

MAGNETIC FIELD SAFETY POLICY

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Originating Office: Office of the
Vice-President, Services

Supersedes /Amends: N/A

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PREAMBLE

Strong Static and Time-Varying Magnetic Fields are generated by research and other equipment in various locations within University facilities. Although Magnetic Fields (both Static and Time-Varying) and associated electromagnetic fields do not cause apparent long-term health effects, there are hazards, under some circumstances, which need to be recognized and controlled to avoid accidents or injury to equipment operators, researchers, support staff, students, visitors, and research subjects, as well as to the general public. Although there is no legislative, certification, or licensing requirement, the University is committed to complying with all federal and provincial guidance documents concerning the safe operation of equipment generating significant magnetic and electromagnetic fields, as described in this Policy and its accompanying [Magnetic Field Safety Manual](#) (the “Manual”).

PURPOSE

Concordia University (the “University”) is committed to providing a safe research, teaching and work environment. All persons working with or near strong Magnetic Fields or occupying University space with potentially elevated Magnetic Fields must comply with this Policy and the procedures outlined in the [Manual](#).

SCOPE

This Policy applies to all persons working with or near strong Magnetic Fields or occupying University facilities with potentially elevated Magnetic Fields and all persons on University premises with potentially elevated Magnetic Fields, including but not limited to University faculty, staff, students, research subjects and authorized visitors.

This Policy is to be interpreted in such a way as to not conflict with or supersede any other University Policy, including but not limited to the following related policies:

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<i>Environmental Health and Safety Policy</i>	VPS-40
<i>Policy on Injury/Incident Reporting and Investigation</i>	VPS-42
<i>Policy on First Aid and Medical Emergencies</i>	VPS-45
<i>Radiation Safety Policy</i>	VPS-46
<i>Policy on the Management of Hazardous Materials</i>	VPS-47
<i>Hazardous Materials Spill Response Policy</i>	VPS-48
<i>Biosafety Policy</i>	VPS-52

DEFINITIONS

For the purposes of this Policy:

“Hertz (Hz)” refers to the oscillation frequency of the electromagnetic field in cycles per second.

“Magnetic Field” is a force field created by a magnet or as a consequence of the movement of electric charges. Its intensity is measured in Tesla (T) or Gauss (G).

“Magnetic Resonance” refers to the phenomenon of absorption of certain frequencies of electromagnetic fields (usually Radiofrequency Range) by nuclei and electrons, atoms and molecules when oriented in strong Static Magnetic Fields and exploited in nuclear magnetic resonance spectroscopy (NMR), magnetic resonance imaging (MRI), and electron paramagnetic resonance spectroscopy (EPR).

“Quenching” refers to loss of cryogenic coolant from a superconducting magnet coil causing reversion to resistive state and loss of Magnetic Field.

“Static Magnetic Field” does not vary with time and is created by either a permanent magnet or a direct current electromagnet.

“Radiofrequency Range” is defined as electromagnetic fields oscillating between 10 MHz and 300 GHz.

“Responsible Users” refers to individuals authorized to operate large magnets or who work within Magnetic Fields of 0.5 mT (5 G) or greater, including facility managers, researchers, research support staff, and equipment operators.

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“*Time-Varying Magnetic Field*” is produced by alternating currents at frequencies from one Hertz to the GHz range.

For more comprehensive definitions and terms, please refer to the [Manual](#).

POLICY

Composition and Mandate of the University Radiation Safety Committee (“URSC”)

1. The Vice-President, Services has authorized the URSC to establish policies concerning the operation of equipment generating strong Magnetic Fields on behalf of the University. Such policies shall be enforced through the activities of the Chair of the URSC and the Radiation Safety Officer (“RSO”), who may delegate day-to-day compliance surveillance to a site-RSO.
2. The composition and mandate of the URSC is established by the University’s *Radiation Safety Policy*, ([VPS-46](#)) and further elaborated in the [Radiation Safety Manual](#).

In matters dealing with Magnetic Fields, the URSC shall include at least one (1) member from each department that operates large magnets and at least one (1) member with theoretical and practical expertise in Magnetic Field safety.

3. The URSC:
 - i. Advises the Vice-President, Services regarding policies, procedures and guidelines on Magnetic Field safety, particularly with respect to operating large magnets in human research studies.
 - ii. Reviews University policies, procedures and practices to ensure compliance with applicable regulations and accepted ‘*best practices*’ and safety standards.
 - iii. Establishes and oversees Magnetic Field protection and training programs.
 - iv. Reviews and approves all standard operating procedures and protocols for operators, workers, researchers, students, and research subjects exposed to large Magnetic Fields, including security and access control for routine cleaning, maintenance and emergency response.

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- v. Reviews and approves protocols for human research studies following scientific merit and human research ethics approval by the University Human Research Ethics Committee (“UHREC”) per the *Policy for the Ethical Review of Research Involving Humans*, ([VPRGS-3](#)), or the external equivalent, to ensure safety of operators, research staff, students, and subjects.
 - vi. Reviews and periodically updates the [Manual](#) on any issues related to Magnetic Field safety or necessitated by changes to legislative requirements or guidelines.
 - vii. Reviews periodic inspection of Magnetic Resonance facilities, reports of incidents, standard operating procedures for use in human subjects, calibration, maintenance, repairs or renovations affecting the performance of equipment, and recommend corrective measures.
 - viii. Maintains written records of activities, decisions, advice and recommendations to the senior administration of the University.
4. In addition to duties outlined in the *Radiation Safety Policy*, ([VPS-46](#)) and further described in the [Radiation Safety Manual](#), and in respect to Magnetic Field safety, the Chair of the URSC:
- i. Corresponds with federal, provincial and municipal departments and agencies on behalf of the University with respect to activities involving large Magnetic Fields.
 - ii. With approval of the URSC, authorizes the operation of equipment generating Magnetic Fields greater than 0.1mT (1 G) to which any person could be exposed.
 - iii. With approval of the URSC, authorizes standard operating procedures involving all faculty, staff, students, research subjects and authorized visitors exposed to Magnetic Fields exceeding 0.1 mT (1 G).
 - iv. Authorizes the closing of University facilities, restricting access or suspending operation of equipment if a hazard is deemed to be excessive by the RSO or the URSC, or in emergency situations; immediately informs the Director of Security, Director of Environmental Health & Safety (EH&S), the appropriate facilities manager(s) about such closing and requests the RSO to change or post appropriate signs.

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5. In addition to duties and responsibilities listed in Section 3 of the *Radiation Safety Policy*, (VPS-46) and the [Radiation Safety Manual](#), and in respect to Magnetic Field safety, the RSO:
 - i. Ensures the day-to-day administration of the Magnetic Field safety and training program on behalf of the University.
 - ii. Advises and consults the Chair of the URSC regarding issues related to the University's use of Magnetic Resonance equipment so as to ensure that such use is carried out in accordance with all applicable legislation and health and safety guidelines.
 - iii. Ensures that records and reports required by the University or external agencies are prepared, maintained and submitted as required.
 - iv. Maintains the coordinates of all persons involved in the supervision and operation of equipment generating Magnetic Fields greater than 0.1 mT (1 G) who have received Magnetic Field safety training.
 - v. Keeps an inventory of all magnets capable of generating Magnetic Fields greater than 0.1 mT (1 G) including locations and records, shielding verification, calibration, maintenance, repairs, reconfiguration or modification.
 - vi. Provides safety warning signs, copies of all relevant regulations and guidelines and information regarding safety equipment or materials required.
 - vii. Provides reports of incidents involving Magnetic Fields to the URSC, the Director of Security and the Director of EH&S, and the appropriate facility manager(s) and administrators with recommendations for corrective action.
 - viii. Routinely (at least semi-annually) inspects University facilities to assess compliance with University policies and approved standard operating procedures as well as adequacy of shielding, access controls and training of personnel; notifies operators, facilities managers, researchers, and units heads of any remedial action, when required.

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- ix. Ensures that all persons (faculty, staff, students, research subjects and authorized, visitors) who may be exposed to Magnetic Fields greater than 0.5 mT (5 G) are adequately screened for ferromagnetic objects, particularly medical devices, and advised of potential health risks and potential damage to personal property.
- x. Ensures that any maintenance staff (custodial distribution, facilities maintenance) and any emergency staff (security, emergency responders) are screened, trained and supervised when approaching large magnets.
- xi. May delegate duties and responsibilities to the Magnetic Field Safety Officer or Site-RSO as appropriate, in consultation with the Director, EH&S and the Chair of the URSC.

Authorization Process

- 6. The URSC approves the location, access controls, security arrangements and shielding required for the safe operation of magnets and Magnetic Resonance equipment.
- 7. The URSC approves the training and qualifications of persons authorized to operate large magnets and Magnetic Resonance equipment who work within the 0.5 mT (5 G) zone.
- 8. An authorization to operate large magnets and Magnetic Resonance equipment may not exceed a period of two (2) years. Such authorization may be withdrawn in the event of non-compliance with this Policy, the [Manual](#), specific authorization conditions, or in the event of serious health risks.
- 9. The authorization to expose human research subjects to fields greater than 0.5 mT (5 G) will only be granted following satisfactory scientific merit review and approval of protocols by the UHREC per the *Policy for the Ethical Review of Research Involving Humans*, ([VPRGS-3](#)).
- 10. The URSC must be advised of any change to Magnetic Resonance equipment and its location, operating procedures, operators or supervisors.

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Responsible Users

11. A Responsible User:

- i. Ensures that all persons working or accessing Magnetic Field-generating equipment under their supervision or control, or in facilities under their jurisdiction, fully complies with all approved standard operating procedures and applicable legislation, regulations and guidelines set forth in this Policy and the [Manual](#).
- ii. Strictly adheres to protocols approved by the UHREC and/or the URSC with respect to exposure of human research subjects to Magnetic Fields greater than 0.5 mT (5 G) and in particular, ensures thorough and rigorous medical and physical screening of research subjects with respect to ferromagnetic materials, conducting metallic implants and medical devices potentially putting individuals at risk. Such exposure of research subjects will be carried out under the supervision of a qualified medical practitioner and executed by a qualified radiology technician.
- iii. Makes certain that individuals working under his/her supervision or in facilities under his/her jurisdiction are properly trained, supervised and aware of the potential risks, safety procedures, emergency procedures and the proper operation of equipment to prevent unintended exposure to themselves and others.
- iv. Restricts access to magnet rooms and control rooms to authorized persons only and accompanies visitors or research subjects to such areas after the appropriate screening and only after informing these research subjects of the risks related to Magnetic Fields.
- v. Provides the RSO with twenty-four (24) hour contact numbers of individuals able to respond in emergency situations, and notifies the RSO of any personnel changes, including the addition or removal of students and employees on authorization lists.
- vi. Is responsible for maintaining all warning signs in visible locations, safety and emergency instructions and any safety equipment required by the RSO.
- vii. Maintains up-to-date logbooks, standard operating procedures, operation manuals, and the [Manual](#). Such documentation shall be placed in a visible location within the

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magnet room or control room and shall be accessible for inspection by the RSO or any other authorized person.

- viii. Maintains records for a minimum of three (3) years regarding the general operations of a magnet room or control room and for long as required by applicable legislation regarding confidential medical and human research subjects.
 - ix. In any procedures involving human research subjects, ensures that emergency resuscitation equipment is available and that personnel trained in emergency first aid are on duty.
 - x. Maintains all equipment and facilities for which he/she is responsible and ensures safe practices with respect to all potential hazards (electrical, acoustic, cryogenic, projectiles) associated with the operation of large magnets.
 - xi. Ensures that informed consent has been obtained and that all research subjects have been given explicit and complete information regarding any health or injury risks associated with the procedures involved.
 - xii. Ensures that all procedures directly involving human research subjects are carried out by qualified technicians following approved standard operating procedures under the direct supervision of a qualified medical practitioner.
12. Failure of Responsible Users to comply with regulations, authorization conditions, approved operating procedures, this Policy and the [Manual](#) constitutes grounds for restricting or suspending the operations of facilities, equipment or procedures involving Magnetic Fields, or imposing disciplinary sanctions.