

National Hydrogen and Fuel Cells Codes & Standards Coordinating Committee In-Person Meeting

March 15th, 2006, at 3:00 P.M. Pacific Standard Time in conjunction with the NHA Annual Conference in Long Beach, CA

Karen Hall, National Hydrogen Association

MEETING MINUTES (31 March 06, with Corrections)

PARTICIPANTS

Coordinating Committee members who participated in the meeting are shown in [Attachment II](#). Other persons that participated are shown in [Attachment III](#).

1. USFCC members were reminded to review and follow the anti-trust guidelines:

[Antitrust Guidelines](#) (27Kb PDF)

and

[Memo on Antitrust Guidelines](#) (24Kb PDF)

2. Reviewed and approved the agenda.

3. Welcome/Opening Remarks were provided by Russ Hewett at NREL. Due to the later than usual time of this meeting, DOE Program manager Pat Davis was unable to participate.

4. Reviewed and approved the previous minutes.

5. Karen Hall welcomed participants on behalf of the NHA. She reported the NHA's Annual Conference and Hydrogen Expo has been successful so far, full of plenaries, breakout sessions, business meetings, and networking opportunities. There were over 1100 attendees plus 400 attending public day. The NHA is honored to host this In-Person meeting of the National Hydrogen and Fuel Cell Codes & Standards Coordinating Committee.

6. Sondra Ullman welcomed everyone on behalf of the USFCC.

7. Opportunity for DOE/HQ Representative to Provide Latest Information on Activities in and FY07 Funding for the Safety, Codes and Standards Subprogram

As no HQ representative was able to participate in the meeting, Russ Hewett announced that the due date for responses to the DOE Codes & Standards Solicitation had been extended until March 31.

8. Discussion Regarding the National Codes and Standards Development Templates

Jim Ohi lead the discussion regarding what changes, if any, should be made to the National Templates, given where we are today:

- o What are the purposes of the Templates?
- o Target audiences for the templates
- o Changes with respect to lead organizations?
- o What about use of the Templates as a "Periodic Review" Tool to help the committee gauge what the focus ought to be on?

[National Templates](#) (143Kb PowerPoint document)

[Jim Ohi's presentation](#) (623Kb PowerPoint document)

The Templates have served to establish good working relationships. They may be historical documents now. The participants discussed the value of the documents, suggested changes, and how best to use the documents going forward.

Discussion items were as follows:

The group agreed to clarify responsibility for some elements of standard development on the Template for Vehicle Systems and Refueling Facilities:

(1) Under Vehicles, the "container" line item will be replaced by two separate line items:

Storage system and container -- SAE

Storage system components -- CSA

Components would include regulators, PRDs and valves. These are areas where CSA has developed specific expertise. CSA will work with SAE so that CSA standards that specify requirements for components expected to be safety critical elements of the vehicle storage systems complement requirements developed by SAE for overall systems and for containers.

(2) The group recognized the need to add a line under Interface Fuel Specs for test methods and to show ASTM as lead SDO for this function.

(3) The question was raised about whether leak detection should be included in other areas of the templates, such as refueling stations, on-board vehicles, etc. It was recognized that leak detection could occur through many methods (not just sensors) and requirements for mobile applications would likely differ considerably from stationary facilities.

(4) Portable - no conclusion was reached on whether a separate SDO responsibility needed to be identified for micro fuel cells.

(5) Discussion of NFPA 853 was informative; no change in the current template was recommended.

Karen Hall discussed the need to review the progress in each area as things have progressed since the templates were agreed to. Some national efforts are complete, some dynamics have changed and some international efforts are moving forward.

Bill Collins suggested we send template out at least two weeks before next in-person meeting so we can discuss and harmonize comments received at the meeting.

9. Patrick Serfass and Carl Rivkin Reported on the First Two Meetings of the New Hydrogen Industry Panel on Codes (HIPOC)

A Hydrogen Industry Panel on Codes (HIPOC) has been created with the goal to extend, and to the best extent practicable, harmonize hydrogen code and standard development activities within the ICC and NFPA such that the proper codes and standards are in place (and stay in place) through the conclusion of the 2007/08 ICC Code Development Cycle (2009 Editions) and the conclusion of the 2009 NFPA Codes & Standards Process. This will coincide with the goal of the U.S. Department of Energy (DOE) to have the appropriate codes and standards in place by 2010 to be able to move to a commercialization decision by 2015.

HIPOC has held two web-based teleconference meetings. The first was mainly to become familiar with the web-based conference facility, which allows the group to share documents online for discussion and modification.

The second meeting was held to review the draft Charter (attached below) and discuss any proposed changes for this current round of the I-Codes. Participants were encouraged to send in any issues they may

have regarding needs for revisions to the I-codes, and issues that require harmonization between NFPA and the ICC codes. Comments received for the March 21 call could be considered for the March 24 deadline for ICC code modification proposals. Tom Joseph, who chaired this call, explained that there would be additional opportunities to make changes, including the NFPA cycle and the next ICC cycle.

[Hydrogen Industry Panel on Codes Statement of Charter, Purpose & Objectives](#) (1,327Kb PDF)

(10) Carl Rivkin Reported on Meeting of the NFPA Hydrogen Consulting Group and Status of NFPA 2

[Carl Rivkin's presentation](#) (57Kb PowerPoint document)

Carl described the current status of the NFPA's formation of a new Technical Committee for Hydrogen. When all hydrogen requirements are put into a single code, gaps will become more apparent. The new TC will be responsible for filling the gaps. The existing TCs will still have responsibility for maintaining the requirements in their code or standard. The new TC is not just a correlating committee, as originally conceived, but a full TC with authority to develop original text as they see fit. The NFPA Standards Council meets next week. They will appoint a chairperson at that meeting. The process to populate the committee with applicants can then begin. The Chairperson will make recommendations regarding membership as input for the July meeting of the Standards Council. The TC has to meet the distribution requirements.

Carl expects that there will be a functioning TC by the end of the calendar year. Anyone interested is encouraged to submit an application. Even if applicants are not appointed to serve on the TC initially, there could be subsequent opportunities to be appointed to fill vacancies. The Committee's new document is likely to be issued in 2009/2010. Hydrogen requirements will remain in the original NFPA documents as well.

(11) Kelvin Hecht's Report on IEC/TC105 Activities and Documents in the "Comments" Stage

Kelvin's report was disseminated by e-mail as an attachment to the agenda.

Standards meeting in March 2006:

- o IEC TC105 WG#3 Stationary Fuel Cells-Safety
" 3/6-7 San Francisco, CA

- o SAE Fuel Cells Standards Troy, MI
" 3/7-8 Working Groups
" 3/9 Fuel Cell Standards Committee

- o IEC TC105 WG#5 Stationary Fuel Cells-Installation
" 3/8-9 San Francisco, CA

- o IEC TC105 WG#7 Portable Fuel Cells-Safety
" 3/9-10 San Francisco, CA

Standards meetings held in February 2006

- o ISO TC197 WG#12 Hydrogen Fuel Specification
" 2/23-24 San Francisco, CA

Working Groups 3, 5 and 7 held meeting last week in San Francisco and are making great progress. They are responding to comments on their draft documents from international community. There will be IEC/TC105 plenary October 19 20, 2006 in Tokyo.

Kevin chairs WG1 of IEC/TC105 whose scope is providing definitions of terms in IEC/TC105 documents. The working group's scope has been expanded to include development of an international glossary of fuel cell terminology.

IEC/TC105 is asking for comments on a proposed EUROPEAN standard for residential-sized fuel cell power

plants. The current document does not have many specific fuel cell requirements. Requirements are needed to meet European directives and it would be of value to US fuel cell manufacturers to review the document. Comments are due to the TAG by the end of March.

(12) Bob Mauro's Report on ISO/TC197 Activities and Documents in the "Comments" Stage

Bob Mauro submitted the report as attached below. Because of a scheduled medical procedure, Bob was unable to participate in the meeting.

[Bob Mauro's report](#) (73Kb PDF)

Karen Hall provided a report of the inaugural meeting of ISO TC/197 WG 13. It was published in the Hydrogen and Fuel Cell Safety Report and is available here:

[Karen Hall's report](#) (57Kb PDF)

Ned Stetson gave a report (via teleconferencing) on the document ISO 16111 being drafted by ISO/TC197 WG10 (Transportable Gas Storage Devices - Hydrogen Absorbed in Reversible Metal Hydride). The official name for ISO 16111 is *Transportable Gas Storage Devices - Hydrogen Absorbed in Reversible Metal Hydride*.

He reported that the document is being circulated as a committee draft, on the path to becoming a Draft International Standard. In parallel, the draft document went through the ISO/TC197 Editing Committee for revision as a Technical Specification and is being circulated for the three-month voting process. WG10 hopes that the voting can be completed and the document approved as a Technical Specification by June 2006.

Jim Ohi gave an update on ISO/TC197 WG12 (Hydrogen Fuel - Product Specification) activities. His report is available here:

[Jim Ohi's report](#) (76Kb PDF)

Jim reported that the final draft of the Technical Specification for hydrogen fuel quality for PEM fuel cell road vehicles has been completed and submitted to TC197 for balloting and approval. It is available here:

[Hydrogen Fuel Product Specification](#) (225Kb PDF)

(13) Report on Activities of the National Highway Transportation Safety Administration (NHTSA) and Global Technical Regulations (GTR)

Nha Nguyen and Barbara Hennessey gave a brief, oral report on NHTSA activities and what's going on regarding WP.29. The United States, Germany and Japan are collaboratively developing a roadmap for the GTR to be presented to WP.29. Plans call for the roadmap to be completed by June for submission to WP.29 at its June meeting. Automobile OEMs have been involved in sharing their needs in the development of the roadmap. NHTSA has also generated a research plan. However, no research has been conducted as of yet -- funding has only just become available. The messages to be conveyed in the roadmap are: (i) the United States, Germany and Japan want the GTR for hydrogen fuel cell vehicles to be at the whole vehicle level; and (ii) they want the requirements to be performance-based.

They reported that Battelle has developed plans to do FMEA (i.e., Failure Modes and Effects Analysis) work on vehicles with compressed hydrogen storage. Also, the following been done:

- o Development of a post-crash test procedures for hydrogen fuel cell vehicles
- o Development of post-crash electrical isolation test procedure

Destructive integrity tests on fuel systems and fuel storage containers are to be done.

NHTSA will conduct comparative assessments of performance based codes, standards, and regulations --

looking for gaps and inconsistencies. Stakeholder industries are welcome to participate in meetings to develop the GTR. NHTSA is considering accepting the invitation to co-chair the GTR Working Group.

(14) Opportunity for CDOs and SDOs to Report on Their Activities - Focusing on Hydrogen and/or Fuel Cell Vehicle-Level Safety Standards

ASME reported on their activities. Their report is [Attachment A](#) to the Minutes.

(15) Chris Moen Reported on the Teleconference Meeting of the "Materials for the Hydrogen Economy" Coordinating Group.

His presentation is available here:

[Chris Moen's presentation](#) (108Kb PowerPoint document)

The recommendation was made to factor in the appropriate impurities from the SAE document into the testing program. Some impurities in the hydrogen fuel may be as detrimental to some materials as to the hydrogen.

(16) Reports on Other International Activities

Karen Hall reviewed a presentation from the FCTESTNET website:

<http://www.jrc.nl/fctestnet/Workshop%20Ulm/FCTESQA%20%20presentation%20Ulm%2022%20October%2004.ppt>

Additional information can be found at www.jrc.nl/fctestnet. The presentation, made by the European Commission Joint Research Centre, is also attached here.

[Fuel Cell Testing, Safety and Quality Assurance](#) (645Kb PowerPoint document)

Concerns were raised that the activity may have antitrust issues, since the project is trying to standardize test methods, which would likely result in a single design. Although the project is aware of the test protocol developed by the USFCC, there may be issues in using it due to copyrighting.

Time was made available in the meeting to address whether or not codes and standards development priorities should be re-examined. No issues were raised other than the need to assess where the items on the National Templates stand.

(18) Opportunity for FY06 "Retrospective Self Analysis"

Time was made available in the meeting to address the question, "Are we conducting the meetings the right way and addressing the appropriate topics"?

Karen Hall reiterated value in looking at progress of activities on the National Templates to be able to focus on activities that need attention. Sondra Ullman said it would be helpful to understand the projected timeline of the activities on the templates.

Bill Collins offered to lift info from the USFCC appendix from its Transportation Working Group that shows what activities are moving, using bold, color, italics, etc, to help the group focus.

(19) Prospects for Next In-Person Meeting

While the Coordinating Committee meets monthly - by means of teleconference meetings - it attempts to have In-Persons meetings once each calendar quarter. Such meetings are held in conjunction with events that Committee members are likely to be attending anyway.

There was discussion regarding prospects for the next In-Person meeting. Possibilities identified included:

- o NFPA Annual Conference in Orlando (June)
- o ICC Conference and Code Development Hearings in Orlando (September)

No decision was made. It was agreed that NREL, DOE, USFCC and NHA would have the "action item" to develop options for the Committee to consider.

(20) Next Monthly Teleconference Meeting

The next meeting of the Coordinating Committee will be an April teleconference meeting:

- o DATE: April 5th (First Wednesday)
- o TIME: 3:00 - 4:30 PM Eastern Daylight Time

The Call-In number and the agenda will be disseminated no later than Monday, April 3rd.

ATTACHMENT A: MARCH 2006 REPORT ON ASME ACTIVITIES

John Koehr
ASME
Three Park Avenue, 20N3
New York, NY 10016-5990

The ASME B31.12 Project Team on Hydrogen Piping and Pipelines met January 31st - February 1st in Tampa, FL. The project team is made up of volunteer subject matter experts from industry, government, and other standards development organizations. Draft sections of the new B31.12 Code are under development and were reviewed during the meeting. The project team is considering piping systems operating at pressures up to 15,000 psi and pipelines operating at pressures up to 3,000 psi. The B31.12 Code will be divided into four parts:

1. A common section containing requirements and data referenced by the relevant code sections below,
2. Part A: Industrial piping systems,
3. Part B: Pipeline and distribution systems and
4. Part C: Commercial and residential systems.

The complete draft B31.12 Code is expected to be forwarded to the B31 Standards Committee for review by September 2006, with B31 Standards Committee ballot expected by the end of 2006.

The ASME Boiler and Pressure Vessel Code (BPVC) Project Team on Hydrogen Tanks met on February 15, 2006 in Portland, Oregon as part of the quarterly Boiler Code Week meetings. The project team is developing new rules for stationary, transportable, and portable tanks in hydrogen service at pressures up to 15,000 psi. The scope includes metallic and composite materials as well as pressure vessels for metal hydride storage. Key activities include:

1. Fracture resistance requirements: A recommended new Article KD-10 has been proposed for ASME BPVC Section VIII Division 3, providing additional toughness requirements for all-steel pressure vessels in Hydrogen service.
2. Addition of new materials (e.g. Al alloy 6061) not already covered in Section VIII Division 3.
3. Design Margins for Composite Vessels: A technical report was prepared to address design margins for composite tanks that will build upon the information developed in the Hydrogen Standardization Interim Report for Tanks, Piping and Pipelines which was distributed to the Project Team. The scope of this study

includes stationary (e.g. storage) and transport tanks; it does not include vehicle fuel tanks. The report provides recommended design margins relative to short term burst pressure and interim margins for long term stress rupture based on a fixed 15 year design life for fully wrapped and hoop wrapped composite tanks with metal liners.

4. New Code Case for Composite Vessels: A draft Code Case is being developed by a Task Group that covers the fabrication of fiber reinforced thermosetting plastic pressure vessels for high-pressure service. The Case covers three applications of pressure vessels, Class A-portable, Class B-transportable, and Class C stationary applications.

5. Revision to Code Case 2390: expanding the scope of metallic lined composite reinforced circumferentially wrapped storage and transport pressure vessels to Hydrogen service at 15,000 psi.

6. Metal Hydride Vessel Design: A draft Code Case has proposed for Section VIII Division 1 application.

7. Improved methods for in-service inspection.

Contact Gerry Eisenberg for more information on ASME hydrogen codes and standards development.

ATTACHMENT II

National Hydrogen and Fuel Cells Codes and Standards Coordinating Committee: Members that Participated in the March 2006 Meeting

NAME	ORGANIZATION	PRESENT AT MEETING (Yes/No)
Adam Gromis	California Fuel Cell Partnership	Y
Andrei Tchouvelev	A. V. Tchouvelev & Associates, Inc.	Y
Antonio Ruiz	USDOE/Hydrogen, Fuel Cell and Infrastructure Technologies Program	
Bill Chericoff	USDOT/Research and Innovative Technologies Administration(RITA)/Washington	Y
Bill Collins	UTC Fuel Cells	Y
Bill Hoagland	Hoagland and Associates	
Bob Mauro	Consultant to NREL	(Illness)
Brad Smith	Shell Hydrogen	
Brian Walsh	US Fuel Cell Council	
Bruce Kinzey	Pacific Northwest Laboratory	
Carl Rivkin	National Fire Protection Association (NFPA)	Y

Carolyn Elam	DOE Golden Field Office	
Cathy Gregoire-Padro	Los Alamos National Laboratory (LANL)	Y
Christina Zhang-Tillman	California Fuel Cell Partnership	
Christopher Moen	Sandia National Laboratories/Livermore	
Dan Casey	ChevronTexaco	
Darren Meyers	International Code Council (ICC)	Y
Debbie Angerman	Compressed Gas Association (CGA)	(Attending ISO/TC58)
Doug Horne	Clean Vehicle Education Foundation	
Gary Howard	A. V. Tchouvelev & Associates, Inc.	
George Kervitsky	SENTECH	
George Thomas	Consultant to Sandia National Laboratories	
Gerry Myers	SPRINT	
Greg Milewski	Shell Oil Products	Y
Hank Seiff	Clean Vehicle Education Foundation	Y/T
Holly Thomas	National Renewable Energy Laboratory (NREL)	Y
Jeff Grant	Ballard Generation Systems	
Jesse Schneider	DaimlerChrysler	Y
Jim McGetrick	BP	
John Koehr	American Society of Mechanical Engineers (ASME)	
Juana Williams	NIST	(On Business Travel)
Julie Cairns	CSA America	Y

Karen Hall	National Hydrogen Association (NHA)	Y
Julie Willets	SPRINT	
Keith Hardy	Argonne National Laboratory	
Kelvin Hecht	ANSI, IEC and Consultant to NREL	Y/T
Ken Krastins	Plug Power	
Larry Johnson	SPRINT	
Larry Moulthrop	Proton Energy Systems	
Laurie Florence	Underwriter Laboratories	
Mark Richards	Gas Technology Institute	Y
Michael Steele	General Motors Advanced Technology Vehicles	Y
Nha Nguyen	NHTSA/Office of International Policy and Harmonization	Y
Patrick Serfass	National Hydrogen Association (NHA)	Y
Pat Davis	USDOE/Hydrogen, Fuel Cell and Infrastructure Technologies Program	
Paul Buehler	Plug Power, Inc.	Y
Prentiss Searles	American Petroleum Institute (API)	
Robert Wichert	US Fuel Cell Council (USFCC)	
Rhoads Stephenson	Motor Vehicle Fire Research Institute	Y
Roger Smith	Compressed Gas Association (CGA)	
Ron Sims	Society of Automobile Engineers (SAE) and Consultant to NREL	Y
Sondra Ullman	Plug Power	Y/T
Spencer Grieco	CSA America	
Steve Turner	C&S Consultant	
Susan Townsend	General Electric Global Research Center	

Terry Conrad	Concurrent Technologies Corp.	
Thad Adams	Savannah River National Laboratory	
Tom Joseph	Air Products and Chemicals	Y
Tony Androsky	US Fuel Cell Council (USFCC)	
Jim Ohi	National Renewable Energy Laboratory (NREL)	Y
Russ Hewett	National Renewable Energy Laboratory	Y

ATTACHMENT III

Participants in the March 2006 In-Person Meeting that are not Members of the Coordinating Committee

(Such Participants Were Invited to Become members)

NAME	ORGANIZATION
Eileen Schmura	Concurrent Technologies Corporation
Charlie Meyers	Nuvera Fuel Cells
Ron Coiner	CSA America
Lesley Crowell	California Air Resources Board
Stephen Woods	Honeywell for NASA WSTF
Robert Hay	TISEC, Inc.
David Zatko	Air Products
Lonnie O'Baker	Concurrent Technologies Corporation
Art Pontau	Sandia National Laboratories
Barbara Hennessey	DOT/National Highway Transportation Safety Administration
Wilbert Lee	ChevronTexaco
Anna Stukas	Angstrom Power
Elizabeth Turnbull	SENTECH
Justin Ward	Toyota Technical Center
Nate Warner	Toyota Technical Center
Spencer Quong	Quong Associates

Robert Boyd	BOC Gases
Rick Rocheleau	University of Hawaii
Doug Wheeler	University of Hawaii
Carmen Mendez	Sandia National Laboratories
Kelly Keefe	Compressed Gas Association
Chris Carnahan	Compressed Gas Association
Stephen Weiner	Pacific Northwest Laboratory
Ned Stetson	Proteus Services Group