NHA-DOE Cost Shared Activities: Hydrogen Codes and Standards Outreach

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Background:

The Mission of the National Hydrogen Association (NHA) is to foster the development of hydrogen technologies and their use in commercial and industrial applications and to promote the role of hydrogen as a major energy carrier of the future. The basic long-term goals are determined by the greatest needs tempered by activities consistent with the role of the NHA as an association. Today these are:

- To educate the public and policy makers on the benefits of hydrogen;
- To assist in the development of necessary hydrogen codes and standards; and
- To support the development of hydrogen infrastructure which in turn supports the deployment of hydrogen-related energy technologies.

Goals and Objectives of this specific codes and standards activity are as follows:

- Bring industry experts together to establish technical criteria for hydrogen energy components and systems nearing commercialization.
- Continue to advance U.S. industry positions in the international arena, including ISO TC 197 and IEC TC 105.
- Participate in applicable working groups, and continue to take an active role in international arenas.
- Work closely with the International Code Council (ICC) Ad Hoc Hydrogen Committee (IHC) to include hydrogen and hydrogen energy systems in the model codes in the United States.
- Continue efforts to identify gaps in codes and standards that are required for commercialization and siting of hydrogen energy systems.
- Identify code and standard organizations that can begin to or are in the process of developing these hydrogen codes and standards.
- Pull industry experts together to assure technical accuracy and consistency of these codes and standards.
- Report on the activities to a wide audience, assuring information transfer regarding the status of efforts and technical (and sometimes political) issues remaining.

Under a separate contract through NREL, the NHA also seeks to facilitate the coordination of hydrogen codes and standards activities through the Hydrogen Codes and Standards Coordination Committee (HCSCC), and disseminate timely information about these efforts through a monthly electronic publication, the “Hydrogen Safety Report”.

The NHA holds technical conferences with industry, academia, national laboratories, government laboratories, code officials and code organizations to bring experts together in a focused activity to develop and write new standards for hydrogen technologies. This includes such items as storage tanks, fueling nozzles, connectors, safety equipment, and other key

components and integrated systems needed to move hydrogen into the energy sector. The NHA has members and staff who are active participants in the International Standards Organization and its Technical Committee 197, which is responsible for the presentation and approval of the developed standards.

NHA Workshops

The NHA holds workshops in conjunction with technical conferences where industry, academia, national and government laboratories, code officials, code organizations, and other stakeholders can come together to identify hydrogen safety code and standards issues and work on drafting consensus documents.

The NHA currently has funding through industry and DOE partnership to host two Hydrogen Safety Codes and Standards Workshops per year. The most recent one was held February 26 in conjunction with a WSRC Hydrogen Storage Workshop. Over thirty experts gathered to exchange information on the status of these efforts, and how to participate in them. Proceedings were available on-line through the electronic newsletter and on the NHA website within 2 weeks of the workshop. The "Hydrogen Safety Report" has been published by the 15th of each month since December 2001, and is free to all interested parties through the NHA website (www.HydrogenUS.com), or on its own site at (www.HydrogenSafety.info). Over 300 interested parties receive email notification when a new issue is posted, with a hotlink to the information.

The next NHA C&S Workshop is to be held either in Fort Worth, Texas September 29 - October 3, 2002 -in conjunction with the BOCA - ICBO - SBCCI Joint Annual Conference or October 17 & 18 in Washington, DC (following the ICC hearings). The final decision on this workshop will be made by the DOE/NREL Hydrogen Codes and Standards Coordination Committee no later than June 30, 2002.

The NHA now publishes Codes and Standards Workshop Proceedings online - available to the public. Only sensitive information not approved for wider dissemination is published on the NHA members-only website, such as draft standards and member contact information.

International Code Council (ICC) Support:

The NHA supports the International Code Council in their efforts to review, develop and promulgate new codes for the use of hydrogen. This includes providing experts, technical reports, data and other information needed by the Code Officials to complete the development of these new codes.

The International Code Council Hydrogen Ad Hoc Committee (AHC) held its first meeting at the NHA office in Washington, District of Columbia on 30-31 August 2000. The purpose of the group is as follows: "The development of appropriate, reasonable and enforceable model health and safety requirements that apply to matters germane to the ICC *International Codes* and affecting or relating to the use of hydrogen in vehicular and portable applications: inclusive of the safeguards that apply to conditions hazardous to life, property or public welfare in the storage, handling or use of hydrogen in the infrastructures (i.e., service stations, parking garages, loading areas and similar uses) that support vehicular and portable applications. Such provisions would serve as a model for adoption and use by enforcement agencies at all levels of government in the interest of national uniformity." The AHC is composed of code officials, designers, industry representatives, and staff of the three code councils for a total of twelve

voting members. There are also non-voting advisors and a number are from the NHA membership including the National Renewable Energy Laboratory, Ford, Praxair, and the Gas Technology Institute. The NHA was proud to host the inaugural AHC meeting and continues to support the ICC Ad Hoc Committee on Hydrogen by attending meetings when permitted, providing data and expertise when requested, reviewing draft code changes, coordinating industry participation, and publicizing the activities.

Another major effort has been garnering industry support for the ICC hearings in Pittsburgh in April. The ICC AHC has proposed changes for including hydrogen energy systems. The NHA participated in all the hydrogen-related hearings. The two proposed code changes to the International Fire Code were approved, with modifications. There was huge support for the need to put something in the code now, knowing we have the next 18 months to work out the details, and include exceptions as appropriate. Only one person stood up in opposition claiming "hydrogen is a very dangerous gas and scares the living daylights out of me". It was a very touch-and-go situation, and we all learned quite a bit about process, and how important it is to have built support across communities, and have assistance, real-time, from those familiar with procedure. F176-02 was approved as modified (AM). The modifications are consistent with SE/SW Fire Chiefs' recommendations to AHC. In addition, ALL four (4) exceptions to Section 2209.3 were deleted. F-177-02 also passed as amended, with issues of venting to be worked out. F177-02 was approved as Modified (AM). IFC Committee Chair ruled AHC modification 'editorial'.

All International Fuel Gas Code proposals were disapproved by the IFGC committee, however floor action was taken on each. Support for the changes was overwhelming, and the committee recommendation along with the floor action will go on to the Final Action Consideration at the end of September. The NHA is working with the HCSCC to coordinate information dissemination to voting members and industry as well as technical support to the ICC AHC.

The NHA will support the BOCA - ICBO - SBCCI Joint Annual Conference ICC Final Action Considerations in Fort Worth, Texas September 29 - October 3, 2002. A critical near-tern need is to educate the governmental members of the ICC bodies that will be deciding the final actions of the disputed ICC AHC proposals for hydrogen in Fort Worth, Texas in September. The NHA will continue to support this through the HCSCC, but increasing support for this type of education and outreach is crucial to the success of the codes and standards efforts.

International Standards Development:

ISO TC 197 is the International Standardization Organization Technical Committee on Hydrogen Technologies. ISO TC 197 working groups which NHA staff supports are as follows:

- ISO TC 197/WG 5; Gaseous hydrogen blends and hydrogen fuel — Service stations and connectors
- ISO TC 197/WG 6; Gaseous hydrogen and hydrogen blends — Land vehicle fuel tanks
- ISO TC 197/WG 7; Basic considerations for the safety of hydrogen systems

Bob Mauro currently serves as the Chair of the U.S. Technical Advisory Group to ISO TC 197. Karen Miller serves on the editing committee of ISO TC 197. Ms. Miller is also active in the safety aspects of IEC TC 105.

The NHA participates in the development of international standards for hydrogen energy technologies in order to provide a forum for issues, to present consensus hydrogen industry input domestically and furnish a collective U.S. hydrogen industry position at international

meetings. Another objective of this effort is to present the U.S. hydrogen positions at international forums and participate in international meetings that are of benefit to the whole hydrogen community in the areas of hydrogen safety, codes and standards. NHA staff attends key energy meetings, including hydrogen-specific and broader energy-related meetings and conferences. This allows the NHA to present U.S. hydrogen community position at these meetings through formal and informal forums. Staff attends ISO/TC-197 work group meetings, plenary sessions, and other applicable meetings.

Some interesting developments in Europe have necessitated an open dialog on the US position in the development of international standards. This has implications both technically and politically, and relates to proposed European-wide regulations which are likely to be proposed as global regulations, despite lack of U.S. involvement in setting the framework.

The need to develop a US position on the international level must go well beyond the current efforts. Bob Mauro has been actively working with EPA, DOT, the Administration, and many others to bring awareness to this effort, which is critical to U.S. competitiveness at home and abroad. The NHA supports efforts to assure that decisions are made by consensus using international standards bodies and that U.S. interests are not disadvantaged by including advanced technologies and including U.S. specific Industry technologies.

In addition, with such excellent cooperation developing on a national level, the current efforts must continue, with additional support for coordinated activities, such as those of the HCSCC. The NHA is poised to lead efforts best led by the hydrogen industry, and play an active role in broader efforts.

It is important to understand that the process differs between Europe and the United States. European governments develop regulations based on standards, where they exist. U.S. industry develops consensus standards that are then codified into law with one or more standard(s) cited in the code. In Europe, the regulations are driven by government policies. In the U.S., we have a large number of code jurisdictions, and out codes and standards are driven by the industries that must abide by them.

There is a very meaningful international role for the U.S. Department of Energy (DOE):

- Make sure that U.S. interests are involved and adequately represented in the standards making process; and
- Make sure that the U.S. government speaks with the same voice in presenting U.S. interests internationally (WP29), as the consensus position of U.S. industry speaks with in international standards organizations.

ISO TC 197 and IEC TC 105 working group meetings and Plenaries will be held in June in Montreal in conjunction with the World Hydrogen Energy Conference (WHEC). NHA will actively participate. The U.S. TAG meeting for ISO TC 197 is to be held in Washington, DC during the third week of May. NHA will discuss and possibly propose a new work item on charged metal hydrides. NHA has organized three technical sessions at WHEC on hydrogen safety, codes and standards.

Coordination:

The NHA works with DOE, NREL, and others to coordinate codes and standards activities to avoid duplication of effort and enable hydrogen systems to be sited. This requires coordination with industry groups and standards organizations such as the International Standardization

Organization, American Society of Mechanical Engineers, IEC TC 105, the U.S. Fuel Cell Council, the Society of Automotive Engineers, Fuel Cell Propulsion Institute, National Fire Protection Association, and the DOE Fuel Cell Codes and Standards Summit.

NHA hosts Hydrogen Codes and Standards Coordination Committee meetings, and participates actively. The NHA has had an abstract accepted for a global world conference aimed at the automotive community for September in Ann Arbor, Michigan. Plans are to coordinate this paper with the HCSCC. Additional attention must be placed on developing and advancing a U.S. position in the development of international standards and regulations.

The NHA will present hydrogen codes and standards activities at the DOE Fuel Cell Summit at the end of May.

The NHA has successfully encouraged a representative from the US Fuel Cell Council to join the NHA C&S Committee and the US TAG for ISO TC 197.

The ICC process has recently brought a number of associations that serve the Petroleum and Natural Gas industries to the fold, all in support of developing codes and standards for hydrogen energy systems.

NHA staff publishes and presents pertinent hydrogen safety, codes and standards information at a variety of forums, including Global Parks conference to be held in September in Michigan, ASNT conference held in March in Portland, Oregon, and SAE Fuel Cell Transportation Technology Summit II in Michigan in April.

In October 2001, the NHA had a large article published in the GSA publication “Vehicle News”.

The NHA keeps its members informed of progress in the development of hydrogen safety, codes and standards through publication in its Quarterly Newsletter, the *NHA News* and by posting sensitive draft information, including draft standards, on the NHA *Members Only* website. This allows NHA members an opportunity to review the work of other organizations who have requested collaboration with the hydrogen community but can not make these items publicly available. The general articles published in the newsletter are made available to the public on the NHA website, and mailed to NHA members. In addition, our separate NREL contract allows us to produce a monthly electronic newsletter dedicated to hydrogen safety issues. It is available on the NHA website, and also has its own dedicated site. Anyone can sign up to receive email notification each month when it is posted online. In this way, the information is distributed broadly, and interested parties are given an opportunity to get involved in the standards development process.

Information dissemination remains crucial to building consensus and developing a national and international dialog. The NHA would like to expand on these efforts to develop informational materials, presentations, and forums for targeted audiences, such as code officials, regulators, early adopters for transportation, stationary, and portable power applications, and the public. It is important to educate the public on several levels. For example, the tax payers must understand hydrogen in order to support efforts to purchase and operate hydrogen buses, then the general public must feel safe and good about riding in them. The benefits of hydrogen technologies need to be clearly articulated. For example, with hydrogen fuel cells running auxiliary power in a vehicle, it is possible to have air conditioning running without the engine operating. There are many value-added benefits that can help prepare the market for these emerging technologies.

Fortunately, we now have a wealth of information on draft C&S efforts, including identified needed expertise. Unfortunately, we are severely constrained on our ability to work with the public, building code officials and local fire marshals, due to lack of support in the form of robust DOE cost-shared education and outreach efforts. I can only hope that these vital programs can be restored and the ability to get the word out on these efforts returns soon.

Conclusion:

The hydrogen industry, largely represented by the National Hydrogen Association, has experience and expertise in safely working with hydrogen energy systems. Other groups have expertise in complementary areas, i.e., SAE has expertise in automotive applications, ICC has expertise in model codes, USFCC has expertise in fuel cells, etc. By bringing these experts together in meetings, workshops, and through information sharing, the necessary codes and standards can be developed utilizing all applicable expertise while minimizing duplication of effort and avoiding technical incompatibility of standards.

In addition, working together allows a national dialogue of the US position for technical standards in the international arena. Concurrently providing information on the status of hydrogen technologies and standards provides an opportunity for regulators, decision-makers, early adopters, and the public to gain confidence in the emergence of hydrogen energy systems.

The NHA conducts safety codes and standards outreach in an open, non-competitive manner by conducting workshops, participating in the development efforts of other organizations, working with the HCSCC to coordinate the efforts, presenting hydrogen safety, codes and standards activities and conferences and workshops, and making information available in a timely manner to all interested parties. Safety is not proprietary.