

## **TRIP REPORT**

### **DOE/NASFM/CaFPI/NREL HYDROGEN FUELING STATION AND FUEL-CELLS-FOR-TELECOMMUNICATIONS PERMITTING WORKSHOP**

**DATES: March 12-13, 2008**

**LOCATION: Buelton, CA (Santa Ynez Valley Marriott)**

**REPORTER: Russell Hewett**

During the period March 12-13, I participated in the *Hydrogen Fueling Station and Hydrogen-Fuel-Cells-for-Telecommunications Permitting Workshop* conducted collaboratively by DOE, NREL, the National Association of State Fire Marshals (NASFM) and the California Fire Prevention Institute (CaFPI). The workshop was conducted in conjunction with CaFPI's *2008 Annual Workshop* held in Buelton, CA.

#### **1.0 BACKGROUND AND WORKSHOP OBJECTIVES**

This workshop was the *second* of a series of planned workshops to address the critical issue of facilitating the timely and cost-efficient permitting of hydrogen fueling stations (HFS) – to facilitate the introduction of hydrogen-powered vehicles in the US as they are introduced by the automotive industry. However, one of the applications of hydrogen being introduced into the marketplace currently is hydrogen-powered fuel cells for providing backup power for telecommunications. Consequently, the workshop also addressed facilitating the permitting process for telecommunication applications.

The objective of these workshops is to obtain the input of key state and local fire and building code officials having roles in the permitting process regarding how the permitting process for HFS and for telecommunications applications should work and be made more timely and cost-effective for both code officials, HFS project developers and telecommunication project developers. In addition, the objective is to give the participants the opportunity to articulate their recommendations regarding: (i) changes to existing codes and standards to facilitate permitting; and (ii) new safety requirements.

The first workshop was held collaboratively with NASFM in Atlanta, GA in July 2007. It was national in scope – the 40 participants selected by invitation from among fire marshals, fire safety officials and building code officials from across the US recognized as being “leaders” and respected by their peers. It focused exclusively on hydrogen fueling station permitting.

The subject workshop was the first of several planned regional workshops and involved approximately 40 invited fire marshals, fire safety officials and building code officials – again, recognized as being “leaders” by their peers.(There was the attempt to have the workshop be “half-and-half” in terms of the mix of fire safety and building code officials). In addition, there were several representatives from the telecommunications industry.

Workshop invitees are listed in the attachment below.



Finally, an additional objective of the Santa Ynez workshop was to introduce the the new DOE/NREL *Hydrogen and Fuel Cells Codes and Standards* website that is being developed for permitting officials.

## 2.0 HOW THE WORKSHOP WAS CONDUCTED

The agenda for the one-and-a-half day workshop is attached below.



The work of the workshop began with a presentation by Antonio Ruiz (Technology Development Manager, Safety and Codes & Standards Subprogram of the DOE Hydrogen, Fuel Cell and Infrastructure Technologies Program). His presentation provided background information for the participants regarding: (i) the Safety and Codes and Standards Subprogram; (ii) how DOE became involved in the workshops program; and (iii) what DOE hoped to get from the workshop.

Then, there were two technology presentations: (i) a combined fuel cell manufacturer/telecommunications presentation describing a completed telecommunication project; and (ii) a presentation on fuel cell vehicles, hydrogen fueling stations and the HFS permitting process from the perspective of the automotive industry.

The objectives of the two presentations were to:

- o Articulate the issues and challenges involved in getting a project permitted (i.e., the telecommunications project) and the codes and standards documents and sections of those documents used in the permitting process

- o Articulate “challenges” involved in working with permitting officials
- o Articulate what might be done to make permitting less time-consuming and more efficient
- o Articulate codes and standards needs
- o Articulate the need for permitting official/project developer collaboration

The telecommunications presentation, given by Paul Buehler (Plug Power), is attached below.



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With respect to telecommunications, for the purposed of the workshop, telecommunications projects are ***projects involving telecommunications towers for which emergency, back-up power is provided by outside gaseous hydrogen fuel cells with the hydrogen stored on-site in storage tanks.***

The presentation on fuel cell vehicles and HFS permitting from the perspective of the automotive industry, given by Alex Keros (General Motors), is attached below.



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After having been given essential information about the use of hydrogen as a fuel, the workshop participants were organized into **breakout groups** (five-to-six participants per group) and were given the task of reviewing two “case studies” of HFS and telecommunications projects that have been permitted or are likely to be proposed in the near term. Each case study included layouts of a HFS or a telecommunications project that incorporated a specific hydrogen delivery and storage option. Each breakout group attempted to reach consensus on how existing codes can be applied to permit each such project. Each group had a copy of the following codes and standards documents for use in their reviews:

- o **International Building Code (2006 Edition)**
- o **International Fire Code (2006 Edition)**
- o **International Fuel Gas Code (2006 Edition)**
- o **International Mechanical Code (2006 Edition)**
- o **NFPA 54 (National Fuel Gas Code 2006 Edition)**
- o **NFPA 55 (Standard for the Storage, Use and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks 2005 Edition)**

**o NFPA 853 (*Standard for the Installation of Stationary Fuel Cell Power Systems 2007 Edition*)**

More specifically, in addressing each project, they did so by addressing the following questions:

- (1) Which codes and standards did you apply during your review and why were they applied?
- (2) What codes or standards were needed but not supplied? (Explain why they were needed)
- (3) What items shown on the plan were determined to be acceptable? (List code sections referenced)
- (4) What items shown on the plans were not found to be acceptable? (List code sections referenced)
- (5) What items or information, if any, was not provided on or with the plan and is needed to complete your review? (List code sections referenced)

As the groups were conducting their reviews, the two workshop facilitators -- Bob Davidson (Davidson Code Concepts) and Sal DiCristina (The DiCristina Group) -- rotated among them, offering assistance and answering questions.

After the groups completed their reviews, every one reconvened in a plenary session during which each group gave a report on the projects that they reviewed.

**3.0 HEWETT'S SUMMARY OF THE COMMENTS MADE BY THE BREAKOUT GROUPS IN THE PLENARY SESSION REGARDING THE PROJECTS THEY REVIEWED**

The detailed, specific comments and critiques of the HFS and telecommunications projects that each breakout group reviewed will be documented in the *Workshop Final Report*.

**3.1 Commonly-Reported Problems with the HFS and Telecommunications Project Plans**

Below are the comments that I recorded that were commonly reported by most of the groups with respect to problems with the plans or missing information for both types of projects:

- (1) Electrical classification information and electrical diagrams were not provided
- (2) For fuel cell projects (i.e., telecommunications), the power ratings of the fuel cells were not provided
- (3) Need for landscaping plans

- (4) “Scope of Work” statements for projects were not provided
- (5) Hydrogen detection and leak detection systems were not shown on the plans
- (6) Issues relating to access to the sites by trucks (in both the cases of HFS and telecommunications projects) were not addressed
- (7) Lack of details on many of the drawings and/or the need to try to interpret what symbols on the drawings and acronyms meant
- (8) No indication or statement was provided as to whether or not the project (in the case of a HFS) was attended or non-attended
- (9) At least for California, seismic issues need to be identified and addressed
- (10) Planning and zoning need to be addressed
- (11) Provisions need to be made for equipment listings and specifications
- (12) Separation distance requirements need to be addressed for telecommunications projects
- (13) Setback distance specifications in the case of HFS projects lacking
- (14) In many cases, no scale or dimensions were provided on the plans
- (15) Fire hydrants and fire protection plans were not provided
- (16) Signage and hazards placards were missing

A “fact of life” that was raised repeatedly by the permitting officials was that, ***at least in California, before projects come to the fire safety and building code officials for permitting, they first have to be approved by the zoning and planning departments.*** An issue for our Program is whether or not this is the case in much of the rest of the country.

Other questions asked and issues raised by the participating permitting officials included:

- (1) There have been changes made in ***NFPA 70 (National Electrical Code)*** relating to electrical requirements that have not been reflected in the other codes
- (2) Sprinkler systems installed under canopies are for protecting canopy-mounted hydrogen equipment from vehicular fires
- (3) How do you get tanks of hydrogen to the tops of canopies?
- (4) With respect to fuel cells for telecommunications, what’s the procedure for gas tank change-out?

Something else that happened during the workshop was the asking of questions by participants – questions such as:

- o What are the properties of hydrogen
- o Where can I find information about fuel cells
- o etc.

The thing that was “troubling” was that the answers to most of the questions raised can be obtained via the DOE Hydrogen Program and/or NREL and/or NHA websites. I guess our ***action item*** is to do a better job of publicizing our various websites.

### 3.2 Additional Codes and Standards Documents Desired for Project Reviews

In addition to the documents provided, the breakout groups would like to have had the following:

- o **NFPA 70** (*National Electrical Code*)
- o **NFPA 52** (*Vehicular Fuel Systems Code*)
- o California-specific fuel dispensing standard

There was concern expressed regarding **NFPA 853**. The concern was that the requirements are not specific enough. Someone expressed hope that this would be addressed as the new **NFPA 2** (*Hydrogen Technologies Code*) is developed.

### 3.3 Recommendations to DOE and NREL Regarding Conducting Future Workshops

Facilitators Bob Davidson and Sal DiCristino pointed out to the participants that the workshop was planned and conducted using feedback and recommendations from the participants in the first workshop and invited the participants to give their feedback and recommendations for use in planning future workshops.

Feedback and recommendations given included the following:

- (1) More detailed plan information regarding the projects that the breakout groups reviewed should be provided . In fact, why not provide the exact plans?
- (2) What about adding other officials as participants in the workshops – specifically, electrical inspectors, planners and zoning personnel?
- (3) Provide other documents for use in reviewing project plans – e.g., **NFPA 70**, **NFPA 52** and jurisdiction-specific codes (as appropriate)

## 4.0 DOE/NREL ***HYDROGEN AND FUEL CELLS CODES AND STANDARDS*** WEBSITE

Prior to the workshop, the invitees were informed by Email about the new DOE/NREL ***Hydrogen and Fuel Cells Codes and Standards*** website that is being developed for permitting officials. They were given the website address and asked to review it and be prepared to give us feedback at the workshop.

The website is intended to provide a unique resource for building code, fire marshals, fire safety and other local/state officials involved in the permitting of: (i) hydrogen dispensing equipment in existing vehicular fueling stations that dispense gasoline and diesel fuel; and (ii) new retail multi-fuel fueling stations with hydrogen to be one of the fuels dispensed; and (iii) stationary fuel cell applications. The website, when fully developed, will be a “one stop” repository /data base relating to hydrogen fueling stations and other applications, and include case studies, technical information regarding hydrogen systems appropriate for permitting officials, etc.

Currently, the website also includes the *Hydrogen Fueling Station Permitting Process* which is a tool for taking permitting officials step-by-step through all the issues involved in the complete permitting of a fueling station. NREL is working to add a telecommunications permitting process module to the website. Current plans call for it to be available by the end of June.

The address for the website is as follows:

[http://www.hydrogen.energy.gov/fueling\\_stations/index.cfm](http://www.hydrogen.energy.gov/fueling_stations/index.cfm)

## **5.0 NEXT STEPS**

The next steps are:

- (1) Generating the Final Report for the workshop that will include: (i) the detailed results of the reviews of the “case study” HFS and telecommunications projects by the breakout groups; (ii) recommendations offered by the participants for use in planning and conducting future workshops; and (iii) the participants’ evaluations of the usefulness of their having participated in the workshop
- (2) Review by DOE, NREL and NASFM of the recommendations offered by the participants
- (3) Planning the next workshop.....

Russ Hewett (24Mar08)

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