



Fuel Cell &  
Hydrogen Energy  
Association

**National Hydrogen and Fuel Cell  
Codes and Standards Coordinating Committee  
(NHFCCSCC)**

**Wednesday, December 16, 2015  
TIME: 3:00 – 4:30 pm (Eastern Standard Time)**

**Minutes**

**Attendees**

**Bill Collins  
Bob Davidson  
Brent Harman  
Carl Rivkin  
Chris LaFleur  
Connor Dolan  
Eric Nelson  
Ernst Baumgartner**

**Jay Keller  
Jesse Schneider  
Karen (Hall)  
Quackenbush  
Kelvin Hecht  
Laura Hill  
Marcia Poxson  
Mike Steele**

**Nick Barilo  
Norm Newhouse  
Spencer Quong  
Steven Yip  
Susan Bershad  
Tommy Rockward  
Will James  
Juana Williams**

**I. Welcome and Housekeeping Items**

- Reviewed FCHEA's anti-trust guidelines - Available on FCHEA's members only website and a copy can be provided to you on request.
- Reviewed the meeting agenda.
- Approved the November draft meeting minutes. Will be available on the Safety Report website.

**II. DOE/HQ Update**

**Will James**

Hydrogen Certification Guide Webinar – held last Thursday in conjunction with Hydrogen Safety Panel meeting in Torrance, California. The Safety Panel (managed by Nick Barilo at PNNL) is developing a certification guide to provide background on the 300 terms of listed / approved / certified / labeled equipment and how code officials meet these requirements. The guide discusses the various codes and puts everything into one single document.

130+ individuals participated in the webinar. Roughly  $\frac{3}{4}$  of the attendees were from the local / state level across many states in the U.S.

The document is currently in draft stage and seeking industry comment / feedback. The slides for the webinar are also available online here -

[https://h2tools.org/sites/default/files/Hydrogen\\_Equipment\\_Certification\\_Guide\\_20151210.zip](https://h2tools.org/sites/default/files/Hydrogen_Equipment_Certification_Guide_20151210.zip)

PNNL hopes to have the document published by the end of the Fiscal Year.

Safety Panel Meeting – Nick Barilo – Held a small town hall meeting with a general discussion on safety and hydrogen topics. Well received. Identified a number of gaps and

white paper needs, particularly transportation applications of hydrogen (non-light duty – mobile fuelers, tanks, etc.). Local area folks, Toyota, and a vendor attended.

### III. C&S Events and Fuel Cell Safety Information

[http://www.fuelcellstandards.com/calendar\\_new.html](http://www.fuelcellstandards.com/calendar_new.html)

**Kelvin Hecht**

<http://www.hydrogenandfuelcellsafety.info/meetings.asp>

**Karen Hall**

**Request:** technical resource updates for the Hydrogen and Fuel Cell Safety website. Any committee members who have materials they would like hosted on the website can send them to Karen Hall ([khall@fchea.org](mailto:khall@fchea.org)) or Connor Dolan ([cdolan@fchea.org](mailto:cdolan@fchea.org)).

*\*\*Preliminary dates for quarterly SAE meetings held in Detroit, Michigan – Mike Steele asked to send meeting dates (expected 3<sup>rd</sup> week of February in Tokyo)*

*\*\*2<sup>nd</sup> week of June – DOE AMR meeting.*

*\*\*WG 24 meeting schedule also needed.*

From Mike Steele –

*These are the meeting dates for SAE for 2016.*

<i>March 8 and 9</i>	<i>Location: Honda facilities, Torrance, Ca</i>
<i>June 21 and 22</i>	<i>Location: SAE Headquarters, Troy MI</i>
<i>Sept 13 and 14</i>	<i>Location: SAE Headquarters, Troy MI</i>
<i>Nov 8 and 9</i>	<i>Location: SAE Headquarters, Troy MI</i>

### IV. Global Technical Regulations

**Nha Nguyen**

Will James – Nha just came back from Geneva. We should have some feedback for the next meeting.

### V. Codes and Standards Organization Updates

#### IEC TC 105

**Kelvin Hecht**

There are new activities being considered in TC 105. These are activities being generated by international groups, the U.S. will have to decide whether to participate and what extent.

1<sup>st</sup> activity - *fuel cell systems for electric vehicles with batteries a range extender.* Proposed by the French delegation. Intended to be an aftermarket device to be put on vehicles (example mail delivery truck). Proposing to write a safety standard and a separate document for performance. Generally not been in favor of TC 105 for writing standards for road vehicles.

Bill Collins – Recommend that keep TC 105 off the vehicle and that it stay with TC 22.

Kelvin Hecht – French are proposing this. U.S. will have to take a position. TC 22 is for propulsion of on road vehicles, this is not for propulsion.

Bill Collins – Recollection that TC 22 also covers APUs on vehicles.

2<sup>nd</sup> activity - Energy Storage Systems Using Fuel Cell Modules in Reverse Mode. Proposed by the Italians with input from China and Japan. Would be used in conjunction with the grid. Three standards – one solid oxide fuel cells (SOFCs), one with PEM fuel cells, and third power to power systems performance.

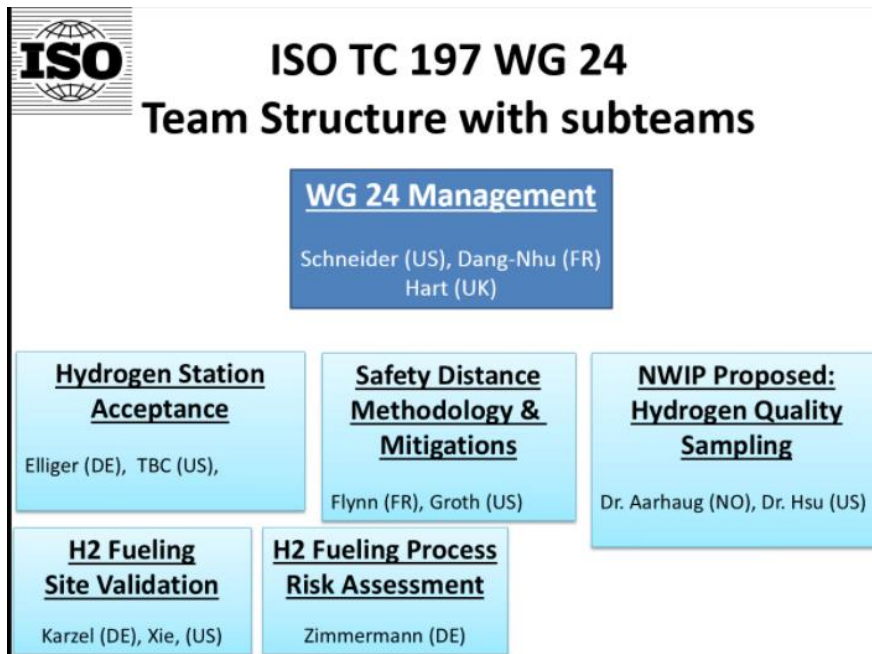
Bill Collins – Already covered in another standard (regenerative fuel cell). Why support this?

Kelvin Hecht – Need to get up to speed and prepared for vote in March of next year. When I have a further description and scope of these documents will share them.

## ISO TC 197

Jill Thompson

Jesse Schneider provided an update on TC 197, showing the new structure of WG 24. TC 197 is considering moving the current 19880-1 TR to a TS designation. Voting at the end of January. TC 197 voted to cancel ISO 20100 TS which is the old TS covering stations



ISO 19880-1 Annex B for fueling validation, CSA 4.3 , and HySut Fueling validation. WG 24 is working to combine these were where it is possible. WG 24 is considering developing a white paper.



## **NFPA 2**

**Martin Gresho / Susan Bershad**

Susan Bershad – the 2016 edition has been issued. Next will be an annual 2018 document / 2019 edition. This is open to public input now. The link is active to submit online. It will close on June 29<sup>th</sup>, 2016. We are tentatively scheduling a first joint draft meeting (NFPA 2 and NFPA 55) in the middle of September 2016.

Karen Hall – Recall hearing that the new NFPA joint task group for multi-fuels is being formed with NFPA 2 and NFPA 30A.

Susan Bershad - NFPA 30A had its first draft meeting a few weeks ago. That group has been set up and the task group is being run by 30A. That should be meeting sometime after the first of the year. There is sufficient representation from NFPA 2 on that task group.

## **ICC**

**Bob Davidson**

The fire code action committees energy storage systems working group will finalize the bulk of its energy storage proposals on Monday on a call, the committee took a vote to move this forward into the IFC in the coming year. One proposal is for language of fuel cells into the energy storage system regulations. Draft is nothing new, exiting language in fire code or reference standards, direct links to NFPA 2 and NFPA 53. This is just a place to have fuel cells included in the energy systems part of the code. There should not be any heart burn over this.

Another small group working on series of code changes to the IFC, tighter code regulation. Clarify the exhaust requirements for repair garages (fire code, mechanical code). Fuel gas committee is hearing for one portion of the regs. ICC gave approval for comprehensive fix, point hydrogen needs to NFPA 2 and match language between codes – resolve conflict.

Defueling of hydrogen for fueling storage containers, method on fueling discharge language will be deleted and replaced with pointers to NFPA 2. The equipment and other information is referenced to NFPA 2, it does not make sense to have any additional requirements.

Hydrogen piping (purging) will not apply to fuel storage piping. California State Marshals Office put out an instructive memo pointing that out.

Toyota suggestion of a concept of motor vehicle repair booth. Right now if one wants to repair vehicles with hydrogen, typically it is pulled into a bay with multiple vehicles. Currently are the hydrogen specific requirements are needed for the entire space. Borrowing for booths for spray printing, a concept of a repair booth where the hydrogen specific requirements would be isolated. That way repair facilities that already exist would be able to install a small repair booth for one single bay, would not affect the requirements of the entire service area.

Requirement for listed gas detection system – UL 64 / UL 2075 are repeated throughout the I codes including in the hydrogen section. This is a problem across the board in the industry. The work group for energy storage systems is proposing to delete that language throughout the code. We want to, at least, get that taken care of under the hydrogen section.

There is a proposal to clarify repair garages for hydrogen fueled vehicles. We need to match the reqs in NFPA 30 A with the I codes.

One of the problems in the IFC in the liquids chapter, specifically article 5 wiring.

Taking a new look at these proposals, with the desire to tighter coordination with NFPA 2, elimination of confusion or different requirements, or the creation of new technology (repair booths) for repairing vehicles.

Marty Gresho and Spencer Quong are working on it. The cycles for NFPA 2 and IFC do not match up. Since IFC is open now, we will get this fixed first then we can move for NFPA 2 also in the future. The IFC committee's goal is that NFPA 2 be the one stop shop for hydrogen which was the motivation for NFPA 2.

Nick Barilo notes that the ICC / IFC references fueling and repair garages. For other applications it defaults to NFPA 55 for hydrogen.

Bob Davidson – Working on a change for all chapters to reference NFPA 2 throughout. There is plenty of time to include this in the mix.

## **CSA**

**Sara Marxen**

Brent Hartman – Updates on 3 documents in development. HGV 4.3 test methods for hydrogen fueling evaluation made it through industry review. There are just a few task groups to work on realignment. We anticipate publication in March.

HGV 4.9 – industry review comments are in on that one, the work schedule ramping up. We anticipate the document to be published in March as well.

HPIT 2 – hydrogen dispensers for industrial trucks. Internal review is occurring now; final comments are being reviewed with the chair. We expect one more meeting in January. Then it will be sent to the Auto TC for ballot. We also anticipate publication in March.

Jesse Schneider – CSA 4.3 is a good document, it has been vetted for a number of years. Jesse notes that 4.9 may benefit from harmonization with ISO. CSA has provided a lot of seed documents for ISO, so leveraging the ISO work which started with CSA seed documents will help harmonize the language. The 19880-1 has had a lot of industry vetting, could benefit from reverse sharing.

## **SAE**

**Mike Steele / Tim McGuire**

Mike Steele – The next SAE meetings are scheduled for March, the 2016 schedule will be set then. The March meetings will be in Torrance (at Honda). The rest of the meetings are in June, September, and November.

## **ASTM**

**Tommy Rockward**

Recently held in Austin was the annual ASTM meeting. 76 and 75 test methods for hydrocarbon in hydrogen published. IOSs – cavity rings – did not have enough laboratories originally, now have 6 identified. Have to work on physics with national lab in the UK.

JP working on an item for determining hydrogen weight. Pulled due to resolutions that have gone unresolved. Agreed to remove that work item and work on before resubmitting.

Mark Baucus from Toyota – recently involved in ASTM efforts. Mark and I came up with a spreadsheet, identifies currently test methods that exist and their detectable constituents. Identifies inter-laboratory participants and where they are at. This will allow other labs to view and identify where they can participate or would like to participate in those inter-laboratory studies.

A workshop in their next annual meeting in June will highlight capabilities for inline or in parallel detection for contaminants in hydrogen fuel.

Bill Collins – status on the document for hydrogenated components?

Tommy Rockward – 07650 – have one published for hydrocarbons, other was pulled for extension.

Bill Collins – document feeding into 2719? Yes.

**Action:** Tommy Rockward will share the spreadsheet with Karen Quackenbush for distribution. Some standards also require review and Tommy can share that as well for industrial input to accelerate the process.

## **ASME**

**John Grimes**

Bill Collins - No activity on B3112- next meeting is in March.

## **VI. Discussion Topics**

### **Facilitating Deployment**

**Carl Rivkin**

We are working on programs for training to support hydrogen technicians who will be working on hydrogen stations and other infrastructure projects. A week and a half ago, we had a chance to meet with Rio Hondo Community College in California, how is working on a curriculum for hydrogen technicians. We offered to develop materials for the curriculum. Status of the project now is that it is on to the California state legislator for approval needed to make it a degree program. We should now in next few weeks. If it is, this is likely will be supported by the national labs.

Bill Collins – Brought up years ago, at the time industry did not want requirements for mechanics to have a certification program.

Karen Hall – as it stands technicians do not have specific training programs, they are needed. We understand do not want requirements, but training is important.

Carl Rivkin – This program is not just on hydrogen infrastructure, much of the curriculum would also include the vehicle as well.

## **H<sub>2</sub>USA Activities**

**Karen Hall**

A number of activities within the joint regulations, codes, and standards task force. Implementation at the state and regional level is the focus. Model codes are there, this group is interested in identifying where state or regional codes are outdated and hence they may not be referencing the latest version of NFPA 2. We found that not just fire code is of interest, sometimes there are restrictions or prohibitions on other requirements (bridges and tunnels, etc.). We hear some questions and concerns being raised. The task force is developing a number of technically validated white papers / outreach materials for stakeholders working in these regions.

Jay Keller – When dealing with folks not in the pro-hydrogen community, we need to ensure that our language is correct and consistent. We need to be technically defensible, without being inflammatory.

## **H2FIRST**

**NREL/SNL**

Will James – The HySTEP device finished its testing at NREL a few weeks ago. It was shipped to CSULA station. Today it held its first demonstration at the station. It will start the first California state testing and it will be transferred more to the state. The goal is to test one more station before an official transfer to the state occurs. Initial feedback received is that the device is robust. Tested in very cold temperatures in Colorado and it operated very well.

## **Regulatory Matrix Review and Comment**

**Karen Quackenbush**

Latest version developed on November 30th, available online at <http://www.fchea.org/s/FCHEA-Regulatory-Matrix-markup-30-November-2015.pdf>.

Comments can be submitted to Karen Quackenbush at [khall@fchea.org](mailto:khall@fchea.org).

## **VII. Permitting and Installation of Hydrogen Fueling Stations**

### **Ca Station Implementation**

**Jennifer Hamilton**

No update at this time.

### **Ca DMS Fuel Quality / Metrology**

**Kevin Schnepf**

No update at this time.

### **Fueling Compliance**

**Sara Marxen / Jesse Schneider**

Jesse Schneider – On the 18<sup>th</sup> of April, there will be a fueling validation workshop held at the California state offices in Sacramento. Mainly from the ISO WG 24, but also other entities will be there as well.



*(1) U.S. Weights and Measures Standards Development Process*

**Commercial Devices**

The 101<sup>st</sup> National Conference on Weights and Measures (NCWM) Interim Meeting<sup>1</sup> will be held January 10-13, 2016 in San Diego, CA. Two proposals to modify NIST Handbook 44 Section 3.39 Hydrogen Gas-Measuring Devices-Tentative Code are being considered by the NCWM Specifications and Tolerances (S&T) Committee<sup>2</sup>. S&T Item 339-1 is a proposal to align all measuring devices' codes to recognize that required information on sealable metrological parameters *may* also be made available in an electronic format on Category 3 devices. S&T Item 339-2 is a proposal to temporarily widen the accuracy tolerances to include three new accuracy classes. The California Division of Measurement Standards, developer of the proposal, indicated it will make test data available at the January 2016 NCWM Interim Meeting. It is likely that the USNWG will meet in March 2016 to discuss the outcome of proposals moving forward for further development, to gather more information, or elevated to a status for a July 2016 NCWM vote.

<sup>1</sup>NCWM Interim Meeting  
January 10-13, 2016  
San Diego, CA

[http://www.ncwm.net/sems/event\\_detail/2016-interim-meeting](http://www.ncwm.net/sems/event_detail/2016-interim-meeting)

<sup>2</sup>2016 NCWM S&T Committee Chairman Mahesh Albuquerque  
Director Division of Oil and Public Safety  
633 17th Street, Suite 500  
Denver, CO 80202-3610  
Email: [mahesh.albuquerque@state.co.us](mailto:mahesh.albuquerque@state.co.us)  
Telephone: 303-318-8502

*(2) International Hydrogen Device Standards*

**OIML R 139 “Compressed gaseous fuel measuring systems for vehicles”<sup>3</sup>**

International Organization of Legal Metrology (OIML) Recommendation (R) 139, Part 1: *Metrological and technical requirements* (2014), Part 2: *Metrological controls and performance tests* (2014), and Part 3: *Report format for type evaluation* (2015) are available on the OIML website at: <http://www.oiml.org/en/publications/recommendations>

<sup>3</sup> “measuring systems that are covered by this Recommendation are intended for the refueling of motor vehicles, small boats, and aircraft with compressed natural gas, hydrogen, biogas, gas blends or other compressed gaseous fuels. They may also be applicable to other vehicles, for instance trains.”

**OIML R 81 “Dynamic measuring devices and systems for cryogenic liquids” (1998)**

NIST OWM (Secretariat for OIML R 81) is compiling comments from TC 8/SC 6 on the first working drafts of Part 1 and Part 2. These comments will be incorporated, where possible, into a first committee draft being readied for distribution and review in January 2016. This draft model regulation includes the metrological and technical requirements and metrological controls and performance tests that apply to measuring devices and systems used for the

dynamic measurement of cryogenic liquids in stationary, vehicle mounted, and vehicle refueling applications.

Please contact Juana Williams by email at: [juana.williams@nist.gov](mailto:juana.williams@nist.gov), if you have questions or wish to discuss national or international hydrogen gas device standards.

The NCWM is always interested in input from anyone who has a stake in these requirements. California has already started to type evaluate equipment for these programs. Input on the performance, testing being performed, errors or uncertainties, is always useful to help the weights and measures community make a decision.

Juana can send copies of the proposals. Please send any comments or input to Chairman Mahesh Albuquerque by January.

The next cycle timeframe starts at the conclusion of their annual meeting. Then the fall regional weights and measures meetings, as well as the technical committee meetings will take place in August up through October. Those feed into the national agenda.

The cycle is basically end of July up through July of the following year. Any proposal, unless it is an emergency item, should have already been set forward to the national level by November 1<sup>st</sup>. Proposals that will be designated for voting status in July 2016 will be decided on by the technical committee(s) in January 2016.

It is likely the January 2016 NCWM Interim Meeting, will probably result in a meeting of the U.S. National Work Group (<http://www.nist.gov/pml/wmd/lmdg/hydrogen.cfm>) to discuss the meeting outcome.

### **VIII. Open Discussion & Other Issues**

Next meeting to be held on Wednesday, February 3<sup>rd</sup>, 2016 at 3:00 PM Eastern.