

**U.S. National Work Group  
for the  
Development of Commercial Hydrogen Measurement Standards  
August 11-13, 2009**

**National Institute of Standards and Technology (NIST)  
100 Bureau Drive, Building 222, Room B263  
Gaithersburg, MD 20899**

**Joint Device Standards Subcommittee (DSS) and Fuel Specifications Subcommittee (FSS)  
In-Person Meeting**

**AGENDA**

**NOTE 1:** Agenda Item (4)(b) Test Procedures scheduled for 1:00 p.m. (EDT) on Wednesday, August 12, 2009, will be a joint meeting of the USNWG and CSA HGV 4.3 Work Group

**NOTE 2:** *ALL OTHER TIMES ARE APPROXIMATE*

**Time:** August 11-13, 2009; 1:00 p.m. - 5:00 p.m. the 11<sup>th</sup>; 8:30 a.m. -5:00 p.m. the 12<sup>th</sup> and 13<sup>th</sup> (EDT)

*This meeting is sponsored by the U.S. Department of Energy and U.S. Department of Commerce's National Institute of Standards and Technology.*

**Purpose:** The U.S. National Work Group (USNWG) is meeting to continue its work to promote the establishment of a comprehensive set of (1) design, accuracy, installation, use, and method of sale requirements, (2) test procedures, and (3) quality standards for hydrogen fuel and equipment used in hydrogen measurements for vehicle and other refueling applications.

**ATTACHMENTS:**

**Appendix A** Draft Summary of the July 2009 USNWG Meeting

**Appendix B** Draft 4.0 of NIST Handbook 44 Hydrogen Gas-Measuring Devices Code

**Appendix C** Weights and Measures Standards Development Process

## AGENDA TOPICS

### 1:00 P.M. (EDT) Tuesday, August 11, 2009

#### **(1) Welcome Current/New Members and Roll Call**

New members of the USNWG and visitors will be welcomed, the meeting is called to order, time for a roll call, and the meeting's purpose reviewed. The collaborative work by the meeting's sponsors will be recognized. New participants will be invited to provide their name, affiliation, and state their specific area of interest in the work to develop hydrogen measurement standards.

#### **(2) Administrative Business**

The USNWG will discuss and decide on procedures for managing and documenting its technical work. The following item(s) will be addressed:

##### **(a) Approve the Summary of the June 2009 USNWG Meeting**

A draft summary of the July 7, 2009 USNWG teleconference/webconference meeting (see Appendix A) was emailed on August 6, 2009 to the group for its review. The USNWG will discuss any modifications to the summary and vote to approve the summary.

##### **(b) Agenda Updates for August 2009**

#### **(3) Opportunity for Reports on Related Activities**

The USNWG is working to harmonize, wherever possible, with related standards to encourage uniformity and to avoid contradictory requirements and trade barriers for U.S. industry. The USNWG Subcommittees will receive updates on work by organizations such as ASTM, CaFCP, DMS, NHA, OIML, SAE and other related activities as their work continues to progress.

#### **(4) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement**

The USNWG will be looked to shortly for updates and recommendations on proposed legal metrology requirements for hydrogen measurement as the weights and measures community begins its 2010 standards development process this September. The USNWG will examine Draft 4.0 of the Hydrogen Gas-Measuring Devices Code (see Appendix B), which will be the basis for commercial equipment test procedures, to determine necessary updates to the requirements and the code's readiness for changes to its status as a Developing Item at the national level.

##### **(a) Draft Hydrogen Code**

###### **(i) Change the Draft Code Title**

NIST WMD recommends the USNWG consider modifying the draft code title to change any reference to "devices" to "systems" to clarify the intent of the code is to address all parts, components, elements of a device or system that are necessary for measurement and metrologically significant. The intent of these changes is to broaden the scope of the code to include methodologies such as pressure-volume-temperature (PVT) systems. The USNWG should consider the following proposed changes to the title of the draft code to read:

#### **Sec. 3.3X. Hydrogen Gas-Measuring Devices Systems**

**(ii) Code Sections Identified for Updates**

A notation was included in the notes section of the draft hydrogen code to revisit paragraph N.2. Test Medium to specify products that could be used in the performance test of hydrogen equipment. The USNWG may wish to update this paragraph or indicate when it anticipates the test medium information might be identified. This information will be necessary to perform valid tests on hydrogen equipment. Currently paragraph N.2. reads:

**N.2. Test Medium. - The device shall be tested with the product commercially measured except that, in a type evaluation examination, hydrogen gas as defined by .....(NOT YET PUBLISHED) may be used.**

**3:00 P.M. – 3:15 P.M. (EDT) Break**

**(iii) Tolerances**

The USNWG will continue its discussions on the appropriateness of the proposed 1.5 % (type evaluation/new systems) and 2.0 % (systems in use) performance tolerances. The USNWG should consider the following principles that are adhered to in the establishment of tolerances:

- Proposed tolerances are practical given the capability of today's hydrogen equipment technology
- Tolerance values are sufficiently small so as not to cause serious injury to either the buyer or seller of hydrogen
- Tolerance values are not so stringent as to make the equipment unreasonably costly, complicated, or delicate
- Tolerances allow for the effects of controllable (maintenance, etc.) and uncontrollable (environment, etc.) factors that affect accuracy under normal operating conditions for hydrogen equipment
- A test method and its associated field standard equipment is available and its accuracy meets the minimum requirement of not exceeding one-third of the smallest applicable tolerance applied to hydrogen equipment under test
- Inaccuracies of the test standard were a consideration in the establishment of the tolerances

The current draft of the hydrogen code includes a notation for keeping the performance tolerances open for discussion as follows:

<b><u>Accuracy Class</u></b>	<b><u>Application or Commodity Being Measured</u></b>	<b><u>Acceptance Tolerance</u></b>	<b><u>Maintenance Tolerance</u></b>
<b><u>2.0</u></b>	<b><u>Hydrogen gas as a motor fuel</u></b>	<b><u>1.5 %</u></b> <b><u>(STAY OPEN FOR DISCUSSION)</u></b>	<b><u>2.0 %</u></b>

**5:00 P.M. (EDT) Meeting Adjourns and Reconvenes on August 12<sup>th</sup>**

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## **8:30 A.M. (EDT) Wednesday, August 12, 2009 Reconvene**

### **Carryover Discussions of Agenda Item (4) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement**

#### **10:00 A.M. – 10:15 A.M. (EDT) Break**

##### **(ii) New Methodologies**

The USNWG will consider a July 2009 proposal to modify the Application Section of the draft code to exempt specific applications such as systems that use PVT methodology. The justification made for proposing this exemption is because no "dynamic" measurements of hydrogen gas were performed by these systems. Draft code paragraph A.1. specifies that the code applies to devices designed to dynamically measure the mass of hydrogen gas.

The USNWG may wish to explore how PVT systems operate and determine if these measurements occur in the sale of hydrogen gas and if the indicated quantities are based only on static measurements. Additionally, the USNWG may wish to determine if there are other methodologies on the rise such as nozzle technology.

#### **11:45 A.M. to 1:00 P.M. Lunch on your own**

#### **1:00 P.M. (EDT) Wednesday, August 12, 2009**

##### **(b) Test Procedures**

CSA HGV 4.3, Hydrogen Test Device Working Group for Temperature Compensation Devices for Hydrogen Dispensing Systems will join in the discussions in an effort to determine if there is a single test standard that can be used to determine if gaseous hydrogen fuel station temperature compensated devices meet safety performance requirements and weights and measures accuracy requirements. The safety requirements are intended to avoid over-pressurization of the vehicle fuel storage tanks under the temperature conditions encountered by these systems.

##### **(i) Tentative Test Procedures**

Also under consideration is identifying a suitable test method(s) and test standards for use to verify the equipment's performance to the proposed tolerances. The USNWG will consider the technology available in the marketplace for similar and competing applications, the examination procedures that already exist, and the last two bullets (availability and accuracy of test equipment) listed above in Agenda Item (4)(a)(iii) in their discussion of this topic.

##### **(ii) Test Method Uncertainty Analysis**

Diane Lee (NIST WMD) will update the USNWG on the uncertainty analysis of data NIST has gathered for the gravimetric and volumetric test methods and will report on the status of the summary of NIST's efforts.

#### **3:00 P.M. – 3:15 P.M. (EDT) Break**

### **Continued Discussion of Agenda Item (4) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement**

#### **5:00 P.M. (EDT) Meeting Adjourns and Reconvenes on August 13<sup>th</sup>**

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## **8:30 A.M. (EDT) Thursday, August 13, 2009 Reconvene**

### **Carryover of Agenda Item (4) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement**

#### **10:00 A.M. – 10:15 A.M. (EDT) Break**

##### **(4)(b)(iii) Decant Test Method**

In December 2008 the USNWG was first introduced to the "decant" test an alternative method for verifying measurement accuracy and possibly obtaining fuel quality samples. The "decant" test represents the fourth method under possible consideration by the USNWG.

The USNWG may wish to explore whether or not this is a practical and affordable test method that is suitable for demonstrating hydrogen refueling equipment performance.

#### **11:45 A.M. to 1:00 P.M. Lunch on your own**

#### **1:00 P.M. (EDT) Thursday, August 13, 2009**

##### **(5) Next Steps/Tasks**

The USNWG will discuss upcoming events and the next steps in the weights and measures standards development process that may affect its work to fully develop hydrogen measurement standards and test procedures. Projects, strategies, and target dates will also be identified to ensure that the USNWG meets its goals.

##### **(a) Upcoming 2010 Weights and Measures Standards Development Process**

The USNWG will discuss the Weights and Measures Standards Development Process (see Appendix C) and the status of the proposals for hydrogen codes developed to address equipment, fuel quality, and method of sale requirements. These proposals remain before the four regional weights and measures associations and will be carried over on the 2010 national agendas. The USNWG may wish to consider either updating the regional and national technical committees on its work or establishing a position with recommendations for changes to the proposed code status at the regional and national levels.

#### **3:00 P.M. – 3:15 P.M. (EDT) Break**

##### **(6) Next Meeting(s)**

The August 2009 meeting is the last meeting of the USNWG for Fiscal Year 09. The goals the USNWG has for 2010 are as follows:

- Field trials of draft test procedures for gaseous hydrogen measuring devices
- Training for test and inspection of gaseous hydrogen measuring devices
- Draft sampling and laboratory procedures for gaseous hydrogen

The USNWG is on track with its goals, but it is now at a critical point in the development of test procedures for hydrogen equipment and fuel quality. The USNWG may wish to establish some intermediate steps and strategies for meeting its 2010 goals.

#### **5:00 P.M. (EDT) Meeting Adjourns – SAFE TRAVELS EVERYONE**