



# Working with Cryogenics

## Lawrence Berkeley National Laboratory Lessons Learned

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**Concern Statement:** There have been two recent incidents involving liquid nitrogen, one resulting in an injury and another in a near miss. The main hazards in handling cryogenic materials are extremely low temperatures (on the order of  $-200^{\circ}\text{C}$  or lower), which can lead to tissue damage, and volumetric expansion, which can result in an uncontrolled release of pressure.

**Applicable to:** Researchers and staff who work with liquid nitrogen and other cryogenic liquids.

**Incident:** In the first incident involving liquid nitrogen, a near miss, an employee was filling a four liter dewar bottle. After stopping the flow of liquid nitrogen to check how full the dewar was, the employee opened the liquid flow valve to continue filling. Restarting the flow of liquid nitrogen resulted in liquid nitrogen splashing out of the dewar. The researcher thought that he had been splashed in the left eye. Upon medical investigation, there was no evidence of a liquid nitrogen burn.

In a second case, an employee received first and second degree contact burns to her left hand when she tried to shut the liquid flow valve on a 200-liter liquid nitrogen dewar after filling a four liter dewar bottle.

**Cause:** In both situations, the root cause is staff not wearing the proper personal protective equipment. In the case of the potential eye injury, the researcher was not wearing safety glasses with side shields. The employee injured while attempting to close the liquid flow valve on the 200 liter liquid nitrogen dewar was bare-handed: not wearing loose fitting gloves that provide protection against very low temperatures.

### Recommended Actions

- Researchers and staff must be vigilant in wearing the appropriate personal protective equipment. Appropriate eye protection includes wearing safety glasses with side shields when filling a four liter dewar bottle and using a face shield when transferring liquid from a pressurized dewar. Employees should always wear loose fitting gloves that provide protection against very low temperatures when handling cryogenic materials or anything that could be at cryogenic temperatures, such as valves and tubing.
- There are additional precautions that staff should take when using cryogenics. Cryogenic material should not be used in unventilated spaces, where a leak can displace oxygen. Oxygen displacement creates an asphyxiation hazard for occupants. Prior to transferring cryogenics with hoses or tubing, employees should verify that there are pressure relief devices between all valves.
- All employees that work with cryogenics must complete EHS0231, Compressed Gas Safety training before handling these materials.



### Further Information

Any additional assistance or questions regarding these incidents or the lessons learned may be directed to John Seabury (x6547).

For other lessons learned, go to: [http://www.lbl.gov/ehs/html/lessons\\_learned.htm](http://www.lbl.gov/ehs/html/lessons_learned.htm) .