

TITLE: Response Process for Oxygen Deficiency Hazard Alarms
CATEGORY: FC Information/LNDS
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ABSTRACT:

I INTRODUCTION

1.1 Purpose:

To provide instructions for the safe entry into an enclosure containing a liquid nitrogen dewar or cryopump should an oxygen deficiency hazard (ODH) alarm occur.

A Liquid Nitrogen Distribution System (LNDS) has been installed at the APS to limit the need for periodic changing of liquid nitrogen dewars supplying cryo-pumps or other devices requiring cooling inside an enclosure. An oxygen deficiency could exist should the liquid nitrogen fill line into the enclosure or connections or devices connected to the fill line rupture. [Note: Enclosures are normally closed which prevents personnel from being inside the enclosure. Enclosures with liquid nitrogen fill lines fed from the LNDS are monitored by a local oxygen deficiency monitor. Should an alarm occur, signage near the monitor instructs personnel NOT to enter the enclosure and to contact the on-call Floor Coordinator. This document includes the procedure to remove the source of oxygen deficiency from the enclosure and to allow safe entry after the oxygen deficiency no longer exists. It is recommended that this document be reviewed every 1-2 years.

1.3 References:

The affixed document "Liquid Nitrogen (LN2) Distribution System" (EFOG tutorial abbreviated for MCR) which describes the system and illustrates the manual control panels and the EPICS screens for remote operation.

The affixed document "Hazard Characteristics and Precautionary Measures for Cryogenic Fluids".

Section 4.10 Cryogenic Liquid Safety found in the ANL-E ES&H manual.

1.4 Type of Procedure:

This is a technical procedure for responding to a local oxygen deficiency alarm in an experimental enclosure by trained EFOG and/or MCR personnel.

1.5 Hazard Control:

An oxygen deficiency may exist within an experimental enclosure. The EFOG and/or MCR personnel are cognizant of the potential hazards of liquid nitrogen release and have appropriate cryogenic training. These procedures will include the emergency shut off procedures should an inadvertent release occur.

II Required Training:

2.1 Familiarization with the affixed document - "Hazard Characteristics and Precautionary Measures for Cryogenic Fluids".

2.2 Completion of EFOG Tutorial # EFO220 (Abbreviated for MCR) "Liquid Nitrogen Distribution System".

III Procedure: When informed of an oxygen deficiency alarm (signage instructs the personnel who detect the alarm, to contact the Floor Coordinator at 2-0101)

[Note: The Floor Coordinator is always on call, though may not be on site during machine studies and maintenance period off hours.]

- 3.1 Closing the source of liquid nitrogen into an experimental enclosure.
 - 3.1.1 If the Floor Coordinator is on site – the Floor Coordinator, Via EPICS control, closes the appropriate drop valve for the sector having an oxygen deficiency alarm and visually verifies that the valve is closed. If remote control is inoperative, close the valve using the manual switch for that valve.
 - 3.1.2 If the Floor Coordinator is NOT on site – the Floor Coordinator calls the Main Control Room (2-9424) – the MCR personnel, Via EPICS control, close the appropriate drop valve for the sector having an oxygen deficiency alarm and visually verifies that the valve is closed. If remote control is inoperative, MCR personnel close the valve using the manual switch for that valve.
 - 3.1.3 Proceed to the enclosure where the alarm occurred. (MCR personnel if Floor Coordinator not on site)
- 3.2 Ventilating and allowing entry into the enclosure.
 - 3.2.1 Clear the area of non-essential personnel.
 - 3.2.2 Wear proper personnel protective equipment. This includes but is not limited to – safety glasses, face shield, and cryo gloves. A portable oxygen monitor is required.
 - 3.2.3 Do NOT enter the enclosure.
 - 3.2.4 If a window is available, look inside the enclosure for any obvious signs of a liquid nitrogen leak (spray, frost on the floor, walls or doors, etc.). Visually assess the situation.
 - 3.2.5 Insure that the beam shutter to the enclosure where the alarm has occurred is closed.
 - 3.2.6 Caution: if a leak exists, it could spray liquid since the system is under pressure. Stand away from the entry and open the enclosure door.
 - 3.2.7 Assess the situation.
 - 3.2.8 IF an emergency conditions exists, call 911. Give detailed location information (i.e. Bldg. #, nearest column #, and sector identification). Isolate the area to prevent entry.

If emergency conditions DO NOT exist. The ODH alarm will stop alarming as the oxygen level increases. Observe the ODH reading. Entry by appropriate personnel can be allowed if the reading is above 19.5 and verified with the portable ODH monitor. If there was no LN2 leak and the ODH alarm can be attributed to a meter malfunction, the LN2 drop valve can be re-opened.
 - 3.2.9 Floor Coordinator will contact the LNDS manager or his alternate.
 - 3.2.10 Floor Coordinator will contact the appropriate CAT personnel.

The formal procedure, including attachments and signatures of approval, may be found at the following web location:

<http://www.aps4.anl.gov/procedures/p4103010104-00027.pdf>