

IONISING RADIATION (CT SCANNERS, XRF DEVICES)

1. The School houses two high resolution micro-CT Scanners both of which use X-Ray's to perform non-destructive 3D imaging of internal structures. One of these, an Xradia Versa XRM-410 is operated and maintained by the School of Engineering. The second, an XT H 225ST Nikon CT scanner, is operated and maintained by the School of Biological Sciences. The two Schools work in close collaboration on the safe operation and maintenance of the machines.



X-rays such as used in the CT scanners are a source of ionising radiation and so must comply with the policies of the University on ionising radiation.



2. University Ionising Radiation Safety Arrangements

The University has published its [Ionising Radiation Safety Arrangements](#) detailing requirements for managing sources of radiation including X-Rays.

The University's full set of publications on its radiation safety arrangements are available here www.abdn.ac.uk/staffnet/working-here/resources-5988.php#faq49 .

3. University Radiation Protection Adviser

A certified Radiation Protection Advisor (RPA) has been appointed to advise the University on compliance with the regulations. The RPA oversees a program of audits and reports the findings to the Heads of Schools and the Radiation Hazards Sub Committee. The RPA is available for advice on all aspects of compliance with IRR17 but holds no management responsibilities for the day to day radiation safety.

The RPA, or members of the team, are involved in the initial commissioning of X-Ray equipment and will produce an 'Audit of Engineering Controls for Equipment that Generates X-Rays' document. This document will specify what is required to meet the legislative requirements and University policies. They will undertake audits at proscribed intervals. The RPA should be advised of any changes to the use or management of the equipment.

4. School Radiation Protection Supervisor

The nature of the equipment combined with management controls does not require the appointment of a School Radiation Protection Supervisor.

5. Access to the CT Scanners

Access to the area is strictly controlled to essential personnel only through swipe entry system.

6. Operation and Maintenance of CT Scanners

Each scanner must be operated and maintained in accordance with RPA audits. Records must be maintained.

7. Training

All users of CT Scanners must be trained and records kept. Only once trained will persons have their access to the area authorised.

8. X-Ray Fluorescence (XRF) Devices

XRF is a non-destructive analytical technique used to determine the elemental composition of materials. XRF analysers determine the chemistry of a sample by measuring the fluorescent (or secondary) X-ray emitted from a sample when it is excited by a primary X-ray source.

During the analysis, the analyser emits a directed radiation beam when the tube is energized. Effort should be made to maintain exposures to radiation as far below dose limits as is practical. This is known as the ALARA (As Low as Reasonably Achievable) principle. Three factors will help minimize radiation exposure: time, distance, and shielding.

While the radiation emitted from a portable or handheld XRF elemental analyser is similar to the exposure received in a normal medical or dental X-ray, care must be taken to always point a handheld XRF analyser directly at the sample and never at a person or a body part.

The following safety precautions should be observed:

- Operators must be authorised and appropriately trained.
- Never aim the device at yourself or others when the primary beam (x-ray on) lights are illuminated.
- Never hold samples during analysis.
- Be aware of primary beam indicator lights.
- Handle and use with respect.
- Store securely – obey manufacturers storage requirements.
- If you have a Safety Emergency, notify the School's Local safety Adviser or the University's Radiation Protection Adviser.

XRF online training courses are available from Thermo Fisher [XRF Radiation Safety Training | Thermo Fisher Scientific - UK](#).

9. Rigaku NEX QC Plus XRF Analyser

This is a fully enclosed low energy low intensity X-ray system. The X-ray tube is fixed at 50kVp and has a power output of 4W which is equivalent to 0.08mA. The system is inherently safe provided the safety and interlock systems are working.



Testing of safety and warning features:

This is a low energy low risk system. The sliding top cover provides shielding to the user when in place. The system has a safety interlock which means the system will not start when the cover is open and locks the cover in place when in operation. For this type of system it is not proportionate to require a service contract but the interlocks must be tested and the tests recorded. The following tests must be carried out at least every six months:

- a) With the cover open ensure that the system acknowledges cover open and that operation is inhibited.
- b) Ensure that when cover is closed and system working that the red warning light comes on.
- c) With the system in operation, stand back and at arm's length try and open the cover.

All tests must be recorded.

If any of these tests fail the system must be put out of action immediately and a sign fixed to the unit stating, "Faulty do not use" and a repair arranged.

School of Engineering Laboratory & Workshop Policies & Guidance

Revision Record			
Issue	Name	Date	Reason for review
1	ES	31/5/2022	Transfer from main handbook
	ES	26/8/2022	Added alt text to images