

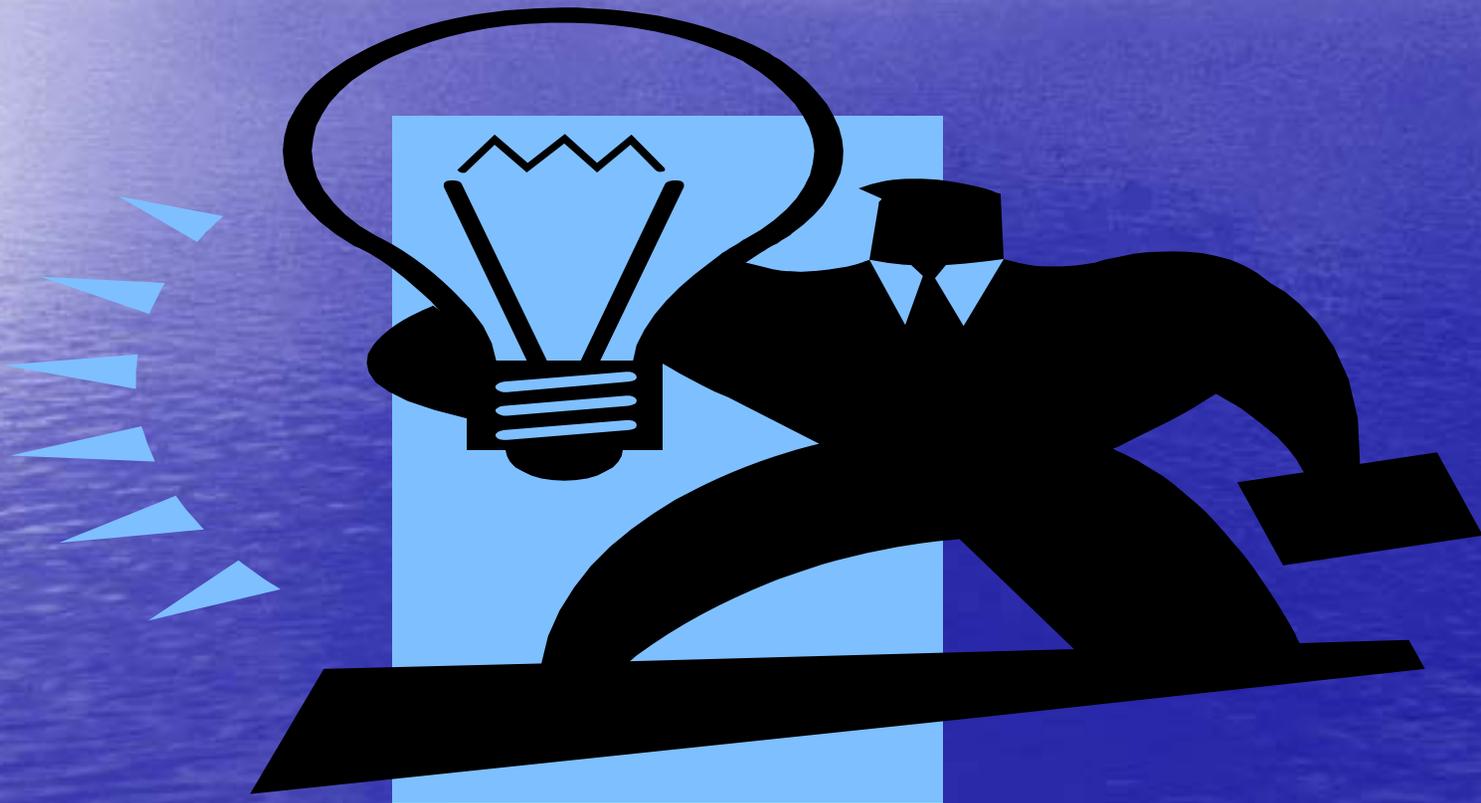
**AC Transit Hydrogen Energy  
Station / Oakland Fire  
Department Project**

**You want to do what in  
my jurisdiction ?**

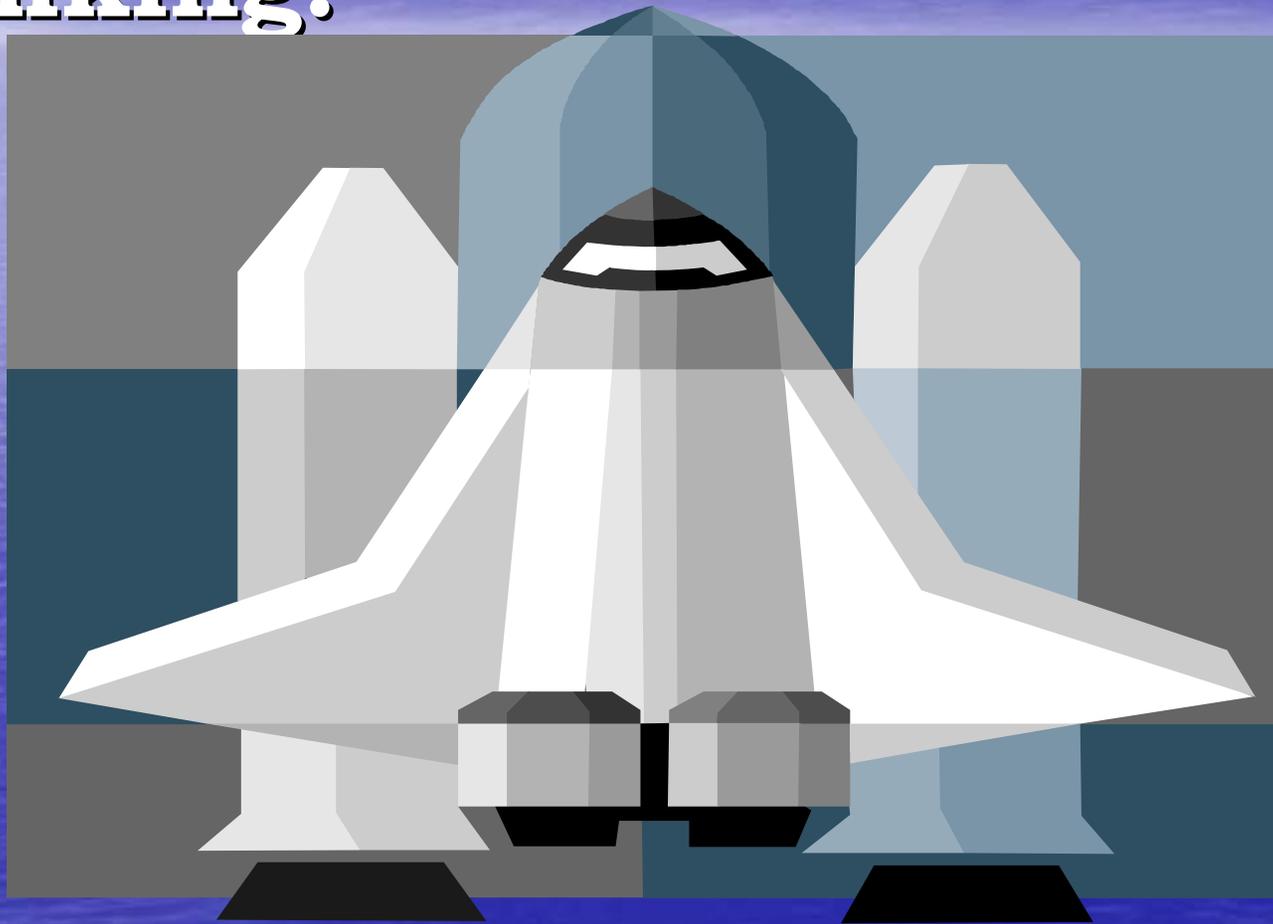
# Phase 1, The Consultant Post Construction Meeting

Consultant: We would like to build  
a hydrogen refueling and vehicle  
servicing station in your City.

# What the Project Consultant Thinks!



# What the Authority Having Jurisdiction (AHJ) is Thinking.



# Phase II (Research on the Subject Matter)



- Limited information on the commercial use of hydrogen.
- Current fire safety codes do not address or provide good guidance for the AHJ on this subject.

**Oakland Fire Department is one of 98 Certified Unified Program Agency (CUPA) in California.**

- **CalEPA enforcement authority.**
- **Risk Management Plan Program**
- **Aboveground Storage Tank Program.**
- **Hazardous Materials Storage.**
- **California Fire Code.**



**Available Codes / Technical  
Guidance for the AHJ**

# National Template for Vehicle Systems

## Vehicles

**Controlling Authority:**  
NHTSA (Crashworthiness),  
EPA (Emissions)

**Fuel Cell Vehicle Systems:** SAE  
**Fuel Delivery Systems:** SAE,  
**Containers:** CSA  
**Reformers:** SAE  
**Emissions:** SAE  
**Recycling** SAE  
**Service/Repair:** SAE

## Interface

**Fuel Specs:** SAE  
ASTM, API  
**Wts/Measures:** NIST,  
API, ASME  
**Fueling/Defueling:** SAE  
**Sensors/Detectors:** UL,  
NFPA, SAE, CSA  
**Connectors:** SAE, API,  
CSA  
**Communications :** SAE  
UL, CSA, API, IEEE

## Fuel Delivery, Storage

**Controlling Authority:**  
RSPA (Over-road Transport,  
Pipeline Safety)

**Composite Containers** ASME  
CSA, CGA, NFPA  
**Pipelines** ASME, API, CGA, AGA  
**Equipment** ASME, API, CGA,  
AGA  
**Fuel Transfer** NFPA, API

## Fueling, Service

## Parking Facility

**Controlling Authority: State, Local Govt.**  
Zoning, Building Permits

**Storage Tanks:** ASME, CSA, CGA, NFPA,  
API  
**Piping** ASME, CSA, CGA, NFPA  
**Dispensers** CSA, UL, NFPA,  
**On-site H2 Production:** CSA, UL, CGA, API  
**Codes for the Built Environment:** ICC, NFPA

Lead SDO underlined

# National Template for Hydrogen Generators and Stationary and Portable Fuel Cells

**Controlling Authority:**  
**OSHA, Emissions – EPA,**  
**Pipeline: Office of Pipeline**  
**Safety**  
**State, Local Government**  
**Zoning, Building Permits**

**Electrolyzers: UL, CSA,**  
**Reformers: UL, CSA, API**  
**Performance Test**  
**Procedures: ASME, CSA**  
**Chemical Hydrides: UL,**  
**CSA, NFPA**

**Installation Piping: ASME, CSA, CGA,**  
**NFPA, ICC**  
**Storage: ASME, CGA, CSA, API, NFPA**  
**Compressors Safety Certification: CSA, UL**  
**Compressor Design, Performance & Safety:**  
**API,**  
**Sensors/Detectors: UL, CSA, NFPA**  
**Fuel specifications: CGA, SAE, API, ASTM**  
**Weights/Measures: NIST, API, ASME,**  
**NCWM**  
**Dispensers: CSA, UL, NFPA, SAE, API**  
**Non-vehicle Dispensing: CGA**  
**Codes for the Built Environment: ASHRAE,**  
**ICC, NFPA, CGA**  
**Interconnection: IEEE , UL, NFPA**

## Interface

**Controlling Authority:**  
**OSHA,**  
**State, Local Government**  
**Zoning, Building Permits**

**H2 ICEs: CSA, UL**  
**H2 Fueled Turbines: CSA,**  
**UL, ASME, API**  
**H2-O2 Steam Generators:**  
**CSA, ASME, UL, NFPA**  
**Performance Test**  
**Procedures: ASME, CSA,**  
**NHA-GTI**

**Hydrogen**  
**Generator**

**Controlling Authority: CPSC, DOT RSPA, OSHA, EPA**  
**(Methanol),**  
**State, Local Govt. (Zoning, Building Permits)**

**Handheld Systems: UL, CSA**  
**Portable Systems: CSA, UL, CGA,**  
**Handheld Fuel Containers: CSA, UL, CGA**  
**Portable Fuel Containers: CGA, CSA, ASME,**  
**H2 Fuel Specifications: CGA, SAE,**  
**Performance Test Procedures: ASME, CSA, NHA-GTI**

**Stationary**  
**Fuel Cells**

**Portable**  
**Fuel Cells**

Leads will change  
 depending on type of  
 environment.

**The other Agencies say “If the Fire Department says it is ok, it alright with us”!**





# **AC Transit Hydrogen Energy Station Project**

**Site is located in a mixed use area within the City of Oakland**



# Project Related Issues

- Project located near a high density population area within the City of Oakland.
- Major urban transportation line is located next to the site location.
- Site is next to a hazardous materials storage site that was pending legal action by the Fire Department.
- It really, really scared the folks in Fire Suppression operations.

# How Did We Do It?



- Pre-construction meetings to establish the codes that each group (building/fire notification) would be working with.
- The early establishment of performance standards for the final acceptance of the system.
- Testing schedules and procedures.

# What does it look like?







# Detection Systems





INDICATION	CONDITION	ACTION
GREEN LIGHT	NORMAL	OK TO DISPENSE HYDROGEN
YELLOW LIGHT	SYSTEM MALFUNCTION	DO NOT DISPENSE HYDROGEN
RED LIGHT	HAZARD	DO NOT DISPENSE HYDROGEN EVACUATE DISPENSER AREA
STROBE/SIREN	FIRE	FIRE DEPARTMENT HAS BEEN CALLED FOLLOW EMERGENCY RESPONSE PLANS

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# Hydrogen Delivery System



# Vehicle Servicing Facility





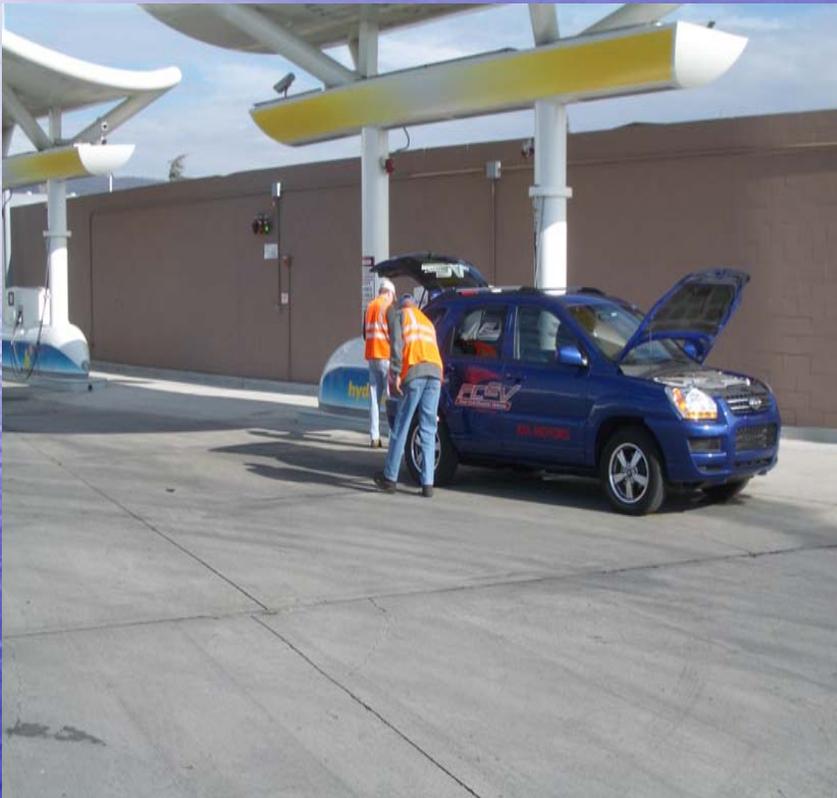




# Refueling and Maintenance Safety



# Refueling Safety Factors



- Fueling operations are only conducted by trained AC Transit staff.
- H<sub>2</sub> monitoring is performed during the fueling operation.

# Vehicle Maintenance Safety Procedures



# Vehicle Maintenance Safety Procedures



- Maintenance Bay 4 Safety Features
- Buses depressurized to 600 psig before entering bay
- Hydrogen leak and fire detection (thermal) systems
- Ignition-free space heating system
- Anti-static, non-skid, grounded floor covering
- If H2 leak detected (20% LEL): garage doors automatically roll up, ventilation fans turn on, heating system shuts off, magnetic doors release
- If H2 leak detected (40% LEL) or fire detected: fire department automatically notified, all electrical power to Bay 4 disconnected (except vent fan and emergency equipment), alarm sounds and building evacuated

Finally, a good Fire Marshal has prepared prior to the project approval a...



- A very, very good letter of resignation or retirement paperwork.

Questions?

