

By LINDA FASSBENDER, BRET AKERS and CHRISTY COOPER

## Introduction to Hydrogen Safety for First Responders

### *New Course Provides Hydrogen Fuel Cell Technology Basics And Critical Information on Initial Protective Actions*



Courtesy of HAMMER

As shown with a controlled demonstration prop, the hydrogen flame, left, is invisible in daylight, whereas the propane flame, right, is clearly visible.

Hydrogen vehicles typically have a blue-diamond decal as shown here.



Courtesy of U.S. Department of Energy

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There's a lot of buzz about energy and alternative fuels today. Hybrid-electric vehicles are becoming more common and E85 (a mixture of 85% ethanol and 15% gasoline) refueling pumps are growing in number. What you may not know is that hydrogen technology is also emerging in certain parts of the country – through vehicle demonstration programs and early deployment of stationary fuel cells for on-site power generation.

What does this mean for firefighters and other first responders? It means hydrogen and fuel cells may already be in use in your community or may be coming sometime in the future. But most people don't know much about hydrogen, and they know even less about its use as a fuel.

The new "Introduction to Hydrogen Safety for First Responders" training course can help you get up to speed. Created by the U.S. Department of Energy, in partnership with the Pacific Northwest National Laboratory and the Volpentest Hazardous Materials Management and Emergency Response (HAMMER) Training and Education Center, the course provides basic information to help raise awareness among fire, law enforcement, and emergency medical personnel and provides access to resources for more detailed information if needed.

Course modules include the following:

- Hydrogen Basics
- Transport and Storage
- Hydrogen Vehicles
- Hydrogen Dispensing
- Stationary Facilities
- Codes and Standards
- Emergency Response

Videos and animations illustrate key points, and a short quiz helps reinforce knowledge retention and tests the users' understanding.

Industry has used hydrogen safely for decades – more than

## HYDROGEN QUICK FACTS

- HYDROGEN is colorless, odorless, tasteless, non-toxic, non-corrosive and non-poisonous.
- HYDROGEN is the lightest and smallest element, and a gas under normal conditions.
- HYDROGEN can be ignited with minimal energy (such as a small spark), and its flammability range is wide (i.e., ignition can occur between 4% and 75% hydrogen in air, by volume).
- HYDROGEN is 14 times lighter than air, so it rises and disperses rapidly.

nine million tons of hydrogen are used annually in the United States. Hydrogen is no more dangerous than conventional fuels when handled properly. Most, if not all, auto manufacturers use a small blue diamond logo to identify hydrogen vehicles. Stationary facilities typically use National Fire Protection Association (NFPA) hazard placards for both gaseous and liquid hydrogen, and the U.S. Department of Transportation requires placards and orange identification panels for hydrogen containers in commercial transport, similar to those used for other hazardous materials.

## Emergency Response


If released, hydrogen rises and disperses very quickly, but leaking and/or burning hydrogen may be difficult to detect. Hydrogen gas is odorless and colorless, and a hydrogen flame is nearly invisible in daylight.

If called to an incident that could involve hydrogen, first responders should follow standard response protocol and remember the following:

- Look for recognizable signage, listen for escaping gas and watch for thermal waves that signal the presence of a flame.
- Let a hydrogen fire burn, if safe to do so.
- Never cut through stainless-steel hydrogen lines or orange high-voltage electrical lines.
- Avoid cutting through vehicle floorlines, where hydrogen lines and high-voltage electrical lines and devices are commonly located.

## Take the Course

The Introduction to Hydrogen Safety for First Responders is available on-line at [www.hydrogen.energy.gov/firstresponders](http://www.hydrogen.energy.gov/firstresponders). For those who cannot access the Internet, the course is also available for free on CD and in print through the DOE Energy Efficiency and Renewable Energy Information Center

(877-EERE-INFO/877-337/3463, from 9 A.M. to 7 P.M. Eastern). Small posters suitable for display on bulletin boards at fire stations and offices summarizing critical hydrogen characteristics and emergency response information will be available soon, for free, through the Information Center  at the number above.