Hydrogen Safety Review Panel

presented by

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for the

DOE Hydrogen Program Review

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Project SA6

This presentation does not contain any proprietary or confidential information

Battelle

Pacific Northwest National Laboratory
Operated by Battelle for the U.S. Department of Energy

Overview

Timeline

- First Panel meeting: Dec 11, 2003
- Continuing

Budget

- Total funding = $860K
- FY04 = $395K
- FY05 = $465K

Partners

- Energetics, Inc.
- Panel member organizations

Barriers addressed

A. Limited historical database
B. Proprietary data
C. Validation of historical data
D. Liability issues
E. Variation in standard practice of safety assessments for components and energy systems
F. Safety is not always treated as a continuing process
G. Expense of data collection and maintenance
H. Lack of hydrogen knowledge by authorities having jurisdiction
I. Lack of hydrogen training facilities for emergency responders

Hydrogen Safety Review Panel

Addison Bain, Chair	NASA (ret.)
Carol Bailey	Sentech
Harold Beeson	NASA White Sands
Bill Doerr	FM Global Research
Don Frikken	Becht Engineering
Jim Hansel	Air Products and Chemicals
Richard Kallman	City of Santa Fe Springs, CA
Harold Phillippi	ExxonMobil Research and Engineering
Jesse Schneider	DaimlerChrysler
Rody Stephenson	Jet Propulsion Laboratory (ret.)
Bob Zalosh	Worcester Polytechnic Institute

Program Objectives (Panel-Related)

- *Starting in 2004, integrate safety procedures into new DOE projects to ensure that they all incorporate hydrogen safety requirements.*
- *The Hydrogen Safety Review Panel, formed in FY2004, will continue to provide expertise and guidance to the DOE, and will assist with identifying areas of additional research.*
- *By 2007, publish a handbook of "Best Management Practices for Safety."*

Ref: Multi-Year Research, Development and Demonstration Plan, p 3-133.

Approach

- Bringing a cross-section of relevant experience to bear on the success of the Hydrogen Program as a whole
- Focusing safety reviews on engagement, learning and discussion rather than as audit, investigative or regulatory exercises
- Identifying project-specific findings/learnings and bringing a broader benefit to the Hydrogen Program

Technical Accomplishments, Progress and Results

- Conducted site visit safety reviews of 10 projects – production, storage, fuel cells and technology validation (March 3, 2004 – first site visit)
  - Site visit protocol
  - Site visit preliminary report
  - Safety evaluation report
- Developed safety template for Hydrogen Program Review
  - May 2004 – enhance role and awareness of safety
  - May 2005 – assess safety vulnerabilities, risk mitigation, accident scenarios across the program

Technical Accomplishments, Progress and Results (continued)

- Completed revision to *Guidance for Safety Aspects of Proposed Hydrogen Projects* (August 2004)
  - A "living" document
  - Articulate the DOE requirement
  - Serve as a resource for project teams
- Review safety plans for all new projects
  - Develop review team expectations and safety plan checklist (January 2005)
  - Review draft safety plans for Storage Centers of Excellence leads (March 2005)
  - Begin review of safety plan deliverables (April 2005)

Technical Accomplishments, Progress and Results (continued)

- Develop criteria for selecting projects for review (January 2005)
  - Combine with safety questions for conducting telephone interviews (March 2005)
  - Ready for beta-test
- Develop safety event reporting process (accidents and near misses) for implementation and analysis
  - Draft template discussing intent, definitions and attributes completed (April 2005)

Technical Accomplishments, Progress and Results (continued)

- Capturing “lessons learned” from project safety reviews for broader benefits
  - Design and assembly of equipment
  - Operating procedures
  - Equipment maintenance
  - Hydrogen storage materials
  - Other issues
  - Examples and observations

Future Work

- Remainder of FY2005
  - Review of project safety plans
  - Project safety reviews
    - Site visits and reporting
    - Telephone interviews
    - Safety question “one-pagers”
  - Panel meeting (June 16-17, 2005)
- FY2006
  - Review safety plans
  - Implementation of project selection criteria for safety reviews; implementation of safety event reporting system
  - Initiate development of Best Management Practices

Publications and Presentations

1. Weiner, S.C., “Hydrogen Safety Review Panel: Utilizing a Wealth of Experience,” Fuel Cell Summit Newsletter, Vol. 5, Issue 1, Spring 2004. http://www.pnl.gov/fuelcells/docs/newsletter/volume5/vol5_issue1.pdf

2. Weiner, S.C., Kinzey, B. and Skolnik, E.G., “Hydrogen Safety Review Panel: Shaping Safety Awareness,” 20th Annual Center for Chemical Process Safety International Conference, Atlanta, GA, April 12, 2005.

3. Weiner, S.C., Kallman, R.A., Ruiz, A. and Schneider, J.M., “Hydrogen Safety: From Policies to Plans to Practices,” International Conference on Hydrogen Safety, Pisa, Italy, September 8-10, 2005. (abstract accepted)