Risk Assessment of Cryogens Handling

1. Location

DNP MAS NMR Hall (B30) at the Sir Peter Mansfield Magnetic Resonance Centre (SPMMRC)

2. Responsible person: Subhradip Paul/Walter Köckenberger

3. Brief Description of work activity

Though liquid and gaseous nitrogen is used for the operation of all the equipment; none of the users will have to handle liquid nitrogen. Liquid helium is used in the superconducting 14.1 T magnet, and the refilling of it will only be done by the vendor. Users will not handle liquid Helium.

4. List of main Hazards: Asphyxiation

- Malfunctioning of the liquid nitrogen reservoir of the low temperature MAS unit.
- Accidental quenching of the 14.1 T magnet.
- In contact with gaseous nitrogen at low temperature when changing samples.

5. Hazard Rating: 2

6. List of control measures

- Oxygen level sensors are placed throughout the laboratory. Two on the ceiling level for detection of deficiency of the oxygen level in case of the quench (Helium release) and two near the floor level for detection of deficiency of oxygen level due to increase in nitrogen level in the lab.
- In case one of the sensors detects deficiency of oxygen level, a fault is picked up by the gas monitoring system located at the facility manager's office which produces both visual alarm and acoustic alarm.
- **The detection of a fault also relays a signal to a slam-shut valve outside which cuts the supply of liquid nitrogen to the lab.**
- **In case there is a fault in the cooling cabinet which is the main vessel containing liquid nitrogen inside the lab, a normally closed connection relays a signal to the oxygen gas system which creates a fault and the slam-shut valve prevents flow of any nitrogen to the lab. So two-step measure have been taken to ensure user safety**.
- The exit door is marked in case an alarm occurs
- An exhaust fan is in continuous operation.
- In case there is a need, the user can put on gloves to change sample though it is not necessary as the whole process of changing samples is less than a minute.
- There are detailed instructions as to how to operate the low temperature cabinet safely.

7. Risk factor: 2

8. Extent: 1

9. Hazard x Risk x Extent: 4

10. Comment

Please read the low temperature cabinet manual before operating it for being safe

X

Subhradip Paul
Research Facility Manager

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