## General Risk Assessment for use of NMR spectrometers

| Date: (1)<br>08 June 2023                                                                | Assessed by: (2)<br>Ralph Adams | Checked / Validated*<br>by: (3)<br>Carlo Bawn<br>Riza Moodley | Location: (4)<br>NMR Laboratories, Chemistry<br>Building | Assessment ref no (5)<br>NMR 001 | Review date: (6)<br>08 June 2024 |  |  |  |
|------------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------------------------|----------------------------------------------------------|----------------------------------|----------------------------------|--|--|--|
| Task / premises: (7)<br>Use of Walk-Up NMR Spectrometers in the Department of Chemistry. |                                 |                                                               |                                                          |                                  |                                  |  |  |  |

| Activity (8)                                                                                      | Hazard (9)                                                 | Who might be<br>harmed and how<br>(10)                                                                                                                                                       | Existing measures to control risk (11)                                                                                                                                                                                                                                                                                                                                                     | Risk rating (12) | Result<br>(13) |
|---------------------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------|
| Loading/Removing<br>Sample into/from<br>Autosampler and<br>setting up walk-up<br>NMR experiments. | Moving parts<br>(autosampler)                              | Who: Users.<br>How (Risk): Trapped<br>or crushed body<br>parts (fingers),<br>ripped clothing.                                                                                                | <ul> <li>Check status of autosampler before loading tube. If<br/>any part is in motion, or the magnet is discharging a<br/>tube, wait for it to finish before approaching.</li> <li>Note the location of the emergency stop button.</li> </ul>                                                                                                                                             | Low              | A              |
|                                                                                                   | Chemical<br>Exposure                                       | Who: Users,<br>occupants of the<br>laboratory, technical<br>staff.<br>How (Risk): Harm<br>will be based on<br>chemical for which a<br>separate COSHH<br>assessment should<br>be performed.   | <ul> <li>Do not use autosamplers for samples characterised<br/>as 'V' (Highly dangerous or noxious) – submit these to<br/>the service.</li> <li>Dispose of chemically contaminated tissue/blue roll<br/>in chemical waste bins.</li> <li>Eye protection and gloves must be worn only when<br/>cleaning NMR tubes.</li> <li>Lab coats are not permitted in the NMR laboratories.</li> </ul> | Low              | A              |
|                                                                                                   | Exposure to<br>chemicals<br>during sample<br>preparations. | Who: Users,<br>occupants of the<br>laboratory, technical<br>staff.<br>How (Risk):<br>Exposure through<br>inhalation,<br>absorption, or<br>injection during<br>sample preparation<br>methods. | <ul> <li>A chemical risk assessment is completed for every experiment.</li> <li>A task-based risk assessment that is separate from the chemical risk assessment must be performed on a per-sample basis for the sample prep to cover the hazards, risks and controls.</li> </ul>                                                                                                           | Medium           | A              |

| Activity (8) | Hazard (9)                                                  | Who might be<br>harmed and how<br>(10)                                                                                                                                         | Existing measures to control risk (11)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Risk rating (12) | Result<br>(13) |
|--------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------|
|              | Slips and Trips                                             | Who: Occupants of<br>the laboratory.<br>How (Risk):<br>Tripping, falling,<br>dropping items.                                                                                   | <ul> <li>Keep walkways clear of equipment, bags, etc.</li> <li>Avoid trailing leads and cables or ensure they are adequately covered or taped down.</li> <li>Ensure deficiencies in the flooring are reported to estates, the technical service manager or NMR staff.</li> </ul>                                                                                                                                                                                                                                                                                                               | Low              | A              |
|              | Broken Glass                                                | Who: Users.<br>How (Risk): Cuts.                                                                                                                                               | <ul> <li>Do not use, cracked, chipped, scratched or broken<br/>NMR tubes.</li> <li>Use a protective depth gauge to check spinner<br/>height.</li> <li>Carefully insert tubes into spinners – do not force<br/>them.</li> <li>Do not use sample rotation for tubes fitted with<br/>Young's taps.</li> <li>Glass bins are provided in B09 and B14 for broken<br/>glass.</li> <li>Knowledge of the Department safe use of sharps<br/>information sheet.</li> <li>Take care when handling NMR tubes, especially when<br/>capping to avoid excessive force and breakage of the<br/>tube.</li> </ul> | Low              | A              |
|              | Cryogenic<br>liquids, and<br>vessels and<br>transfer lines. | Who: Occupants of<br>the laboratory<br>working in the<br>vicinity of cryogenic<br>materials. Users of<br>variable temperature<br>(VT) equipment.<br>How (Risk): Cold<br>burns. | <ul> <li>Keep clear of instruments that are being filled with cryogens.</li> <li>Do not insert/remove samples while filling is in progress. Particularly, avoid nitrogen exhaust and gas plume.</li> <li>VT users must have passed relevant university 'pressurised gas and cryogenic safety' training.</li> <li>Wear appropriate clothing and PPE - trousers with turn-ups should not be worn, nor sandals or ankle boots with loose fitting tops.</li> </ul>                                                                                                                                 | Low              | A              |

| Activity (8) | Hazard (9)             | Who might be<br>harmed and how<br>(10)                                                                                                                                                                                                                 | Existing measures to control risk (11)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Risk rating (12) | Result<br>(13) |
|--------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------|
|              | Oxygen<br>depletion    | <ul> <li>Who: Occupants of the room, adjacent rooms.</li> <li>How (Risk): Asphyxiation.</li> <li>Note: This is a more immediate danger than fire.</li> </ul>                                                                                           | <ul> <li>If oxygen depletion alarms are sounding and/or red warning lights outside laboratories are flashing evacuate the area immediately.</li> <li>If oxygen depletion alarms are sounding and/or red warning lights outside laboratories are flashing do not enter the area.</li> <li>If a cryostat suddenly starts venting gas evacuate the area, informing users around you as you do so.</li> <li>Doors should be left open when working in a laboratory containing a cryostat.</li> <li>Keep clear of instruments which are being filled with cryogens.</li> </ul>                                                         | Low              | A              |
|              | Oxygen<br>enrichment   | Who: Occupants of the room.                                                                                                                                                                                                                            | • Ensure that there are no naked flames in the vicinity of the filling operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Low              | A              |
|              | High magnetic<br>field | Those with<br>pacemakers or metal<br>implants.<br>How (Risk):<br>Pacemakers may<br>malfunction in the<br>field, implants may<br>become<br>uncomfortable or<br>attracted to the<br>magnet. Increased<br>rate of combustion<br>of flammable<br>materials | <ul> <li>Persons with pacemakers or metal implants are not permitted to perform this activity.</li> <li>Display signs to warn of high magnetic fields.</li> <li>Barriers and floor markings to indicate 5 G line.</li> <li>Keep keys, bank cards, phones, and watches outside 5 G line.</li> <li>Do not take ferrous metal objects including wheelchairs, tools and ladders within the 5 G line.</li> <li>Objects, e.g. screws and swarf, may drift towards the magnet.</li> <li>Visitors including contractors may only enter the area under the supervision of The School Health and Safety Advisor or their deputy.</li> </ul> | Low              | A              |
|              | Use of steps           | Who: User, persons<br>nearby.<br>How (Risk): Falling,<br>tripping, dropping<br>items.                                                                                                                                                                  | <ul> <li>Ensure that steps are stable and on level flooring and are positioned so that access can be completed without stretching or leaning.</li> <li>Use the handrail.</li> <li>Inspect steps before use, report any loose fixings to NMR staff.</li> <li>Use a sample rack if you have to carry multiple samples.</li> </ul>                                                                                                                                                                                                                                                                                                   | Low              | A              |

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|--------------|------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------|
|              | Electricity            | Who: Equipment<br>users.<br>How (Risk): Electric<br>shock. | <ul> <li>Do not use equipment that appears damaged.</li> <li>Regular PAT testing is carried out.</li> </ul>                                                              | Low              | Т              |
|              | Gases at high pressure | Who: Equipment<br>users.<br>How (Risk): Hit by<br>flailing | <ul> <li>Air supplies must be switched off before<br/>disconnecting</li> <li>Air supplies should be switched on slowly and<br/>connections checked for leaks.</li> </ul> | Low              | Т              |

Researcher Name:

Researcher Signature:

Date:

Supervisor Name:

Supervisor Signature:

Date

University Safety Services risk assessment form and guidance notes. Revised Aug07