2006 DOE Hydrogen Program Hydrogen Safety Education and Training for Emergency Responders

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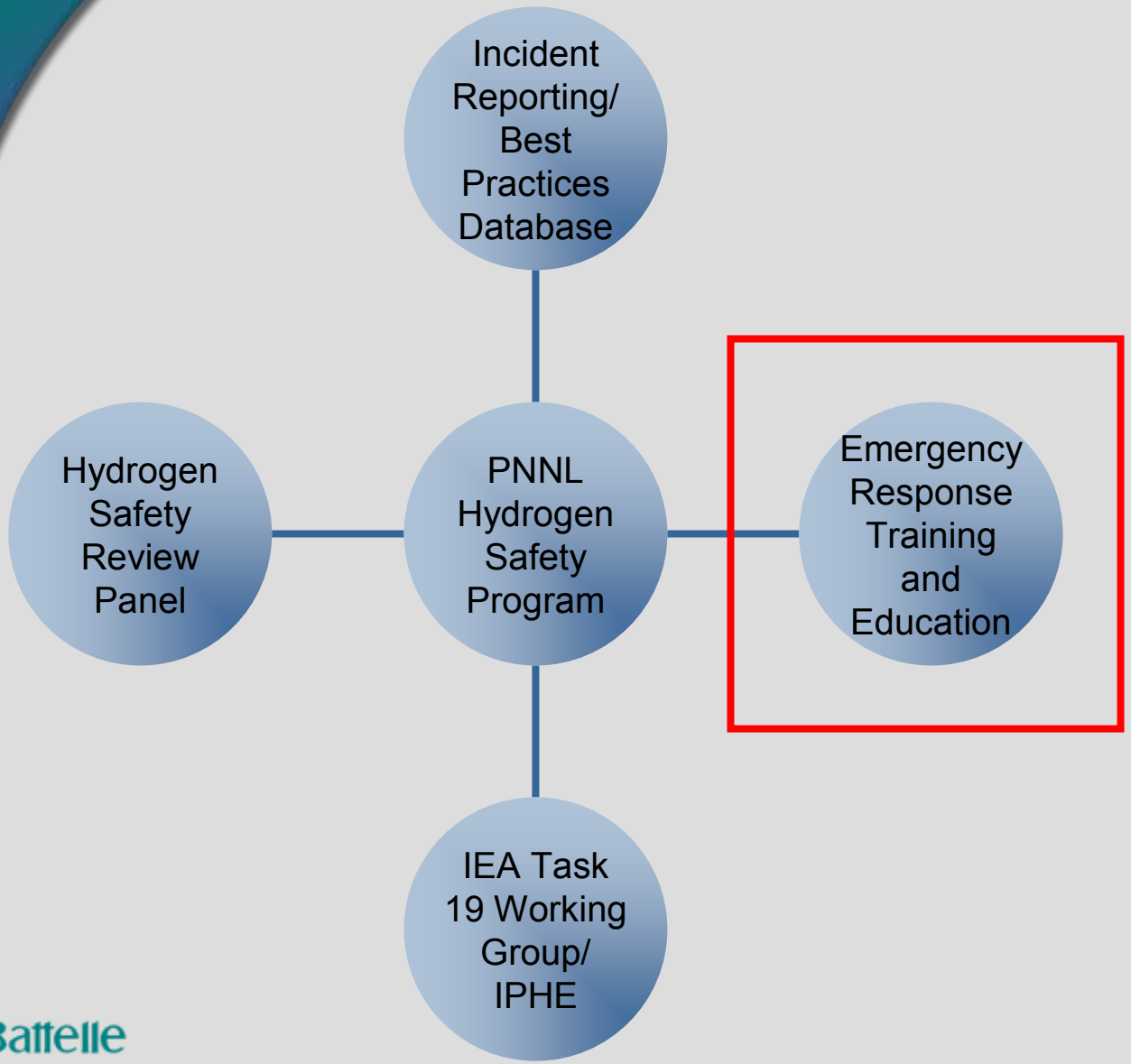
PNNL Hydrogen Safety Program



The Hydrogen Safety Program contributes a number of important activities to HFCIT. The current main elements of the program are shown here.

Overview

Timeline

- Start: 10/2004
- Finish: 09/2008
- Percent complete: 20%

Budget

- Total project funding to date: $300K
  - Funding received in FY05:
    - $0 from Education;
    - $100K from Safety, Codes and Standards
  - Funding from Education for FY06: $200K

Barriers

- Education: Lack of Awareness.
- Education: Institutional Barriers and Access to Audiences.
- Safety: Lack of Hydrogen Knowledge by Authorities Having Jurisdiction.
- Safety: Lack of Hydrogen Training Facilities for Emergency Responders.

Partners

- HAMMER
- Communication with other potential partners, including industry and training organizations, is ongoing

Objectives

- Long-term: Prepare emergency responder and other related safety communities for near-term hydrogen demonstrations and the long-term hydrogen economy.
- Near-term: Develop hydrogen safety training and educational materials for first responders and code officials that can be used alone or “dropped in” to a wide variety of existing training activities, depending on the needs of the audience. Must be accomplished in close collaboration with relevant hydrogen and safety communities.
- Immediate: Complete and release Awareness-Level educational materials for emergency responders who must be able to recognize a hydrogen incident and take initial protective measures.

Approach

- Undertake a collaborative process that incorporates widespread input and review, using both online and “live” audiences.
- Assemble a development team that includes subject experts, emergency responder training specialists, and members of the emergency response community.
- Seek input (knowledge and materials) from numerous organizations with an interest in and experience with emergency responder training, in order to provide the most relevant information and engage the target audience.
- Convey technical content in a non-technical manner, using photos, video clips, narration/voiceovers, and computer animations.
- Provide materials in a variety of formats to meet a wide variety of needs and address variability of our target audience.
- Complete a broad and comprehensive review of the training materials; seeking comment from industry, the emergency responder community, training organizations, and others.

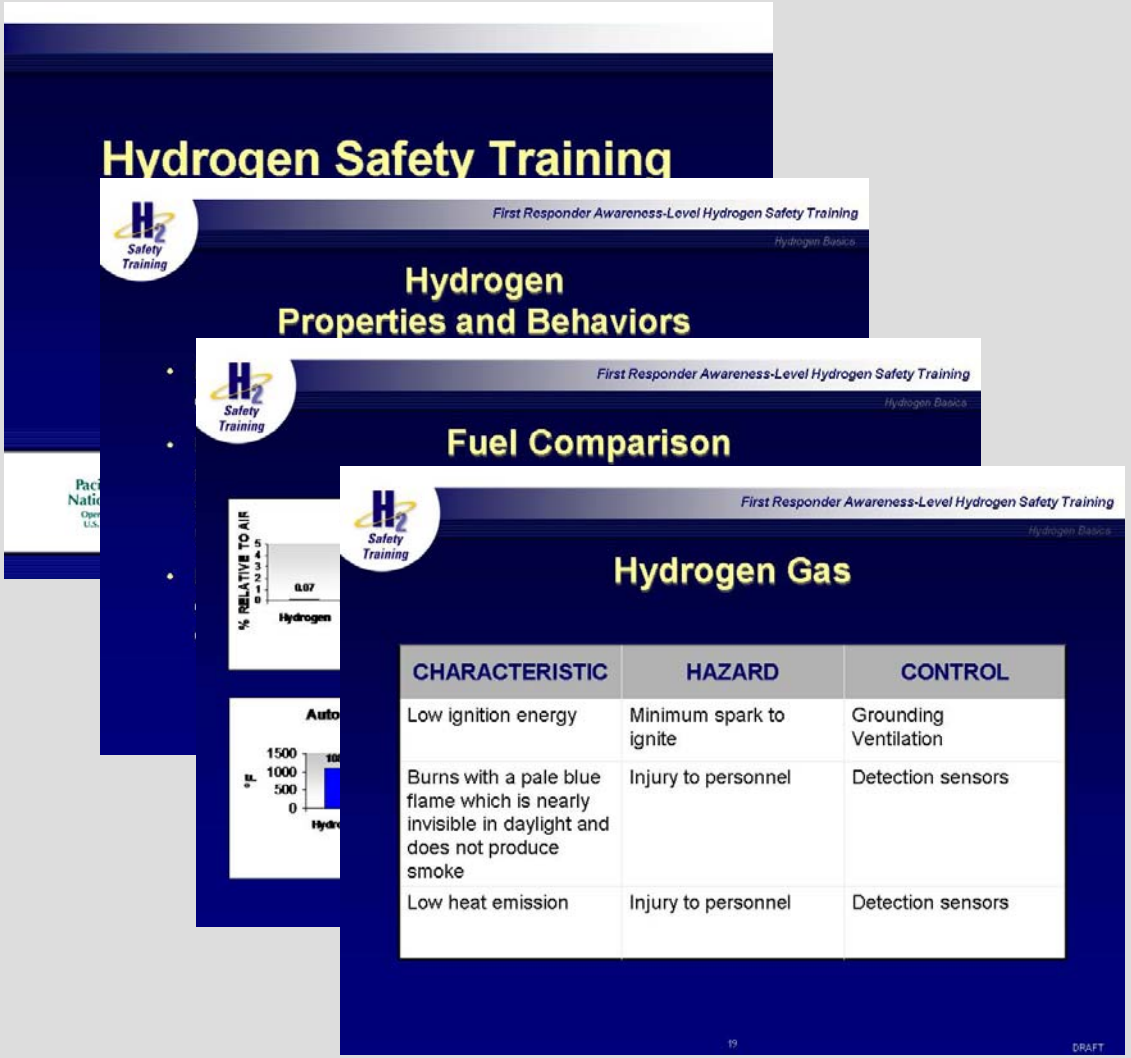
Technical Accomplishments/ Progress/Results

- Developed draft Awareness-Level training materials. Substantially consolidated and updated material according to comments received in pilot tests conducted in August 2005.
- Current version includes videos, animation clips, narration, quizzes.
- Live pilot audience recently tested April 1-2, 2006 in four sessions at Washington State HazMat annual training seminar; feedback very positive.
- Web-based system available for broad review in May 2006

Awareness-Level Curriculum

General Overview:

- Properties and potential hazards of compressed and liquid hydrogen
- Comparison with familiar fuels
- Standard design methods for safe hydrogen systems



Awareness-Level Curriculum – cont'd

- Hydrogen fuel cell vehicles, stationary applications, and refueling
- Recognition of hydrogen vehicles, signage and placards, packaging and storage
- Ignition sources
- Initial protective actions

Future Work

- By the end of FY06, complete development of Awareness-Level materials and make available in multiple formats to accommodate the various needs and media capabilities of emergency responders and training organizations:
  - Web-based
  - CD or DVD
  - Live (via project staff or training their own trainers)
  - Video (live presentation recorded on tape)
  - Hard copy printout
- In FY07, initiate development of Operations-Level training materials, to be used, when possible, in conjunction with mobile “hydrogen behavior demonstration” props funded under Safety, Codes and Standards.
- In FY07, complete development of training materials for other target audiences, including code officials.

Summary

- Hydrogen safety training and education for emergency responders and other members of the safety community is essential for successful near-term hydrogen demonstrations and a future hydrogen economy.
- Our approach seeks widespread involvement/review by the relevant hydrogen, vehicle, safety, and emergency response communities.
- This activity is intended to provide stand-alone training as well as an information set that emergency responder and other safety training organizations may incorporate into their own ongoing or planned activities.

Back-up Slides

Responses to Previous Year Reviewers' Comments

- "Need to capture the 'lessons learned' in a book or on the web."
  - The Incident Reporting and Best Practices Database funded under the larger Hydrogen Safety Program are intended to do just that, and be available via a public website.
- "How will you deal with the 70% volunteers?"
  - The variety of formats in which the materials will be available at no cost is intended to at least partially address this issue.
- "Closer coordination with related international efforts should be emphasized."
  - This work is just beginning, but a portion of the interaction with the International Energy Agency Hydrogen Safety Working Group is pursuing this goal.

Publications and Presentations

- First Pilot Courses conducted at HAMMER (August 2 and 30, 2005)
- Second Pilot Courses conducted at HAMMER (April 1-2, 2006)
- Fassbender, LL, Kinzey, BR and BM Akers. Safety Training for the Hydrogen Economy. 2006-01-0329. SAE World Congress 2006
- Kinzey, B.R., Fassbender, L.L. and Akers, B.M. National Training Facility for Hydrogen Safety: Five-Year Plan for HAMMER, 2005 HYSAFE Conference, Pisa, Italy, September 2005.
- National Hydrogen Association. "HAMMER Facility Well Positioned for Hydrogen Safety Training of First Responders." Hydrogen Safety Report , April 2005.
- NASFM/RSPA Hydrogen Workshop in Greenbelt, Maryland, November 2004.
- Fassbender, Linda and Bret Akers. National Training Facility for Hydrogen Safety at the HAMMER Site. Presented to Hydrogen and Fuel Cells Summit VIII, Miami, FL June 15, 2004.
- DOE/HFCIT Hydrogen Safety Review Panel Semiannual Meeting, June 2004
- Numerous informal presentations, such as to International Energy Agency Hydrogen Safety working group, HAMMER Steering Committee, etc.

Critical Assumptions and Issues

- The needed national and international effort goes far beyond the constraints of the Department of Energy program.
  - DOE can provide useful materials, but cannot pay for training nor require anyone to undergo training. A national/international collaboration among public and private sectors that gains commitment on everyone's part is needed. For example, the HFCIT effort continues to pursue partnerships with organizations that conduct or support safety education and training in order to take advantage of established communication channels, thereby accelerating dissemination at minimum additional cost.
- The commitment to education and training must be long-term to support a hydrogen transition.
  - The scope of the effort is quite large, even from the simple standpoint of the size of the audiences that ultimately must be reached. Sustained support for the education and training effort will be required over many years to be successful.