

**U.S. National Work Group (USNWG) Meeting
for the
Development of Commercial Hydrogen Measurement Standards
December 2-4, 2008
MicroMotion, Inc.
Boulder, CO**

AGENDAS

Call In Number: 1-888-422-7128
Participant Code: 899122#
Host Code: 664793

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The meetings of the USNWG Subcommittees are 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) Subcommittees are meeting to continue their 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.

NOTE: TECHNOLOGY TOURS - A tour of the NIST Boulder cryogenic flow facility and the ongoing work on thermal conductivity measurement and density metrology will take place from 1:00 p.m. – 2:30 p.m. (MT) on Thursday, December 4th. A second tour will take place at the National Renewable Energy Laboratory and Xcel Energy wind-to-hydrogen (Wind2H2) demonstration project at the National Wind Technology Center in Golden, Colorado from 3:00 p.m. – 4:30 p.m. Thursday, December 4th.

You must be preregistered to participate in the tours. To register please contact Juana Williams at juana.williams@nist.gov.

ATTACHMENTS:

- Appendix A** Summary of the August 2008 USNWG Meeting
- Appendix B** Draft 3.2 of NIST Handbook 44 Gas Measuring Devices Code
- Appendix C** Draft 2.2 of NIST Handbook 130 Uniform Laws and Regulations, Engine Fuel Quality
- Appendix D** Federal Trade Commission (FTC) Guide for Labeling Alternative Fuels

AGENDA – DAY 1

DEVICE STANDARDS SUBCOMMITTEE (DSS) MEETING

Tuesday, December 2, 2008, 8:30 a.m. – 5:00 p.m. (MT)

MicroMotion, Inc., 7070 Winchester Circle

Boulder, CO

Chair – Kristin Macey (CDFA DMS)

Technical Advisor – Juana Williams (NIST WMD)

- 8:30 - 8:40 **(1) Welcome and Introductions**
The DSS participants will be 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 MircoMotion, Inc., 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 DSS 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 August 2008 USNWG Meeting** (see Appendix A).
- (b) Subcommittee Name Change**
As of December 2, 2008 the Device Standards and Test Procedures Subcommittee (DSTPS) will be known as the Device Standards Subcommittee (DSS). This is only a name change and does not change the scope of the work by this subcommittee.
- (c) Approve the USNWG Guidelines**
A draft of the Guidelines incorporating the June comments and associated Agenda Submission Form were distributed to the USNWG August 17, 2008. During the August 26-27, 2008 meeting the USNWG agreed that the Technical Advisor should ballot the USNWG for its approval of the Guidelines and Agenda Submission Form due to time constraints.
- 9:00 - 10:00 **(3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement**
- (a) Test Procedures**
The establishment of proper test methods is key to instilling confidence in commercial measurements in this sector of the hydrogen economy. Consequently, the USNWG recommended that work be carried out simultaneously to develop equipment standards and test procedures.

In August 2008 the DSS agreed to postpone its discussions of the minimum test draft and tank sizes necessary to simulate various fills (e.g., 1/3, 2/3, and 3/3 fill) so that it could harmonize, wherever possible, with SAE guidelines on fill protocol to be published in December 2008. The DSS anticipates an update on the status of work by SAE so that it might move forward in the development of test procedures based on the draft Hydrogen Gas-Measuring Devices Code.

The hydrogen and weights and measures communities provided only a limited response to the USNWG's request for test procedures and types of equipment that are currently in use to verify the performance of hydrogen refueling equipment. The USNWG must now move forward to establish preliminary minimum specifications for standards, suitable laboratory and field test procedures, and guidelines on the uncertainties associated with gravimetric, volumetric, and master meter test methods with existing input from stakeholders. Test procedures and performance data will be discussed at the December 2008 USNWG meeting.

NIST Weights and Measures Division-Legal Metrology Devices Group and Process Measurements Division-Fluid Metrology Group will collaborate to make a preliminary assessment of the uncertainties associated with each test method. A matrix will be drafted outlining the pros and cons of each test method, and will include the next steps for establishing guidelines on test procedures. A draft matrix will be available at the December 2008 USNWG meeting.

(b) Opportunity for Reports on Related Activities

(i) Update on Work at CDFA DMS

(ii) Update on Work at Other Agencies/Organizations

(c) Draft Code

The DSS will have the opportunity to complete its review of Draft Version 3.2 of the NIST Handbook 44 Hydrogen Gas Measuring Devices Code (See Appendix B). This latest version of the draft code is the result of work by the DSS at its August 2008 meeting. The DSS will resume its review of the code at the User Requirements section, where it stopped its August 2008 review due to time constraints. The DSS may wish to revisit an August 2008 recommendation under its consideration to include new definitions for "device" and "assembly" to further clarify where adjustments are permissible.

The DSS is reminded that its proposal will be introduced for the first time before the 2009 NCWM Specifications and Tolerances Committee on the Committee's Developing Items Agenda. This begins the process to make the national weights and measures community aware of upcoming proposals to change NIST Handbook 44 requirements to address hydrogen refueling applications.

10:00 - 10:15 **Break**

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| 10:15 | - | 12:15 | (3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement (Continued) |
| 12:15 | - | 1:30 | Lunch |
| 1:30 | - | 2:45 | (3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement (Continued) |
| 2:45 | - | 3:00 | Break |
| 3:00 | - | 5:00 | (3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement (Continued) |

Meeting adjourns and reconvenes on August 27, 2008 at 9:00 a.m. (MT)

AGENDA – DAY 2

DEVICE STANDARDS SUBCOMMITTEE (DSS) MEETING

Wednesday, December 3, 2008, 9:00 a.m. – 5:00 p.m. (MT)

MicroMotion, Inc., 7070 Winchester Circle

Boulder, CO

Chair – Kristin Macey (CDFA DMS)

Technical Advisor – Juana Williams (NIST WMD)

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| 9:00 | - | 10:30 | Technical tour of the MicroMotion, Inc. facility |
| 10:30 | - | 10:45 | Break |
| 10:45 | - | 12:15 | (3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement (Continued) |
| 12:15 | - | 1:30 | Lunch |
| 1:30 | - | 2:45 | (3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement (Continued) |
| 2:45 | - | 3:00 | Break |
| 3:00 | - | 4:00 | (3) Development of Device Standards and Test Procedures for Commercial Hydrogen Measurement (Wrap Up) |

- 4:00 - 4:30 **(5) Next Steps/Tasks**
The DSS 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.
- 4:30 - 5:00 **(6) Next Meeting**
At the conclusion of the December 2-3 meeting the DSS 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 DSS. The weeks of February 9-13 and 23-27, May 11-15 and 18-22, and August 17-21 and 24-28, 2009 have been identified as tentative dates for upcoming USNWG meetings. It is anticipated that there may be a need to dedicate an entire meeting to one specific device 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 post meeting information and to avoid scheduling conflicts with upcoming events and meetings in the weights and measures and hydrogen communities.
- 5:00 **DSS Meeting Adjourns**

AGENDA – DAY 3

FUEL SPECIFICATIONS SUBCOMMITTEE (FSS) MEETING

Thursday, December 4, 2008, 8:30 a.m. – 12 noon (MT)

MicroMotion, Inc., 7070 Winchester Circle

Boulder, CO

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

Technical Advisor – Lisa Warfield (NIST WMD)

- 8:30 - 8:40 **(1) Welcome and Introductions**
The FSS participants will be 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 MircoMotion, Inc., 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 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 August 2008 USNWG Meeting** (see Appendix A).
- (b) Change in NIST Technical Advisor to the Subcommittee**
Effective October 1, 2008, Lisa Warfield, NIST WMD Laws and Metrics Group assumed responsibility as the NIST Technical Advisor to the Fuel Specifications Subcommittee from Ken Butcher (NIST WMD).
- (c) Approve the USNWG Guidelines**
A draft of the Guidelines incorporating the June comments and associated Agenda Submission Form were distributed to the USNWG August 17, 2008. During the August 26-27, 2008 meeting the USNWG agreed that the Technical Advisor should ballot the USNWG for its approval of the Guidelines and Agenda Submission Form due to time constraints.
- 9:00 - 9:45 **(3) Method of Sale for Hydrogen Dispensing Applications**
The FSS will continue its work to develop appropriate method of sale requirements based on Draft Version 2.2 (see Appendix C) of the Uniform Laws and Regulations. This version includes modifications recommended in August 2008 by the FSS.
- The FSS also has under its review 16 CFR Part 309 "Labeling Requirements for Alternative Fuels and Alternative Fueled Vehicles," (see Appendix D), which includes the FTC requirements for posting the hydrogen fuel rating on dispensers. In this instance a disclosure of the amount of the principal component of a fuel is expressed as a minimum percentage on a label in a

fashion similar to what is now required in octane posting for gasoline pumps. Consequently, the FSS may wish to consider whether or not to note the FTC requirement or to include some guidelines to explain the FTC requirement to field enforcement officials in other sections of NIST Handbook 130.

(a) Opportunity for Reports on Related Activities

(i) Update on Work at CDFA DMS

(ii) Update on Work at Other Agencies/Organizations

9:45 - 10:00 **Break**

10:00 - 10:30 **(4) Engine Fuel Quality**

(a) Opportunity for Reports on Related Activities

10:30 - 10:45 **(5) Laboratory Manual**

(a) Opportunity for Reports on Related Activities

(b) Laboratory Practices and Procedures

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:

(i) Test Methods and Reproducibility Limits

(ii) Equipment (minimum and recommended) Source and Cost

(iii) Documentation (e.g., Standard Operating Procedures)

(iv) Handling and Storage of Hydrogen Fuel

(v) References and Good Laboratory Practices

(vi) Minimum Training Standards for Laboratory Personnel

(vii) Facilities

(viii) Safety

- 10:45 - 11:00 **(6) Field Sampling Procedures**
- The FSS may wish to consider work to establish field sampling 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) Opportunity for Reports on Related Activities**
 - (b) Procedures/Guidelines**
 - (i) Equipment/Source/Cost**
 - (ii) Good Sampling Practice**
 - (iii) Handling, storage, and transportation**
 - (iv) Minimum Training Standards for Field Officials**
- 11:00 - 11:30 **(7) Next Steps/Tasks**
- The FSS may wish to consider how future work should progress to ascertain the appropriate hydrogen fuel quality standards. Project work and target dates will also be identified.
- 11:30 - 12 noon **(8) Next Meeting**
- At the conclusion of the December 4th meeting the FSS 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 FSS. The weeks of February 9-13 and 23-27, May 11-15 and 18-22, and August 17-21 and 24-28, 2009 have been identified as tentative dates for upcoming USNWG meetings. It is anticipated that there may be a need to dedicate an entire meeting to one specific device 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 post meeting information and to avoid scheduling conflicts with upcoming events and meetings in the weights and measures and hydrogen communities.
- 12 noon **FSS Meeting Adjourns**