Assessment Carried out by: Dr Siobhan Smith & Dr Kevin Jones Date of Assessment: 15/06/2022 Date of Next Review: 15/06/2023

Risk Assessment: Operation of the Liquid State NMR Facility

Hazards	**Who Might be Harmed and How?**	**Existing Control Measures**	**Further Actions Required**	**Responsible Person**	**Date**
Superconducting Magnets	*Any person entering the NMR suite who has a metal implant or pacemaker.* The strong magnetic fields generated by the superconducting magnets may have an adverse effect on metal implants and pacemakers leading to injury	Warning signs are displayed at the entrance to the NMR facility. Dangers of superconducting magnets are discussed during induction training.	N.A.	N.A.	N.A.
Uncontrolled Movement of Magnetic Objects	*Researchers using the facility and contractors carrying out maintenance work.* If a metal object is subjected to a powerful magnetic field, it may move uncontrollably towards the magnet causing injury or damage to equipment.	Warning signs are displayed at the entrance to the NMR facility. Facility users are informed that magnetic objects should be kept outside of the “5 Gauss line”, which is marked on the floor around the magnets. Where there is no line, the 5 Gauss line is within the footprint of the magnet. Facility users are informed that they should assume any piece of metal is magnetic until proven otherwise.	N.A.	N.A.	N.A.

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Hazards	**Who Might be Harmed and How?**	**Existing Control Measures**	**Further Actions Required**	**Responsible Person**	**Date**
Cryogenic Burns	*NMR-facility staff carrying out liquid nitrogen / liquid helium fills. Researchers and contractors present in the facility when cryogen fill is being carried out.* Liquid nitrogen / helium can cause serious freeze burns in contact with skin or eyes.	Facility staff carrying out cryogen fills must adhere to University policy on handling of cryogenic materials. Loose fitting gloves and eye protection will be worn when using liquid nitrogen. Areas will be cordoned off when nitrogen fills are taking place to prevent access by untrained persons. If a freeze burn to skin or eyes is sustained, first-aid will be administered.	N.A.	N.A.	N.A.
Asphyxia	*All staff in the NMR facility in the vent of a magnet quench.* Following a “magnet quench” (a rapid release of nitrogen and helium gas), air may be displaced such that oxygen levels become dangerously low with no visible indication. This can lead to asphyxia / loss of consciousness.	Warning signs are displayed throughout the facility with a photo of an active quench. Signs inform users to leave the area in the event of a magnet quench.	Oxygen-depletion monitors are to be installed throughout the facility. Monitors will be connected to flashing beacons outside entrances to deter entry in the event of an oxygen depletion event.	Kevin Jones	15.06.2022

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Hazards	Who Might be Harmed and How?	Existing Control Measures	Further Actions Required	Responsible Person	Date
Electrocution	*NMR-facility staff carrying out liquid nitrogen / liquid helium fills. Researchers and contractors present in the facility when cryogen fills are being carried out.* During cryogenic fills, condensation of water around electrical cables may result in an electrical shock hazard.	Plastic sheeting will be used to cover equipment where this is a risk until the fill is complete.	N.A.	N.A.	N.A.
Falls from Height	*Facility staff and users adding samples to NMR machines.* Wooden steps are provided to allow access to the NMR sample changers. Ladders are used for access the magnets and other hardware during maintenance. The steps / ladders are not fixed to the floor so must be used with caution as staff may fall and sustain an injury.	Facility users are warned of fall risk during induction training. All facility staff have completed training on the correct use of ladders.	N.A.	N.A.	N.A.

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Hazards	Who Might be Harmed and How?	Existing Control Measures	Further Actions Required	Responsible Person	Date
Slips and Trips	*NMR-facility staff carrying out liquid nitrogen / liquid helium fills. Researchers and contractors present in the facility when cryogen fill is being carried out.* During cryogenic fills, condensation of water may lead to puddles on the floor. If facility staff / users slip on puddle, they may sustain an injury.	Any puddles of water must be cleaned immediately and warning sign used to alert people to the potential risk.	N.A.	N.A.	N.A.
Cuts	*Facility staff and users* Glass NMR tubes used for analysis are brittle and may snap when being positioned in a sample holder. Broken glass may result in cuts.	Broken glass must be immediately placed in the glass bin provided and a member of facility staff alerted.	N.A.	N.A.	N.A.
Chemical Exposure	*Facility staff and users* If a glass NMR tube containing a research sample breaks, the sample may make contact with the skin and cause an injury.	Gloves will be worn when clearing broken tubes or emptying samples from the carousels.	N.A.	N.A.	N.A.