

**U.S. National Work Group Meeting  
for the  
Development of Commercial Hydrogen Measurement Standards**

**August 26-27, 2008**

**Air Products and Chemicals, Inc. (APCI)**

**Allentown, PA**

**AGENDAS**

**Call-In Number:** TBA

**Pass Code:** TBA

*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 equipment used in hydrogen measurements for vehicle and other refueling applications.

**ATTACHMENTS:**

- Appendix A** Summary of the June 2008 USNWG Meeting
- Appendix B** USNWG Guidelines – Final Draft 2
- Appendix C** USNWG Agenda Submission Form
- Appendix D** Draft 3.1 of NIST Handbook 44 Gas Measuring Devices Code
- Appendix E** The Starting Point: A Discussion Paper Describing a Proposed Method of Sale and Quality Specification for Hydrogen Vehicle Fuel
- Appendix F** Comments on Hydrogen Codes-August 2008
- Appendix G** Draft 2.1 of NIST Handbook 130 Uniform Laws and Regulations, Engine Fuel Quality
- Appendix H** USNWG June 2008 Meeting 3 Task List

# AGENDA – DAY 1

## DEVICE STANDARDS AND TEST PROCEDURES SUBCOMMITTEE (DSTPS) MEETING

Tuesday, August 26, 2008, 8:30 a.m. – 5:00 p.m. (ET)

Air Products and Chemicals, Inc., 7201 Hamilton Boulevard, Admin 6  
Allentown, PA

Chair – Kristin Macey (CDFA/DMS)

Technical Advisor – Juana Williams (NIST WMD)

- 8:30 - 8:40 **(1) Welcome and Introductions**  
The DSTPS participants are welcomed in-person and on audio conference, the meeting is called to order, and its purpose reviewed. The collaborative work by the meeting's sponsors will be recognized. Participants will be briefed on the facilities available at APCI, the schedule of events, meeting procedures, and materials. Participants will be invited to provide their name, affiliation, and state their specific area of interest in the work to develop hydrogen measurement standards.
- 8:40 - 9:00 **(2) Administrative Business**  
The DSTPS will discuss and decide on procedures for managing and documenting its technical work. The following items will be addressed:
- (a) Approve the Summary of the June 2008 USNWG Meeting** (see Appendix A).
- (b) Approve the USNWG Guidelines**  
The Technical Advisor modified the June 2008 Draft of the USNWG Guidelines in response to requests from the DSTPS for clarification of the topics: (1) active participation, (2) balloting, (3) teleconference, and (4) quorum (see Appendix B).
- 9:00 - 10:00 **(3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement**  
The DSTPS will have the opportunity to review Draft Version 3.1 of the NIST Handbook 44 Hydrogen Gas Measuring Devices Code (See Appendix D). This latest version of the draft code is the result of work by the DSTPS at its June 2008 meeting. The DSTPS will resume its review of the code at the Test Notes, Tolerances, and User Requirements, where it stopped its June 2008 review due to time constraints.
- The DSTPS identified the following requirements as needing further research and/or discussion to ensure they are appropriate and/or properly address the gaseous hydrogen application. The draft code includes a requirement for a nonresettable totalizer similar to those in other corresponding NIST Handbook 44 Codes that apply to motor-fuel dispenser applications. However, equipment manufacturers questioned where to derive quantity values to achieve agreement between the totalizer and dispenser indications. The DSTPS discussed marking requirements for the “minimum measured quantity,” (MMQ) which are a part of international requirements for all meter technologies and a NIST Handbook 44 requirement for mass flow meter technology. The MMQ is used to determine the limits for other

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requirements in international standards. Consequently, the DSTPS is looking for the best technical approach to include MMQ requirements in the draft code. The design of some refueling systems for pressurization of the hose and high pressure deliveries may affect the control of the flow rate during test. Also in question is whether or not to permit the venting of product from the standard after a test of the refueling equipment in highly industrial areas. The DSTPS will consider the best approach to resolve these concerns.

The DSTPS will consider submitting a request to the 2009 NCWM Specifications and Tolerances Committee to include an item on the Committee's "Developing Items Agenda to make the weights and measures community aware of upcoming proposals to change NIST Handbook 44 requirements to address hydrogen refueling applications.

10:00 - 10:15 Break

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

12:15 - 1:30 Lunch

1:30 - 3:00 **(3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement (Continued)**

3:00 - 3:15 Break

3:15 - 5:00 **(3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement (Continued)**

**Meeting adjourns and reconvenes on August 27, 2008 at 8:30 a.m. (ET)**



## AGENDA – DAY 2

### DEVICE STANDARDS AND TEST PROCEDURES SUBCOMMITTEE MEETING

Wednesday, August 27, 2008, 8:30 a.m. – 2:30 p.m. (ET)

Air Products and Chemicals, Inc., 7201 Hamilton Boulevard, Admin 6

Allentown, PA

Chair – Kristin Macey (CDFA/DMS)

Technical Advisor – Juana Williams (NIST WMD)

8:30 - 11:00 **(3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement (Continued)**

11:00 - 11:15 Break

11:15 - 12:15 **(3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement (Continued)**

12:15 - 1:30 Lunch

1:30 - 2:00 **(3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement (Wrap Up)**

2:00 **(5) Next Steps/Tasks**

The DSTPS will discuss ideas for how the work should progress to develop hydrogen measurement standards and test procedures. Project work and target dates will also be identified.

**(6) Next Meeting**

At the conclusion of the August 26-27 meeting the DSTPS will have a better understanding of the work ahead to develop hydrogen measurement standards and test procedures. Some tasks may be completed by conference calls and email, while others may require an in-person meeting of the DSTPS. One additional meeting is tentatively planned for 2008. It is anticipated that there may be a need to dedicate an entire meeting to one specific standards' related project that is identified by the USNWG. Future meeting locations will be based on logistics and technical tasks that the USNWG must accomplish. The USNWG will make every effort to avoid scheduling conflicts with upcoming events and meetings in the weights and measures and hydrogen communities.

2:15 - 2:30 Break

**DSTPS Meeting Adjourned**



## AGENDA – DAY 2

### FUEL SPECIFICATIONS SUBCOMMITTEE (FSS) MEETING

Wednesday August 27, 2008, 2:30 p.m. – 5 p.m. (ET)

Air Products and Chemicals, Inc., 7201 Hamilton Boulevard, Admin 6  
Allentown, PA

Chair – Bob Boyd (Linde North America, Inc.)

Technical Advisor – Kenneth Butcher (NIST WMD)

**NOTE:** Please review Appendix E "The Starting Point: A Discussion Paper Describing a Proposed Method of Sale and Quality Specification for Hydrogen Vehicle Fuel" which provides a more detailed discussion, analysis, and graphics on the method of sale and fuel quality issues for hydrogen refueling applications.

- 2:30 - 2:40 **(1) Welcome and Introductions**  
The FSS participants are welcomed in-person and on audio conference, the meeting is called to order, and its purpose reviewed. The collaborative work by the meeting's sponsors will be recognized. Participants will be briefed on the facilities available at APCI, the schedule of events, and materials. Participants will be invited to provide their name, affiliation, and state their specific area of interest in the work to develop a hydrogen fuel specification.
- 2:40 - 2:50 **(2) Administrative Business**  
The FSS will discuss and decide on procedures for managing and documenting its technical work. The following items will be addressed:
- (a) Approve the Summary of the June 2008 USNWG Meeting** (see Appendix A)
  - (b) Approve the USNWG Guidelines**  
The Technical Advisor modified the June 2008 Draft of the USNWG Guidelines in response to requests from the DSTPS for clarification of the topics: (1) active participation, (2) balloting, (3) teleconference, and (4) quorum (see Appendix B).
  - (c) Appointment of New Chair Robert "Bob" Boyd**
- 2:50 **(3) Method of Sale for Hydrogen Dispensing Applications**  
The FSS is asked to consider proposals to amend NIST Handbook 130 to recognize hydrogen refueling applications to address (1) the method of sale, (2) define what products fall under this application, (3) sales to the end user should be made on the basis of mass (kilogram) in whole cents, and (4) device labeling for hydrogen dispensers and advertisements. The proposals for Handbook 130 requirements distributed in June 2008 were modified to include proposed new requirements for labeling the dispenser with the product name and NFPA labeling requirements (see Appendix G).
- The FSS was asked to review the discussion paper "The Starting Point: A Discussion Paper Describing a Proposed Method of Sale and Quality Specification for Hydrogen Vehicle Fuel" (see Appendix E) and be prepared to discuss the appropriate units for pressure and other relevant units of measurement. The FSS was asked to consider NIST Special Publication (SP) 330 "The International System of Units (SI)" and NIST SP 811 "Guide for the Use of the International System of Units (SI)" as the source for uniform implementation of SI units.

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The USNWG will consider submitting a request to the 2009 NCWM Laws and Regulations Committees to include an item on the Committee's Developing Items Agenda to make the weights and measures community aware of upcoming proposals to change NIST Handbook 130 requirements to address hydrogen refueling applications.

#### **(4) Engine Fuel Quality**

The FSS will discuss the latest updates on hydrogen fuel quality standards and recent work to measure hydrogen fuel properties. The FSS was asked to consider a proposed fuel specification developed by California's Department of Agriculture. The fuel specification would be a starting point for a proposal to amend NIST Handbook 130. The interim fuel specification and background materials are part of the discussion paper (see Appendix E) under the FSS's review. The FSS was asked to be prepared to discuss the most appropriate reference standards for fuel quality at the August 2008 meeting. The FSS also agreed to discuss alternative resources for determination of fuel quality if state and local agencies are not able to perform this function.

4:30

#### **(5) Laboratory Manual**

The FSS will discuss ongoing work to ensure fuel quality laboratories perform measurements that are traceable to recognized national standards. The FSS will work to promote the establishment of documented laboratory practices and procedures that encompass:

- (a) Test Methods and Reproducibility Limits**
- (b) Equipment (minimum and recommended) Source and Cost**
- (c) Documentation (e.g., Standard Operating Procedures)**
- (d) Handling and Storage of Hydrogen Fuel**
- (e) References and Good Laboratory Practices**
- (f) Minimum Training Standards for Laboratory Personnel**
- (g) Facilities**

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#### **(h) Safety**

#### **(6) Field Sampling Procedures**

The USNWG anticipates there are two separate tests that will need to be performed by weights and measures/fuel quality officials. The first is an accuracy test of the dispenser system and the second is sampling hydrogen for compliance with quality specifications.

The FSS may wish to consider work to establish field sample procedures to provide uniform inspection, sampling, and enforcement procedures to promote the protection of consumers (vehicles) and businesses from economic loss resulting from substandard product and to encourage safe practices by officials conducting inspections. It is recommended that these procedures/guidelines address:

- (a) Equipment/Source/Cost**
- (b) Good Sampling Practice**
- (c) Handling, storage, and transportation**
- (d) Minimum Training Standards for Field Officials**

4:45

#### **(7) Next Steps**

The FSS may wish to consider how future work should progress to establish the appropriate hydrogen fuel quality standards. Project work and target dates will also be identified.

#### **(8) Next Meeting**

At the conclusion of this meeting the FSS will have a better understanding of the work ahead to develop fuel quality sampling and test procedures for hydrogen used to refuel internal combustion engines and fuel cell vehicles. One additional meeting is tentatively planned for 2008. It is anticipated that there may be a need to dedicate an entire meeting to one specific standards' related project that is identified by the USNWG. Future meeting locations will be based on logistics and technical tasks that the USNWG must accomplish. The USNWG will make every effort to avoid scheduling conflicts with upcoming events and meetings in the weights and measures and hydrogen communities.

5:00

**Meetings adjourned**

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### **CONTACTS**

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