INFORMATION SHEET – MANAGING THE RISKS FROM EXPOSURE TO ELECTROMAGNETIC FIELDS (EMFs)

This Information Sheet provides guidance regarding the arrangements that Colleges / Professional Services must put in place to ensure no harm arises from exposure to electromagnetic fields (EMFs). The document should be read in conjunction with the University's Electromagnetic Fields Policy Standard, developed to ensure compliance with the Control of Electromagnetic Fields at Work Regulations. In addition, a number of example Risk Assessments are available.

WHAT ARE ELECTROMAGNETIC FIELDS (EMFs)?

Electromagnetics and the associated electromagnetic field spectrum is the part of physics that deals with electricity and magnetism. It covers everything from fridge magnets to batteries, mobile phones to lasers and even X-rays.

Electric fields are usually experienced via the electrical voltages they induce: the higher the voltage, the stronger the electric field. Magnetic fields are created when electric current flows: the greater the current, the stronger the magnetic field.

An electric field can exist even when there is no current flowing, such electrostatic fields are commonplace and something that we have all seen and experienced. If an electrical current does move, the strength of the magnetic field will relate to the magnitude and direction of the current flow.

- **Natural Sources of EMF:** Electromagnetic fields are present everywhere in our environment but are invisible to the human eye. However, the effects they can induce can be spectacular, for example a lightning strike. The background hiss you hear when tuning between an analogue radio station is another common manifestation of naturally occurring sources of EMF. The Earth's own core generates its own magnetic field, which causes a compass needle to orient in a North-South direction and is used by birds and fish for navigation.
- **Human-made Sources of EMF:** The electromagnetic fields generated by human-made sources include for example: mobile phones, microwave ovens and hospital MRI scanners. The electricity that comes out of every power socket also has an associated low frequency electromagnetic field. Various kinds of higher frequency electromagnetic waves are used for communication, for example: GPS, radio or microwave wave signals and high-speed broadband over optical.

The section of the EMF spectrum covered by the Control of Electromagnetic Fields at Work Regulations (CEMFAWR) are those with a spread of frequencies from 1Hz to 300GHz, just below that of optical radiation.

LEGISLATION: CONTROL OF ELECTROMAGNETIC FIELDS AT WORK REGULATIONS (CEMFAWR)

For most, EMF field strengths are at a level that will cause no harm. However, although no proven causal link between EMFs and long-term health effects, in some workplaces field strengths may present a risk. As such, the CEMFAWR came into effect in 2016 to address short-term health and sensory effects arising from exposure to EMF (0 – 300 GHz) in the workplace with specific consideration given to *Persons at Particular Risk*.

The University's Electromagnetic Fields Policy Standard ensures compliance with the Regulations.

ACTION LEVELS AND EXPOSURE LIMITS

The CEMFAWR refers to two sets of values: Action Levels and Exposure Limit Values that indicate the levels of risk associated with the type of electromagnetic field and what type of action is required.

i. *Exposure Limit Values (ELVs):* Are the legal limitations of exposure of employees to EMFs and must not be exceeded. ELV Tables are contained within the CEMFAWR[1].

ii. *Action Level (ALs):* Set of values contained within the CEMFAWR to provide an indication of risk, based on direct measurement of an electric or magnetic field. *If the AL is not exceeded, the corresponding ELV cannot be exceeded*.

RISKS FROM EMFs

The CEMFAWR and associated Guidance broadly splits risks into three categories:

Direct Effect Temporary changes that occur in a person as a result of exposure to EMF	• Vertigo and nausea from static magnetic fields • Effects on sense organs, nerves and muscles from low frequency fields (up to 100kHz) • Heating of whole body or parts from high frequencies (10MHz & above • Effects on nerves, muscles and heating from intermediate frequencies (100kHz – 10MHz)
Long-term Effects	• Currently no well-established scientific evidence to indicate **a** definitive causal link between EMFs and long-term health effects
Indirect Effects Undesirable effects due to the presence of objects in the EMF leading to a safety or health hazard	• Interference with medical electronic equipment • Interference with active implanted medical devices (eg pacemaker), body worn (eg insulin pumps) and passive (eg artificial joints, pins) • Effects on shrapnel, body piercings, tattoos and body art • Projectile risks from loose ferromagnetic objects • Fire or explosions from ignition of flammable / explosive materials • Potential for electric shocks or burns from contact currents

PERSONS AT PARTICULAR RISK (PPR)

Some of us may have a condition that increases susceptibility to the potential effects of exposure to electromagnetic fields.

The CEMFAWR defines this as *Persons at Particular Risk.* This includes expectant mothers working with certain levels of EMF, persons with photosensitivity, and those working in close proximity to electro-explosive devices, explosive materials or flammable atmospheres. In addition, persons wearing medical devices (see Table) may be at greater risk[2]:

NOTE: College/Schools/Professional Services are reliant on persons (staff, students, visitors, contractors) advising them of a condition which increases susceptibility to EMFs

1 In practice calculation of ELVs, is expensive and complicated so employers can chose to work to the ALs. Only if the AL is exceeded is further consideration and assessment against the corresponding ELV then required

2 Table taken from HSG281: A guide to the Control of Electromagnetic Fields at Work Regulations

Active implanted medical devices	Passive implanted medical devices	Body-worn medical devices
Cardiac pacemakers	Orthopaedic implants or joints	Insulin pumps
Implantable cardiac defibrillators	Pins, plates, screws	Hormone infusion pumps
Cochlea implants	Surgical staples and clips, ie tubal ligation clips – used in female sterilisation and aneurism clips	Hearing aids
Brainstem implants	Stents	Continuous glucose monitoring systems
Inner ear prostheses	Heart valve prostheses	Metallized drug-delivery patches (over the counter or prescription)
Neurostimulators	Annuloplasty rings	
Retinal encoders	Intrauterine contraceptive device (IUD) or other metallic contraceptive implants	
Implanted drug infusion pumps	Penile implants – used to treat erectile dysfunction (impotence)	

GENERAL UNIVERSITY, COLLEGE / PROFESSIONAL SERVICES REPONSIBILITIES

Each College/School/Professional Service must introduce management arrangements to ensure no harm arises because of exposure to EMFs within their areas of control. The following summarises core requirements with full details available in the Electromagnetic Fields Policy Standard:

a) Identify EMF sources.

b) Assess or calculate the level of exposure created by these to ensure levels are below the Action Levels (ALs) and the Exposure Limit Values (ELVs).

c) Take immediate action if EMFs exceed the ELVs.

d) If required devise and put in place an Action Plan to ensure compliance with the ALs / ELVs.

e) If potential risk identified, prepare a Risk Assessment to eliminate and / or control risk with an additional, specific Risk Assessment prepared for any *'Person at Particular Risk'*.

f) Provide information and training to relevant persons on the particular risks (if any) posed by EMFs and details of any action to remove or control them.

ASSESSING THE RISK

The risks from exposure to EMFs must be put into context. Yes, the University operates equipment that produces EMFs, but the majority of items will be those we also use on a daily basis outside of work and will pose no risk.

The supporting Risk Assessments / Case Studies look at higher risk equipment we may encounter at the University, if there is a risk, who is at risk (ie *Particular Persons at Risk*) and what controls, if any outside of those already in place, may be required.

1. School of Chemistry Nuclear Magnetic Resonance (NMR) Spectrometer.
2. Trans Cranial Magnetic Stimulation (TMS).

The Risk Assessments are based on the comprehensive information provided in the following documents that detail a range of common workplace equipment, the realistic risk arising from these and recommended controls.

- Control of Electromagnetic Fields at Work Regulations
- European Commission's Non-binding Guide to Good Practice for Implementing Directive 2013/35/EU Electromagnetic Fields: Case Studies

FURTHER GUIDANCE

Please contact Health and Safety, Campus Services if you have concerns regarding exposure to electromagnetic fields.

APPENDIX 1: Example Signs

Warning
This equipment generates strong magnetic fields

No Entry
for those wearing active implanted medical devices