



This form is to be used in conjunction with the Environment Health and Safety Manual Procedure 3.2 Hazard Identification, Assessment and Control - Application.

Information of Activity

Activity: NMR use

Location: NMR lab

Identified by: G. Papadopoulos/T.K. Lim Date: 1/3/06

Identified Hazard / Aspect: Exposure to high magnetic and radio frequency fields, handling of cryogenics and high electrical voltages/RF sources, magnet quench.

Risk Analysis matrix – level of risk

Identified Hazards	Risk Assessment			Risk Score	Risk Level
	Exposure (E)	Likelihood (L)	Consequence (C)	E x L x C	
Interference of medical electronic implants e.g. pacemakers or magnetic attraction of metallic implants e.g. clips, prostheses	3	0.3	10	10	M/H
Damage to Watches, Mobile Phones ATM cards etc	3	0.3	2	1.8	L
Magnet quench, or when filling magnet with liquid nitrogen:- Asphyxia	2	0.1	10	2	L
- Cold burns	2	0.3	2	1.2	L
Long term exposure to magnetic fields- brain tumors	3	0.05	10	1.5	L

Definitions

Exposure	E	Likelihood	L	Consequence	C	Risk Score	Hierarchy of Risk Controls
Continuously	10	Almost Certain	1.0	Catastrophic	20	E >20 H >10 M 3-10	Elimination is a permanent solution and should be attempted in the first instance. Substitution involves replacing the hazard or environmental aspect by one of lower risk. Engineering controls involve physical barriers or structural changes to the environment or process. Administrative controls reduce hazard by altering procedures and providing instructions. Personal protective equipment last resort or temporary control.
Frequently	6	Likely	0.6	Major	10		
Occasionally	3	Possible	0.3	Moderate	5		
Infrequently	2	Unlikely	0.1	Minor	2	L < 3	
Rarely	1	Rare	0.05	Insignificant	1		

LEGEND

E: extreme/significant risk; immediate action required; must be managed by senior management with a detailed plan, notify RMO immediately.

H: high risk, senior management attention needed, detailed research and management planning at senior levels

M: moderate risk, management responsibility must be specified; manage by specific monitoring or response procedures

L: low risk, manage by routine procedures; unlikely to need specific allocation of resources

Details of Risk Controls to be Taken

Risk Controls: (These should be determined by both the person(s) identifying the risk and the responsible manager and HSR or Environmental Representative). When determining risk controls refer to Hierarchy of Risk Control. Some examples are operating manuals, safe work procedures, licenses, permits to work, training and instruction etc



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- Trained personnel only to enter NMR lab, therefore access to the NMR lab restricted to only the NMR staff and users of the instruments. Cleaners and maintenance staff must receive authorization and must be escorted by the NMR technician. People with pacemakers or medical implants must not enter the NMR lab under any circumstances. Clearance from their own doctor is required.
- Leave all non essential devices (eg, watches, mobile phones, belt buckles, steel toed shoes, tools, equipment with metallic components such as vacuum cleaners) outside NMR lab. Do not go beyond safety barrier (chain and post). These items may be strongly attracted to the magnet. This might result in damage to the magnet/probes (possibly resulting in a quench) or serious injury or death to personnel working near or under a magnet. Magnetic fields may also permanently damage watches, calculators and certain types of credit cards. These items need to be kept well away from the magnets.
- Only experienced technicians to fill the magnet with liquid nitrogen. When refilling magnet with liquid nitrogen, do not touch vessel as valves and outlets are very cold. Gauntlet thermal gloves and face shield must be worn. The magnet cryostats are only filled using stainless steel transfer lines to reduce risk of rupture. Refills must be continuously attended. Magnet quenches (the rapid release of gaseous cryogenics from the cryostat into the room) should trigger the fire alarm. The door should be left open in case of valve malfunction or magnet quench to reduce any risk of asphyxiation due to the large volume expansion. In the event of a quench personnel should evacuate the area (a quench warranting evacuation would be obvious by the noise of the escaping gas and clouds of vapour).
- NMR staff and researchers should spend no longer than reasonably necessary within the 5 gauss line for sample changing and adjustments. No other equipment unrelated to the NMR system is to be placed within the 5 gauss line. There is little or no hazard of cumulative exposure to magnetic fields outside the 5 gauss safety line.

Person assessing the risk: ___ G. Papadopoulos

Date: 1/3/06

Authorised by: _____ G. Papadopoulos/T.K. Lim _____

Planned completion date: _____

Risk Control Measures Completed

Actions by: _____ Completed (Initials & date): _____