

# **ORANGE PEEL**

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## **UTILITY CONTROL AND THE UPS**

During a recent response for a gas leak at a local seed research facility we diligently performed our duties: We conducted a hazard assessment, determined if there was anyone needing medical attention and secured both the natural gas and power, eliminating potential fuel and ignition sources, right? At first glance yes, but it was not until later in the incident did we realize the computer work stations were still powered. They all had an uninterruptible power supplies or UPS systems.

The building was charged with natural gas. Whether the concentration was above, below or within the flammable range was unknown, and (Yes I know that natural gas is lighter than air, but the container was full) whether the UPS could provide an ignition source is unknown, but we were not as safe as we first thought? As we completed our operations, now aware of the missed power supplies, I began to notice additional battery powered equipment including the emergency egress lighting and the exit lights. I never really thought of these as potential ignition sources, but given the right conditions they indeed could provide the means to create an explosion and/or fire.

Though exit and emergency lights and UPS units are common items in commercial occupancies, many people use the UPS for their home computers also. There are two common systems in use today: standby UPS and continuous UPS. A standby UPS runs the computer off of the normal utility power until it detects a problem. At that point, it very quickly (in five milliseconds or less) turns on a power inverter and runs the computer off of the UPS's battery. A power inverter simply turns the DC power delivered by the battery into 120-volt, 60-Hertz AC power.

In a continuous UPS, the computer is always running off of battery power and the battery is continuously being recharged. The battery charger continuously produces DC power, which the inverter continuously turns back into 120-volt AC power. If the power fails, the battery provides power to the inverter. There is no switch-over time in a continuous UPS. This setup provides a very stable source of power.

Standby UPS systems are far more common for home or small-business use because they tend to cost about half as much as a continuous system. Continuous systems provide extremely clean, stable power, so they tend to be used in server rooms and mission critical applications.

The hazard to firefighters from the UPS can come from electric shock, heat generation and the chemical reaction from the charging process. Other locations where you will find UPS and battery back-up systems are at cell phone sites and electric utility sub-stations. These systems typically use a wet cell lead-acid battery. When these batteries charge, they produce hydrogen gas, which is the same gas that was in the Hindenburg. If this gas is not properly ventilated it will accumulate and find an ignition source. In March 2001, the Sacramento Metropolitan Fire District responded to a report of a building explosion in Rancho Cordova, CA. Upon further investigation they found a computer company's battery back-up system had exploded. 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 energy released by an explosion can injure and even kill responders. Other concerns for firefighters can include back-up generator systems. These systems are designed to supply power to the building in the event of a power system failure. These systems must have a system to switch between the power sources- the utility company or the generator. This switch is typically automatic, and will activate when there is any interruption in the utility power supply, i.e. when we turn off the power. This can prove to be a problem when firefighters are attempting to eliminate the electrical hazards at an emergency scene. Preplanning and onsite training with the building maintenance personnel will give fire companies an opportunity to understand how the system works and how to overcome the automatic operation. Even more dangerous to the firefighters is the illegal generator hookups, without the required switch; the power can come from either source. Also associated with the illegal hook up is the improper use of the gasoline powered generator. The generator is a common cause of CO poisoning, and as was the origin of a recent house fire, caused from the heat from engine operation and exhaust.

So the next time that you are assigned to secure the utilities, realize that you may have not completely de-energized the building. The use of UPS, battery backup and generator systems many continue to provide power and ignition sources in the building and danger to the firefighters operating at the incident