

Recent Nitrogen Fatalities Are a Vivid Reminder

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▲ Liquid nitrogen poses oxygen deficiency hazards in addition to freezing hazards.

On January 28, 2021, a liquid nitrogen leak occurred at a poultry processing plant in Gainesville, GA (1). The poultry plant had installed the liquid nitrogen system four to six weeks prior to the leak to quickly freeze chicken products. A maintenance manager was able to shut off an external isolation valve, stopping the flow of liquid nitrogen to the process and likely preventing further exposures. The leak killed six workers, sent 12 others to the hospital, and forced the evacuation of 130 people.

While the causes are still under investigation, this incident is a reminder of the hazards of liquid nitrogen, which include asphyxiation and frostbite. Many other oxygen-deficiency incidents have occurred due to nitrogen leaks or purging. Entering a confined space without testing or without a proper breathing apparatus for an oxygen-deficient atmosphere is one of the most frequent causes of asphyxiations. Plant personnel need to use extreme caution when working in or around operations that use nitrogen.

Did You Know?

- In the U.S., nitrogen asphyxiation hazards caused 80 deaths from 1992 to 2002 and 14 from 2012 to 2020 (1). These incidents occurred in a variety of facilities, including industrial plants, laboratories, and medical facilities. Almost half of the incidents involved contractors.
- Nitrogen is often called “the silent killer” because it is odorless, colorless, and tasteless. People in a nitrogen-enriched environment lose consciousness from lack of oxygen before realizing they are in danger. Low oxygen levels can only be detected with proper instrumentation.
- In addition to causing asphyxiation, liquid nitrogen is extremely cold and can quickly cause severe frostbite upon contact.
- Many nitrogen-related fatalities occur when others rush to rescue someone in an oxygen-deficient atmosphere. Do not enter a potentially oxygen-deficient space without proper permits, preparation, and a breathing apparatus.

What Can You Do?

- Read the safety data sheet (SDS) for nitrogen to review its hazards and precautions.
- Review guidance on nitrogen from the U.S. Chemical Safety Board (CSB) (2).
- Watch the CSB safety video on the Valero refinery asphyxiation incident (3).
- If you work in or around operations that use nitrogen, know where it is being used and look for potential release points, such as open pipes and relief discharges.
- Reference past Process Safety Beacons related to nitrogen hazards, such as the April 2004, December 2006, August 2007, April 2015, November 2017, and June 2018 editions.
- Review the European Industrial Gases Association's booklet on the dangers of asphyxiation by industrial gases (4) and the Compressed Gas Association's poster on liquid nitrogen safety (5) for more information.

Literature Cited

1. Amy, J., “Liquid Nitrogen Leak at Georgia Poultry Plant Kills 6,” AP News, www.apnews.com/article/liquid-nitrogen-leak-georgia-plant-34698174274717f4ec84b6964782e9fe (Jan. 28, 2021).
2. U.S. Chemical Safety and Hazard Investigation Board, “Hazards of Nitrogen Asphyxiation,” CSB, Washington, DC, www.csb.gov/hazards-of-nitrogen-asphyxiation (2003).
3. U.S. Chemical Safety and Hazard Investigation Board, “Valero Refinery Asphyxiation Incident,” CSB, Washington, DC, www.csb.gov/valero-refinery-asphyxiation-incident (2006).
4. European Industrial Gases Association, “Dangers of Asphyxiation,” EIGA, www.eiga.eu/publications/safety-leaflets/sl-0117-dangers-of-asphyxiation (2017).
5. Compressed Gas Association, “Liquid Nitrogen Safety,” CGA, www.cganet.com/liquid-nitrogen-safety (accessed Mar. 9, 2021).

Nitrogen is often a safeguard, but it is also a hazard.

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