

## IONISING RADIATION USE OF X-RAY SETS POLICY

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<b>Policy Officer</b>	<b>Senior Responsible Officer</b>	<b>Approved By</b>	<b>Date</b>
Head of Health & Safety	University Secretary	Health & Safety Committee	21 <sup>st</sup> May 2010

This Policy will be reviewed in 2028

## **1. INTRODUCTION**

X-rays are a form of radiation. They can be produced electronically by inducing the sudden deceleration of electrons in an x-ray tube. X-rays can be very penetrating, depending on the energy of the x-rays and can be capable of passing through lead. X-rays have many positive uses and are used widely, for example in medicine, research, and industry.

X-rays are ionising which means they are potentially damaging to biological tissue, causing cell damage and even cell death in high exposure situations. In the short term (acute) symptoms because of over exposure can range from nausea, vomiting, superficial burns etc. In the long term, over exposure can cause (chronic) health affects, for example dermatitis, cataracts, cancer and can ultimately lead to death.

## **2. POLICY STATEMENT AND SCOPE**

It is the policy of Bangor University, so far as is reasonably practicable, but in accordance with the relevant statutory requirements and good practice, to ensure the health and safety of staff, students, and visitors to the University.

This Policy states the requirements placed on the University and its Colleges and Professional Services with regards to the management and safe operation of X-ray sets to protect operators of X-ray sets, those being scanned and others who could be affected from the effects of ionising radiations arising from University activities.

### **The Policy applies to:**

- DEXA X-ray Sets.
- XRD and XRF X-ray Sets (portable and static).
- X-ray Operators.
- Radiation Protection Supervisors (X-Ray Sets).
- Staff, Students, Visitors and Contractors.
- Volunteers (participants).

### **The Policy does not apply to:**

- Open sources of ionising radiation.
- Sealed sources of ionising radiation.
- Radon.
- fMRI, NMR.

## **3. RELATED POLICIES AND LEGISLATION**

In addition to those general duties in law, the University and its constituent Colleges and Services, have a specific obligation under the Ionising Radiation Regulations (IRR 2017) to ensure exposure to ionising radiation arising from work activities, is kept as low as reasonably practicable and does not exceed dose limits specified for individuals. In addition, under the Ionising Radiation (Medical Exposure) Regulations, the University also has a responsibility to protect those being exposed to ionising radiation, in the form of x-rays for medical or research purposes.

A separate University Policy is in place for the management of ionising radiation (open sources) and Sealed Radiation Sources.

#### **4. DEFINITIONS / TERMINOLOGY**

For the purposes of this Policy the following definitions apply:

- X-Ray: X-rays are a form of electromagnetic radiation that can pass through solid objects. For the purposes of this Policy, the term 'X-Ray Sets' will be used which includes:
  - DEXA (Dual-energy X-ray Absorptiometry): A type of X-ray that measures bone mineral density (BMD).
  - XRD (X Ray Diffraction) and XRF (X-ray Fluorescence): A similar type of X-ray, used to study the structure, composition, and physical properties of materials.<sup>1</sup>
- RPA: Radiation Protection Adviser.
- RPO: Radiation Protection Officer.
- RPS: Radiation Protection Supervisor.

#### **5. DUTIES OF THE UNIVERSITY**

Through this Policy, the University establishes management arrangements to ensure X-ray sets are used safely and correctly in accordance with relevant legislation. The University will:

- a. Provide adequate resources to ensure X-ray sets are used safely and correctly in accordance with the requirements of the Ionising Radiation Regulations (IRR17) and if x-raying human participants the Ionising Radiation (Medical Exposure) Regulations (IRMER 2017).
- b. Appoint a competent Radiation Protection Adviser (RPA) to advise on the use of X-ray sets and associated management arrangements.
- c. Ensure competent (staff member) University Radiation Protection Officer and University Radiation Protection Supervisors (X-rays) are in place to oversee and facilitate the use of X-ray sets and management arrangements.
- d. Ensure suitable risk assessments are in place and suitable arrangements operate for the management of risk from X-ray sets.
- e. Appoint an appropriate dosimetry service to supply and process dosimetry badges provided to staff and students, as advised by the RPA.
- f. Delegate responsibility for the implementation of this Policy to Heads of Colleges and Directors of Professional Services (as applicable).

#### **6. RESPONSIBILITY OF RADIATION PROTECTION ADVISER / RADIATION PROTECTION OFFICER / RADIATION PROTECTION SUPERVISOR**

##### **The Radiation Protection Adviser (RPA):**

The appointed RPA shall provide specialist advice and assistance to the University with regards to Ionising Radiation. The RPA shall also undertake periodic reviews and audits of the University's systems for managing the risks from ionising radiation.

The RPA must be consulted on all matters listed in Schedule 4 of IRR17.

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<sup>1</sup> XRD can determine the presence and amounts of minerals species in a sample, as well as identify phases. XRF will give details as to the chemical composition but will not indicate what phases are present.

**The Radiation Protection Officer (RPO):**

The RPO shall oversee the day-to-day operation and implementation of this Policy and liaise with the external RPA and local RPS' as is necessary.

The RPO shall also:

- a. Ensure that a sufficient number of local RPS' are appointed and trained.
- b. Ensure suitable Local Rules and risk assessments are produced.
- c. Ensure suitable training is available for new users of X-ray sets.
- d. Ensure that a register of all static and portable X-ray sets is held and inform central Health and Safety of all new purchases.
- e. Approve the purchase and use of new X-ray sets.

**The Radiation Protection Supervisor (RPS):**

The RPS shall:

General

- a. Ensure all personnel are suitably trained and registered before they work with X-ray sets.
- b. Ensure, where appropriate, registered personnel understand the hazards involved with working with X-ray sets, associated precautions and have copies of the Local Rules and associated risk assessments.,
- c. Distribute copies of guidance notes, risk assessments and Local Rules to personnel as and when required.
- d. On the advice of the RPA and in accordance with the Local Rules, arrange area and personal dosimetry badges and ensure these are distributed and returned promptly in accordance with the provider's instructions.
- e. Brief X-ray set Operators in (if applicable) the correct positioning of the dosimetry badge and actions required to avoid spurious readings.
- f. Monitor dosimetry data, taking immediate action as per the Local Rules if results identify an exposure exceeding stipulated dose investigation levels.
- g. Notify all new equipment capable of generating X-rays (including adventitious X-rays) to the RPO, who in turn will notify Health and Safety, Campus Services as required.
- h. For fixed equipment, regularly check laboratory conditions and confirm controls are still effective.
- i. For static installations, carry out an annual survey scatter measurement, forwarding the findings to the RPO.
- j. For portable X-Ray equipment, ensure the risk to others in and / or near to the operating envelope are suitably considered and controlled.
- k. Liaise with the University RPO, RPA and Service Engineers when required.
- l. Remove defective X-ray sets from service until appropriate repairs have been undertaken.
- m. Arrange maintenance of the X-ray set in accordance with manufacturer's guidance.
- n. Immediately report staff and students not using the X-ray sets appropriately to the Radiation Protection Officer / supervising RPS.

### 6.1 DEXA Sets

In addition to the general requirements above, if using DEXA sets, the appropriate RPS shall:

- a. Train personnel in the use of the DEXA set.
- b. Carry out periodic, random checks to ensure Operators are:
  - Working within the Local Rules.
  - Maintaining the Supervised Areas correctly and preventing unauthorised access.
  - Providing appropriate information on the risk of X-ray scans to each volunteer and ensuring the Consent Form is completed and signed by the volunteer.
- c. Implement and maintain an overview of the record system documenting the use of DEXA scanners (to include the operators name, volunteer ID, date, scan type, scan code, ethics approval reference / unique identifier and other information the RPS considers relevant).
- d. Be in attendance during the annual RPA / RPO radiation dose rate survey.
- e. Notify the RPA / RPO if the DEXA instruments are moved and / or require a re-commissioning survey.

### 6.2 Portable XRD / XRF Sets

In addition, to the general requirements detailed in 6 above, the appropriate RPS shall for portable XRD / XRF Sets used in the field:

- a. Ensure all associated Risk Assessments and Local Rules consider the specific risks when using such equipment out in the field in a dynamic environment.
- b. Ensure personnel are suitably trained in the safe use of the equipment and understand the hazards arising from their use in the field and of the required controls.
- c. Monitor arrangements in the field to ensure equipment is used safely and correctly.

## **7. COLLEGE / PROFESSIONAL SERVICE REQUIREMENTS**

Each College and Professional Service, as applicable, is required to:

- a. Ensure no X-ray set is purchased or procured without the knowledge and approval of the RPO.
- b. Following recommendation by the RPA and/or RPO, appoint an RPS to oversee the day-to-day management and operation of the X-ray sets within their area of responsibility.
- c. Implement appropriate management controls for X-ray sets within their area of responsibility as recommended by the RPO / RPS.
- d. Implement systems to ensure all staff, students, visitors, and contractors are, as applicable, aware of and understand controls for the use of X-ray sets.
- e. Implement systems to ensure scans on humans or animals are not undertaken until, Ethical Approval has been received (for humans as detailed in the Ethical Approval Process for the Use of X-Rays for Medical or Research Purposes document) and that Ethical Approvals remain current.
- f. Implement systems to ensure the dose constraints that form part of the Ethical Approval process, under IRMER, are adhered to.

## **8. RESEARCH SUPERVISOR**

Research Supervisors are required to:

- a. Ensure all work under their supervision has, where appropriate, Ethical Approval by the relevant Ethical Approval Committee before any DEXA scan, or X-ray of a human or animal, takes place.
- b. Ensure all DEXA scans undertaken as part of their research are performed by an approved X-ray Operator.
- c. Ensure X-ray Operators performing scans on their behalf are aware of and understand the key conditions of the Ethical Approval such as the need to adhere to dose constraints.
- d. Ensure all use of X-ray sets is undertaken in accordance with this Policy and all relevant legislation.

## **9. X RAY OPERATOR RESPONSIBILITIES**

As with those duties placed upon the University and its Colleges / Professional Services, staff and students also have responsibilities in law. With regards to this Policy, X-ray Operators must:

- a. Never use an X-ray set unless authorised (registered) and trained to do so.
- b. Prior to the scanning of a volunteer as part of a research project (DEXA units) ensure Ethics Approval is in place and the associated paperwork including the volunteer's consent is present.
- c. Adhere to the key conditions e.g., dose constraints.
- d. Follow all management controls implemented by their College / Professional Service.
- e. Cooperate with and comply with all instruction given by the Radiation Protection Supervisor with regards to the safe use and management of the X-ray Set.
- f. Not interfere with or misuse any X-ray sets.
- g. Immediately report defects with the X-ray sets to the Radiation Protection Supervisor.
- h. Not use the X-ray set for any other purpose than that which they have ethics approval for, as applicable.
- i. Contact the Radiation Protection Supervisor immediately if they wish to change what they are using the X-ray set for.

## **10. VOLUNTEERS / PARTICIPANTS**

As with those duties placed upon the University and its staff and students, those volunteering to be X-rayed (human participants) in medical research involving X-rays also have responsibilities in law. With regards to this Policy, volunteers must:

- a. Follow all instruction given by the Operator and / or Radiation Protection Supervisor.
- b. Ensure they do not participate in a scan until they have received appropriate information from the Operator, understand the information given, have signed the Consent Form and provided such medical information as is necessary.

## **11. STAFF, STUDENT, VISITORS AND CONTRACTOR RESPONSIBILITIES**

As with those duties placed upon the University and its Colleges / Professional Services, staff, students, visitors, and contractors also have responsibilities in law. With regards to this Policy, they must:

- a. Follow all management controls implemented by the University and Colleges / Professional Services.
- b. Not interfere with or mis-use equipment provided to control the use of X-ray sets.
- c. Immediately report concerns associated with the use of X-ray sets to the respective College / Professional Service.
- d. Where a contractor wishes to use an X-ray set on site the commissioning College or Professional Service shall obtain their safe system of work/Local Rules and risk assessment and advise central Health and Safety, Campus Services, before approval.
- e. Where an X-ray set is to be used as part of a building project that is under the control of a Principal Contractor and separate from the University and its staff and students, the relevant Principal Contractor shall put in place necessary arrangements to safeguard workers and others and ensure compliance with the IRR17.

## **12. EQUALITY IMPACT ASSESSMENT**

Every effort must be made to support individuals, so they are treated equally and to enable them to undertake their tasks in the same way as their peers.

However, in some rare instances, there may be a requirement to treat 'persons with a protected characteristic' differently to safeguard their own health, safety, and well-being. It is noted that there are specific exposure limits set to protect the expectant mother and unborn child.

In addition, the dose constraints set by IRR17, IRMER 2017 and ethical approvals applies to all individuals, and which could, if an individual has received exposures outside of University activities (e.g., a medical x-ray) exclude the person.

Any such consideration will be discussed with the RPA, the RPO and the individual concerned with reasonable adjustments made where possible.

## **13. FURTHER INFORMATION AND PRACTICAL GUIDANCE**

In addition to the information found in this Policy more practical and procedural guidance can be found on the Health and Safety Website.

## **14. REVIEW AND AUDIT PROCEDURES**

Health and Safety, Campus Services, may undertake periodic audits or reviews to assess the effectiveness of and compliance with, this Policy.

Colleges / Professional Services must periodically review their own procedures to ensure the requirements of this Policy are implemented, suitable and effective.

In addition, the University's Health, Safety and Emergency Management Committee may from time to time review the effectiveness of the University's system for the management of x-ray sets across Colleges and Professional Services.

**End.**