

Meeting Minutes November 2&3, 2006

Technical Committee on Hydrogen Technology

MEMORANDUM

DATE: November 13, 2006
TO: Technical Committee on Hydrogen Technology
FROM: Carl Rivkin, Principal Chemical Engineer /Staff Liaison
RE: Meeting Minutes: November 2006 meeting

Enclosed are the minutes from the November 2-3, 2006 meeting of the T/C on Hydrogen Technologies. This meeting was the 1st meeting for this new committee that will create NFPA 2. The committee did an excellent job of reviewing issues of concern and developing an outline to develop a draft document. I would also like to thank Russ Hewett and everyone at NREL for providing a productive work environment. Please bring any substantial incorrect items to my attention.

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Below is an overall schedule for the T/C on NFPA 2 assuming it is on the annual 2010 revision cycle:

Annual 2010 Revision Cycle	
Item	Date
Notice of intent to enter cycle Pre-Report on Proposal draft complete and posted for public proposals	7/7/08
Public proposal closing date	11/22/08
Final Date for Report on Proposal (ROP) meeting	2/23/09
ROP published and posted	6/22/09
Public Comment closing date	8/31/09
Final date for a Report on Comment (ROC) meeting	11/2/09
ROC published and posted	2/22/10
Intent to make a motion (ITMAM) closing date	4/4/10
Posting of filed ITMAMs	5/4/10
Association meeting for documents with ITMAMS	6/2-6/5 10
Appeals to NFPA Standards council	6/20/10
Council issuance of all documents (documents with ITMAMs and without ITMAMs)	7/25/10

Thank you for a successful meeting. As always, if you have questions or comments, please feel free to contact me at 617.984.7418 or via e-mail at crivkin@nfpa.org.

cr/cr

Technical Committee on Hydrogen Technology

MINUTES OF MEETING

Attendance:

Principal Members/Staff:

Martin Gresho, Chair – Sandia National Laboratories, CA
William Aaron – Code Consultants, Inc., MO
Nick Barilo- Pacific Northwest National Laboratory, WA
Paul Buehler – Plug Power, Inc., NY
Elise Chan – Province of British Columbia, BC
Lawrence Danner – General Electric, Energy, SC
John Davenport – Aon Risk Consultants, VA
Joseph DiGiacomo – Flynn Burner Corporation, OH
Larry Fluer- Fluer, Inc., representing the Compressed Gas Association, CA
James Goodloe – Florida Division of State Fire Marshal, FL
Stephen Goyette – Proton Energy Systems, CT
Karen Hall – National Hydrogen Association, DC
Russell Hewett – National Renewable Energy Laboratory, CO
Tom Joseph – Air Products and Chemicals, Inc., PA
Gregory Milewski – Shell Oil Company, TX
Michael Short – UTC Power, CT
Andrea Zajac – Michigan Department of Environmental Quality, MI
Robert Zalosh – Firexplo, MA

ALTERNATES

David Farese– Air Products and Chemicals, PA (Principal –Tom Joseph)
William Houf – Sandia National Laboratories, CA (Principal Martin Gresho)
Lawrence Moulthrop – Proton Energy Systems, CT (Principal Stephen Goyette)
Roger Smith – Compressed Gas Association, VA (Principal Larry Fluer)

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Nonvoting Members

GUESTS

Dave McLean- Next Energy, MI

James Ohi - National Renewable Energy Laboratory, CO

Carl Rivkin - NFPA Staff Liaison, MA

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1. **Start.** The meeting began at approximately 8:30 AM on November 2, 2006 with the introduction of attendees.
2. **NREL presentation.** Dale Gardner of NREL gave presentation describing the work done at NREL and the capabilities of the organization.
3. **Report of the chair.** The chair discussed the following topics:
 - the purpose of the committee
 - the structure and content of NFPA 2 Hydrogen Technologies Code
 - how extract from existing NFPA documents would be used to create NFPA 2
 - the timeline for creating NFPA 2
 - the documents that would be used as the basis for NFPA 2
 - Carl Rivkin will post copies of NFPA 54 and 45 to committee web page (action item)
 - NFPA has web software available for task group meetings that allows for attendees to view a common computer screen and edit documents
4. **Report of the staff liaison.** The staff liaison discussed the following topics:
 - document timeline
 - NFPA extraction policy
 - Basic process for creating or amending a document
 - Work being done by the Hydrogen Executive Leadership Panel (HELP) of the National Association of State Fire Marshals (NASFM) (additional information provided by Paul Buehler indicated that the HELP work product would not conflict with NFPA 2. HELP is developing reference information for emergency responders dealing with alternative fuel vehicles).
5. **Presentation by Bill Houf.** Bill Houf gave a presentation on ongoing work being done at the Combustion Research Facility at Sandia National Laboratories in Livermore, CA. This effort characterizes the radiant heat flux and concentrations of hydrogen releases for various release conditions. Several papers describing this work have been posted to the committee web page.
6. **Presentation by Robert Zalosh.** Robert Zalosh gave presentation "US Hydrogen Safety Standards, Guidelines, and Practices". This presentation gave an overview of hydrogen codes and standards and identified area where there are gaps. The presentation and the paper on which it is based have been posted to the committee web page.
7. **Subject Matter and Structure of NFPA 2.** The committee had a lengthy discussion of the material that should be covered in NFPA 2
The following outline captures some of the topics that were to be a part of NFPA 2. Carl Rivkin will develop a draft document by extracting existing text to match the topics (but will also include the full range of hydrogen related material in the relevant extract documents)

NFPA 2 Hydrogen Technologies Code Outline

1. Administrative chapter- applies to all occupancies- somewhere need to qualify requirements by occupancy

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Mixtures

2. Reference documents
3. Definitions
4. Performance based requirements (from 1/5000)
5. Emergency planning and response
6. Hydrogen Fundamentals (storage, use, handling, generation-) (Extract material from NFPA 55)
 - Storage- liquid, gaseous, metal hydride, etc
 - Indoor/outdoor
 - Containers
 - System components- gas cabinets, pumps, etc – limited specific listing requirements
 - Piping and components- aboveground/underground indoor/outdoor
 - Pressure relief systems
 - Suppression systems
 - System siting for both dedicated hydrogen storage and multiple hazardous material utilization facilities
 - Hydrogen waste generation
 - Ventilation
 - Monitoring
 - Venting
 - Aboveground/underground
 - Electrical equipment/classification (add articles 250, 500, 501, 503, 504)
 - Transfer
 - Material compatibility
 - Grounding/bonding
 - Fire suppression
 - Signage

6b Occupancy specific requirements

2. Specific Applications

2a. Vehicular applications (Extract material from NFPA 52 and NFPA 30A)

- Blended fuels
- Vehicle fueling systems including dispensers, valves, piping, nozzles and fuel monitoring and communication devices
- Outdoor fueling requirements
- Indoor fueling requirements
- Automatic and manual shutdown
- Special concerns about hydrogen storage systems and vehicles
- Detection and alarm systems
- Vehicle maintenance facilities
- Emergency response
- mobile fueling
- residential fueling

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2b. Fuel Cell Systems (Extract material from NFPA 853)

- Indoor/outdoor
- Fixed fuel cell system installation requirements
- Refer to NFPA 55 for hydrogen storage requirements
- Special electrical requirements (extract material from NFPA 70 Article 692)

2c . Hydrogen Generation Systems (new subject matter- size TBD)

- electrolyzers
- gasification -
- other hydrogen generation devices

2d Combustion processes (furnaces and ovens)

2e Special atmospheres

2f Laboratory operations/research

2g Parking garages

2h Road tunnels

2i Inspection, testing, and maintenance

2j Temporary installations

Annex- Hazards and Physical Properties

Annex -Risk Assessment,

Annex – Plan review guidance

Annex- relevant publications- have an abstract for each

Annex- relevant web sites

Annex- normative annex material

8. Presentation by Jeff La Chance on risk informed decision making. Jeff La Chance of Sandia Laboratories, Albuquerque, NM gave a presentation on risk informed decision making. The work he discussed showed how the impact analysis performed by Bill Houf could be integrated with an analysis of probability of events occurring to give a picture of the risk that certain activities present. This type of analysis will work will continue to identify what are the major risk drivers in activities of interest, such as vehicle fueling.

9. Task Groups. The following task groups have been created to develop NFPA 2

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Hydrogen Technologies
TASK GROUPS

<p>Task Group #1 Administrative and Annex Material</p>	
<p>Scope: This task group has overall responsibility for the administrative aspects of the products of each of the task groups. The objective is to assure that text developed by the task groups is consistent and compatible with both the balance of the document and NFPA standards.</p>	
Members - Task Group Chairs	Partial Topic List
Marty Gresho-Chair	Coordinate overall products of the individual task groups.
Tom Joseph	Assure consistency with NFPA requirements.

<p>Task Group #2 Fundamentals</p>	
<p>Scope: Establish the fundamental (non use-specific) controls surrounding the storage, use and handling of gaseous and liquefied hydrogen applicable to all occupancies and uses. The fundamental controls are to be developed through the use of NFPA's extract policy. NFPA 55 will be used as the basis for control recognizing that extract material will be found in Chapters of NFPA 55 other than Chapters 10 and 11 specific to bulk installations. NFPA 52 will be reviewed for potential fundamental provisions which may have not been addressed by NFPA 55. Consideration shall be given to an expansion in the fundamental provisions based on material developed by use specific groups, e.g., gas generation. Annex material relative to fundamental physical and chemical properties of hydrogen as well as general safe handling procedures will be included.</p>	
Members	Partial Topic List:
Tom Joseph- chair	Storage- liquid, gaseous, metal hydride, etc
Larry Fluor	Indoor/outdoor
Karen Hall	Containers
Larry Moulthrop	System components- gas cabinets, pumps, etc – limited specific listing requirements
Nick Barilo	Piping and components-aboveground/underground indoor/outdoor
Joe DiGiacomo	Pressure relief systems
	Suppression systems
	System siting for both dedicated hydrogen storage and multiple hazardous material utilization facilities
	Hydrogen waste generation
	Ventilation
	Monitoring
	Venting
	Aboveground/underground
	Electrical equipment/classification (add articles 250, 500, 501, 503, 504)
	Transfer
	Material compatibility
	Grounding/bonding
	Fire suppression
	Signage

<p>Task Group #3 Fuel stations and Code Gaps- Vehicular Related Applications</p>	
<p>Scope: This task group shall have responsibility for the portions of NFPA 2 pertaining to,</p>	

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handling, and transfer of hydrogen related to the support of vehicle systems.	
Members	Partial Topic List:
Andrea Zajac- chair	fueling stations
Dave Farese	parking garages
Mike Steele	transport vehicle fueling
Bill Chemicoff	maintenance facilities
Dave McLean	tunnels, temporary
Jim Goodloe	siting of h2 systems
Greg Milewski	fuel blends
John Davenport	electrical classification
Russ Hewett	

Task Group #4	
Fuel Cell Systems and Hydrogen Generation Systems	
Scope: The Fuel Cell and H2 Generating Task Group will cover installation of fuel cells and hydrogen generators drawing from the existing NFPA 853 standard, and developing new code language for installation of hydrogen generating equipment such as electrolyzer, reformers, and combination fuel cell and hydrogen gas generating equipment (small scale)	
Members	Topics
Mike Short- chair	TBD-
Steve Goyette	
Paul Buehler	
Bill Aaron	

Task Group #5	
Code Gaps- Stationary Applications	
Scope: Investigate the spectrum of Hydrogen uses other than Generation, storage, delivery, fuel cells and vehicular. From this investigation, identify the existing safety documents (NFPA, IFC, etc.) applicable to the use and evaluate those requirements to determine if there are any credible hazards that are not addressed. Develop material applicable to those uses to be included in the NFPA 2 Document.	
Members	Partial Topic List:
Larry Danner-chair	Combustion processes
Nick Barilo	Special atmospheres
Joe DiGiacomo	Laboratory operations

Task Group #6	
Code Gaps- Separation Distances	
Scope: Validate or revise the existing prescriptive hydrogen separation distances in NFPA 55 using new research and investigate use of risk informed processes.	
Members Marty Gresho- chair	Topics
Houf	Risk Informed
LaChance	Prescriptive distances
Short	Performance/Risk based
Zalosh	
David Farese, Jim Ohi	

Task Group Action Items:

- Task Group chairs to identify areas where participation by a member from another TC is needed (e.g. NFPA 55, 42, etc).

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Task Group Chairs to schedule 1st virtual meeting for their respective groups. Please include both Carl Rivkin and Marty Gresho in all correspondence

2. **Next Meeting.** The next meeting at NEXT Energy in Detroit, MI from April 17-19, 2007 (3 full days).
3. **Adjournment.** The meeting adjourned November 3, 2006 at approximately 2:00 PM.

Submitted



Carl Rivkin, P.E.

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Agenda:

NFPA Hydrogen Technologies Technical Committee Meeting

November 2 and 3, 2006

8:30 AM – 5 PM

Both days

National Renewable Energy Laboratory, Golden, CO

Type of meeting: Planning meeting for writing NFPA 2 Hydrogen Technologies Code

Attendees: NFPA 2 Technical Committee Members & Guests

Please read: NFPA 52, NFPA 55, NFPA 853,

Please be familiar with: NFPA 30A, NFPA 70-Article 692, NFPA 497, NFPA 88A, NFPA 86, NFPA 5000, NFPA 1 (see Attached Overview document)

Please bring: NFPA 52, NFPA 55, NFPA 853.

Copies of codes posted to the Committee web page

Agenda

DAY 1

Item	Time Duration	Discussion
Introduction of Attendees	8:30-8:45	30 Persons – 30 seconds each. State name, affiliation, and brief statement of your interest in H2.
Welcome to NREL talk	8:45-9AM	Dale Gardner (Associate Director of NREL for Renewable Fuels Science and Technology)
Committee Scope	8:45-9:00	<i>Committee Scope: This Committee shall have primary responsibility for documents on the storage, transfer, and use of hydrogen. The use of Hydrogen would include stationary, portable, and vehicular applications.</i> <i>The committee will create a new NFPA</i>

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		<i>document, NFPA 2 Hydrogen Technologies Code.</i>
Purpose and content of NFPA 2	9-9:30	
<ul style="list-style-type: none"> • Desired product: Extract document, ID and fill gaps as needed. Authority to create new text.. • Work with other related TCs • NFPA 2 has authority over H2 issues if needed. 		
Discuss NFPA 2 Schedule and Process	9:30-9:45	
<ul style="list-style-type: none"> • Present overall schedule for 2010 cycle • Discuss code development process. • How code gets written <ul style="list-style-type: none"> ○ TC proposals ○ Public proposals ○ ROP, ROC etc. • Refer to NFPA Directory for procedural questions. • Technical Presentations • Meeting schedule & frequency 		
BREAK	9:45-10:00	
Review of existing NFPA source documents	9:45 – 10:30	Display TOC for each
Discussion of coordination with other related codes and regulations	10:30-10:45	IFC HIPOC
Discussion of draft outline		
Technical Presentation #1	11-11:45	Bill Houf
LUNCH	12-1	Hosted on site by NREL
Technical Presentation #2	1-2	Bob Zalosh
Discuss list of topic/subjects to be included in NFPA 2	2-5	
Begin to categorize then by common functions/groupings		
DAY 2		
Technical Presentation #3	8:30-9:30	Jeff LaChance
Break	9:30-9:45	
Continue Topic categorization as needed	9:45-11	
Assemble Topics into a TOC	11-12	
LUNCH	12-1	Hosted on site by NREL
Identify action items for next meeting		

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- Create Task Groups for Chapters

Set next meeting date and location

Adjourn –afternoon of November 3.

5PM (or earlier)

Additional Information

Special notes: