



**Worker  
Asphyxiated  
by  
Nitrogen  
Gas  
While  
Wearing a  
Supplied Air  
Respirator**

A production worker, and USW member, was found unresponsive by a co-worker shortly after beginning work in a powder coating spray booth. The co-worker called for first responders who immediately removed the worker's supplied-air respirator hood and began CPR, with assistance from outside emergency services. Unfortunately, those efforts were not successful, and the worker was asphyxiated by nitrogen gas.

Prior to the incident, a new 'laser machine' had been installed in the workplace. The laser's installation included a three-way valve that was being serviced by a third-party contractor. Inadvertently during this work, the valve released a backflow of nitrogen into the compressed air system. The contractor was not aware at the time that nitrogen would then feed into the same compressed breathing air lines the worker was using at the powder coating spray booth. Nitrogen is colorless, tasteless, odorless gas and gives no warning. Nitrogen is sometimes called the 'silent killer' as humans in nitrogen enriched atmospheres, and low in oxygen, lose consciousness before realizing they're in danger.



**Recommendations:**

- Eliminate the use of nitrogen where possible or physically separate nitrogen and Grade D (or higher air quality) breathing air systems.
- Install check valves and automatic shutoffs on air supply lines.
- Use unique fittings for nitrogen and breathing air to prevent cross-connection.
- Maintain and test valves for leakage per the manufacturer's guidelines and various standards.
- Use a continuous gas monitor in the supplied-air system that detects gases simultaneously, alerting users when there are hazardous gases present near the supplied air source that can displace breathing air, and have all data/logs accessed in real time.
- Use personal continuous air monitors to measure breathing air concentration from 19.5% to 23.5% and give audible alarms for low oxygen concentrations at the point of use.
- All air lines and hose drops must be mapped and labeled in the facility to ensure no points of cross-contamination are possible.
- Labeling must comply with ASME A13.1 Scheme for the Identification of Piping Systems. Pipe legends must be applied close to valves or flanges and adjacent to changes in direction, branches, and where pipes pass through walls or floors; and at intervals on shaft pipe runs sufficient for identification.
- Host and contractor employers (when needed) must have and exchange written safety programs, including training about the workplace. A manager of the host employer must work closely with the contractor to ensure compliance with the health and safety systems.
- Use and maintain compressed Grade D (or higher air quality) breathing filtration equipment in accordance with manufacturer's guidelines and ensure there is backup equipment in the event the primary system is not available or is out-of-service. Use stop work authority when needed.
- Maintain chain-of-custody procedures for air source changes.
- Workers must be trained on nitrogen Safety Data Sheets.
- Assess exposure levels and provide other types of respirators, such as, full face, half mask or powered air purifying respirators that use ambient air instead of system air, along with proper training per the manufacturer's guidelines as a last line of defense, and medical approvals.
- For additional information on nitrogen, visit the U.S. Chemical Safety and Hazard Investigation Board's video and safety bulletin on the hazards of nitrogen asphyxiation.



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This hazard alert is based on an actual incident, and reflects our best understanding of the incident at the time it was written. However, many incidents have multiple causes; this alert may not cover all of them. The purpose of the alert is to illustrate workplace hazards; it is not intended to be a comprehensive report on the incident.