>.**
> **<u>Note: Effective January 1, 2022, this will apply to all software-based devices (or equipment).</u>**

The Sector agreed that the same changes should be made to the other checklists included in the above recommendation. In the interest of brevity of this summary, these changes have been incorporated into the above recommendation rather than repeating the excerpts included in the "Recommendation" section.

B. G-S.9. Metrologically Significant Software Updates

Background:
At the 2016 NCWM Annual Meeting, the NCWM adopted a new General Code Paragraph G-S.9. Metrologically Significant Software Updates as follows:

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

Recommendation:

As a result of the addition of paragraph G-S.9., the Sector is asked to recommend changes to the following NCWM Publication 14 checklists as outlined in the tables below:

- Liquid-Measuring Devices Checklist;
- Hydrocarbon Gas-Vapor Measuring Devices Checklist;
- Cryogenic Liquid-Measuring Devices Checklist;
- ECR Interfaced with RMFD Checklist in NCWM Publication 14.

Note that the recommended changes to the Hydrocarbon Gas-Vapor Measuring Devices Checklist also propose the addition of Code References which appear to have been inadvertently omitted from the checklist, perhaps during an earlier re-organization of the measuring checklists.

Liquid-Measuring Devices Checklist:

Page LMD 25: Modify the title of Code Reference G-S.8. to include a reference to new paragraph G-S.9. Metrologically Significant Software Updates.

Code Reference: G-S.8. Sealing Electronic Adjustable Components; ~~and~~ Provision for ~~Metrologist~~ Sealing ~~of~~ Adjustable Components; **Provision for Metrological Data Change** ~~**or**~~ Audit Trial and **G-S.9. Metrologically Significant Software Updates**.

Note: Also reference specific code requirements for sealing and audit trails including Liquid Measuring Devices Code Paragraph S.2.2., Mass Flow Meters Code Paragraph S.3.5, and other applicable specific code requirements

2.1.8. Electronic adjustable components that affect the performance of a device shall provide for an approved means of security (e.g., data change audit trail) or for physically applying a security seal. ~~**These**~~ **This includes** components ~~**include**~~ **such as** the mechanical adjustment mechanism of meters; the electronic calibration factor and automatic temperature compensator for electronic meter registers**;** selection of pressure of density correction capability, and correction **values~~,~~;** and pulser setting and gallon/liter conversion switches when they may accidentally or intentionally be used to perpetrate fraud**; and software updates that change the metrologically significant software**. ☐ Yes ☐ No ☐ N/A

Page LMD-124: Modify Appendix A as follows to specify that metrologically significant software updates are considered "sealable events."

Typical Features and Parameters to Be Sealed

The following provides examples of configuration and calibration parameters that are to be sealed. The examples are provided for guidance and are not intended to cover all possible parameters.

Calibration Parameters:

Calibration parameters are those parameters whose values are expected to change as a result of accuracy adjustments. Examples include the following:

Liquid-Measuring Devices Checklist:

1. Measuring element adjustments where linearity corrections are used (e.g., flow rate 1 and meter factor 1, flow rate 2 and meter factor 2, etc.)

2. Mass flow meter adjustments for zero adjustments (not simply setting the display to zero) and span settings.

Configuration Parameters:

Configuration parameters are those parameters where the values are expected to be entered once only and not changed after all initial installation settings have been made. Examples include the following:

3. Octane or other blend setting rations (optional in Canada at this time.)

4. Temperature, pressure, density, and other sensor settings for zero, span, and offset values.

5. Measurement units (in Canada, only if not displayed or printed on the primary register)

6. Temperature compensation table, liquid coefficient of expansion, or compressibility factors or tables.

7. Liquid density setting (in Canada, only if not displayed or printed on the primary register) and allowable liquid density input range.

8. Vapor pressure of liquids if used in calculations to establish the quantity.

9. Meter or sensor temperature compensation factors.

10. False or missing pulse limits for dual pulse systems (Canada only.)

11. On/off status of automatic temperature, pressure, or density correction.

12. Automatic or manual data input for sensors.

13. Dual pulse checking feature status on or off.

14. Flow control settings (optional in Canada.)

15. Filtering constants.

16. **Software updates that change the metrologically significant software.**

Typical Features or Parameters to be Sealed	Typical Features or Parameters NOT Required to be Sealed
• Measuring Element Adjustment (both mechanical and electronic) • Linearity Correction Values	• Analog-to-Digital Converters • Quantity Division Value (display resolution) • Double Pulse Counting

• Measurement Units (e.g., gallons to liters) • Octane Blend Setting for Retail Motor Fuel Dispensers • Any Tables or Settings Accessed by the Software or Manually Entered to Establish the Quantity (e.g., specific gravity, pressure, etc.) • Density Ranges • Pulsers • Single Pick-up (magnetic or reluctance) • Temperature Probes and Temperature Offsets in Software • Pressure and Density Sensors and Transducers • Flow Control Settings (e.g., flow rates for slow-flow start, quantity for slow-flow start and stop) • Temperature Compensating Systems (on/off) • Differential Pressure Valves • As a point of clarification, the flow control settings referenced above are those controls typically incorporated into the installations of large-capacity meters (wholesale meters). The reference does not include the point at which retail motor fuel dispenser's slow product flow during a prepaid transaction to enable the dispenser to stop at the preset amount. • **<u>Software updates that change the metrologically significant software.</u>**	• Communications

<u>Hydrocarbon Gas Vapor-Measuring Devices Checklist</u>

<u>Page HGVMD-6:</u> Add "Code Reference" titles to properly reflect references to NIST Handbook 44 and to be consistent with the format used in other portions of the checklist. Add General Code References corresponding to other measuring checklist that are missing from the Hydrocarbon Gas Vapor-Measuring Devices Checklist.

3. Design of Measuring Elements

3.2. **<u>Code Reference: S.2.2.</u> Provision for Sealing.** ☐ Yes ☐ No ☐ N/A
Adequate provision shall be made for applying security seals in such a manner that no adjustment may be made of any measurement element.

3.3. **<u>Code Reference: S.2.3.</u> Maintenance of Vapor State**. ☐ Yes ☐ No ☐ N/A
A device shall be so designed and installed that the product being measured will remain in a vapor state during passage through the meter.

3.4. **<u>Code Reference: S.2.4.</u> Automatic Temperature Compensation.** ☐ Yes ☐ No ☐ N/A
A device may be equipped with an adjustable automatic means for adjusting the indication and registration of the measured volume of vapor to the volume at 15 ° C (60 ° F.)

Hydrocarbon Gas Vapor-Measuring Devices Checklist

4. Design of Discharge Lines

Code Reference: S.3. Design of Discharge Lines.

4.1. **Diversion of Measured Vapor –** No means shall be provided by which any measured vapor can be diverted from the measuring chamber of the meter or the discharge line there from.	☐ Yes ☐ No ☐ N/A

5. ~~**Repeatability of**~~ **Graduations, Indications, and Recorded Representations**

Code Reference: G-S.5.2.1. Analog Indication and Representation.

5.1. **An analog device must have graduations and a suitable indicator to provide an accurate indication of quantity and money values.**

Code Reference: G-S.5.2.3. Size and Character.

Digits used for comparable values must be uniform in size and character, but subordinate values may be displayed in different and less prominent digits than more significant values may be displayed. The latter more likely occurs on analog devices. In digital indications, the digits are usually uniform throughout a particular display. The size of digits differs for different quantities. For example, the quantity and unit price digits may be smaller than the total price digits.

5.2. **Corresponding graduations shall be uniform in size and character.**	☐ **Yes** ☐ **No** ☐ **N/A**
5.3. **Subordinate graduations, indications, and recorded representations shall be appropriately portrayed or designated.**	☐ **Yes** ☐ **No** ☐ **N/A**

Code Reference: G-S.5.2.4. Values

5.4. **Values shall be adequately defined by a sufficient number of figures, words, symbols, or combinations and uniformly placed so that they do not interfere with the accuracy of the reading.**	☐ **Yes** ☐ **No** ☐ **N/A**

Code Reference: G-S.5.2.5. Permanence

5.5. **Graduations, indications, or recorded representations and their defining figures, words, and symbols shall be of such character that they will not easily become obliterated or illegible.**

Code Reference: G-S.5.3. and G-S.5.3.1. Values of Graduated Intervals or Increments

Graduations, digital and analog indications and recorded representations shall be uniform in size, character, and value throughout any series. Graduations must have a regular pattern, and the increments must be consistent. Quantity values shall be defined by the specific unit of measure in use.	☐ **Yes** ☐ **No** ☐ **N/A**
5.6. **Graduations and indications shall be uniform throughout any series.**	☐ **Yes** ☐ **No** ☐ **N/A**
5.7. **Graduations must have a regular pattern and the increments must be consistent.**	☐ **Yes** ☐ **No** ☐ **N/A**
5.8. **Quantity values shall be identified by the unit of measure.**	☐ **Yes** ☐ **No** ☐ **N/A**

Code Reference: G-S.5.4. Repeatability of Indications.

Hydrocarbon Gas Vapor-Measuring Devices Checklist

The quantity measured by a device shall be repeatable within tolerance for the same indication. One condition that may create a problem is that the value of the quantity division may be large relative to the tolerance. A delivery must be within tolerance wherever the delivery is stopped within the nominal indication of the test draft. Meters that may be at the tolerance limit may be out of tolerance at an extreme limit of the nominal quantity indication.

5.9. When a digital indicator is tested, the delivered quantity shall be within tolerance at any point within the quantity-value division for the test draft. ☐ Yes ☐ No ☐ N/A

Code Reference: G-S.5.6. Recorded Representations

5.10. All recorded values shall be digital. See also G-UR.3.3. ☐ **Yes** ☐ **No** ☐ **N/A**

5.11. In applications where recorded representations are required, the customer may be given the option of not receiving the recorded representation.

5.12. For systems equipped with the capability of issuing an electronic receipt, ticket, or other recorded representations, the customer may be given the option to receive any required information electronically (e.g., via cell phone, computer, etc.) in lieu of or in addition to a hard copy. ☐ **Yes** ☐ **No** ☐ **N/A**

The electronic copy is provided:

5.12.1. In lieu of a hard copy of the recorded representation. ☐ **Yes** ☐ **No** ☐ **N/A**

5.12.2. In addition to a hard copy of the recorded representation. ☐ **Yes** ☐ **No** ☐ **N/A**

Describe the options provided:

5.12.3. Via Cell phone. ☐ **Yes** ☐ **No** ☐ **N/A**

5.12.4. Computer. ☐ **Yes** ☐ **No** ☐ **N/A**

5.12.5. Other (describe) ☐ **Yes** ☐ **No** ☐ **N/A**

Code Reference: G-S.5.7. Magnified Graduations and Indications

5.13. Magnified indications shall conform to all requirements for graduations and indications. ☐ **Yes** ☐ **No** ☐ **N/A**

Code Reference: Code Reference: G-S.6. Marking, Operational Controls, Indications and Features

All operational controls, indications, and features shall be clearly and definitely identified. Non-functional keys and annunciators shall not be marked because their marking implies that the key or annunciator is functional and should be inspected or tested by the enforcement official. Keys and operator controls that are visible to a customer in a direct sale transaction shall be marked with words or symbols to the extent that they can aid the customer to understand and make the transaction. Keys that are visible only to the console operator need to be marked only to the extent that a trained operator can understand the function of each key.

Hydrocarbon Gas Vapor-Measuring Devices Checklist

5.14. All operational controls, indications, and features including switches, lights, displays, and push-buttons shall be clearly and definitely identified. The use of approved pictograms or symbols shall be acceptable.	☐ **Yes** ☐ **No** ☐ **N/A**
5.15. All dual function (multi-function) keys or controls shall be marked to clearly identify all functions.	☐ **Yes** ☐ **No** ☐ **N/A**
5.16. Non-functional controls and annunciators shall not be marked.	☐ **Yes** ☐ **No** ☐ **N/A**

Code Reference: G-S.7. Lettering, Readability

5.17. Required markings and instructions shall be permanent and easy to read.	☐ **Yes** ☐ **No** ☐ **N/A**

Code References: G-S.8. Sealing, Electronic Adjustable Components; Provision for Sealing Adjustable Components; and Provision for Metrological Data Change Audit Trail and G-S.9. Metrologically Significant Software Updates.

Note: Also reference specific code requirements for sealing and audit trails including Liquid Measuring Devices Code Paragraph S.2.2., Mass Flow Meters Code Paragraph S.3.5, and other applicable specific code requirements.

5.18. Electronic adjustable components that affect the performance of a device shall provide for an approved means of security (e.g. data change audit trail) or for physically applying a security seal. This includes components such as the mechanical adjustment mechanism of meters; the electronic calibration factor and automatic temperature compensator for electronic meter registers; selection of pressure of density correction capability and correction values; pulser setting and gallon/liter conversion switches when they may accidentally or intentionally be used to perpetrate fraud; and software updates that change the metrologically significant software.

Page HGVMD-14: Modify Appendix A as follows to specify that metrologically significant software updates are considered "sealable events."

Typical Features and Parameters to be Sealed

The following provides examples and configuration and calibration parameters that are to be sealed. The examples are provided for guidance and are not intended to cover all possible parameters.

Calibration Parameters

Calibration parameters are those parameters whose values are expected to change as a result of accuracy adjustments. Examples include the following.

1. Measuring element adjustments where linearity corrections are used (e.g., flow rate 1 and meter factor 1, flow rate 2 and meter factor 2, etc.)
2. Mass flow meter adjustments for zero adjustments (not simply setting the display to zero) and span settings.

Hydrocarbon Gas Vapor-Measuring Devices Checklist

Configuration Parameters

Configuration parameters are those parameters whose values are expected to be entered only once and not changed after all initial installation settings are made. Examples include the following.

1. Octane or other blend setting ratios (optional in Canada at this time.)
2. Temperature, pressure, density, and other sensor settings for zero, span, and offset values.
3. Measurement units (in Canada, only if not displayed or printed on the primary register.)
4. Temperature compensation table, liquid coefficient of expansion, or compressibility factors or tables.
5. Liquid density setting (in Canada, only if not displayed or printed on the primary register) and allowable liquid density input range.
6. Vapor pressures of liquids if used in calculations to establish the quantity.
7. Meter or sensor temperature compensation factors.
8. False or missing pulse limits for dual pulse systems (Canada only.)
9. On/off status of automatic temperature, pressure, or density correction.
10. Automatic or manual data input for sensors.
11. Dual pulse checking feature status on or off.
12. Flow control settings (optional in Canada.)
13. Filtering constants.
14. **Software updates that change the metrologically significant software.**

Hydrocarbon Gas-Vapor Measuring Device Features and Parameters

Typical Features or Parameters to be Sealed	Typical Features or Parameters NOT Required to be Sealed
• Measuring Element Adjustment (both mechanical and electronic) • Linearity Correction Values • Measurement Units (e.g., cubic feet to cubic meters) • Any Tables or Settings Accessed by the Software or Manually Entered to Establish the Quantity (e.g., specific gravity, pressure, etc.) • Density Ranges • Pulsers • Single Pick-up (magnetic or reluctance) • Temperature Probes and Temperature Offsets in Software • Pressure and Density Sensors and Transducers • Flow Control Settings (e.g., flow rates for slow-flow start, quantity for slow-flow start and stop) • Temperature Compensating Systems (on/off) • Differential Pressure Valves • As a point of clarification, the flow control settings	• Analog-to-Digital Converters • Quantity Division Value (display resolution) • Double Pulse Counting • Communications

Hydrocarbon Gas Vapor-Measuring Devices Checklist

referenced above are those controls typically incorporated into the installations of large-capacity meters (wholesale meters). The reference does not include the point at which retail motor-fuel dispenser's slow product flow during a prepaid transaction to enable the dispenser to stop at the preset amount.

- **Software updates that change the metrologically significant software.**

Note: The above examples of adjustments, parameters, and features to be sealed are to be considered "typical" or "normal." This list may not be all inclusive. Some parameters other than those listed, which affect the metrological performance of the device, must be sealed. If listed parameters or other parameters, which may affect the metrological function of the device, are not sealed, the manufacturer must demonstrate that all settings comply with the most stringent requirements for the application of the device (e.g., the parameter does not affect compliance with NIST Handbook 44.)

Section 3.33. of NIST Handbook 44, Code for Hydrocarbon Gas Vapor-Measuring Devices, does not include specific design criteria for electronic audit trails. Based upon G-A.3., Special and Unclassified Equipment, and G-S.8., Provisions for Sealing Electronic Adjustable Components, Table S.2.2. of the Liquid-Measuring Devices Code, Categories of Device and Methods of Sealing, will be applied to the type evaluation of cryogenic devices until specific design criteria are added to Section 3.33. of NIST Handbook 44 for the design of audit trails installed in Hydrocarbon Gas Vapor-measuring devices.

Cryogenic Measuring Devices Checklist:

Page CLMD-6: Modify the title and body of the following code reference to include a reference to new paragraph G-S.9. Metrologically Significant Software Updates.

Code Reference: G-S.8. Sealing Electronic Adjustable Components; ~~and~~ Provision for ~~**Metrologist**~~ Sealing ~~of~~ Adjustable Components; **Provision for Metrological Data Change ~~or~~ Audit Trial and G-S.9. Metrologically Significant Software Updates.**

2.21. Electronic adjustable components that affect the performance of a device shall provide for an approved means of security (e.g. data change audit trail) or for physically applying a security seal. These components include the following: (1) mechanical adjustment mechanism for meters, (2) the electronic calibration factor and automatic temperature compensator for electronic meter registers, (3) selection of pressure for density correction capability and correction values, ~~and~~ (4) pulser setting and gallon/liter conversion switches when they may accidentally or intentionally be used to perpetrate fraud~~.~~**; and (5) software updates that change the metrologically significant software**. ☐ **Yes** ☐ **No** ☐ **N/A**

Page CLMD-19: Modify Appendix A as follows to specify that metrologically significant software updates are considered "sealable events."

Cryogenic Measuring Devices Checklist:

Typical Features and Parameters to Be Sealed

The following provides examples of configuration and calibration parameters that are to be sealed. The examples are provided for guidance and are not intended to cover all possible parameters.

Calibration Parameters

Calibration parameters are those parameters whose values are expected to change as a result of accuracy adjustments. Examples include the following.

1. Measuring element adjustments where linearity corrections are used (e.g., flow rate 1 and meter factor 1, flow rate 2 and meter factor 2, etc.)
2. Mass flow meter adjustments for zero adjustments (not simply setting the display to zero) and span settings.

Configuration Parameters

Configuration parameters are those parameters whose values are expected to be entered only once and not changed after all initial installation settings are made. Examples include the following.

1. Octane or other blend setting ratios (optional in Canada at this time.)
2. Temperature, pressure, density, and other settings for zero, span, and offset values.
3. Measurement units (in Canada, only if not displayed or printed on the primary register.)
4. Temperature compensation table, liquid coefficient of expansion, or compressibility factors or tables.
5. Liquid density setting (in Canada, only if not displayed or printed on the primary register) and allowable liquid density input range.
6. Vapor pressure of liquids if used in calculations to establish the quantity.
7. Meter or sensor temperature compensation factors.
8. False or missing pulse limits for dual pulse systems (Canada only.)
9. On/off status of automatic temperature, pressure, or density correction.
10. Automatic or manual data input for sensors.
11. Dual pulse checking feature status on or off.
12. Flow control settings (optional in Canada.)
13. Filtering constants.
14. **Software updates that change the metrologically significant software.**

<u>Cryogenic Measuring Devices Checklist:</u>

Liquid Measuring Device Features and Parameters

Typical Features or Parameters to be Sealed	Typical Features or Parameters Not Required to be Sealed
• Measuring Element Adjustment (both mechanical and electronic) • Linearity Correction Values • Measurement Units (e.g., gallons to liters) • Octane Blend Setting for Retail Motor Fuel Dispensers • Any Tables or Settings Accessed by the Software or Manually Entered to Establish the Quality (e.g., specific gravity, pressure, etc.) • Density Ranges • Pulsers • Single Pick-up (magnetic or reluctance) • Temperature Probes and Temperature Offsets in Software • Pressure and Density Sensors and Transducers • Flow Control Settings (e.g., flow rates for slow-flow start, quantity for slow-flow start and stop) • Temperature Compensating Systems (on/off) • Differential Pressure Valves • As a point of clarification, the flow control settings referenced above are those controls typically incorporated into the installations of large-capacity meters (wholesale meters). The reference does not include the point at which retail motor-fuel dispenser's slow product flow during a prepaid transaction to enable the dispenser to stop at the preset amount. • **<u>Software updates that change the metrologically significant software.</u>**	• Analog-to-Digital Converters • Quality Division Value (display resolution) • Double Pulse Counting • Communications

Note: The above examples of adjustments, parameters, and features to be sealed are to be considered "typical" or "normal." This list may not be all inclusive. Some parameters other than those listed, which affect the metrological performance of the device, must be sealed. If listed parameters or other parameters, which may affect the metrological function of the device, are not sealed, the manufacturer must demonstrate that all settings comply with the most stringent requirements for the application of the device (e.g., the parameter does not affect compliance with NIST Handbook 44.)

Section 3.33. of NIST Handbook 44, Code for Cryogenic Liquid-Measuring Devices, does not include specific design criteria for electronic audit trails. Based upon G-A.3., Special and Unclassified Equipment, and G-S.8., Provisions for Sealing Electronic Adjustable Components, Table S.2.2. of the Liquid-Measuring Devices Code, Categories of Device and Methods of Sealing, will be applied to the type evaluation of cryogenic devices until specific design criteria are added to Section 3.33. of *NIST Handbook 44* for the design of audit trails installed in cryogenic liquid-measuring devices

Electronic Cash Registers Interfaced with Retail Motor-Fuel Dispensers Checklist:

Page ECRD-6: Modify the title of the following code reference to reflect new paragraph G-S.9. Metrologically Significant Software Updates.

Code Reference: G-S.8. Provision for Sealing Electronic Adjustable Components and G-S.9. Metrologically Significant Software Updates.

Remote controllers, which have the capabilities to electronically adjust components that affect the performance of a device, shall have provisions for approved means of security. *See LMD - Appendix A - Philosophy for Sealing, Typical Features to be Sealed.*

Discussion:
The Sector reviewed the proposed changes to reflect new General Code Paragraph G-S.9. Metrologically Significant Software Updates. Technical Advisor, Ms. Tina Butcher (NIST, OWM), noted that in preparing the proposed changes to reflect G-S.9., she noted that several sections of the Hydrocarbon Gas Vapor Measuring Devices Checklist that were previously in NCWM Publication 14 had been inadvertently omitted from the last several printings. The proposed changes in the "Recommendation" include proposed changes to reinstate these criteria along with additional suggestions for formatting it to reflect the current checklist.

Decision:
The Sector agreed to recommend the proposed changes to the four checklists to reference new paragraph G-S.9. Metrologically Significant Software Updates. The Sector also agreed to recommend the editorial changes proposed by Technical Advisor, Ms. Butcher, to replace sections of the Hydrocarbon Gas Vapor Measuring Devices Checklist that had inadvertently been omitted from previous editions of Publication 14.

C. LMD Code; VTM Code; and LPG & NH_3 - Return to Zero (S&T Committee Items 330-1; 331-1; and 332-1)

(Note: This section was not marked correctly in the original Agenda and should have appeared as sub-section "C" to Item 2 as shown in this summary.)

Background:
At the 2016 NCWM Annual Meeting, the NCWM modified the LMD Code and the LPG and NH_3 Code as follows to specify that primary indications are not permitted to be resettable during a delivery:

LMD Code:

S.1.6.3. Return to Zero.

(a) The primary indicating elements, and primary recording elements if the device is equipped to record, shall be readily returnable to a definite zero indication. However, a key-lock operated or other self-operated device may be equipped with cumulative indicating or recording elements, provided that it is also equipped with a zero-return indicating element.

(b) It shall not be possible to return primary indicating elements, or primary recording elements beyond the correct zero position.

(c) Primary indicating elements shall not be resettable to zero during a delivery.

(Amended 1972 **and 20XX**)

VTM Code:

S.1.1.5. Return to Zero. – Primary indicating elements shall be readily returnable to a definite zero indication. Means shall be provided to prevent the return of primary indicating elements, and of primary recording elements if these are returnable to zero, beyond their correct zero position. **Primary indicating elements shall not be resettable to zero during a delivery.**

LPG NH_3 Code:

S.1.4.2. Return to Zero.

(a) Primary indicating elements shall be readily returnable to a definite zero indication.

(b) Primary recording elements on a stationary retail device shall be readily returnable to a definite zero indication if the device is equipped to record.

(c) Means shall be provided to prevent the return of primary indicating elements and of primary recording elements if these are returnable to zero, beyond their correct zero position.

(d) Primary indicating elements shall not be resettable to zero during a delivery.

(Amended 1990 **and 20XX**)

Recommendation:

The Sector is also asked to consider modifying the LMD Checklist as follows, to reflect the changes to the above three codes with regard to “return to zero” requirements.

LMD Checklist, Checklist and Test Procedures for RMFDs:

Page LMD-37: Modify Code Reference S.1.6.3. as follows:

Code Reference: S.1.6.3. Return to Zero

The primary indicating and recording elements of a retail device shall readily return to a definite zero indication. Key-lock and other self-operated devices must have a zero-return indicating element, but they are not required to have the recording element return to zero. These devices may be equipped with cumulative recording elements. The primary indicating and recording elements shall not go beyond their correct zero position. **Primary indicating elements shall not be resettable to zero during a delivery.**

7.28	Does the device have a primary recording element?	☐ Yes ☐ No ☐ N/A
7.29	The indicating and recording elements of a retail device shall be readily returnable to a definite zero indication.	☐ Yes ☐ No ☐ N/A
7.30	Key-lock and self-operated devices shall have an indicating element that return to zero.	☐ Yes ☐ No ☐ N/A
7.31	Does the device have:	☐ Yes ☐ No ☐ N/A
	7.31.1 A cumulative indicating element?	☐ Yes ☐ No ☐ N/A
	7.31.2 A cumulative recording element?	☐ Yes ☐ No ☐ N/A
7.32	Primary indicating and recording elements shall not go beyond their correct zero position.	☐ Yes ☐ No ☐ N/A
7.33	**Primary indicating elements shall not be resettable to zero during a delivery.**	☐ Yes ☐ No ☐ N/A

<u>LMD Checklist, Checklist and Test Procedures for RMFDs:</u>

Page LMD-58: Modify Code Reference S.1.1.5. as follows:

Code Reference: S.1.1.5. Return to Zero
The primary indicating elements on a vehicle tank meter must be returnable to zero before a delivery. If the register has a printer, it is not required that the printer be returnable to zero. If it is returnable to zero, then neither the indicating nor the recording element shall go beyond their correct zero position. Due to the manner in which vehicle tank meters are operated, the outlet side of the meter shall be automatically or manually pressurized before the indicating and recording elements are set to zero. **<u>Primary indicating elements shall not be resettable to zero during a delivery.</u>**

22.8.	Primary indicating elements shall be readily returnable to a definite zero indication. Means shall be provided to prevent the return of the primary indicating or recording elements beyond their correct zero position.	☐ Yes ☐ No ☐ N/A
22.9.	Automatic or manual means shall be provided to assure that the system on the outlet side of the meter is pressurized before recording an initial zero condition as required by UR.2.1.	☐ Yes ☐ No ☐ N/A
22.10.	A printer shall be so designed that the recording of zero shall reflect the actual initial condition of the meter prior to deliver.	☐ Yes ☐ No ☐ N/A
22.11.	**<u>Primary indicating elements shall not be resettable to zero during a delivery.</u>**	☐ Yes ☐ No ☐ N/A

<u>LMD Checklist, Checklists and Test Procedures for Specific Criteria for LPG LMDs:</u>

Page LMD-64: Modify Code Reference S.1.4.2. Return to Zero as follows:

Code Reference: S.1.4.2. Return to Zero
The primary indicating element on any retail device shall be returnable to zero before a delivery. However, unless the retail device is a retail motor fuel device (or a stationary retail device), the recording element need not be returnable to zero before a delivery. Consequently, a vehicle-mounted Liquefied Petroleum Gas retail meter is not required to have a recording element that is returnable to zero before a delivery. **<u>Primary indicating elements shall not be resettable to zero during a delivery.</u>**

27.13.	Is the device equipped with a recording element?	☐ Yes ☐ No ☐ N/A
27.14.	The primary indicating element shall be capable of being reset to zero before a delivery.	☐ Yes ☐ No ☐ N/A
27.15.	If the device is a retail motor fuel device and includes a printer, it shall be possible to reset the printer to zero before a delivery.	☐ Yes ☐ No ☐ N/A
27.16.	Indicating and recording elements shall not go beyond their correct zero position.	☐ Yes ☐ No ☐ N/A
27.17.	**<u>Primary indicating elements shall not be resettable to zero during a delivery.</u>**	☐ Yes ☐ No ☐ N/A

Discussion/Decision:
The Sector reviewed and agreed to recommend the proposed changes to reflect the changes adopted by the NCWM at the July 2016 Annual Meeting. There was little discussion on these proposed changes. The Sector noted that this subsection was incorrectly lettered in the original agenda.

D. LMD Code Paragraph S.1.6.10. Automatic Timeout for Pay-at-Pump RMFDs (S&T Committee Item 330-2)

(Note: This section was not marked correctly in the original Agenda and should have appeared as sub-section "D" to Item 2 as shown in this summary. Subsequent sections have been renumbered accordingly.)

Background:
At the 2016 NCWM Annual Meeting, the NCWM adopted a new requirement as shown below for RMFDs which are activated by payment at the pump. The new paragraph requires a transaction to time out if the device is not activated within a specified period of time.

> ***S.1.6.10. Automatic Timeout – Pay-At-Pump Retail Motor-Fuel Devices.*** *– Once a device has been authorized, it must de-authorize within two minutes if not activated. Re-authorization of the device must be performed before any product can be dispensed. If the time limit to de-authorize the device is programmable, it shall not accept an entry greater than two minutes.*
> *[Nonretroactive as of January 1, 2017]*
>
> (Added 2016)

Liquid-Measuring Devices Checklist, Additional Checklists and Test Procedures for Card-Activated RMFDs:

Page LMD-79: Modify Code Reference G-S.2. as follows:

Code Reference: G-S.2. Facilitation of Fraud
There is great concern regarding the potential for accidental or intentional fraud when card-activated systems are used in service stations, especially because bank-card-activated systems give direct access to bank accounts.

A card-activated system shall authorize the dispensing of product for not more than ~~three~~**two** minutes of the time between authorization and "handle on" at the dispenser. **Additionally, once a device has been authorized, it must de-authorize within two minutes if not activated.** It shall properly record transactions on the appropriate card account.

When a card-activated system is subjected to power loss of greater than 10 seconds, the dispenser shall deauthorize. Because systems may be installed with separate power lines to the console, card reader, and dispenser, to different parts of the system should be tested with power failures to evaluate the potential for accidental or intentional errors. The appropriate device response depends upon when the power loss occurs during the delivery sequence.

38.3.	The dispenser must de-authorize in not more than ~~three~~**two** minutes if the pump "handle" is not turned on.	☐ Yes ☐ No ☐ N/A
38.4.	**The dispenser must de-authorize in not more than two minutes if not activated.**	☐ Yes ☐ No ☐ N/A
38.5.	If the time limit to ~~deactivate~~**deauthorize** a dispenser is programmable, it shall not accept an entry greater than ~~three~~**two** minutes.	☐ Yes ☐ No ☐ N/A
38.6.	When a power loss greater than 10 seconds occurs after the pump "handle" is on, the dispenser must de-authorize.	☐ Yes ☐ No ☐ N/A

Liquid-Measuring Devices Checklist, Additional Checklists and Test Procedures for Card-Activated RMFDs:

38.7. When there is a loss of power, but the pump "handle" is not on, the dispenser must de-authorize in not more than three minutes. ☐ Yes ☐ No ☐ N/A

Liquid-Measuring Devices Checklist, Additional Checklists and Test Procedures for Card-Activated RMFDs:

Page LMD-80: Modify Section 39. Test Methods as follows:

39. Test Methods

39.1. Authorize the dispenser and, with the pump "handle" on, interrupt power to any part (or all) of the system. The pump should de-authorize immediately. Specifically:

39.1.1. Authorize with a card and turn the "handle" on. Power down briefly then restore power. Try to dispense product, the dispenser must not dispense since the power failure should have de-authorized the dispenser. ☐ Yes ☐ No ☐ N/A

39.2. Authorize the dispenser using a card (leaving handle off), wait more than **~~three~~two** minutes, and try to start the dispenser. It should not start because the authorization should have timed out. Specifically:

39.2.1. Authorize with a card, but do not turn the "handle" on. Power down for more than **~~three~~two** minutes, and then restore power. Try to dispense product, the dispenser should have "timed-out" and not dispense. ☐ Yes ☐ No ☐ N/A

39.2.2. Authorize and dispense with card #1. Allow the system to time out and de-authorize (if it does.) Do not turn off the "handle." Authorize and dispense with card #2. The transactions shall be properly recorded for each card. ☐ Yes ☐ No ☐ N/A

…

For Multi-Hose Dispensers:

… ☐ Yes ☐ No ☐ N/A

39.2.8. Authorize a dispenser with card #1, but do not turn the dispenser "handle" on. Try to authorize the same dispenser with card #2, it should not be accepted until after the **~~three~~two-**minute time-out.

The Sector is also asked to consider modifying Section 54 of the LMD Checklist, which includes a corresponding interpretation of G-S.2. Although the change adopted to the LMD Code does not appear in the Hydrogen Measuring Devices Code, it seems the same logic would apply with regard to interpreting G-S.2.

Liquid-Measuring Devices Checklist, Additional Checklists and Test Procedures for Hydrogen Gas-Measuring Devices:

Page LMD-101: Modify Section 54. Card-Activated Hydrogen Gas-Measuring Devices

Code Reference: G-S.2. Facilitation of Fraud
There is great concern regarding the potential for accidental or intentional fraud when card-activated systems are used in service stations, especially because bank-card-activated systems give direct access to bank accounts. The following criteria and test procedures apply to card-activated retail vehicle fuel dispensers.

A card-activated system shall authorize the dispensing of product for not more than ~~**three**~~**two** minutes of the time between authorization and "control" on at the dispenser. It shall properly record transactions on the appropriate card account.

When a card-activated system is subjected to power loss of greater than 10 seconds, the dispenser shall deauthorize. Because systems may be installed with separate power lines to the console, card reader, and dispenser, the different parts of the system should be tested with power failures to evaluate the potential for accidental or intentional errors. The appropriate device response depends upon when the power loss occurs during the delivery sequence.

Note: The term "control" generically refers to the handle, flapper, start button, on/off switch, or other mechanism used to activate or deactivate the dispenser.

54.1. The dispenser must de-authorize in not more than ~~**three**~~**two** minutes if the pump "control" is not turned on. ☐ Yes ☐ No ☐ N/A

54.2. If the time limit to deactivate a dispenser is programmable, it shall not accept an entry greater than ~~**three**~~**two** minutes. ☐ Yes ☐ No ☐ N/A

Liquid-Measuring Devices Checklist, Additional Checklists and Test Procedures for Hydrogen Gas-Measuring Devices:

Page LMD-102: Modify Section 54. Card-Activated Hydrogen Gas-Measuring Devices

55. Test Methods for Card-Activated Retail Vehicle Fuel Dispensers

55.1. Authorize the dispenser and, with the pump "control" on, interrupt power to any part (or all) of the system. The pump should de-authorize immediately.

55.1.1. Authorize with a card and turn the "control" on. Power down briefly, then restore power. Try to dispense product: the dispenser must not dispense because the power failure should have de-authorized the dispenser. ☐ Yes ☐ No ☐ N/A

55.2. Authorize the dispenser using a card (leaving control off); wait more than ~~**three**~~**two** minutes, and try to start the dispenser. It should not start because the authorization should have timed out. ☐ Yes ☐ No ☐ N/A

55.2.1. Authorize with a card, but do not turn the "control" on. Power down for more than ~~**three**~~**two** minutes, and then restore power. Try to dispense product; the dispenser should have "timed-out" and not dispense. ☐ Yes ☐ No ☐ N/A

55.2.2. Authorize and dispense with card #1. Allow the system to time out and de-authorize (if it does). Do not turn off the ☐ Yes ☐ No ☐ N/A

Liquid-Measuring Devices Checklist, Additional Checklists and Test Procedures for Hydrogen Gas-Measuring Devices:

	"control." Authorize and dispense with card #2. The transactions shall be properly recorded for each card.	
55.2.3.	Authorize with card #1. Turn the "control" on, then off. Authorize with card #2. Dispense product and complete the delivery. Check the printed receipt to verify that the delivery has been properly charged to card #2.	☐ Yes ☐ No ☐ N/A
55.2.4.	Turn the dispenser "control" on, and use a card to authorize the dispenser. Turn the "control" off. After a period of 15 seconds, turn the "control" on. Try to deliver product; the dispenser must not dispense.	☐ Yes ☐ No ☐ N/A
55.2.5.	Authorize with card #1 (do not turn the "control" on) and interrupt power for at least 10 seconds. This should de-authorize the dispenser. Resupply power; turn the "control" on; try to dispense. The dispenser shall not deliver product.	☐ Yes ☐ No ☐ N/A
55.2.6.	Authorize with card #1 (turn the "control" on) and interrupt power for at least 10 seconds. This should de-authorize the dispenser. Resupply power; turn the "control" on; try to dispense. The dispenser shall not deliver product.	☐ Yes ☐ No ☐ N/A
	Note: This test is not required if the device under test complies with paragraph 10.1.	
55.2.7.	Authorize a dispenser with card #1, but do not turn the dispenser "control" on. Try to authorize the same dispenser with card #2; it should not be accepted until after the ~~3~~**two-** minute time-out.	☐ Yes ☐ No ☐ N/A
55.3.	Attempt to override or confuse the card system by varying the length of time the card is in the slot, (e.g., vary the "swipe" times) and pushing all other keys on the keypad during each step of the authorization process.	☐ Yes ☐ No ☐ N/A

Discussion/Decision:
The Sector reviewed and agreed to recommend the proposed changes to reflect the changes adopted by the NCWM at the July 2016 Annual Meeting. There was little discussion on these proposed changes. The Sector noted that this subsection was incorrectly lettered in the original agenda.

E. LMD and VTM Codes - Verification of Linearization Factors (S&T Committee Items 330-3 and 331-4)

Background:
At its 2016 Annual Meeting, the NCWM adopted the following changes to the LMD Code and the VTM Code to add a test note pertaining to the testing of metering systems using linearization factors. A corresponding user requirement was added to each code to describe the user's responsibilities when making adjustments to systems with these capabilities.

LMD Code:

> **N.4.5. Verification of Linearization Factors. -** All enabled linearization factors shall be verified. The verification of enabled linearization factors shall be done through physical testing, or a combination of physical testing and empirical analysis at the discretion of the official with statutory authority.

VTM Code:

> **N.4.6. Verification of Linearization Factors. -** All enabled linearization factors shall be verified. The verification of enabled linearization factors shall be done through physical testing, or a combination of physical testing and empirical analysis, at the discretion of the official with statutory authority.

The submitter of these items also worked with a group of experts in the community to develop a document providing guidance on conducting an empirical analysis and presented the document to the S&T Committee for consideration. A copy of this document is included in Appendix C to this meeting summary and is titled "Guidance on Empirical Analysis." Comments received suggested getting additional input from the community on the guidance document, including input from the Measuring Sector, and providing the final document to NIST for incorporation in metering Examination Procedure Outlines as appropriate.

Recommendation:
The Sector is asked to discuss whether or not additional criteria is needed for addition to NCWM Publication 14 with regard to the evaluation of systems including linearization factors, possibly in the Field Evaluation and Permanence Testing for Metering Sections of the LMD Checklist. Presently the only references in the checklist with regard to linearization are a reference to the inclusion of multi-point calibration capability as a feature on a CC where applicable (See Technical Policy Section A. Type Evaluation Test Location, Installations Criteria, and Certificate of Conformance) and Technical Policy Section G. Range of Data Points (see below).

G. Range of Data Points

The number and types of tests to be run on devices covered under this checklist are specified in the Checklist and Test Procedures section and the Field Evaluation and Permanence Tests for Metering Systems section of this checklist. However, if the NTEP laboratory feels that there is a performance or other NIST Handbook 44 related problem and provides reasons to support this belief, the laboratory is given the latitude to require additional testing.

A measuring element may use factory-established linearization curves to establish the minimum flow range (5:1, 10:1, or as required), providing the linearization programming is installed during manufacturing and the programming cannot be altered after leaving the factory.

Auxiliary equipment (e.g., indicator or register) with programmable multi-point calibration that alters the output signal from the measuring element to extend the flow range of the system beyond the measuring element's required minimum flow range may be used and the auxiliary device's multi-point calibration will be noted on the Certificate of Conformance and must be marked on the meter.

The Sector is also asked to review the guidance document "Guidance on Empirical Analysis" and provide input on its contents.

Discussion:
Technical Advisor, Ms. Tina Butcher, suggested that the Sector consider whether or not additional guidance is needed in NCWM Publication 14 to address controllers with multi-point calibration. Mr. Dmitri Karimov (Liquid Controls), Mr. Rich Miller (FMC), and others noted that the guidelines weren't intended for type evaluation and suggested that the guidelines be ignored for type evaluation. Mr. John Roach (California) concurred and noted that they test at all points across the range of the meter. Mr. Allen Katalinic (North Carolina) noted he is uncomfortable simply eliminating testing based on data alone. Ms. Butcher noted that, during the discussions of this issue within the NCWM, NIST, OWM suggested that it be included as part of the NIST EPO and suggested that added input on the guidelines be sought from others in the community as well as the Measuring Sector, the

Meter Manufacturers Association (noting that many of its members were part of the group that developed the guidelines), and others who may have an interest. She also suggested a clear explanation of how to translate a meter factor into a meter error so that officials can appropriately assess the result of different meter factors through the flow range of a system.

In discussing the item, the Sector initially agreed that the criteria provided in the guidance document is unnecessary during type evaluation. During type evaluation, the evaluating laboratories conduct physical testing on all linearization factors programmed into a metering system. The Sector also suggested that additional explanation be provided in the guidance document regarding how to compare meter factors. Individual Sector members are also encouraged to provide comments on the guidance document to the Technical Advisor and to the Chairman of the Work Group that developed the document.

After considering the criteria overnight, the Sector renewed its discussion of the item. Several NTEP Laboratory representatives commented that it would be beneficial to have something in NCWM Publication 14 to describe how to handle multi-point calibration capability during type evaluation. Several Sector members noted that there are differences in how various systems and technologies handle linearization. Mr. Rich Miller (FMC) shared a copy of Measurement Canada's Approval Procedure for Linearization Functions Incorporated in Measuring Instruments and suggested that the Sector consider this in its assessment. He expressed concern about how poor performance of a particular meter could reflect negatively on the performance of an indicator. Ms. Butcher noted that there are two issues for the Sector to consider: 1) The group that developed the guidance document *for use in routine field testing* submitted to the NCWM in July 2016 would appreciate feedback from people with expertise in metering systems, particularly the Measuring Sector members; and 2) There appears to be a need to further define/document how linearization capability is addressed in type evaluation with regard to how the feature will be evaluated so that there is consistency among type evaluations.

Decision:
Sector members are asked to review the guidelines presented by the small working group that presented the draft guidelines to the NCWM and provide input as it applies to field testing.

The Sector agreed that more definitive criteria is needed in Publication 14 to define how linearization factors are to be addressed during type evaluation. The labs currently address this feature in the same way, but agree it needs to be documented.

The Sector acknowledged there is a document from Measurement Canada that could form the basis for this criterion. The Sector also noted that there is a draft checklist for indicators that is close to completion and that this type of criteria might be included in that document. Several members volunteered to work on finalizing this checklist and including criteria for evaluating indicators with linearization features.

The following members agreed to work on this project:

- Rich Miller (FMC)
- Allen Katalinic (North Carolina)
- Joe Eccleston (Maryland)

Allen and Rich agreed to co-chair the group. Others who are interested in working on this are encouraged to contact Allen.

The Sector agreed that this item should be included as a carryover item and that this group will work on finalizing the electronic indicators checklist, including additional guidance on linearization features.

F. Table S.2.2. Categories of Sealing and Methods of Sealing (S&T Committee Items 331-2; 332-4; 334-1; 335-1; 337-1; 338-1; 339-1) – VTM, LPG, Cryogenic LMD, Milk Meters, MFM, CO2, and Hydrogen Gas Metering Codes

Background:
At the 2016 NCWM Annual Meeting, the NCWM adopted changes to the requirements for event loggers in the VTM, LPG, Cryogenic LMD, Milk Meters, MFM, CO2, and Hydrogen Gas Metering Codes. For systems requiring the use of an event logger, the system may offer an electronic copy of the log in addition to the required hard copy. This does not replace the need for such systems to provide for a hard copy, but recognizes that an electronic copy may also be provided.

The following shows the changes that were adopted to Tables S.2.2. of the VTM Code. Similar changes were made to the other codes referenced; in the interest of brevity, these changes are not shown below, but can be viewed in the Committee's 2016 Interim Report.

For full details on this issue, including the submitter's justification and recommendations and other background information, please see Appendix A in the S&T Committee's 2016 Interim Report.

Recommendation:
The Sector is asked recommend changes to the LMD Checklist in NCWM Publication 14 checklists as outlined in the tables below to reflect the new paragraph:

Table S.2.2.
Categories of Device and Methods of Sealing

Categories of Device	***Methods of Sealing***
Category 1: No remote configuration capability.	*Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.*
Category 2: Remote configuration capability, but access is controlled by physical hardware. *The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.*	*The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are located in the system controller rather than at the individual device, means must be provided to generate a hard copy of the information through an on-site device.*
Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password). *The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.*	*An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available* ***<u>on demand</u>*** *through the device or through another on-site device.* ***<u>The information may also be available electronically.</u>*** *The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)*

[Nonretroactive as of January 1, 1995]

(Table Added 2006) **<u>(Amended 20XX)</u>**

Recommendation:
As a result of the changes outlined above, the Sector is asked recommend changes to the following NCWM Publication 14 checklists as outlined in the tables below:

- Liquid-Measuring Devices Checklist;
- Hydrocarbon Gas-Vapor Measuring Devices Checklist;
- Cryogenic Liquid-Measuring Devices Checklist;

Liquid-Measuring Devices Checklist:

Page LMD-28: Modify Code Reference G-S.8. as follows:

Category 3 Devices (Devices with Unlimited Remote Configuration Capability):

Category 3 devices have virtually unlimited access to sealable parameters or access is controlled though a password.

2.36.	For devices manufactured after January 1, 2001, the device must either:	
2.37.	Clearly indicate when it is in the remote configuration mode. **OR**	☐ Yes ☐ No ☐ N/A
	2.37.1. The device shall not operate while in the remote configuration mode.	☐ Yes ☐ No ☐ N/A
2.38.	The device is equipped with an event logger.	☐ Yes ☐ No ☐ N/A
2.39.	The event logger automatically retains the identification of the parameter changed, the date and time of the change, and the new value of the parameter.	☐ Yes ☐ No ☐ N/A
2.40.	Event counters are non-resettable and have a capacity of at least 000 to 999.	☐ Yes ☐ No ☐ N/A
2.41.	The system is designed to attach a printer, which can print the contents of the audit trail. **<u>In addition to the hard copy, the information may also be made available electronically.</u>**	☐ Yes ☐ No ☐ N/A
2.42.	The audit trail information must be capable of being retained in memory for at least 30 days while the device is without power or must be retained in nonvolatile memory.	☐ Yes ☐ No ☐ N/A
2.43.	The event logger must have a capacity to retain records equal to ten times the number of sealable parameters in the device, but not more than 1000 records are required.	☐ Yes ☐ No ☐ N/A
2.44.	The event logger drops the oldest event when the memory capacity is full and a new entry is saved.	☐ Yes ☐ No ☐ N/A
2.45.	Describe the method used to seal the device or access the audit trail information:	☐ Yes ☐ No ☐ N/A

____

____

Page LMD-128: Modify Table S.2.2. as follows:

Table S.2.2. Categories of Device and Methods of Sealing

Categories of Device	Method of Sealing
Category 1: No remote configuration capability.	Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.
Category 2: Remote configuration capability, but access is controlled by physical hardware. Device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.	[The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are in the system controller rather than at the individual device, means must be provided to generate a hard copy of the information through an on-site device.] [Non-retroactive as of January 1, 1996.]
Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password.) The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.	An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available **on demand** through the device or through another on-site device. **The information may also be available electronically.** The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1000 records are required. (**Note:** Does not require 1000 changes to be stored for each parameter.)

Hydrocarbon Gas-Vapor Measuring Devices Checklist:

Page HGVMD-8: Modify Section 5.27. as follows:

Category 3 Devices (Devices with Unlimited Remote Configuration Capability):
Category 3 devices have virtually unlimited access to sealable parameters or access is controlled though a password.

….

5.27.	The system is designed to attach a printer, which can print the contents of the audit trail. **In addition to the hard copy, the information may also be made available electronically.**	☐ Yes ☐ No ☐ N/A

…

Cryogenic Liquid-Measuring Devices Checklist:

Page CLMD-8: Modify Section 2.43. as follows:

Category 3 Devices (Devices with Unlimited Remote Configuration Capability):
Category 3 devices have virtually unlimited access to sealable parameters or access is controlled though a password.

…

2.4.3.	The system is designed to attach a printer, which can print the contents of the audit trail. **In addition to the hard copy, the information may also be made available electronically.**	☐ Yes ☐ No ☐ N/A

…

Discussion:
Mr. Keilty reviewed the changes made at the July 2016 NCWM Annual Meeting relative to sealing. There was some discussion regarding the use of a flash drive to transfer event logger information to another on-site device for the purposes of printing a hard copy of the event log. While this approach wasn't part of the original discussion of audit trail criteria, some were amenable to permitting this method of printing the event logger information.

Decision:
The Sector agreed to recommend the changes proposed to the checklist to reflect the changes adopted at the 2016 NCWM Annual Meeting ("Report of the 101st National Conference on Weights and Measures.")

www.nist.gov/pml/weights-and-measures/ncwm-2016-annual-report-sp-1212

G. LPG Code Updates - S.1.4.3. Power Loss, etc. (S&T Committee Item 332-2)

Background:
At the 2016 NCWM Annual Meeting, the NCWM adopted numerous changes to the LPG and NH_3 Code to align requirements for retail motor-fuel applications with those in the LMD Code. In the interest of brevity, the Sector is referred to the S&T Committee's Interim Report beginning on page S&T - 28.

Recommendation:
The Sector is asked to consider recommending the following changes to the LMD Checklist to reflect the changes to the LPG and NH_3 Code outlined in the Background above.

LMD Checklist, Checklist and Test Procedures for LPG LMDs:

Page LMD-64: Modify Code Reference S.14.1. Indication of Delivery as follows.

Code Reference: S.1.4.1. Indication of Delivery

27.12.	A retail device shall automatically show **on its face the** ~~its~~ initial zero condition and the ~~**amount**~~**quantity** delivered up to normal capacity of the device.	☐ Yes ☐ No ☐ N/A
27.13.	**The measurement, indication of delivered quantity, and the indication of total sales price shall be inhibited until the fueling position reaches conditions necessary to ensure that the delivery starts at zero.**	☐ Yes ☐ No ☐ N/A

LMD Checklist, Checklist and Test Procedures for LPG LMDs:

Page LMD-65: Modify Code Reference S.1.5.1. Display of Unit Price and Product Identity.

Code Reference: S.1.5.1. Display of Unit Price and Product Identity
A computing or money-operated device shall ~~**have a means for**~~ display~~**ing**~~ on ~~**its**~~**each** face the unit price at which it is set to compute or deliver, expressed as a decimal value in dollars. Means shall be provided to **display on each side of the device**~~**post**~~ the identity of the product grade, blend, or mixture of product being dispensed.

Except for dispensers intended to be limited for use exclusively for fleet sales and other price contract sales, all of the unit prices at which that product is offered for sale shall meet the following conditions:

(1) **For a system that applies a discount prior to the delivery, all unit prices shall be displayed or shall be capable of being displayed on the dispenser through a deliberate action of the purchaser prior to the delivery of the product. It is not necessary that all of the unit prices be simultaneously displayed prior to the delivery of the product.**

(2) **For a system that offers post-delivery discounts on fuel sales, display of pre-delivery unit price information is exempt from (1) above, provided the system complies with S.1.5.5. Recorded Representations for Transactions Where a Post-Delivery Discount(s) is Provided.**

Note: When a product is offered at more than one-unit price, display of the unit price information may be through the deliberate action of the customer: 1) using controls on the device; 2) through the customer's use of personal or vehicle-mounted electronic equipment communicating with the system; or 3) verbal instructions by the customer.

28.1.	Means shall be provided to display the unit price on ~~**the**~~**each** face of the device.	☐ Yes ☐ No ☐ N/A

LMD Checklist, Checklist and Test Procedures for LPG LMDs:

28.2.	The unit price shall be expressed in dollars and decimals of dollars using a dollar sign. A common fraction shall not appear in the unit price, (e.g., $1.299 not $1.29 9/10.)	☐ Yes ☐ No ☐ N/A
28.3.	The unit price cannot be changed while the dispenser is activated.	☐ Yes ☐ No ☐ N/A
28.4.	Means shall be provided to ~~post~~**display** on **each**~~the~~ side of the device the product identity, grade, brand, blend, or mixture of product being dispensed.	☐ Yes ☐ No ☐ N/A
28.5.	**If a grade, brand, blend, or mixture is offered for sale at more than one-unit price from a device, then all of the unit prices at which that product is offered for sale:**	
28.5.1.	**Shall be displayed prior to the delivery of the product. OR**	☐ Yes ☐ No ☐ N/A
28.5.2.	**Shall be capable of being displayed on the dispenser through the deliberate action of the purchaser using: 1) controls on the device; 2) personal or vehicle mounted electronic equipment communicating with the system; or 3) verbal instructions**	☐ Yes ☐ No ☐ N/A

Note: It is not necessary to simultaneously display all of the unit prices for all grades, brands, blends, or mixtures provided the dispenser complies with this section, S.1.5.1.

Note: For a system that offers post-delivery discounts on fuel sales, display of pre-delivery unit price information is exempt from 28.5, provided the system complies with S.1.5.5. Recorded Representations for Transactions Where a Post-Delivery Discount(s) is Provided.

28.6.	**The unit prices for each product and price level may be:**	☐ Yes ☐ No ☐ N/A
28.6.1.	**Displayed simultaneously for all products.**	☐ Yes ☐ No ☐ N/A
28.6.2.	**Displayed simultaneously for each product separately.; or**	☐ Yes ☐ No ☐ N/A
28.6.3.	**Displayed individually in a unit-price display only if controls permit the customer to sequence the display through the unit prices for each and every product.**	☐ Yes ☐ No ☐ N/A

Note: Section 28.5 shall not apply to fleet sales, other contract sales, or truck refueling sales (e.g. sales from dispensers used to refuel trucks.)

LMD Checklist, Checklist and Test Procedures for LPG LMDs:

Page LMD-63: Modify Code Reference G-S.5.2.2. Digital Indications and Representations to reference new LPG and NH3 Code Paragraph S.1.5.3. Agreement Between Indications. Note that this language is based on that in the LMD Checklist beginning on page LMD-33.

Code References: G-S.5.2.2. Digital Indication and Representation; S.1.5.3. Agreement Between Indications

Basic operating requirements for devices are that:

- **All digital values of like value in a system shall agree.**

LMD Checklist, Checklist and Test Procedures for LPG LMDs:

- **A digital value shall agree with its analog representation to the nearest minimum graduation.**
- **Digital values shall round off to the nearest digital division that can be indicated or recorded.**
- **When a digital zero display is provided, the zero indication shall consist of at least one digit to the left and all digits to the right of the decimal point.**

Due to limitations of some of the technologies used to transmit information from dispensers to service station consoles, some exceptions to these rules have been given to the indications on retail motor fuel dispensers and service station consoles. Exact agreement of digital quantity values is not required if only total price information is sent from the dispenser to the console. In these cases, the console calculates the quantity from the unit price set in the console. Consequently, the quantity indicated on the console may not agree exactly with the quantity indicated on the dispenser. However, if the console prints a customer receipt, then the quantity times unit price must equal the total price on both the dispenser and the printed receipt. In 2016, provisions were added to the LPG and NH_3 Code to allow systems to apply post-delivery discounts. In cases where a system applies a post-delivery discount(s) to a fuel's unit price through an auxiliary element, the exception mentioned above does not apply and, therefore, the total volume quantity of the delivery shall be in agreement between all elements in the system. *See LPG and NH_3 Code S.1.5.3.* The money value indication prior to the application of any post-delivery discount for dispensers and consoles must agree for all installations.

For those systems consisting of a console and dispensers and equipped with pre-set volume, the dispenser must deliver at least the pre-set volume; it cannot deliver less. For example, if the console sends only the money equivalent of the pre-set volume to the dispenser, the dispenser shall deliver at least the pre-set volume. It may not stop at the first quantity amount that results in mathematical agreement with the money value equivalent of the pre-set volume if the quantity indication is less than the pre-set volume. Similarly, if a money value is pre-set, the dispenser is not properly designed if it always stops at the lowest quantity value that provides mathematical agreement with the pre-set money value.

Tests for agreement of digital values shall be performed in the post pay, prepay money, and pre-set volume modes. Agreement should be checked at several unit prices including the maximum unit price and with the dispenser operating at its maximum flow rate.

Code Reference: G-S.5.2.2. Digital Indication and Representation

27.3. Basic operating requirements:

~~**27.3.1. All digital values of like value in a system shall agree.**~~ ~~☐ Yes ☐ No ☐ N/A~~

~~**27.3.2. A digital value shall agree with its analog representation to the nearest minimum graduation.**~~ ~~☐ Yes ☐ No ☐ N/A~~

~~**27.3.3. Digital values shall round off to the nearest digital division that can be indicated or recorded.**~~ ~~☐ Yes ☐ No ☐ N/A~~

~~**27.3.4. When a digital zero display is provided, the zero indication shall consist of at least one digit to the left and all digits to the right of the decimal point.**~~ ~~☐ Yes ☐ No ☐ N/A~~

~~**Agreement of indications shall be checked for several deliveries. Check the totalizer for accuracy and agreement with individual deliveries and with other totalizers in the system. Indications may disagree if digital indicators receive quantity pulses from a non-resettable pulsar.**~~

27.**43**.1. All digital values of like values in a system agree with one another. ☐ Yes ☐ No ☐ N/A

LMD Checklist, Checklist and Test Procedures for LPG LMDs:

27.~~5~~**3**.2.	Digital values coincide with associated analog values to the nearest minimum graduation.	☐ Yes ☐ No ☐ N/A
27.~~6~~**3**.3.	Digital values "round off" to the nearest minimum unit that can be indicated or recorded.	☐ Yes ☐ No ☐ N/A
27.~~7~~**3**.4.	The device totalizer shall agree with the total of the individual deliveries and with other totalizers in the system.	☐ Yes ☐ No ☐ N/A
27.3.5.	**All total sale money value indications in a computing system are primary indications and must agree prior to the application of any post-delivery discount.**	☐ **Yes** ☐ **No** ☐ **N/A**
27.3.6.	**Digital volume indications in a non-computing system must agree or "round off" to the nearest minimum unit that can be indicated or recorded.**	☐ **Yes** ☐ **No** ☐ **N/A**
27.3.7.	**Manual quantity entries in invoice billing systems must be identified as such.**	☐ **Yes** ☐ **No** ☐ **N/A**

For stationary retail devices:

27.4.	**When delivery from a stationary retail computing device is based upon a pre-set volume, the quantity indicated on the dispenser and any auxiliary device must be equal to or greater than the pre-set volume and the dispenser and remote console must comply with G-S.5.5. Money Values, Mathematical Agreement.**	☐ **Yes** ☐ **No** ☐ **N/A**
27.5.	**The quantity, unit price, and total price indications on the console shall be in mathematical agreement prior to the application of any post-delivery discount.**	☐ **Yes** ☐ **No** ☐ **N/A**
27.6.	**The following applies when a quantity value indicated or recorded by an auxiliary element such as a console, ticket printer, or remote customer display, is a derived or computed value based on data received from a retail motor fuel dispenser. When a system applies a post-delivery discount(s) to a fuel's unit price through an auxiliary element, the total volume of the delivery shall be in agreement between all elements in the system.**	☐ **Yes** ☐ **No** ☐ **N/A**
27.11.1.	**In systems that do not apply a post-delivery discount the quantity values indicated or recorded on a console, electronic cash register, or other auxiliary indicating or recording element may differ, however, for all systems:**	☐ **Yes** ☐ **No** ☐ **N/A**
27.11.1.1.	**All indicated or recorded total money values for an individual sale shall agree. AND**	☐ **Yes** ☐ **No** ☐ **N/A**
27.11.1.2.	**The indicated or recorded quantity, unit price, and total sales price values shall be in mathematical agreement to the closest cent (e.g., within each element, the values indicated or recorded must meet the formula [quantity x unit price = total sales price] to the closest cent.)** **Examples: $1.5549 rounds to $1.55**	☐ **Yes** ☐ **No** ☐ **N/A**

LMD Checklist, Checklist and Test Procedures for LPG LMDs:

$1.5551 rounds to $1.56
$1.5550 rounds to either $1.55 or $1.56

27.7.	**The printed ticket and dispenser must comply with G.S.5.5. Money Values, Mathematical Agreement to the nearest cent (unit price × volume = total sale ± 0.5 cent.)**	☐ Yes ☐ No ☐ N/A
27.8.	**Digital values agree with their associated analog value to the nearest minimum graduation.**	☐ Yes ☐ No ☐ N/A

Page LMD-66: Modify Code Reference S.1.5.3. Recorded Representations, Point of Sale Systems and add a new paragraph reference as follows to reflect new paragraphs S.1.5.4. Recorded Representations and S.1.5.5. Recorded Representations for Transactions Where a Post-Delivery Discount(s) is Provided.

~~**Code Reference: S.1.5.3. Recorded Representations, Point-of-Sale Systems**~~

~~**28.13.**~~	~~**A printed receipt providing the following information is available through a built-in or separate recording element for all transactions conducted with point-of-sale systems or devices activated by debit cards, credit cards, and/or cash. This does not apply to fleet sales and other price contract sales.**~~	~~☐ Yes ☐ No ☐ N/A~~
	~~**28.13.1. The total volume of the delivery printed.**~~	~~☐ Yes ☐ No ☐ N/A~~
	~~**28.13.2. The unit price printed.**~~	~~☐ Yes ☐ No ☐ N/A~~
	~~**28.13.3. The total computed price printed.**~~	~~☐ Yes ☐ No ☐ N/A~~
	~~**28.13.4. The product identity by name. symbol, abbreviation, or code number.**~~	~~☐ Yes ☐ No ☐ N/A~~

Code References: S.1.5.4. Recorded Representations; and S.1.5.5. Recorded Representations for Transaction Where a Post-Delivery Discount(s) is Provided. ~~☐ Yes ☐ No ☐ N/A~~

Except for fleet sales and other price contract sales, for transactions conducted with point-of-sale systems or devices activated by credit cards, debit cards, or cash, a printed receipt containing information about the transaction shall be available to the customer as outlined in the following items. A printed receipt must always be available to the customer upon request and printing of the receipt may be initiated at the option of the customer. In addition, some systems may be equipped with the capability to issue an electronic receipt; for those systems, the customer may be given the option to receive the receipt electronically (e.g., via cell phone, computer, etc.). See also NCWM Publication 14, Code Reference: G-S.5.6. Recorded Representations. ~~☐ Yes ☐ No ☐ N/A~~

Device capabilities: ☐ **Printed Receipt** ☐ **Electronic Receipt**

28.13. The system must provide a receipt to be made available to the customer at the completion of the transaction through either:

28.13.1. a built-in recording element OR ☐ Yes ☐ No ☐ N/A

Page LMD-66: Modify Code Reference S.1.5.3. Recorded Representations, Point of Sale Systems and add a new paragraph reference as follows to reflect new paragraphs S.1.5.4. Recorded Representations and S.1.5.5. Recorded Representations for Transactions Where a Post-Delivery Discount(s) is Provided.

28.13.2. a separate recording element that is part of the system	☐ Yes ☐ No ☐ N/A
28.14. Except for transactions where a post-delivery discount is provided, the customer receipt must contain the following information:	☐ Yes ☐ No ☐ N/A
28.14.1. The total volume of the delivery;	☐ Yes ☐ No ☐ N/A
28.14.2. The unit price;	☐ Yes ☐ No ☐ N/A
28.14.3. The total computed price; and	☐ Yes ☐ No ☐ N/A
28.14.4. The product identity by name, symbol, abbreviation, or code number.	☐ Yes ☐ No ☐ N/A
28.15. Where a post-delivery discount(s) is applied, the sales receipt must provide:	☐ Yes ☐ No ☐ N/A
28.15.1. the product identity by name, symbol, abbreviation, or code number;	☐ Yes ☐ No ☐ N/A
28.15.1 the total quantity, unit price, and total computed price that were displayed on the dispenser at the end of the delivery prior to any post-delivery discount(s);	☐ Yes ☐ No ☐ N/A
28.15.1. an itemization of the post-delivery discounts to the unit price; and	☐ Yes ☐ No ☐ N/A
28.15.1. the final total price of each fuel sale after all post-delivery discounts are applied.	☐ Yes ☐ No ☐ N/A

LMD Checklist, Checklist and Test Procedures for LPG LMDs:

Add new code references to include a provision for new LPG and NH3 Code Paragraphs S.1.5.6. Transaction Information, Power Loss and S.1.5.7. Totalizers for Retail Motor-Fuel Dispensers.

Code Reference: S.1.5.6. Provisions for Power Loss

Even if power fails during a delivery, it is still necessary to correctly complete all transactions in progress at the time of the power failure. Quantity and total sales price information shall be recallable for at least 15 minutes after the power failure. The information may be recalled at the dispenser or at the console if the console indications are accessible to the customer. Operator information, such as fuel and money value totals, shall be retained in memory during a power failure. The operator information is not required to be recallable during the power failure, but shall be recallable after power is restored. Test to determine if the indications are accurate when the delivery is continued after a power failure.

Note: For remote controllers (e.g., cash register, console, etc.) which have the capability to retain information pertaining to a transaction (e.g., stacked completed sales.) If the information cannot be recalled at the dispenser following a power outage, means (e.g., uninterruptible power supply or other means) must be provided to enable the transaction information to be recalled and verified for at least 15 minutes following a power outage.

28.16. The quantity and total sales price shall be recallable for 15 minutes after the power failure.	☐ Yes ☐ No ☐ N/A

LMD Checklist, Checklist and Test Procedures for LPG LMDs:

28.17.	**The quantity and total sales price values shall be correct if the power fails between deliveries.**	☐ Yes ☐ No ☐ N/A
28.18.	**The quantity and total sales price values shall be correct if the delivery is continued after a power failure.**	☐ Yes ☐ No ☐ N/A
28.19.	**The operator's information shall be retained in memory during a power failure.**	☐ Yes ☐ No ☐ N/A
28.120.	**Remote controllers which stack completed sales must have a means to enable the transaction information to be recalled and verified for at least 15 minutes.**	☐ Yes ☐ No ☐ N/A

In addition to the above criteria for power, loss, the following applies to evaluations of Cash-Activated LPG Retail Motor-Fuel Dispensers:

In addition to the above checklist complete those portions of Section 15. of LMD Checklist, Checklists and Test Procedures for Cash-Activated Retail Motor-Fuel Dispensers which relate to provisions for power loss.

Code Reference: S.1.5.7. Totalizers for Retail Motor-Fuel Dispensers.

28.21.	**Retail motor fuel dispensers shall be equipped with a non-resettable totalizer for the quantity delivered through the metering device.**	☐ Yes ☐ No ☐ N/A

Renumber subsequent checklist items under existing Code Reference S.1.6.1 accordingly.

LMD Checklist, Checklist and Test Procedures for LPG LMDs:

Add a new code reference to reflect the addition of new paragraph S.2.5. Zero-Set-Back Interlock for Stationary Retail Motor-Fuel Devices. Renumber subsequent code references to reflect corresponding changes to those paragraphs in Handbook 44.

Code Reference: S.2.5. Zero-Set-Back Interlock

The zero-set-back interlock on a dispenser is critical to prevent fraudulent practices. A retail motor fuel device shall have an effective automatic interlock such that once the dispenser shuts off, it cannot be restarted without resetting the indicating element to zero. This requirement also applies to the recording element if one is present. The dispenser shall be designed so that the starting lever must be in the shut-off position and the interlock engaged before the discharge nozzle can be returned to its designed hanging position. If a single pump supplies more than one dispenser, then each dispenser shall have an automatic control valve that prevents product from being delivered by a dispenser until its indications have been set to zero.

29.5.	**After the device is turned off by moving the lever that stops the flow, a subsequent delivery shall be prevented until the indicators (and recording element if present) have returned to their correct zero positions.**	☐ Yes ☐ No ☐ N/A

LMD Checklist, Checklist and Test Procedures for LPG LMDs:

29.6. **The starting lever shall be in shut off position and zero-set-back interlock engaged before the nozzle can be returned to its designed hanging position. That is any position where the tip of the nozzle is placed in its designed receptacle and the lock can be inserted.** ☐ **Yes** ☐ **No** ☐ **N/A**

29.7. **If more than one dispenser is connected to a single pump, an automatic control valve shall prevent fuel from being delivered until the indicating elements have been returned to their correct zero position and engaged.** ☐ **Yes** ☐ **No** ☐ **N/A**

29.8. **The use of the interlock shall be effective under all conditions when any control on the console, except a system emergency shut-off, is operating and after any momentary power failure.** ☐ **Yes** ☐ **No** ☐ **N/A**

Renumber existing code references as follows:

Code Reference: S.2.~~5~~6. Thermometer Well

29.~~5.~~**9.** For test purposes, means shall be provided for inserting a thermometer in the meter chamber or immediately adjacent to the meter.

Code Reference: S.2.~~6~~7. Automatic Temperature Compensator

29.~~6.~~**10.** A~~n~~ Liquefied Petroleum Gas meter may be equipped with an automatic temperature compensator. If so equipped, the meter shall be provided with a means for automatically adjusting the indication and registration of the measured volume of the product to the volume at 15 °C (60 °F.)

Code Reference: S.2.~~6~~7.1. Provision for Deactivation

29.~~7.~~**11.** If a device is equipped with only a net indicating and/or recording element (volume compensated to 15 °C (60 °F) provisions must be made to facilitate the deactivation of the automatic temperature-compensating mechanism so that the meter will indicate and/or record the uncompensated volume.

Code Reference: S.2.~~6~~7.2. Provision for Sealing

29.~~8.~~**12.** Automatic temperature compensators must provide for applying security seals to prevent undetected adjustment or disconnection of the compensating system.

Discussion:
The Sector acknowledged the changes proposed in the "Recommendation" above are to reflect the changes made by the NCWM at its July 2016 Annual Meeting. These changes are intended to align the LPG and NH_3 Code with the LMD and other measuring codes.

During discussion of the proposed changes, a question was raised regarding the requirements for including temperature compensating mechanisms in an LPG metering system. Technical Advisor, Ms. Tina Butcher, noted that NIST Handbook 130 states that the method of sale for LPG is the volume corrected/adjusted to the volume at 60 °F. If the LPG is being metered using a system with a maximum flow rate above 20 gpm, the system is required to make the corrections automatically via an automatic temperature compensating mechanism or system. For other metering systems operating at flow rates below this rate, the correction is not required to be made automatically; it can be accomplished manually. She also noted that NIST Handbook 44 is silent as to the method of sale for LPG; Handbook 44 only includes requirements that apply in those instances where automatic temperature compensation is being used. There was some discussion about how to align requirements across the LPG and MFM codes; however, no specific proposal was suggested nor pursued.

Decision:
The Sector agreed to recommend the changes to the checklist proposed in the "Recommendation" above. Sector members agreed that it was a bit difficult to consider changes without having a device in front of them to consider; however, they acknowledged that, should the laboratories and manufacturers feel added changes are needed once they begin applying the revised checklist, additional changes can be proposed at a that time.

H. LPG Code – S.2.1. Vapor Elimination (S&T Committee Item 332-3)

Background:
At the 2016 NCWM Annual Meeting, the NCWM adopted the following changes to the requirements for vent lines on vapor eliminators in the LPG and NH_3 Code (and adopted similar changes in the CO_2 LMD Code) which emphasizes the need for the lines to be made of material that is "non-collapsible."

S.2.1. Vapor Elimination.

(a) A device shall be equipped with an effective **automatic** ~~**vapor eliminator or other effective**~~ means to prevent the passage of vapor through the meter.

(b) Vent lines from the vapor eliminator shall be made of appropriate non-collapsible material.
(Amended 20XX)

Recommendation:
The Sector is asked to consider recommending the following changes to Code Reference 2.21. of the NCWM Publication 14 LMD Checklist which references vapor eliminator vent lines for LPG and NH_3 LMDs. Note that the checklist does not currently include specific requirements for CO_2 LMDs. Additionally, the current text refers to the vent line as a "vapor return line," which generally connotes a different type of line; consequently, the recommendation includes proposed changes to correct this reference.

Since there seems to be general agreement on the criteria for a suitable vent line, the Sector may wish to consider modifying this reference to make a more generic reference to requirements for vent lines on vapor eliminators rather than for LPG and NH_3 systems only. This would eliminate the need to include specific requirements in multiple places in the various measuring checklists. For example, although similar changes were made to a corresponding paragraph in the CO_2 code, the current LMD checklist includes no reference to this requirement. Additionally, there are other sections of the checklist (such as VTMs and Loading-Rack Meters) where similar requirements appear, but the language doesn't currently align with this language.

LMD Checklist:

Page LMD-32, 2016: Modify Code Reference S.2.1. as follows:

27.3.1. Measuring Elements

Code Reference: S.2.1. Vapor Elimination (LPG S.2.1.)
If air enters through a metering system or the product changes into vapor as it passes through the system, then it must be equipped with a vapor eliminator to remove the air or vapor before it passes through the meter. To prevent the ~~**vapor return**~~ **vapor eliminator vent** lines from being pinched closed and re-opened without being detected, the vent lines shall be made of metal tubing or other ~~**rigid material**~~ **appropriate non-collapsible material**. If the system is designed such that air or vapor will not enter the system, then a vapor eliminator is not required. One example is when a product is being pumped from the bottom of a tank and a

LMD Checklist:

low-level detector in the tank shuts off the pump before the liquid level gets to the point where air could enter the system. Code Reference: S.1.5.1. Symmetry

6.1.	The metering system is equipped with an effective vapor eliminator.	☐ Yes ☐ No ☐ N/A
6.2.	The vent lines are made of metal tubing or some other ~~**rigid material**~~ **appropriate non-collapsible material.**	☐ Yes ☐ No ☐ N/A

Discussion:
The Sector Chairman and Technical Advisor described the proposed changes to the checklist and their origin, noting that the intent of the changes was to align the requirements for vapor elimination with those in other measuring codes. They also noted that the Meter Manufacturers Association had questioned the use of the term "rigid," citing concerns that rigid material is not typically used on vehicle-mounted systems; the term "non-collapsible" material will accomplish the same goal without being overly restrictive.

Decision:
The Sector agreed to recommend the proposed changes to the checklist as shown in the "Recommendation" above.

I. MFM Code – Natural Gas (S&T Committee Item 337-2)

Background:
At the 2016 NCWM Annual Meeting, the NCWM adopted multiple changes to the Mass Flow Meters Code to recognize the sale of liquefied natural gas through retail metering systems. Those changes are outlined in the table below.

Amend NIST Handbook 44, Appendix D to include the following new definition:

diesel gallon equivalent (DGE). – Diesel gallon equivalent (DGE) means 6.384 pounds of compressed natural gas or 6.059 pounds of liquefied natural gas. [3.37]

(Added 2016)

Amend NIST Handbook 44, Appendix D definitions as follows:

gasoline gallon equivalent (GGE). – Gasoline gallon equivalent (GGE) means 5.660 lb of **compressed** natural gas. [3.37]

(Added 1994) **(Amended 2016)**

Delete the following NIST Handbook 44, Appendix D definition as shown:

~~**gasoline liter equivalent (GLE).** – Gasoline liter equivalent (GLE) means 0.678 kilograms of natural gas. [3.37]~~

~~(Added 1994)~~

Amend NIST Handbook 44, Mass Flow Meters Code Paragraphs S.1.2., S.1.3.1.1., S.5.2., and UR.3.8. and add new paragraphs S.1.3.1.2., S.5.3., UR.3.1.1. and UR.3.1.2. as follows:

S.1.2. Compressed Natural Gas and Liquefied Natural Gas Dispensers. – Except for fleet sales and other price contract sales, a compressed **or liquefied** natural gas dispenser used to refuel vehicles shall be of the computing type and shall indicate the quantity, the unit price, and the total price of each delivery. The dispenser shall display the mass measured for each transaction either continuously on an external or internal display accessible during the inspection and test of the dispenser, or display the quantity in mass units by using controls on the device.

(Added 1994) **(Amended 2016)**

S.1.3. Units.

S.1.3.1.1. Compressed Natural Gas Used as an Engine Fuel. – When compressed natural gas is dispensed as an engine fuel, the delivered quantity shall be indicated in ~~"gasoline liter equivalent (GLE) units" or~~ **"**gasoline gallon equivalent (GGE) units**" or diesel gallon equivalent units (DGE), or in mass.** (Also see Appendix D definitions.)

(Added 1994) **(Amended 2016)**

S.1.3.1.2. Liquefied Natural Gas Used as an Engine Fuel. – When liquefied natural gas is dispensed as an engine fuel, the delivered quantity shall be indicated in diesel gallon equivalent units (DGE) or in mass. (Also see definitions.)

(Added 2016)

S.5.2. Marking of ~~Gasoline Volume~~ Equivalent Conversion Factors for Compressed Natural Gas. – A device dispensing compressed natural gas shall have either the statement ~~"1 Gasoline Liter Equivalent (GLE) is Equal to 0.678 kg of Natural Gas" or~~ "1 Gasoline Gallon Equivalent (GGE) ~~is Equal~~ **means** 5.660 lb of **Compressed** Natural Gas" **or "1 Diesel Gallon Equivalent (DGE) means 6.384 lb of Compressed Natural Gas"** permanently and conspicuously marked on the face of the dispenser according to the method of sale used.

(Added 1994) **(Amended 2016)**

S.5.3. Marking of Equivalent Conversion Factors for Liquefied Natural Gas. – A device dispensing liquefied natural gas shall have the statement "1 Diesel Gallon Equivalent (DGE) means 6.059 lb of Liquefied Natural Gas" permanently and conspicuously marked on the face of the dispenser according to the method of sale used.

(Amended 2016)

S.6. Printer. – When an assembly is equipped with means for printing the measured quantity, the following conditions apply:

(a) the scale interval shall be the same as that of the indicator;

(b) the value of the printed quantity shall be the same value as the indicated quantity;

(c) ***the printed quantity shall also include mass value if mass is not the indicated quantity; [Nonretroactive as of January 1, 2021]***

(~~**c**~~ **d**) a quantity for a delivery (other than an initial reference value) cannot be recorded until the measurement and delivery has been completed;

(~~**d**~~ **e**) the printer is returned to zero when the resettable indicator is returned to zero; and

(**e** **f**) the printed values shall meet the requirements applicable to the indicated values.

(Amended 2016)

UR.3.1.1. Marking of Equivalent Conversion Factors for Compressed Natural Gas. – A device dispensing compressed natural gas shall have either the statement "1 Gasoline Gallon Equivalent (GGE) means 5.660 lb of Compressed Natural Gas" or "1 Diesel Gallon Equivalent (DGE) means 6.384 lb of Compressed Natural Gas" permanently and conspicuously marked on the face of the

dispenser according to the method of sale used.

(Added 2016)

UR.3.1.2. Marking of Equivalent Conversion Factors for Liquefied Natural Gas. – A device dispensing liquefied natural gas shall have the statement "1 Diesel Gallon Equivalent (DGE) means 6.059 lb of Liquefied Natural Gas" permanently and conspicuously marked on the face of the dispenser according to the method of sale used.
(Added 2016)

UR.3.8. Return of Product to Storage, Retail Compressed and Liquefied Natural Gas Dispensers. – Provisions at the site shall be made for returning product to storage or disposing of the product in a safe and timely manner during or following testing operations. Such provisions may include return lines, or cylinders adequate in size and number to permit this procedure.

(Added 1998) **(Amended 2016)**

Recommendation: The Sector is asked to consider recommending the following changes to the NCWM Publication 14 LMD Checklist to reflect the changes to the Mass Flow Meters Code outlined in the Background above.

LMD Checklist, Checklists and Test Procedures for Mass Flow Meters:

Page LMD-71: Modify Code References S.1.2. and S.1.3.1.1. and add new code reference S.1.3.1.2. as follows.

Code Reference: S.1.2. Compressed Natural Gas and Liquefied Natural Gas Dispensers – Mass Flow Meters

32.19.	Except for fleet sales and other price contract sales, a compressed **or liquefied** natural gas dispenser used to refuel vehicles shall be of the computing type and shall indicate~~d~~ the quantity, the unit price, and the total price of each delivery.	☐ Yes ☐ No ☐ N/A
32.20.	The mass measured for each transaction shall be displayed on the dispenser, either continuously on an external **display** or **on an** internal display accessible during the inspection and test of the dispenser, or **it shall** display the quantity in mass units by using controls on the device.	☐ Yes ☐ No ☐ N/A

Code Reference: S.1.3.1.1. Compres321sed Natural Gas Used as an Engine Fuel - Mass Flow Meters

32.21.	When compressed natural gas is dispensed as an engine fuel, the delivered quantity shall be indicated in ~~"gasoline liter equivalent (GLE) units" or~~ "gasoline gallon equivalent units (GGE) " **or "diesel gallon equivalent units (DGE)," or in mass.** See NIST Handbook 44, Definitions below.	☐ Yes ☐ No ☐ N/A

Code Reference: S.1.3.1.2. Liquefied Natural Gas Used as an Engine Fuel - Mass Flow Meters

32.22.	**When liquefied natural gas is dispensed as an engine fuel, the delivered quantity shall be indicated in diesel gallon equivalent units (DGE) or in mass. See NIST Handbook 44, Definitions below.**	☐ Yes ☐ No ☐ N/A

LMD Checklist, Checklists and Test Procedures for Mass Flow Meters:

Diesel Gallon Equivalent (DGE). – Diesel gallon equivalent (DGE) means 6.384 pounds of compressed natural gas or 6.059 pounds of liquefied natural gas. [3.37]

(Added 2016)

Gasoline Gallon Equivalent (GGE)
Gasoline gallon equivalent (GGE) means 5.660 pounds of compressed natural gas. [3.37]

(Added 1994)

~~**Gasoline Liter Equivalent (GLE)**~~
~~**Gasoline liter equivalent (GLE) means 0.678 kilograms of natural gas.\ [3.37] (Added 1994)**~~

LMD Checklist, Checklists and Test Procedures for Mass Flow Meters:

Page LMD-77: Modify Code References S.5.2. and add new code references S.5.3. Marking and S.6. Printer as follows.

Code Reference: S.5.2. Marking of ~~Gasoline Volume~~ Equivalent Conversion Factors for Compressed Natural Gas

36.3. A device dispensing compressed natural gas shall have either the statement ~~**"1 Gasoline Liter Equivalent (GLE) is Equal to 0.678 kg of Natural Gas" or**~~ "1 Gasoline Gallon Equivalent (GGE) ~~**is Equal to**~~ **means** 5.660 lb of **Compressed** Natural Gas" **or "1 Diesel Gallon Equivalent (DGE) means 6.384 lb of Compressed Natural Gas"** permanently and conspicuously marked on the face of the dispenser according to the method of sale used. ☐ Yes ☐ No ☐ N/A

Code Reference: S.5.3. Marking of Equivalent Conversion Factors for Liquefied Natural Gas

36.4. **A device dispensing liquefied natural gas shall have the statement "1 Diesel Gallon Equivalent (DGE) means 6.059 lb of Liquefied Natural Gas" permanently and conspicuously marked on the face of the dispenser according to the method of sale used.** ☐ Yes ☐ No ☐ N/A

Code Reference: S.6. Printer

36.5. **When an assembly is equipped with means for printing the measured quantity, the following conditions apply:**

(a) the scale interval shall be the same as that of the indicator; ☐ Yes ☐ No ☐ N/A

LMD Checklist, Checklists and Test Procedures for Mass Flow Meters:	
(b) the value of the printed quantity shall be the same value as the indicated quantity**, except that after January 1, 2021 the printed quantity shall also include mass value if mass is not the indicated quantity**;	☐ Yes ☐ No ☐ N/A
(c) **a quantity for a delivery (other than an initial reference value) cannot be recorded until the measurement and delivery has been completed;**	☐ Yes ☐ No ☐ N/A
(d) **the printer is returned to zero when the resettable indicator is returned to zero; and**	☐ Yes ☐ No ☐ N/A
(e) **the printed values shall meet the requirements applicable to the indicated values.**	☐ Yes ☐ No ☐ N/A

Discussion:
Sector Chairman, Mr. Mike Keilty, noted that the proposed changes are intended to reflect the changes made by the NCWM at its July 2016 Annual Meeting. There was some discussion regarding the reference to UR.3.1. since, as NTEP Director, Mr. Jim Truex, noted NTEP doesn't generally reference or apply "User Requirements" during type evaluation. He noted that how the labs test and evaluated these systems won't change; they must simply continue to examine how the information is displayed and make sure it is appropriate. There was some additional discussion regarding whether the laboratories are to verify the conversion factor that is programmed into a system and what testing is required to add the new "DGE" term to a Certificate. The labs reported that they generally verify the factor mathematically. Mr. Randy Moses (Wayne) noted that some companies can modify the conversion factor and some cannot. Mr. Truex, noted that if a company wants to list the term on a CC, they must request an amendment to the CC; NTEP may or may not require additional testing, but they would look at the system (either physically or through photographs) to ensure displays are clear and understandable and examine the algorithms used.

Decision:
The Sector agreed to recommend the proposed changes to the checklist as shown in the "Recommendation" abo**ve.**

3. NCWM Publication 14, LMD Checklist, Laboratory/Field Evaluation and Permanence Tests for Metering Systems, Section B – Previously Evaluated Meters.

Source:
Randy Moses, Wayne Fueling, LLC

Recommendation:
The Sector is asked to consider recommending the following change to the Section B of the "Laboratory/Field Evaluation and Permanence Tests for Measuring Systems" of the Liquid-Measuring Devices Checklist in NCWM Publication 14.

Page LMD-108, 2016 Edition:

Liquid Measuring Devices – Laboratory/Field Evaluation and Permanence Tests for Metering Systems; Field Evaluation Test of Previously Evaluated Components in Retail Motor Fuel Dispensers Using Different Previously Evaluated Meters

Different Previously Evaluated Meter

Previously evaluated dispensers using a previously type evaluated meter and indicator (register) will normally be subject to an initial test **at the discretion of the testing lab**. Based on the test results of the initial test, National Type Evaluation Program (NTEP) may require a permanence test.

Non-metrological Changes

A technical administrative review shall be conducted to issue a new Certificate of Conformance (CC) or amend an existing CC for previously evaluated devices because of non-metrological changes. Based on the results of the technical administrative review, NTEP may require additional tests.

Background:
The proposed changes are recommended to allow the evaluating NTEP laboratory some discretion when looking at the approval requirements for adding tested meters to existing dispenser files. This refers to the requirement for an initial test as called out in NCWM Publication 14, Section B, on page LMD-108. In some cases, there may be no difference in model series of a manufacturer except for things like the sheet metal cabinet making such a test unnecessary.

Discussion:
Mr. Randy Moses (Wayne Fueling) provided an overview of the proposal, noting that the goal of the proposed changes is to make the process easier for updating CCs when features or components are changed. Sometimes changes are non-metrological such as modifying the cabinet of an RMFD and sometimes they are more significant and require additional testing. At present, there is nothing in the policy that recognizes "mixing and matching" and this can result in the need for unnecessary testing when changes are not metrologically significant.

NTEP Director, Mr. Jim Truex, noted that "mixing and matching" of components has been widely accepted for scales for many years. Technical Advisor, Ms. Butcher (NIST, OWM), concurred that moving in this direction makes sense, particularly since measuring systems are often comprised of multiple elements. If we were to move in this direction and make corresponding changes to NIST Handbook 44 as has been done in the scales code, this would provide a great deal more flexibility for the type evaluation of measuring systems and allow for better tracking of main components such as the meters in retail motor-fuel dispensing systems. Mr. John Roach (California) concurred with the concept, noting that presently he must take pictures of individual components in an RMFD and it would make the process easier for field inspections. Mr. Mario Dupuis (Measurement Canada) noted that, at times they have found changes in components to result in significant differences such as the way that pulse transmission is done and, in such cases, additional testing is warranted. Mr. Moses and other sector members concurred that there are often instances where additional testing is needed. The Sector discussed various instances where additional testing would be warranted as well as instances where changes could be made to the system and CC without the need for additional testing.

Some manufacturers questioned whether or not the current policies are adequately clear to define when additional testing is needed. Until such time that more specific guidance and examples might be developed, Ms. Butcher proposed at least adding a statement such as "If the meter and electronics have been evaluated together, additional testing will not typically be required if it is put into a new cabinet. However, the final decision rests with NTEP regarding the need for additional testing, depending upon the specific situation." The Sector discussed the proposal; however, after considering the proposal, the NTEP laboratories and NTEP Director felt the current policy allows for sufficient flexibility in assessing the testing needed.

Decision:
The Sector concurred that no changes are needed to the current policy. The policy currently allows NTEP the latitude to assess the amount and extent of testing required. Additional policies might be consulted and considered in making this assessment; however, no additional changes are needed to Publication 14 at the present time.

4. Display of Unit Price in Tenths of a Cent.

Source:
NTEP Measuring Labs via NTEP Director Jim Truex

Recommendation:
The Sector is asked to consider the addition of a specific NIST Handbook 44 code reference to the lead-in paragraph to NCWM Publication 14, Liquid Measuring Device Checklist, Section 1.16. to read as follows:

> "Code Reference<u>**s**</u>: G-S.5.1<u>**. and G-S.5.2.2.**</u> Indicating and Recording Elements"

The Sector is also asked to consider recommending the addition of a new Section <u>**1.22.**</u> to read as follows:

<u>**Page LMD-23, 2016 Edition:**</u>

Code Reference<u>s</u>: G-S.5.1. <u>and G-S.5.2.2.</u> Indicating and Recording Elements

Several requirements of a general nature facilitate the reading and interpretation of displayed values. Each display for quantity or total price must be appropriate in design and have sufficient capacity for particular applications to be suitable for the application. For example, retail fuel dispensers capable of indicating to 99.999 liters or gallons or $99.99 are appropriate for automobiles at today's prices, but that are unsuitable for fueling trucks where deliveries may regularly exceed 100 liters or gallons and $100. Metering devices must be capable of indicating the maximum quantity and money values that can normally be expected in a particular application.

1.16.	The maximum money value and quantity indications and unit prices are appropriate for the intended use.	☐ Yes ☐ No ☐ N/A
1.16.1.	The indications must be clear, definite, and accurate.	☐ Yes ☐ No ☐ N/A
1.16.2.	The indications must be easily read under normal operating conditions.	☐ Yes ☐ No ☐ N/A
1.16.3.	Totalizer values must be accurate to the nearest minimum interval with decimal points displayed or subordinate digits adequately differentiated from others, if applicable.	☐ Yes ☐ No ☐ N/A
1.16.4.	Symbols for decimal points shall clearly identify the decimal position. (Generally acceptable symbols are dots, small commas, or x.)	☐ Yes ☐ No ☐ N/A
1.16.5.	The zero indication must consist of at least the following minimum indications as appropriate:	☐ Yes ☐ No ☐ N/A
1.16.6.	One digit to the left and all digits to the right of a decimal point.	☐ Yes ☐ No ☐ N/A
1.16.7.	If a decimal point is not used, at least one active decade plus any constant zeros.	☐ Yes ☐ No ☐ N/A

1.16.8.	A fixed or constant zero cannot appear after a decimal point, (e.g., all decades to the right of a decimal point must be active).*	☐ Yes ☐ No ☐ N/A
1.16.9.	**<u>Unit price values shall be displayed and recorded to the nearest 1 cent ($ 0.01), except motor fuel dispensers which are permitted to display and record up to three decimal places to the right of the decimal point ($0.001).</u>**	☐ Yes ☐ No ☐ N/A

*A fixed zero may appear after a decimal point on a receipt and/or console if the system is unable to distinguish if the digit is fixed or active.

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Code References: G-S.5.1. and G-S.5.2.2. Indicating and Recording Elements

Several requirements of a general nature facilitate the reading and interpretation of displayed values. Each display for quantity or total price must be appropriate in design and have sufficient capacity for particular applications to be suitable for the application. For example, retail fuel dispensers capable of indicating to 99.999 liters or gallons or $99.99 are appropriate for automobiles at today's prices, but that are unsuitable for fueling trucks where deliveries may regularly exceed 100 liters or gallons and $100. Metering devices must be capable of indicating the maximum quantity and money values that can normally be expected in a particular application.

1.17.	The maximum money value and quantity indications and unit prices are appropriate for the intended use.	☐ Yes ☐ No ☐ N/A
1.17.3.	The indications must be clear, definite, and accurate.	☐ Yes ☐ No ☐ N/A
1.17.4.	The indications must be easily read under normal operating conditions.	☐ Yes ☐ No ☐ N/A
1.17.5.	Totalizer values must be accurate to the nearest minimum interval with decimal points displayed or subordinate digits adequately differentiated from others, if applicable.	☐ Yes ☐ No ☐ N/A
1.17.6.	Symbols for decimal points shall clearly identify the decimal position. (Generally acceptable symbols are dots, small commas, or x.)	☐ Yes ☐ No ☐ N/A
1.17.7.	The zero indication must consist of at least the following minimum indications as appropriate:	☐ Yes ☐ No ☐ N/A
1.17.8.	One digit to the left and all digits to the right of a decimal point.	☐ Yes ☐ No ☐ N/A
1.17.9.	If a decimal point is not used, at least one active decade plus any constant zeros.	☐ Yes ☐ No ☐ N/A
1.17.10.	A fixed or constant zero cannot appear after a decimal point, (e.g., all decades to the right of a decimal point must be active).*	☐ Yes ☐ No ☐ N/A
1.17.11.	**Unit price values shall be displayed and recorded to the nearest 1 cent ($ 0.01), except motor fuel dispensers which are permitted to display and record up to three decimal places to the right of the decimal point ($0.001).**	☐ Yes ☐ No ☐ N/A

*A fixed zero may appear after a decimal point on a receipt and/or console if the system is unable to distinguish if the digit is fixed or active.

Background:
During an NTEP evaluation, the evaluator was asked to accept a recording element and receipt where the unit price was indicated and printed out to four decimal places (example: $3.6990). The NTEP Labs acknowledge that it is customary for dispensers to indicate unit price values to three decimal places but do not think it is appropriate for other devices, such as POS systems, registers for meters). Total price values need to be rounded to the nearest cent. The NTEP labs propose the following amendments to NCWM Publication 14.

Discussion:
The Sector Chairman, Mr. Mike Keilty, reviewed the item and its source, noting that the goal is to add clarity and consistency to the requirements for displaying unit prices on RMFDs. NTEP Director, Mr. Jim Truex and a number

of others questioned the need for multiple places past the decimal point; since transactions are conducted based on whole cents, the need for even tenths of a cent seems inappropriate. However, the practice for expressing unit prices to a tenth of a cent is already ingrained in the system.

Sector Technical Advisor, Ms. Tina Butcher (NIST, OWM) commented that there are two different issues being discussed: 1) the value of the unit price is not sealable; and 2) the appropriate number of places past the decimal point for a unit price display. Ms. Butcher also commented that it seems like the ability to make adjustments to the number of places past the decimal point should be a sealable feature; however, there was no additional discussion on this point. Mr. Truex and others agreed that the gap and lack of clarity around the appropriate number of places needs to be corrected and the Sector agreed that the proposed language will accomplish this.

Mr. Gordon Johnson (Gilbarco) expressed concerns that the change regarding the number of places past the decimal is not supported by a specific NIST Handbook 44 reference. Others felt that the General Code adequately supported the change. The Sector discussed the idea of adding a reference to General Code Paragraph G-S.5.5. Money Values, Mathematical Agreement as well; however, there wasn't strong support to do this. Some manufacturers expressed concern about possible instances where they find the additional places are legitimately needed, but couldn't provide examples at that point. The Sector agreed, there is always the option to bring the issue back at a future point should a specific need be identified.

Decision:
The Sector agreed to recommend the proposed changes to the checklist. The Sector acknowledged that there are not specific references in NIST Handbook 44 to reflect the proposed changes; however, there is a reference in the General Code under which the proposed changes clearly fall. Consequently, the Sector concurred that the proposed changes are supported by NIST Handbook 44.

5. NCWM Publication 14, Electronic Cash Registers Interfaced with Retail Motor-Fuel Dispensers Checklist – Change to Title.

Source:
NTEP Measuring Labs via NTEP Director Jim Truex

Recommendation:
The Sector is asked to consider recommending the following change to the title of the checklist and subsequent references to the checklist to read:

> **"Electronic Cash Register Interfaced with Retail Motor-Fuel Dispensers<u>, Console Controller, and Point-of-Sale System Software</u> Checklists and Test Procedures"**

Background: NTEP evaluators routinely use the ECR checklist when evaluating console controllers and POS system software. The labs are recommending that the title of the ECR section in NCWM Publication 14 and subsequent references be changed to indicate inclusion of controllers and software.

Discussion: NTEP Director, Mr. Jim Truex, provided the Sector with a history of this item, noting there are instances where companies don't realize that the laboratories are drawing from the Electronic Cash Registers checklist as well as the LMD Checklist. He noted that the purpose of the proposed changes is simply to clarify what the laboratories are already doing. There was no additional discussion on this issue.

Decision: The Sector agreed to recommend the proposed changes to the checklist.

6. Manual Volume Entries – Delete Entry in NCWM Publication 14 Electronic Cash Registers Interfaced with Retail Motor-Fuel Dispensers Checklist.

Source: NTEP Measuring Labs via NTEP Director Jim Truex

Recommendation:
The Sector is asked to consider recommending that Section 2.3. in the Checklist on Electronic Cash Registers Interfaced with Retail Motor-Fuel Dispensers be deleted as follows:

> **~~2.3. Manual volume entries are permitted. They must be clearly identified on the receipt as a manual entry by the terms "Manual Fuel Sale."~~**
>
> **~~Note: All uppercase or a combination of upper and lower case letters are permitted provided the evaluating laboratory finds the resulting text to be clear and legible.~~**

Background:
NIST Handbook 44 does not support the use of manual volume entries. Unless the Sector can provide a reason for the allowance in NCWM Publication 14, the NTEP laboratories recommend removal of this section.

Discussion:
Sector Chairman, Mr. Mike Keilty, introduced the item. Mr. Gordon Johnson (Gilbarco) noted that Gilbarco does have this feature on their equipment; however, it isn't a feature that is routinely used. It is primarily included to enable an operator to go out to the dispenser and record information and enter it into the console in instances where communication between the console and the dispenser is malfunctioning. This enables the transaction to be processed and finalized. Additional situations where the feature might be used is in completing transactions for "standalone" dispensers such as those that dispense kerosene, which are not interfaced with the console system. Mr. Randy Moses (Wayne Fueling) questioned whether removing the language may not prevent a manufacturer from still providing the option. Mr. John Roach (California) commented that in the many years he has been evaluating systems, he has not used the provision. He recently reviewed similar requirements for weighing devices, but in that case, there are specific provisions in NIST Handbook 44 that address the use of a manual entry feature. Sector Technical Advisor, Ms. Tina Butcher, noted that if there is a desire to use the feature, it would be best to propose adding provisions to NIST Handbook 44 to address the feature in measuring systems. For weighing systems, where it this is deemed a necessary feature, NIST Handbook 44 includes very specific specifications and user requirements to ensure the feature is designed and used appropriately. For weighing devices, there was a particular concern to ensure that the system clearly indicates to the customer that the weight information was not generated through the weighing device in front of the customer. If the Sector wants to see more specific references, the Technical Advisor could develop a proposal and submit it through the NCWM process.

Mr. Joe Eccleston (Maryland) commented that, if we are going to leave the provision in NCWM Publication 14, additional language needs to be added to clarify that it is not allowed in other applications such as LPG metering systems and VTM systems. Ms. Butcher noted, the Sector could also develop a list of applications where the feature is and is not appropriate to ensure consistent understanding and interpretation by manufacturers and laboratories. Some members expressed concern over whether or not the provision is adequately supported by NIST Handbook 44; however, the General Code would address the use of the feature in a broad sense. The Sector discussed how the provision might be proposed for NIST Handbook 44, either in the General Code and/or in specific codes. There was some concern that presenting specific language to the NCWM might also inadvertently lead to the omission of the feature altogether.

Decision:
The Sector identified several instances where a manual fuel entry would be appropriate and felt that it should be allowed. However, the Sector acknowledged that the language in NCWM Publication 14 is not currently supported by NIST Handbook 44. The Sector recognized that specific criteria is needed to ensure uniform interpretations and there should be specific references in NIST Handbook 44 if criteria is to be included in NCWM Publication 14. However, the Sector was also concerned that, by presenting it to a larger audience, there may be unintentional consequences, including the removal of the provision in entirety.

The Sector considered several possible options such as leaving the language as it is currently written; included an additional code reference in the item; proposing a change to NIST Handbook 44; and including additional guidance in NCWM Publication 14. The Sector was unable to reach a consensus on the options proposed. Consequently, the Sector agreed to take no action and to allow the use of manual entries in NCWM Publication 14 as is currently written.

ADDITIONAL ITEMS AS TIME ALLOWS:

If time permits, the NCWM S&T Committee and/or other groups would appreciate input from the Measuring Sector on the measuring-related issues that are outlined in the remaining agenda items below. A copy of any regional association modifications or positions will be provided to the Sector when these are made available by the regions.

7. S&T Committee 2017 New Item – General Code, G-S.5.2.2. Digital Indication and Representation

Source:
Mr. Ross Andersen, Retired (2017)

Purpose:
Address application of the code requirements across multiple devices.

Item under Consideration:
Amend NIST Handbook 44, General Code as follows:

G-S.5.2.2. Digital Indication and Representation. – Digital elements shall be so designed that:

(a) All digital values of like value in a system agree with one another.

(b) A digital value coincides with its associated analog value to the nearest minimum graduation.

(c) A digital value "rounds off" to the nearest minimum unit that can be indicated or recorded.

(d) A digital zero indication includes the display of a zero for all places that are displayed to the right of the decimal point and at least one place to the left. When no decimal values are displayed, a zero shall be displayed for each place of the displayed scale division.
[Nonretroactive as of January 1, 1986]

(f) ***A digital value that is electronically summed from the digital indications of multiple independent devices shall be mathematically correct.***
[Nonretroactive as of January 1, 20XX]

(Amended 1973, 1985**, and 20XX**)

Background:
For full details on this issue, including the submitter's justification and recommendations and other background information, please see Appendix A in the S&T Committee's 2016 Interim Report.

Discussion/Decision:
The Sector did not want to offer comments on this items without having a better understanding about the background and history of the proposal than is provided in the S&T Committee's report.

8. S&T Committee 2017 New Item – General Code, G-UR.3.3. Position of Equipment

Source:
Illinois (2017)

Purpose:
Eliminate interpretation differences, while also demonstrating an apparent need for customer readability and giving the statutory authority permission to require visible indications for ease of test procedures.

Item under Consideration:
Amend NIST Handbook 44, General Code as follows:

> **G-UR.3.3. Position of Equipment.** – A device or system equipped with a primary indicating element and used in direct sales, except for prescription scales, shall be positioned so that its indications may be accurately read and the weighing or measuring operation may be observed from some reasonable "customer" and "operator" position. The permissible distance between the equipment and a reasonable customer and operator position shall be determined in each case ~~**upon the basis of the individual circumstances**~~ **<u>by the official with statutory authority, who shall base the determination on "customer readability" and ease of testing procedures</u>**, particularly the size, character, and **<u>position</u>** of the indicating element. **<u>(e.g., A deli customer shall be able to read the indications from the patron side of the deli counter, whereas a truck driver shall be able to read the indications from the cab of the vehicle.) (Also see G-UR.4.4. Assistance in Testing Operations. and Appendix D. direct sales.)</u>**

Background:
For full details on this issue, including the submitter's justification and recommendations and other background information, please see Appendix A in the S&T Committee's 2016 Interim Report.

Discussion:
Sector Chairman, Mr. Mike Keilty, introduced the item. The Sector was asked to review and provide comments as appropriate to assist the S&T Committee and the submitter with the proposed change to NIST Handbook 44. Some Sector members shared instances where remote displays were required on weighing systems to ensure customers are able to view the transaction information. Several sector members commented that NIST Handbook 44 isn't the place to include examples.

Decision:
The Sector had no comments on this item; however, the Sector did express concern that the examples may be misinterpreted as applying to measuring systems. Some sector members suggested the examples be removed and included in other documents such as Examination Procedure Outlines (EPOs) and NCWM Publication 14.

9. S&T Committee 2017 Carryover Item – LMD Code - Recognized the Use of Digital Density Meters

Source:
Missouri (2016)

Purpose:
Allow the use of digital density meters for inspections of meter for viscous fluids such as motor oils, diesel exhaust fluid (DEF), and antifreeze.

Item under Discussion:
Amend NIST Handbook 44, Liquid Measuring Devices Code as follows:

> Develop provisions in various LMD Codes of NIST Handbook 44 that would recognize the use of digital density meters in lieu of volumetric provers, or the use of flasks and thermometers in the case of gravimetric testing when testing meters used to dispense certain viscous fluids such as motor oil, DEF, antifreeze, syrups, etc.

"Digital density meters may be a solution for testing motor oil, DEF and anti-freeze meters."

Background/Discussion:
For full details on this issue, including the submitter's justification and recommendations and other background information, please see Appendix A in the S&T Committee's 2016 Interim Report.

Discussion:
Sector Chairman, Mr. Mike Keilty, introduced the item. The Sector was asked to review and provide comments as appropriate to assist the S&T Committee and the submitter with developing the proposal. The Sector discussed the item, noting there was little information provided about any ultimate proposal for NIST Handbook 44. The Sector speculated that the intent is to use density meters in lieu of scales to determine the density of fluids when doing gravimetric testing of metering systems. Mr. Marc Buttler (Micro Motion) commented that the measurement of density is a component of a viable reference standard and gravimetric testing makes sense, particularly in instances where there are safety issues related to the fluid being metered. He commented that there needs to be very clear accuracy and traceability requirements included in any recommendations and the Sector concurred.

Decision:
The Sector briefly reviewed this item. Since there isn't a fully developed proposal for comment at this point, the Sector did not provide specific suggestions. However, sector members provided some general comments including:

- Gravimetric testing provides a good option for testing measuring systems, particularly where safety or practicality of other types of testing are of concern.

- Density determination and associated equipment are a component of a viable reference standard, but additional criteria must be in place to ensure accuracy and suitability of the equipment and its use.

- NIST Handbook 44 doesn't appear to be the right place to include such a proposal. Such provisions would seem to be more appropriate for a NIST EPO, NCWM Publication, or other guidance documents.

- There aren't enough specifics in the proposal to be able to provide any substantive technical comments at this point.

The Sector will be glad to provide additional input and comment as further development is made on the item.

10. S&T Committee 2017 Carryover Item – VTM Code - S.3.7. Manifold Hose Flush System

Source:
New York (2016)

Purpose:
Recognize the use of hose flush systems in the HB 44 VTM code**.**

Item under Consideration:
Amend NIST Handbook 44, Vehicle-Tank Meter Code as follows:

S.3.7. Manifold Hose Flush System. – A hose flush system to clear the hose of product may be installed in the manifold when multiple products are dispensed through a single meter and hose under the following conditions:

(a) the inlet valves for the system are conspicuously located above the bottom framework of the truck; and

(b) the inlet valves for the system are not connected to any hose or piping (dust covers are permitted) when not in use; and

(c) the discharge hose remains of the wet hose type; and

(d) the direction of flow for which the system may be set at any time is definitely and conspicuously indicated; and

(e) a recorded representation of each flush is maintained for inspection.

Background:
For full details on this issue, including the submitter's justification and recommendations and other background information, please see Appendix A in the S&T Committee's 2016 Interim Report.

Discussion:
Sector Chairman, Mr. Mike Keilty, introduced the item. The Sector was asked to review and provide comments as appropriate to assist the S&T Committee and the submitter with developing the proposal. Mr. Allen Katalinic (North Carolina) acknowledged the benefits of such a system with regard to safety; however, noted that additional work is needed to address concerns regarding appropriate use of such a system. Ms. Tina Butcher (NIST, OWM) noted that OWM provided a number of suggestions and extensive comments to the submitter to assist in the development of the proposal, including a suggestion to add a user requirement to the proposal regarding appropriate use of the system. Additionally, OWM believes there should be some sort of interlocks provided to prevent misuse. Several sector members acknowledged the benefits of such a system in helping to prevent contamination and improving safety practices; however, it was noted that additional provisions are needed to deter misuse.

Decision:
The Sector has no specific suggestions to offer the submitter on the proposed language. However, the Sector did identify some areas that should be considered and addressed:

- There is a significant potential to facilitate fraud if adequate safeguards are not provided to help ensure that these systems are being designed appropriately and used as intended.
- Additional work is needed to clarify appropriate operation of such a system.
- A user requirement would help to provide some minimum criteria regarding appropriate use such as hose capacity; the use of preset volumes for flushing; and setting of interlocks.
- The "diversion of product" provisions in the code are not sufficiently strong as currently written to address the concerns about the use of such systems in diverting measured product.
- Provisions are needed to prevent misuse, including incorporating features such as interlocks to help prevent indicated volumes from being inappropriately used.

11. S&T Committee 2017 New Item – VTM Code - S.5.7. Meter Size

Source:
City of Madison, Wisconsin (2017)

Purpose:
Remove a marking requirement that is no longer necessary due to changes in the product depletion test tolerance**.**

Item under Consideration:
Amend NIST Handbook 44, Vehicle Tank Meter Code as follows:

> ~~***S.5.7. Meter Size. – Except for milk meters, if the meter model identifier does not provide a link to the meter size (in terms of pipe diameter) on an NTEP Certificate of Conformance, the meter shall be marked to show meter size.***~~
> ~~***[Nonretroactive as of January 1, 2009]***~~
>
> ~~**(Added 2008)**~~

Background:
For full details on this issue, including the submitter's justification and recommendations and other background information, please see Appendix A in the S&T Committee's 2016 Interim Report.

Discussion:
Sector Chairman, Mr. Mike Keilty, introduced the item. The Sector was asked to review and provide comments as appropriate to assist the S&T Committee and the submitter with developing the proposal. Mr. Allen Katalinic (North Carolina) commented that, when the NTEP Laboratories discussed this proposal, they felt that the issue is straightforward. Mr. Joe Eccleston ((Maryland) noted that not all states adopt the current edition of NIST Handbook 44, and, therefore, some states are not currently enforcing provisions for marking meter size. Mr. Dmitri Karimov (Liquid Controls) questioned whether or not there are instances where the marking of meter size is still beneficial, for example, in correlating a specific meter to an NTEP CC. Several sector members concurred that meter size markings may assist field officials in assessing whether or not a particular meter is covered by an NTEP CC.

Decision:
The Sector had few comments to offer. The NTEP Laboratories agreed that the requirement may no longer be needed. A comment was made that the meter size marking may still be useful to inspectors in determining whether a particular meter is covered by an NTEP CC since CCs typically list specific meter sizes.

12. S&T Committee 2017 New Item – VTM Code - N.4.X. Automatic Stop Mechanism, T.X. Automatic Stop Mechanism, and UR.2.6. Automatic Stop Mechanism

Source:
City of Madison, Wisconsin (2017)

Purpose:
Incorporate the automatic stop mechanism test requirement in NIST Handbook 112, EPO 23, Vehicle-Tank Meters, Power Operated into NIST Handbook 44 so it is enforceable**.**

Item under Consideration:
Amend NIST Handbook 44, Vehicle-Tank Meter Code as follows:

> **N.4.X. Automatic Stop Mechanism. – The automatic stop mechanism shall stop the flow within one-half the minimum interval indicated.**
>
> **T.X. Automatic Stop Mechanism. – The automatic stop mechanism shall stop the flow within one-half the minimum interval indicated.**
>
> **U.R.2.6. Automatic Stop Mechanism. – The automatic stop mechanism shall stop the flow within one-half the minimum interval indicated.**

Background:
For full details on this issue, including the submitter's justification and recommendations and other background information, please see Appendix A in the S&T Committee's 2016 Interim Report.

Discussion: Sector Chairman, Mr. Mike Keilty, introduced the item. The Sector was asked to review and provide comments as appropriate to assist the S&T Committee and the submitter with developing the proposal. Some questioned whether or not the preset feature is a metrological component and if it would be covered by NIST Handbook 44. The Sector Technical Advisor noted that many jurisdictions consider this part of the measuring system and appropriately require the components to function properly as required in the General Code Paragraph G-UR.4.1. Maintenance of Equipment. The NTEP Director and Sector Advisor and others commented that the proposed paragraph should be written as a specification rather than a user requirement. Mr. Rodney Cooper (Tuthill Transfer Systems) and several others expressed concern about the limits proposed, questioning whether or not some of the mechanical systems would have difficulty meeting the proposed requirement. Pressure changes and other system influences can sometimes affect how closely you stop relative to the preset amount.

Decision:
The Sector had no specific recommendations to offer; however, it was noted that additional development is needed before the item is ready for consideration.

13. S&T Committee 2017 Carryover Item – LPG and NH3 Code - N.4.2.3. For Wholesale Devices

Source:
NIST Office of Weights and Measures (2016)

Purpose:

1) To specify the purpose of special tests conducted on Wholesale LPG and Anhydrous Ammonia Liquid-Measuring Devices;

2) To specify that the special tests are to be conducted at or slightly above the designated flow rates in the referenced paragraph; and

3) To specify that the special tests are not to be conducted below the device's marked minimum discharge rate.

Item under Consideration:
Amend NIST Handbook 44, Liquefied Petroleum Gas and Anhydrous Liquid-Measuring Devices Code as follows:

> **N.4.2.3. For Wholesale Devices.** – ~~**A wholesale device shall be so tested at a minimum discharge rate of:**~~ "**Special" tests shall be made to develop the operating characteristics of a measuring system and any special elements and accessories attached to or associated with the device. "Special" tests shall include a test at or slightly above the slower of the following rates:**
>
> (a) 40 L (10 gal) per minute for a device with a rated maximum discharge less than 180 L (50 gal) per minute~~.~~**;**
>
> (b) 20 % of the marked maximum discharge rate for a device with a rated maximum discharge of 180 L (50 gal) per minute or more~~,~~**;** or
>
> (c) the minimum discharge rate marked on the device~~, whichever is least~~.
>
> **In no case shall the test be performed at a flow rate less than the minimum discharge rate marked on the device.**
>
> (Amended 1987 **and 20XX**)

Background:
For full details on this issue, including the submitter's justification and recommendations and other background information, please see Appendix A in the S&T Committee's 2016 Interim Report.

Discussion:
Sector Chairman, Mr. Mike Keilty, introduced the item. The Sector was asked to review and provide comments as appropriate to assist the S&T Committee and the submitter with developing the proposal. Sector Advisor, Ms. Tina Butcher (NIST, OWM), noted that there was no opposition to the concept of modifying the paragraph to align it with similar requirements in the LMD Code; however, the Meter Manufacturers Association (MMA) had suggested at the 2016 NCWM Annual Meeting that the item be held over to allow some additional work on the language. Members of the MMA commented that some of the provisions in the existing paragraph appear unnecessary and this might be an opportune time to fix them. She noted that OWM will be working with members of the MMA to propose additional revisions. Some of the MMA members present at the Sector meeting, including Mr. Marc Buttler (Micro Motion) and Mr. Dmitri Karimov (Liquid Controls) concurred and committed to working with NIST, OWM.

Decision:
Sector members are asked to review and comment on alternative language that will be presented by NIST. Some suggestions included eliminating all sections but the reference to the marked minimum discharge rate.

14. S&T Committee 2017 New Item – Appendix A – Fundamental Considerations: Section 4.4. General Considerations

Source:
Mr. Ross Andersen, Retired (2017)

Purpose:
Address the application of the code requirements across multiple devices.

Item under Consideration:
Amend NIST Handbook 44, Appendix A – Fundamental Considerations as follows:

> **4.4. General Considerations. – <u>Code requirements are applied only to a single device or system, unless specifically stated in the code. The official may encounter equipment where the digital indications from more than one device are electronically summed. This may be done in multiple ways. Each device may have its own indicating element and the sum is indicated on a separate, associated indicator which is interfaced directly with each device (i.e., a computer or console via cable or even Bluetooth wireless communication). The indicating elements of the individual devices may be enclosed in a single housing, with separate indicators for each device and a separate indicator for the electronic sum. An electronic sum of measured values from multiple devices is not subject to code requirements, except that it be mathematically correct, i.e., add up to the proper sum – See General Code G-S.5.2.2.(e).</u>**

The simpler the commercial device, the fewer are the specification requirements affecting it, and the more easily and quickly can adequate inspection be made. As mechanical complexity increases, however, inspection becomes increasingly important and more time consuming, because the opportunities for the existence of faulty conditions are multiplied. It is on the relatively complex device, too, that the official must be on the alert to discover any modification that may have been made by an operator that might adversely affect the proper functioning of the device.

It is essential for the officials to familiarize themselves with the design and operating characteristics of the devices that he inspects and tests. Such knowledge can be obtained from the catalogs and advertising literature of device manufacturers, from trained service persons and plant engineers, from observation of the operations performed by service persons when reconditioning equipment in the field, and from a study of the devices themselves.

Inspection should include any auxiliary equipment and general conditions external to the device that may affect its performance characteristics. To prolong the life of the equipment and forestall rejection, inspection should also include observation of the general maintenance of the device and of the proper functioning of all required elements. The official should look for worn or weakened mechanical parts, leaks in volumetric equipment, or elements in need of cleaning.

Background/Discussion:
For full details on this issue, including the submitter's justification and recommendations and other background information, please see Appendix A in the S&T Committee's 2016 Interim Report.

Discussion/Decision:
The Sector briefly discussed this item and how it might apply to measuring systems, acknowledging that the Fundamental Considerations applies all types of weighing and measuring equipment. The Sector had no comments to offer on the proposal.

15. S&T Committee 2017 New Item – Vapor Elimination, Measuring Codes

Source:
Mr. Dmitri Karimov (Liquid Controls) and Ms. Tina Butcher (NIST, OWM)

Purpose:
To align other measuring device codes with the changes adopted in the S&T Committee LPG and NH_3 Code Item 332-3 (S.2.1. Vapor Elimination) in 2016.

Item under Consideration:
Amend the requirements for vapor elimination in the following NIST Handbook 44 Sections and Paragraphs as outlined below:

- Section 3.30. Liquid-Measuring Devices Code (S.2.1.);
- Section 3.31. Vehicle-Tank Meters Code (S.2.1.);
- Section 3.35. Milk Meters Code (S.2.1.);
- Section 3.36. Water Meters Code (S.2.2.1.); and
- Section 3.37. Mass Flow Meters Code (S.3.3.)

3.30. Liquid Measuring Devices

S.2. Measuring Elements.

S.2.1. Vapor Elimination.

(a) A liquid-measuring device shall be equipped with **an effective,** ~~**a vapor or air eliminator or other**~~ automatic means to prevent the passage of vapor and air through the meter.

(b) Vent lines from the air or vapor eliminator shall be made of **appropriate non-collapsible** ~~**metal tubing or other rigid**~~ material.

(Amended 1975 **and 2017**)

S.2.1.1. Vapor Elimination on Loading Rack Metering Systems.

(a) A loading rack metering system shall be equipped with **an effective,** ~~**a vapor or air eliminator or other**~~ automatic means to prevent the passage of vapor and air through the meter unless the system is designed or operationally controlled by a method, approved by the weights and measures jurisdiction having control over the device, such that air and/or vapor cannot enter the system.

(b) Vent lines from the air or vapor eliminator (if present) shall be made of appropriate non-collapsible metal tubing or other rigid material.

(Added 1994) **(Amended 2017)**

3.31. Vehicle-Tank Meters

S.2. Design of Measuring Elements.

S.2.1. Vapor Elimination.

(a) A metering system shall be equipped with an effective vapor or air eliminator or other automatic means to prevent the passage of vapor and air through the meter.

(b) Vent lines from the air or vapor eliminator shall be made of ~~metal tubing or some other suitable rigid material~~ **appropriate non-collapsible material**.

(Amended 1993) **(Amended 2017)**

3.35. Milk Meters

S.2. Design of Measuring Elements.

S.2.1. Vapor Elimination.

(a) A metering system shall be equipped with an effective**,** ~~**vapor eliminator or other**~~ **automatic means** ~~**automatic in operation**~~ to prevent the passage of vapor and air through the meter.

(b) Vent lines from the air (or vapor) eliminator shall be made of ~~**metal tubing or some other suitably rigid material**~~ **appropriate non-collapsible material**.

(Amended 2017)

3.36. Water Meters

S.2.2. Batching Meters Only.

S.2.2.1. Air Elimination.

(a) Batching meters shall be equipped with an effective**, automatic means to prevent the passage of vapor and air through the meter** ~~air eliminator~~**.**

(b) Vent lines from the air or vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 2017)

3.37. Mass Flow Meters

S.3.3. Vapor Elimination.

(a) A liquid-measuring instrument or measuring system shall be equipped with an effective**, automatic** ~~vapor or air eliminator or other effective~~ means~~, automatic in operation,~~ to prevent the measurement of vapor and air.

(b) Vent lines from the air or vapor eliminator **if present** shall be made of ~~metal tubing or some other suitable rigid material~~ **appropriate non-collapsible material**.

(Amended 1999 **and 2017**)

S.3.3.1. Vapor Elimination on Loading Rack Liquid Metering Systems.

(a) A loading rack liquid metering system shall be equipped with ~~a vapor or air eliminator or other~~ **an effective,** automatic means to prevent the passage of vapor and air through the meter**. Such means might include, but is not limited to a** ~~unless the~~ system **that is** designed or operationally controlled by a method, approved by the weights and measures jurisdiction having statutory authority over the device, such that neither air nor vapor can enter the system.

(b) Vent lines from the air or vapor eliminator (if present) shall be made of **appropriate non-collapsible** ~~metal tubing or other rigid~~ material.

(Added 1995) **(Amended 2017)**

Background:
The NCWM adopted the following changes to the LPG and NH_3 code at its Annual Meeting in July 2016:

S.2.1. Vapor Elimination.

(a) A device shall be equipped with an effective **automatic** ~~vapor eliminator or other effective~~ means to prevent the passage of vapor through the meter.

(b) Vent lines from the vapor eliminator shall be made of appropriate non-collapsible material.

(Amended 20XX)

The proposed changes will align other codes with the above changes to the LPG and NH_3 code and will help ensure consistency across the various measuring device codes in NIST Handbook 44. This would help ensure more uniform interpretation of the requirements and facilitate application by officials and industry.

The proposed changes make the requirement less design-specific and more focused on ensuring that the means for eliminating air or vapor are effective, including that the vent lines not be susceptible to restriction. The proposed changes also clarify that the provision for vapor elimination must be automatic in nature to be considered effective.

NIST, OWM in its analysis of the 2016 S&T Committee agenda item referenced above suggested that a similar change be proposed, where necessary, to corresponding requirements in other measuring codes and encouraged the Committee to consider including such an item on its agenda in the 2016 - 2017 NCWM cycle.

Note that the Mass Flow Meters Code states “means to prevent the measurement of vapor and air” while other codes state “means to prevent the passage of vapor and air through the meter,” but such distinction is probably justified. Consequently, no modifications are proposed to align this language with other codes.

Recommendation:
The Sector is asked to review the proposed change and to provide input that would assist the submitters in refining the proposal as needed.

Discussion:
Sector Chairman, Mr. Mike Keilty, introduced the item. The Sector was asked to review and provide comments as appropriate to assist the S&T Committee and the submitter with developing the proposal. Sector Advisor, Ms. Tina Butcher (NIST, OWM) and Mr. Dmitri Karimov (Liquid Controls) clarified that the proposal is to align the provisions for vapor elimination across these codes with what was adopted in the LPG and NH_3 code in July 2016. Mr. Marc Buttler (Micro Motion) commented that there is a difference in the language in the Mass Flow Meters (MFM) Code and questioned if this means something other than a vapor eliminator and vent line can be used in those systems as long as it is effective. Ms. Butcher clarified that it is permissible to use other means provided the means can be demonstrated to be effective. There was some additional discussion about various methods used in systems to prevent vapor from being measured. Mr. Gordon Johnson (Gilbarco) acknowledged and concurred with the proposed reference to “non-collapsible,” but questioned why the reference to “metal” was eliminated, noting any tube could be collapsed. Several noted that “metal” tubes are specifically not used on vehicle-mounted systems because of the effects of vibration and eventual breakage or loosening.

Mr. Johnson questioned the use of the word “device” rather than “system,” noting that we are talking about systems and an actual “air eliminator” may not be used in the system if those other effective means are designed and incorporated into the system. Ms. Butcher stated there has been a separate, though related discussion of changing the references to “devices” and “meters” to systems throughout the measuring codes; reviewing and proposing such changes will prove to be a rather significant project to ensure use and application of the terms are still appropriate. Regarding this change, the Sector might consider providing feedback suggesting that the terminology be changed in this proposal. NTEP Director, Mr. Jim Truex, concurred, citing other terms such as “device,” “system,” “equipment,” and “meter” are sometimes used interchangeably.

Decision:
The Sector supports the proposed changes; however, suggests the term “device” be changed “system” in the proposed change to the LMD Code and the Water Meters Code.

ADDITIONAL ISSUES ADDED AT THE SECTOR MEETING:

16. Categorization of DEF in Technical Policy C Product Categories and Families for Meters

Technical Advisor’s Note: This item was submitted on September 19, 2016, prior to the Sector meeting, but following the publication of the Sector’s agenda. The Sector agreed to address the item at the end of its meeting, as time permitted.

Source:
Mr. Marc Buttler (Micro Motion)

Recommendation:
Change the value of the example density for Urea that is listed under mass meters in the NCWM Publication 14, LMD Product Table from 1.89 to 1.32. Add DEF to as a product under the Mass Meter "Test B" sub-heading with an SG value of 1.09 and a Product Category of "Chem."

Background:
The following was provided by the submitter via an NCWM Form 15 for this item:

> ***Problem/Justification:*** In the LMD Product Table under the Product Category and Test Requirements for Mass Meters, the example density of Urea is incorrectly stated as 1.89 SG, while the more accurate density value available from NIST PML would be 1.32 SG. Furthermore, there is no listing for Diesel Exhaust Fluid (DEF) in the product table. Legal metrology devices are used increasingly to dispense and meter both DEF (which is a solution of 32.5 % urea and 67.5 % deionized water) and Urea. Inspectors and evaluators who are consulting NTEP CC's for master meters and consulting NCWM Publication 14 can be confused by the incorrect SG stated as an example value for urea and also need an example value for DEF to know if the density range stated in the NTEP CC includes DEF and/or urea.
>
> ***Alternative Considered:*** DEF could also be added under the headings of Magnetic Flow Meters, Positive Displacement Meters, and Turbine Meters. However, only Mass Meters are known to be used in DEF dispensers, so information related to the Conductivity, Dynamic Viscosity, and Kinematic Viscosity of DEF are not readily available. If meter manufacturers or others can provide example values for these properties, then DEF should be added as a product under these meter types, as well.
>
> ***Attachments and Additional Information:***
>
> NIST PML source for Urea density of 1.32 SG: **http://physics.nist.gov/cgi-bin/Star/compos.pl?matno=273**
>
> Example of DEF 1.09 SG as stated by one DEF manufacturer:
>
> **blueskydefna.com/wp-content/uploads/2014/07/BlueSky32.5_datasheet.pdf**

Discussion:
Mr. Buttler introduced the item, noting that his goal is twofold: 1) to modify the reference for "Urea" in the Product Families Table from 1.89 to 1.32; and 2) to add "Diesel Exhaust Fluid (DEF)" to the tables along with "Urea" where the density would be recognized as 1.89. There was some discussion regarding the most appropriate place to include the reference to DEF. Some noted that the "FL&O" (Fuels, Lubricants, Industrial and Food Grade Liquid Oils) category might be considered because of how drivers are purchasing DEF during refueling; however, the product is not technically a fuel since it is added to the exhaust stream. Regarding categorization, however, it could fit within the FL&O category or in the "Chemicals" category. Mr. Dmitri Karimov (Liquid Controls) commented that on LC's NTEP CCs, the meters include DEF under the category of "clear liquid fertilizers" and LC specifies the viscosity for the product. Rodney Cooper (Tuthill Transfer Systems) noted that there may be a different value specified for turbine meters.

Several Sector members commented that additional time is needed to study the issue and consider how different metering technologies might be impacted and where the most appropriate category would be to include the product. Sector Advisor, Ms. Tina Butcher, also noted that DEF is diluted with water, thus, it may be appropriate to consider a range so as not to penalize a manufacturer who may do a test with a particular supply of DEF. There were some additional comments regarding the most appropriate value to assign for the density of the product, given various references found on line.

NTEP Director, Mr. Jim Truex, also commented that there may be other Sector members who are not present who would like an opportunity to weigh in on the discussion, so it would seem appropriate to hold the discussion over to the next meeting. Sector members agreed with the need to hold the item over, provided that a resolution can be reached in a timely manner.

Decision:
The Sector agreed that the proposal to refine and include the values for DEF has merit and needs to be addressed. The submitter agreed to continue to refine the proposal and will appreciate input from others who are interested in the issue. The Sector agreed to include this as a "carryover item" for next year's agenda and asks that the submitter provide an update proposal, including recommendations for the significant characteristics for various meter types, prior to the next Sector meeting.

17. Checklist for Electric Vehicle Fueling Systems

Technical Advisor's Note: This item was submitted by California DMS via the NTEP Director prior to the Sector meeting, but following publication of the Sector's agenda. The NTEP Labs reviewed this issue during their meeting just prior to the Sector meeting and Sector agreed to address the item at the end of its agenda.

Source:
Mr. Jim Truex, NTEP Director

Background:
There is no a type evaluation checklist for Electric Vehicle Supply Equipment (EVSE). A Tentative Code in NIST Handbook 44, Section 3.40. Electric Vehicle Fueling Systems (EVFS) was added in 2015 that applies to EVSEs. EVSEs are being produced and installed in the marketplace across the nation for commercial use. However, there is no a type evaluation checklist for laboratories to follow to determine if the EVSEs comply with the EVFS NIST Handbook 44 code as exists with other commercial weighing and measuring devices covered by NIST Handbook 44.

CDFA DMS developed a proposed type evaluation checklist for EVSEs that DMS requests the Measuring Sector to consider and recommend incorporating into NCWM Publication 14. This proposed EVSE checklist covers the specifications within NIST Handbook 44, Section 3.40. EVFS. If adopted, then NTEP laboratories and EVSE manufacturers would have specific guidelines to follow to assure the equipment does or does not comply with the NIST Handbook 44, EVFS code. A copy of this draft checklist is included in Appendix D to this Meeting Summary.

Discussion: NTEP Director, Mr. Jim Truex, provided a synopsis of the issue. He noted that he has been discussing the concept of type evaluation Electric Vehicle Fueling Systems with manufacturers, NTEP laboratories, NIST, and others for some time. CA DMS has been working on this issue under grants for alternative fuels as well. He noted that a tentative code has been adopted in NIST Handbook 44 and the NIST USNWG on Electric Vehicle Fueling and Submetering has been working on requirements for test standards and test procedures. The next step is to develop criteria and documentation for type evaluation. California DMS has submitted a draft checklist and has asked the Measuring Labs and for input.

Mr. Truex reported that he asked the NTEP labs to review the draft checklist during the Measuring Lab meeting just prior to the Sector meeting. The NTEP Labs felt that the draft checklist was more along the lines of an examination procedure outline (EPO), not an NTEP checklist. Thus, the laboratories felt that additional work is needed to develop a draft checklist. The NTEP Labs also suggested that the issue be presented to the NTEP Committee and the NCWM Board of Directors with a request that a Work Group comprised of evaluating laboratories, manufacturers, and others be established to develop type evaluation checklists and criteria. There are many people with experts who are already part of the USNWG who might provide the expertise needed for this work group. They also noted the need to establish traceability of the test standards and equipment.

Mr. Truex stated, he didn't feel it would be fair to turn this issue over to the Measuring Sector since its members may not feel comfortable with nor have the expertise in this field. Additionally, he noted that any checklist developed by the proposed group should go straight to the NTEP Committee not via the Measuring Sector. This is the same approach that has been used by other devices such as the Taximeters Checklist and the Multiple Dimension Measuring Devices.

Decision:
The Measuring Sector agreed with the recommendations of the laboratories. The Measuring Sector appreciates the request to review the proposal, but doesn't have the expertise necessary to address these devices and recommends the BOD/NTEP Committee establish a WG to address the checklist and draw from the expertise currently within the

USNWG. This does not prevent members of the MS, who have an interest in the work, from participating in and/or providing input to the proposed WG.

18. Discussion of Possible Meeting Location and Date:

Background/Discussion/Decision:
At the conclusion of its meeting, the Sector discussed potential locations and dates for the 2017 Sector meeting. The Sector asked the NCWM to look at Chicago, Atlanta, Denver, Houston, Dallas, and Austin as possibilities realizing the location and timing will depend upon the availability of a hotel and meeting space within cost constraints.

Possible dates to consider:

- September 25
- October 2
- October 3 – 4

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Appendix A. Attendees

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Appendix B

B. Field Evaluation and Permanence Tests for Mass Flow Meters

The following tests are considered to be appropriate for mass flow meters:

Type Evaluation

The gravimetric test method shall be used for type evaluation for meters indicating only in units of mass and may be used for meters indicating in units of volume. Meters indicating in only units of volume may be tested using a volumetric standard. **Alternatively, transfer standard meters (master meters) may be used for type evaluation for meters indicating in either mass or volume units, provided that the master meter indicates in the appropriate units and is a traceable reference standard in compliance with all the requirements of this policy.**

Test Data

Meters tested in a laboratory environment will be tested four times at each of five different flow rates. Use the product available in the laboratory for both the initial and the follow-up evaluation to establish "baseline" data for the meter's performance. A Certificate of Conformance (CC) may be issued for the product(s) tested in the laboratory; however, additional products will not be included until testing is completed with these products. After a "baseline" is obtained, products can be included on the CC by performing three tests at each of four different flow rates in the field for both the initial and follow-up evaluation. If a meter is tested in the field without first determining a "baseline," the meter must undergo four tests at each of five different flow rates; these criteria apply for both the initial and follow-up test.

Following the initial test, the meters will be placed into service for the permanence test. The minimum throughput criterion recommended for these meters are 60 days, or 2000 × maximum rated flow in units per minute. Following the period of use, the tests listed above are to be repeated. All results within the range of flow rates to be included on the certificate of conformance must be within the applicable tolerances. Extended flow range testing performed at the manufacturer's discretion may be included on the certificate of conformance provided the results are within the acceptable tolerances.

Gravimetric Standard

As a general guideline for the gravimetric standard, the value of the scale division should not be larger than one-tenth of the tolerance times the smallest test draft. The combined error of the standard used for testing measuring instruments shall not exceed 20 % of the maximum permissible error to be applied. Using known weight (field standard), determine the error present in the weighing instrument over the weighing range that will be used in the test. inherent error, if present, is to be factored out of the measurement. The scale will then be used as a transfer standard.

The reference scale used in the gravimetric test must be tested immediately prior to testing the mass flow meter. The test should be conducted no earlier than one day prior to the test of the mass flow meter. For example, the laboratory may arrive at the site and conduct the test of the reference scale on the first day and then return the second day to begin testing of the mass flow meter. If at all possible, the reference scale should not be used for other purposes during the testing of the mass flow meter. However, it is recognized that this is not always practical since the scale will often be used at the site for other purposes. If the evaluating laboratory has reason to believe that scale performance has changed (e.g., erratic readings, observed abuse of the scale, etc.) during the conduct of the mass flow meter test, testing of the reference scale should be repeated. If scale performance has changed, any meter tests that have already been performed must be repeated.

If necessary, the reference scale should also be tested after the test of the mass flow meter is completed; this includes testing after completing the series of initial tests in the permanence test and also after completing the series of subsequent tests in a permanence test.

Under no circumstances is the laboratory to accept test results from a prior scale inspection or test. The evaluating laboratory must witness the test of the reference scale, and the test must be conducted at the same time as the testing of the mass flow meter. Accuracy tests of the scale must be conducted with certified, traceable test weights. On the subsequent test of a meter after the permanence period, the reference scale must be retested; scale test results obtained during the initial test of the meter are not sufficient.

Remember that the reference scale serves as your test standard for the mass flow meter test, and you are to make error corrections to your mass flow meter test results based upon the test you perform on the reference scale. Therefore, it is essential to ensure that the standard is correct at all times during the test and to determine the exact errors in the scale in the range of weights where the mass flow meter will be tested.

The Sequence of Testing is To Occur as Follows:

1. Test the reference scale and note the errors in the weight ranges where the meter test will be conducted.
2. Perform initial tests of the mass flow meter.
3. If necessary, test the reference scale to determine that scale performance has not significantly changed.
4. Subject the meter to throughput during the permanence test.
5. Test the reference scale and note errors in the weight ranges where the meter test will be conducted.
6. Perform the subsequent tests of the mass flow meter.
7. If necessary, test the reference scale to determine that scale performance has not significantly changed. It is preferable to have a scale that is dedicated to only NTEP weighing during the evaluation of the meter. The scale shall be reverified if it is used for purposes other than evaluation weighing, or if the maximum time between the initial test and the permanence test exceeds five days.

Additional Considerations:

1. The reference scale should be adjusted to have errors as close to zero as practicable.
2. When weighing individual test drafts, the beginning weight (tare) and ending weight (gross) must both be corrected for scale error at that load range in order to determine the correct net weight for the run.
3. All scale readings should be made using error weights to 0.1 d or using expanded resolution if available. The scale should repeat successive readings of the same load within 0.5 scale divisions. An NTEP approved scale is not required.
4. If reasonably stable readings using error weights cannot be achieved due to wind or other environmental factors, testing should be suspended until such time that stable readings can be achieved.
5. The NTEP Laboratory and the applicant may consider setting the scale up and calibrating with a smaller division or using an expanded resolution mode if available. If the scale is set up and calibrated with a smaller division and the resulting total number of divisions for the scale exceeds the n_{max} allowed for the device, the use of the scale will be restricted to the type evaluation weighings only.
6. To conduct the mass flow meter tests, position the test vessel completely on the scale and in the same position for all weighments.
7. When "semi" tractor/trailer tankers are used, the maximum gross load can be reduced by uncoupling the tractor and weighing only the trailer.
8. The driver should be out of the truck and the engine off whenever weighments are made.
9. The scale shall be within five miles of the meter evaluation site unless it is possible to determine fuel consumption and make appropriate corrections for the fuel consumed.

Notes: Measurement Canada requires that the minimum scale division not exceed one fifth of the limit of error for the test draft. Test criteria are being developed for an abbreviated follow-up test.

Test Drafts with a Gravimetric Standard
All test drafts shall meet the following criteria:

The minimum quantity for any test draft shall be equal to or greater than the amount delivered in one minute at the flow rate being tested, and any test draft shall be equal to or greater than ten times the division size of the available reference scale(s) divided by the applicable draft tolerance in percent for the device under test. As a formula:

Minimum draft size ≥ 10 (scale "d")/Applicable Draft Tolerance for one minutes flow

For example: With a scale division of 0.1 lb (or 1 lb with 10:1 expanded resolution or by using error weights) and an applicable tolerance of 0.2 %, the minimum draft must be equal to or greater than 500 lb.

With a scale division of 0.5 lb (or 5 lb with 10:1 expanded resolution / error weights) and an applicable tolerance of 0.3 %, the minimum draft must be equal to or greater than 1667 lb.

Transfer Standard Meter (Master Meter) Qualification
Prior to using the master meter for field evaluation testing, traceability of the master meter (master meter) measurements shall be established and documented in one of the two ways described here:

- **Calibration in the units (mass or volume) by an independent laboratory that is accredited to ISO17025 standards by a recognized notified body (e.g., NVLAP, A2LA). The documentation of the scope of accreditation of the lab must indicate that the uncertainty of the calibrated master meter measurements, in the units to be tested, is less than or equal to one-third of the tolerance allowed for the device in service that is to be tested. The lab used to calibrate the master meter shall maintain and provide on demand the following documentation that will include the following:**
    - **the date and time of the most recent calibration,**
    - **the metrological traceability chain linking the master meter calibration to NIST standards,**
    - **the uncertainty of the calibrated master meter stated in the Scope of Accreditation,**
    - **the measurement procedures used to calibrate the master meter,**
    - **the Certificate of Accreditation to ISO 17025 as proof of the technical competence of the lab and its personnel,**
    - **the master meter calibration test results realized in SI units,**
    - **the periodic calibration verification schedule and the calibration history of the master meter,**
    - **the measurement assurance program data for the lab,**
    - **a statement of compliance with NCWM Publication 14 on the master meter test reports.**
- **Calibration of a master meter by a lab that is not accredited to ISO17025 may be performed, so long as the calibration is witnessed by the official inspector or evaluator. In cases where the**

inspector or evaluator witnesses the calibration of the master meter in a lab that is not ISO17025 accredited, the inspector or evaluator must also witness the verification of the gravimetric scales with mass standards traceable to NIST prior to the use of that scale(s) to calibrate the master meter. The uncertainty of the calibration should be documented and approved by the inspector or evaluator as being less than or equal to one-third of the tolerance that is to be tested. The following documentation of the master meter traceability should be included in the report filed by the inspector and or evaluator:

- **the date and time of the witnessed calibration,**
- **the metrological traceability chain linking the master meter to NIST standards,**
- **the uncertainty of the calibrated master meter,**
- **the measurement procedures used to calibrate the master meter,**
- **the observed technical competence of the lab and its personnel,**
- **the master meter calibration test results realized in SI units.**

When the master meter has been shown through testing against traceable standards to have the same calibration configuration values between liquid and gas, the calibration may be done on either liquid or gas, regardless of whether the master meter will be used as a liquid or a gas transfer standard during field evaluation testing.

At the discretion of the inspector or evaluator, calibration verification of the master meter may be required immediately following field evaluation testing. The decision whether to require post-testing calibration verification of the master meter should be based on:

- **the time that has passed since the most recent calibration of the master meter,**
- **the past history performance and stability documented for the master meter,**
- **the data collected during the field evaluation (e.g., irregular or unusually close to allowed tolerance).**

Test Drafts with a Transfer Standard Meter (Master Meter)
All test drafts shall meet the following criteria:

The minimum quantity for any test draft shall be equal to or greater than the amount delivered in one minute at the flow rate being tested, and any test draft shall be equal to or greater than ten times the MMQ of the master meter.

MMQ testing may be performed with master meters with smaller quantities than required above, provided that MMQ of the master meter is equal to or less than the MMQ of the device being evaluated.

Testing for Volume Units Only or to Add Volume Units to Existing Certificates

In order to add volumetric indications to an existing NTEP Certificate of Conformance (CC) for a meter which already covers mass indications for a meter, the following criteria relative to meter sizes to be covered on the CC must be met:

- At least one-meter size must be tested in the volumetric mode.
- If the meter size(s) selected for testing is not already covered on the existing CC, then the request is treated as a submission to add a new meter size (e.g., a permanence test is required and testing must be performed in both the mass and the volume modes of operation.)

Note: During an evaluation of a meter to add volume unit to an existing certificate the tolerance specified in the mass flow meters code is to be applied to both the initial and the final tests. No adjustments may be made to the meter during this period. This tolerance is to be applied even if different liquid temperatures and pressures exist between the initial and final tests. During the evaluation of a meter for volume units only for a product specific application where a separate product specific NIST Handbook 44 code exists; e.g., LPG, cryogenic liquids, CO_2, etc., the appropriate NIST Handbook 44 section for the intended application will be applied.

Determination of performance relative to repeatability, accuracy, and linearity should be performed using accepted statistical methodology. Reference documents include: 1) SAMA Standard PMC 20.1-1973, Process Measurement and Control Terminology; 2) ANSI/ASME MFC-2M-1983, Measurement Uncertainty for Fluid Flow in Closed Conduits; and 3) ANSI/ASME MFC-1M-1979, Glossary of Terms Used in the Measurement of Fluid Flow in Pipes.

Repeatability for Mass Flow Meters (Mass Flow Meters Code Reference T.3.)

When multiples tests are conducted at approximately the same flow rate, the range of the test results for the flow rate shall not exceed:

1. 0.2 % for retail liquid motor fuel devices; AND
2. 40 % of the applicable tolerance for all other devices listed in Table T.2. of the Mass Flow Meters Code.

Note: The normal test of a mass flow metering system shall be made at the maximum discharge rate developed under the conditions of the installation. Any additional tests conducted at flow rates down to and including the rated minimum discharge flow rate shall be considered normal tests. (Code reference N.6.) Special test tolerances shall apply to tests such as a split compartment test conducted to develop operating characteristic of the measuring systems.

Testing for Multi-Product Applications

Multi-product applications (that is, applications in which the meter will be used without a change to zero or calibration to dispense different products which vary in specific gravity by more than 0.1) must include a multi-product test. The multi-product initial test will be performed on the meter without a change to zero or calibration using multiple products having a difference in specific gravity of at least 0.2. For devices which will be used to dispense multiple products having a specific gravity range greater than 0.2, the multi-product testing must be performed over the anticipated range before multi-product applications will be included on the CC. For the multi-product testing, throughput testing will be performed on one or a combination of the products; testing for the subsequent test will be conducted on both products without a change to zero or calibration. The CC for a mass flow meter will cover multi-product applications where the specific gravity of a single product, or multiple products, varies by the amount tested throughout the entire approved specific gravity range of the meter.

Example: Where a meter has been tested and a certificate issued for multi-product with one liquid having a specific gravity of 0.7 and another liquid having a specific gravity of 1.0 and the meter is subsequently tested to expand the range with a liquid having a specific gravity of 1.6 the allowed variation of densities covered by the CC will be from 0.7 through 1.6. Multi-product testing requirements do not apply to meters used to dispense a product such as propane in which the density varies in normal operation.

Additional Considerations for Testing Mass Flow Meters Dispensing Compressed Natural Gas (CNG)

1. Ideally, the device should be tested over a temperature range. Because this is not possible to easily regulate in the field, to observe any effects of temperature changes test early in the day and then again later in the day.

Note: The evaluating laboratory should attempt to test at as wide a temperature range as possible; however, it is recognized that this may not always be possible and, in some cases, little or no variation in temperature will be experienced.

2. The magnitude of the draft (and, therefore, the time required for delivery) may impact upon the test results. For very small drafts, the start and stop effects can become significant and may result in large variability. Because CNG stations are presently few and far between in some areas, it is anticipated that these devices will be heavily used to "top off" tanks. Consequently, the minimum measured quantity declared for the device can be significant. It is desirable to have at least some tests run at or near the minimum measured quantity.
3. In setting up the arrangements for testing, the resolution of the scale relative to the test draft must be considered and "rounding error" of the scale must be kept to an acceptably small level. As a general guideline, the value of the scale division should not exceed one-tenth of the tolerance applied to the device. Either a high-resolution scale is needed; error weights should be used; or a larger test draft selected. A combination of these approaches may be used. The total error of the transfer standard must be limited to less than one-third of the tolerance. Therefore, the scale must be thoroughly tested; the repeatability of the scale verified; and corrections made to the results of the meter test to correct for any errors determined during the scale test.
4. The repeatability of the test results must be within 40 % of the absolute value of the maintenance tolerance and the results of each test shall be within the applicable tolerances.

   Tests for repeatability shall include a minimum of three consecutive test drafts of approximately the same size and be conducted under controlled conditions where variations in factors, such as temperature, pressure, and flow rate, are reduced to the extent that they will not affect the results obtained.
5. Repeat tests should be run over a range of flows or, because the device may operate at only one flow in the field installation, over a range of quantities.
6. The typical tank size being filled by the device will be 7 kg to10 kg (16 lb to 20 lb). A very large tank size may be 20 kg (40 lb) if a vehicle is equipped with two tanks. The average amount dispensed will probably be around 4 kg (8 lb).
7. Because the zero changes with temperature, the zero must be sealable as noted in the Mass Flow Meters Code in NIST Handbook 44. CNG meters must indicate on the basis of mass, with the computation of total sale based on mass units. Supplemental units may be used in addition to the mass units; however, these must be clearly identified as supplementary units. It is suggested that conversion charts be provided to explain to the consumer how the conversion factor for the supplemental units is derived.

The Following Tests are Considered Appropriate for CNG Dispensers:

1. Normal Test (Code References S.3.7., N.4., N.6.1., T.2., and T.3.)

Computer Jump:

- Remove nozzle from dispenser and connect to test cylinder. (Test cylinder pressure should not be greater than 200 psi to simulate an actual delivery.)
- Turn nozzle valve from "OFF" position to "FILL" position.
- Empty discharge hose.
- Turn nozzle valve to "OFF" position.
- Activate dispenser.
- Observe dispenser indications, if computer jump occurs, take appropriate action.

Note: A test cylinder is not necessary for the computer jump test on dispensers equipped with an autovent system. To test, turn dispenser on and observe the indication display for computer jump when the dispenser shuts off.

Minimum Test Drafts are as Follows:

- Place empty test cylinder on the scale.
- Access mass display of the dispenser.

- Tare weight of the test cylinder, chocks, and stand.
- Connect the nozzle to the test cylinder.
- Fill the test cylinder to one-third capacity full at maximum flow rate.
- Disconnect the nozzle from the test cylinder.
- Compare mass display to scale indication.
- Determine dispenser error. (Code Reference T.2.)
- Leave product in test cylinder.
- Tare the weight of the test cylinder, chocks, and stand.
- Connect the nozzle to the test cylinder.
- Begin the fill operation with product in the cylinder; fill cylinder to two-thirds capacity at maximum flow rate.
- Disconnect the nozzle from the test cylinder.
- Compare mass display to scale indication.
- Determine dispenser error. (Code Reference T.2.)
- Tare the weight of the test cylinder, chocks, and stand.
- Connect the nozzle to the test cylinder.
- Begin the fill operation with product in the cylinder; fill cylinder to capacity at maximum flow rate.
- Disconnect the nozzle from the test cylinder.
- Compare mass display to scale indication.
- Determine dispenser error. (Code Reference T.2.)
- Return product to owner/operator of dispenser. (Code Reference UR.3.8.)
- Place empty test cylinder on scale (scale may be supported by chocks and stand).
- Tare the weight of the test cylinder, chocks, and stand.
- Connect the nozzle to the test cylinder.
- Fill test cylinder to capacity at maximum flow rate.
- Disconnect the nozzle from the test cylinder.
- Compare mass display to scale indication.
- Determine dispenser error. (Code Reference T.2.)
- Return product to owner/operator of dispenser.
- Repeating previous tests. (Code Reference T.3.(a))
- Applicable tolerance for multiple tests at the same flow rate.
- Return product to owner/operator of dispenser.
- If the meter minimum measured quantity (MMQ) is less than the smallest test draft, conduct a test at the MMQ value. (Code Reference N.4.)

Note: If 300 divisions (d) or 2.27 kilograms (5 pounds) is greater than one-third of the test cylinder capacity, then the test cylinder should be emptied to accommodate a delivery of at least 300 d or 2.27 kilograms (5 pounds) otherwise a larger tank is necessary.

2. Check effectiveness of zero-setback interlock. (Code References S.3.8., UR3.6., and UR.3.7.)
    - No subsequent delivery until indicating and recording element returned to zero.
    - After delivery is complete the dispenser starting lever (mechanism) is shutoff, interlock engaged, and discharge nozzle is in the designed hanging position. Note: This does not apply to nozzle control.
    - Remove nozzle from hanging position.
    - Reset computer to zero and turn on dispenser.
    - Attempt to return the nozzle to its designed hanging position, carefully remove nozzle and connect it to the test tank and open valve. Move the dispenser starting lever (mechanism) to "ON" position and attempt to dispense product. Note: This does not apply to nozzle control.

- Product should not flow without resetting the indications to zero.

3. Check operation of low-flow cut-off valve. (Code Reference UR.2.3.)
   - Valve shall not be set lower than the minimum flow rate.
   - Valve stops registration when flow is below the low-flow cut-off value.
   - Connect nozzle to empty test tank and dispense product. Slowly throttle down on the valve on the test tank to the minimum attainable flow rate. Product delivery should not occur below the mass flow meter minimum flow rate.
4. Power loss test. (Code References S.2.4.1. and S.2.4.2.)
   - Transaction in progress at power loss, information shall be retainable for 15 minutes.
   - Device memory shall retain quantity of product and sales price during power loss.
   - Security seal—apply wire security seal to secure adjusting mechanism (if applicable.) (Code References G-UR.4.5. and S.3.5.)
   - Note on the official report the number of gasoline gallon equivalents of product dispensed during the test.
   - After all equipment at a location has been tested, review results to determine compliance with equipment maintenance and use of adjustments. (Code Reference G-UR.4.1. and G-UR.4.3.)

Appendix C

Draft 16-

Guidance on Empirical Analysis

This guide is intended for:

- Service agents acting under the auspices of their local regulatory authority, who are calibrating or placing meters into service with multiple linearization factors;
- Regulatory officials who witness the calibration or placing-in-service of meters with multiple linearization factors;
- Regulatory officials and service agents who are verifying the accuracy of meters with multiple linearization factors.

In theory, any properly performing meter system should be able to be calibrated with one calibration setting and remain in tolerance at any flow rate for one product, or group of similar products. Meter systems with mechanical calibrators operate in this manner. They have one calibration setting and are limited to dispensing only one product or one group of similar products. Accuracy is typically optimized at the normal flow rate for the most frequently dispensed product. This usually means there are slight errors at other flow rates, and for other products. These errors should be of no concern to the regulatory official if they are within applicable tolerances, but the device owner may wish to reduce these inaccuracies.

Modern meter registration technology allows accuracy to be optimized for multiple products at multiple flow rates through the use of linearization factors. Establishing, maintaining, and verifying these linearization factors can be time-consuming, however, because meter performance can be affected by system configurations. Differences in product density and viscosity can affect meter performance. Differences in storage tank size, location and plumbing configurations upstream of the meter may also affect meter technologies sensitive to flow profile configurations.

Device owners must weigh the benefits of optimization against the time commitment necessary to establish and maintain multiple linearization factors. It is the device owner's prerogative to determine whether each meter will be programmed with multiple flow rates and factors for each product, or with just one factor regardless of flow rate and product. If a meter is configured with only one linearization factor, it should be calibrated and verified exactly like a meter with a mechanical calibrator and register.

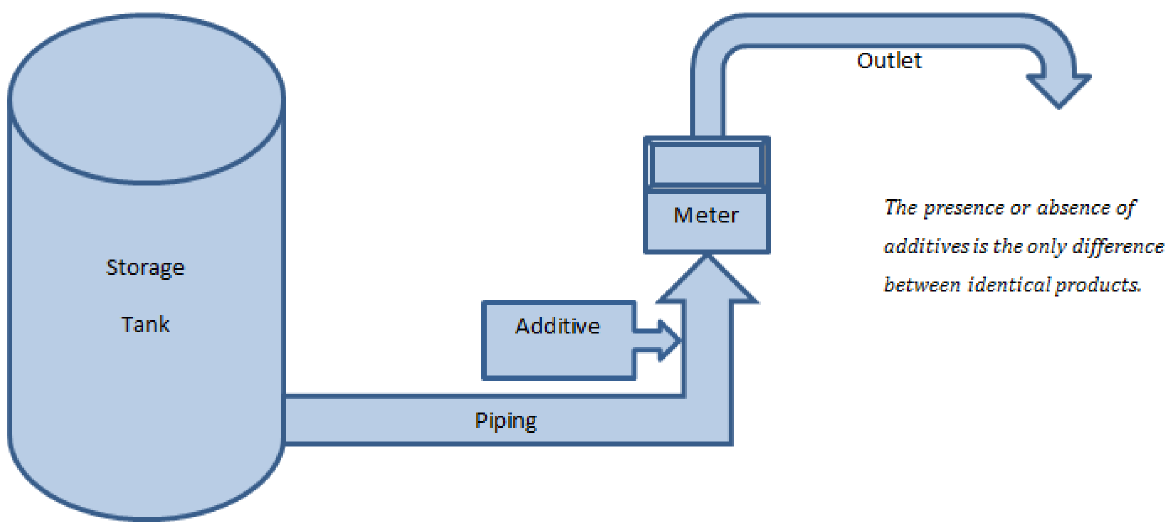
Meters with multiple linearization factors must initially be physically tested on each non-identical product at each configured flow rate in order to characterize the system and to determine the appropriate linearization factors. Using this initial data, regulatory officials can then determine which products can be treated as if they were identical and which as similar or discreet. The regulatory official may then also decide if and when empirical analysis may be used in conjunction with physical testing to reduce the time burden on subsequent calibrations and verifications.

The purpose of this guidance is to aid regulatory officials (and service agents acting under the auspices of their local regulatory authorities) in determining how and when empirical analysis can be properly utilized.

Initial Testing - Identical vs Similar vs Discreet Products

Products are Considered Identical when:

- The base product is the same; and
- The base product flows from the same storage tank; and
- The base product uses the same piping; and
- Any differences are due only to the injection of octane enhancer or corrosion inhibiters, dye, or similar additives that do not significantly change the product's properties.



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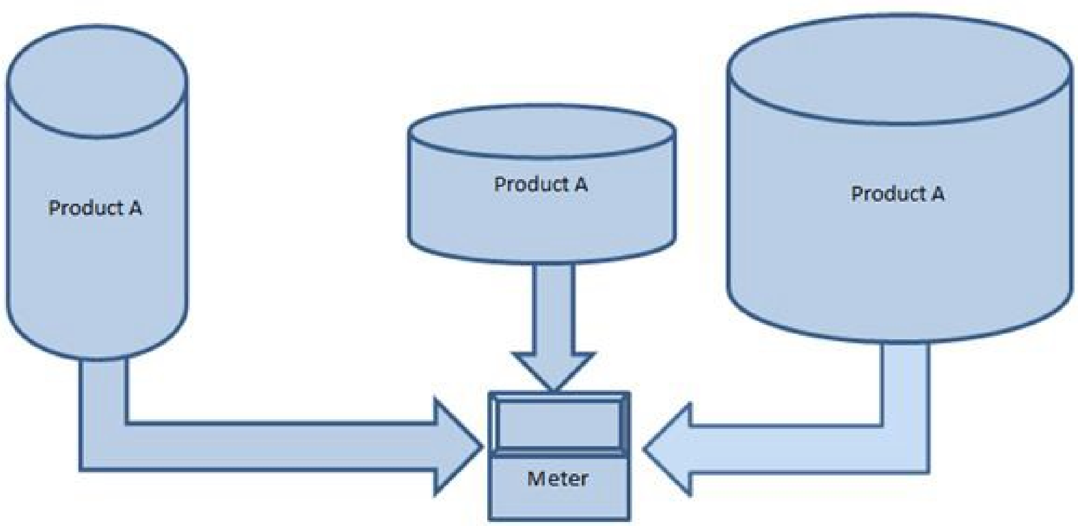
Identical products should be configured identically. Flow rates, and linearization factors at each flow rate, should be identical. Initially, only one product in a group of identical products needs to be physically tested, but it should be tested at all flow rates for which the meter is configured. On subsequent verifications, some of the flow rates may be verified empirically at the discretion of the regulatory official.

Consider, for example, a terminal meter which delivers taxed (clear) and untaxed (dyed) #2 diesel, drawn from the same tank, and delivered through the same piping. The red dye for the untaxed diesel is injected at the rack and there are no other differences between the products other than the dye. The meter is configured with the same slow flow rate, high flow rate, and intermediate flow rate for both products. It would be appropriate to physically test only the clear diesel on initial at all three flow rates. The linearization factors for the dyed product should be the same as the linearization factors of the clear product. If any adjustments were made to the clear product's linearization factors, the same adjustments should be made to the dyed products factors.

At future inspections, the regulatory official may decide that the clear diesel will be physically tested at high and low flow rate rates, and its linearization factor will be empirically verified at the intermediate flow rate. The dyed diesel will always be empirically compared to the clear diesel, and its linearization factors will always match those of the clear.

Products are considered similar when:

- They are the same grade of product but flow from different storage tanks; or
- They are the same grade of product but they reach the meter through different piping; or
- They are different products listed in the same Product Family on the meter's NTEP Certificate of Conformance, and they differ by –
  - No more than 10 % in viscosity (for positive displacement, turbine and similar meters); or
  - No more than 10 % in specific gravity (for mass flow meters).



The size and shape of storage tanks, the strength of different pumps, and the length and configuration of the plumbing, can affect the performance of some meters. Initial testing is needed to determine if the same product coming from different tanks can be considered to be similar, or if the product in each tank must be treated as if it was discreet.

Initial physical testing of the meter should be done with all non-identical products at all flow rates. The official with regulatory authority will use the initial test data to determine whether similar products can be treated as if they were identical on subsequent verifications and calibrations.

Initial data may show that the meter performs as if some products were identical. For example, different batches of gasoline with the same octane but drawn from different tanks may have identical linearization factors at every speed. Such products can be treated as if they are identical. [Note: Some meter technologies are sensitive to upstream flow dynamics caused by environmental factors like pumphorse power, tank shape and size, or plumbing configurations. Do not assume that the meter will perform identically with product of the same grade from different tanks. Verify through physical testing before making that determination.] Similar products which can be treated as if they were identical should be configured with the same flow rates and identical factors at each flow rate. Only one product in the group needs to undergo physical testing on subsequent verifications. Any adjustments made to the product being physically tested should be made to the other products in the group.

Initial testing may show that some products have optimal linearization factors which are not the same, but which are so close that the products can be treated as if they were identical. For example, consider a terminal meter which delivers sub-grade, mid-grade, and premium gasoline. Initial physical testing shows that the maximum difference between their optimal linearization factors at any flow rate is less than 0.0 5%. (One quarter of acceptance tolerance)

If the owner prefers to save time on subsequent verifications, the regulatory official would be justified in allowing the high and low factors to be averaged for every speed, and those factors to be input for all three products. These products could be treated as if they were identical on subsequent verifications.

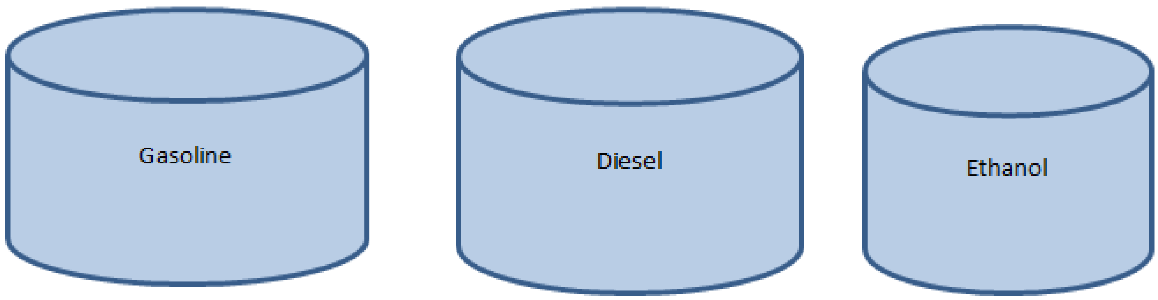
Only the intermediate product in the group would need to undergo physical testing on subsequent verifications. Any adjustments made to the product being physically tested should be made to the other products in the group.

If, however, the owner prefers to optimize accuracy and accepts that more physical testing will be required, each product can utilize its optimal linearization factor at each flow rate. The regulatory official must then determine if physical testing will be required for all products at all flow rates, or some combination of physical and empirical testing will be allowed.

Products are considered discreet when:

- They meet the criteria of similar products except that their optimal linearization factors differ from those of other products so much that they could not utilize the same factor as another product and still be in tolerance; or
- They are listed in the different Product Families on the meter’s NTEP Certificate of Conformance; or

- They are different products listed in the same Product Family on the meter's NTEP Certificate of Conformance, and they differ by –
    - o More than 10 % in viscosity (for positive displacement, turbine and similar meters); or
    - o More than 10 % in specific gravity (for mass flow meters).



Discreet products are from different product families as listed on the NTEP certificate, are from the same product family but they differ by more than 10% in viscosity or specific gravity, or are similar but initial testing has determined that they cannot use the same linearization factors and still be in tolerance.

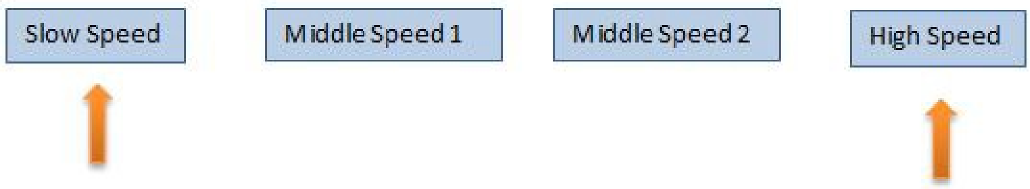
An example of a discreet product would be ethanol dispensed through a meter that is also configured to dispense various grades of gasoline. Discreet products must always be physically tested at all speeds initially. Regulatory officials may decide to allow empirical analysis on some speeds during subsequent verifications.

Empirical Analysis

Based on data analysis of the initial testing, the official with regulatory authority will determine if and when empirical analysis can be used on subsequent tests.

Acceptable Methods of Empirical Analysis

1. Evaluation between linearization factors on the same product.
   A product with unique linearization factors at different flow rates should not have linearization factors which are significantly different from adjacent factors. The regulatory official does not have to conduct physical testing at every flow rate, but should test the high and low flow rates at a minimum. The official can review the factors for flow rates which were not tested. Most meters have calibration curves which are roughly (not exactly) linear, so any factor which stands out as abnormally high or low should be physically verified.

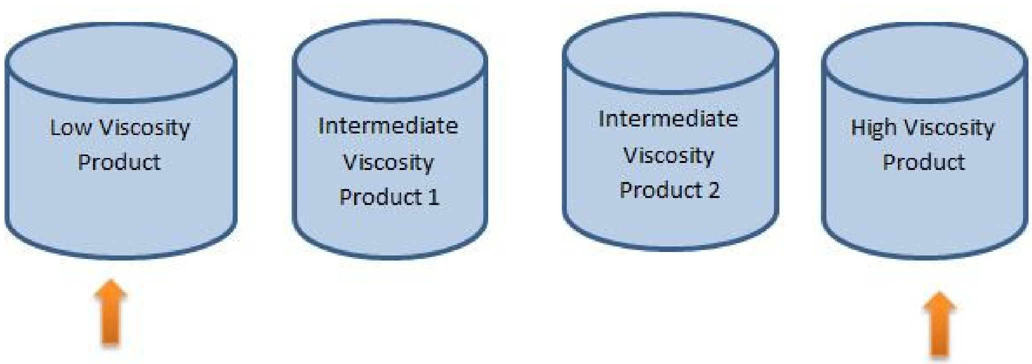


Test the slow speed first, and then the high speed. The factors for the middle speeds should be between the high and low speed factors. The factors should be roughly linear.

2. Evaluation between linearization factors on a group of similar products.

   If a group of similar products all have the same linearization factors, testing the highest and lowest viscosity products should be enough to determine whether the intermediate viscosity products will be in tolerance or not.

   If the similar products have different factors, test the high and low viscosity products. The linearization factors of the intermediate products should fall between the linearization factors for the two extreme products in a progression that mirrors the relation to the viscosities of the high/low viscosity products.



Test the highest and lowest viscosity products, and then evaluate the linearization factors of the intermediate products. All products should have the same linearization factors at every configured speed, or the intermediate products should have factors which fall between the factors of the high and low viscosity products.

Draft 16-06-22

Appendix D. EVFS Type Evaluation Checklist

EVFS Type Evaluation Checklist – 8/29/2016 ***Code Reference: NIST HB 44 3.40 EVFS – TC 2016***

Index	Requirement(s)	Met?	Comments
A. Application *Code Reference: A. Application*			
A.1.	**General** This code applies to devices, accessories, and systems used for the measurement of electricity dispensed in vehicle fuel applications wherein a quantity determination or statement of measure is used wholly or partially as a basis for sale or upon which a charge for service is based.	YES ☐ NO ☐ N/A ☐	
A.2.	**Exceptions** This code does not apply to: (a) the use of any measure or measuring device owned, maintained, and used by a public utility or municipality only in connection with measuring electricity subject to the authority having jurisdiction such as the Public Utilities Commission. (b) Electric Vehicle Supply Equipment (EVSEs) used solely for dispensing electrical energy in connection with operations in which the amount dispensed does not affect customer charges or compensation. (c) the wholesale delivery of electricity.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
A.3.	**Additional Code Requirements** In addition to the requirements of this code, Electric Fueling Systems shall meet the requirements of Section 1.10. General Code.	YES ☐ NO ☐ N/A ☐	
A.3.1.	**Electric Vehicle Supply Equipment (EVSE) with Integral Time-Measuring Devices** An EVSE that is used for both the sale of electricity as vehicle fuel and used to measure time during which services (e.g., vehicle parking) are received. These devices shall also meet the requirements of Section 5.55. Timing Devices.	YES ☐ NO ☐ N/A ☐	
A.4.	**Type Evaluation** The National Type Evaluation Program (NTEP) will accept for type evaluation only those EVSEs that comply with all requirements of this code and have received safety certification by a nationally recognized testing laboratory (NRTL).	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
G-S. Specifications Code Reference: G-S. Specifications			
G-S.1.	**Identification** All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification with the following information:	YES ☐ NO ☐ N/A ☐	
	(a) the name, initials, or trademark of the manufacturer or distributor;	YES ☐ NO ☐ N/A ☐	
	(b) a model identifier that positively identifies the pattern or design of the device; The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lower case.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
	(c) a nonrepetitive serial number; The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number. Abbreviations for the word “Serial” shall, as a minimum, begin with the letter “S,” and abbreviations for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., S/N, SN, Ser. No., and S. No.).	YES ☐ NO ☐ N/A ☐	
	(e) a National Type Evaluation Program (NTEP) Certificate of Conformance (CC) number or a corresponding CC Addendum Number for devices that have a CC. The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms “NTEP CC,” “CC,” or “Approval.” These terms may be followed by the word “Number” or an abbreviation of that word. The abbreviation for the word “Number” shall, as a minimum, begin with the letter “N” (e.g., No or No.).	YES ☐ NO ☐ N/A ☐	
	The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
G-S.3.	**Permanence** All equipment shall be of such materials, design, and construction as to make it probable that, under normal service conditions: (a) accuracy will be maintained; (b) operating parts will continue to function as intended; and (c) adjustments will remain reasonably permanent. Undue stresses, deflections, or distortions of parts shall not occur to the extent that accuracy or permanence is detrimentally affected.	YES ☐ NO ☐ N/A ☐	
G-S.4.	**Interchange or Reversal of Parts** Parts of a device that may readily be interchanged or reversed in the course of field assembly or of normal usage shall be: (a) so constructed that their interchange or reversal will not affect the performance of the device; or (b) so marked as to show their proper positions.	YES ☐ NO ☐ N/A ☐	
G-S.5.2.2.	**Digital Indication and Representation** Digital elements shall be so designed that:	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
	(a) all digital values of like value in a system agree with one another.	YES ☐ NO ☐ N/A ☐	
	(c) a digital value “rounds off” to the nearest minimum unit that can be indicated or recorded.	YES ☐ NO ☐ N/A ☐	
G-S.5.2.3.	**Size and Character** In any series of graduations, indications, or recorded representations, corresponding graduations and units shall be uniform in size and character. Graduations, indications, or recorded representations that are subordinate to, or of a lesser value than others with which they are associated, shall be appropriately portrayed or designated.	YES ☐ NO ☐ N/A ☐	
G-S.5.2.5.	**Permanence** Graduations, indications, or recorded representations and their defining figures, words, and symbols shall be of such character that they will not tend easily to become obliterated or illegible.	YES ☐ NO ☐ N/A ☐	
G-S.5.3.	**Values of Graduated Intervals or Increments** In any series of graduations, indications, or recorded representations, the values of the graduated intervals or increments shall be uniform throughout the series.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
G-S.5.5.	**Money Values, Mathematical Agreement** Any recorded money value and any digital money-value indication on a computing-type weighing or measuring device used in retail trade shall be in mathematical agreement with its associated quantity representation or indication to the nearest 1 cent of money value.	YES ☐ NO ☐ N/A ☐	
G-S.6.	**Marking Operational Controls, Indications, and Features** All operational controls, indications, and features, including switches, lights, displays, push buttons, and other means, shall be clearly and definitely identified. The use of approved pictograms or symbols shall be acceptable.	YES ☐ NO ☐ N/A ☐	
G-S.7.	**Lettering** All required markings and instructions shall be distinct and easily readable and shall be of such character that they will not tend to become obliterated or illegible.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
S. Specifications *Code Reference: S. Specifications*			
S.1. Primary Indicating and Recording Elements			
S.1.1.	**Electric Vehicle Supply Equipment (EVSE)** An EVSE used to charge electric vehicles shall be of the computing type and shall indicate the electrical energy, the unit price, and the total price of each transaction.	YES ☐ NO ☐ N/A ☐	
	(a) EVSEs capable of applying multiple unit prices over the course of a single transaction shall also be capable of indicating the start and stop time, the total quantity of energy delivered, the unit price, and the total price for the quantity of energy delivered during each discrete phase corresponding to one of the multiple unit prices.	YES ☐ NO ☐ N/A ☐	
	(b) EVSEs capable of applying additional fees for time-based and other services shall also be capable of indicating the total time measured; the unit price(s) for the additional time-based service(s); the total computed price(s) for the time measured; and the total transaction price, including the total price for the energy and all additional fees.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
S.1.2.	**EVSE Indicating Elements** An EVSE used to charge electric vehicles shall include an indicating element that accumulates continuously and displays, for a minimum of 15 seconds at the activation by the user and at the start and end of the transaction, the correct measurement results relative to quantity and total price. Indications shall be clear, definite, accurate, and easily read under normal conditions of operation of the device. All indications and representations of electricity sold shall be clearly identified and separate from other time-based fees indicated by an EVSE that is used for both the sale of electricity as vehicle fuel and the sale of other separate time-based services (e.g., vehicle parking).	YES ☐ NO ☐ N/A ☐	
S.1.2.1.	**Multiple EVSEs Associated with a Single Indicating Element** A system with a single indicating element for two or more EVSEs shall be provided with means to display information from the individual EVSE(s) selected or displayed, and shall be provided with an automatic means to indicate clearly and definitely which EVSE is associated with the displayed information.	YES ☐ NO ☐ N/A ☐	
S.1.3.	**EVSE Units**		

Index	Requirement(s)	Met?	Comments
S.1.3.1.	**EVSE Units of Measurement** EVSE units used to charge electric vehicles shall be indicated and recorded in megajoules (MJ) or kilowatt-hours (kWh) and decimal subdivisions thereof.	YES ☐ NO ☐ N/A ☐	
S.1.3.2.	**EVSE Value of Smallest Unit** The value of the smallest unit of indicated delivery by an EVSE, and recorded delivery if the EVSE is equipped to record, shall be 0.005 MJ or 0.001 kWh.	YES ☐ NO ☐ N/A ☐	
S.1.3.3.	**Values Defined** Indicated values shall be adequately defined by a sufficient number of figures, words, symbols, or combinations thereof. An indication of “zero” shall be a zero digit for all displayed digits to the right of the decimal mark and at least one to the left.	YES ☐ NO ☐ N/A ☐	
S.2. EVSE Operating Requirements			
S.2.1.	**EVSE Return to Zero**		
	(a) the primary indicating and the primary recording elements of an EVSE used to charge electric vehicles, if the EVSE is equipped to record, shall be provided with a means for readily returning the indication to zero either automatically or manually.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
	(b) it shall not be possible to return primary indicating elements, or primary recording elements, beyond the correct zero position.	YES ☐ NO ☐ N/A ☐	
S.2.2.	**EVSE Indicator Zero Reset Mechanism** The reset mechanism for the indicating element of an EVSE used to charge electric vehicles shall not be operable during a transaction. Once the zeroing operation has begun, it shall not be possible to indicate a value other than: the latest measurement; “all zeros;” blank the indication; or provide other indications that cannot be interpreted as a measurement during the zeroing operation.	YES ☐ NO ☐ N/A ☐	
S.2.3.	**EVSE Provision for Power Loss**		
S.2.3.1.	**Transaction Information** In the event of a power loss, the information needed to complete any transaction (i.e., delivery is complete and payment is settled) in progress at the time of the power loss (such as the quantity and unit price, or sales price) shall be determinable through one of the means listed below or the transaction shall be terminated without any charge for the electrical energy transfer to the vehicle:		

Index	Requirement(s)	Met?	Comments
	(a) at the EVSE;	YES ☐ NO ☐ N/A ☐	
	(b) at the console, if the console is accessible to the customer;	YES ☐ NO ☐ N/A ☐	
	(c) via on site internet access; or	YES ☐ NO ☐ N/A ☐	
	(d) through toll-free phone access.	YES ☐ NO ☐ N/A ☐	
	For EVSEs in parking areas where vehicles are commonly left for extended periods, the information needed to complete any transaction in progress at the time of the power loss shall be determinable through one of the above means for at least eight hours.	YES ☐ NO ☐ N/A ☐	
S.2.3.2.	**Transaction Termination** In the event of a power loss, either:		
	(a) the transaction shall terminate at the time of the power loss; or	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
	(b) the EVSE may continue charging without additional authorization if the EVSE is able to determine it is connected to the same vehicle before and after the supply power outage.	YES ☐ NO ☐ N/A ☐	
	In either case, there must be a clear indication on the receipt provided to the customer of the interruption, including the date and time of the interruption along with other information required under S.2.6. EVSE Recorded Representations.	YES ☐ NO ☐ N/A ☐	
S.2.3.3.	**User Information** The EVSE memory, or equipment on the network supporting the EVSE, shall retain information on the quantity of fuel dispensed and the sales price totals during power loss.	YES ☐ NO ☐ N/A ☐	
S.2.4.	**EVSE Indication of Unit Price and Equipment Capacity and Type of Voltage**		
S.2.4.1.	**Unit Price** An EVSE shall be able to indicate on each face the unit price at which the EVSE is set to compute or to dispense at any point in time during a transaction.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
S.2.4.2.	**Equipment Capacity and Type of Voltage** An EVSE shall be able to conspicuously indicate on each face the maximum rate of energy transfer (i.e., maximum power) and the type of current associated with each unit price offered (e.g., 7 kW AC, 25 kW DC, etc.).	YES ☐ NO ☐ N/A ☐	
S.2.4.3.	**Selection of Unit Price** When electrical energy is offered for sale at more than one-unit price through an EVSE, the selection of the unit price shall be made prior to delivery through a deliberate action of the purchaser to select the unit price for the fuel delivery. Except when the conditions for variable price structure have been approved by the customer prior to the sale, a system shall not permit a change to the unit price during delivery of electrical energy. Note: When electrical energy is offered at more than one-unit price, selection of the unit price may be through the deliberate action of the purchaser: 1) using controls on the EVSE; 2) through the purchaser's use of personal or vehicle-mounted electronic equipment communicating with the system; or 3) verbal instructions by the customer.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
S.2.4.4.	**Agreement Between Indications** All quantity, unit price, and total price indications within a measuring system shall agree for each transaction.	YES ☐ NO ☐ N/A ☐	
S.2.5.	**EVSE Money-Value Computations** An EVSE shall compute the total sales price at any single-purchase unit price for which the electrical energy being measured is offered for sale at any delivery possible within either the measurement range of the EVSE or the range of the computing elements, whichever is less.	YES ☐ NO ☐ N/A ☐	
S.2.5.1.	**Money-Value Divisions Digital** An EVSE with digital indications shall comply with the requirements of paragraph G-S.5.5. Money-Values, Mathematical Agreement, and the total price computation shall be based on quantities not exceeding 0.5 MJ or 0.1 kWh.	YES ☐ NO ☐ N/A ☐	
S.2.5.2.	**Auxiliary Elements** If a system is equipped with auxiliary indications, all indicated money value and quantity divisions of the auxiliary element shall be identical to those of the primary element.	YES ☐ NO ☐ N/A ☐	

S.2.6.	**EVSE Recorded Representations** A receipt, either printed or electronic, providing the following information shall be available at the completion of all transactions: (a) the total quantity of the energy delivered with unit of measure; (b) the total computed price of the energy sale; (c) the unit price of the energy, and for systems capable of applying multiple unit prices for energy during a single transaction, the following additional information is required: (1) the start and stop time of each phase during which one of the multiple unit prices was applied; (2) the unit price applied during each phase; (3) the total quantity of energy delivered during each phase; (4) the total purchase price for the quantity of energy delivered during each phase; (d) the maximum rate of energy transfer (i.e., maximum power) and type of current (e.g., 7 kW AC, 25 kW DC, etc.); (e) any additional separate charges included in the transaction (e.g., charges for parking time) including:	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
	(1) the time and date when the service begins and the time and date when the service ends; or the total time interval purchased, and the time and date that the service either begins or ends; (2) the unit price applied for the time-based service; (3) the total purchase price for the quantity of time measured during the complete transaction; (f) the final total price of the complete transaction including all items; (g) the unique EVSE identification number; (h) the business name; and (i) the business location.		
S.2.7.	**Indication of Delivery** The EVSE shall automatically show on its face the initial zero condition and the quantity delivered (up to the capacity of the indicating elements).	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
S.3. Design of Measuring Elements and Measuring Systems.			
S.3.1.	**Metrological Components** An EVSE measuring system shall be designed and constructed so that metrological components are adequately protected from environmental conditions likely to be detrimental to accuracy. The system shall be designed to prevent undetected access to adjustment mechanisms and terminal blocks by providing for application of a physical security seal or an audit trail.	YES ☐ NO ☐ N/A ☐	
S.3.2.	**Terminals** The terminals of the EVSE system shall be arranged so that the possibility of short circuits while removing or replacing the cover, making connections, or adjusting the system, is minimized.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
S.3.3.	**Provision for Sealing** Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that no adjustment may be made of: (a) each individual measurement element; (b) any adjustable element for controlling voltage or current when such control tends to affect the accuracy of deliveries; (c) any adjustment mechanism that corrects or compensates for energy loss between the system and vehicle connection; and (d) any metrological parameter that detrimentally affects the metrological integrity of the EVSE or system. When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal. Audit trails shall use the format set forth in Table S.3.3. Categories of Device and Methods of Sealing.	YES ☐ NO ☐ N/A ☐	
S.3.4.	**Data Storage and Retrieval**		
	(a) EVSE data accumulated and indicated shall be unalterable and accessible.	YES ☐ NO ☒ N/A ☐	

Index	Requirement(s)	Met?	Comments
	(b) values indicated or stored in memory shall not be affected by electrical, mechanical, or temperature variations, radio-frequency interference, power failure, or any other environmental influences to the extent that accuracy is impaired.	YES ☐ NO ☐ N/A ☐	
	(c) memory and/or display shall be recallable for a minimum of three years. A replaceable battery shall not be used for this purpose.	YES ☐ NO ☐ N/A ☐	
S.3.5.	**Temperature Range for System Components** EVSEs shall be accurate and correct over the temperature range of – 40 °C to + 85 °C (− 40 °F to 185 °F). If the system or any measuring system components are not capable of meeting these requirements, the temperature range over which the system is capable shall be stated on the NTEP CC, marked on the EVSE, and installations shall be limited to the narrower temperature limits.	YES ☐ NO ☐ N/A ☒	
S.4. Connections			
S.4.1.	**Diversion of Measured Electricity** No means shall be provided by which any measured electricity can be diverted from the measuring device.	YES ☐ NO ☒ N/A ☐	

Index	Requirement(s)	Met?	Comments
S.4.1.1.	**Unauthorized Disconnection** Means shall be provided to automatically terminate the transaction in the event that there is an unauthorized break in the connection with the vehicle.	YES ☐ NO ☐ N/A ☐	
S.4.2.	**Directional Control** If a reversal of energy flow could result in errors that exceed the tolerance for the minimum measured quantity, effective means, automatic in operation to prevent or account for the reversal of flow shall be properly installed in the system. (See N.3. Minimum Test Draft [Size]).	YES ☐ NO ☐ N/A ☐	
S.5. Markings The following identification and marking requirements are in addition to the requirements of Section 1.10. General Code, paragraph G-S.1. Identification.			
S.5.1.	**Location of Marking Information; EVSE** The marking information required in General Code, paragraph G-S.1. Identification shall appear as follows:		
	(a) within 60 cm (24 in) to 150 cm (60 in) from ground level; and	YES ☐ NO ☐ N/A ☐	
	(b) on a portion of the EVSE that cannot be readily removed or interchanged (e.g., not on a service access panel).	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
S.5.2.	**EVSE Identification and Marking Requirements** In addition to all the marking requirements of Section 1.10. General Code, paragraph G-S.1. Identification, each EVSE shall have the following information conspicuously, legibly, and indelibly marked:		
	(a) voltage rating;	YES ☐ NO ☐ N/A ☐	
	(b) maximum current deliverable;	YES ☐ NO ☐ N/A ☐	
	(c) type of current (AC or DC or, if capable of both, both shall be listed);	YES ☐ NO ☐ N/A ☒	
	(d) minimum measured quantity (MMQ); and	YES ☐ NO ☐ N/A ☐	
	(e) temperature limits, if narrower than and within – 20 °C to + 50 °C (− 4 °F to 122 °F).	YES ☐ NO ☐ N/A ☐	
S.5.3.	**Abbreviations and Symbols** The following abbreviations or symbols <u>may</u> appear on an EVSE system:		
	(a) VAC = volts alternating current;	YES ☒ N/A ☐	

Index	Requirement(s)	Met?	Comments
	(b) VDC = volts direct current;	YES ☐ N/A ☐	
	(c) MDA = maximum deliverable amperes;	YES ☐ N/A ☐	
	(d) J = joule.	YES ☐ N/A ☐	
S.6. Printer When a system is equipped with means for printing the measured quantity, the printed information must agree with the indications on the EVSE for the transaction and the printed values shall be clearly defined.			
S.6.1.	**Printed Receipt** Any delivered, printed quantity shall include an EVSE identification number that uniquely identifies the EVSE from all other EVSEs within the seller's facility, the time and date, and the name of the seller. This information may be printed by the EVSE system or pre-printed on the ticket.	YES ☐ NO ☐ N/A ☐	
S.7. Totalizers for EVSE Systems			
	EVSE systems shall be designed with a nonresettable totalizer for the quantity delivered through each separate measuring device. Totalizer information shall be adequately protected and unalterable. Totalizer information shall be provided by the system and readily available on site or via on site internet access.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
S.8. Minimum Measured Quantity (MMQ) The minimum measured quantity shall satisfy the conditions of use of the measuring system as follows:			
	(a) measuring systems shall have a minimum measured quantity not exceeding 2.5 MJ or 0.5 kWh.	YES ☐ NO ☐ N/A ☐	
N. Notes *Code Reference: N. Notes*			
N.1. No Load Test			
	A no load test may be conducted on an EVSE measuring system by applying rated voltage to the system under test and no load applied.	YES ☐ NO ☐ N/A ☐	
N.2. Starting Load Test			
	A system starting load test maybe conducted by applying rated voltage and 0.5-ampere load.	YES ☐ NO ☐ N/A ☐	
N.3. Minimum Test Draft (Size)			
	Full and light load tests shall require test of the EVSE System for a delivery of the minimum measured quantity as declared by the manufacturer.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
N.4. EVSE System Test Loads			
	EVSE measuring system testing shall be accomplished by connecting the test load and test standard at the point where the fixed cord is connected to the vehicle. Losses in the cord between the EVSE under test and the test standard should be automatically corrected for in the EVSE quantity indication for direct comparison to the test standard and also while the EVSE is in normal operation. For EVSEs that require a customer-supplied cord, system testing shall be accomplished by connecting the test load and test standard at the point where the customer's cord is connected to the EVSE.	YES ☒ NO ☐ N/A ☐	
T. Tolerances *Code Reference: T. Tolerances*			
T.1. Tolerances, General. (a) The tolerances apply equally to errors of underregistration and errors of overregistration. (b) The tolerances apply to all deliveries measured at any load within the rated measuring range of the EVSE. (c) Where instrument transformers or other components are used, the provisions of this section shall apply to all system components.			
T.2. Load Test Tolerances			
T.2.1	**EVSE Load Test Tolerances** The tolerances for EVSE load tests are:		

Index	Requirement(s)	Met?	Comments
	(a) acceptance tolerance: 1.0 %.	YES ☐ NO ☐ N/A ☐	
T.3. Repeatability			
	When multiple load tests are conducted at the same load condition, the range of the load test results shall not exceed 25 % of the absolute value of the maintenance tolerance and the results of each test shall be within the applicable tolerance.	YES ☐ NO ☐ N/A ☐	
T.4. Tolerance Application in Type Evaluation Examinations for EVSEs For type evaluation examinations, the acceptance tolerance values shall apply under the following conditions:			
	(a) at any temperature, voltage, load, and power factor within the operating range of the EVSE, and	YES ☐ NO ☐ N/A ☐	
	(b) regardless of the influence factors in effect at the time of the conduct of the examination, and	YES ☐ NO ☐ N/A ☐	
	(c) for all quantities greater than the minimum measured quantity.	YES ☐ NO ☐ N/A ☐	
T.5. No Load Test			
	An EVSE measuring system shall not register when no load is applied.	YES ☐ NO ☐ N/A ☐	

Index	Requirement(s)	Met?	Comments
T.6. Starting Load			
	An EVSE measuring system shall register a starting load test at a 0.5 ampere (A) load.	YES ☐ NO ☐ N/A ☐	

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Appendix E

National Type Evaluation Program (NTEP) Software Sector Meeting Summary

September 14, 2016
Kansas City, Missouri

5200-2 INTRODUCTION

The charge of the NTEP Software Sector is important in providing appropriate type evaluation criteria for software based weighing or measuring device based on specifications, tolerances, and technical requirements of NIST Handbook 44, "*Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices*," Section 1.10. General Code, Section 2 for weighing devices, Section 3 for liquid and vapor measuring devices, and Section 5 for taximeters, grain analyzers, and multiple dimension measuring devices. 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 the National Conference on Weights and Measures (NCWM) Specifications and Tolerances (S&T) Committee. Sector membership includes industry, NTEP laboratory representatives, technical advisors, and the NTEP Administrator. Meetings are held annually, or as needed and are open to all NCWM members and other registered parties.

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

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

Table A
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Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
BIML	International Bureau of Legal Metrology	OIML	International Organization of Legal Metrology
CC	Certificate of Conformance	OWM	Office of Weights and Measures
EPO	Examination Procedure Outline	PDC	Professional Development Committee
NCWM	National Conference on Weights and Measures	S&T	Specifications and Tolerances Committee
NIST	National Institute of Standards and Technology	SMA	Scale Manufacturers Association
NTEP	National Type Evaluation Program	WELMEC	European Cooperation in Legal Metrology

Details of All Items
(In order by Reference Key)

I. SOFTWARE SECTOR PRESENTATION

Technical Advisor, Mr. Doug Bliss gave a presentation from the Software Sector for the benefit of those Grain Analyzer Sector members who may not have been familiar with the agenda items and the background behind them. The presentation can be found on the NCWM.net website (**www.ncwm.net**) for those interested in reviewing the background.

II. 2016 NCWM INTERIM AND ANNUAL MEETING REPORT

Darrell Flocken reported that the two Voting items from our Sector were passed by the Conference at the July meeting.

The marking requirement for Not Built for Purpose instruments begins January 1, 2017, and will begin to be required for Built for Purpose instruments in 2022. Ms. Diane Lee relayed Ms. Cathy Brenner's comment that she is only aware of one Certificate of Conformance (CC) with the software revision on it. One of the labs (GIPSA) checked the meters, and two out of eight had the software revision on the label. Since built-for-purpose devices don't need to be able to indicate software revision until 2022, it is expected that the addition of this requirement will not pose a problem for grain analyzer manufacturers.

Also, in August, NCWM Publication 14 was revised by the Weighing Sector to include the requirement that changing software is a metrologically significant event.

III. 2016 INTERNATIONAL ACTIVITY REPORT

At the Berlin, Germany, OIML TC 5-SC 2 meeting, Dr. Thompson met with Mr. Ulrich Grottker, who revealed a proposal to revise OIML D 31. He estimates it will take three to five years for the revision to be completed. Dr. Thompson suggested that the United States would volunteer to act as Secretariat for the document review process.Carry-over Items

1. Software Identification/Markings

Source:
NTEP Software Sector

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

Since its inception the Sector has wrestled with the issue of software identification and marking requirements. At the 2014 meeting, significant work was done to make the recommendation to modify GS-1. Identification more palatable to the Conference. The new approach was a less invasive modification with effective dates set in the future for compliance to new requirements.

Mr. Darrell Flocken reported on the discussions during the 2015 Interim Meeting S&T Committee sessions. The item was left as a Developing item and was not officially commented upon during the session; the Committee indicated they were waiting for the outcome from the joint meetings with the other sectors, especially this one, to move forward.

In 2015, in conjunction with the Measuring Sector, some additional fine tuning was done. The current recommendation is below.

Amend NIST Handbook 44: G-S.1. Identification as follows:

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

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

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

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

(*c*) *a nonrepetitive serial number, except for equipment with no moving or electronic component parts and* ~~**not built-for-purpose software-based software devices**~~ ***software****;*
[Nonretroactive as of January 1, 1968]
(Amended 2003 and 2016)

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

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

(*d*) the current software version or revision identifier for not-built-for-purpose software-based devices~~;~~ **manufactured as of January 1, 2004, and all software-based devices or equipment manufactured as of January 1, 2022;**
~~***[Nonretroactive as of January 1, 2004]***~~

(Added 2003) **(Amended 2016)**

(1) The version or revision identifier shall be:

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

Note: If the equipment is capable of displaying the version or revision identifier but is unable to meet the formatting requirement, through the NTEP type evaluation process, other options may be deemed acceptable and described in the CC.
(Added 2016)

ii. ***continuously displayed or be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an alternative, permanently marking the version or revision identifier shall be acceptable providing the device does not always have an integral interface to communicate the version or revision identifier.***
[Nonretroactive as of January 1, 2022]
(Added 2016)

(2) Abbreviations for the word "Version" shall, as a minimum, begin with the letter "V" and may be followed by the word "Number." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R" and may be followed by the word "Number." The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). ***Prefix lettering may be initial capitals, all capitals, or all lowercase.***
[Nonretroactive as of January 1, 2007]
(Added 2006) (Amended 2016)

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

> *(1) The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.)*
> *[Nonretroactive as of January 1, 2003]*
>
> The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device. (Amended 1985, 1991, 1999, 2000, 2001, 2003, ~~**and,**~~ 2006, **and 2016**)

Concerns were raised regarding situations where a particular device can be ordered with or without a display. In those situations, the manufacturers would prefer to hard-mark the software version/revision in all cases, keeping the manufacturing process simple. In this case, the wording "as an exception" is problematic since it is only allowed as an exception if the device has no capability of displaying it. Mr. Marc Buttler and Mr. Michael Keilty suggested that "exception" be replaced by "alternative," and "always" be added after "not" to address this concern, that is:

ii. ***continuously displayed or be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an ~~exception~~ alternative, permanently marking the version or revision identifier shall be acceptable providing the device does not always have an integral interface to communicate the version or revision identifier.***
[Nonretroactive as of January 1, 2022]

(Added 20XX)

The Software Sector Chair asked the members of the Measuring and Software Sector in attendance whether everyone agreed to this modification of the proposal. Since no one objected, this change was included in the recommendation to the S&T Committee (and is included in the version shown above).

We debated whether to leave the non-retroactive date as 2020. It is possible to use 20XX and explain the intent in the proposal, but it might be better to leave it as a hard target. Since time has passed since we selected 2020, we backed it off until 2022, anticipating adoption by 2017 which would provide the intended period of five years after adoption.

In last year's proposal, there was an additional sub-clause included (in the 2014 Software Sector Summary version, this clause was in G-S.1.d(1).ii, and read ***directly linked to the software itself***). That line has been removed in this year's submission after further discussion during the 2015 joint meeting. Objections were raised that the clause did not actually represent a marking requirement. One suggestion was it could be removed from Identification and moved to Sealing Requirements. Ms. Tina Butcher suggested instead that it be removed and a definition be added for Software Version or Revision Identifier. Unfortunately, if a definition is used instead, the non-retroactive date would be lost. Another alternative suggested was to add a brand-new section specifically for this; however, there's a general reluctance to add new sections to NIST Handbook 44 that would have to be overcome.

It was realized that the word "permanently" in the very first paragraph of G-S.1. was sufficient language to require the software version or revision identifier to be linked to the software, so we ultimately decided to remove it from the proposed change. Since we already have a proposal on the agenda for the S&T Committee's meeting, we will be submitting an amendment to reflect the new version of this proposal, rather than using Form 15 as for a new proposal.

The new version of the proposal was sent to the regions and other sectors for comment.

The amended proposal was accepted as a Voting item at the 2016 Interim Meeting and passed at the 2016 Annual Meeting.

Discussion:
Mr. Darrell Flocken reported that the Weighing Sector asked what alternatives were permissible (per the Note to G-S.1.(d)i. above). Mr. Jim Pettinato described potential situations, such as a seven-segment display, where such a problem might exist.

Conclusion:
G-S.1.1. Location of Marking Information for Not-Built-For-Purpose, Software-Based Devices pertains to the location of marks. It currently maintains the distinction between built-for-purpose and not-built-for-purpose. The Software Sector would like to see that distinction eventually be eliminated, but the current thinking is that until the non-retroactive date of 2022 is reached, the differentiation cannot be eliminated. Due to that complication, Mr. Flocken recommended we table the issue until then. Mr. Jim Truex pointed out that we should begin working on it in 2021 so it could be considered in 2022. The Software Sector agreed to remove this item from the agenda until then. To prevent the intent to revisit this section of the general code being lost or forgotten, the item will remain on the agenda as a carry-over item, which has been tabled until 2021.

2. Identification of Certified Software

Source:
NTEP Software Sector

Background:
See the 2015 Software Sector Meeting Summary for more background on this item.

This item originated as an attempt to answer the question, "How does the field inspector know that the software running in the device is the same software evaluated and approved by the lab?"

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

(d) the current software version or revision identifier for ~~***not-built-for-purpose***~~ ***software-based electronic*** *devices;*
[Nonretroactive as of January 1, 2004]
(Added 2003) **(Amended 20XX)**

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

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

(3) The version or revision identifier shall be directly and inseparably linked to the software itself. The version or revision identifier may consist of more than one part, but at least one part shall be dedicated to the metrologically significant software.
[Nonretroactive as of January 1, 201X]
(Added 20XX)

Also, the Sector recommended the following information be added to NCWM Publication 14 as explanation/examples:

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

This item was eventually Withdrawn. Mr. Darrell Flocken shared his recollection of why the S&T Committee objected to this wording back in 2010. Basically, it went too deep for Handbook 44 and would be better placed in NCWM Publication 14.

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

- The current software identifier must be displayable/printable on command during operation (or made evident by other means deemed acceptable by G-S.1.)
- At a minimum, the software identifier must include a version/revision indication (1.02.09, rev 3.0 a, etc.). It could also consist of/contain checksum, etc. (crc32, for example).
- The version or revision identifier may consist of more than one part, but at least one part shall be dedicated to the metrologically significant software.

Other questions previously brought up that have not really been satisfied to date are:

- If we allow hard-marking of the software identifier (the sector has wavered on this in the past), does the above wording then imply that some mechanical means is required (i.e. physical seal) to "inseparably link" the identifier to the software?
- If a device is capable of doing so, does it still have to be able to display, print or communicate the identifier somehow, even if it is hard-marked?

The possibility of creating a separate NCWM Publication 14 section specific to software was debated. There are pros and cons in terms of the chances of adoption with that approach. It might be beneficial to manufacturers, due to keeping the requirements in one place. This becomes a philosophical question – is the content of NIST Handbook 44 intended to be a guide to manufacturers, or is it intended as direction to field inspectors? This discussion was tabled for present.

Historically, CC's have been written in terms of "version X and higher." It is not our intention to change that "policy," but it is not documented anywhere. Perhaps that should be addressed by the Software Sector. Mr. Truex reviewed the administrative policy text, which includes the requirement to report changes to NTEP, based on whether they are metrologically significant.

California indicated their NTEP lab only puts the software version on the certificate if it is not-built-for-purpose, but it seems that the other labs do so for all software-based devices.

If pushed, the Sectors agreed that a simple defining statement to qualify the class of devices to be included would be forwarded to the interested parties:

Software Based Device – Any device with metrologically significant software.

The Software Sector decided to leave the previously withdrawn recommendation as-is, in the hopes that the other changes to G-S.1. will be adopted, and then this can be revisited. Several Measuring Sector members and all the labs indicated their support for the language as written.

Regarding field inspection and locating the required information, the lists of acceptable menu text and symbols in Appendix A are intended to assist the labs in finding the certification number. The Sector noticed no action by the Sectors had been taken when this list was circulated for comment. We would like to remind them that the Sector would like to have it reviewed. We feel that this belongs in, for example, the Weighing Device NCWM Publication 14, page DES-22, Section 3; the Belt – Conveyor Scales, page BCS-10, Section 8.7; the Measuring Devices, page LMD-21, Section 1.6; the Grain Moisture Meter, page GMM-14, Section 1 (G.S.1); and Near Infrared Grain Analyzers, page NIR-8, Section 1 (G.S.1).

Ms. Tina Butcher mentioned that the Weighing Sector has a Weighing Checklist that has a similar set of approved symbols, so the examples shown in Appendix A would be in line with their current practice.

Discussion:
Since the G-S.1. change from Item 1 was voted on and adopted in 2016, we can now move forward on this item and consider adding to NCWM Publication 14 the specifics that the Sector has been discussing related to presenting the software identification.

Mr. Flocken asked whether it's a specification or information. This would determine whether it should belong in NIST Handbook 44 or only in NCWM Publication 14. One possibility is follows:

(3) The version or revision identifier shall be directly and inseparably linked to the software itself.

Note: The version or revision identifier may consist of more than one part, but at least one part shall be dedicated to the metrologically significant software.
[Nonretroactive as of January 1, 201X]

(Added 20XX)

Concern was expressed that this could cause confusion with field inspectors. Software separation isn't something that's intended to be useful in the field, it is intended to ease type approval and software maintenance release processing. This would lend weight to the argument of keeping it in NCWM Publication 14.

If the Sector desires to include this in NCWM Publication 14, we would need to identify all the sections where this concept would need to be added. The Software Sector doesn't have the authority to add it to the other sectors' NCWM Publication 14s. Mr. Flocken reported that a note regarding the concept of software separation has already been added to several of the various NCWM Publication 14 sections.

It was also noted that the checklist being developed for the labs currently includes (1.4.3) the requirement that the software version or revision be linked to the software itself.

Ms. Diane Lee relayed Ms. Cathy Brenner's comment that she believes most grain analyzers are currently using a checksum, which would meet the requirement for the version/revision be linked to the software. The general consensus seemed to be that this type of requirement would not be an imposition for grain analyzer manufacturers as it is already current practice to include a checksum.

As a side note, it was noted there is precedence in the load cell code in NIST Handbook 44 of including requirements pertinent only at type evaluation. Mr. Flocken does not like this practice, but it is a possibility (for the requirement to make the software revision/version linked to the software itself).

Mr. Flocken found the wording added to NCWM Publication 14 pertaining to the software version/revision marking requirement. The following wording has been added to the Weighing, Measuring, and Automatic Bulk Weighing Sections of Marking Requirements (Section 3), but not the Grain Analyzer Sector's section because they hadn't had a meeting in 2015 (or the Near Infrared).

A. Additional Marking Requirements- Not Built-for-Purpose Software-Based Devices

Identification of Certified Software:

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

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

For the Weighing Sector, there is a holding spot in the checklist for this, due to the delay for implementation until 2022 for built-for-purpose. For now, it only pertains to not-built-for-purpose.

Mr. Flocken suggested that the text be rearranged a bit:

B. Additional Marking Requirements - Not Built-for-Purpose Software-Based Devices

Identification of Certified Software:

3.1. The manufacturer must describe and possibly demonstrate how the version or revision identifier is directly and inseparably linked to the metrologically significant software. Where the version revision identifier is comprised of more than one part, the manufacturer shall describe which portion represents the metrological significant software and which does not. Yes __ No ___ N/A ___

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

Conclusion:

Mr. Jim Truex thinks that putting the requirement in the checklist in NCWM Publication 14 could be linked to the marking requirement just adopted in 2016. Mr. Doug Bliss pointed out how permanence of markings is tested (via NCWM Publication 14), but it isn’t specifically spelled out in NIST Handbook 44.

Given that no grain analyzers are currently implemented as not-built-for-purpose devices, the requirement wouldn’t affect them until 2022. Mr. Flocken will forward the proposed text to the other sectors (the Measuring Sector meets next week, but they have a full agenda already). Ms. Diane Lee will include this as part of the summary for Grain Analyzer’s meeting and ask for feedback and guidance as to where to put it. That means it won’t be adopted this year for the Grain Analyzer’s Section of NCWM Publication 14.

The Chair proposed we table agenda Item 2 until 2021, we continue to pursue implementing the checklist in NCWM Publication 14. Mr. Darrell Flocken suggested that the Software Sector recommend that the various Sectors adopt this for their NCWM Publication 14s. It would take a year or so, to make it through all the various sectors. A note could be added saying that a device can’t be rejected if it doesn’t meet this requirement in the checklist until 2022. It was agreed that we would table this item until the 2021 meeting, at which time we will propose the following (updated) wording for the 2022 NCWM Publication 14:

C. Additional Marking Requirements- Software

Identification of Certified Software:

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

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

3. Software Protection/Security

Source:
NTEP Software Sector

Background:
See the 2014 Software Sector Summary for additional background on this item.

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

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

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

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

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

Due to proprietary issues, the labs cannot simply give us direct feedback from the companies they interact with. Mr. Darrell Flocken volunteered to obtain information from the labs, aggregate it, and remove any potential proprietary information issues.

The checklist as updated during the 2014 meeting:

1. Devices with Software

1.1.	Declaration of the manufacturer that the software is used in a fixed hardware and software environment. <u>**The manufacturer should indicate whether it’s solely software or includes hardware in the system. Can the software be changed after the system has been shipped without breaking a seal?**</u> **AND**	☐ Yes ☐ No ☐ N/A

1.2. Cannot be modified or uploaded by any means after securing/verification. **<u>With the seal intact, can you change the software?</u>** ☐ Yes ☐ No ☐ N/A

Note: It is acceptable to break the "seal" and load new software, audit trail is also a sufficient seal.

1.3. The software documentation contains:

1.3.1. Description of all functions, designating those that are considered metrologically significant. ☐ Yes ☐ No ☐ N/A

1.3.2. Description of the securing means (evidence of an intervention). ☐ Yes ☐ No ☐ N/A

1.3.3. Software Identification, including version/revision. **<u>It may also include things like name, part number, CRC, etc.</u>** ☐ Yes ☐ No ☐ N/A

1.3.4. Description how to check the actual software identification. ☐ Yes ☐ No ☐ N/A

1.4. The software identification is:

1.4.1. Clearly assigned to the metrologically significant software and functions. ☐ Yes ☐ No ☐ N/A

1.4.2. Provided by the device as documented. ☐ Yes ☐ No ☐ N/A

1.4.3. Directly linked to the software itself. **<u>This means that you can't easily change the software without changing the software identifier. For example, the version identifier can't be in a text file that's easily editable, or in a variable that the user can edit.</u>** ☐ Yes ☐ No ☐ N/A

2. Programmable or Loadable Metrologically Significant Software

2.1. The metrologically significant software is:

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

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

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

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

3.3. Check whether there is a complete set of commands (e.g., function keys or commands via external interfaces) supplied and accompanied by short descriptions. ☐ Yes ☐ No ☐ N/A

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

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

4.5. Check whether a checksum or equivalent signature is generated over the machine code of the metrologically significant software (program module(s) subject to legal control Weights and Measures jurisdiction and type-specific parameters). **<u>This is a declaration or explanation by the manufacturer.</u>** ☐ Yes ☐ No ☐ N/A

4.6.	Check whether the metrologically significant software will detect and act upon any unauthorized alteration of the metrologically significant software using simple software tools (e.g., text editor). **This is a declaration or explanation by the manufacturer.**	☐ Yes ☐ No ☐ N/A

5. Software Interface(s)

5.7. Verify the manufacturer has documented:

5.7.1.	**If software separation is employed, t**he program modules of the metrologically significant software are defined and separated.	☐ Yes ☐ No ☐ N/A
5.7.2.	**For software that can access the operating system or if the program is accessible to the user, t**he protective software interface itself is part of the metrologically significant software.	☐ Yes ☐ No ☐ N/A
5.7.3.	The functions of the metrologically significant software that can be accessed ~~**via the protective software interface**~~.	☐ Yes ☐ No ☐ N/A
5.7.4.	The **metrologically significant** parameters that may be exchanged ~~**via the protective software interface**~~ are defined.	☐ Yes ☐ No ☐ N/A
5.7.5.	The description of the functions and parameters are conclusive and complete.	☐ Yes ☐ No ☐ N/A
5.7.6.	There are software interface instructions for the third party (external) application programmer.	☐ Yes ☐ No ☐ N/A

The Sector discussed examples, such as the upgrade of application programs and how these changes would affect audit trails and version numbers. It should be clear that if the upgraded software doesn't affect anything metrologically significant, then it's irrelevant for the purposes of this checklist. On the other hand, if it does affect metrologically significant functions or parameters, it should be tracked and/or identified somehow.

Some of the labs have used the checklists, but they don't have easy access for the data to share. Not all the labs have tried to use the checklist yet. In general, when the software programmers themselves are approached with the checklist, it's useful, but that's heavily dependent on who is interacting with the labs.

Mr. Jim Pettinato reiterated the Software Sector's request that the labs continue (or begin) to ask manufacturers whether they're willing to participate in the use of this checklist (on a voluntary basis), and to send their feedback to Mr. Darrell Flocken. Mr./Ms. Teri Gulke will clean up the checklist and put it in a separate document that can be posted on the NCWM website under the Software Sector's documents.

The contents of the checklist should tie back to requirements in NCWM Publication 14. We originally crafted our checklist from the contents of D-31, so we went back to it to see if we could use it as a starting point for writing our own requirements for NCWM Publication 14.

Though they need to be reworded, of course, the most useful portion of D-31 for our current purposes are probably sections 5.1.1., 5.1.3.2.a., 5.1.3.2.d., and 5.2.6.1. which state, respectively:

> ***5.1.1. Software identification***
> *Legally relevant software of a measuring instrument/electronic device/sub-assembly shall be clearly identified with the software version or another token. The identification may consist of more than one part but at least one part shall be dedicated to the legal purpose. The identification shall be inextricably linked to the software itself and shall be presented or printed on command or displayed during operation or at start up for a measuring instrument that can be turned off and on again. If a sub-assembly/an electronic device has neither display nor printer, the identification shall be sent via a communication interface in order to be displayed/printed on another sub-assembly/electronic device.*

5.1.3.2.a. The legally relevant software shall be secured against unauthorized modification, loading, or changes by swapping the memory device. In addition to mechanical sealing, technical means may be necessary to secure measuring instruments having an operating system or an option to load software.

5.1.3.2.d. Software protection comprises appropriate sealing by mechanical, electronic and/or cryptographic means, making an unauthorized intervention impossible or evident.

5.2.6..1 Only versions of legally relevant software that conform to the approved type are allowed for use (see 5.2.5.). Applicability of the following requirements depends on the kind of instrument and is to be worked out in the relevant OIML Recommendation. It may differ also depending on the kind of instrument under consideration.

The question was asked, do these new requirements need to go into a new appendix specific to software in NCWM Publication 14? Do we need to document new requirements at all if the checklist is put into NCWM Publication 14? It could be considered that the checklist itself constitutes the new requirements. Mr. Flocken and Mr. Truex supported that interpretation.

The Sector asked that the revised checklist continue to be used by the labs.

As we meet with each Sector jointly, we can get an updated report on the trial and decide if we're ready to recommend it for NCWM Publication 14. We can also look at the language from D-31 in more detail to craft guidance in line with NCWM/NTEP philosophy.

Discussion:
The Grain Analyzer Sector's labs have not had the opportunity to try using the checklist because they didn't meet in 2015. Mr. Tom Buck from Ohio reported that they've been giving the checklist to manufacturers but haven't been getting them back. Mr. Flocken has two examples, one for built-for-purpose and one for a built-for-purpose device.

Conclusion:
Mr. Jason Jordan from GIPSA said they'd try it out. Mr. Doug Bliss and Mr. Jim Pettinato have volunteered to answer any questions that might arise as the labs attempt to use the checklist.

4. Software Maintenance and Reconfiguration

Source:
NTEP Software Sector

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

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

1. Verify that the update process is documented (OK).
2. For traced updates, installed Software is authenticated and checked for integrity.

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

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

Examples are not limiting or exclusive.

3. Verify that the sealing requirements are met

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

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

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

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

   The question before the group is can this be made mandatory?

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

The Sector **agreed** the two definitions below for Verified update and Traced update were acceptable.

Verified Update
A verified update is the process of installing new software where the security is broken and the device must be re-verified. Checking for authenticity and integrity is the responsibility of the owner/user.

Traced Update
A traced update is the process of installing new software where the software is automatically checked for authenticity and integrity, and the update is recorded in a software update log or audit trail.

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

In 2010 the Software Sector had considered the following:

G-S.9. Metrologically Significant Software Updates – The updating of metrologically significant software shall be considered a sealable event. Metrologically significant software that does not conform to the approved type is not allowed for use.

Dr. Ambler Thompson raised a concern about the fact, at this point, none of the suggested wording requires that the software identifier be unique (i.e., a change to the metrologically significant software should require a change to the software identifier). You could perhaps infer it from the requirement that it be inextricably linked to the software, but that isn't clear. Mr. Jim Truex thinks this will eventually need to be addressed, but not right now.

After the discussion during the 2014 joint meeting, we revised the wording of the proposed G-S.9. to reflect some of the concerns heard from the other Sectors and interested parties:

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

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

We debated once again whether this would be redundant. It can certainly be argued that G-S.8. already covers this requirement. If G-S.9. isn't added, is there support for changing NCWM Publication 14 to add the software to the existing list of sealable parameters?

Philosophy of Sealing, Appendix A, in NCWM Publication 14 doesn't specifically say anything about software. It discusses calibration and configuration parameters. There is a list of features and parameters that are typically sealed and another list of features and parameters that are not sealed. A note below states that these lists aren't fully inclusive, but anything that's metrologically significant does need to be sealed. We've discussed before the fact that the terminology in Philosophy of Sealing repeatedly uses the term "parameter," which could cause confusion due to people interpreting this to only require sealing of parameters. G-N.8. Checklist 2.18. for LND's in the Measuring Sector's NCWM Publication 14 might be another place to add the word "software." This checklist is specific to the Measuring Sector's NCWM Pub. 14, so there wouldn't necessarily be something analogous in the other sectors' versions of Publication 14. G-S.8 refers to changing adjustable components, which could be interpreted as not having anything to do with software. At one point, the Software Sector had considered amending G-S.8., but that proved to be overly complicated.

The Software and Measuring Sector attendees, as well as the lab representatives agreed to forward the above proposed addition of G-S.9 to the S&T Committee and recommends it be considered as a Voting item in 2016. This item (See 2016 NCWM Publication 15, S&T Agenda Item 310-2.) was voted upon and adopted at the 2016 Annual Meeting.

Discussion:
The Sector will decide if any further action on this item is required.

All currently approved grain analyzers provide Category 3 audit trails, and the Grain Analyzer Sector is planning to change NIST Handbook 44 to make it a requirement that all grain analyzers must be Category 3.

The Weighing Sector (which is the only Sector that's met since the adoption of G-S.9.) has added language to NCWM Publication 14's Provision for Sealing, making software changes a sealable event.

Conclusion:
At this point, because the G-S.9. proposal has been voted upon and passed, the Software Sector can remove this item from its agenda. The only thing left to do is for the various Sectors to meet and adopt language similar to the Weighing Sector for their respective sections in NCWM Publication 14.

5. NTEP Application for Software and Software-based Devices

Source:
NTEP Software Sector

Background:
The purpose of initiating this item was to identify issues, requirements, and processes for type approving Type U device applications. It was suggested that it may be useful to the labs to devise a separate submission form for software for Type U devices. What gets submitted? What requirements and mechanisms for submission should be available? Validation in the laboratories – all required subsystems shall be included to be able to simulate the system as installed.

Mr. Roach, California Division of Measurement Standards, stated that if the software package being evaluated supports platforms/subsystems from multiple manufacturers, testing should be done using at least two platforms/subsystems. Scale laboratories and scale manufacturers indicated this is not usually done for scale evaluations.

Since the NTEP Committee passed the related item at NCWM Annual Meeting, we will continue to work on this. Mr. Truex, NTEP Administrator, indicated that we can move in this direction, but felt it was somewhat premature to develop this thoroughly now. At the point where the Sector has developed checklist requirements, then we could move to perhaps add a subsection to current NTEP applications for applicable software. Refer to D-31.6.1. It was also agreed that there seems to be no reason for limiting the scope of this item to software-only applications, and all software/software-based devices could benefit from an enhanced application process. Hence, the description of this agenda item was modified as shown in the marked-up heading.

Comments given at the meeting indicate the current practice does not require anything different for software/software based devices compared to any other type approval. It was also noted that for international applications, OIML D-31.6.5 states, "The approval applicant is responsible for the provision of all the required equipment and components." This would likely also be the policy of NTEP.

Since the checklist is still being tried out by some of the laboratories, the Sector is not quite ready to develop this fully. Some documentation that eventually might be required by applicants could include (from WELMEC doc. 7-2 Issue 4. This is the list of documents referred to in the checklist.

- A description of the software functions that are metrologically significant, meaning of the data, etc. (e.g., an architecture diagram or flowchart).
- The software identification (version, revision, etc.) and how to view it.
- An overview of the security aspects of the operating system (e.g., protection, user accounts, privileges, etc.).

Mr. Flocken and Mr. Truex reviewed existing documentation required for obtaining certification in NCWM Publication 14, Administrative Policy, and the application, to see what is already required. Administrative Policy 9.1.7 was where this was found:

- Engineering specification
- Operating descriptions that characterize the type

NTEP evaluators already have the authority to request whatever documentation they need. We can provide them with a list of documents we think would assist the evaluator in his job and give the manufacturer a good idea of what they should be capable of providing.

Darrell Flocken suggested that this list could be added to administrative policy 9.1.7 in NCWM Publication 14. Mr. Jim Truex suggested it could also be added to the application.

If we combine the two lists, it might appear as something like this:

- A description of the software functions that are metrologically significant, meaning of the data, etc. (e.g., an architecture diagram or flowchart).
- A description of the user interface, communication interface, menus, and dialogs.
- The software identification (version, revision, etc.) and how to view it.
- An overview of the system hardware (e.g., topology block diagram, type of computer(s), type of network, etc.) if not described in the operating manual.
- An overview of the security aspects of the operating system (e.g., protection, user accounts, privileges, etc.).
- The operating manual.

- Engineering specification.
- Operating descriptions that characterize the type.

A statement could be made along the lines of, "If not included in the operating manual, provide the following, as applicable."

After the last sentence in 9.1.7, this could be added:

As part of the type evaluation submission, the following information should be provided for software-based devices:

- **A description of the software functions that are metrologically significant, meaning of the data, etc. (e.g., an architecture diagram or flowchart).**
- **The software identification (version, revision, etc.), how to view it, and how it is tied to the software.**
- **An overview of the security aspects of the operating system (e.g., protection, user accounts, privileges, etc.).**

These documentation requirements will be considered as input for requirements that will eventually appear in NCWM Publication 14 and the application paperwork. Further work by the Sector to develop the NCWM Publication 14 requirements is needed, after more input from the labs is gathered. The Sector recommends including the above bulleted list as an introduction to the checklist as part of our recommendation to include the checklist from agenda Item 3 in NCWM Publication 14. As a description of the accuracy of the measuring algorithms, simply declaring the type and class being aimed for may be sufficient. This list should reflect the needs of the labs for an evaluation. The bulleted list and the paragraph before it should be brought to the labs for an initial review and their input.

There may be concerns with disclosure of proprietary information. Mr. Jim Truex says that the labs already protect other proprietary information. If the information provided is sufficiently high level, even theft of the data shouldn't cause too much of a concern.

Mr. Michael Keilty didn't think it appropriate for the Measuring Sector, as a body, to make a recommendation regarding this proposal since it must do with administrative policy.

Per Mr. Jim Truex, the labs already have the authorization to require this information.

While working on writing requirements for NCWM Publication 14 from the checklist we've designed, we considered altering the second bullet point in our proposal for 9.17, so that it will require a description of how the software version or revision identifier is tied to the software itself.

Discussion:
The goal of this agenda item has somewhat shifted back to the original purpose, which is how do we communicate to applicants the expectations related to software based devices?

Ms. Diane Lee suggested we review the OIML requirements for documentation. The comment was made from the floor that OIML may go further than we are currently prepared to recommend.

Mr. Jason Jordan expressed his opinion that moving forward with this item will be helpful for the labs.

Mr. Darrell Flocken and Mr. Jim Truex think this should be added to the Application section. If limited to that section, it shouldn't require approval from any of the other Sectors.

Mr. Doug Bliss suggested it might be easier to provide examples that do not meet acceptable standards.

As we began discussing the training of field inspectors, Mr. Flocken asked that we also provide further training for lab inspectors. There's an annual lab meeting typically around April and in 2017, it will be in Annapolis, Maryland.

Conclusion:
The Software Sector's recommendation will be to add the requirements to the Application section.

The Software Sector agreed to provide support for any desired training of lab personnel at the April meeting.

6. Training of Field Inspectors

Source:
NTEP Software Sector

Background:
During discussions at the 2009 NTEP Software Sector Meeting, the Sector concluded that a new agenda item should be initiated specific to the training of field inspectors in relation to evaluating/validating software-based devices.

California has an Examination Procedure Outline (EPO) that begins to address this. Use California Handbook 112 as a pattern template for how it could read.

Items to be addressed:

- Certificate of Conformance
- Terminology (as related to software) beyond what is in NIST Handbook 44.
- Reference materials/information sources

System Verification Tests
NOTE: Item numbers 1 through 5 apply to both weighing and measuring devices. Numbers 6 and 7 are specific to weighing devices; while numbers 9 and 10 apply to measuring devices.

1. Identification. The identification (ID) tag may be on the back-room computer server and could be viewed on an identification screen on the computer monitor. The ID information may be displayed on a menu or identification screen. Though currently discouraged, some systems may be designed so the system must be shut down and reset to view the ID information. G-S.1. [1.10]
   1.1. Manufacturer.
   1.2. Model designation.

2. Provisions for sealing. G-S.8. [1.10]; S.1.11. [2.20]; S.2.2. [3.30]
   2.1. Verify sealing category of device (refer to Certificate of Approval for that system).
   2.2. Verify compliance with certificate.

3. Units of measure.
   3.1. A computer and printer interfaced to a digital indicator shall print all metrological values, intended to be the same, identically. G-S.5.2.2.(a); G-S.5.1. [1.10]
   3.2. The unit of measure, such as lb, kg, oz, gal, qt, liters, or whatever is used, must agree.

4. Operational controls, indications, and features (buttons and switches). Verify that application criteria and performance criteria are met (refer to Certificate of Approval).
   4.1. Any indication, operation, function, or condition must not be represented in a manner that interferes with the interpretation of the indicated or printed values.

5. Indications and displays.
   5.1. Attempt to print a ticket. The recorded information must be accurate or the software must not process and print a ticket with erroneous data interpreted as a measured amount.

Weighing Devices

6. Motion detection.
   6.1. For railway track, livestock, and vehicle scales apply or remove a test load of at least 15d while simultaneously operating a print button, push-button tare or push-button zero. A good way to do this is to try to print a ticket while pulling the weight truck or another vehicle onto the scale. Recorded values shall not differ from the static display by more than 3d. Perform the test at 10 %, 50 % and 100 % of the maximum applied test load. S.2.5.1.(a) [2.20]; EPO NO. 2-3, 2.4
   6.2. For all other scales, apply or remove at least 5d. Printed weight values must agree with the static weight within 1d and must exactly agree with other indications. S.2.5.4.(b) [2.20]; EPO NO. 2-3, 2.4

7. Behind zero indication.
   7.1 Apply a load in excess of the automatic zero setting mechanism (AZSM) and zero the scale. S.2.1.3. [2.20]; EPO NO. 2-3, 2.4, 2.5.2
   Example: On a vehicle scale have someone stand on the scale, then zero them off (AZSM is 3d). Remove the weight (person) and note the behind zero display (usually a minus weight value) or error condition.
   7.2. Attempt to print a ticket. With a behind zero condition, (manually or mechanically operated) a negative number must not be printed as a positive value.

8. Over capacity.
   8.1. Manually enter a gross weight if permissible or apply a test load in excess of 105 % of the scale's capacity. S.1.7. [2.20]; S.1.12., UR.3.9. [2.20]
   8.2. Attempt to print a weight ticket. A system must not print a ticket if the manually entered weight or load exceeds 105 % of the scale capacity.

Measuring Devices

9. Motion detection.
   9.1. Initiate flow through the measuring element. Attempt to print a ticket while the product is flowing through the measuring chamber. The device must not print while the indication is not stable. S.2.4.1. [3.30]

10. Over capacity.
    10.1. Attempt to print a ticket in excess of the indicated capacity. A system must not print a ticket if the device is manually or mechanically operated in excess of the indicated value.

NOTE: Be aware of error codes on the indicator which may be interrupted as measured values.

Mr. Jordan, California Division of Measurement Standards, is already doing something similar, and he may be able to assist. Mr. Roach, California Division of Measurement Standards, will talk to him to see whether they're available. In addition, Mr. Parks, California Division of Measurement Standards, is based in Sacramento and a potential resource. If the meeting is held in Sacramento next year, they may be able to attend.

Mr. Truex, NTEP Administrator, pointed out that the PDC would also be a valuable resource on this subject. Mr. Pettinato, Co-Chair, will contact them.

**NIST Handbook 112- Examination Procedure Outline for Commercial Weighing and Measuring Devices.*

The PDC is focused on training sessions at the moment; so, it's unsure how much time they'd have to review this currently.

It was suggested by Mr. Truex and Mr. Flocken we make it part of our report as an attachment or an appendix of the meeting minutes. Then we can send out an e-mail notifying the Software Sector members as to where to find it.

Alternatively, we could forward the document to the PDC Committee, tell them it was our starting point, and ask them for their suggestions.

The Sector would like to continue exploring means by which it can be of assistance in training of field inspectors as software and electronic systems become more and more prevalent in their daily tasks.

It was also suggested we contact Mr. Ross Anderson, a paid consultant working with the PDC committee, to ask his opinion on how the Software Sector could best proceed to assist in the training of field inspectors. The Sector chair, Mr. Jim Pettinato, will act as primary point of contact for this communication.

Discussion:
Mr. Pettinato hasn't heard anything further from the PDC or Mr. Anderson, as they continue to be quite busy.

For the Grain Analyzer Sector, Ms. Diane Lee thought it would take some time to put together some training material, as they do not currently have anything in place for software requirements.

Examples from completed checklists would be very helpful when putting together field inspector training. A lot of training videos have been recently generated. Mr. Doug Musick suggested we recommend adding this to the agenda for the PDC Committee. Certification exams could be updated more easily, on a state-by-state level. It might be better to make software a separate exam.

Ms. Diane Lee suggested we look at developing a basic course for software, incorporating specific guidelines for specific device types.

Ms. Amanda Dubin was concerned about having the field inspectors know all the different existing software, which is a monumental task. Instead, the training should focus on how to find the pertinent CC and look up information from it on the website. Ideally, down the road there could be some sort of database or software tool disseminated to field inspectors to assist in the look up of certificate numbers and the approved version number(s) for the software for a particular device, and even instructions on how to view/print the audit trail.

Mr. Jim Truex holds a meeting once a year for the lab evaluators. Mr. Darrell Flocken suggested that we also focus on training them on software. Ms. Diane Lee mentioned that NIST has been having manufacturers coming in to provide training on, for example, how to access the audit trail.

Conclusion:
As mentioned in the previous agenda item, the lab meeting is expected to occur in the April timeframe next year and the Software Sector is willing to assist in providing such training.

Dr. Thompson will be reviewing the training courses to identify areas that will need to be updated to cover the new requirements that have been approved.

Mr. Jim Pettinato will contact Mr. Ross Anderson regarding the PDC Committee, offering the Software Sector's assistance in continuing to develop training pertaining to software.

7. Retrieval of Audit Log information

Source:
Adam Oldham, Gilbarco

Background/Discussion:
The current requirements for a Category III audit trail include printing of log on demand. However, many devices are approved standalone and can be connected to systems that are approved standalone. How could Category 3 audit trail mechanisms be approved in situations where multiple devices need to work together to attain it? How can a device maintain Category 2 and 3 approvals in this scenario? What alternatives to printing can be considered as potentially valid solutions (files, laptop, flash drive, etc.)?

This was discussed during the Measuring Sector's meeting on September 15. The wording suggested was not agreed upon. Mr. Adam Oldham would like to have the Software Sector's suggestions, so he can put together a proposal for next year.

The United States has rather unique requirements for printing the Category 3 audit trail, which are quite unwieldy – both in terms of the actual printing process (and results), as well as the needed approvals (the example provided by Mr. Adam Oldham required an approval for each and every Point-of-Sale [POS] system that might be connected to their system). The most similar is from Mexico, but they require an electronic copy.

Mr. Flocken reported there has been a little movement forward – alternative methods are now allowable, to some degree, but it's dependent on what the states are going to allow. It still requires the ability to print it. The change will be in LMD Code S.2.2., not in NIST Handbook 44, General Code 1.10., G-S.2.2.

We discussed the difficulty of requiring the electronic data be printable on-site, given that some sites don't have any printers, and other sites may have printers attached to computers that are restricted in what can be used to attach to them.

In Mexico, Gilbarco relies upon laptops being present, supplied by the auditing company.

LMD NCWM Publication 14 has a section in Appendix B, Requirements for Metrological Audit Trails, on the event logger, and this information doesn't seem to be in NIST Handbook 44. In fact, it may even contradict what is in the LMD NCWM Publication 14. In practice, what's in Publication 14 tends to be more influential with evaluators.

Mr. Adam Oldham will work on the wording for a proposal for next year, which the Software Sector will review during the 2016 meeting.

Discussion:
Mr. Oldham wasn't in attendance. Mr. Pettinato reported that North Carolina had recently run into an instance where the audit trail wasn't printable on-site.

The devices monitored by the Grain Analyzer Sector are all Category 3, and they are all capable of printing the audit trail.

Mr. Musick pointed out that if you keep the metrological information in the Category 3 audit trail, and separate it from the non-metrological information, there's less of a problem with the requirement to print the audit trail; however, such separation is not a requirement. Mr. Pettinato discussed various options for limiting what's printed, such as selecting a date range.

Mr. Pettinato reported that the S&T Committee reviewed this issue recently. Gilbarco's original proposal was shot down, but a revised proposal was made. Mr. Flocken reported in July a version with the caveat that the inspector has discretion was voted upon and accepted.

Mr. Bliss suggested we table this agenda item since we do not have a concrete proposal.

Conclusion:
Without a proposal and without Gilbarco being present, the Sector can take no action at this time. The Chair will attempt to ascertain whether the intent to move this item forward still exists prior to drafting next year's agenda.

NEW ITEMS

8. Transmission of Measurement Data

Source:
Software Sector

Background:
General discussion on various issues related to distributed systems seen in use today and how metrology might be affected or vulnerable to facilitation of fraud. Specifically, authenticating sources of transactional data; guaranteeing integrity and/or retaining privacy of data; local vs. remote application functionality, SaaS.

Discussion:
The discussion began with an example: the integration of 'smart' utility meters that send data directly to the utility company and is designed to (eventually) eliminate the need to do local meter reading. In this application, there may be need to associate data securely with the particular meter in question – be able to protect private information while guaranteeing the authenticity and integrity of the data being reported upstream.

Dr. Ambler Thompson discussed his experience with "smart metering." They need some sort of positive ID, to associate the measurement with a time stamp, etc.

Mr. Bliss pointed out that the Europeans have requirements on this subject, but they're pulling back on them since there's little they can do in field verification, type evaluation, etc. to enforce them.

Mr. Pettinato asked the lab inspectors whether they regularly deal with systems that have portions remote from the originator of the data. Mr. Truex responded that they deal with that all the time. Mr. Musick says he's concerned particularly about retail-fuel dispensers.

In the Grain Analyzer Sector, their inspectors typically check for issues by tracking individual transactions all the way down the data chain.

In instances of fraud, particularly man-in-the-middle attacks, the generation of fraud tends to be by the simplest means possible. Fraudsters, at the current time, seem generally to be attacking hardware, not software, or communication interfaces. Also, it sounds like the various means of fraud are on a very case-by-case basis that would be impossible to apply across the board without major inconvenience to manufacturers.

Conclusion:
It sounds like it may be premature for the Software Sector to attempt to generate any recommendations or requirements on this subject. Mr. Pettinato suggested that, maybe at some point in time, we could consider issuing some sort of statement on the subject, but not now.

We will remove this from future agendas. Mr. Truex recommended we not put it back in unless we get more specific requests to deal with the issue from other Sectors.

9. Use of GPS Receivers and Mapping Software for Trade (e.g., fare determination)

Source:
Software Sector

Background:
Other Committees have initiated conversation on this topic primarily due to the surge in popularity of alternate taxi services (Uber and Lyft). Does the Software Sector see a need for technical guidance in this conversation? If so, what would be the scope of such guidance?

Discussion:
There were a few presentations at the Interim Meeting on this subject. The 2016 Annual Meeting archive (Denver, Colorado, 2016) has a presentation from Lyft that was given at that meeting.

Dr. Ambler Thompson has discussed this subject with the Europeans. One issue is traceability of the time stamp(s). You can also calculate velocity based upon the phase shift of the GPS signal, though it requires a high-end, survey-grade GPS receiver ($50k each). Car companies can use these devices to obtain a great deal of data.

Uber and Lyft claim that they are not billing upon GPS data, but rather a pre-negotiated contract based upon distance, time, and type of vehicle. Mr. Doug Bliss has been told the bill is based upon the starting GPS location from the driver's phone, the ending GPS location from the same phone, and a calculation of the shortest distance from Google Maps. If the driver's phone doesn't have a great GPS receiver, or if the reception is bad so it's relying upon cell towers, etc., that's a problem. We're also not sure of the accuracy of Google Map's route calculations. Also, Google Maps is a disinterested third party whose database is being used for a purpose that they didn't specifically authorize.

Mr. Musick reported that the Uber contract is based upon a unit price, though they do provide an estimate to the customer.

Mr. Truex pointed out the Taxi Meter Code in NIST Handbook 44 is obviously addressed to the old-style taxi. What's in NIST Handbook 44 isn't applicable to the new Uber and Lyft paradigm.

Mr. John Barton is leading a working group dealing with the Taxi Meter Code.

Mr. Andrei Brezoica from California, who is on the working group, reported there is a draft for new code to address this. Options exist for open-ended contracts for the customer. Google Maps is helping with the apps, pertaining to absolute distances, that Uber and Lyft are using. Mr. Pettinato asked that Mr. Brezoica send us a copy of the draft recommendation.

Ms. Lee pointed out there are several exemptions elsewhere in the code, which may be useful as examples when working on changes to the Taxi Meter Code.

Mr. Doug Musick suggested that there could be a requirement for the companies to post their unit price, per-mile, and per-time. Apparently, Uber does this, but Lyft does not.

Conclusion:
The Software Sector will offer assistance to the working group dealing with the Taxi Meter code. Dr. Thompson will talk to Mr. Barton.

10. Next Meeting

Background:
The Sector is on a yearly schedule for NTEP Software Sector Meetings. Now that we've adopted a joint meeting system, the next Sector joint meeting will coincide with one of the remaining Sector meetings.

Discussion:
The Belt-Conveyor Sector would be the next in the sequence, but they may not be a viable option. They may be meeting in November.

Mr. Pettinato suggested we instead schedule the Software Sector Meeting to convene with the Weighing Sector again. This would typically be in Annapolis, Maryland. The dates are still up in the air, but it would be close to Labor Day. The Grain Analyzer meeting is August 16 - 17. The Western Meeting also occurs in this timeframe.

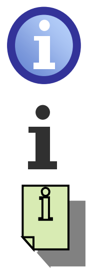
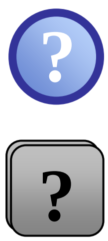
The MDMD work group meeting might be another option, but it's in April, and they're not actually a Sector. They meet in Columbus, Ohio. This could help us get on the agenda for each of the other Sectors with any recommendations we might have for NCWM Publication 14.

Mr. Pettinato recommended we leave the decision up to Mr. Truex and Mr. Flocken depending on logistics and availability of open dates.

Conclusion:
After reviewing potential scheduling conflicts in the August/September timeframe, the group is leaning toward favoring the April option in conjunction with the MDMD meeting. Mr. Flocken will contact Mr. Robert Kensington (Chair of the MDMD Work Group) to verify that the MDMD work group would be okay with combining the meetings.

Appendix A

Acceptable Menu Text/Icons for Weights and Measures information

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

Ms. Tina Butcher mentioned that the Weighing Sector has a Weighing Checklist that has a similar set of approved symbols, so the examples shown above would be in line with their current practice.

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Appendix F

National Type Evaluation Program (NTEP) Weighing Sector Meeting Summary

August 23 - 24, 2016
Denver, Colorado

5200-3 INTRODUCTION

The charge of the NTEP Weighing Sector (WS) is important in providing appropriate type evaluation criteria based on specifications, tolerances, and technical requirements of NIST Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices," Sections 1.10. General Code, 2.20. Scales, 2.22. Automatic Bulk Weighing Systems, and 2.24. Automatic Weighing Systems. The Sector's recommendations will be presented to the National Type Evaluation Program (NTEP) Committee each January for approval and inclusion in NCWM Publication 14, "Technical Policy, Checklists, and Test Procedures" for national type evaluation.

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

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

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

Table A
Table of Contents

Reference Key	Title of Contents	Page F

Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
ABWS	Automatic Bulk Weighing Systems	NCWM	National Conference on Weights and Measures
AREMA	American Railway Engineering Maintenance-of-Way Association	NIST	National Institute of Standards and Technology
AWS	Automatic Weighing Systems	NTEP	National Type Evaluation Program
CC	Certificate of Conformance	OIML	International Organization of Legal Metrology
DES	Digital Electronic Scales	OWM	Office of Weights and Measures
HB 44	NIST Handbook 44	R	Recommendation
IZSM	Initial Zero-Setting Mechanism	SS	National Type Evaluation Program Software Sector
LMD	Liquid Measuring Device	S&T	Specifications and Tolerances Committee
MC	Measurement Canada	SMA	Scale Manufacturers Association
MRA	Mutual Recognition Agreement	WS	National Type Evaluation Program Weighing Sector

Details of All Items
(In order by Reference Key)

CARRY-OVER ITEMS

1. Recommended Changes to NCWM Publication 14 Based on Actions at the 2016 NCWM Annual Meeting.

Source:
Mr. Richard Harshman, National Institute of Standards and Technology (NIST) Technical Advisor will provide the Sector with specific recommendations for incorporating test procedures and checklist language based upon actions of the 2016 NCWM Annual Meeting. The Sector is asked to briefly discuss each item and, if appropriate, provide general input on the technical aspects of the issues.

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

Source:

- 2010 - 2015 Final Reports of the S&T Committee: **www.ncwm.net/meetings/annual/meeting-reports**
- 2008 - 2015 Software Sector summaries: **www.ncwm.net/committees/ntep/sectors/software/archive**
- 2013 - 2015 Weighing Sector summaries: **www.ncwm.net/committees/ntep/sectors/weighing/archive**
- 2016 Final Report of the S&T Committee: **nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1212.pdf**

Technical Advisor's Note: This item has appeared on the Weighing Sector's Agenda from 2010 to 2015 and was titled, "Acceptable Symbols/Abbreviations to Display the Certificate of Conformance (CC) Number Via a Device's User Interface."

Background:
At the 2016 NCWM Annual Meeting, NCWM voted to amend NIST Handbook 44 paragraph G-S.1. Identification as follows:

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

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

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

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

(Added 2000) (Amended 2001)

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

(Amended 2003 **and 2016**)

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

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

(d) the current software version or revision identifier for not-built-for-purpose software-based devices~~;~~ **manufactured as of January 1, 2004, and all software-based devices (or equipment) manufactured as of January 1, 2022;**
~~[Nonretroactive as of January 1, 2004]~~

(Added 2003) **(Amended 2016)**

(1) The version or revision identifier shall be:

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

(Added 2006)

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

(Added 2016)

ii. ***continuously displayed or be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an alternative, permanently marking the version or revision identifier shall be acceptable providing the device does not always have an integral interface to communicate the version or revision identifier.***
[Nonretroactive as of January 1, 2022]

(Added 2016)

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

(Added 2006) **(Amended 2016)**

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

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

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

(Amended 1985, 1991, 1999, 2000, 2001, 2003, **~~and,~~** 2006**, and 2016**)

The marking requirements pertaining to software included in NIST Handbook 44, paragraph G-S.1. Identification currently only apply to not-built-for-purpose software-based devices. The changes adopted by the NCWM in 2016 expand the application of paragraph G-S.1. to include all software-based devices and equipment. Some of the changes were adopted take effect immediately (i.e., January 1, 2017); while other changes don't take effect until January 1, 2022. At the 2016 WS meeting, it was suggested that the Sector consider recommending changes to only those parts of NCWM Publication 14 that are affected by the changes that will take effect at the beginning of 2017. It was recommended that the Sector revisit this issue at their 2021 meeting to recommend additional changes to NCWM Publication 14 to take into account the NIST Handbook 44 changes taking effect in 2022.

The following changes to NCWM Publication 14 were suggested at the 2016 Weighing Sector Meeting in consideration of the changes taking effect on January 1, 2017:

Amend NCWM Publication 14, DES Sections 1 and 3 of Checklists and Procedures as follows:

1. Marking - Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales

...

The system must be clearly and permanently marked on an exterior surface, visible after installation, **with the following information** **~~as follows:~~**

1.1. …

1.2. ...

1.3. Except for equipment with no moving or electronic component parts and **~~not built for purpose~~**, software**~~-based devices~~**, a non-repetitive serial number. The serial number shall be prefaced by the words "Serial Number" or an abbreviation, or a symbol, that clearly identifies the number as the required serial number. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.).

3. Additional Marking Requirements – Not Built-for-Purpose Software-Based Devices Manufactured as of January 1, 2004, and All Software-Based Devices or Equipment Manufactured as of January 1, 2022.

Identification of Certified Software:

...

Code Reference: G.S.1.1. Location of Marking Information for Not Built-for-Purpose, Software-Based Devices.

3.1. For not built-for-purpose, software-based devices the following shall apply:

Amend NCWM Publication 14, DES Sections 1 and 3 of Checklists and Procedures as follows:

3.1.1. The Certificate of Conformance (CC) Number shall be:

3.1.1.1. Permanently marked on the device. OR…

3.1.1.2. Continuously…

3.1.1.3. Accessible…

*Note: For (3.1.**1.**~~2.~~), clear instructions for accessing the information required in G-S.1. (a), (b), and (d) shall be listed on the CC, including information necessary to identify that the software in the device is the same type that was evaluated.*

3.1.2. The version or revision identifier shall be prefaced by the word "Version" or "Revision" as appropriate and either word may be followed by the word "Number." The abbreviations for the word "Version" shall, as a minimum, begin with the letter "V." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R." The abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.) ~~**Accep"**~~ **Prefix lettering may be initial capitals, all capitals, or all lowercase.** Unacceptable abbreviations include "v 1234," "ver 1234," "r 1234," and "rev 1234."

Note: If the equipment being evaluated is incapable of prefacing the software version or revision with a "V" or "R," a different method of indication may be deemed permissible providing that method is specified on the CC.

3.2. **…**

Amend NCWM Publication 14, ECR Interfaced with Scales Section 5 as follows:

5. Identification

Example Modular System
Point-of-sale systems may consist…

The cash register shall be clearly and permanently marked for the purposes of identification with the following information:

5.1. The name, initials, or … ☐ Yes ☐ No ☐ N/A

5.2. A model identifier …

5.3. Except for equipment with no moving or electronic component parts and ~~**not built for purpose**~~, software~~**-based devices**~~, a non-repetitive serial number. The serial number shall be prefaced by the words "Serial Number" or an abbreviation, or a symbol, that clearly identifies the number as the required serial number. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.). ☐ Yes ☐ No ☐ N/A

5.4. For not built-for-purpose, software based devices the current software version designation. The version or revision identifier shall be prefaced by the word "Version" or "Revision" as appropriate and either word may be followed by the word "Number." The abbreviations for the word "Version" shall, as a ☐ Yes ☐ No ☐ N/A

Amend NCWM Publication 14, ECR Interfaced with Scales Section 5 as follows:

minimum, begin with the letter "V." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R." The abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). **Prefix lettering may be initial capitals, all capitals, or all lowercase.**

Note: If the equipment being evaluated is incapable of prefacing the software version or revision with a "V" or "R," a different method of indication may be deemed permissible providing that method is specified on the CC.

…

Amend NCWM Publication 14, Automatic Bulk Weighing Systems Section 17 as follows:

17. Marking – General

Code Reference: G-S.1.
All equipment, except weights…

17.1. …

17.1.1. …

17.1.2. …

17.1.3. Except for equipment with no moving or electronic component parts and ~~**not built for purpose,**~~ software~~**-based devices**~~, a non-repetitive serial number. The serial number shall be prefaced by the words "Serial Number" or an abbreviation, or a symbol, that clearly identifies the number as the required serial number. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.). ☐ Yes ☐ No ☐ N/A

17.1.4. For not built-for-purpose, software based devices the current software version designation. The version or revision identifier shall be prefaced by the word "Version" or "Revision" as appropriate and either word may be followed by the word "Number." The abbreviations for the word "Version" shall, as a minimum, begin with the letter "V." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R." The abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). **Prefix lettering may be initial capitals, all capitals, or all lowercase.** ☐ Yes ☐ No ☐ N/A

Note: If the equipment being evaluated is incapable of prefacing the software version or revision with a "V" or "R," a different method of indication may be deemed permissible providing that method is specified on the CC.

…

Amend NCWM Publication 14, Automatic Weighing Systems Section 1 as follows:

1. General Code Requirements, Identification

Code Reference: G-S.1. and S.7.
Virtually all weighing…

…

1.1. The system must be clearly and permanently marked on an exterior surface, visible after installation, as follows:

1.1.1. The name, initials, … ☐ Yes ☐ No ☐ N/A

…

…

1.1.3. Except for equipment with no moving or electronic component parts and ~~**not built for purpose,**~~ software~~**-based devices**~~, a non-repetitive serial number. The serial number shall be prefaced by the words "Serial Number" or an abbreviation, or a symbol, that clearly identifies the number as the required serial number. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.). ☐ Yes ☐ No ☐ N/A

1.1.4. For not built-for-purpose, software based devices the current software version designation. The version or revision identifier shall be prefaced by the word "Version" or "Revision" as appropriate and either word may be followed by the word "Number." The abbreviations for the word "Version" shall, as a minimum, begin with the letter "V." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R." The abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). **Prefix lettering may be initial capitals, all capitals, or all lowercase.** ☐ Yes ☐ No ☐ N/A

Note: If the equipment being evaluated is incapable of prefacing the software version or revision with a "V" or "R," a different method of indication may be deemed permissible providing that method is specified on the CC.

…

Discussion/Conclusion:
In considering the suggested changes being proposed for this item, a member of the Sector commented that the "*Note*" proposed for addition in NCWM Publication 14, DES Section 3, ECR Section 5, ABWS Section 17, and AWS Section 1 was worded somewhat different than the "*Note*" that is in the version of the proposal that had been adopted in 2016 by the NCWM. The Sector compared the text in the two notes and agreed that the text in the note being proposed didn't match that which was adopted. It was determined the note being proposed in the Sector's agenda was from an earlier version of the proposal and had since been changed. The Sector then considered whether or not it would be appropriate to include the correct note into the different sections of NCWM Publication 14 identified by Mr. Harshman. Upon reviewing the correct version of the note, the NTEP evaluators present at the meeting indicated there would be no reason to include the note in NCWM Publication 14, because, if equipment is unable to meet the formatting requirement specified, an evaluator would know to include a description of how the information is

identified on the CC. Consequently, the Sector agreed to omit the note in all locations within Publication 14 where it had been proposed for addition.

The Sector was asked to consider whether or not the change proposed to the title of DES Section 3 was appropriate given that the checklist criteria specified in this section currently applies only to not built-for-purpose software-based devices and will continue to do so until January 1, 2022. As of January 1, 2022, the checklist criteria in this section will apply to all software-based devices or equipment given the changes that were adopted by the NCWM in 2016. The Sector agreed not to change the existing title of Section 3 with the understanding tit would need to revisit this section in 2021 to propose changes and make clear the application of the criteria to all software-based devices and equipment as of 2022. Thus, the Sector agreed to keep the existing title of Section 3 without change.

A member of the Sector asked whether or not the last sentence in Section 3.1.2. of the DES portion of Publication 14, which reads, "Unacceptable abbreviations include "v 1234," "ver 1234," "r 1234," and "rev 1234" conflicted with the new sentence, "<u>Prefix lettering may be initial capitals, all capitals, or all lowercase.</u>" that had been adopted as part of the proposal by the NCWM and being proposed for addition to this section. Members of the Sector, upon reviewing the two sentences, concluded that the new sentence represented a significant change and would, in fact, conflict with the last sentence. Consequently, the Sector agreed to add the new sentence that had been adopted as part of the proposal in 2016 and delete the last sentence to eliminate any conflict in Section 3.1.2.

Members of the Sector reviewed the remaining changes proposed for this item by Mr. Harshman and confirmed they were appropriate and agreed to recommend that they be adopted. All the proposed changes agreed to by the Sector can be found in Appendix A, Item 1.a. of this report.

1.b. Item 310-2: G-S.9. Metrologically Significant Software Updates.

Source:

- 2013-2015 NTEP Software Sector: **www.ncwm.net/committees/ntep/sectors/software/archive**
- 2013 NTEP Weighing Sector: **www.ncwm.net/committees/ntep/sectors/weighing/archive**
- 2013 - 2014 NTEP Measuring Sector: **www.ncwm.net/meetings/ntep/measuring/archive**
- 2016 S&T Committee Final Report: **www.nist.gov/pml/weights-and-measures/ncwm-2016-annual-report-sp-1212**

Technical Advisor's note: This item appeared on the Weighing Sector's Agenda in 2013 as Agenda Item 11. Software Maintenance and Reconfiguration.

Background:
At the 2016 NCWM Annual Meeting, NCWM voted to add a new NIST Handbook 44, General Code (1.10.) Paragraph G-S.9. Metrologically Significant Software Updates as follows:

> **<u>G-S.9. Metrologically Significant Software Updates – A software update that changes the metrologically significant software shall be considered a sealable event.</u>**
>
> **<u>(Added 20XX)</u>**

At the 2016 WS Meeting, it was suggested that members of the Sector discuss how an NTEP evaluator is to verify compliance with this new General Code paragraph when conducting an NTEP evaluation on equipment that utilizes metrologically significant software and whether or not the testing required to make this determination should be performed by the evaluator in a lab setting. Mr. Harshman (NIST Technical Advisor) asked the question, in his recommendation to the Sector pertaining to this item, that to verify compliance, wouldn't it be necessary for the applicant to submit a software update with his/her equipment when applying for a CC? The update would then need to be installed as part of the NTEP evaluation to determine whether or not the device's audit trail was capable of detecting that new software, which changed one or more of the sealable parameters or features, had been installed. If the Sector concludes that such testing is to be part of the NTEP evaluation, then draft procedures should be developed by the Sector and proposed for addition into the different checklists associated with weighing devices to provide guidance on how the testing is to be performed.

Included in the different text boxes below are some specific portions of the different weighing device sections of NCWM Publication 14 that Mr. Harshman identified/targeted for possible change. Members of the Sector were asked to review these changes to determine whether or not they are appropriate. It was also recommended that members of the Sector review the existing sealing requirements and the different checklists associated with sealing in each of the weighing device portions of NCWM Publication 14 to determine whether or not additional changes might be needed.

Given the amount and scope of the information contained in NCWM Publication 14 DES and AWS Appendix A and B relating to sealing, the Sector might want to consider asking the Software Sector to review this information at their September 2016 meeting and provide feedback to the Weighing Sector, including any suggested revisions.

Amend NCWM Publication 14, DES Section 10 as follows:

10. Provision for Metrological Sealing of Adjustable Components or Audit Trail

Code References: G-S.8.1., G-S.9., and S.1.11.

The current language in NIST Handbook 44, paragraph G-S.8. states: "A device shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism."

Thus, for parameters protected by physical means of security, once a physical security seal is applied to the device, it should not be possible to make a metrological change to those parameters without breaking the seal. Likewise, for parameters protected by electronic means of security, it should not be possible to make a metrological change to those parameters without that change being reflected in the audit trail. **Additionally, updates to software, which result in a metrological change to one or more of the "sealable" parameters shall itself be considered a sealable event and also reflected in the audit trail.** Since this philosophy addresses provisions for protecting access to any metrological adjustment, the philosophy should be applied consistently to all electronic device types.

Due to the ease of adjusting the accuracy of electronic scales, all scales (except for Class I scales) must provide for a security seal that must be broken or provide an audit trail, before any adjustment that detrimentally affects the performance of the electronic device can be made. Only metrological parameters, which can affect the measurement features, that have a significant potential for fraud and features or parameters whose range extends beyond that appropriate for device compliance with NIST Handbook 44 or the suitability of equipment, shall be sealed.

For additional information on the proper design and operation of the different forms of audit trail, *see Appendix B for the Requirements for Metrological Audit Trails.*

The judgment of whether or not a method of access to an adjustment represents a "significant potential for fraud" and will normally require sealing for security will be made based upon the application of the *Philosophy for Sealing in Appendix A*.

Amend NCWM Publication 14 DES, and Automatic Weighing Systems Appendix A by adding a new bulleted feature/parameter to the table beneath the column titled "Typical Features or Parameters to be Sealed" as follows.

Scale Features and Parameters	
Typical Features or Parameters to be Sealed	Typical Features or Parameters NOT Required to be Sealed
• Coarse Zero • Initial Zero-setting Mechanism (IZSM) on Separable Indicating Elements with Limits That Can Be Adjusted More Than 20 % Beyond the Maximum Capacity of the Load-receiving Element. … **Software update that changes the metrologically significant software.**	*No changes recommended*

Add the following new sub-heading and new paragraph at the end of Publication 14 DES, Appendix A:

Software Updates

When software is updated, the updated version, upon installation into the device, can change one or more of the typical features or parameters to be sealed without these changes being reflected in a device's audit trail. For this reason, it is important that any update to software that changes the metrological significant software, be considered a sealable event as required by Handbook 44, paragraph G-S.9. Metrologically Significant Software Updates.

Alternatively, the following is offered for consideration:

Software Updates

When software is updated, the update itself can change one or more of the typical features or parameters to be sealed without these changes being reflected in a device's audit trail. For this reason, it is important that any update to software that changes the metrological significant software be considered a sealable event as required by Handbook 44, paragraph G-S.9. Metrologically Significant Software Updates.

Amend NCWM Publication 14 Automatic Weighing Systems Section 8 as follows:

8. Provision for Metrological Sealing of Adjustable Components or Audit Trail for Other than Automatic Checkweighers

Code Reference: S.1.3.
Due to the ease of adjusting the accuracy of electronic scales, all Automatic Weighing Systems (except for automatic checkweighers) must have provision for a security seal that must be broken, or an audit trail provided, before any adjustment that detrimentally affects the performance of the electronic device can be made. Security seals are not required for automatic checkweighers in field applications where it would prohibit an authorized user from having access to the calibration functions of the device. Only metrological parameters that can affect the measurement features that have a significant potential for fraud, and features or parameters whose range extends beyond that appropriate for device compliance with NIST Handbook 44 or the suitability of equipment, shall be sealed. **This includes software updates that change the metrological significant software.**

For additional information on the proper design and operation of the different forms of audit trail, see "Appendix B for the Audit Trail."

The judgment as to whether or not a method of access to an adjustment represents a "significant potential for fraud" and will normally require sealing for security will be made based upon the application of the following philosophy.

…

Amend NCWM Publication 14, ECR Interfaced with Scales Section 6 as follows.

6. Provision for Metrological Sealing of Adjustable Components or Audit Trail

Code Reference: S.1.11.
All components of a point-of-sale (POS) system must comply with Section 10 of the Digital Electronic Scale Checklist if they have a metrological effect on the system. POS Cash Register features, not addressed in this checklist, maybe covered and shall comply with applicable sections in the Digital Electronics Scales Checklist.

Due to the ease of adjusting the accuracy of electronic scales, all scales (Except for Class I scales) must provide for a security seal that must be broken or provide an audit trail, before any adjustment that detrimentally affects the performance of the electronic device can be made.

Only metrological parameters that can affect the measurement features that have a significant potential for fraud and features or parameters whose range extends beyond that appropriate for device compliance with *NIST Handbook 44* or the suitability of equipment, shall be sealed. **This includes software updates that change the metrological significant software.**

Verify that the electronic cash register (ECR) has not sealable parameters and cannot adjust the accuracy of the POS.

6.1 Does the ECR have sealable parameters or features? *See table of typical "Scale Features and Parameters" in the Digital Electronics Scales checklist, Section 10. Provision for Metrological Sealing of Adjustable Components or Audit Trail.* ☐ **Yes** ☐ **No** ☐ **N/A**

Amend NCWM Publication 14, ECR Interfaced with Scales Section 6 as follows.		
6.1.1.	If yes, the ECR shall comply with the Digital Electronic Scales Checklist Section 10 Provision for Metrological Sealing of Adjustable Components or Audit Trail.	☐ **Yes** ☐ **No** ☐ **N/A**

Mr. Harshman also noted that the WS was opposed to adding the following sentence to NCWM Publication 14 when considering the item in 2013 at the request of the Software Sector:

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

Mr. Harshman recommended to members of the Sector to compare the language in the sentence that was reviewed in 2013 for addition to NCWM Publication 14, which was recently adopted for addition to NIST Handbook 44 and consider whether or not the language in G-S.9. is appropriate. If it is not, the Sector may wish to draft a new proposal to address any remaining concerns.

Discussion/Conclusion:
Members of the Sector agreed the changes proposed by Mr. Harshman were appropriate. The Sector made a few minor editorial changes to the proposed language and agreed to recommend that NCWM Publication 14 be changed in the different segments and sections identified to clarify updates to software that changes one or more of the typical features or parameters to be sealed is to be considered a sealable event. All the proposed changes agreed to by the Sector can be found in Appendix A, Item 1.b. of this report.

Regarding to the testing needed to determine whether or not equipment submitted for evaluation complies with the new requirement, the NTEP evaluators present at the meeting agreed to create a new agenda item for the 2017 NTEP Lab meeting to discuss how manufacturers identify software that's separated into metrologically significant software from that which is not metrologically significant. It is anticipated the discussion of the new item at the 2017 NTEP Lab meeting will also consider the testing required to confirm whether or not equipment is compliant.

Members of the Sector also reviewed the language it opposed in 2013, which would have also required the updating of metrologically significant software to be considered a sealable event. It was stated the reason for the Sector's opposition in 2013 was because some members of the Sector viewed software that checks the authenticity and integrity of the updates non-metrologically significant.

1.c. Item 320-2: Relationship of Load Cell Verification Interval to the Scale Division

Source:

- 2015 NTEP Weighing Sector: **www.ncwm.net/committees/ntep/sectors/weighing/archive**
- Scale Manufacturers Association Recommendations 2016 Spring Meeting:
- 2016 S&T Committee Final Report: **www.nist.gov/pml/weights-and-measures/ncwm-2016-annual-report-sp-1212**

Background:
At the 2016 NCWM Annual Meeting, NCWM voted to amend NIST Handbook 44, Scales Code Paragraph S.5.4. Relationship of Load Cell Verification Interval to the Scale Division as follows:

> ***S.5.4 Relationship of Minimum Load Cell Verification Interval Value to the Scale Division~~.~~ –*** *The relationship of the value for the* ***minimum*** *load cell verification interval, v_{min}, to the scale division, d, for a specific scale ~~**installation**~~ using NTEP* ***certified*** *load cells shall comply with the following formulae where N is the number of load cells in a single* ***independent[1] weighing/load-receiving element*** *~~**scale**~~ (such as hopper~~,~~ ~~**or**~~* ***railroad track or*** *vehicle scale weighing/load receiving elements);*

(a) $v_{\min} \le \dfrac{d*}{\sqrt{N}}$ *for scales without lever systems; and*

(b) $v_{\min} \le \dfrac{d*}{\sqrt{N} \times (scale\,multiple)}$ *for scales with lever systems.*

[1] Independent means with a weighing/load-receiving element not attached to adjacent elements and with its own A/D conversion circuitry and displayed weight.

*[*When the value of the scale division, d, is different from the verification scale division, e, for the scale, the value of e must be used in the formulae above.]*

This requirement does not apply to complete weighing/load-receiving elements or scales, which satisfy all the following criteria:

- *the complete weighing/load-receiving element or scale has been evaluated for compliance with T.N.8.1. Temperature under the NTEP;*
- *the complete weighing/load-receiving element or scale has received an NTEP Certificate of Conformance; and*
- *the complete weighing/load-receiving element or scale is equipped with an automatic zero-tracking mechanism which cannot be made inoperative in the normal weighing mode. (A test mode which permits the disabling of the automatic zero-tracking mechanism is permissible, provided the scale cannot function normally while in this mode.*

[Nonretroactive as of January 1, 1994]

(Added 1993) (Amended 1996 **and 20XX**)

At its 2016 meeting, the WS considered the following suggested amendments to NCWM Publication 14 identified by Mr. Harshman (NIST Technical Advisor) as possibly needing to be changed as a result of the NCWM's adoption of this proposal and the subsequent NIST Handbook 44 changes to follow:

Amend NCWM Publication 14, DES Sections 8 and 22 as follows:

8. Weighing Systems, Scales, or Weighing/load-receiving elements Greater than 30 000 lb Capacity

8.1. Additional criteria**…**

8.3.2. Range of Parameters for Modular Scales

The following range of parameters…

Nominal capacities …

Platform area … evaluated. Increased lengths for scales with two or more modules are not restricted as long as the width complies with 8.3.2. (e) and the load cells meet the vmin formula (e.g., vmin ≤ d / √ ~~n~~ **N where "N" is the number of load cells in a single independent weighing/load-receiving element. Independent means with a weighing/load-receiving element not attached to adjacent elements and with its own A/D circuitry and displayed weight.** (Additional modules to increase length must be of the same type as those used in the device submitted for evaluation (e.g., 4-cell, 2-cell, and 0-cell.)

…

22. Relationship of v_{min} to d

Code Reference: S.5.4.
The relationship of the value for the minimum load cell verification interval, v_{min}, to the scale division, d, for a specific scale using NTEP load cells shall comply with the following formulae where N is the number of load cells in a single *independent weighing/load-receiving element. ~~**If the scale uses National Type Evaluation Program (NTEP) load cell, the load cell verification interval must satisfy one of the following relationships (w**~~**When t**he value of the scale division, d, is different than the verification scale division, e, for the scale, the value of e must be used in the formula below.~~)~~

22.1 $$v_{\min} \le \frac{d}{\sqrt{N}}$$ Where: N is the number of load cells in the scale without lever systems. ☐ Yes ☐ No ☐ N/A

22.2 $$v_{\min} \le \frac{d}{\sqrt{N} \times \text{(scale multiple)}}$$ for scales with lever systems. ☐ **Yes** ☐ **No** ☐ **N/A**

***Independent means with a weighing/load-receiving element not attached to adjacent elements and with its own A/D conversion circuitry and displayed weight.**

Amend NCWM Publication 14, DES Sections 8 and 22 as follows:

This requirement does not apply to complete scales and weighing/load-receiving elements which satisfy the following criteria:

1. The device has been evaluated for compliance with T.N.8.1. Temperature under the NTEP

2. The device has received an NTEP Certificate of Conformance. **AND**

3. The device must be equipped with an automatic zero-setting mechanism, which cannot be made inoperative in the normal weighing mode. (A test mode which permits the disabling of the automatic zero-setting mechanism is permissible, provided the scale cannot function normally while in this mode.)

Discussion/Conclusion:
The Sector agreed to recommend Sections 8 and 22 of Publication 14 DES be amended as proposed and shown above to better clarify how the $v_{\mathbf{min}}$ formula in NIST Handbook 44, Scales Code Paragraph S.5.4. is to be applied to scale systems equipped with multiple independent weighing/load receiving elements, each with its own A/D circuitry.

2. NCWM Publication 14, DES Section 31. Multi-Interval Scales

Source:
Measurement Canada/Canada (2015)

Background:
This item appears as Agenda Item 10 on the 2015 NTEP Weighing Sector Agenda. During the 2015 Weighing Sector Meeting, Mr. Pascal Turgeon (Measurement Canada [MC]) identified conflicts in various parts of NCWM Publication 14, DES Section 31. Multi-Interval Scales and suggested some changes be made to NCWM Publication 14 based on the type evaluation criteria developed and used by MC in their evaluation of a tare feature on a multi-interval scale. The conflicts identified by MC were disclosed during a routine general maintenance of the Canadian documents, and in particular, the requirements pertaining to multi-interval scales. Noting the importance of being careful not to change something that could conflict with NIST Handbook 44 or NCWM Publication 14 because of the United States and Canadian Mutual Recognition Agreement, MC requested an interpretation of the following sections of NCWM Publication 14, which it viewed as conflicting:

- The preamble to Section 31. contains examples and clauses that conflict with the requirements set out in 31.1. and 31.2. For example, the tare calculation example shows a net weight value that is not consistent with the scale interval of the weighing segment in which it falls, but both 31.1. and 31.2. require that it be consistent. The preamble also states that "Except for semi-automatic tare, all tare values shall not exceed the maximum capacity of the first weighing segment" whereas as 31.1.5. states, "Tare may be taken to the maximum capacity of the smallest weighing range (segment) of the scale," leading to another contradiction.

- Another issue with Section 31. is the applicability of 31.1. vs 31.2. It seems to be implied that either one or the other applies, depending on how the device operates, but it is not clear. It seems that 31.1. applies to devices that display all three values, while 31.2. is for devices that only display in one mode. However, review of the sub-clauses in each section show this isn't correct (e.g., 31.1.9. refers to scales that only show net weight). We feel that Section 31 needs to be reviewed to consolidate redundant clauses and clearly state the applicability of 31.1. and 31.2.

The Sector was asked at its 2015 meeting to review NCWM Publication 14, Section 31. for consistency and recommend changes as needed to resolve any conflicts or ambiguous parts. Members of the Sector concluded there are conflicts within Section 31. and it was generally accepted that at least some of the conflicts identified are the result of grouping together the different requirements of which apply to the various types of tare (e.g., semi-automatic, keyboard, etc.) used with multi-interval scales and scales designed with a single versus dual weight display.

Mr. Rick Harshman (NIST Technical Advisor) noted the tare requirements contained in the Scales Code of NIST Handbook 44 do not provide the same level of detail as those in the NCWM Publication 14 checklist. Members of OWM's Legal Metrology Devices Program believe more work is needed to further develop requirements that apply to tare taken on multi-interval scales. Mr. Darrell Flocken (NCWM) suggested a small work group be formed to further develop the checklist and eliminate the conflicts in Section 31. of NCWM Publication 14, DES. Mr. Harshman suggested a review of the requirements in Section 31. to determine their intended application (e.g., those intended to apply to scales equipped with semi-automatic tare versus keyboard tare, etc.) Mr. Harshman believes much of this work had already been completed by the Sector in previous meetings.

The Sector agreed with Mr. Flocken's suggestion to form a small work group to further develop the checklist and eliminate the inconsistencies, which had been identified. The following members of the Sector volunteered to participate on the work group:

Tom Buck (Ohio)
Scott Davidson (Mettler-Toledo)
Paul Lewis (Rice Lake Weighing)
Pascal Turgeon (Measurement Canada) or (Justin Rae)
Rick Harshman (NIST, OWM)

Mr. Harshman agreed to host the first work group tele-conference, and it was agreed the work group would attempt to develop a proposal for the Sector to consider at next year's meeting.

A final recommendation made by Mr. Pascal at the 2015 Sector meeting was to move 31.1.9. and all its subparts to 31.2. since all 31.1.9. applies to scales that display or record only net weight values, and 31.2. applies to scales that indicate in only one mode (gross or net). This recommendation to be considered by the work group as part of their review and further development of Section 31.

Prior to the 2016 NTEP Lab Meeting, Mr. Harshman developed a draft document titled "Principles of Tare - Multi-Interval and Multiple Range Scales" to be reviewed at the 2016 NTEP Lab Meeting with the NTEP weighing evaluators and those members of the small work group formed by the WS (to further develop the checklist and eliminate inconsistencies) in attendance at the meeting. This draft document was created with the thought if an agreement could be achieved on some basic principles of tare for the different types of tare operation (e.g., keyboard, push-button, etc.), it might make it easier to identify in NCWM Publication 14 those requirements that deviate from the agreed upon principles, and they could then be eliminated. The draft document was reviewed at the 2016 Lab Meeting, feedback provided, and a revised version of the document was completed.

At the 2016 WS Meeting, members of the Sector were asked to review the revised draft document titled, "Principles of Tare - Multi-Interval and Multiple Range Scales" and provide feedback on whether or not they agreed or disagreed with the different tare principles specified in the document and to identify any remaining gaps that needed to be addressed. The revised draft document was provided as an attachment to the Sector's 2016 agenda and is also included as the sole attachment to this report. Providing the Sector can achieve agreement on basic principles of tare, it was further recommended members of the Sector review the specific portions of DES Section 13 that MC had previously identified as being in conflict and recommend corrective action as necessary.

The Sector may also want to consider recommending a final completed version of this draft document be inserted as an Appendix to the DES Section of NCWM Publication 14 for future reference.

Discussion/Conclusion:
Mr. Rick Harshman (NIST Technical Advisor) displayed on a screen and reviewed with Sector members of the different portions of NCWM Publication 14, DES Section 31 that had previously been identified by MC as conflicting with one another. He said the tare requirements in NIST Handbook 44 applicable to single range scales are easy to understand and apply, because for most scale types, the value of the tare division must equal the value of the scale

division. If an attempt is made to enter a tare to a value that differs from the value of the scale division, the scale must either reject the entry or round the entry to the value of the nearest scale division. Either option is considered acceptable for single range scales and will typically result in a net weight indication that is mathematically correct (i.e., gross – tare = net).

The subtraction of tare from a gross load on a multi-interval and multiple-range scale becomes more complicated because tare can be taken in a weighing segment or range that differs from the weighing segment or range of the gross load applied. Consequently, the value of the scale division in the range where tare is taken is often different than the value of the scale division in the range where the gross load happens to fall. NCWM Publication 14 restricts the maximum tare taken to the capacity of the smallest weighing range or segment. Thus, when a tare is taken in the smallest weighing range or segment and the gross load applied is in a higher weighing range or segment, how the scale treats the tare entry to provide an accurate net weight indication (result) is of concern. If the scale has been designed to round the tare to the nearest scale division of the weighing range or segment in which the gross load falls, the tare could round to zero, and some could conceivably argue that by doing so, it facilitates the perpetration of fraud. Additionally, a different net weight can result depending on whether the scale rounds the tare before subtracting it from the weight of the gross load or rounds the net weight result after tare has been subtracted from the weight of the gross load. This issue is made even more complex when considering the different types of tare (e.g., semi-automatic, keyboard, digital, etc.), and the fact the determination of net weight might be different depending on the type of tare being operated.

Mr. Harshman noted too that NIST Handbook 44 has a provision (Scales Code S.1.2.1.) that exempts multi-interval and multiple range scales from having to present net weight indications in divisions of 1, 2, or 5, (or a decimal multiple or submultiple of 1, 2, or 5) when the net weight indication is calculated from gross and tare weight indications with different scale division values. Mr. Harshman stated, to his knowledge, very few multi-interval and multiple range scales are designed to operate in this fashion (perhaps only a single model from one manufacturer). Mr. Harshman said he did not believe Canadian requirements included such a provision. Mr. Turgeon acknowledged agreement.

Mr. Harshman believes if the U.S. scale manufacturers could agree on some basic principles on how tare is to operate on multi-interval and multiple range scales, these principles could quite possibly help resolve the conflicts identified by MC in NCWM Publication 14. They might also be used to help establish a means of grouping together the different tare requirements in NCWM Publication 14 by tare type if someone wishes to take on this effort to better organize them so they can be more easily followed. Mr. Harshman then initiated a review of the draft document he prepared titled, "Principles of Tare – Multi-Interval and Multiple Range Scales" to try and determine if different U.S. scale manufacturers were consistent in how they designed their scales to calculate a net weight indication from a tare taken in a lower weighing range or segment than the weighing range or segment of the gross load. He asked the various members of the Sector and those representing a U.S. scale manufacturer to review the example calculations shown in the draft document and to explain how their scales determined the net weight result. Several of the scale representatives, upon being asked to provide input, indicated they were not familiar with how their scales determined net weight and would need to consult with engineering staff and report back sometime later. Consequently, it was agreed this item could not be concluded during the meeting because it required additional input from the U.S. scale manufacturers. As a result, the Sector agreed this item would remain on its agenda in 2017 as a carryover item.

In concluding the discussions on this item, Mr. Harshman indicated, although he wished to remain an active member of the Tare Work Group, he preferred not to lead it in 2017 due to a current staffing shortage within the Legal Metrology Devices Program of NIST, OWM, and there being no indication of when the situation might improve. Mr. Darrell Flocken (NTEP Specialist) offered to assume lead of the work group and the Sector accepted his offer. All 2016 members of the Tare Work Group agreed to continue taking part in the work group. Mr. Robert Meadows (Kansas) and Mr. Eric Golden (Cardinal Scale Manufacturing, LLC) volunteered and were added as new participants on the work group.

NEW ITEMS

3. NCWM Publication 14, DES Section 57. Device Tolerances

Source:
Ohio NTEP Lab

Background:
The acceptance tolerances specified for a Class IIII scale in the table of tolerances included in DES Section 57. Device Tolerances of NCWM Publication 14 are different from those specified for wheel-load weighers and portable axle-load weighers of Class IIII design in the Scales Code of NIST Handbook 44. That is, Handbook 44, Scales Code paragraph T.N.3.3. Wheel-Load Weighers and Portable Axle-Load Weighers of Class IIII specifies the tolerance values are two times the values specified in T.N.3.1. Maintenance Tolerance Values and T.N.3.2. Acceptance Tolerances Values. Scales Code paragraph T.N.3.1. Maintenance Tolerances Values specifies the maintenance tolerance values are as specified in Table 6. Maintenance Tolerances. Paragraph T.N.3.2. Acceptance Tolerance Values specifies the acceptance tolerance values shall be one-half the maintenance tolerance values. Thus, it can be concluded from paragraphs T.N.3.1., T.N.3.2., and T.N.3.3. that the maintenance tolerance values for wheel-load weighers and portable axle-load weighers of Class IIII design are two times the value of the tolerances specified in Table 6 Maintenance Tolerances. Acceptance tolerance values would, therefore, equal the values of the tolerances specified in Table 6 for Class IIII scales. NIST Handbook 44, Scales Code paragraphs T.N.3.1., T.N.3.2., and T.N.3.3. and Scales Code Table 6 (Class IIII Maintenance Tolerances) have been copied below for easy review.

NIST Handbook Tolerances Applicable to Wheel-Load Weighers and Portable Axle-Load Scales of Class IIII design.

T.N.3.1. Maintenance Tolerance Values. – The maintenance tolerance values are as specified in Table 6. Maintenance Tolerances.

T.N.3.2. Acceptance Tolerance Values. – The acceptance tolerance values shall be one-half the maintenance tolerance values.

T.N.3.3. Wheel-Load Weighers and Portable Axle-Load Weighers of Class IIII. – The tolerance values are two times the values specified in T.N.3.1. Maintenance Tolerance Values and T.N.3.2. Acceptance Tolerance Values.

(Amended 1986)

Table 6.
Maintenance Tolerances
(All values in this table are in scale divisions)

	Tolerance in Scale Divisions			
	1	**2**	**3**	**5**
Class	**Test Load**			
IIII	0 - 50	51 - 200	201 - 400	401 +

If the Sector agrees that the acceptance tolerance values for wheel-load weighers and axle-load scales of Class IIII design in the DES Section 57. table are incorrect, (i.e., one-half of what they should be) it may want to recommend an explanatory note be added to the table clarifying that the acceptance tolerance values for Class IIII Wheel-Load

Weighers and Portable Axle-Load Weighers are two times the tolerances specified. The following proposed changes to the table were offered by the NIST Technical Advisor for consideration by the WS at its 2016 meeting:

Amend NCWM Publication 14 DES Section 57 as follows:

57. Device Tolerances

Code References: G-T.1. (e), T.N.3.2., T.N.3.5. and Table 6.

The acceptance tolerances …

Acceptance Tolerances (All values in this table are in scale divisions)				
Tolerance in Scale Divisions				
Complete Devices	0.5	1.0	1.5	2.5
Separable Main Elements[1]	0.35	0.7	1.05	1.75
Separable Indications w/o Expanded Resolution	0	0	1	1
Class	**Test Load**			
I	0 - 50 000	50 001 - 200 000	200 0001 +	
II	0 - 5 000	5 001 - 20 000	20 0001 +	
III	0 - 500	501 - 2 000	2 001 - 4 000	4 001 +
IIII*	0 - 50	51 - 200	201 - 400	401 +
III L	0 - 500	501 - 1 000	(Add ½ d for each additional 500d or fraction thereof)	
***For Wheel-Load Weighers and Portable Axle-Load Weighers of Class IIII, acceptance tolerance values are two times the values specified.**				

It is strongly recommended that indicating elements submitted separately for evaluation have a test mode providing reading indications to 0.1e to provide adequate resolution to apply the tolerance (expanded resolution). If the indicator provides indications to only the maximum number of divisions requested for the Certificate of Conformance, the tolerance will be truncated to the number of divisions that can be indicated.

Discussion/Conclusion: Members of the Sector reviewed the Class IIII tolerances specified in NIST Handbook 44, Scales Code, Table 6 and paragraphs T.N.3.2. Acceptance Tolerance Values and T.N.3.3. Wheel Load Weighers and Portable Axle-Load Weighers of Class IIII. They then considered the acceptance tolerance values specified for Class IIII devices in the table in Section 57 of NCWM Publication 14, DES and agreed that those values fail to consider the doubling effect of Scales Code paragraph T.N.3.3. and are, therefore, incorrect for wheel-load weighers and portable axle-load scales of Class IIII design. Consequently, members of the Sector agreed to the changes recommended and shown above to make clear that the values in the table are to be doubled when being applied to wheel-load weighers and portable axle-load weighers of Class IIII design.

4. NCWM Publication 14, DES Section 61. Power Voltage Variations

Source:
NCWM/NTEP

Background:
The "Variation of Voltage Report Form" located in NCWM Publication 14, DES Section 61. is not consistent with the instructions for the actual test. Test Procedure 3. beneath the heading "Test" instructs you to:

> "*Conduct increasing and decreasing load tests with at least three different test loads, including the maximum test loads at each tolerance level.*"

For a typical indicating element with 10 000 scale divisions (i.e., n = 10 000), this test would produce four test points. The current version of the test report only provides space for recording three test loads and specifies the test loads should be at "10e," "½ max," and "max."

Submitters note: the existing test report was taken directly from OIML R 76 and was not modified to fit the test instructions of NCWM Publication 14.

The submitter proposes the current report form be replaced with a revised report form. This revised report form removes the suggested test loads of "½ max," and "max" and provides three blank locations plus a location for "max" load, for recording the actual test loads used when conducting the test. The revised report form appears in Appendix A, Item 4 of this report.

Discussion/Conclusion:
Mr. Darrell Flocken (NTEP Specialist) explained to members of the Sector the reasons for the proposed changes to the form titled, "Variation of Voltage Report Form" in NCWM Publication 14, DES Section 61. The Sector agree to recommend the revised form replace the current form. The revised form agreed to by the Sector can be found in Appendix A, Item 4 of this report.

5. NCWM Publication 14. Automatic Weighing Systems Technical Policy Section Certificate of Conformance Parameters

Source:
OCS Checkweighers, Inc.

Background:
NCMW Publication 14 defines the formula BL – PL_{max} > = SD, and requires mentioning the formula in all NTEP CCs.

Since the values for SD and DAT_{min} written in the NTEP CCs can in no time be verified by an inspector, the SD, the DAT_{min}, the formula (BL – PL_{max} > = SD) and the note ("The formula above … will be noted on all NTEP CCs") should be deleted from publication 14.

The SD, the DAT_{min} and the formula (BL – PL_{max} > = SD) should not be in the CCs and should be deleted from all CCs.

The submitter recommends deleing the following struck-through portions of Section C. of the Technical Policy:

C. Certificate of Conformance Parameters

Certificates of Conformance (CC) shall detail the main elements, load cells, and auxiliary devices used during an evaluation, including model designation, and other significant parameters under the "Test Conditions" portion of the CC. Test conditions will include the number of chains, the type, number, material of the belts. Only the standard features and options, which have been evaluated, will be included on the CC.

The Following Guidelines Apply:

Device Parameters:

- minimum data acquisition time (dynamic only)
- width of load receiving element
- belt width
- length of load receiving element
- load cell
- maximum scale conveyor speed (dynamic only)

~~**DAT$_{min}$ (minimum data acquisition time in metric units)**~~
~~**For the purpose of uniformity in National Type Evaluation Program evaluations, the formula used for data acquisition time is:**~~

~~**DAT$_{min}$ = (BL – PL$_{max}$) / SBS$_{max}$**~~

~~**Where:**~~

~~**BL = Belt length in meters**~~

~~**PL$_{max}$ = Maximum Package length in meters**~~

~~**SBS$_{max}$ = Maximum scale belt speed in m/s**~~

~~**SD (System Data for the device submitted) = DAT$_{min}$ × SBS$_{max}$**~~

The models to be submitted for evaluation shall be those having:

a. Highest Capacity *

b. Smallest e_{min}*

c. Highest n_{max}*

~~**d. The Minimum Data Acquisition Time**~~

e. Widest Load Receiving Element (LRE)

* One device may be submitted to meet a, b, and c.

A CC Will Apply to All Models That Have:

- Equivalent metrological hardware and software, including the:
  - Same scale (LRE) transport construction (e.g., chain system, belt system)
  - Same number of load cells
  - *See section D Substitution of Load Cells*
- The same or smaller number of divisions

C. Certificate of Conformance Parameters

- Subsets of standard options and features of the equipment evaluated
- Equal or greater than the minimum data acquisition time
- Equal or smaller LRE width, including belt width**
- ~~**Met the formula:**~~

  ~~**BL – PL_{max} ≥ SD**~~

  ~~**Where:**~~

  ~~**BL = Belt length in meters**~~

  ~~**PL_{max} = Maximum Package length in meters**~~

  ~~**SD = System Data for the device submitted**~~
- Length with 4:1 from both directions of the device submitted (e.g., 10 m submitted, accepted range is 2.5 m to 40 m?) (determination of length noted on all NTEP CCs)
- A scale division(e) equal to or larger than that of the device evaluated
- Equal or slower scale belt speed*
- Equal or smaller capacity of the device evaluated

*The manufacturer must specify in the application form whether or not the Automatic Weighing Systems is of a fixed-speed or variable-speed design. If equipped with variable scale belt speeds, the systems covered must have equal or slower scale belt speeds for each weighing range.

**The width of the LRE is typically the LRE dimension that is perpendicular to the direction of travel. In some cases, the width of the belt or other conveyor mechanism will represent the width of the LRE if objects can only be weighed on the belt or if the belt or conveyor mechanism is wider than the LRE.

~~***Note: The formula above, BL – PL_{max} ≥ SD, will be noted on all NTEP CC's***~~

Discussion/Conclusion:
At the 2016 WS Meeting, Mr. Darrell Flocken (NTEP Specialist) provided an overview of this item to members of the Sector. Mr. Flocken indicated DAT_{min} can be defined as a minimum time specified by an AWS manufacturer that a package being weighed must be completely positioned on the scale portion of an AWS for the AWS to determine an accurate weight. Thus, Data Acquisition Time (DAT) is the time that the trailing end of a package to be weighed first moves onto the weighing area of the conveyor up to the time the leading edge of the package moves off the weighing area. DAT is affected by the length of the belt, speed of the belt, and the length of the package to be weighed. NIST Handbook 44 does not require the DAT_{min} value to be marked on an AWS.

Mr. Flocken reported that originally NTEP evaluators determined a DAT_{min} value for a device being evaluated through testing, and later it was decided it is the manufacturer's responsibility to provide the value and NTEP would verify that devices could perform accurately when tested at the declared DAT_{min}.

At the 2015 NTEP Lab Meeting, NTEP evaluators agreed not to support a proposal on its agenda to draft an NCWM Form 15 proposal to amend NIST Handbook 44 by specifying DAT_{min} be a required marking on an AWS. The evaluators also agreed at the meeting to make the marking of DAT_{min} on a CC optional (i.e., at the discretion of the NTEP evaluator). At the 2016 NTEP Lab meeting, NTEP evaluators amended their 2015 decision that it be optional and agreed the DAT_{min} specified by a manufacturer would be included on the CC.

In consideration of these discussions, members of the Sector agreed the DAT_{min} value specified by a manufacturer should be included on the NTEP CC. The Sector concluded that from the DAT_{min} and max belt speed specified, evaluators would be able to develop tests to confirm whether a device performed accurately when weighing at the DAT_{min} specified. The Sector agreed to recommend that the formula and identification of all variables in the formula shown in the policy portion of NCWM Publication 14 AWS be deleted as proposed with the only exception being bullet d. "The Minimum Data Acquisition Time," which the Sector concluded should remain in the policy. Members of the Sector also agreed to recommend that paragraph 10.13.2. of Section 10 of the checklist be deleted because it was agreed that at no time should the time to weigh a package be less than the DAT_{min} specified by a manufacturer. All the proposed changes agreed to by the Sector can be found in Appendix A, Item 5 of this report.

Members of the Sector also considered whether or not field officials should be confirming as part of their inspection of an AWS whether or not for each installation, packages being weighed remain on the weigh area of the scale long enough to comply with the DAT_{min} specified by the manufacturer. For example, should officials be measuring the length of the weigh belt, the length of the longest package to be weighed, and take into account the speed of the belt to determine if packages being weighed are on the weigh belt equal or longer than the DAT_{min} specified? It was stated that just because a manufacture specifies a DAT_{min} does not necessarily mean the installation will provide for that time. The Sector concluded this should be part of a field official's inspection of an AWS because it determines an AWSs suitability for the particular installation.

ADDITIONAL ITEMS (NOT INCLUDED ON THE DRAFT AGENDA)

6. NCWM Publication 14, Administrative Policy, Section 9 Process to Obtaining Type Evaluation and NTEP Certification and Section 19 Certificate of Conformance.

Source:
Kansas Dept. of Agriculture (Mr. Doug Musick)

Background:
Some guidance as to what the minimum test weight certification standards should be would be useful for NTEP evaluators. Also, in an era of reduced government budgets, many jurisdictions have lengthened the certification time periods for test weights. This trend will likely continue. Sometimes this is based on good data showing minimal and acceptable changes in accuracy and other times it is done simply as a cost cutting measure to reduce the work load, or as a political expedient way to decrease test weight certification cost for both the public and private sectors. Therefore, relying on the test weight certification periods allowed by the local jurisdiction may not be the best approach.

Since NTEP Certificates of Conformation are required by most states and accepted by other countries having one standard for test weight certification would be beneficial to NTEP. This proposal is suggesting any and all test weights used for NTEP evaluation performance and permanence tests have a Certificate of Calibration no more than a year old at the time of any NTEP testing. While I'm aware some states allow the use of test weights with certificates up to two-years old, using a year-old certificate would set a higher standard for NTEP. It is also suggesting the certificate ID's for the test weights used be recorded on the official NTEP evaluation paperwork and printed on NTEP Certificates of Conformance for traceability purposes.

The submitter proposes the following changes to Section 9 of the Administrative Policy of NCWM Publication 14:

Amend Section 9 and Section 19 of the Administrative Policy as follows:

9. Process to Obtaining Type Evaluation and NTEP Certification

The type evaluation process follows a sequence…

…

9.4 Conducting the Evaluation

Amend Section 9 and Section 19 of the Administrative Policy as follows:

9.4.1 The participating laboratory will conduct the evaluation.

9.4.1.1 When using test weights for an evaluation, all test weights used must have a NIST traceable certificate of calibration one year or less old at the time an NTEP evaluation is conducted

9.4.2 The participating laboratory will determine conformance or nonconformance; if nonconformance, the applicant must correct deficiencies before the process can continue. *See Section 10 Results of Evaluation*.

9.4.3 The participating laboratory will communicate all results to the applicant.

…

19. Certificate of Conformance

The Certificate of Conformance may contain some or all of the typical information listed below:

19.1…

…

19.6 NIST Traceable Certificates of Calibration for Test Weights Used

19.6.1 The Certificate of Calibration Identification Information for all test weights used during the NTEP evaluation, including permanence testing, must be recorded on the Certificate of Conformance.

…

Discussion/Conclusion:
When this item was introduced at the 2016 WS meeting, it was immediately made clear to all by Mr. Rob Upright (WS Chair) that the Administrative Policy portion of NCWM Publication 14 is the responsibility of the NTEP Committee and not the WS. Mr. Upright stated the purpose of the discussion is to provide Mr. Musick with initial feedback on the proposal and for the possible development of a WS position, if the members felt it was appropriate. The submitter of the item was then offered the opportunity to ask members of the WS their opinion of the changes proposed.

During the discussion, several members representing U.S scale manufacturers commented that while they could support a calibration frequency, a one-year frequency is of concern. They noted some states have a two-year calibration cycle for both the state-owned test weights as well as those owned by service agencies. Since an NTEP evaluation requires a significant amount of test weights, the one-year frequency could require both the state and service agencies to have their tests weights certified before the state mandated time period. In this situation it is likely that the company applying for the NTEP evaluation would be expected to pay the calibration costs associated with this stepped up (i.e., yearly) frequency. A representative of one of the U.S. scale manufacturers also indicated that he was opposed to adding the additional requirements proposed in Section 19 of the policy. There were additional comments from others supporting the deletion of this portion of the proposal.

An additional discussion point was the fact it may not always be practicable or even possible to find sufficient certified test weights to perform an evaluation. In such cases, it may be necessary to use objects other than test weights; at which point the evaluator is responsible for developing a method to determine the weight of the object that its combined error and uncertainty is less than one-third the tolerance applied to the device being evaluated when that object is used as a standard in testing. There may also be instances where test weights are of a design that can no longer be issued a certificate traceable to NIST (e.g., a test weight with a concave bottom, which no longer meets NIST Handbook 105 requirements for design). In such cases, a mass laboratory could issue an “as found” report showing the suitability of the weight for use during the evaluation.

There was general agreement amongst those providing comment that the NTEP Technical Policy should include a provision restricting the amount of time a test weight used for type evaluation can be used before needing to be recertified. There were mixed opinions on how much time should be provided before recertification is to occur. One NTEP evaluator indicated that his state (i.e., the state in which he is employed) required test weights used for NTEP evaluations to be recertified at a frequency not to exceed five years. This same evaluator indicated he believed five years was too long and should be shortened to perhaps no longer than a year or two. The majority of the members providing comment favored a two-year cycle.

Mr. Pascal Turgeon (MC) reported that Canada already has a standard in place; one that uses a level of confidence (e.g., level 1, level 2, etc.,) based on a number of factors to provide indication of when a test weight would need to be recertified. For example, he indicated that if test weights are in storage, the level of confidence would allow up to five years before recertification is necessary.

Mr. Musick thanked everyone for their comments and stated he would consider the feedback received for possible changes to the proposal before submitting it to the NTEP Committee for consideration.

APPENDIX A - RECOMMENDATIONS FOR AMENDMENTS TO PUBLICATION 14

1.a. Agenda Item 1.a.

Amend NCWM P**ublica**tion 14, DES Sections 1 and 3 as follows:

1. Marking – Applicable to Indicating, Weighing/Load-Receiving Elements and Complete Scales

…

The system must be clearly and permanently marked on an exterior surface, visible after installation, **with the following information** ~~**as follows**~~:

1.1. …

1.2. …

1.3. Except for equipment with no moving or electronic component parts and ~~**not built for purpose**~~, software~~**-based devices**~~, a non-repetitive serial number. The serial number shall be prefaced by the words "Serial Number" or an abbreviation, or a symbol, that clearly identifies the number as the require…d serial number. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.)

3. Additional Marking Requirements – Not Built-for-Purpose Software-Based Devices ~~Manufactured as of January 1, 2004, and All Software Based Devices or Equipment Manufactured as of January 1, 2022~~.
Identification of Certified Software:

…

Code Reference: G.S.1.1. Location of Marking Information for Not Built-for-Purpose, Software-Based Devices

3.1. For not built-for-purpose, software-based devices the following shall apply:

3.1.1. The Certificate of Conformance (CC) Number shall be: ☐ Yes ☐ No ☐ N/A

3.1.1.1. Permanently marked on the device. OR

…

*Note: For (3.1.**1.**~~2~~.), clear instructions for accessing the information required in G-S.1. (a), (b), and (d) shall be listed on the CC, including information necessary to identify that the software in the device is the same type that was evaluated.*

3.1.2. The version or revision identifier shall be replaced by the word "Version" or "Revision" as appropriate and either word may be followed by the word "Number." The abbreviations for the word "Version" shall, as a minimum, begin with the letter "V." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R." The abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). ~~**Accep"**~~ **Prefix lettering may be initial capitals, all capitals, or all lowercase.** ~~**Unacceptable abbreviations include "v 1234," "ver 1234," "r 1234," and "rev 1234."**~~ ☐ Yes ☐ No ☐ N/A

Amend NCWM Publication 14, ECR Interfaced with Scales Section 5 as follows:

5. Identification

Example Modular System
Point-of-sale systems may consist…

The cash register shall be clearly and permanently marked for the purposes of identification with the following information:

5.1. The name, initials, or …	☐ Yes ☐ No ☐ N/A
5.2. A model identifier …	…
5.3. Except for equipment with no moving or electronic component parts and **~~not built for purpose~~**, software**~~-based devices~~**, a non-repetitive serial number. The serial number shall be prefaced by the words "Serial Number" or an abbreviation, or a symbol, that clearly identifies the number as the required serial number. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.).	☐ Yes ☐ No ☐ N/A
5.4. For not built-for-purpose, software based devices the current software version designation. The version or revision identifier shall be prefaced by the word "Version" or "Revision" as appropriate and either word may be followed by the word "Number." The abbreviations for the word "Version" shall, as a minimum, begin with the letter "V." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R." The abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). **Prefix lettering may be initial capitals, all capitals, or all lowercase.**	☐ Yes ☐ No ☐ N/A

...

Amend NCWM Publication 14, Automatic Bulk Weighing Systems Section 17 as follows

17. Marking – General

Code Reference: G-S.1.
All equipment, except weights…

17.1. **…**

17.1.1. **…**

17.1.2. **…**

17.1.3. Except for equipment with no moving or electronic component parts and ~~**not built for purpose,**~~ software~~**-based devices**~~, a non-repetitive serial number. The serial number shall be prefaced by the words "Serial Number" or an abbreviation, or a symbol, that clearly identifies the number as the required serial number. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.).

☐ Yes ☐ No ☐ N/A

17.1.4. For not built-for-purpose, software based devices the current software version designation. The version or revision identifier shall be prefaced by the word "Version" or "Revision" as appropriate and either word may be followed by the word "Number." The abbreviations for the word "Version" shall, as a minimum, begin with the letter "V." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R." The abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). **Prefix lettering may be initial capitals, all capitals, or all lowercase.**

☐ Yes ☐ No ☐ N/A

…

Amend NCWM Publication 14, Automatic Weighing Systems Section 1 as follows:

1. General Code Requirements, Identification

Code Reference: G-S.1. and S.7.
Virtually all weighing…

…

1.1. The system must be clearly and permanently marked on an exterior surface, visible after installation, as follows:

1.1.1. The name, initials, …	☐ Yes ☐ No ☐ N/A
…	…
1.1.3. Except for equipment with no moving or electronic component parts and ~~**not built for purpose,**~~ software~~**-based devices**~~, a non-repetitive serial number. The serial number shall be prefaced by the words "Serial Number" or an abbreviation, or a symbol, that clearly identifies the number as the required serial number. Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No, and S No.).	☐ Yes ☐ No ☐ N/A
1.1.4. For not built-for-purpose, software based devices the current software version designation. The version or revision identifier shall be prefaced by the word "Version" or "Revision" as appropriate and either word may be followed by the word "Number." The abbreviations for the word "Version" shall, as a minimum, begin with the letter "V." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R." The abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). **Prefix lettering may be initial capitals, all capitals, or all lowercase.**	☐ Yes ☐ No ☐ N/A

…

1.b. Agenda Item 1.b.

Amend NCWM Publication 14, DES Section 10 as follows:

10. Provision for Metrological Sealing of Adjustable Components or Audit Trail

Code References: G-S.8.1., G-S.9., and S.1.11.
The current language in NIST Handbook 44 paragraph G-S.8. states: "A device shall be designed with provision(s) for applying a security seal that must be broken, or for using other approved means of providing security (e.g., data change audit trail available at the time of inspection), before any change that detrimentally affects the metrological integrity of the device can be made to any electronic mechanism."

Thus, for parameters protected by physical means of security, once a physical security seal is applied to the device, it should not be possible to make a metrological change to those parameters without breaking that seal. Likewise, for parameters protected by electronic means of security, it should not be possible to make a metrological change to those parameters without that change being reflected in the audit trail. **Additionally, updates to software, which result in a change to one or more of the "sealable" parameters shall itself be considered a sealable event and also reflected in the audit trail.** Since this philosophy addresses

Amend NCWM Publication 14, DES Section 10 as follows:

provisions for protecting access to any metrological adjustment, the philosophy should be applied consistently to all electronic device types.

Due to the ease of adjusting the accuracy of electronic scales, all scales (except for Class I scales) must provide for a security seal that must be broken or provide an audit trail, before any adjustment that detrimentally affects the performance of the electronic device can be made. Only metrological parameters that can affect the measurement features that have a significant potential for fraud and features or parameters whose range extends beyond that appropriate for device compliance with NIST Handbook 44 or the suitability of equipment, shall be sealed.

For additional information on the proper design and operation of the different forms of audit trail, *see Appendix B for the Requirements for Metrological Audit Trails.*

The judgment of whether or not a method of access to an adjustment represents a "significant potential for fraud" and will normally require sealing for security will be made based upon the application of the *Philosophy for Sealing in Appendix A.*

Amend NCWM Publication 14 DES, and Automatic Weighing Systems Appendix A by adding a new bulleted feature/parameter to the table titled, "Scale Features or Parameters" as follows:

Scale Features and Parameters

Typical Features or Parameters to be Sealed	Typical Features or Parameters NOT Required to be Sealed
• Coarse Zero • Initial Zero-setting Mechanism (IZSM) on Separable Indicating Elements with Limits That Can Be Adjusted More Than 20 % Beyond the Maximum Capacity of the Load-receiving Element … **Software update that changes the metrologically significant software**	*No changes recommended*

Add the following new sub-heading and new paragraph at the end of Publication 14 DES Appendix A:

Software Updates

When software is updated, the update itself can change one or more of the typical features or parameters to be sealed without these changes being reflected in a device's audit trail. For this reason, it is important that any update to software that changes the metrologically significant software be considered a sealable event as required by NIST Handbook 44 paragraph G-S.9. Metrologically Significant Software Updates.

Amend NCWM Publication 14, Automatic Weighing Systems Section 8 as follows:

8. Provision for Metrological Sealing of Adjustable Components or Audit Trail for Other than Automatic Checkweighers

Code Reference: G-S.9., S.1.3.
Due to the ease of adjusting the accuracy of electronic scales, all Automatic Weighing Systems (except for automatic checkweighers) must have provision for a security seal that must be broken, or an audit trail provided, before any adjustment that detrimentally affects the performance of the electronic device can be made. Security seals are not required for automatic checkweighers in field applications where it would prohibit an authorized user from having access to the calibration functions of the device. Only metrological parameters that can affect the measurement features that have a significant potential for fraud, and features or parameters whose range extends beyond that appropriate for device compliance with NIST Handbook 44 or the suitability of equipment, shall be sealed. **This includes software updates that change the metrologically significant software.**

For additional information on the proper design and operation of the different forms of audit trail, see "Appendix B for the Audit Trail."

The judgment as to whether or not a method of access to an adjustment represents a "significant potential for fraud" and will normally require sealing for security will be made based upon the application of the following philosophy.

…

Amend NCWM Publication 14, ECR Interfaced with Scales Section 6 as follows:

6. Provision for Metrological Sealing of Adjustable Components or Audit Trail

Code Reference: G-S.9., S.1.11.
All components of a point-of-sale (POS) system must comply with Section 10 of the Digital Electronic Scale Checklist if they have a metrological effect on the system. POS Cash Register features, not addressed in this checklist, maybe covered and shall comply with applicable sections in the Digital Electronics Scales Checklist.

Due to the ease of adjusting the accuracy of electronic scales, all scales (Except for Class I scales) must provide for a security seal that must be broken or provide an audit trail, before any adjustment that detrimentally affects the performance of the electronic device can be made.

Only metrological parameters that can affect the measurement features that have a significant potential for fraud and features or parameters whose range extends beyond that appropriate for device compliance with NIST Handbook 44 or the suitability of equipment, shall be sealed. **This includes software updates that change the metrologically significant software.**

Verify that the electronic cash register (ECR) has not sealable parameters and cannot adjust the accuracy of the POS.

6.2. Does the ECR have sealable parameters or features? *See table of typical "Scale Features and Parameters" in the Digital Electronics Scales* ☐ Yes ☐ No ☐ N/A

Amend NCWM Publication 14, ECR Interfaced with Scales Section 6 as follows:

checklist, Section 10. Provision for Metrological Sealing of Adjustable Components or Audit Trail.

6.1.2. If yes, the ECR shall comply with the Digital Electronic Scales Checklist Section 10 Provision for Metrological Sealing of Adjustable Components or Audit Trail.	☐ Yes ☐ No ☐ N/A

Agenda Item 4.

Variation of Voltage Report Form

Code Reference: T.N.8.3.1.

Control No.: ____________________________
Pattern Designation: ______________________
Date: ________________________________
Observer: _____________________________
Verification Scale Interval e: _______________

	At Start	At Max	At End
Temp.:	°C		
Rel. h:			
Time:			
Bar. Pres. (Only Class I):	hPa		

Automatic Zero-Setting and Zero-Tracking Device Is:
☐ Non-existent ☐ Not In Operation ☐ Out of Working Range ☐ In Operation

Marked Nominal Voltage or Voltage Range AC or DC (from main): ______________________________
Marked Nominal DC Voltage Battery Operated Instruments: ______________________________
$E = I + 0.5\ e -)\ L - L$
$E = E - E_0$
E_0 = error calculated at or near zero (*)

Voltage (**)	**U (V)**	**Load L**		**Indication I**	**Add. Load L**	**Error E**	**Corrected Error E_c**	**mpe**
Reference Value		10 e						
Reference Value − 15 % (or lower limit of battery voltage)		10 e						
		max						
Reference Value + 10 % (or upper limit of battery voltage)		10 e						
		max						
Reference Value		10 e						
		max						

***In case a voltage range (v_{min}, v_{max}) is marked, then the test shall be performed at v_{min}, v_{max} and at the nominal line voltage of the laboratory.*

☐ Passed ☐ Failed

Remarks:

Agenda Item 5.

Amend NCWM Publication 14, AWS Section C. Technical Policy as follows:

C. Certificate of Conformance Parameters

Certificates of Conformance (CC) shall detail the main elements, load cells, and auxiliary devices used during an evaluation, including model designation and other significant parameters, under the "Test Conditions" portion of the CC. Test conditions will include the number of chains, the type, number, material of the belts. Only the standard features and options that have been evaluated will be included on the CC.

The Following Guidelines Apply:

Device Parameters:

- Minimum data acquisition time (dynamic only)
- Width of load receiving element
- Belt width
- Length of load receiving element
- Load cell
- Maximum scale conveyor speed (dynamic only)

~~**DAT_{min} (minimum data acquisition time in metric units)**~~
~~**For the purpose of uniformity in National Type Evaluation Program evaluations, the formula used for data acquisition time is:**~~

~~**$DAT_{min} = (BL – PL_{max}) / SBS_{max}$**~~

~~**Where:**~~

~~**BL = Belt length in meters**~~

~~**PL_{max} = Maximum Package length in meters**~~

~~**SBS_{max} = Maximum scale belt speed in m/s**~~

~~**SD (System Data for the device submitted) = DATmin × SBS_{max}**~~

The models to be submitted for evaluation shall be those having:

a. Highest Capacity *

b. Smallest e_{min}*

c. Highest n_{max}*

d. The Minimum Data Acquisition Time

e. Widest Load Receiving Element (LRE)

* One device may be submitted to meet a, b, and c.

A CC Will Apply to All Models That Have:

- Equivalent metrological hardware and software, including the:
  - Same scale (LRE) transport construction (e.g., chain system, belt system)
  - Same number of load cells
  - *See section D Substitution of Load Cells*

Amend NCWM Publication 14, AWS Section C. Technical Policy as follows:

- The same or smaller number of divisions
- Subsets of standard options and features of the equipment evaluated
- Equal or greater than the minimum data acquisition time
- Equal or smaller LRE width, including belt width**
- ~~**Met the formula:**~~

  ~~**BL – PL_{max} ≥ SD**~~

  ~~**Where:**~~

  ~~**BL = Belt length in meters**~~

  ~~**PLmax = Maximum Package length in meters**~~

  ~~**SD = System Data for the device submitted**~~

- Length with 4:1 from both directions of the device submitted (e.g., 10 m submitted, accepted range is 2.5 m to 40 m?) (determination of length noted on all NTEP CC's)
- A scale division(e) equal to or larger than that of the device evaluated
- Equal or slower scale belt speed*
- Equal or smaller capacity of the device evaluated

*The manufacturer must specify in the application form whether or not the Automatic Weighing Systems is of a fixed-speed or variable-speed design. If equipped with variable scale belt speeds, the systems covered must have equal or slower scale belt speeds for each weighing range.

**The width of the LRE is typically the LRE dimension that is perpendicular to the direction of travel. In some cases, the width of the belt or other conveyor mechanism will represent the width of the LRE if objects can only be weighed on the belt or if the belt or conveyor mechanism is wider than the LRE.

~~***Note: The formula above, BL – PL_{max} ≥ SD, will be noted on all NTEP CC's***~~

Delete sub-paragraph 10.13.2 from NCWM Publication 14, AWS Section 10. Checklists and Procedures as follows:

10.13. If the time to weigh a package is smaller than the minimum DAT, the system must:

10.13.1. Prevent inaccurate indications or recorded representation of weight. ~~**OR**~~ ☐ Yes ☐ No ☐ N/A

~~**10.13.2. Marked with the minimum DAT for the specific installation ☐ Yes ☐ No ☐ N/A**~~

ATTACHMENTS

Attachment to Agenda Item 2. Principles of Tare

Principles of Tare – Multi-Interval and Multiple Range Scales

Multi-Interval Scales

Digital, Keyboard, and Programmable Tare

- It shall not be possible to enter or program a tare value that exceeds the capacity of WS1
- All tare values shall be equal to the value of the displayed scale division of WS1
  - If an attempt is made to enter a tare to a different value of d of WS1, the scale shall either reject the tare entry or round the tare entry to the nearest value of d of WS1
- Which of the following two bullet points in the box below is a correct statement (i.e., principle of tare) or should it be specified that either "rounding" method is appropriate?

1. A tare entered (or programmed) to the value of the displayed scale division of WS1 will automatically round to the closest value of the displayed scale division of the WS in which the net weight happens to fall once a gross load has been applied; *or*

2. A tare entered (or programmed) to the value of the displayed scale division of WS1 will be subtracted from the weight of a gross load and the net result then rounded to the closest value of the displayed scale division of the WS in which the net result happens to fall.

The example below provides indication of the difference in the net weight results depending on which value (tare or net) gets rounded.

Consider the following capacity statements marked on a multi-interval scale for this example:
WS1 0 - 1000 lb × 2 lb
WS2 1000 - 5000 lb × 5 lb

Displayed and/or Printed		
	Actual	**Acceptable**
Gross	1010 lb	1010 lb
Tare	− 12 lb	− 12 lb
Net	998 lb	1000 lb

In this example, **<u>if the scale rounds tare</u>** to the closest value of the displayed division in the range of the resulting net weight, it would round the 12 lb tare to 10 lb and the net result would be 1000 lb. However, if it is the **<u>net weight that gets rounded</u>** after subtraction of tare, the net weight would round to the closest 2 lb and the result would be 998 lb.

The decision is important becasuse if it decided that rounding is to the net weight (i.e., after subtraction of tare) then there is only one correct answer and that is 998 lb. If rounding of tare is permitted, then both net results would be considered correct. (That is, 998 would still be considered acceptable due to the exception allowed by Scales Code paragraph S.1.2.1.)

NCWM Publication 14, DES Section 31 currently specifies the following:

In applying these principles, it is acceptable to:

- **Round the indicated and printed tare values to the nearest appropriate net weight scale division.**

In reviewing this example during the 2016 NTEP Lab meeting, Darrell indicated the net result could be either 998 lb or 1000 lb. For the net result to be 1000 lb, the 12 lb tare must round to the nearest value of d in the second weighing range (10 lb). That is, rounding would have to occur before subtraction of tare from gross. If rounding occurred after subtraction, then the only acceptable answer would be 998 lb. A 2 lb rounding error is significant because it represents approximately 0.2 % of the net load. Review answers again with Darrell just to confirm he believes both answers are correct.

Which is correct: What is the rule or principle that applies?

- The value of the scale division for the net weight, whether positive or negative, must be displayed in scale divisions consistent with the weighing segment in which the net weight falls.
- If a tare value can be cleared when a load is on the platform, a clear indication that the tare value has been eliminated must be provided.
- In all cases, any displayed or recorded net weight value must be in mathematical agreement with the gross and tare values indicated or recorded (i.e., gross − tare = net).
  - o This applies to both when a tare value and the resulting net weight value fall in the same WS (i.e., WS1) and when a tare value and the resulting net weight value fall in different WSs (e.g., tare in WS1 and the resulting net weight in WS2)
- A multi-interval scale may indicate and record tare weights in a lower weighing segment (WS) and net weights in a higher WS and provide a mathematically correct net weight result in accordance with the examples provided in NIST Handbook 44 Scales Code Paragraph S.1.2.1. Digital Indicating Scales, Units.

The following examples are provided to better show how these principles apply:

Consider the following capacity statements marked on a multi-interval scale for Examples A-D shown in the table below:

WS1	0 - 5 lb × 0.002 lb
WS2	5 - 10 lb × 0.005 lb
WS3	10 - 30 lb × 0.01 lb

Example A

Displayed and/or Printed

	Actual	**Acceptable**
Gross	13.38 lb	13.38 lb
Tare	− 0.122 lb	− 0.122 lb
Net	13.258 lb	13.26 lb

In the “Acceptable” column 13.258 lb has been rounded up to the nearest scale division of WS3.

Example B

Displayed and/or Printed

	Actual	**Acceptable**
Gross	13.38 lb	13.38 lb
Tare	− 0.004 lb	− 0.004 lb
Net	13.376 lb	13.38 lb

In the “Acceptable” column 13.376 has been rounded up to the nearest scale division of WS3. *In this case, the scale clears the tare value once the load is applied. The scale is required to provide a clear indication of that it has done so.*

Example C

Displayed and/or Printed

	Actual	**Acceptable**
Gross	13.38 lb	13.38 lb
Tare	− 0.006 lb	− 0.006 lb
Net	13.374 lb	13.37 lb

In the “Acceptable” column 13.374 has been rounded to the nearest scale division of WS3.

Example D

Displayed and/or Printed

	Actual	**Acceptable**
Gross	10.54 lb	10.54 lb
Tare	− 0.626 lb	− 0.626 lb
Net	9.914 lb	9.915 lb

In the “Acceptable” column 9.914 has been rounded to the nearest scale division of WS2.

In each of the examples shown above, the net values shown beneath both “Actual” and “Acceptable” would be considered the only acceptable results given the principles of tare on a multi-interval scale.

Push-button (Semi-automatic) Tare

- There are no capacity limitations for semi-automatic tare. Tare may be taken to the capacity of any WS.
- A semi-automatic tare rounds the weight of the object being tared to the closest value in the range where taken.
- Entries of tare shall be to the value of the displayed scale division of the WS in which the tare is taken and then rounded to the closest value of the displayed scale division in the WS in which the net weight results once a load is applied.
- In all cases, any displayed or recorded net weight value must be in mathematical agreement with the gross and tare values indicated or recorded (i.e., gross − tare = net).
- The value of the scale division for the net weight, whether positive or negative, must be displayed in scale divisions consistent with the weighing segment in which the net weight falls.

Multiple Range Scales

- It is important to think of each weighing range of a multiple range scale as if a single scale. There are multiple range scales in which the range is manually selected and there are those in which the range changes automatically with the amount of load applied.
    - For those in which the range is manually selected, tare can only be taken to the value of the displayed scale division of the range selected. An attempt to enter a keyboard (or programmable) tare value that differs from the value of the displayed scale division can either be rejected or rounded and accepted to the closest value of the displayed scale division.

- For those in which the range changes automatically, the scale must only accept a tare entry to the displayed scale division of the range in which the tare value falls. A tare entry accepted in a lower WR will automatically round to the nearest displayed scale division of a higher weighing range once the application of a load causes the net weight indication to breach the higher WR. However, if the applied load is then decreased, the value of the tare scale division (that was previously rounded to the higher WR) must not change, nor shall the value of the displayed net weight scale division change to that of the lower WR.
- If a tare value can be cleared when a load is on the platform, a clear indication that the tare value has been eliminated must be provided. (*What constitutes a clear indication that tare has been removed?)*

Both Multi-Interval and Multiple Range Scales

- The tare mechanism shall only operate in a backward direction with respect to the zero-load balance condition of the scale.
- Scales must provide a clear indication that tare has been taken.
- If tare is set to zero, there must be a clear indication that tare has been removed.
- If a tare value can be cleared when a load is on the platform, a clear indication that the tare value has been eliminated must be provided. What is not known is how the scale will identify the quantity being displayed once tare is erased. I believe some scales revert back to a gross. What constitutes a clear indication that tare has been removed? Under what conditions would NTEP accept the deletion of a tare entry?
- Scales designed to automatically clear tare, shall be designed to prevent the clearing of tare until a complete transaction has been indicated.
- A pre-programmed tare cannot replace a manually entered tare without obvious indication.
- The tare weight plus the net weight must always equal the gross weight. In all cases, any displayed or recorded net weight value must be in mathematical agreement with the gross and tare values indicated or recorded (i.e., gross − tare = net).
- Keyboard and programmable tare entries must be visible at some point in the transaction so the entry can be verified. (Re: DES Section 48). Do you agree that this principle also applies to multi-interval and multiple range scale?

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NEXT MEETING:

The Sector agreed to hold its next meeting in the Central or Mountain Time Zone to be determined by the NCWM. It was also agreed that the meeting will take place August 22 - 23, 2017.

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Appendix G

National Type Evaluation Program (NTEP) Multiple Dimension Measuring Device (MDMD) Work Group Meeting Summary

April 26 - 27, 2016
Reynoldsburg, Ohio

Item 5200-2

APPENDICES

Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
NIST	National Institute of Standards and Technology	NTEP	National Type Evaluation Program
MDMD	Multiple Dimension Measuring Device	OIML	International Organization of Legal Metrology
MC	Measurement Canada	OWM	Office of Weights and Measures
MRA	Mutual Recognition Arrangement	R	Recommendation
NCWM	National Conference on Weights and Measures	WG	Work Group

SCHEDULE

i. Introduction and Welcome *(R. Kennington)*

ii. Reiteration of NTEP MDMD Work Group Mission *(D. Flocken)*

Discussion:
Darrell Flocken (NTEP) reviewed the mission of the MDMD WG as stated during the October 2014 and May 2015 WG meeting for the benefit of all participants. The mission of the WG is to deal with specific issues concerning MDMDs; that is, to consider the requirements in NIST Handbook 44 (HB44) and make sure NTEP has a type evaluation checklist in place to verify compliance with HB44 and influence factor testing.

iii. Goal of this Meeting *(D. Flocken)*

Discussion:
The goal for this meeting is to review and update both the Measurement Canada (MC)/NTEP Specification Comparisons document and the NCWM Publication 14 Checklist. In addition, the WG should take this opportunity to discuss any new items brought to the WG's attention.

iv. Report – 2016 NCWM Interim Meeting *(D. Flocken)*

Discussion:
Mr. Darrell Flocken reported that all three proposals submitted from the WG's September 2015 meeting were on the NCWM Specifications and Tolerance Committee agenda for this meeting. Mr. Flocken reported there was a suggestion heard during the open hearings on the proposal permitting some required marks to be available on a separate document if the device is too small to accommodate them. While the comments were not in opposition to the proposal, a suggestion was made for consideration be given to requiring the serial number of the device also be included on the accompanying document. It was mentioned this requirement was already in place for load cells. As no strong opposition to the three proposals were heard during the open hearings, the Specifications and Tolerance Committee recommended that all three proposals remain as presented and be given Voting status for the July 2016 NCWM Annual Meeting.

v. Report – Recent Measurement Canada Type Evaluation Activity *(P. Turgeon)*

Discussion:
Mr. Pascal Turgeon report there has been no type evaluation activity since the September 2015 WG Meeting. Mr. Turgeon did take the opportunity to report several changes in personnel have occurred in the Measurement Canada Laboratory. Ms. Isabelle Trembley and Mr. Justin Rea have both moved to other positions within Measurement Canada.

vi. Report - Recent NTEP MDMD Type Evaluation Activity *(T. Buck)*

Discussion:
Mr. Tom Buck reported the Ohio NTEP Laboratory had received seven evaluation assignments; four assignments were for new devises, and three assignments were for revisions to existing certificates.

INTRODUCTION AND WELCOME

CARRYOVER ITEMS

1. Review meeting summary from September 2015 meeting.

Discussion:
Chairman Kennington asked if there were any changes or additions to the September 2016 Meeting Summary hearing now, he asked for the adoption of the summary. The meeting summary was adopted by unanimous vote.

2. Review changes to NIST Handbook 44, MDMD code since last meeting.

Discussion:
No changes to NIST Handbook 44 have been made since the WG's September 2015 meeting. It was reported the three proposals submitted from the September 2015 WG meeting were on the National S&T's Committee Report with a Voting status for the up coming July 2016 NCWM Annual Meeting.

3. Review changes to NCWM Publication 14, MDMD Checklist.

Discussion:
Mr. D. Flocken reported there has **b**een no changes to the Checklist reviewed and adopted by the WG during their September 2015 meeting. He also reported the Checklist was adopted by the NTEP Committee and is published in the 2016 edition of Publication 14.

4. Review changes to Measurement Canada MDMD Code and Terms and Conditions

Discussion:
Mr. P. Turgeon reported no changes to the Canadian MDMD Code have occurred since the WG's September 2015 meeting.

5. Review update to NTEP/MC Requirements Comparison Document.

Discussion:
Mr. D. Flocken reported on the status of the WG's Comparison Document. No changes have been made to the document since the WG's September 2015 Meeting.

6. Publication 14, MDMD Checklist

Discussion:
It was agreed no changes to the Checklist are required at this time. The WG will review possible changes during their next meeting.

7. Review results of the NTEP/MC Mutual Recognition Agreement discussion at the 2016 NCWM Interim meeting.

Discussion:
Mr. D. Flocken reported at the request of Measurement Canada, the proposal of adding MDMD devices to the NTEP/Measurement Canada Mutual Recognition Agreement document be Withdrawn. The request was made based on comments heard during the NCWM 2016 Interim Meeting. MC felt there was not enough support for the addition. The NCWM NTEP Committee removed the item from their agenda and suggested that if necessary, members of industry can reintroduce the proposal at a later date.

8. Report on progress from multi-interval operation requirements subgroup.

Discussion:
Mr. Rick Harshman (NIST, OWM) provided an update on the progress of three NCWM Form 15 proposals that had been submitted by the MDMD WG to the NCWM in 2015, one of which, was developed by a small subgroup of the MDMD WG formed to address multi-interval MDMDs. Mr. Harshman reviewed the intended purpose of each proposal and noted each had been submitted to the four regional weights and measures associations early enough in 2015 to be considered by each of those regions when they met for their fall meeting. Having been accepted by at least one region, the proposals were then added to the 2016 S&T Committee's agenda and given consideration at the 2016 NCWM Interim Meeting. The proposals appear on the 2016 S&T Committee's agenda as Items 358-1, 358-2, and 358-3. The Committee received many comments in favor of the proposals at the Interim Meeting, which prompted the Committee to assign a Voting status to each proposal. Each proposal will be voted on at the upcoming 2016 NCWM Annual Meeting in July.

Mr. Harshman noted that OWM's Legal Metrology Devices Program had earlier expressed concern in comments to the S&T Committee regarding the proposal (i.e., the Item 358-2 proposal) to allow some marking information to appear on an accompanying document rather than be marked on the device as is currently required by the MDMD Code in NIST HB 44. OWM's concern was the proposal didn't require the serial number of the device to appear on the accompanying document to link the two together, as is required on accompanying documents for load cells in the Scales Code of HB 44. Mr. Harshman also questioned how officials performing a test on an MDMD could immediately tell the value of the measuring division for each axis and range and the minimum and maximum dimensions for each axis if this information doesn't appear on the device. He further noted officials need this information to determine tolerances and to ensure that tests are within the operational parameters set by the manufacturer.

With respect to S&T Item 358-2, Mr. Scott Henry (Zebra Technologies) noted the information proposed for inclusion on the accompanying document can be accessed from a menu on the devices offered by Zebra Technologies, and instructions for accessing the information could be made available on the NTEP CC. It was also reported the value of the measuring division for each axis and range on equipment in which this proposal was intended to apply is fixed and <u>not</u> configurable.

9. Develop Form 15s identified in Requirements Comparison Document.

Discussion:
The WG reviewed the remaining "open" items and agreed that two changes to HB 44 would have value. The items were:

1. The expansion of S.1.7. to include multi-interval devices with the additional proposed changes provides a better explanation of how to apply the 12 d minimum measurement specification and the application of tare with respect to marked maximum dimension for the axes in which tare was applied, and
2. the change in the use of the word "length" to "measurement."

A Form 15 (Appendix A) was developed during the WG meeting and was submitted to the NCWM the following week. A copy of the submitted document is included at the end of this summary document.

NEW ITEMS

10. The impact of MDMD Specifications and tolerances on the LTL trucking business and their use of such devices.

Discussion:
Mr. Don Newell presented an overview of the LTL (Less Then Truckload) trucking business. A copy of Mr. Newell's presentation is included in the distribution of this meeting summary and is provided in Appendix B of this report.

Mr Newell spoke of some of the challenges that LTL trucking companies face when assessing freight charges. Many of the pallets are not uniform and can be difficult to measure. Some are too large to be moved around with a fork lift. Traditional methods of charging by commodity code can have its own challenges. He asked manufacturers of MDMD equipment to consider these realities as they design pallet MDMDs.

Density is one of four factors used by some LTL trucking companies to establish freight class. It is the number one component in determining freight charges. The other three factors are stowing ability, handling, and liability. Density is a ratio of the weight of a product to be shipped divided by its volume in cubic feet (i.e., lb/ft^3). Generally speaking, the higher the density, the lower the price to ship.

11. Discussion on OIML Testing Capability.

Source:
H. Sprague Ackley, Honeywell

Background/Discussion:
In previous meetings, Measurement Canada and Ohio Laboratories have indicated they are looking into what it would take to be able to perform an OIML certification. Mr. Ackley offered to lead a discussion to see whether there is something the MDMD Work Group could do to support this direction.

CLOSING DISCUSSION

12. Review meeting activities and conclusions.

Nothing to report.

13. Define next steps (if needed).

Discussion:
The WG agreed that no specific actions are needed from this meeting. The WG will monitor the three existing and one new proposal and will address their outcome at the next meeting.

14. Chairman's discussion.

Discussion:
Chairman Kennington took this opportunity to comment that he has chaired the WG for close to ten years and expressed interest in resigning from the position. He opened the discussion to others who would be interested in moving into the chair position. No one openly volunteered and the discussion was closed. Mr. D. Flocken and Mr. R. Harshman both commented the WG needs to become more self-operating in that the members should consider appointing document responsibility to WG members.

15. Next meeting

Discussion:
While the last four meetings were held on a semi-annual basis the WG agreed our assigned tasks have been completed and the meeting schedule could return to an annual basis. The WG agreed to have the next meeting on Tuesday and Wednesday, May 2 - 3, 2017. Once again, the Ohio NTEP Laboratory agreed to host the meeting at their location.

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Appendix A

Form 15: Proposal to Amend NIST Handbooks, Bylaws or NTEP Administrative Policy

Proposal to Amend: S.1.7. Minimum Measurement Lengths and

S.1.8. Indications Below Minimum and Above Maximum.

National Conference on Weights and Measures / National Type Evaluation Program

Form 15: Proposal to Amend NIST Handbooks, NCWM Bylaws or NTEP Administrative Policy

23. List of Attachments: Provide a list of all attachments in the order that they are referenced on Form 15. Attachments may include letters, data, studies, or other documents. It is not necessary for attachments to be in Word format.

General Information (See Instructions)

1. Date: April 27, 2016

2. Regional Association(s): (Not applicable for proposals to the Board of Directors or NTEP Committee)
_X_ Central (CWMA) _X_ Northeastern (NEWMA) _X_ Southern (SWMA) _X_ Western (WWMA)

3. Standing Committee:
__Laws & Regulations X Specifications & Tolerances __Professional Development __Board of Directors __NTEP Committee

4. Submitter Name:
Multiple Dimensioning Measuring Device Work Group (or Darrell Flocken)

5. Street Address:
1135 M Street, Suite 110

6. City:	**7. State:**	**8. Zip Code:**	**9. Country:**
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10. Phone Number:	**11. Fax Number:**	**12. Email Address:**
614.620.6134		darrell.flocken@ncwm.net

Proposal Information (See Instructions)

13. Purpose:
Clarification of the application of the minimum measurement and tare operation.

14. Handbook to be Amended:
_X_ *NIST Handbook 44* __ *NIST Handbook 130* __ *NIST Handbook 133* __ *NCWM Bylaws* __ *NTEP Administrative Policy*
Section:
Paragraph:

15. Proposal:

S.1.7. Minimum <u>Measurement</u> ~~Lengths~~. – Except for entries of tare, the minimum **<u>measurement</u>** ~~length to be measured~~ by a device is 12 <u>d</u> ~~divisions~~. The manufacturer may specify a longer minimum **<u>measurement</u>** ~~length~~. **<u>For multi-interval devices, this applies only to the first measuring segment.</u>**

S.1.8. Indications Below Minimum and Above Maximum. – When objects are smaller than the minimum dimensions identified in paragraph S.1.7. Minimum **<u>Measurement</u>** ~~Lengths~~ or larger than any of the maximum dimensions plus 9 d, and/or maximum volume marked on the device plus 9 d, or when a combination of dimensions**<u>, including tare,</u>** for the object being measured exceeds the measurement capability of the device, the indicating or recording element shall either:
.....

16. Justification:
The MDMD Work Group believes that the expansion of S.1.7. to include multi-interval devices with the additional proposed changes provides a better explanation of how to apply the 12 d minimum measurement specification and the application of tare with respect to marked maximum dimension for the axes in which tare was applied.

This proposal also addresses the change in the use of the word "length" and recommends the use of the word "measurement". The Work Group feels that "measurement" is better suited for all axes.

These proposed changes better harmonize the device specification with those of Measurement Canada.

17. Other Contacts:
Richard Harshman, NIST, OWM, Email: richard.harshman@nist.gov, Phone 301.975.8107

National Conference on Weights and Measures / National Type Evaluation Program

Form 15: Proposal to Amend NIST Handbooks, NCWM Bylaws or NTEP Administrative Policy

18. Other Reasons For: None
19. Other Reasons Against: None
20. Evidence: None
21. Additional Considerations: None
22. Suggested Action: _X_ Recommend NCWM Voting Item ___ Developing Item ___ Informational Item ___ Other (Please Describe):
23. List of Attachments: None

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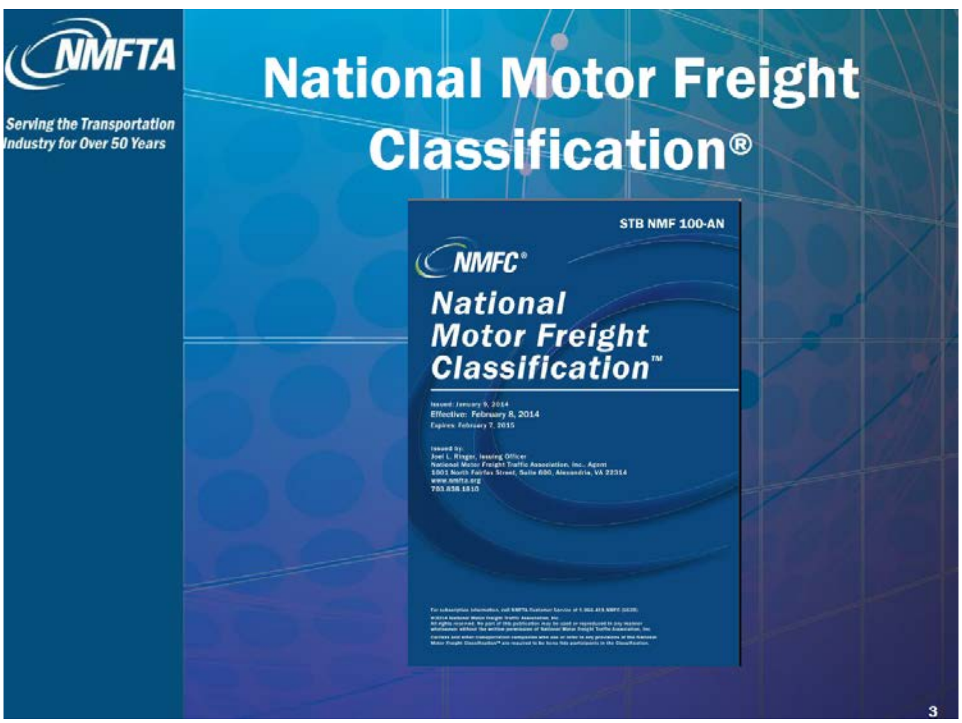
Appendix B

NMFTA Presentation


NMFTA
Serving the Transportation Industry for Over 50 Years
The LTL (Less Than Truckload) Environment
2


NMFTA
Serving the Transportation Industry for Over 50 Years
National Motor Freight Classification®
STB NMF 100-AN
NMFC®
National Motor Freight Classification™
Issued: January 9, 2014
Effective: February 8, 2014
Expires: February 7, 2015
3

NMFTA
Serving the Transportation Industry for Over 50 Years

Rule For Determination of Shipment Density

Sec. 8. 'Density.'Where classes are based on the density of articles as tendered for shipment, the word 'density' refers to the actual density of the articles shipped, as measured in pounds per cubic foot.

Sec. 8. (a)To determine the density of a handling unit, first determine the cubage of the handling unit by multiplying the greatest straight-line dimensions of length, width and height (depth) in inches, including all projections, if any, as tendered to the carrier for shipment, and dividing the total by 1,728 cubic inches (one cubic foot). The density is the result of the division of the weight of the handling unit as tendered for shipment by the cubic feet. For instance, the density of a handling unit consisting of boxes unitized on a lift truck pallet measuring 48" x 40" x 45" and weighing 450 pounds is determined as follows: 48" x 40" x 45" = 86,400 cubic inches; 86,400 ÷ 1,728 = 50 cubic feet; 450 lbs. ÷ 50 = 9.00 pounds per cubic foot (pcf).

Sec. 8. (b)To determine the density of a cylindrical-shaped handling unit, square the greatest dimension on the cylindrical plane by multiplying the dimension by itself in inches and then multiplying that result by the height or length. Divide the result by 1,728 cubic inches. The density is the result of the division of the weight of the handling unit by the cubic feet.

Sec. 8. (c)Where articles are unitized on lift truck pallets, platforms, racks or skids, the pallet, platform, rack or skid constitutes an integral part of the handling unit, and except as provided in Item 640, Sec. 3 (b), must be included in the computation of density.

4

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Not Unusual in LTL

5


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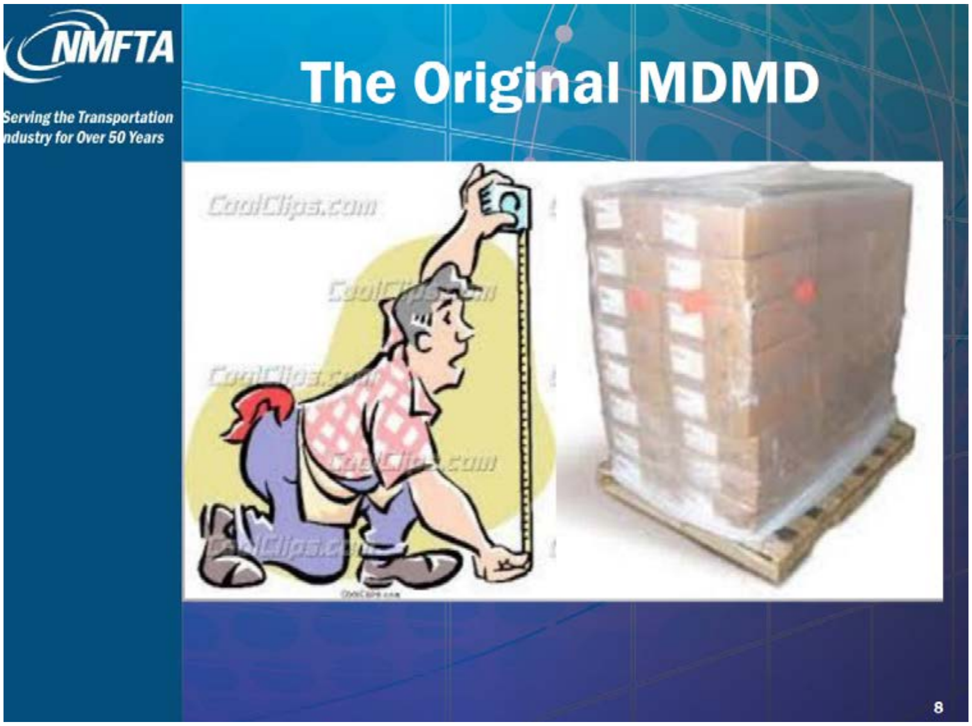
Serving the Transportation Industry for Over 50 Years
Becoming Less Common
Nice, regular package.
Easy to handle.
Easy to stow with no excess space taken up
6


NMFTA
Serving the Transportation Industry for Over 50 Years
Becoming More Common
7


NMFTA
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The Original MDMD
CoolClips.com
8

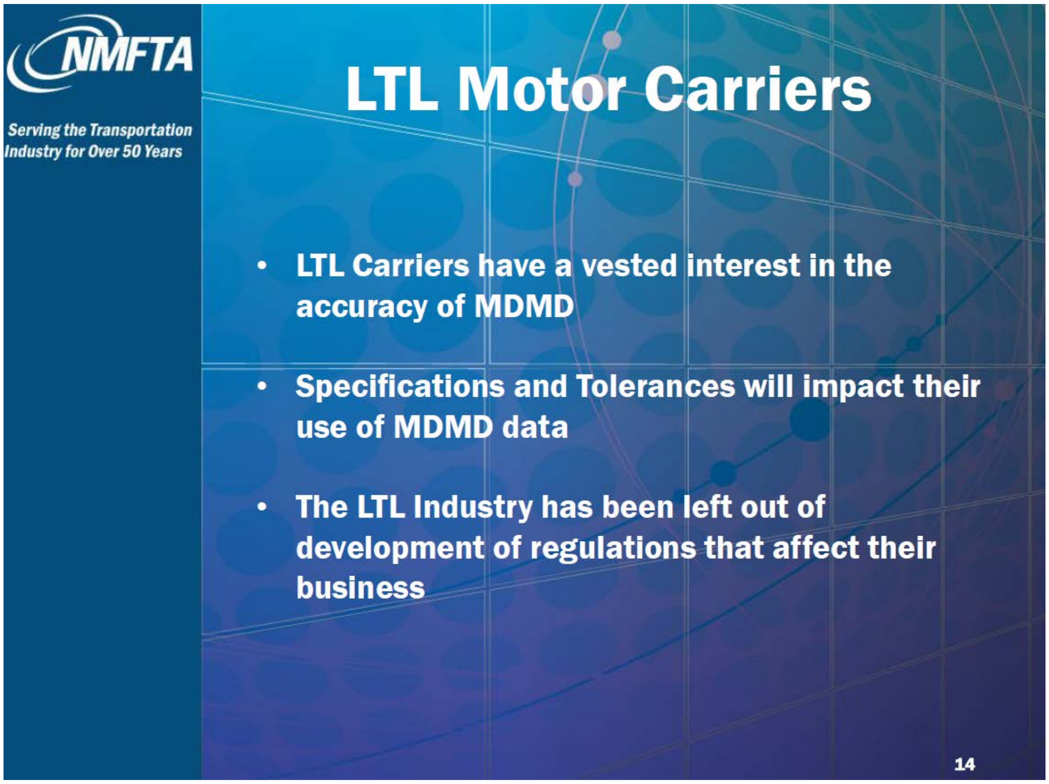

NMFTA
Serving the Transportation Industry for Over 50 Years
The New MDMD
9


NMFTA
Serving the Transportation Industry for Over 50 Years
How about the inside?
10


NMFTA
Serving the Transportation Industry for Over 50 Years
Portable or Hand-Held MDMD?
11


NMFTA
Serving the Transportation Industry for Over 50 Years
How "Fine" Do MDMD See?
12


NMFTA
Serving the Transportation Industry for Over 50 Years
How "Fine" Do MDMD See?
13


NMFTA
Serving the Transportation Industry for Over 50 Years
LTL Motor Carriers
• LTL Carriers have a vested interest in the accuracy of MDMD
• Specifications and Tolerances will impact their use of MDMD data
• The LTL Industry has been left out of development of regulations that affect their business
14


NMFTA
Serving the Transportation Industry for Over 50 Years
LTL Motor Carriers
• NMFTA represents over 700 LTL Motor Carriers
• Representatives of 4 major LTL Carriers are here today
• Our Goal is to insure that the Industry has some input into Specifications, Tolerances and Regulations for MDMD going forward
15

Appendix C

MDMD Work Group Final Attendee List

April 26 –28, 2016
Reynoldsburg, Ohio

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Report of the Nominating Committee

Jerry Buendel, Committee Chair
Washington

8000 INTRODUCTION

The Nominating Committee (hereinafter referred to as the "Committee") met during the Interim Meeting of the National Conference on Weights and Measures (NCWM), January 8 - 17, 2017, in San Antonio, Texas. At that time, the Committee nominated persons for the various available Board of Director positions for the 102nd NCWM. The following report reflects the decisions of the NCWM membership.

Table A identifies the agenda items by reference key, title of item, page number and the appendices by appendix designations, and Table B reflects the Voting Results.

Table A
Table of Contents

Table B
Voting Results

Reference Key Number	*House of State Representatives*		*House of Delegates*		*Results*
	Yeas	***Nays***	***Yeas***	***Nays***	
To Elect the Slate of Officers as presented in the Report	Voice Vote				Adopted

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Details of All Items
(In order by Reference Key)

8100 NOMINATIONS

(This item was adopted by unanimous vote of the 101st National Conference on Weights and Measures.)

8100-1 VOFFICER NOMINATIONS

Source:
Nominating Committee

Purpose:
Election of NCWM officers

Item Under Consideration:
The following slate of officers was selected by unanimous vote of the Committee:

Chairman-Elect:
Brett Gurney, Utah Department of Agriculture and Food

Treasurer: (3 years pending proposed bylaw change to extend from 1 year)
Raymond Johnson, New Mexico Department of Agriculture

Board of Directors Active Director – Western: (5 years)
Mahesh Albuquerque, Colorado Division of Oil and Public Safety

Background/Discussion:
The Nominating Committee met during the 2017 Interim Meeting at the Hyatt Regency Hotel in San Antonio, Texas, at which time the Committee nominated the persons listed above to be officers of the 103rd National Conference on Weights and Measures. In the selection of nominees from the active and associate membership, consideration was given to professional experience, qualifications of individuals, conference attendance, participation, and other factors considered to be important.

Mr. Jerry Buendel, Washington | Committee Chair
Mr. Stephen Benjamin, North Carolina | Member
Mr. Charles Carroll, Massachusetts | Member
Mr. Kurt Floren, Los Angeles County, California | Member
Mr. John Gaccione, Westchester County, New York, | Member
Mr. Joe Gomez, New Mexico | Member

Nominating Committee

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102nd Annual Meeting Attendees

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