

Magnetic Field Guidelines

Last updated: 20 August 2009

Background

- 1 Oscillating magnetic fields are produced by the flow of electrical current. The magnetic field is proportional to the current, that is, the amount of electricity flowing through the wires. In most situations oscillating magnetic fields are produced by a standard 50 hertz alternating current.
- 2 Static magnetic fields are associated with magnets. Some equipment such as Nuclear Magnetic Resonance (NMR) or Magnetic Resonance Imaging can produce a significant static magnetic field.

Standards

- 3 The University has adopted a policy of 'prudent avoidance' of long-term exposure to elevated levels of magnetic field due to the present scientific uncertainty regarding health effects of exposure to elevated levels of oscillating magnetic fields.
- 4 Staff or students can be located at workstations that have oscillating magnetic fields of 20 milli Gauss / 2 microTesla or below without restriction.
- 5 Where areas have oscillating magnetic fields above 20 milliGauss / 2 microTesla and below 1,000 milliGauss / 100 microTesla, staff or students may occupy such areas regularly provided the area has an appropriate warning sign posted. Regularly means more than once per week for periods over an hour.
- 6 In the event that an area is identified with levels above 20 milliGauss / 2 microTesla, action will be taken if practicable to mitigate the exposure. These actions may include:
 - relocation of cables
 - shielding of cables
 - relocation of staff or students away from the area. Magnetic fields often drop off dramatically within 1 metre of the source, staff can stand back from electrical equipment, and work stations can be moved out of the 1 metre range of stronger EMF sources.
- 7 Areas that have oscillating magnetic fields of 1,000 milliGauss / 100 microTesla or above must have an appropriate warning sign posted. Entry to such areas must be controlled by a Permit system.
- 8 Where significant static magnetic fields can be generated, such as near NMR equipment, the field strengths around the machine should be mapped where practicable. Information about field strengths should be obtained from equipment suppliers. Staff not using the equipment involved will be located in areas where the static field is less than 2,000 milliGauss / 200 microTesla.
- 9 Where magnetic fields in laboratories etc. are likely to exceed the Ceiling for users of medical implant such as pacemakers or prosthetic parts, warning signs for staff and the public must be provided. The Ceiling is 1,000 milliGauss / 100 microTesla for oscillating magnetic fields and 5,000 milliGauss / 500 microTesla for static magnetic fields. Failure to provide or heed signs could result in serious injury. Any closer approach should only occur after advice from a doctor or the medical implant manufacturer.

Managing Exposure to Magnetic Fields

- 10 Where managers or supervisors require staff or students to work in, or be located in areas where oscillating magnetic fields are above 20 milli Gauss / 2 microTesla, they must:
 - Consult with the staff and their OHS representatives involved
 - Ensure as far as practicable that action has been taken to mitigate or reduce the exposure level
 - Ensure that appropriate signs are present in the area informing staff and others of the fields
 - Control access to any area where oscillating magnetic fields of 1,000 milliGauss / 100 microTesla or above (or static magnetic fields of 5,000 milliGauss / 500 microTesla or above) are present through a Permit to Enter system.

- 11 Where managers purchase equipment or renovate or construct areas that are subject to oscillating magnetic fields above 20 milli Gauss / 2 microTesla, they must use low-EMF designs wherever possible, for example with the layout of office power supplies.
- 12 Facilities Management Services Division and Information Technology Services Division will:
 - Consider magnetic field strengths in the design and refurbishment of workplaces and the purchase of equipment
 - Design and refurbish workplaces to minimise potential magnetic field exposures
 - Providing timely advice to other areas affected about magnetic field strength that may exceed University guidelines.

Additional Information on Magnetic Fields

- 13 The source of elevated magnetic field levels at Deakin are associated with electrical power cables, substations and laboratory equipment. Elevated levels of magnetic field usually come to the attention of staff as a result of investigations into computer screen flicker. Computer screen flicker is sometimes caused when an oscillating magnetic field interferes with the screen's function. Slight screen flicker can be caused by an oscillating magnetic field of 10 milliGauss / 1 microTesla. Screen interference generally increases as the magnetic field increases.
- 14 Static Magnetic Fields can also interfere with electronic equipment, generally at levels above 2,000 milliGauss / 200 microTesla. In addition the magnetic attraction will exert forces on ferrometallic objects. The earth has a natural static magnetic field of 500 milliGauss / 50 microTesla.

Oscillating Magnetic Fields

- 15 There are currently no Australian Standards regulating exposure to low frequency oscillating magnetic fields. However the following guidelines are in common use:

Oscillating Magnetic Fields	Whole Working Day (milliGauss)	Ceiling (milliGauss)
Occupational:		
Whole Body	5,000 (1)	10,000 (2)
Limbs	250,000 (1)	
Medical electronic implant users (e.g. pacemakers)(3)		1,000 (2)

Notes:

(1) The National Health and Medical Research Council (NHMRC) 'Interim guidelines on limits of exposure to 50/60 Hz electric and magnetic fields (1989)'.
 (2) American Institute of Governmental Industrial Hygienists 2009
 (3) See Note 3 under Static Magnetic Fields for general warning
 (4) Divide by 10 to get equivalent figures in microTesla

- 16 It needs to be noted that the NH&MRC guidelines specify oscillating magnetic fields below which immediate health effects are unlikely. They are not an indication of safe levels for continued exposure to low levels of magnetic field. Therefore these levels do not distinguish "safe" from "unsafe" levels of magnetic field. Current scientific knowledge has not established whether exposure to low levels of magnetic field is carcinogenic or has some other adverse health effect. Therefore a "safe" level of exposure has not yet been determined.
- 17 The Australian Radiation Protection and Nuclear Safety Agency has recommended that workplace exposure to fields produced by electrical substations and power cables should be avoided.

Static Magnetic Fields

- 18 The health effects of static magnetic fields have not been studied extensively. Current exposure recommendations for static magnetic fields are:

Static Magnetic Fields	Whole Working Day (milliGauss)	Ceiling (milliGauss)
Occupational:(1)		
Whole Body	600,000	20,000,000
Limbs	6,000,000	200,000,000
Medical electronic implant users (e.g. pacemakers)(3)		5,000
Public:(2)	100,000	500,000

Notes:

- (1) American Institute of Governmental Industrial Hygienists 2009
- (2) National Health and Medical Research Council (NHMRC) 'Safety Guidelines for Magnetic Resonance Diagnostic Facilities' 1991
- (3) Magnetic fields can have a significant effect on surgical implants of any kind if they contain even small amounts of ferromagnetic material. As well as the magnetic fields effect on electronic devices, some ferromagnetic materials heat up when near magnetic fields. Therefore it is necessary to exclude all public with any type of implant, from NMR laboratories until a check of the nature of the surgical implant is under taken. Then it can be said to be safe to approach NMR magnets.

Related Documents

- 19 Australian Radiation Protection and Nuclear Safety Agency, Commonwealth Department of Health and Aged Care:
- ["The Controversy Over Electromagnetic Fields and Possible Adverse Health Effects"](#)
 - ["50Hz Electric and Magnetic Fields"](#)
 - ["Powerline \(Extremely Low Frequency - ELF\) Electromagnetic Fields and Cancer - The Doll Report"](#)
- 20 American Institute of Governmental Industrial Hygienists "TLVs and BEIs" 2009
- 21 U.S. Department Of Health And Human Services, National Institute for Occupational Safety and Health:
- ["EMFs In The Workplace \(1996\)"](#)
 - ["EMF Electric and Magnetic Fields Associated With the Use of Electric Power – Questions and Answers Booklet \(2002\)"](#)
- 22 National Health and Medical Research Council (NHMRC):
- "Interim Guidelines on Limits of Exposure to 50/60 Hz Electric and Magnetic Fields (1989)"
 - "Safety Guidelines for Magnetic Resonance Diagnostic Facilities (1991)"