

Name of Economy: **United States of America**

Current Developments in U.S. Legal Metrology:

Major issues on the Agenda of the National Conference on Weights and Measures (NCWM) as of November 2015 and related national initiatives of the National Institute of Standards and Technology (NIST).

1. Revisions to the U.S. Taximeters Code

A new USNWG on Taximeters was formed to develop proposals to revise the current Taximeters Code in NIST Handbook 44 (HB 44), “*Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices*.” The purpose of this USNWG is to adequately address emerging technologies used to assess charges based on time and/or distance measurements in taxi applications and to ensure that the prescribed methodologies and standards facilitate measurements that are traceable to the International System of Units (SI).

The main body of the work group will target the completion of updating the existing Taximeters Code so that it will encompass current devices and technologies in use. In addition to this work, a subcommittee was formed to work towards the development of standards and requirements that specifically address the use of Global Positioning System (GPS) applications when they are used commercially to compute fares based upon distance and/or time measurements.

Many of the proposals for changes to the existing Taximeters Code were approved during the July 2015 NCWM Conference in Philadelphia. These changes included:

- A. Re-defining a “point-of-sale” system (as it relates to taximeters);
- B. Addressing the use of “flat” or fixed rates in some jurisdictions;
- C. Requiring that a form of receipt is capable of being produced by the taximeter system for all transactions (non-retroactively) -- and removing the existing optional provision for a recording element;
 - Transactions involving for-hire vehicles may include multiple charges and as a result be somewhat complex. Total charges resulting from taxi services in some jurisdictions can include the fare based on time and distance traveled) as well as extras and other additional charges. Those extras and additional charges may include charges for additional passengers, transportation of luggage, tolls, surcharges, taxes, and possible additional services.

- In many instances the interchange between passenger and the taxi driver is brief and that the passenger may not immediately comprehend fully all the details regarding a transaction. With a potential total cost to the passenger comprised of numerous charges, it is considered important that the customer (passenger) be able to receive a record/receipt (printed or electronic) to ensure that there a record of expenses paid for, and for documentation in cases where the charges may be disputed.
- Recorded Representation. – A printed 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), or permit number, or other identifying information as specified by the statutory authority;
 - (c) start and end time of trip;
 - (d) distance traveled, maximum increment of 0.1 kilometer (0.1 mile);*
 - (e) fare in \$;
 - (f) for multi rate taximeters, each rate at which fare was computed and the associated fare at that rate;
 - (g) additional charges/discounts in \$ (where permitted) such as extras any surcharges, telephone use, telecommunications charges, tip, discounts, credits, and taxes shall be identified and itemized; and
 - (h) total fare charge for service in \$ (total charge inclusive of fare, extras, and all additional charges);
 - (i) trip number, if available; and
 - (j) telephone number (or other contact information) for customer assistance.

Since the major portion of the work involved in updating the existing Taximeters Code has now been accomplished and only a few changes that are needed remain, the emphasis on the standards work involving taximeters has now turned to those services using location services (e.g., GPS) and cellular telephone “apps.”

A meeting of the GPS Subcommittee was held in October 2015 in Sacramento, CA to further this effort. Members of that group considered additional changes to the existing Code to revise any portions that were not applicable to the use of location services with the more traditional-type of taximeters and have tentatively planned to continue this important work through the further development of a new separate Code for these services using GPS and cell-phone apps. Meetings of the GPS Subcommittee will continue on an aggressive schedule with the intent to have a useable standard by 2017.

2. Belt-Conveyor Scales

Recent efforts of US National Working Group (USNWG) on Belt-Conveyor Scales has been towards the further development of proposed changes to the NIST HB44 Belt-Conveyor Scale Systems Code so that it may be more appropriately applied to shorter conveyor systems known as “weigh-belts.” The conclusions from this work group have resulted in the submission of eight specific proposed changes to the HB44 Belt-Conveyor Scale Systems Code for consideration by the NCWM in July 2015.

NIST Handbook 44 Belt-Conveyor Scale Systems Code language that existed prior to 2001 provided an exemption for belt-conveyor scale systems designed and furnished by the manufacturer from requirements that were related to specific details of the installation of belt-conveyor scale systems. In general, weigh-belt systems are designed and built by the manufacturer as a unit and are therefore less likely to be susceptible to malfunctions or operational defects directly caused by a variance from the manufacturer's intended installation specifications. This is in contrast to belt-conveyor scale systems that are typically installed as separate components (conveyor, weighing system, belt loading system, speed sensor, etc.) within an existing conveyor system where the details of the installation for each component may greatly influence the performance of other components in the system.

USNWG members have agreed that it is important not to impose prescriptive requirements that may restrict innovation in the design of this type of device in HB44. Requirements that place limitations on the placement of components in a conveyor system in relation to the weighing device and to other components are viewed as being arbitrary and may be invalid if the design of a system is shown to operate within performance requirements regardless of the configuration of its components.

All eight of the proposed changes that would allow the BCS Systems Code to be applied to "weigh-belt systems" were adopted by the NCWM in their Annual meeting in July 2015.

3. Truck Scales -- Weigh-in-Motion Systems

The US is drafting new requirements for Weigh-in-Motion (WIM) Systems. Some elements of these new requirements are:

- A. Procedures for establishing the reference weights of axle loads, axle-group loads, and total vehicle weight -- and the types of scales considered acceptable for use in establishing such test loads and their acceptable level of accuracy;
- B. Specific requirements applicable to the design, installation, and maintenance of approach and exit aprons of the weigh sensors of a WIM system;
- C. Additional accuracy classes for WIM systems (currently there is one accuracy class specified) capable of achieving greater accuracy levels or at least provide the option of adding higher accuracy classes later.

4. Legal Metrology Issues related to Alternative-Fuel Vehicles

a. Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) Vehicles

With the current situation of an abundant and inexpensive U.S. domestic natural gas supply, the U.S. is significantly increasing its use of natural gas as a vehicle fuel. A natural gas vehicle (NGV) uses compressed natural gas (CNG) or liquefied natural gas (LNG) as a cleaner alternative to other fossil fuels.

For the past several years, the most prevalent NGVs in the US are fleets of mass-transit local busses which are fueled with CNG at a (non-retail) central location for the fleet.

Because of the inexpensive natural gas fuel costs, the owners/operators of many heavy-use engines that traditionally have used diesel fuel (including long-haul trucks and boats) have been buying or converting their engines to run on natural gas, especially LNG. NIST and NCWM are working to establish new requirements and test procedures for the new retail LNG fuel dispensers that will be installed to service these industries.

b. Electrical Vehicles

Electric vehicles run on battery power, replenished through electrical connections. In the U.S., the primary charging locations are residences, businesses, and storage locations for fleet vehicles. There are minimal legal metrology issues in these locations because the electricity has already been metered and billed by the electrical utility. In these locations, with a standard charger, recharging a typical electric vehicle battery from near-total discharge to full charge usually takes 4-8 hours, with most vehicles charging overnight.

The number of public charging sites for electric vehicles has increased dramatically in the U.S. over the past three years. These sites are usually located in city or store parking lots, and at hotels, airports, and various businesses. The installation of “DC Fast-Charging Stations” with high-speed charging capability can allow consumers to recharge a battery on their electric vehicle from 20% to 80% in about 10 minutes.

The legal metrology issues arise on how the public site is attempting to “sell” the electricity to consumers. Many sites favored a “time-of-connection” charge, but that was found to be not very equitable because of the wide range of charging capabilities of the different types of stations/connections. The key for the weights and measures officials was that the transactions involve a measurable finite quantity of energy so that nationally-standardized requirements for the method of sale could be developed.

A U.S. National Working Group was established to develop new legal metrology standards related to electrical vehicle charging. This USNWG held meetings in January and March 2013. In July 2013, the NCWM approved the recommendation of the USNWG and adopted the following method of sale (which was implemented in January 2014):

NCWM Handbook 130, Section 2.34.2. Method of Sale. – All electrical energy offered for sale and/or sold at retail as a vehicle fuel shall be in units in terms of the megajoule (MJ) or kilowatt-hour (kWh). In addition to the fee assessed for the quantity of electrical energy sold, fees may be assessed for other services; such fees may be based on time measurement and/or a fixed fee.

The USNWG is now developing new testing procedures for sites that sell electricity at retail as a vehicle fuel.

c. Development of Hydrogen Fuel Measurement Standards

As part of a national effort to promote alternative fuels for vehicles, NIST established a U.S. National Work Group (USNWG) for the Development of Commercial Hydrogen Measurement Standards in to develop a comprehensive set of legal metrology standards for commercial measurement of hydrogen for vehicle and other refueling applications.

The tentative equipment code applies to hydrogen gas deliveries sold typically through service station dispensers for use as fuel in fuel cell and internal combustion engine vehicles. The approved method of sale stipulates that hydrogen fuel only be sold by the kilogram and that street sign pricing be shown in terms of whole cents (e.g., \$3.49 per kg, not \$3.499 per kg). The tentative code includes device design, accuracy, installation and use requirements, and test procedures. NIST published the tentative code in its 2011 edition of NIST Handbook 44 “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices.”

Hydrogen fuel quality requirements were approved in July 2012 and are found in NIST Handbook 130. These requirements recognize the most recent version of the US Society of Automotive

Engineers (SAE) Standard J2719 “Hydrogen Fuel Quality for Fuel Cell Vehicles” that requires greater than 99.97% hydrogen purity.

This USNWG is currently continuing its work to refine and finalize the test procedures for retail hydrogen fuel dispensers and related equipment.

5. Development of a new ANSI standard for Gas Meters / Harmonization with OIML Recommendations

The American National Standards Institute (ANSI) technical committee B109, responsible for gas metering standards has developed a draft new performance-based standard for gas meters that will cover all new metering technologies. This new standard is based on the final draft of OIML R137 “Gas Meters,” and is being tentatively called “ANSI B109-point-zero.” The organization responsible for this technical committee is the American Gas Association (AGA), and a NIST engineer is leading this effort. Some of these “newer” technologies are not currently covered by a domestic US standard – creating a significant problem for the purchasers of these systems. A single performance-based standard that covers all metering technologies will serve to alleviate this issue.

The United States is also continuing the effort to harmonize its requirements in other areas of legal metrology with those of the International Organization of Legal Metrology (OIML). Because our system splits responsibility between the national government and the state governments, the National Conference on Weights and Measures (NCWM) and National Institute of Standards and Technology (NIST) are working as a team to focus attention on the need to harmonize national and international legal metrology standards.

6. Moisture Allowance

A controversial item was adopted by the NCWM concerning a 3% “moisture allowance” for pasta and noodle products. These products are packaged in paper bags, paperboard cartons, and/or flexible plastic bags with a moisture content of 13 % or less at the time of pack. This new requirement went into effect in January 2014.

Studies indicate that moisture loss for pasta products is reasonably predictable over time. Pasta exhibits consistent moisture loss when handled in a uniform manner. However, moisture loss can vary more than 4 % due to environmental and geographic conditions. Although it eventually reaches equilibrium with the surrounding atmosphere because it is hygroscopic, this balance does not occur until long after packaging and shipping. One potential problem is that manufacturers may possibly attempt to under-fill on purpose to take advantage of the allowance; correct net weight would need to be verified at time of packaging.

In 2015, a new effort was initiated to study additional products that are affected by significant moisture loss issues.

7. Aerosols and Similar Pressurized Containers

There are a number of products in the marketplace bearing quantity statements in terms of fluid measure that utilize the Bag on Valve (BOV) technology. Packages using BOV technology are generally pressurized containers but propellant is not dispensed with the product. Consumers are not able to do price and quantity comparisons between products packaged using BOV technology (which is being typically labeled by volume in the marketplace) and similar product in traditional aerosol

packaging (required to be labeled by net weight) – because the aerosol packaged product includes the propellant in the net weight and the propellant is dispensed with the product.

In July 2014, the National Conference on Weights and Measures (NCWM) unanimously approved a revision to the requirements for these products. The revision supports and further strengthens states position that the method of sale for aerosols and other pre-pressurized containers dispensing product under pressure (including those using BOV technology) **must be sold by weight**. This has been the traditional method of sale in the marketplace for these type products for over 50 years.

Please note that industry who have been mislabeling BOV containers by volume, were granted a 3 year time period (2014-2017) to comply with the labeling requirements.

8. Animal Bedding

Animal Bedding, also called pet or stall bedding, litter or simply bedding, is generally sold by dry volume in compressed or uncompressed packages. Based on numerous failed inspections of packaged animal bedding, the NIST Office of Weights and Measures conducted a study in which compressed and uncompressed packages of animal bedding were measured using a variety of procedures and test equipment. The results from those tests indicated that the current procedures in the 2014 Edition of NIST Handbook 133 “Checking the Net Contents of Packaged Goods,” the dimensional inspection procedure for testing compressed packages (e.g., peat moss); and the volumetric inspection procedure (e.g., mulch); were inadequate for use in testing animal bedding.

Uncompressed volume measurements of animal bedding are dependent on a number of factors, including the size and shape of the measuring container, the method of filling the measuring container, and the means used to break up the bedding prior to measuring. Based on the findings of this study, a draft procedure has been developed for testing the uncompressed volume of animal bedding. NIST OWM also designed and constructed new test measures to be used with the procedure, and then brought these measures to several animal bedding packaging plants for on-site verification of the test methods.

Preliminary findings indicate that the draft procedure provides more consistent measurement results. Further, the study shows that there is no correlation between compressed and uncompressed volumes of animal bedding, leading to the conclusion that the requirement for compressed volume statements on the package label is unnecessary.

NIST has developed proposals that includes recommended changes to the method of sale for Animal Bedding in NIST Handbook 130 “Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality,” a revised test procedure for NIST Handbook 133 relating to the verification of the compressed volume of peat moss (which has been used with animal bedding), new test procedures for measuring the compressed and uncompressed volumes of animal bedding, suggested test equipment and a gravimetric auditing procedure that allows inspectors to avoid destroying all of the packages.

Previously, packaged animal bedding of all kinds, except for baled straw, should have been sold by volume (by the cubic meter, liter, or milliliter and by the cubic yard, cubic foot, or cubic inch). If the commodity was packaged in a compressed state, the quantity declaration should have included both the quantity in the compressed state and the usable quantity that could be recovered.

9. IACET Accreditation for NIST's Office of Weights and Measures

The International Association for Continuing Education and Training (IACET) has awarded the National Institute of Standards and Technology (NIST) Office of Weights and Measures (OWM) an "Authorized Provider" accreditation. IACET Authorized Providers are the only organizations approved to offer IACET Continuing Education Units (CEUs). In order to achieve Authorized Provider accreditation, NIST OWM completed a rigorous application process, including a review by an IACET site visitor, and successfully demonstrated adherence to the ANSI/IACET 1-2007 Standard addressing the design, development, administration and evaluation of its training program. The accreditation period extends for five years and includes courses offered or created that follow OWM procedures during that time.

Many US states require that their weights and measures officials receive training throughout their careers. Using an accredited training organization gives those officials confidence that the training they will receive is of high quality.

The NIST OWM analyzes weights and measures training needs, obtains input from the weights and measures community, designs and delivers training for laboratory metrologists and weights and measures officials, measures the impact and effectiveness of training to ensure ongoing continual improvement, and consults with the weights and measures community to ensure ongoing professional development.

10. Unit Pricing Information

NIST has formed a workgroup that is developing guidelines to improve the accuracy and usability of unit pricing information offered on retail store shelves in the United States. The workgroup includes representatives from industry and trade associations (such as the Food Marketing Institute), weights and measures officials, consumers and consumer groups (such as the National Consumer League and Consumers Reports), and other key stakeholders.

There is not a Federal Government mandate in the U.S. that requires unit pricing. Voluntary use of unit pricing by retailers is highly recommended because of its value to consumers and businesses. Providing clear and unambiguous information about the prices of products offered for sale not only helps to guarantee transparency in the marketplace, but also serves to protect consumers by permitting them to make value and price comparisons and educated purchasing decisions.

In the U.S., there is currently a significant lack of uniformity in the use of unit pricing in the marketplace (from retailer to retailer). There many examples of possible improvements in the design of unit price labels, including:

- Increased Font size and readability (i.e. require a minimum font size and a requirement of the correlation between the size and proportion of retail price and unit price);
- Larger unit price labels on the bottom shelves. This will make information more clear and conspicuous;
- Greater consistency from retailer to retailer on the placement of information on the label to ensure standardization and uniformity;
- A requirement for unit pricing on sale items – considering the requirement for unit pricing on internet, sales ads and other forms of advertising media;
- Extend unit pricing to more product categories, not just food products;
- Greater adoption of the Uniform Unit Pricing Regulation by individual states to ensure retailers meet the minimum recommended national uniform requirements; and
- Recommend greater use of metric unit pricing.

This workgroup has now developed an industry “Best Practices Guide” for unit pricing that is available online for use by anyone interested in improving the presentation and accuracy of unit pricing information.

The guide built upon the existing Uniform Unit Pricing Regulation (UUPR) in NIST Handbook 130, and promotes a more comprehensive, consumer friendly and uniform approach to unit pricing. This new guide, NIST Special Publication 1181 was published in January 2015 (approximately 37 pages with good/bad examples). The workgroup may now also develop recommendations to revise the UUPR which may be submitted to the National Conference on Weights and Measures for consideration.