PNNL-SA-65774

Hydrogen Safety: First Responder Education

Marylynn Placet,
Pacific Northwest National Laboratory

for the

Vehicle Technologies Annual Merit Review
May 21, 2009

This presentation does not contain any proprietary, confidential or otherwise restricted information.

Project ID# ed_01_placet

Pacific Northwest NATIONAL LABORATORY

Proudly Operated by Battelle *Since 1965*

Overview

Timeline

- Project start date: 10/2004
- On-going
- Percent complete, FY09: ~50%

Budget*

- FY06: $325K
- FY07: $490K
- FY08: $300K
- FY09: $265K

(100% DOE funded)

* *Pre-FY06 funding came from the HFCIT Safety, Codes and Standards program element. FY07 & FY08 funding was from HFCIT Education budget. FY09 funding is from VTP.*

Barriers addressed**

- Lack of Readily Available, Objective, and Technically Accurate Information
- Disconnect Between Hydrogen Information and Dissemination Networks
- Lack of Educated Trainers and Training Opportunities

Partners

PNNL is working with the Volpentest Hazardous Materials Management and Emergency Response (HAMMER) Training and Education Center and California Fuel Cell Partnership on course curriculum, course delivery and outreach

** *Hydrogen, Fuel Cells & Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan, October 2007.*

Objectives

- **Long-Term Goal:**

  Support the successful implementation of hydrogen and fuel cell demonstration projects and market transformation by providing technically-accurate and objective information about hydrogen to first responders*

- **Objectives for FY09:**

  1. Launch an in-depth, one-day course for first responders, utilizing DOE's fuel cell vehicle prop
  2. Continue to update the awareness-level course (first launched in FY07)
  3. Disseminate first-responder hydrogen safety educational materials at appropriate conferences

**Focus is on first responders (fire, law enforcement, and emergency medical personnel), who must know how to handle potential incidents; their understanding can also facilitate local project approval.*

Pacific Northwest
NATIONAL LABORATORY

Approach: FY09

- **Task 1: Prop-Based Course Curriculum and Delivery (70% complete)**

  Develop, pilot, and deliver an advanced course that uses a mobile hydrogen fuel cell vehicle prop (developed in a companion project, originally funded under the Hydrogen Safety, Codes and Standards program element)

- **Task 2: Awareness-Level Course (95% complete)**

  Update the stand-alone, interactive, web-based "awareness-level" course -- "Introduction to Hydrogen Safety for First Responders"

- **Task 3: Outreach (50% complete)**

  Conduct outreach activities related to the "Introduction to Hydrogen Safety for First-Responders" course, and disseminate related materials

Milestones and Deliverables

Deliverable/Milestone	Status
Deliver prop-based course (1st course by 1/30/09; 2nd course by 6/2/09)	On schedule Pilot courses given in December 2008 and March 2009; 1st course for first responders May 2009; 2nd course proposed for June 2009
Evaluation of potential training sites (by August 2009)	Expected to be completed on schedule
Conferences chosen (October 2008)	Completed
Webcast of Awareness-Level Course (Sept 2009)	Expected to be on schedule, if resources permit

Pacific Northwest
NATIONAL LABORATORY

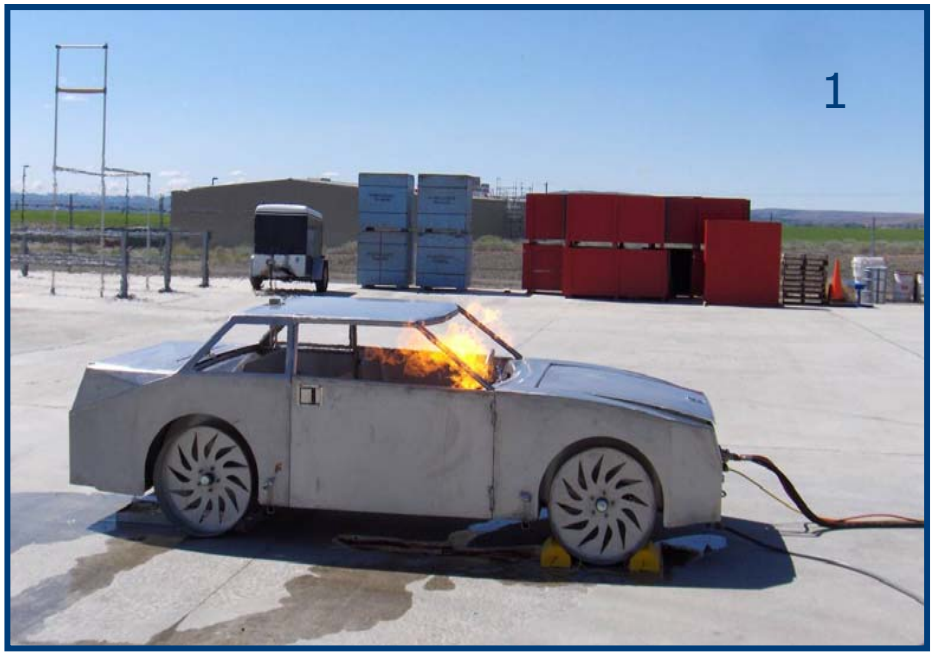
Accomplishments: Task 1 (Prop-Based Course)

- Curriculum completed and reviewed by DOE
- Pilot course for technical reviewers held on Dec. 2, 2008
- Pilot course for industry representatives held on March 10, 2009
- Curriculum was revised slightly after each pilot course
- First course for first responders held on May 6, 2009
- Courses planned for June and August 2009

Pacific Northwest
NATIONAL LABORATORY

Fuel Cell Vehicle Safety Training Prop

Prop demonstrates potential conditions that could be encountered during the control and suppression of a fire in or around a FCV.



A propane flame simulates a compartment fire. (1) A hydrogen flame, from vented hydrogen gas, is also simulated by the prop, but is not visible in daylight. This flame can be seen using a thermal imaging camera (2).

Training prop features: (3) mock fuel cell stack, (4) mobile capability, (5) mock hydrogen storage tank.

Volpentest HAMMER

Pacific Northwest NATIONAL LABORATORY

Proudly Operated by Battelle *Since 1965*

Prop-Based Course Curriculum

- Classroom Modules
  - Hydrogen and Fuel Cell Basics
  - Hydrogen Vehicles
  - Stationary Facilities
  - Emergency Response
- Practical Exercise: Incident Scenarios
- Quiz
- Hands-On Exercise with FCV Prop

Pacific Northwest
NATIONAL LABORATORY

Followed Steering Committee Advice from FY08

Key input:

- Eight-hour course is appropriate
- Use existing, vetted materials as much as possible
- Integrate information on technical issues (e.g., the components of a FCV) with instruction on the appropriate safety-related emergency responses
- Teach first responders what is the same and different about hydrogen and FCVs, compared to conventional fuels and vehicles

Steering Committee Members:

OEMs (Ford and General Motors; Plug Power)

Energy companies (Shell and Chevron)

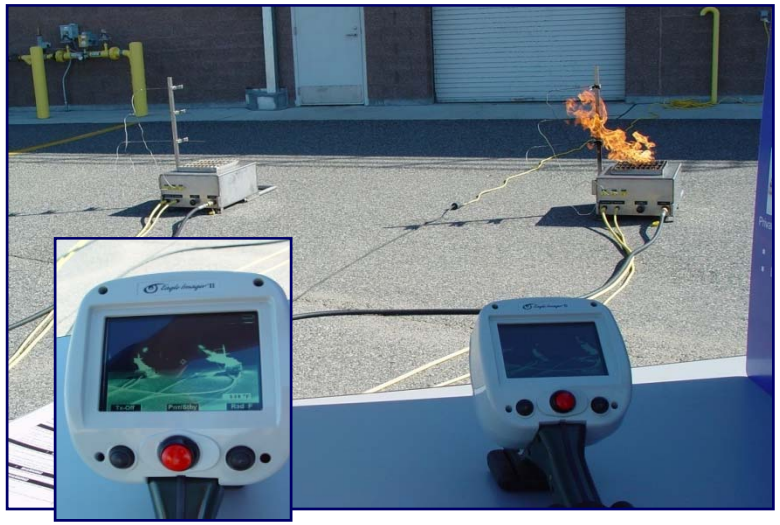
Hydrogen/FCV organizations (California Fuel Cell Partnership and NextEnergy)

Firefighting organizations (Washington State Fire Training Academy and local Washington State fire departments)

Technical Experts from Los Alamos, Sandia and Lawrence Livermore National Labs

Accomplishments: Task 2 (Awareness-Level Course)

- Added **new video** of hydrogen versus propane flame
- Completed **voiceovers** (instead of text only)
- **Certificate** of completion added
- Revised **quiz**
- Still averaging **300-500 unique visits** per month



Pacific Northwest NATIONAL LABORATORY

Proudly Operated by Battelle Since 1965

Accomplishments: Task 3 (Outreach)

- HAMMER staff attend two major first-responder ***conference*** events to raise awareness about hydrogen safety and about the DOE-sponsored courses
  - Fire Department Instructor's Conference, April 2009
  - Fire Rescue International, August 2009
- Booths display and disseminate **posters**, announcements of **course offerings**, hydrogen safety **literature**, awareness-level course **CDs**
- At FDIC Conference, HAMMER conducted live flame prop **demonstrations**

Pacific Northwest
NATIONAL LABORATORY

Future Work

- Complete three first responder courses at HAMMER before end of FY09
- Bring prop-based course “on the road” to chosen training centers in FY10
- Continue to address comments, revise content, and field questions on the Awareness-Level Course
- Continue outreach activities (conferences, distribution of materials)

Project Summary

- **Relevance** – Education of first responders is a critical element of introducing hydrogen and fuel cell technology
- **Approach** – Develop and disseminate educational materials that pertain to hydrogen safety and that are aimed at the first-responder audience, including ***hands-on*** exercises that first responders expect
- **Accomplishments** – Prop-based, one-day course completed, piloted and launched. Web-based awareness-level course revised. Several versions of hydrogen properties video developed. Attended major conference to promote prop- and web-based courses.
- **Future work** – Deliver prop-based course, secure endorsement, and begin giving the course to first responders nationwide. Continue to maintain, refine, and disseminate awareness-level course and related materials.