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Subject: Blue Alert: Unauthorized Modification Results in Nitrogen Release

Title: Unauthorized Modification Results in Nitrogen Release

Identifier: Formal Lessons Learned Report, 1998-KO-SNL-0010

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Lessons Learned Statement: If you hear or observe an abnormal release of gas or fluid, do not enter an area to investigate even if you do not perceive it to be a hazardous scenario. Gases that displace oxygen can accumulate to fatal levels within seconds. Additionally, employees should not modify facility property or equipment without authorization as unapproved changes may create new/undocumented hazards.

Discussion of Activities: An employee heard a hissing sound coming from a vacant lab, saw an open nitrogen line leaking gas, and called the site incident commander. The lab doors were closed, and an emergency response was initiated. HazMat personnel placed oxygen monitors in the hall area outside the lab. Oxygen readings were near normal. The personnel then entered the room wearing self-contained breathing apparatus. Hand-held oxygen monitors indicated 0% oxygen a few feet into the lab. The HazMat personnel were able to install a valve on the leaking line and stopped the nitrogen release. The building ventilation system subsequently restored normal oxygen levels in the lab.

Analysis: Inspection of the piping clearly indicated that someone had cut out a component (probably a regulator / shut-off valve combination) from the nitrogen system. This modification was probably not seen as a hazard because the removed section of piping was in a part of the system that had been valved off by Facilities personnel. Therefore, a release did not occur when the component was removed. Later, the section of piping was re-activated and the release occurred. The isolation valve for the system was on another floor in an equipment chase some distance from the lab. Therefore, when workers opened the valve to reactivate the section of piping, they were unaware that a release was occurring. The component that had been removed had pipe threads on one end, allowing the response team to connect a valve and close it. The other side of the line where the component had been removed was a copper line that had been sawed off.

The amount of oxygen in the air we breath is approximately 20.8%. The amount of oxygen that OSHA considers to be oxygen deficient is 19.5%. Breathing 0% or near 0% oxygen in nitrogen can cause unconsciousness in seconds. The uncontrolled release of nitrogen into the standard sized, normally ventilated lab rapidly created an asphyxiation hazard. After 20 to 30 minutes, the lab was purged of air and represented a lethal hazard.

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