WEIGHTS & MEASURES
CONNECTION
NIST
National Institute of Standards and Technology
U.S. Department of Commerce
Volume 5 Issue 7
December 10, 2014

Inside this Issue

In the Field

Is there a W&M topic that you would like to have appear in the Weights and Measures Connection?

How can we better serve our W&M community?

Do you have a safety tidbit to share?

Do you have a W&M event that you wish to post in the *Connection's* calendar?

Submissions can be sent to the Editor, Linda Crown at Linda.Crown@nist.gov

Office of Weights and Measures

General Inquries: (301) 975-4004; e-mail: owm@nist.gov
Office Chief, Carol Hockert: e-mail: carol.hockert@nist.gov
Newsletter Editor: Linda Crown; (301) 975-3998; e-mail: linda.crown@nist.gov

NCWM Affirms Method of Sale for "Products Sold in Pressurized Containers Using Bag on Valve Technology"

Byline: David Sefcik

Since January of 2011, the National Conference on Weights and Measures (NCWM), along with industry representatives, trade associations, and other stakeholders have been trying to reach a consensus on the method of sale for pressurized containers utilizing "bag on valve (BOV)" technology. Unlike

traditional aerosols in which the product (pay-load) is mixed with gas in the container and expelled simultaneously when dispensed, BOV is designed to separate the product from the gas inside the container so that when the product is dispensed from a barrier package only the product is expelled, while the gas remains in the package and is never mixed with the product.

Aerosols and similar pressurized containers are required to be sold by net weight in accordance with Section 10.3. Aerosols and Similar Pressurized Containers of the Uniform Packaging and Labeling Regulation in NIST Handbook 130, "Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality." This has been the traditional method of sale and firmly established general consumer usage and trade custom with respect to the terms used in expressing a declaration of quantity for over 45 years.

The issue is some pressurized containers using BOV technology are being labeled and sold with quantity statements in terms of volume (fluid ounces). Products using BOV technology versus traditional aerosol products cannot be easily distinguished when placed side by side, creating a challenge when consumers attempt to make value comparisons when the two different methods of sale (i.e., weight and volume) are used.

On January 9, 2014, a meeting was held at the National Institute of Standards and Technology (NIST), in Gaithersburg, Maryland, www.nist.gov/pml/wmd/bov-wrkgrp.cfm to discuss the appropriate method of sale for products sold in pressurized containers using bag on valve (BOV) technology. This was done at the recommendation of the NCWM Laws and Regulations Committee. The meeting was attended by 34 participants including representatives from the Food and Drug Administration (FDA), Federal Trade Commission (FTC), Environmental Protection Agency (EPA), Consumer Product Safety Commission (CPSC), state and county regulatory officials, industry trade associations, and individual companies representing both manufacturers and retailers. The purpose of the meeting was to clearly define the problem, understand current federal and state laws and regulations, and determine if net weight was the appropriate method of sale for BOV containers. At the conclusion of the meeting, there was unanimous agreement that weight should be required as the method of sale for all pressurized containers, regardless of technology. The current requirement (weight as the method of sale) in the NIST Handbook 130 is not intended to take into consideration the various technologies use to fill and dispense pressurized containers.

At the 99th NCWM Annual Conference held in Detroit, Michigan, July 13 - 17, 2014, the NCWM adopted the amended language below to clarify Section 10.3., making it clear that the method of sale applies to aerosols and other self-pressurized containers (including those utilizing BOV technology).

This amended language is effective January 2015, and includes a provision allowing BOV manufacturers who are labeling their BOV containers by volume three years to bring their packaging and labeling into compliance. This will allow manufacturers and retailers to sell existing inventories through 2017.

Training and Events Calendar

2015

Registration for training in the NIST Office of Weights and Measures is handled by Yvonne Branden at yvonne.branden@nist.gov.

Course descriptions can be viewed on the Office of Weights and Measures website at http://www.nist.gov/pml/wmd/calendar.cfm and clicking on the name of the course.

January 18 - 21 (4 days)
National Conference on Weights and Measures Interim Meeting
Daytona Beach, FL
Contact: info@ncwm.net

January 26 - 30 (5 days)
Fundamentals of Metrology
Class No. 5329
NIST/Gaithersburg, MD

February 9 - 13 (5 days)
Fundamentls of Metrology
Class No. 5347
NIST/Gaithersburg, MD

February 12 (2 hr)
Webinar - Conducting an Effective Management Review
2:00 p.m. to 4:00 p.m.
Class No. 5295

February 18 - 19 (2 days)
Handbook 130, Price Verification
Class No. 5350
Salt Lake City, UT

February 24 - 26 (3 days)
Train the Trainer
Class No. 5352
NIST/Gaithersburg, MD

February 26
NTEP Belt-Conveyor Sector Meeting
St. Louis, MO
Contact: info@ncwm.net

February 26 (2 hr)
Webinar - Internal Auditing Best Practices
2:00 p.m. to 4:00 p.m.
Class No. 5296

March 2 - 6 (5 days)
Fundamentos de Metrología
Class No. 5348
NIST/Gaithersburg, MD

(continued pg. 3)

10.3. Aerosols and Other Pre-Pressurized Containers Dispensing Product Under Pressure. – The declaration of quantity on an aerosol and on other pre-pressurized containers dispensing products under pressure shall disclose the net quantity of the commodity (including propellant, where applicable) in terms of weight that will be expelled when the instructions for use as shown on the container are followed.

Note: Enforceable on packages using bag-on-valve (BOV) technology after January 1, 2018.

(Amended 2014)

This amendment supports and further strengthens the requirement that the traditional method of sale for aerosols and other pre-pressurized containers dispensing product under pressure (including those using BOV technology) must be sold by weight.

For more information, contact David Sefcik at david.sefcik@nist.gov, (301) 975-4868. You may also contact Lisa Warfield at lisa.warfield@nist.gov, (301) 975-3308.

Testing Compressed Natural Gas Retail Motor-Fuel Dispensers

Arriving Prepared to Test

Byline: Rick Harshman

As the developing infrastructure for fueling vehicles that use compressed natural gas (CNG) as an engine fuel continues to unfold, some weights and measures jurisdictions are raising questions about the equipment needed to test the retail motor-fuel dispensers (RMFDs) that dispense CNG. The testing of CNG RMFDs necessitates some advance planning to ensure that all of the proper test equipment is available on the day that testing is to take place. There is information that officials can gather beforehand that will allow them to make a preliminary determination of whether or not the equipment made available to them for testing will be adequate and improve the likelihood that a complete test, as outlined in NIST EPO No. 28 Examination Procedure Outline for Compressed Natural Gas (CNG) Retail Motor Fuel Dispensers, can be performed on the date that testing is scheduled. This article identifies the information that needs to be known about the test equipment as well as the RMFD to be tested and explains how this information is used to make this determination.

The NIST Office of Weights and Measures
homepage: http://www.nist.gov/pml/wmd/index.cfm

March 9 - 12 (4 days)
Handbook 133, "Checking the Net Contents of Packaged Goods," Basic
Class No. 5363
Southgate, CA

March 16 - 27 (2 weeks)
Mass Metrology Seminar
Class No. 5333
NIST/Gaithersburg, MD

March 17 - 19 (3 days)
New Administrator Workshop
Class No. 5368
NIST/Gaithersburg

March 19 (2 hr)
Webinar - Contract Review
2:00 p.m. - 4:00 p.m.
Class No. 5343

March 26 (2 hr)
Webinar - Document Control and Record Keeping
2:00 p.m. - 4:00 p.m.
Class No. 5344

April 1 (2 hr)
Webinar - NISTIR 6969, SOP 8, Part 1
2:00 p.m. - 4:00 p.m.
Class No. 5364

April 2 (2 hr)
Webinar - NISTIR 6969, SOP 8, Part 2
2:00 p.m. - 4:00 p.m.
Class No. 5365

April 13 - 17 (5 days)
Handbook 133, "Checking the Net Contents of Packaged Goods," Basic
Class No. 5362
Indianapolis, IN

April 13 - 16 (4 days)
SEMAP**
Class No. 5357
Florida

April 14 - 16 (3 days)
Train the Trainer
Class No. 5353
NIST/Gaithersburg, MD

May 4 - 7 (4 days)
WRAP**
Class No. 5358
Olympia, WA

May 4 - 8 (5 days)
Northeast Weights and Measures Association (NEWMA) Annual Meeting
Saratoga Springs, NY
Contact: James Cassidy,
jcassidy@cambridgema.gov

(continued pg 4)

Note: The word "preliminary" prefaces the word "determination" in the above paragraph for good reason. CNG RMFDs are tested gravimetrically, which requires the use of a suitable reference scale that has been proven to be sufficiently accurate and capable of repeating its indications. The reference scale is tested onsite, immediately prior to being used as a transfer standard in testing the CNG RMFDs. Testing of the reference scale typically takes place outdoors, under existing weather conditions, and in close proximity to where the scale will be used to weigh test drafts of CNG. The results from such onsite testing determine whether or not the scale performs well enough to be used as a standard in testing another device; in this case, a CNG RMFD. For this reason, even when a preliminary determination has been made that the reference scale being made available for testing is adequate (i.e., based on elements of its design), it isn't until the results of testing the reference scale onsite are known that a final determination can be made relative to its adequacy.

Dispenser Information

There are two things that officials need to find out about a CNG RMFD that they are planning to test. The first is the minimum measured quantity (MMQ) marked on the device. The second is how mass units are accessed.

MMQ. NIST Handbook 44, Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices, Section 3.37. Mass Flow Meters Code paragraphs S.5. Markings and N.1. Minimum Measured Quantity requires that the MMQ be specified and marked on the device by the manufacturer.

> **S.5. Markings.** – A measuring system shall be legibly and indelibly marked with the following information:
>
> (a) …
>
> minimum measured quantity; and
>
> (b) …
>
> **N.1. Minimum Measured Quantity.** – The minimum measured quantity shall be specified by the manufacturer.

May 18 - 22 (5 days)
Central Weights and Measures Association (CWMA) Annual Meeting
Columbus, OH
Contact: Sherry Turvey, sherry.turvey@kda.ks.gov

June 1 - 5 (5 days)
HB 133, "Checking the Net Contents of Packaged Goods," Basic
Class No. 5345
Indianapolis, IN

June 1 - 11 (2 weeks)
Advanced Mass Seminar (Rev 2015)
Class No. 5349
NIST/Gaithersburg, MD

July 18 - 21 (4 days)
National Conference on Weights and Measures (NCWM) Annual Meeting
Philadelpha, PA
Contact: info@ncwm.net

July 19 - 23 (5 days)
NCSL International Conference 2015
Metrology and the Quality of Life
Orlando, FL
Information: www.ncsli.org

August 13 (2 hr)
Webinar - Contract Review
2:00 p.m. - 4:00 p.m.
Class No. 5334

August 17 -21 (5 days)
Volume Metrology Seminar
Class No. 5356
NIST/Gaithersburg, MD

August 19 - 20 (2 days)
NTEP Grain Analyzer Sector Meeting
Live Web Meeting
Details unavailable at this time.

(continued pg 5)

NIST Handbook 44, Section 3.37. Mass Flow Meters Code Paragraphs S.5. Markings and N.1. Minimum Measured Quantity

The MMQ provides the critical piece of information needed to determine whether or not the value of the scale division (d) of the reference scale will be small enough for the scale to be used as a standard in testing the RMFD. To be small enough, the value of "d" must be less than or equal to one-tenth the smallest tolerance to be applied to the RMFD under test. The smallest applied tolerance on a CNG RMFD is the tolerance that gets applied to the smallest test draft; which in this case, is a test draft equal to the MMQ. The variables used to determine the maximum allowable division size for the reference scale are expressed in formula (1).

$$\textit{Reference scale division } (d) \leq \textit{smallest test load} \times \textit{tolerance} \div 10 \qquad (1)$$

Rearranging some of the variables in this equation also makes possible a determination of the smallest test load of CNG to be delivered into the test cylinder during testing. Formula (2) establishes the smallest permissible test load or test draft size.

$$\frac{Reference\ scale\ division\ (d)\ x\ 10}{Tolerance\ of\ device\ under\ test} = Smallest\ test\ load \quad (2)$$

Note: *Error weights or an expanded scale resolution feature, providing the scale is equipped with one, may be used to expand the readability of a scale to a value smaller than "d." If readability can be expanded, it is the value to which a scale can be read that should be inserted for the value of the scale division "d" in formulas (1) and (2) shown above. For example, in formula (1), if d = 0.02 lb and the scale can be put into an expanded resolution and read to 0.002 lb, then it is 0.002 lb, rather than 0.02 lb, that is to be less than or equal to one-tenth the smallest applied tolerance.*

In consideration of these two formulas, it is important to be mindful of the relationship between the value of "d" on the reference scale and the minimum test draft size. Increasing the size of the smallest test draft allows for the use of a reference scale with a higher scale division value. Stated differently, as the value of the scale division increases on the reference scale, so must the size of the smallest test draft.

Accessing Mass Units. CNG RMFDs are required to indicate the delivered quantity in either gasoline gallon equivalent (GGE) units or gasoline liter equivalent (GLE) units as specified in Mass Flow Meters code paragraph S.1.3.1.1. Compressed Natural Gas Used as an Engine Fuel. Even though they must indicate in GGE or GLE units, the dispensers are required to display the mass measured for each transaction. The mass value may either be displayed continuously on an external or internal display accessible during the inspection and test of the dispenser, or the mass value may be accessed using controls on the device as specified in paragraph S.1.2. Compressed Natural Gas Dispensers.

> **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" (see definitions).
> (Added 1994)
>
> **S.1.2. Compressed Natural Gas Dispensers.** – Except for fleet sales and other price contract sales, a compressed 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)

Section 3.37. Mass Flow Meters Code Paragraphs S.1.3.1.1. Compressed Natural Gas Used as an Engine Fuel and S.1.2. Compressed Natural Gas Dispensers

It is wise to determine how mass units are accessed in advance of arriving on site for a test so that if special assistance or some separate piece of equipment is needed to access the mass units, these can be made available at time

Information to be posted at:
https://www.ncwm.net/ntep/sectors/grain-analyzer/registration

August 25 - 26 (2 days)
Weighing Sector Meeting
Denver, CO
Information at:
www.ncwm.net/sems/event_detail/2015_weighing

August 27 (2 hr)
Webinar - Document Control and Record Keeping
2:00 p.m. - 4:00 p.m.
Class No. 5335

September 14 - 17
NEMAP**
Class No. 5359
Massachussetts

September 24 (2 hr)
Webinar - State Laboratory Annual Submission Process
Class No. 5355

September 27 - October 1 (5 days)
Western Weights and Measures Association (WWMA)
Boise, ID
Contact: Jerry Buendel,
jbuendel@agr.wa.gov

September 28 - October 1 (4 days)
SWAP**
Class No. 5360
Missouri

October 5 - 7
Central Weights and Measures Association (CWMA) Interim Meeting
St. Charles, MO
Contact: Sherry Turvey,
sherry.turvey@kda.ks.gov

October 5 - 8 (4 days)
MidMAP**
Class No. 5361
Wisconsin

October 19 - 23 (5 days)
HB 133, "Checking the Net Contents of Packaged Goods," Basic
Class No. 5346
Frankfort, KY

October 22 (2 hr)
Webinar - Internal Auditing Best Practices
2:00 p.m. - 4:00 p.m.
Class No. 5339

October 26 - November 6 (2 weeks)
Mass Metrology Seminar
Class No. 5340
NIST/Gaithersburg

(continued pg 6)

of test. Some NTEP Certificates of Conformance (CCs) provide an indication of how mass units can be accessed. If not specified on the CC, the device owner should be able to provide this information.

Test Equipment Information

Given the limited number of CNG refueling stations in some areas of the country, combined with the uncertainty of knowing just how many more might be added in the future, some states are finding it difficult to justify the expense of purchasing the test equipment needed to test CNG RMFDs. As an alternative to purchasing the test equipment, some states are currently opting to require, under the provisions of NIST Handbook 44 paragraph G-UR.4.4. Assistance in Testing Operations, that the owner or operator of the dispensers supplies the specialized test equipment.

> **G-UR.4.4. Assistance in Testing Operations.** – If the design, construction, or location of any device is such as to require a testing procedure involving special equipment or accessories or an abnormal amount of labor, such equipment, accessories, and labor shall be supplied by the owner or operator of the device as required by the weights and measures official.

NIST Handbook 44 paragraph G-UR.4.4. Assistance in Testing Operations

Whether provided by the jurisdiction or the device owner, the following test equipment is needed to perform an official test on a CNG RMFD:

- ***Test cylinder*** – the container (or vessel) that receives the test drafts of CNG that are dispensed during the testing of a CNG RMFD.
- ***Reference scale*** – the scale used to determine the actual weight of the CNG delivered into the test cylinder for each test draft.
- ***Test weights*** - physical standards that meet specifications and tolerances in NIST Handbook 105-series handbook (or other suitable and designated standards) that are used to test and determine the adequacy of the reference scale prior to it being used as a transfer standard in the testing of a CNG RMFD. Test weights of smaller value, known as "error weights" are sometimes needed to reduce rounding errors and expand the readability of a digital electronic reference scale so that it can be read to a value less than its displayed scale division.

Test Cylinder

NIST EPO N0. 28 Examination Procedure Outline (EPO) for Compressed Natural Gas (CNG) Retail Motor Fuel Dispensers provides a list of criteria officials need to verify concerning the test cylinder. The EPO indicates that the following should be considered when selecting a test cylinder:

- rating must be equivalent to or greater than the service pressure* marked on the device under test as required by the ANSI/IAS NGV 4.1/CSA 12.5 "NGV Dispensing Systems," Standard for Natural Gas Vehicle Dispensing Systems;
- compatible fittings that allow for the connection of the dispenser dis-

2016

January 9 - 4
National Conference on Weights and Measures (NCWM) Interim Meeting
San Diego, CA
No information available at this time.

February 11 (2 hr)
Webinar - Conducting an Effective Management Review
2:00 p.m. - 4:00 p.m.
Class No. 5336

March 3 (2 hr)
Webinar - Internal Auditing Best Practices
2:00 p.m. - 4:00 p.m.
Class No. 5337

*Invitation Only
**Limited to State Laboratory Program Participants

Handbooks should have arrived at a mailbox near you.

NIST Handbook 130 (2015), *Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality.*

NIST Handbook 133 (2015), *Checking the Net Contents of Packaged Goods.*

NIST Handbook 44 (2015), *Specifications, Tolerances and Other Technical Requirements for Weighing and Measuring Devices.*

Handbooks have been shipped based on the information provided by the National Conference on Weights and Measures (NCWM). Membership who have requested handbooks should have received them. Those that renewed their memberships early will receive their copies first. If you have any questions, you can contact NCWM at info@ncwm.net.

Also note that these documents are available online **free** of charge at the NIST, Office of Weights and Measures website at:
http://www.nist.gov/pml/wmd/index.cfm
See the links under "Popular Links" in the lower right hand column.

charge nozzle;
- bleed valve;
- pressure gauge;
- drain hose; and
- means for grounding the cylinder prior to connecting to dispensing equipment such as a quick connect ground strap.

***Note:** Service pressure is the settled pressure at a uniform gas temperature of 21 °C (70 °F) and full gas content. It is the pressure for which the equipment has been constructed under normal conditions. This is different from the maximum working pressure.

In addition to verifying that a test cylinder complies with all the criteria listed in the NIST EPO, the capacity of the test cylinder (i.e., the amount of CNG it will contain) is needed to determine whether or not it is of sufficient capacity to be considered suitable for use in testing the particular RMFDs that are planned. In order to be considered suitable, the test cylinder must be able to hold at least three times the value of the minimum measured quantity (MMQ) marked on the dispenser for the following reasons:

- MMQ is an operational rating declared by the manufacturer of the equipment and provides an indication of smallest quantity that can be accurately measured by the device. This rating applies to both use and testing of a device. Thus, it would not be appropriate to dispense an amount less than the MMQ for any tests intended to verify accuracy of the device; nor would it be appropriate for an operator to dispense a quantity less than the MMQ.
- A segment of the overall test to verify accuracy of a CNG RMFD, as outlined in EPO NO. 28, requires the completion of three consecutive test drafts, each equal to one-third test cylinder capacity. The first test draft is dispensed into the empty test cylinder. The second and third test drafts are initiated with product from the previous test draft(s) remaining in the test cylinder. The test cylinder should be full after completion of the third test. Since it would not be appropriate for any test draft to be less than the MMQ, the test cylinder needs to be able to hold at least three times the value of the MMQ to accommodate proper completion of these three consecutive, one-third capacity tests.

Reference Scale

Aside from having to test a reference scale to prove its adequacy prior to using it as a transfer standard, there are four important questions relating to elements of scale design that need to be answered to determine whether or not a reference scale is adequate.

1. Is it intrinsically safe?
2. Is the value of the scale division small enough that rounding errors won't use up too much of the tolerance to be applied to the device under test?
3. Is the capacity large enough to weigh a test cylinder full of product?
4. Does its design accommodate ease of application and proper positioning of the test cylinder during testing?

National Conference on Weights and Measures

2015

Interim Meeting

January 18 - 21, 2015

Daytona Beach, Florida

Registration and lodging information for the January meeting is available online at: https://www.ncwm.net/sems/event_detail/2015_interim_fl.

The meeting schedule and supporting documents are also available at this website location.

Hotel Accommodations:
Group Code: NCWM15
Hilton Daytona Beach Oceanfront Resort
100 North Atlantic Avenue
Daytona Beach, FL 32118
Phone: (386) 947-8016
Fax: (386) 944-1394
or online at:
http://www.hilton.com/en/hi/groups/personalized/DDABDHHF-NCWM15-20150115/index.jhtml

Let Your Voice Be Heard!

Visit the National Fire Protection Association for Valuable Tips on Christmas Safety.

http://www.nfpa.org/categoryList.asp?categoryID=296&URL=Safety%20Information/For%20consumers/Holidays/Christmas%20tree%20fires&cookie%5Ftest=1

Artifical trees should be labeled, certifed, or identified by the manufacturer as fire retardant.

The following provides a discussion of these questions and explains their significance in determining the adequacy of a reference scale.

- ***Intrinsically safe?*** NIST EPO NO. 28 provides the following guidance on intrinsic safety as it relates to a reference scale: scale meets Underwriters Laboratories (UL) Area Classification Class I Division 2 Group D (scale equipment must be located outside of the classified area, which is five feet from the hose fueling connection to the dispenser). It's important to confirm that the reference scale complies with the UL standard specified due to the high flammability of CNG.

- **Is the value of "d" small enough?** As explained earlier in the section of this article titled "The RMFD," the value of "d" is small enough when the scale can be read to a value that is less than or equal to one-tenth the tolerance to be applied to the RMFD. Therefore, to determine if scale resolution is appropriate, one only needs to know the value to which the reference scale can be read; the tolerance to be applied to the RMFD during testing; and the MMQ marked on the dispenser. If the scale is to be setup and used outdoors, it's also a good idea to determine if shielding will be made available to reduce the effect of wind.

- **Is the scale capacity large enough?** The scale selected for use must have a capacity large enough to weigh a test cylinder full of product including the weight of any shims, cart, or other accessory items that will likely be applied to the scale when weighing the test cylinder during testing. Therefore, one must have knowledge of the approximate weight of the empty test cylinder selected for use in testing and also the approximate weight of the CNG that it will contain when full. When added together, the result equals the approximate weight of the test tank full of product. In some cases, the supplier of the test cylinder may be able to provide the approximate weight of the cylinder full of product. If not, he or she should be able to provide the approximate weight of the test cylinder empty and the volume capacity of the test cylinder in GGEs or GLEs. The volume capacity of the test cylinder can be converted into weight by multiplying the volume capacity value by its associated conversion factor (5.660 lb for a volume capacity specified in GGEs and 0.678 kg for a volume capacity specified in GLEs) to determine the capacity of the test cylinder in units of weight. The approximate weight of a test tank full of CNG may then be determined by adding the weight of the empty test cylinder to that of the CNG contained in a full test cylinder.

- **Does its design accommodate ease of loading and proper positioning of the test cylinder?** Determine the approximate weight of the test cylinder in an empty state and when full of CNG to gain a better understanding of the amount of weight to be moved and hoisted onto the scale. Determine the type of scale selected for use and the ease with which the test cylinder can be safely applied to the load receiving element, both when empty and when full of CNG. Confirm that when the test cylinder is positioned on the scale for weighing, the load is distributed evenly over the main load supports of the scale

Weights and Measures in the News

Ahwatukee Foothills News
Check those receipts, save money this holiday season
http://www.ahwatukee.com/holly/article_80014444-74eb-11e4-a9bd-3f1dab93abf3.html

CBS SF Bay Area
Caught on Video: Gas Pump in Castro Valley Keeps Charging Customer After Filling Tank
http://sanfrancisco.cbslocal.com/2014/11/29/caught-on-video-gas-pump-in-castro-valley-keeps-charging-customer-after-filling-tank-overcharged-gas-station-redwood-road-weights-and-measures/

Poway Patch
Shop Smart, Shop Carefully
http://patch.com/california/poway/shop-smart-shop-carefully-0

Springfield News-Leader
Know the facts before buying, or selling, firewood
http://www.news-leader.com/story/news/business/2014/11/29/know-facts-buying-selling-firewood/19673477/

Atlantic Highlands Herald
Monmouth County Checking Fuel Oil Trucks for Accuracy
http://www.ahherald.com/newsbrief/monmouth-news/18871-monmouth-county-checking-fuel-oil-trucks-for-accuracy

AGRI-VIEW
Black Friday: Hit the stores with a plan
http://www.agriview.com/news/regional/black-friday-hit-the-stores-with-a-plan/article_86a6a02c-9c9b-5c0c-b3d1-4a1997d68057.html

and does not produce binding or off-center loading. A preliminary determination of whether or not scale design accommodates ease of loading and proper position of the test cylinders can be made based on a comparison of the type of reference scale used, size test cylinder and its weight when full of product.

Test Weights

Based on a NIST OWM recommendation that reference scales used in the testing of CNG RMFDs be tested to at least the weight of the largest test draft of CNG to be weighed, the weight of the test cylinder full of product must be known to determine the minimum amount of test weight that will be needed to test the reference scale. NIST Class F standards are generally of sufficient accuracy to test a reference scale that will be used to weigh test drafts of CNG dispensed from a RMFD.

Summary: When planning for the test of a CNG RMFD, it is always a good idea to obtain the information necessary to determine whether or not the different test equipment made available for testing will be adequate. This article was developed to assist in identifying the information that is needed and explain how that information is used to make this determination. Verifying in advance that the equipment being supplied is suitable improves the likelihood that testing can be safely completed and with confidence at the time scheduled. For additional information regarding this article, please contact Rick Harshman at richard.harshman@nist.gov or by phone: (301) 975-8107.

U.S. National Working Group on Alternative Test Methods, Field Task Group Activities

Byline: G. Diane Lee

The National Institute of Standards and Technology (NIST), Office of Weights and Measures established the U.S. National Working Group (USNWG) on Alternative Test Methods (ATMs) for Commercial Measuring Devices. The objectives of the USNWG on ATMs are to promote, encourage, and participate in the establishment of a comprehensive set of standards; encourage their widespread use by weights and measures officials and service companies to test commercial measuring devices; and establish proposed alternatives to ensure that the methodologies and standards facilitate measurements that are traceable to International Systems of Units (SI). This work includes an investigation of current methodology and standards (e.g., neck-type volumetic field standards and associated test procedures). At its initial April 2012 meeting, a field task group was established to look at areas in which work is needed to establish the framework for recognizing a given alternative test method for commercial use. At this meeting the field task group identified the areas of work needed to establish this framework:

- uncertainty analysis of test methods used in the field;
- protocols (framework, key issues and questions to be answered);
- legal and acceptance issues (references in laws and regulations and service companies vs. weights and measures regulations); and
- field inspection (Evaluation Procedure Outlines (EPOs), guidelines, training, variables in field implementation).

The field task group began working to identify and quantify uncertainties associated with testing liquid measuring devices by:

- reviewing the key factors that contribute to measurement uncertainty when using hand held test measures, bottom drain provers, and closed loop provers; and
- developing a test protocol for side-by-side testing of retail motor fuel dispensers using test measures, bottom drain provers and closed loop provers.

In May 2013, side-by-side tests were conducted at two different retail motor-fuel stations in Pennsylvania. Three fuel types (regular, premium, and diesel) were tested on a total of 18 positive displacement (PD) meters; including 4 diesel and 14

gasoline meters. A maximum of five fast and two slow flow tests were performed on each meter and product. Prior to testing, NIST technical advisors verified that each standard used for testing had a current calibration certificate.

The analysis of the side-by-side test results was based on a limited number of data points and test conditions and, as such, was not intended for use to draw any final conclusions regarding the suitability of the standards examined or the effects of any factors contributing to uncertainties associated with the use of a given standard. The data associated with the analysis were intended to assist the USNWG in its efforts to determine baseline values for assessing the uncertainties associated with testing using three different types of standards.

After the side-by-side test data was analyzed, NIST, OWM learned that the validity of the calibrations that were performed in another state on the test measure and bottom drain prover could not be confirmed due to traceability issues. Without a valid calibration to provide a correct value and uncertainty for these standards, no determination could be made to how well the methods compared to each other (e.g., the bias between standards could not be determined). However, the field task group was able to review the repeatability for each of the standards separately.

The task group met to review the data. Outliers were observed that revealed possible problems with the repeatability for two of the standards. More data is needed to draw any final conclusions of repeatability problems. It was agreed that more data is needed to review the operation of the standards over wider ranges of temperature, time, and flow in addition to other major factors that contribute to uncertainties of tests using different standards. As such, the ATM field task group identified the major contributing factors to uncertainties associated with the alternative test methods examined:

- repeatability over a range of temperatures and time;
- repeatability over a range of flow rates and time;
- vapor loss;
- effects on test results due to removing the dispenser nozzle for testing; and
- compressibility.

It was also noted during this meeting that existing data is available that may be used to assess the uncertainty of alternative test methods used in the field. Following the meeting, field task group participants provided data that was collected from other studies, along with a summary of challenges and concerns. NIST summarized this information in a matrix and distributed it to the field task group.

The matrix lists the major contributing factors to uncertainties associated with the alternative test methods as noted above in this article and groups the uncertainty data that was submitted with the major contributing factor that it supports. The list is color coded to denote if the data was provided from a source outside the task group, collected as part of the field task group activities, or if specific data is still needed. In addition, the matrix includes (1) who provided the data; (2) challenges to the data; (3) comments; and (4) notations of whether or not uncertainty values are included in the analysis of the data. Due to the number of concerns and challenges to the data, it was determined that additional data are needed to adequately quantify uncertainties for the major contributing factors identified by the field task group.

Volunteers are needed to assist manufacturers in collecting the data needed to complete the uncertainty analysis for testing using different standards. As additional data is collected and pending sufficent resources, NIST will monitor and witness the data collection as resources are available to assist the field task group in its efforts to determine the uncertainties associated with alternative test methods.

The field task group will need to develop guidelines to ensure that the data collected is appropriate and valid for use in determining the uncertainties associated with the different test methods. If you have any questions about this work or the work of the field task group, please contact Diane Lee by e-mail at diane.lee@nist.gov.