Process Safety Beacon
Messages for Manufacturing Personnel
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Recent nitrogen fatalities are a vivid reminder

April 2021

Figure 1. Location of 6 fatalities from a nitrogen leak
Source: Insurance Journal

Figure 2. Warning signs for liquid nitrogen hazards

A recent event in Gainesville, Georgia, US, involved a significant leak of liquid nitrogen. A poultry processing plant used liquid nitrogen to quickly freeze chicken products. This freezing system had only been in operation for 4-6 weeks before the event. Six workers died and 12 others were taken to a hospital. 130 people had to be evacuated. A maintenance manager shut off an external isolation valve, stopping the flow of liquid nitrogen to the process and likely preventing further exposures. While the causes are still under investigation, it serves as a reminder for us to understand the hazards of nitrogen and use extreme caution when working in or around nitrogen consuming operations.

Many other oxygen deficiency incidents have occurred due to nitrogen leaks or purging. Entering a confined space with an oxygen deficient atmosphere without testing or a proper breathing apparatus is one of the most frequent causes of asphyxiations.

Did You Know?

- In the US, nitrogen asphyxiation hazards in industry resulted in 80 deaths from 1992 to 2002. These incidents occurred in a variety of facilities, including industrial plants, laboratories, and medical facilities; almost half involved contractors. More recently, fourteen workers in the US, died from asphyxiation linked to nitrogen accidents from 2012 to 2020, according to AP news agency.
- Nitrogen is sometimes called “the silent killer” because it is odorless, colorless, tasteless and gives no warning. People in a nitrogen enriched environment (low in oxygen) simply lose consciousness before realizing they are in danger. Low oxygen can be detected only with the correct gas detectors..
- In addition to its asphyxiation hazards, liquid nitrogen is extremely cold and contact can quickly cause severe frostbite burns.
- Many nitrogen-related fatalities occur when others rush to rescue a worker in an oxygen deficient atmosphere. No one should enter a potentially oxygen deficient space without proper permits, preparation, and breathing apparatus.

What Can You Do?

- Read the SDS for nitrogen to review its hazards and precautions.
- Review the US Chemical Safety Board’s guidance on nitrogen. Follow the link below for both the Hazards of Nitrogen Asphyxiation bulletin (No. 2003-10-B June 2003) and a PowerPoint presentation on nitrogen hazards.
  - (https://www.csb.gov/hazards-of-nitrogen-asphyxiation/)
- Watch the CSB safety video on the Valero Refinery Asphyxiation incident.
  - (https://www.csb.gov/valero-refinery-asphyxiation-incident/)
- Be aware where nitrogen is being used in your area and look for potential release points such as open pipes, relief discharges or other possible leak points.

Past Beacons – April 2004, December 2006, August 2007, April 2015, November 2017, and June 2018 [Beacon Archive: https://www.aiche.org/ccps/resources/process-safety-beacon/archives]

Other references: EIGA: https://www.eiga.eu/publications/safety-leaflets/sl-0117-dangers-of-asphyxiation/
CGA: https://www.cganet.com/liquid-nitrogen-safety/

Nitrogen is often a safeguard, but it also has serious hazards.