

# Key Learnings from Sandia Workshop

Sondra Ullman



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# Key Learnings from Sandia Workshops

- Early Market Fuel Cell Technologies Codes and Standards Workshop
- DOE Vehicular Tank Workshop
- April 28-29 at Sandia National Laboratories in Livermore, CA

# Sandia Workshop Learnings

- Application of hydrogen fuel cells in powered industrial trucks is emerging quickly and is poised to become a large volume commercial product.
- Some codes and standards are currently in place (i.e., UL 2267 – Fuel cell in Powered Industrial Trucks).
  - Existing codes require updating for new learning in this emerging market.
- Currently drawing upon requirements for similar, but different applications (on-road vehicles, fueling stations for on-road vehicles, stationary and on-road vehicle storage).
  - Additional codes and standards are required to complete the regulatory framework to support the deployment of these products.
- Much productive work has occurred over the last year.
- DOE plays a valuable role in enabling the development of defensible and traceable of science/technical based requirements as a basis for codes standards.

# Document Reference Paths

## Industrial Trucks

Components – CSA HPIT1



Subsystems – SAE J2919



Systems – UL2267



Vehicles  
UL583, NFPA 505



Refueling Guidelines  
NFPA 52, CSA HPIT2

## Indoor Refueling

Components – CSA HGV 4 series



Installations  
NFPA 52, CSA HGV4.9



## Legend

Unpublished  
No committee

Unpublished  
Active Committee

Published

From A. Harris, Nuvera presentation 4/28/10

# Support for Ongoing Activities

- Fuel tank requirements in product level standard (UL 2267)
- Address integration of fuel cell with truck (UL 2267 / UL 583)
- Develop detailed component requirements for fuel tanks in powered industrial trucks (HPIT1)
  - DOE providing scientific understanding of the affect of hydrogen on steel tanks at the fueling frequency in this new application
- Issue component and dispenser TIRs
  - Review, revise and release as ANSI standards
    - Validation of test requirements funded by NREL
- Continued support needed for coordination effort
  - USFCC Forklift Task Group

# Follow on work

## ■ Follow-on work for steel tanks

- Statistical understanding of of flaws in tanks
- Refinement of NDE test methods (detect smaller flaws, increase speed / decrease cost)
- Characterization of materials

## ■ Indoor hydrogen refueling

- Dispenser designs sited today based conservative safety assessments
- Codes and standards needed to create regulatory framework to expedite installation
  - Recommend a risk informed approach to requirements development
    - Understand frequency, severity and likelihood of realistic releases
  - Need both scientists and codes and standards writers
  - Further develop requirement for indoor fueling in NFPA 52
  - Harmonization of NFPA 52 with IFC requirements
  - HPIT2 – New standard under development
  - Need to understanding roles and scopes of different codes & standards to coordinate efforts / placement of requirements

## ■ Other

- NFPA 505 2010 – Beginning new revision cycle
- End-of life / Aftermarket



#### **HEADQUARTERS**

968 Albany-Shaker Road  
Latham, New York 12110  
Phone: (518) 782-7700  
Fax: (518) 782-9060

#### **CANADA**

13120 Vanier Place  
Richmond, British Columbia  
V6V 2J2  
Phone: (604) 303-0050  
Fax: (604) 231-0400

#### **EUROPE, MIDDLE EAST & AFRICA**

7301 BC Apeldoorn  
P.O. Box 880  
The Netherlands  
Phone: 31 55 53 81 000  
Fax: 31 55 53 81 099

**[www.plugpower.com](http://www.plugpower.com)**

