U.S. DEPARTMENT OF ENERGY

Safety, Codes and Standards

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2009 DOE Hydrogen Program & Vehicle Technologies Program Annual

Merit Review and Peer Evaluation Meeting

May 22, 2009

Goal and Objectives

SAFETY:

Develop and implement practices and procedures to ensure safety in the operation, handling, and use of hydrogen and hydrogen systems for all DOE-funded projects and utilize those practices and lessons learned to promote the safe use of hydrogen.

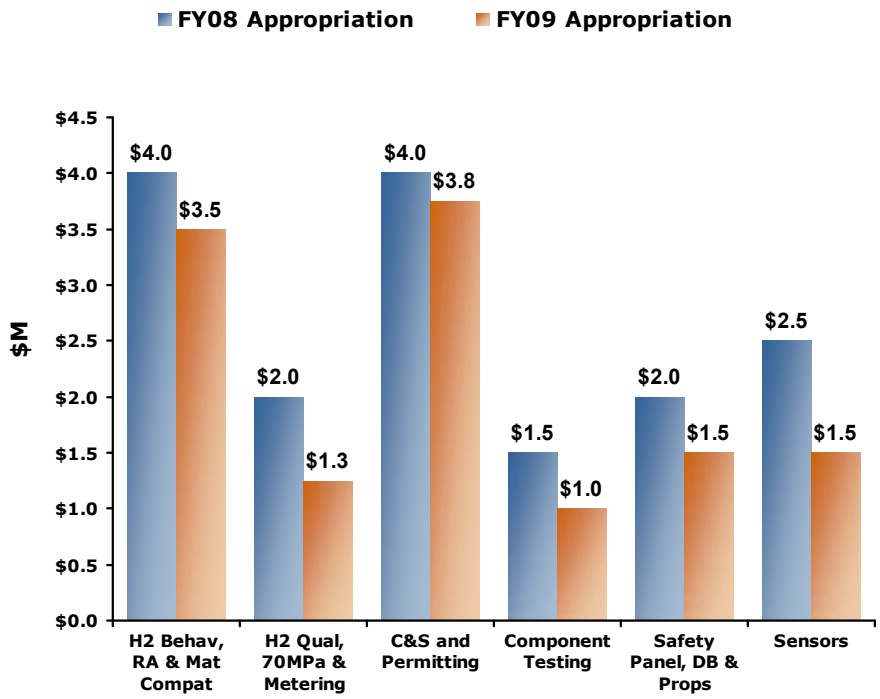
CODES & STANDARDS:

Perform the underlying research to enable codes and standards to be developed for the safe use of hydrogen in all applications. Facilitate the timely development and harmonization of domestic and international codes and standards.

Budget

FY 2009 Appropriation = $12.5M

FY 2008 Appropriation = $16.0M

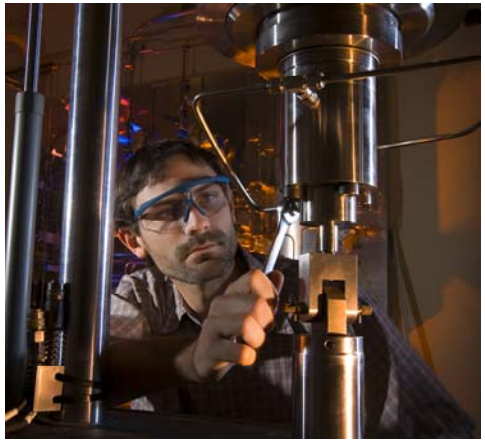


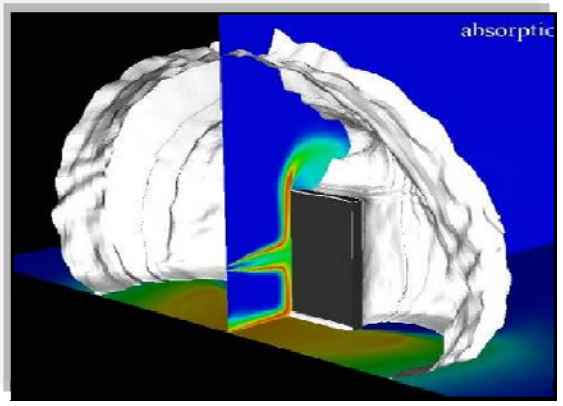
EMPHASIS

- Technically validated performance data needed for codes and standards.
- Tools to facilitate permitting of hydrogen fueling stations and stationary fuel cell installations.
- Hydrogen fuel quality testing, measurement, and metering.
- Risk assessment and establishment of protocols to identify and mitigate risk.
- Global harmonization of hydrogen fuel quality and other key standards.
- Dissemination of hydrogen best practices and safety information.

Challenges

- Synchronizing codes & standards development and adoption with technology commercialization needs
- Aligning data generation with codes & standards development cycle
- Facilitating timely adoption of approved codes & standards
- Streamlining and standardizing the permitting process for hydrogen facilities
- Promoting domestic and international consistency
- Compiling and disseminating safety information





2009 Progress & Accomplishments

Introduced Risk-Informed Approach for Separation Distances into NFPA 55 (Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders) 2009 code cycle – June 2009

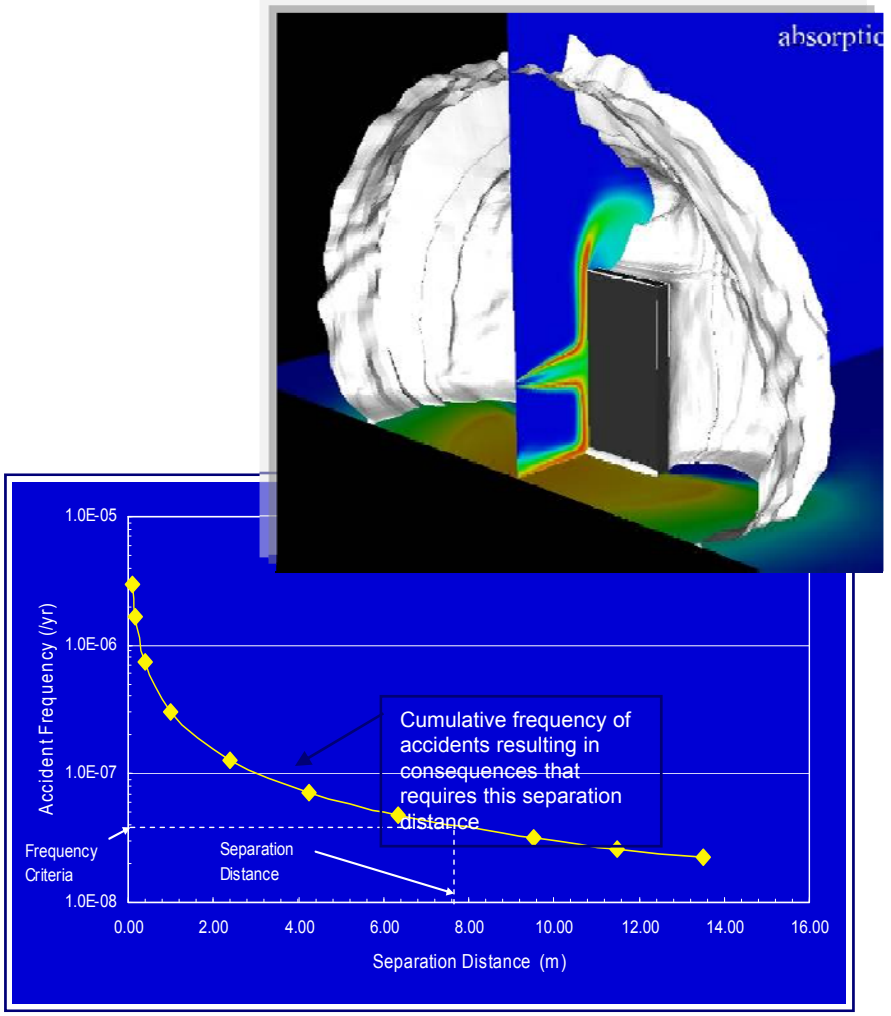
- Facilitated NFPA 2: Hydrogen Technologies Code Proposed Standard
  - Available for public comment
- Developed and implemented hydrogen installation permitting workshops
  - Over 250 code officials have been trained to date
- Coordinated the International Fuel Quality Specification, (ISO 14687-2) approved by ISO Technical Committee 197, March 1, 2008
  - ISO TS 14687-2 and SAE J2719 harmonized
- Developed an online course for researchers on hydrogen safety
- Designed a fuel cell vehicle prop for hands-on training of first responders
  - First hands-on training Conducted - May 2009

2009 Progress & Accomplishments

Integrated Risked- Informed Approach into NFPA code

Accomplishments

- Adopted Risk-Informed approach for Separation Distances into NFPA 55 2009 code
- Determined how barrier walls affect consequences of high-pressure gaseous release hazards using a risk-informed approach
- Introduced risk-informed decision making into the NFPA code development process
- Developed risk-informed permitting tools for NFPA 55 and NFPA 2

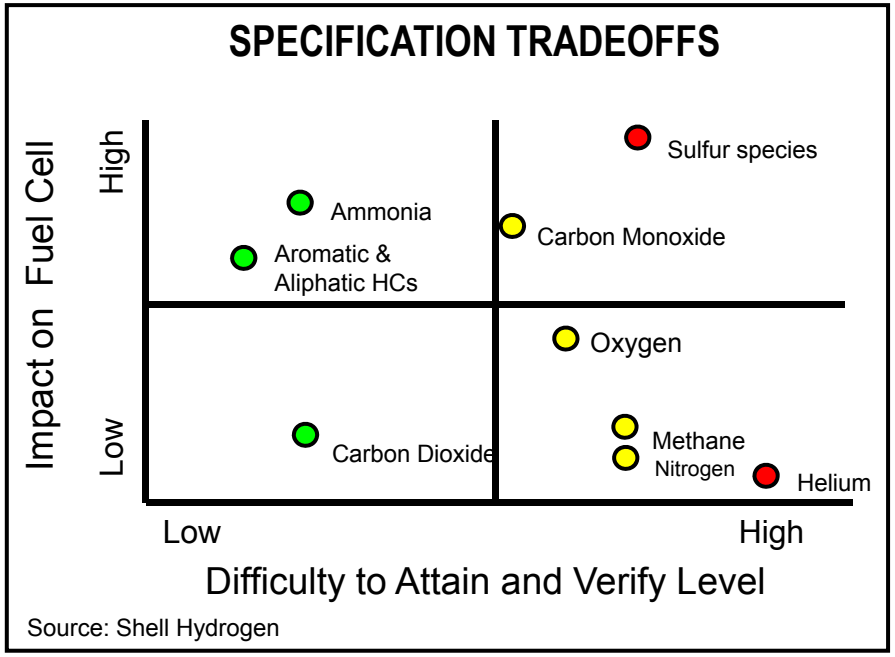


2009 Progress & Accomplishments

Fuel Quality - On schedule for a 2010 ISO Hydrogen Fuel Product Specification Standard

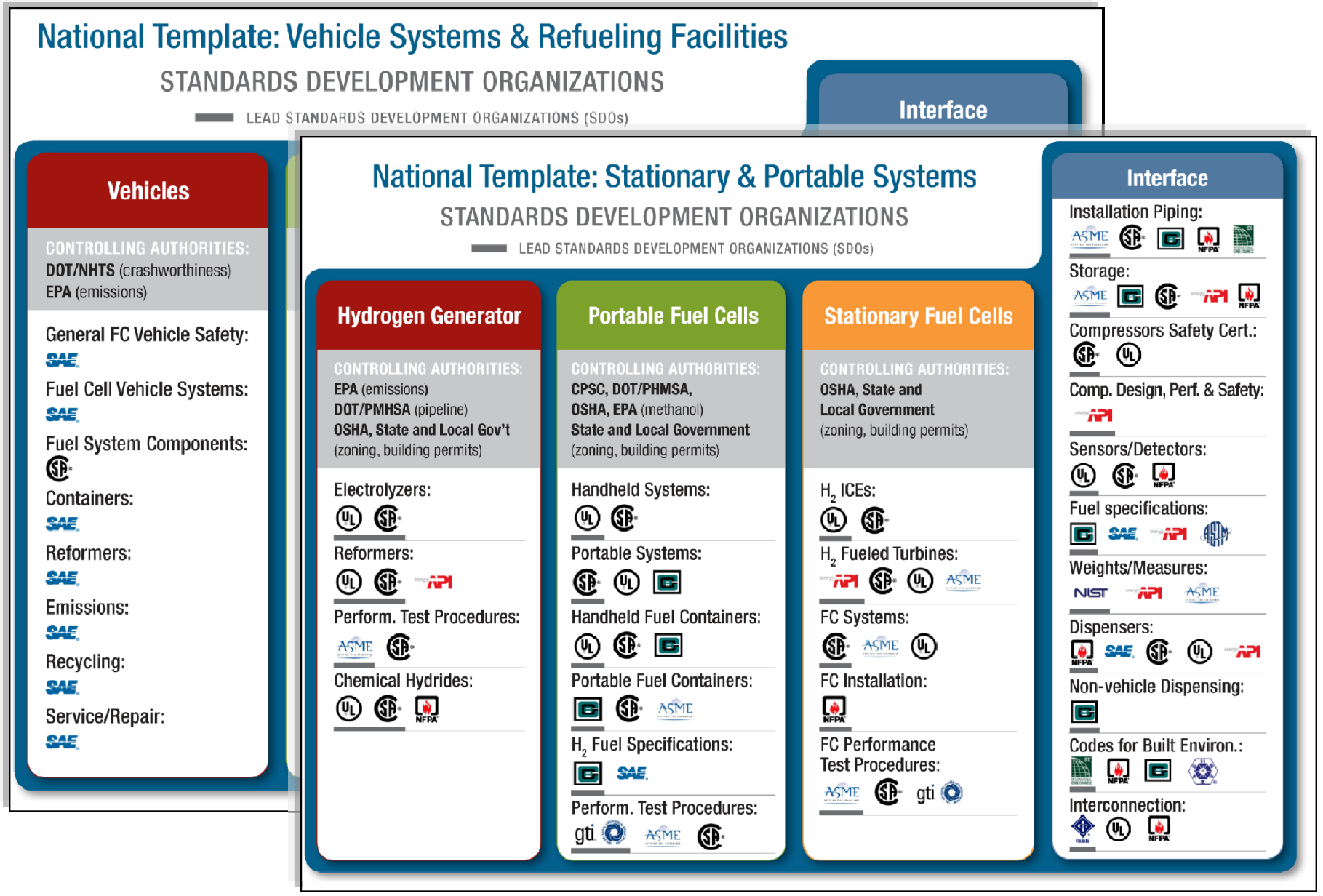
Accomplishments

- Approved and published ISO Technical Specification (TS 14687-2)
  - Committee Draft (CD) for International Standard under review
  - ISO TS 14687-2 and SAE J2719 are harmonized
- Adopted a Test protocol, test matrix, data reporting format
  - Testing priorities identified and adopted
  - Collaborative testing underway at LANL, HNEI, USC, Clemson-SRNL, UConn
  - Testing coordinated with Japan, Korea, and EU
- Standardized sampling and analytical methodologies under development by ASTM
  - Hydrogen Quality Sampling Apparatus (HQSA) to support ASTM test methods developed and safety-tested
- Applied Fuel cell stack and PSA models to support testing and to address fuel quality-fuel cost tradeoffs
  - Testing and modeling coordinated to help address effects of key contaminants on fuel cell performance
  - Potential canary constituent identified (CO) to simplify testing and analytical monitoring.



Source: Shell Hydrogen

National Template



www1.eere.energy.gov/hydrogenandfuelcells/codes/pdfs/cs_templates.pdf

Hydrogen Installation Permitting

U.S. DEPARTMENT OF ENERGY

Hydrogen Program

hydrogen.energy.gov

SEARCH PERMITTING

Search Help

Permitting Hydrogen Facilities

- Permitting Process
- Codes & Standards Search
- Hydrogen Fueling Stations
- Telecommunication Fuel Cell Use

The objective of this U.S. Department of Energy Hydrogen Permitting Web site is to help local permitting officials deal with proposed hydrogen fueling stations, fuel cell installations for telecommunications backup power, and other hydrogen projects.

A permitting process section seeks to help project developers and the public understand the general procedures involved.

Technology overviews of hydrogen fueling stations and telecommunications fuel cell use and searchable model code information should provide helpful information for local permitting officials to address project proposals.

Hydrogen Fueling Stations

Model Codes Search

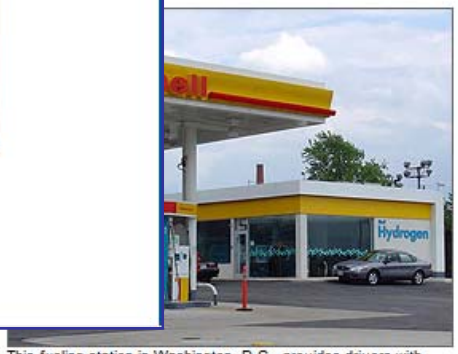
Technology Overview

Telecommunication Fuel Cell Use

Model Codes Search

Technology Overview

If you have any suggestions for making this site more useful, please let us know.



This fueling station in Washington, D.C., provides drivers with both hydrogen and gasoline fuels

- Telecommunication Fuel Cell Use

about hydrogen basics.

Also affecting the design and permitting of hydrogen fueling stations are the methods used for hydrogen acquisition, storage, compression, and dispensing. Learn more about:

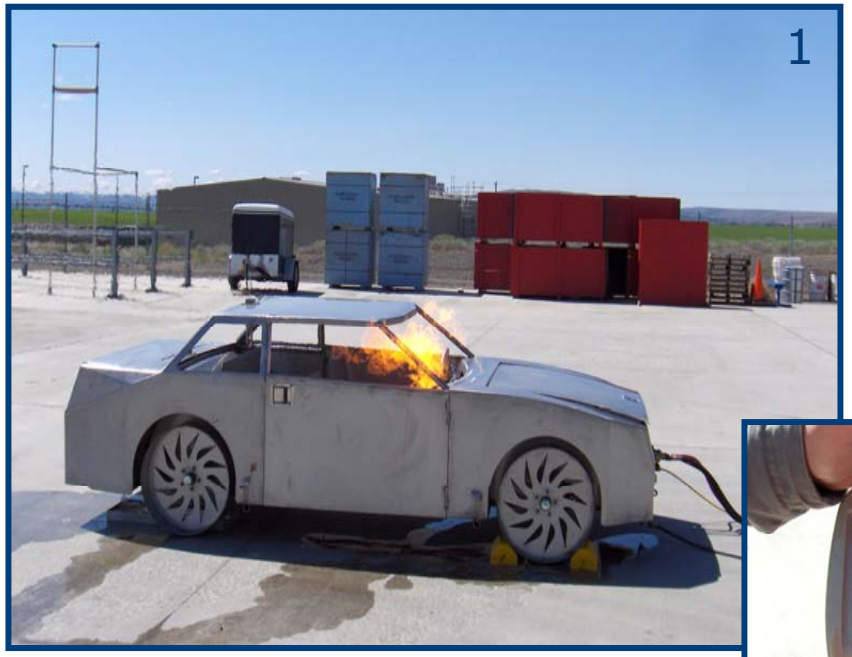
- Hydrogen delivery
- On-site hydrogen production
- Hydrogen storage and compression
- Hydrogen dispensing
- Design Standards
- Operation Standards

www.hydrogen.energy.gov/permitting/

National Renewable Energy Laboratory

Fuel Cell Vehicle Safety Training

First hands-on training conducted - May 2009



(1) A propane flame simulates a compartment fire

Training prop features: (2) mock fuel cell stack, (3) mobile capability, (4) mock hydrogen storage tank.

- Firefighters, safety experts, fire marshals, hydrogen experts, OEM's, Energy Companies and Industry have participated and contributed to the course development.

Safety Information Tools

Updated and Improved Safety Databases

www.h2incidents.org

www.h2bestpractices.org

www.hydrogen.energy.gov

Published First Quarterly Safety Newsletter

Newsletter to share safety information relevant to the Program

Pacific Northwest National Laboratory

Summary

- Promote risk-informed approach for developing technically sound (and traceable) codes & standards
- Continue hydrogen installation permitting workshops for fire safety and building code officials
- Continue generation of technically validated performance data needed for development and revisions of codes and standards
- Complete testing and modeling to develop international hydrogen fuel quality standard by 2010
- Explore insurance requirements necessary for operating of hydrogen installations and fueling stations

For More Information

Safety, Codes and Standards

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