

## BATTERY ROOM EXPLOSION

Severity  
**Incident**  
Leak  
**Yes**  
Ignition  
**Yes**

A hydrogen explosion occurred in an Uninterruptible Power Source (UPS) battery room. The explosion blew a 400 ft<sup>2</sup> hole in the roof, collapsed numerous walls and ceilings throughout the building, and significantly damaged a large portion of the 50,000 ft<sup>2</sup> building. Fortunately, the computer/data center was vacant at the time and there were no injuries.

The facility was formerly a large computer/data center with a battery room and emergency generators. The company vacated the building and moved out the 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. 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 the local fire department. Given how slowly batteries generate H<sub>2</sub> (1.3x10<sup>-7</sup>m/s per amp-cell), it appears as though batteries were charging for a long period of time with no ventilation. Apparently the detector was alarming, and hydrogen continued to build up until it found an ignition source. 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. Onsite personnel assumed that the ignition occurred at or near a grounding strap on the battery racks, but in a room full of batteries and electrical equipment, ignition sources are plentiful.

### Incident Date

Mar 20, 2001

### Setting

[Battery Charging Facility](#)

### Equipment

**Electrical Equipment Ventilation System>Exhaust Fan Batteries and Related Equipment>Batteries**

### Damage and Injuries

[Property Damage](#)

**Probable Cause**

Abnormal Operations

**Contributing Factors**

Change in Procedures, Equipment, or Materials

Design Flaw

Situational Awareness

Training Issue

**When Incident Discovered**

During Operations

**Lessons Learned**

The lesson to pass on is that ventilation is critical in UPS battery rooms. Great care should be taken to ensure that the ventilation system is operational and brings in enough outdoor air to properly ventilate the enclosure.

Electrical safety interlocks should also be considered, which would isolate the batteries from their power supply, not allowing the batteries to charge if the ventilation system isn't working properly.

It is imperative that the battery room designers pay close attention to the design of ventilation systems and electrical safety interlocks. There are lots of good (and bad) ways to design and install battery rooms and critical ventilation systems. If designers do not have experience designing UPS battery rooms, experienced consultants should be contacted to ensure a safe and effective design.

In addition, internal management procedures need to be developed which analyze operation of such systems. As in this case, the entire data center was removed and the UPS system was no longer needed. The UPS system should have been decommissioned when the data center was removed. A good management-of-change procedure would have uncovered this problem before it became an incident.

More information on management of change can be found in the Lessons Learned Corner and also in the Hydrogen Safety Best Practices Manual.

**Post date**

September, 2017