



## **National Fire Fighter Near-Miss Reporting System Reports Related to Incidents Involving Hydrogen**

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**05-424**

**Event Description**

I was assigned to an engine company. The battery on the truck was low, so it was hooked to a charger. Since we had to wash the truck, I disconnected the clamps from the charger to pull the truck outside. My supervisor then told me to wait to wash the truck, so I hooked the cables back up to the battery. The caps were off the battery. When I touched the battery, it caused a spark, which set off an explosion from the hydrogen gas produced by the battery acid, and plastic shrapnel struck me in the face. I immediately washed my eyes and face, so no permanent injury occurred.

**Lessons Learned**

Know what you're dealing with. I had no prior experience working with batteries and should have asked for help. I was lucky.

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**08-530**

**Event Description**

In August 2008, law enforcement and fire units responded to a suicide involving hydrogen sulfide in Pasadena, California. The victim, found dead in his car, had mixed a fungicide and toilet bowl cleaner in a plastic tray to produce a fatal concentration of hydrogen sulfide gas.

First responders saw the tray with a “bright blue liquid” in the back seat of the vehicle. The man had placed a note on the car to warn first responders. Inhalation of hydrogen sulfide has become a popular means of suicide in Japan and could become more popular in the U.S. as publicity about these incidents spreads.

**Lessons Learned**

1. When responding to incidents, especially possible suicides, members should be aware of the possibility of encountering hydrogen sulfide gas, a potentially lethal toxic chemical.
2. Units are reminded to expect the unexpected; stay focused and avoid complacency; remember no operation is routine.
3. Early recognition of a hazardous materials incident and ensuring the health and safety of responders is paramount to the success of an operation.
4. Ensure proper SCBA usage at all hazardous material operations.
5. Hydrogen sulfide is highly flammable and has an explosive range of about 4-46 %.
6. Effects of exposure to hydrogen sulfide include the following:
  - a) Low concentrations: eye irritation, sore throat, cough.
  - b) Intermediate concentrations: shortness of breath, headache, dizziness, nausea, vomiting, pulmonary edema.
  - c) High concentrations: is potentially fatal; it can result in immediate incapacitation with loss of breathing, even after a single breath.

7. Although the incident was a suicide, it demonstrated the potential for easily produced hydrogen sulfide to be used as a chemical weapon in a terrorist attack. As responders, we may be presented with a variety of incidents ranging from an individual overcome by the improper mixing of cleaning solutions to a chemical weapon terrorist attack.

8. Potential production of hydrogen sulfide gas may be identified by the collection of commonly used household items seemingly out of place, e.g., paints, pesticides, toilet bowl cleaners, and disinfectants.

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## **10-1126**

### **Event Description**

Responded on a structure fire as a mutual aid company in a chemical pickling facility. Had members enter the structure with first due company and was involved in minor firefighting. Both members were exposed to a caustic corrosive acid in solid form. When acid gets wet, it liquefies and turns green. Both members exited the structure and were immediately decontaminated. Both members started to have burning sensation to the hands. One was transported to the hospital and the other drove himself to the hospital after returning to the station. Both members were wearing leather firefighting gloves. One member said that he reached down to grab the nozzle that was submerged in the green liquid.

### **Lessons Learned**

Disconnect the battery and wait! Treat every damaged vehicle the same, whether the damage is from fire or from a collision. I would never have entered that car without the battery disconnected if this had been an extrication. Physical damage is easy to see, but think about the hidden damage. Don't get complacent about "routine" vehicle fires. I've seen many airbags deploy during a fire, but never after the car had cooled. Thankfully, I'm here as a witness that they CAN and WILL deploy unexpectedly at anytime! There's nothing like an ER doctor telling you "you're lucky to be alive" to make you really appreciate the dangers that we tend to take for granted.

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## **10-1168**

### **Event Description**

On September 5th at 1000 hours, a lieutenant and a senior firefighter were returning to the station from a special detail. The two personnel stated that they smelled a foul odor and it smelled like rotten eggs. Moments later, the senior firefighter became disoriented and finally lost consciousness. The lieutenant was able to return the vehicle to the station because they were less than a block away.

As they pulled into the station, the rest of the on-duty personnel witnessed them pulling in and acting irrationally. The lieutenant collapsed to the ground and began gasping for air. As the personnel rushed to aid the down firefighters, they heard a hissing sound coming from the interior of the vehicle. The two down firefighters were transported to a level one trauma center with respiratory distress.

*National Fire Fighter Near-Miss Reporting System  
Grouped Reports: Incidents Involving Hydrogen*

Upon inspection of the vehicle, it was found that a 12 volt lead battery (installed in the rear compartment of the vehicle to charge all of the ancillary equipment) had overcharged and became overheated. The battery vented hydrogen sulfide into the passenger compartment of the vehicle. The benefit to both of these firefighters was the fact that it was a beautiful summer day and they had their windows down. The gas meter in the rear of the truck was on when this event happened and it recorded that the passenger compartment received hydrogen sulfide gas over the amounts of 50ppm within seconds.

**Lessons Learned**

There should not be a battery installed in the passenger compartment of any vehicle without proper ventilation. If the amount of electronics in the vehicle is draining the battery to a point that another battery needs to be installed, then the amount of equipment being stored in the vehicle needs to be evaluated or the layout of the vehicle needs to be considered.