

## Liquefied Gas Cylinder Failure

December 2006



**Intact cylinder and remains of ruptured cylinder**

before the explosion, the leaking gasket had been replaced and the cylinder refilled with liquid nitrogen. With the new gasket, the cylinder was now completely sealed, and pressure could build up. The cylinder ruptured when its internal pressure rose above 1000 psi (69 bar). The catastrophic failure of the nitrogen cylinder was a result of the removal of the pressure relief devices.

A liquid nitrogen (Dewar) cylinder in a university chemistry laboratory catastrophically failed due to over pressurization, causing substantial damage. Fortunately the incident occurred at 3 AM and the building was not occupied, so there were no injuries. The over pressurization blew out the bottom of the cylinder and propelled the cylinder upwards. The cylinder pressure relief valve and rupture disc had been replaced by two brass plugs at some time in the past by an unknown person. Before the incident, the cylinder may have been leaking through an old gasket, providing sufficient release of gas to prevent over pressure.

Approximately twelve hours



**Laboratory Damage**

### Did you know?

- Liquefied and pressurized gas cylinders are commonly used in laboratories and in manufacturing plants.
- In this incident, the force released by the failure of the cylinder was estimated at 250,000 pounds (~ 113,000 kilograms-force).
- Cryogenic storage must either be refrigerated to maintain the low temperature and pressure, or slowly bleed off enough vapor to maintain pressure and cool the remaining inventory.
- An incident this powerful can release other hazardous materials in nearby containers, vessels, and piping, causing an even more severe incident.

### What can you do?

- Never modify any equipment containing hazardous materials or energy without qualified engineering evaluation, and always conduct a management of change review.
- If you observe a high pressure or liquefied gas cylinder that appears to have been modified, or is corroded or otherwise damaged, report it to supervision immediately so it can be removed from service.
- Ensure that cylinders are properly maintained and periodically inspected, including the pressure relief devices.
- If you use pressurized gas cylinders, make sure you are properly trained in the safe handling of high pressure cylinders.
- Share this incident with your colleagues in the laboratory who may use pressurized gas cylinders.
- Read the Texas State Fire Marshall's Alert on this incident: <http://www.tdi.state.tx.us/fire/documents/fmred022206.pdf>

CCPS PSID Members, see Free Search - Cylinder

***Don't let a gas cylinder become a rocket!***