

Nitrous Oxide Explosion at Airgas Facility

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<http://www.csb.gov/csb-releases-final-report-into-2016-nitrous-oxide-explosion-at-airgas-facility-in-cantonment-florida-noting-safety-management-system-and-regulatory-deficiencies-contributed-to-the-incident/>

Activity

The Airgas facility down in Cantonment, Florida handles dangerous nitrous oxide. The Airgas Cantonment facility is one of few plants in the United States that produces nitrous oxide. This process includes pumping liquid nitrous oxide from storage tanks into containers or trailer trucks, which will deliver the chemical nationwide. On August 28, 2016, a single employee was transferring liquid nitrous oxide at a loading dock at the facility.

Hazards

Nitrous oxide when stable can be safely handled. If the conditions change and become unfavorable it can decompose explosively. Federal regulations require some chemical facilities that manufacture hazardous substances to have process safety management systems in place to protect their employees and the surrounding community. Airgas did not recognize the hazard of possible cause of death or serious physical harm to their employees. There are also known hazards that come from the heat from the pump. The pump had safeguards installed by the company, such as automatically shutting down the pump and flame arrestors if an incident were to occur.

Preventative Actions and Safeguards

Have proper nitrous oxide pumping procedures and correct equipment.

Contingency Plan/ Mitigating Actions

Ensure the mechanical integrity of the equipment and also that it is properly sized and designed for the given processes.

Initiating Event

While transferring the chemical, the pump used for transfer heated the gas above its safe operating limit triggering a violent explosion. The decomposing reaction started in the pump and migrated into the trailer, which is what caused the explosion. The facility was destroyed and the plant was no longer in operation. The blast killed the worker.

Incident

After further investigations, the federal regulations requiring process safety management were not required for nitrous oxide facilities. The contributing causes of the explosion can be drawn back to the lack of an effective process safety management system. Since there was a hazard attributed with the pump and no evaluation of a safer design option that could eliminate the pump all together added a level of risk to this task. Also, the pump safeguards were likely ineffective which ended up failing to prevent the event.

Lessons Learned

Facilities should have good safety management systems to try and reduce the risks that are present. These safety management systems are in place to identify, evaluate, and control process safety hazards. It is also recommended to increase the warnings on nitrous oxide.

