Remarks

As Prepared For Delivery By

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Office of Hazardous Materials Safety

Hydrogen Executive Leadership Panel (HELP)

On-Going Dialogue with Emergency Responders on Safety of Hydrogen Fuel Cell Transportation Technologies

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Good Afternoon

It is a privilege to be among you today. I represent the U.S. Department of Transportation and, in particular, DOT's Research and Special Programs Administration.

RSPA, as we call it, is the Federal agency that regulates, inspects, and enforces the safety of hazardous materials in transportation.

Our safety authority includes the 800,000 hazmat shipments transported daily by rail, highway, vessel and air. Petroleum products currently account for over 80% of the roughly 3.1 billion tons of hazardous materials shipped annually. Liquid and gas commodities also travel through the 2.3 million miles of pipelines traversing the

nation. The emerging hydrogen economy, as it replaces or supplants a petroleum based economy, holds potentially profound impacts on hazardous material and pipeline transportation. We must begin to think about and plan for this transformation.

I was asked to speak briefly about the public safety consequences implied in our transition to hydrogen as a primary energy carrier – and emergency response capabilities play a critical role in ensuring public safety. Your efforts at educating and maintaining a highly professional cadre of emergency responders is duly noted and sincerely appreciated. We are once again joining in partnership. And I fully expect this affiliation to prove equally effective.

Historically, the general public both anticipates and fears radical breakthroughs in technology. There is always fear of the unknown. We need to instill public confidence, both in the safe regulatory mandates that DOT enforces, and the expert capabilities of the first responder communities to catastrophic incidents.

We are now embarking on a revolution in energy-carrying technology that will bring hydrogen into our everyday lives. Hydrogen is a hazardous material, and therefore the DOT is intrinsically involved in the ground floor transportation safety efforts to prepare for its widespread use.

I know that you are already familiar with hydrogen hazards. Hydrogen is currently transported in cylinders, tube trailers, rail cars and cargo tanks. There are 900 miles of dedicated hydrogen pipelines in this country.

Up until now hydrogen has been used primarily for the petrochemical and food industries, and of course at NASA where it is used as a propellant for satellites and rockets. The historical use of hydrogen has been a very safe endeavor with few incidents. However, as hydrogen becomes a wider accepted standard energy source, there will be greater opportunity for accidents and incidents to which we must respond.

In responding to accidents and incidents, I am sure everyone in this room is familiar with role played by the Emergency Response Guidebook. The Department of Transportation just published the 2004 edition and has distributed 1.73 million copies. Information about the unique chemical and flammability properties of hydrogen (lighter-than-air and burns with an invisible flame) was incorporated as a result of a National Transportation Safety Board investigation of an accident near Ramona, Oklahoma in 2001 involving a tractor semi-trailer carrying horizontally mounted cylinders filled with compressed hydrogen. We welcome first responder input into future revisions of the Guidebook, whether related to hydrogen or otherwise.

For the most part, the public is not aware that hydrogen has been transported safely in this country for the last 60 years. In hazardous materials transportation, hydrogen today is typically transported as a

compressed gas or a cryogenic liquid (primarily the former). The energy penalty to get hydrogen into a cylinder or container is roughly 10% of the energy content in the case of a compressed gas (and higher at greater pressures) and 30% in the case of a cryogenic liquid.

The energy density (by volume or weight) of hydrogen, either transported as a compressed gas or cryogenic a liquid, is a roughly 1/3 or so of that of gasoline. So for every tank truck of gasoline on the highway today (and about 18,000,000 such shipments are transported annually), some multiple would be required if the same energy content was moved in this fashion.

As mentioned earlier, the safety record for transporting hydrogen has been good. Since the beginning of recorded history, which translates to about 1972 with respect to hazardous materials transportation incident reports, there have been 3 fatalities and 13 injuries attributable to transportation of hydrogen by highway or rail. By way of comparison, there are roughly 10 fatalities per year due to the transportation of gasoline and other flammable liquids. However, again, the amount of hydrogen transported today is absolutely dwarfed by the quantity of petroleum products currently moved.

From an emergency response standpoint, the transition to a hydrogen economy will at least pose differences in incident response. Gasoline, transported as a liquid with heavier-than-air vapors, would be replaced by much greater numbers of vehicles transporting hydrogen, a lighter-than-air gas transported conceivably at very high pressures. Basic

differences in transferring the material from storage to vehicle, particularly with the current familiarity the public has with gasoline, may present challenges.

The Department of Transportation is already faced with requests to review and approve applications for exemptions for novel designs to transport hydrogen -- including plastic-lined, carbon fiber-wrapped cylinders capable of service pressures from 7,300 up to 13,000 pounds per square inch. Use of metal hydride technology to store and transport hydrogen; cylinder, tank, or pipeline failure due to hydrogen embrittlement; changes in testing and service life; different packaging failure modes and consequences; and a host of other technical issues confront us as we move to a hydrogen economy.

Ensuring that hydrogen and fuel cell powered vehicles provide a level of safety comparable to other vehicles currently in use requires a substantial research effort. The Department of Transportation supports advanced hydrogen research and developmental demonstrations to understand and harness hydrogen's energy capabilities. We do this through funding grants, partnering, and management programs with industry and university researchers. We also develop and enforce the safety codes, standards and regulations of hazmat transportation. The public bases its trust on the reliability of our measures. But the public's ultimate trust really resides in you. . . . . the first responder community . . . . . and your courageous efforts to meet each challenge . . . . . and to save lives.

Hydrogen, though an energy commodity with which you, as first responders, are familiar, has never been in the public eye. Widespread use is not far in the future. Now is the time to begin preparations.

Tomorrow's exercises are extremely important. Imagining and preparing for worst-case scenarios is a strategic tool to guard against mishaps and to be prepared to mitigate them when they do occur. We need to share our experiences and strategies in "what if?" situations.

It is our mutual responsibility to imagine possible disaster scenarios. Play them out in intellectual exercise; experiment in laboratories and in secured real-world demonstrations. We can learn from each small incident during the demonstration stages. We can improve our processes, protocols, and standards. We can, above all, share our experiences, our concerns, our insights, and our solutions.

This forum is intended to facilitate open examination of the public safety community's concerns about the safe management and use of hydrogen as an energy carrier –on board automobiles, in stationary refueling stations, on trucks, barges and rail cars and through our national pipeline system.

One of the very best approaches to safety is in reaching out to American communities . . . . . educating the public to better understand hydrogen, its properties and its hazards. This is no small undertaking. With human factors, the challenge goes beyond simply education. The challenge is in understanding how to motivate people to act in safer

ways, and how to find and manage those people who refuse to act safely. Reaching America's communities is a tall order. To be effective, we need people in every community who know safety…, know their communities…, and have an extraordinary level of public credibility. We need people with a strong sense of public service and a sturdy desire to make a difference in hydrogen safety awareness.

You, of all audiences, know that accidents will happen. How we approach this transition to a hydrogen economy, and how well we work to mitigate the damage of such incidents largely dictates public acceptance . . . . . and the success of the hydrogen fuel initiatives.

With time, the public has learned to accept startling new technologies which have changed our lives for the better. The same will be true for hydrogen.