

Battery Explosion

Broadcast Message from the Sacramento Fire Marshall to a Fire Marshall's List Server:

MESSAGE #1:

Thought some of you might be interested in this picture. It is a hydrogen explosion in a UPS/battery room we had here in Sacramento this week. It is a very good example of what happens if you lose ventilation in a battery charging room. The explosion blew a 400+ sq.ft. hole in the roof (notice the sky above in the picture), collapsed numerous walls and ceilings throughout the building, and significantly damaged a large portion of the 50,000+ sq.ft. building. Fortunately the computer/data center was vacant at the time, so there were no injuries. I have more pictures/info, if interested just let me know.



MESSAGE #2:

I received a lot of requests for more pictures & info - so I'll try to get it all in one email. I believe it is important to share information in the industry to prevent future incidents... but I'm also guessing this incident could result in some litigation, which I prefer to avoid, so I apologize if I'm a little vague on some of the specifics. The facility was formerly a large computer/data center w/battery room & emergency generators. The company vacated the building, moved out computer equipment, however the battery back-up system was left behind.



The ventilation for the battery room appeared to be tied into a hydrogen monitoring system (which is pretty common). The hydrogen sensor was in alarm upon emergency responders arriving at the scene (post-explosion). 911 callers reporting the explosion also reported hearing an alarm for 3 days prior to the explosion. This appears to have been a local alarm, as it was not relayed at any time to Fire Dept. Given how slowly batteries generate H₂ (1.3×10^{-7} m/s per ampcell), it appears as though batteries were charging for a long period of time with no ventilation - the detector was alarming, and hydrogen continued to build up until it found an ignition source. One could make their own guess as to why ventilation did not work. Due to the damage and actions of emergency responders shutting off all circuit breakers, etc., it could not be verified whether the ventilation system failed, or was previously turned off when the building was vacated. The best guess is that the ignition occurred at or near a grounding strap on the battery racks. But in a room full of batteries & electrical equipment, ignition sources are plentiful... especially when considering the sensitivity of hydrogen.

The lesson to pass on, is that ventilation is critical in these facilities. Great care should be taken to ensure ventilation is adequate, or even better that the batteries can not be charged without the ventilation system properly working. To complicate matters, the codes are not really helpful in these facilities - UFC Article 64 requires that continuous ventilation be provided or that system is designed in accordance with ANSI-IEEE 484. IEEE 484 unfortunately is very vague, does not prescribe set levels of ventilation, does not require interlocks, and even allow natural ventilation. IEEE 484 also specifically exempts the space from being a Classified (hazardous) electrical location. There are some other sections of UMC & UFC that could possibly be applied - but it could be quite a stretch. Since codes may not be enough, AHJ's may not be able to enforce adequate controls - therefore designers really need to pay close attention. If monitoring is used to activate ventilation, things are further complicated by the fact that there are not any thorough standards regulating the design or installation of gas detection systems. There are lots of good (and bad) ways to design and install battery rooms & critical ventilation systems, you just may have to look beyond the codes & standards. I've worked on a whole bunch of these - feel free to send any questions you might have in the future. Hope this



helps some of you out there.

A Broadcast Message From Bob Taylor (Who Has Been Leading A Very Vocal Campaign To "Prove" That Battery Systems Are Dangerous... And To Increase Regulatory Requirements Applicable To Battery Plants In The Building And Fire Codes):



I think emergency responders should find the following incident report of interest. No emergency responders were hurt since no one was inside or next to the building. In my opinion, we dodged another life threatening incident, BUT there are thousands and thousands more of this type hazard waiting for us.

Bob Taylor

Friend of the Fire Fighter

From the Sacramento Fire Department Fire Department:

http://www.smfd.ca.gov/pr03_20_02.htm

PRESS RELEASE

Explosion In Rancho Cordova

March 20,2001

10980 Gold Center Dr, Rancho Cordova

2:41 pm Metro Firefighters responded to a report of a building explosion. When the battalion Chief arrived on the scene he reported a large portion of the roof missing and large steel roll up door with a large hole in it. The Chief requested a second alarm to the scene.


When Firefighters entered the building they found several walls blown over and visible smoke from a room that housed several large batteries. Firefighters also reported that a 40-foot section of the roof was missing just over the area of the explosion. The building was searched for possible trapped victims, and none were found.

The property management company indicated that a computer firm that handled data collection had occupied the building a month prior to the incident. It was also indicated that a battery back up system that was suspected of exploding was partially in operation.

Fire Investigators along with Hazardous Materials Response team from the Sacramento Fire Department are attempting to determine that cause of the explosion. It was very fortunate that no one was inside or directly near the building at the time of the explosion.

Alarm Assignment

3 Chief Officers, 6 Engines, 2 Ladder Trucks, 1 Haz Mat Crew, 40 Total Personnel

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