University Occupational Health and Safety Standard

IONISING RADIATION

1. PURPOSE

The University of Strathclyde has a legal obligation to ensure the safety of its employees and those that could potentially be exposed to radiation as a result of its activities. The purpose of this document is to provide guidance to departments to ensure that the University fulfils all of its legal duties.

The University's activities with sealed and unsealed radioactive materials are subject to permits issued by both the Health and Safety Executive & Scottish Environmental Protection Agency.

2. SCOPE

This OHS Operational Control Standard applies to any person, whose work may potentially expose them to ionising radiation on University premises or otherwise in connection with University related activities involving ionising radiation, including under/post graduate students, all members of staff and any visitors to the University.

This standard does not cover the use of Lasers, Radiofrequency or Electromagnetic Frequency generating equipment.

3. ABBREVIATIONS

ADS	Approved Dosimetry Service
ALARP	As Low as Reasonably Practicable
Bq	Becquerel (may prefixed by k, M etc.)
DIL	Dose Investigation Level
DRPS	Departmental Radiation Protection Supervisor
EA(S)R18	Environmental Authorisation (Scotland) Regulations 2018
eRad	Electronic Radiation Management System
IRR17	Ionising Radiation Regulations 2017
OHS	Occupational Health & Safety
PI	Principal Investigator
RRA	Radiation Risk Assessment
SACSOH	Statutory Advisory Committee on Safety and Occupational Health
SEPA	Scottish Environmental Protection Agency
SHaW	Safety Health & Wellbeing
SIRIS	Strathclyde Incident Reporting and Investigation System
Sv	Sievert (may be prefixed by µ, m etc.)
URPA	University Radiation Protection Advisor
URPO	University Radiation Protection Officer
URWA	University Radioactive Waste Advisor
UCO	University Compliance Officer

4. DEFINITIONS

4.1 **ADS** – A legally recognised body. Authorised by the HSE to conduct the process of issuing, reading and recording the results from dosimetry issued to the University.

4.2 **ALARP** - This is the approach taken to ensure, using available dose reduction methods, all doses received by a person are as low as is reasonably practicable.

4.3 **Best Practicable Means** – This is the practice of minimising, as far as is reasonably practicable, the environmental impact of the work that is being undertaken, when weighed against factors such as cost-effectiveness, technical ability, safety and others.

4.4 **Contamination** – Radioactive material that is found outside of its designated area. Can be either loose (powders or liquids) or fixed (cannot be removed by cleaning) and this can be on a work surface or on the skin/clothing of an employee.

4.5 **Critical Exam** - An examination of any equipment that will generate X-rays or contains radioactive material that is required to be carried out under specific circumstances. This can be done either by the manufacturer/installer or by the URPO.

4.6 **Dose** – In this document, this is a reference to the effective dose (measured in Sv). This is the amount of energy deposited by ionising radiation into bodily tissues, considering the biological sensitivity of the affected tissue the relative biological effectiveness of the radiation.

4.7 **Dose Investigation level** – The (DIL) is the dose at which an investigation into work and working practices is to be undertaken to ensure that all possible measures to restrict exposure are in place. Currently this is set at 0.1mSv per yearly quarter.

4.8 **Ionising Radiation** – Any type of particle (Alpha / Beta / neutron) or electromagnetic wave (Gamma / X-Ray) that possesses sufficient energy to ionise an atom.

4.9 **IRR17** – The overarching UK regulations that govern the use of all forms of ionising radiation in the workplace.

4.10 **Outside Person** - Any person/entity (University or otherwise) that will receive radioactive material from the University where the material needs to leave its approved storage area and the ownership of the material changes (permanently or temporarily).

4.11 **Outside Worker** - Any person who wishes to work with ionising radiation within a Strathclyde University radiation area. Can be either a non-classified radiation worker or a classified radiation worker.

4.12 **Sealed Source** - Any source of ionising radiation that is wholly contained within a structure that, by virtue of its construction, prevents access to the radioactive material.

4.13 **Unsealed Source** - Any source of ionising radiation that is not encapsulated by a permanent structure, such as powders, liquids or gaseous radioactive materials.

5. ROLES AND RESPONSIBILITIES

The specific roles and responsibilities for the management of Ionising radiations are detailed below.

5.1 **University Compliance Officer** will act as the “radiation employer” and permit holder and is responsible for compliance on advice from the URPA, URWA and URPO, with statutory requirements from both IRR17 and EA(S)R18 and its associated permits.

The UCO is required to appoint, in writing, the URPA and URWA, via the Director of SHaW.

5.2 **Executive Deans** are responsible for performance monitoring of this Standard within their area of control.

They must ensure that departments within their areas of responsibility are resourced such that this standard is fully implemented.

5.3 **Head of Department** will act as the radiation employer as delegated by the UCO and will be required to fulfil all the responsibilities of this role. They are responsible for:

- Ensuring that appropriate systems are put in place to ensure compliance with this document and all legislative requirements.
- Ensuring that sufficient resources are allocated so that the department is compliant with this standard and legislative requirements, by:
  - Appointing, in writing, a suitable number of DRPSs.
  - Providing resources to allow the DRPS to carry out their duties.
  - Ensuring that all members of their department receive appropriate training and supervision.
- Ensuring the safety and security of all articles to which this standard applies.
- Ensuring that the risks posed by the use and handling ionising radiation are identified in the radiation risk assessment, and that any recommended risk control measures are implemented fully.

5.4 **Departmental Radiation Protection Supervisor** is appointed by the HoD to manage the department's work with ionising radiation to ensure that work is conducted in line with the requirements of this Standard and IRR17.

They shall:

- Know and understand the applicable requirements of the legislation, and where they are unsure, know when to seek assistance.
- Consult with the URPA, via the URPO, on any matters involving ionising radiation (See Section 6.2)
- Be aware of all work involving radiation in their department.
- Assist PIs / Laboratory Supervisors / Line Managers with the development of radiation risk assessments and systems of work.
- Ensure that suitable arrangements are put in place to manage the ordering, storage, security, use and disposal of radioactive materials or generators in their department in accordance with this document and legislative requirements.
- Maintain all records, where required, by this Standard.
- Ensure that all those wishing to utilise ionising radiation register as workers on eRad and that they receive an appropriate level of supervision and have completed all mandated training as detailed in this Standard and within their own departmental Health and Safety Arrangements.
- Effectively manage all supervised and controlled areas in their department by:
  - Maintaining suitable control of access to all radiation areas.
  - Maintaining suitable Local Rules for each radiation area.
  - Maintaining suitable records of all stocks and disposals within their department.
- Liaise with SHaW, the URPO and external regulatory bodies as requested.

5.5 **University Radiation Protection Officer** is employed to provide departments with competent advice and guidance on radiation protection and to aid departments in gaining and maintaining compliance with all legislative requirements.

They shall:

- Act as a point of contact for the external RPA and RWA.
- Act as the point of contact for all external regulatory bodies.
- Managing the permits issued by SEPA and the Health and Safety Executive, on behalf of the University, including:
  - Making applications for new permits or variations to existing permits.
  - Compiling and submitting annual waste disposal records.
- Arranging the disposal of radioactive waste to an approved contractor.
- Assisting departments in the management or decommissioning of radiation facilities.
- Organising and acting as a point of contact for the management of dosimetry needs.
- Providing advice on the selection of monitoring equipment and its calibration.
- Investigate incidents and report incidents to the relevant person as required.
- Advising on the requirements for training in radiation safety as required.

The URPO reports, via the Director of SHaW to the University SACSOH committee on all aspects of radiation safety.

5.6 **University Radiation Protection Adviser** must be consulted by the University for advice on complying with IRR17.

The RPA must hold a valid certificate of competence recognised by the HSE.

The URPA is engaged to provide competent advice on all aspects of the safe use of radioactive materials and radiation generators, including:

- Development of appropriate dose constraints for work involving radiation.
- Development and planning of new work/facilities.
- Designation of radiation areas.
- The requirement to classify particular workers.
- Development and review of radiation risk assessments, safe systems of work, written arrangements and incident response plans.
- Monitoring programs involving monitoring and dosimetry.
- Review of employment conditions for pregnant of breastfeeding employees.
- Investigation and analysis or accidents and incidents and appropriate remedial actions.
- Guidance on the selection and use of radiation monitoring equipment.
- Provision of suitable training in the safe use of ionising radiation.
- Application and variation of operating permits.
- Support in the event of a radiation incident.

The URPA is involved in the development of any work involving the use of ionising radiation. Therefore, no new work that involves ionising radiations may begin until it has received final approval from the URPA.

The URPA is appointed by the Director of SHaW, on behalf of the UCO.

5.7 **University Radioactive Waste Adviser i**s engaged to provide competent advice relating to the treatment, movement and final disposal of radioactive waste from University premises, including:

- Development of processes and methods for the disposal of radioactive material in accordance with the University's operating permits.
- Creation and review of radiation risk assessments and documentation for the transport of radioactive materials within the University.

The URWA is appointed by the Director of SHaW, on behalf of the UCO.

5.8 **Principal Investigator / Laboratory Supervisor / Line Manager** is solely responsible for radioisotopes or radiation generators purchased for their work, and for employees engaged in that work. They must ensure:

- That a suitable and sufficient general risk assessment and radiation risk assessment has been completed and reviewed by the URPA prior to their work beginning, and that this risk assessment is reviewed at suitable intervals.
- The safety and security of any source of radiation until these have been disposed of or transferred to another appropriate person.
- That any person they manage and who is involved in work with radiation, registers with SHaW as a radiation worker on eRad.
- That any persons they manage receive suitable training and they are competent to carry out the work expected of them.
- That all work they manage is supported by an appropriate set of safety documents, including risk assessments, systems of work and dose assessments and that the requirements of these documents are fully implemented.
- That the radiation areas that they manage are maintained in accordance with the requirements of this standard and supporting guidance.
- They are aware of the need to respond appropriately in the event of a radiation incident.

- That no harm comes to themselves or others as a results of their work, actions or inactions.

5.9 **Radiation Workers** are any person, whether a member of the University or an outside worker, who works with radiation as part of their studies or employment. They shall:

- Attend all mandatory training as detailed by the University, their DRPS and their PI or Supervisor.
- Follow the requirements of all applicable sections of this Standard.
- Follow the requirements of all safety documentation developed for the work that they are involved in.
- Report any unsafe conditions or any defects immediately to their PI or Supervisor.
- Ensure that no harm comes to themselves or others because of their work, actions or inactions.

5.10 **All other Workers** are any persons who may be affected by a department's use of Ionising Radiations. PIs and Supervisors should ensure they liaise with the DRPS to make aware any such persons who may be affected by their use of radiation. All other workers must:

- Not interfere with any safety signage, equipment or systems intended for the safe use of radiations.
- Report any unsafe conditions appropriately.
- Work to ensure that no harm comes to themselves or others because of their actions or inactions.

5.11 **Radiation Safety Forum** provides a means for departments to monitor and control the impact of radiation safety within the University, provides a forum for the sharing of good practice, how they manage radiation safety within their areas and for developing and guiding the University

This forum will meet annually and is open to all members of staff across the University.

6. WORKING WITH IONISING RADIATION

6.1 Assessing radiation risk – Radiation Risk Assessment

All work involving the use of radiation (either materials or that created by generators) must be covered by a suitable and sufficient risk assessment. The radiation risk assessment (RRA) is the responsibility of the PI or supervisor, and they must ensure that it covers all potential safety aspects of the planned work.

The requirement for a RRA should be identified during the general risk assessment process which must be completed first using the online eRisk system. This will identify the hazard of ionising radiation as part of the work being planned or conducted. The PI, Laboratory Supervisor or Line Manager must ensure that the RRA is completed in consultation with the employees who will be undertaking the activity involving ionising radiation, the DRPS, and all those that may potentially be affected by the work. The URPO is available for advice where needed.

No work may start or continue, and no radioactive materials or generators may be purchased or brought onto University premises unless a suitable and sufficient RRA has been completed, reviewed and approved by the URPA. All RRAs must be sent to the URPO for initial review, prior to submission for approval by the URPA. Any risk assessments not approved by the URPA are not valid and the work will not be allowed to commence.

All RRA must be completed using the RRA form found here.

Further information: Guidance Note – Radiation Risk Assessment

6.2 Consulting with an RPA

The University is required to ensure that an RPA is consulted whenever any work which involves the use of ionising radiation is planned or is carried out, to ensure that appropriate advice on the safe management of ionising radiation is provided and implemented

The URPA is available to provide advice on a number of topics, including:

- Development and review of RRAs, safe systems of work, written arrangements and incident response plans.
- Periodic examination and testing of engineered controls.
- Development of appropriate dose constraints for work involving radiation and the completion of dose assessments where applicable.
- Development and planning of new work/facilities.
- Designation of radiation areas.
- The requirement to classify particular workers.
- Monitoring programs involving monitoring and dosimetry.
- Review of employment conditions for pregnant of breastfeeding employees.
- Investigation and analysis or accidents and incidents and appropriate remedial actions.
- Guidance on the selection and use of radiation monitoring equipment.
- Provision of suitable training in the safe use of ionising radiation.
- Application and variation of operating permits.
- Support in the event of a radiation incident.

The position of URPA is provided by an external contractor, and they can be contacted via the URPO.

6.3 Information, Instruction, Training & Supervision

It is a legal requirement that all persons associated with work involving ionising radiation, including their managers, are provided with suitable information, instruction, training and supervision when dealing with any form of ionising radiation.

SHaW provide and arrange a variety of mandatory training courses for those working with ionising radiations. These are designed to give a basic understanding of the safety measures required to be in place for the generic hazards associated with ionising radiations.

All those who will be using ionising radiation will be required to complete the University Basic Radiation Safety Induction. The University has a course for each of the forms of radiation that it is permitted to use:

- Ionising Radiation: Use of Sealed Sources Induction
- Ionising Radiation: Use of Unsealed Radioactive Sources Induction
- Ionising Radiation: Use of X-ray Generating Sources Induction

Until the worker has completed the relevant University Basic Radiation Safety Induction, any required departmental training and have been judged as competent by their line manager, they **MAY NOT** use any form of ionising radiation. The Radiation Worker Training and Competency Record Form should be used as a record of training and competence and should be regularly reviewed (at least annually or where otherwise indicated e.g., following an incident or a long period of absence).

Further Information: Radiation Worker Training and Competence Record Form

Further Information: Training Requirements for Workers using Ionising Radiations

6.4 Radiation worker registration

Anyone wishing to work with ionising radiation are required to register with SHaW by completing the registration form on the eRad system. Upon completing their registration, and provided the information is suitable, this will be approved by both the nominated DRPS and the URPO. The worker will then be able to access the University Basic safety inductions.

6.5 Radiation Areas

Radiation areas should be appropriately designed and designated, with consideration given to: the construction of the areas (i.e. the materials used for the fabric of the area); demarcation within the area; access; signage and the development of appropriate Local Rules; and decommissioning.

Further Information: Management of a Radiation Facility.

6.5.1 Selection of area

Any area selected for radiation work must be appropriately located within the department. It would be inappropriate to select an area that would experience high levels of footfall throughout, e.g. in the middle of a lab. Consideration should be given to suitable flooring, walls and ceilings, doors and windows, benches and work surfaces, and waste disposal sinks.

Departments should contact the URPO early in their plans for beginning work to determine if their chosen area will be suitable for its intended purpose.

6.5.2 Area Designation

Any area that ionising radiation sources are to be used in must be identified, appropriately designated and recorded in the Departmental OHS Management Arrangements. This designation must be done in consultation with the URPO. All areas where ionising radiation is used must be given a designation from the IRR17 as follows:

1) Supervised Area

This is an area where it is necessary to keep the working conditions under review to ensure that, if it becomes necessary, the area will be re-designated as a controlled area.

It may be necessary to designate an area as supervised where there is the risk of contamination caused by dispersal of material from a sealed source.

2) Controlled Area

This is an area where it is necessary, due to the potential for significant radiation doses, to prevent, or closely supervise, access to the area by employees who are unconnected with the work with ionising radiation and other processes while that work is underway.

Any person working in the area is likely to receive an effective dose greater than 6mSv in a calendar year or an equivalent dose greater than three-tenths of any applicable dose

limit. Any person working in such an area will require to be classified (see Section 6.6.) or to agree to work to specific written arrangements.

The requirement to designate an area falls to the HoD and must be done in advance of any work starting.

6.5.3 Signage and Demarcation

Once the designation of an area has been determined, then the area itself must be demarcated and appropriate signage displayed so that it is obvious to everyone that the area may present a risk to their health or wellbeing.

6.5.4 Radiation Area Local Rules

Laboratories / areas that contain radioactive materials or generators are required to display a set of Local Rules at the entry point to the area. Radiation Local Rules are a requirement of IRR17.

The purpose of the Local Rules is to provide a clear and concise overview of the work and hazards that are present within the room. They should not be over complex or burdensome to those that read them.

Further Information: Radiation Area Local Rules Form

6.5.5 Access control

Access to any radiation areas that contain sealed or unsealed sources or houses any form of X-ray generator must be controlled to ensure the safety and security of the material or generator inside. Access control includes the use of physical controls (i.e. physical lock) and administrative controls (i.e. authorised user lists).

6.5.6 Decommissioning a Radiation Area

When a department ceases work with radiation, and the area is to be returned to use as a non-radioactive area, the department must ensure that the room is appropriately decommissioned.

The general requirements for decommissioning a laboratory can be found in the document Management of a Radiation Facility. Whilst this gives a general overview of the requirements, the URPO must be consulted to ensure that the correct actions have been planned and implemented.

Once the department has completed their decommissioning, the HoD is to sign the Final Decommissioning Departmental Checklist and then submit this to the URPO.

6.6 Worker Classification

It is required that any member of staff who is likely to receive an effective whole-body dose in excess of 6mSv, an equivalent dose to the lens of the eye in excess of 15mSv or an equivalent dose greater than 150mSv to the skin or extremities in a calendar year be designated as “Classified”. The need to classify a worker will be based on findings of the RRA following review of the likely doses.

Classified Persons must undergo annual medical screening to ensure that they are fit for work under IRR17. A suitably qualified and experienced medical practitioner must carry out this medical screening. The University engages an external company to provide this service through the University Occupational Health Service. Access to this screening is only available through the URPO.

Should a classified person not attend their annual medical, the Occupational Health Service will report this to the URPO for further action, which may include the revocation of the workers registration to work with radioactive materials until remedial action is taken.

Each Classified Persons medical records will be retained by the Occupational Health Service in accordance with statutory medical requirements, and will be issued a classified workers passbook, which will be maintained by the DRPS.

When a Classified Person intends to cease work with radiation, or intends to leave the University, they must report this to the URPO, as they will need to have a final medical examination and be issued with a copy of their dose history from the University ADS.

6.7 Dosimetry

Dosimetry is used to record the amount of radiation a worker is exposed to. This can take the form of personal dosimetry (typically a body badge) that is worn when working with radiation or in a radiation area, or can be environmental, where dosimeters are placed within the radiation area to determine the level of ambient radiation caused by the work or equipment.

Additional forms of dosimetry may be required, as determined by the RRA. Additional forms of dosimetry can include such methods as:

- Thyroid (neck) monitoring for the uptake of radioiodine.
- Urine monitoring for the uptake of tritiated materials.

6.7.1 Dosimetry devices

The University employs an outside contractor to act as its ADS, as required by IRR17. The appointed ADS provide dosimetry to all classified University personnel and all those that are deemed to require it by their RRA. The provision of dosimetry is via the DRPS, who will ensure that sufficient dosimetry is ordered from the ADS, via the URPO.

6.7.2 Dosimetry records

Dose records are provided by the University ADS and include doses for the last wear period as well as a cumulative record of the dose received by each wearer for the period of their employment.

IRR17 requires that dose records for classified workers must be kept until the person they relate to has or would have attained the age of 75 and for at least 30 years from the date the record was made. The ADS and the URPO will maintain the dose records on behalf of the University.

6.7.3 Dose Limits and Constraints

There are maximum statutory levels that limit the amount of radiation that a worker may be exposed to. These limits are dependent on the body part in question. Table 1 shows the most relevant limits and the associated body part.

Table 1.

Body Part	Maximum Annual Dose limit
Whole Body (Worker Aged 18+)	20mSv Effective Dose
Lens of the eye	20mSv Equivalent Dose
Skin	500mSv Equivalent Dose (Averaged over 1cm^2)
Extremities	500mSv Equivalent Dose

Where there is reason to believe that a dose to the lens of the eye is considered a strong possibility, this must be included in the RRA. Special forms of dosimetry and controls may be required.

To ensure that all appropriate controls are in place, all departments are to ensure that no worker exceeds the DIL set by the University. The University DIL is currently set at 0.1mSv per yearly quarter (3-month periods).

Exceeding this level will not stop the person from working; however, a review of the working practices will be undertaken by the DRPS and URPO with assistance from the URPA to determine if further controls are necessary.

6.8 Persons at significant risk

6.8.1 Young persons

Persons who study or work at the University who are below the age of 18 are classified as young persons for the purpose of this standard.

IRR17 does not exclude Young Persons from their participation in work involving the use of ionising radiations due to their age, however departments must ensure that any Young Person is not exposed to radiation that would result in a dose of more than the University DIL.

All RRAs must include the potential deliberate or accidental exposure of Young Persons as a risk, where this is deemed as reasonably foreseeable.

6.8.2 Pregnant and Breastfeeding Employees

It is important the radiation hazards and risks are communicated to all person(s) who may be affected whether directly working with radiation or not. Any person who works with ionising radiation or may be affected by work with radiation and are, or believe they may be, pregnant are encouraged to notify their line manager as soon as possible. This should be by written notification to the employee's line manager, DRPS and HR.

IRR17 places no prohibition on pregnant or breastfeeding employees from working with ionising radiation; however, it does state that additional controls need to be in place to ensure the health of both the parent and the baby. The additional controls necessary should be determined by completion of a NEMS risk assessment, carried out by the relevant supervisor in conjunction with the URPO/URPA.

Where the breastfeeding employee intends to return to work that involves the use of sealed or unsealed radioactive materials, then they are required to inform their HoD, in writing that they intend to do so. Loose radioactive material may have the potential to cause an internal radiation hazard to both parent and baby.

The assessment will allow the department to make suitable amendments to working practices and the area that they work in to ensure the safety of both the parent as well as the baby.

Further Information: New and Expectant Mothers

6.9 Procurement

6.9.1 Ordering of Radioactive Sources

Each department that uses radioactive materials must ensure that it has a robust, auditable system in place to track each source of radiation from the point of ordering through its entire life cycle to the point of disposal. This process should be detailed in the RRA and should reference this Standard. The process will only be authorised for use once confirmed as suitable by the URPO.

All radioactive materials or generators must be purchased only from a reputable supplier. Where there is any doubt over whether a purchase should be made from a particular supplier, assistance shall be sought from the URPO.

All orders for radioactive sources are to be made via the approved ordering route detailed in the relevant RRA / Department SOP, by a person who has been authorised by their respective PI / Laboratory Supervisor / Line Manager and the DRPS. All orders for radioactive sources must be made on the Finance Management System (FMS) using the purchasing code **HB001**. Only specific users that have been authorised by their DRPS and who have been approved by the URPO will be able to access this purchase code on FMS.

All orders of sealed sources, or equipment which contain embedded sealed sources are to be made using the same purchase code (**HB001)**. Sealed sources are managed in the same way as unsealed but are subject to their own permit or exemption conditions.

When planning the procurement of radiation sources, departments must ensure that sufficient consideration is given to the disposal of the source. This must be included in the RRA. The URPO is to be contacted during the procurement process as it may be necessary to discuss with URPA.

6.9.2 Ordering of X-ray Generating Sources

Where a department wishes to purchase a piece of X-ray generating equipment, this must be notified to the URPO so that the design and engineered controls of the device can be checked for suitability, and where necessary so that feedback can be sent to the manufacturer for adjustments to be made to ensure compliance with legislative requirements.

All orders for radiation generators are to be made via the approved ordering route detailed in the relevant RRA / Department SOP, by the respective PI / Laboratory Supervisor / Line Manager, and the DRPS. All orders for radiation generators must be made on the Finance Management System (FMS) using the purchasing code **HB001**. Only specific users that have been authorised by their DRPS and who have been approved by the URPO will be able to access this purchase code on FMS.

Where the purchase of equipment is in relation to a handheld X-ray analyser, then this must be notified to the URPO. Such devices can be particularly hazardous if used incorrectly, and focussed attention will be required to ensure their safe operation. Guidance on the safe use of such devices can be found on the website of the Society for Radiological Protection.

When planning the procurement of radiation generators, departments must ensure that sufficient consideration is given to the disposal of the source. This must be included in the RRA. the URPO is to be contacted during the procurement phase as it may be necessary to discuss with URPA.

6.10 Storage and Security of Radioactive sources

When completing the RRA, the plans for how sources / generators will be securely stored and managed must be detailed. These will be considered, and where necessary, changes will be recommended.

All radioactive sources must be stored in such a way that minimises, as far as is reasonably practicable, the potential for the spread of contamination, and prevents access by unauthorised personnel.

Appropriate storage and security measures must be included as part of the RRA, and should include where the sources will be located and the reasoning for the selection of a particular method of storage or security plan.

For information on acceptable methods for the storage of unsealed and sealed radioactive materials, the URPO can be contacted.

6.11 Inventory and Record Keeping

All departments should maintain an accurate and up-to-date inventory of all radioactive materials. Records of all purchases, usages and disposals of radioactive materials are to be made on the University eRad system. It is the responsibility of the PI/Supervisor to ensure that on receipt of the material, that it is entered onto the system.

6.12 Critical Examination

To ensure that all radiation generating equipment or equipment containing a radiation source is safe to use, all such equipment must be subject to a critical examination.

This examination must be carried out in the following circumstances:

- Whenever new equipment is installed for the first time.
- Whenever existing equipment is moved from one position to another.
- If there is any doubt as to the effectiveness of built in safety devices or shielding.

Departments must retain records of the most recent critical examination for each device, and copies provided to the URPO.

Further information: Critical Exam Form

6.13 Monitoring radiation / contamination

Within any area where radioactive sources or generators are present, there must be suitable monitoring conducted to measures the level of dose present in the area, and where unsealed radioactive materials are present, that contamination is detected quickly to ensure that appropriate action is taken to remove this.

6.13.1 Monitoring for Radiation

All areas in which ionising radiations are used are to have a suitable schedule for undertaking environmental radiation monitoring to ensure that all doses are as low as reasonably practicable.

The frequency of monitoring required is to be made commensurate with the frequency and level of expected radiation in the working area.

For example, an X-ray laboratory may only require monthly monitoring due to the inbuilt shielding and engineering controls. Conversely, an area making use of sealed sources of significant activity may require daily monitoring.

The agreed upon frequency must be detailed in the Local Rules for the area.

Where there is any concern with the results of a radiation survey, or where a survey exceeds safe levels that have been detailed as part of the RRA, these must be reported to the DRPS immediately.

The frequency that the department decides to carry out their radiation monitoring must be included in the RRA, and this will be approved by the URPO/URPA.

A record of all radiation surveys completed must be provided to the DRPS for record keeping. These records must be kept for a minimum of 5 years from the date they are created.

Further Information: Routine Radiation Survey Form

6.13.1 Monitoring for Contamination

All areas where there is the potential for radioactive material to be found outside of its containment are to have a suitable schedule for undertaking radiation monitoring of the areas that they are used in.

The frequency of monitoring required is to be made commensurate with the type of radiation and frequency of work being carried out within the area. For example, if the lab is used once every three months for work with radioactive materials, then it is reasonable to carry out a survey of the full lab at the end of each instance of use.

Conversely, if the area were being used on a daily basis, then carrying out a survey of the work area at the end of each day as well as carrying out a full lab survey each week would be acceptable.

The frequency and method that the department decides to carry out their contamination monitoring must be included in the RRA, and this will be approved by the URPO/URPA.

A record of all contamination surveys completed must be provided to the DRPS for record keeping. These records must be kept for a minimum of 5 years from the date they are created.

Further Information: Management of a Radiation Facility

Further Information: Routine Contamination Survey Form

6.13.2 Leak Testing Sealed Sources

All sealed sources are to be routinely checked by either the DRPS or the responsible PI / Laboratory Supervisor / Line Manager to ensure the integrity of the capsule that contains the radioactive materials has not been compromised. This is important to prevent the possible spread of contamination from a damaged source.

The interval for the leak testing of sealed sources should be identified in the RRA and should never exceed two years. Should a department intend to retain a source past the

manufacturer's recommended working life, the interval length should be reviewed to ensure that the source is maintained properly. Where a source is to be used beyond the manufacturers stated working life, then advice must be sought from the URPO to ensure a suitable program of monitoring. This must be included in the RRA.

The procedure for carrying out a sealed source leak test is decided by the form that the sealed source takes, and a suitable RRA and SOP must be available prior to beginning the process.

Departments are to provide the URPO with a copy of the Sealed Source Leak Test Record Form on successful completion of the test.

Further Information: Sealed Source Leak Test Record Form

Further Information: Management of a Radiation Facility

6.13.3 Selection of radiation monitoring equipment

When planning work involving the use of ionising radiations, allowances must be made to ensure that suitable equipment is purchased that is capable of detecting the radiation that will be emitted by the materials or generators that will be used.

Given the variety of radiation sources, it is not possible to give a comprehensive list of all monitors. To ensure that the correct monitor is chosen for the work being done, advice must be sought from the URPO. Where, necessary, advice will be sought from the URPA.

Information on the monitors to be used for a given piece of work must be included in the RRA.

6.13.4 Maintenance of monitoring equipment

The IRR17 require that any equipment used for monitoring radiation or contamination undergo periodic maintenance, inspection and testing. Departments are responsible for ensuring that all radiation monitors that they use are suitable and appropriate for use, in date for calibration, and that any devices that fail calibration are removed from circulation and either repaired or disposed of.

This testing must be carried out at least every 12 months. If more than 12 months has passed since a monitor's examination, then the device is to be quarantined, and sent for exam as soon as possible.

When a device is calibrated, the person carrying out the calibration will issue a test certificate to confirm it is fit for use. These test records are to be retained by the DRPS for a minimum of 5 years from the date they are issued. Each department is to make suitable provision for the maintenance of their equipment and the test records.

Devices that are used for training purpose do not need to be calibrated, but must be marked in such a way that it is immediately obvious that the device is to be used for training purposes only.

eRad provides a method of inventorying monitoring equipment, and provides the ability to archive previous test records, which will assist departments in complying with the requirements stated above.

6.14 Transport of Radioactive Materials

All movements of radioactive materials, whether within a University building or between buildings on campus, are strictly controlled as per the outcome of the RRA. Any potential spillages of contaminated material have the potential to cause significant harm to personnel, the environment as well as the University's reputation. Emergency scenarios must be included in the RRA and should include transport.

The URPO can provide Information on the requirements necessary to allow safe movement of radioactive materials within or between University buildings, as well as what is required if departments wish to send materials to other research establishments, in conjunction with the URPA.

Further Information: Transport of Radioactive Materials

6.15 Disposal of Radioactive Materials, Sealed Sources and Generators

6.15.1 Disposal of Radioactive Materials / Sealed Sources

The EA (S) R2018 aims to protect the environment from the effects of radioactive materials. To ensure that the University's activities impact as little as possible on the local population and environment, all disposals of radioactive material are strictly controlled and recorded in accordance with its operating permits issued by SEPA.

Departments requiring to make disposals of radioactive materials may not do so until the method they are planning to use to make the disposal has been approved by the URPA through the URPO. This must be detailed in the RRA.

All departments generating radioactive waste are to ensure that they have a suitable plan in place for managing the waste, as well as a suitable location in which to store the material (where approved). These plans are to be written into the Departmental OHS Management Arrangements.

All disposals made by a department are to be recorded on the University's eRad system. These records are checked monthly by the URPO to ensure they are made correctly, and to ensure that the University does not exceed the limits imposed by SEPA.

Further Information: Management of Radioactive Waste

6.15.2 Disposal of Radiation Generators

All departments that make use of radiation generators must have a suitable plan in place for the disposal of these devices.

Where a department is planning to dispose of a radiation generator, this must be done in such a way that the device will not be able to be activated once it has left the University's control.

Before a department may dispose of a radiation generator, they must inform the URPO of their intent to do so, so that all suitable considerations can be made to prevent the accidental activation of the device once it has been disposed of.

6.16 Radiation Incidents

Whilst every effort must be taken to ensure that all personnel are protected from reasonably foreseeable incidents which may arise from the use of radioactive materials or generating equipment, there is always the possibility that an incident may occur.

Where the RRA identifies that there is a reasonably foreseeable risk from the work to either employees or others, there is a legal requirement that the employer prepares an Incident Response Plan to restrict the level of exposure and ensure the health and safety of anyone who may be affected by the incident.

Incident Response Plans must be written into both the Departmental OHS Management Arrangements and the radiation area Local Rules (see Section 6.5.4 and the Management of Radiation Facilities Guidance Note for further information on the Local Rules).

It is the department's responsibility to ensure that all Incident Response Plans are reviewed by the URPA, and that they are regularly rehearsed and adequately resourced.

To assist departments in developing their Incident Response Plans, examples are available. Departments may adapt these as required but must ensure that they are relevant for the work being carried out in the department.

The University is required to have in place a response plan in the event of a radiation Incident. The University will practice theses plans regularly, with rehearsals being co-ordinated by the University Risk and Resilience Manager.

Further Information: Example Radiation Incident Response Plans

Further Information: Radiation Risk Assessment Guidance

6.17 Visiting/Outside Workers

Workers coming from outside institutions / companies can be split in to two categories:

1) **Non-Classified Outside Workers** – Any worker not employed by the University who requires access to a supervised or controlled area and has not been classified by their parent organisation.

2) **Classified Outside Workers** – Any worker not employed by the University who requires access to a supervised or controlled area and who has been classified by their parent organisation.

If a department is to host a worker from another organisation who requires access to a supervised or controlled area, then they will be required to complete the same process as a University employee (registration, training etc.) and must comply with this Standard and the Local Rules for the area.

If the outside worker has not been classified by their parent organisation and the intent is for them to access a University controlled area, then written arrangements must be in place before access will be granted. These written arrangements must be included in the area's Local Rules.

Written arrangement list the conditions that are to be in place, to ensure that the dose received by such a worker is restricted as far as is reasonably practicable, through the use of close supervision, PPE or by limiting the length of time that the worker is allowed in the area.

The DRPS for a department intending to host an outside worker (whether Classified or not), who will be working with ionising radiation, is required to inform the URPO a minimum of two weeks prior to the work starting, stating what control measures have been put in place to ensure they comply with the University's requirements.

6.18 Working with Radiation Outside of the University

Any research that is to be conducted by a University employee at an outside organisation, where they may be exposed to ionising radiation, must be notified to the URPO at least two weeks in advance of the work starting.

The responsible department is to ensure that a copy of the host institutions risk assessment for the work to be carried out is requested and a copy is sent to the URPO for review. This will allow time for a review of control measures concerning their exposure to ionising radiation to be undertaken.

All visits by University staff are to be recorded and held by the parent department for a minimum of 5 years.

6.19 Handover of radiation generating equipment or controlled radiation area

Where a department requires an external provider to conduct work in a controlled radiation area or perform maintenance on a radiation generator that has a controlled area inside or around the generator, control of the equipment or area where the work is to be conducted must be formally handed over to the external provider in writing.

Where equipment or a controlled area is handed over to another party, then the external workers are required to follow their companies own policies and procedures. Copies of these documents must be provided in advance of the work starting and the equipment or area being handed over.

Further Information: Area / Equipment Handover Form

6.20 Gifts

Any gifts of sealed or unsealed radioactive materials are to be notified to the URPO prior to acceptance. The URPO will provide information on whether these gifts can be accepted, any conditions that will be placed onto their usage and storage and how these can be entered into the eRad system.

Before accepting any gift of radioactive material or equipment, departments must ensure that sufficient financial provision is available to ensure the safe disposal of such materials or equipment when it reaches the end of its usable life.

6.21 Performance Monitoring

To ensure that departments are complying with all required aspects of both the IRR17 and EA(S)R18, as well as additional University requirements, all departments employing ionising radiations will be subject to routine audits and inspections by various parties from both the University and regulatory bodies (e.g., HSE and SEPA).

The purpose of these visits is to ensure that departments are compliant with this standard and are maintaining a suitable level of control over the hazards presented by radiations, and to provide guidance and recommendations for continual improvement.

Support visits will be carried out by the URPO on a rolling basis. These visits will focus on an individual aspect of compliance with this Standard.

The URPA and regulatory inspections are carried out routinely and departments will be notified of the dates once the University has been informed.

Instances where the URPA or a regulatory body identify a failure to comply with the terms of an issued permit could result in the withdrawal of the issued permits, which would impact on the University's ability to use radiation across the campus, potentially impacting on any teaching or research work that involves the use of radiation. In addition, enforcement action can be taken leading to fine or imprisonment.

7. DOCUMENT CONTROL PROCEDURES

The requirements to meet the standard for the safe management of Ionising Radiations are described in this document. Some aspects are covered in more detail in other documents which are referenced throughout.

Written records to be maintained to comply with this Standard are:

- Registration of workers
- Contamination surveys
- Radiation surveys
- Training records
- Purchase records
- Stock records
- Dosimetry records
- Records of all transport of materials
- Local rules
- Suitable risk assessments (Including NEMS)
- Maintenance and testing records
- Leak tests of all sealed sources
- Waste disposal records
- Radiation monitoring calibration certificates
- Records of visits by University personnel to other institutions
- Written arrangements (where necessary)

8. COMMUNICATION AND REPORTING

8.1 A copy of the latest Standard will be available on the SHaW website.

8.2 Departments are expected to report on compliance with this Standard as part of regular OHS performance monitoring, further information can be obtained from SHaW.

8.3 With regard to this Standard, departments must report incidents associated with Ionising Radiation to the DSC, DPRS, URPO immediately. If appropriate, a report on SIRIS must be completed, and submitted to SHaW. If more than one person is involved in an incident then a separate SIRIS report should be completed for each individual involved.

8.4 Some incidents may be reportable under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR). These regulations require that certain work-related injuries, cases of ill health and dangerous occurrences be reported to the Health and Safety Executive (HSE). SHaW manage the reporting of incidents under RIDDOR.

9. TOOLS

Forms:

- Area / Equipment Handover
- Critical Exam
- Radiation Area Local Rules
- Radiation Risk Assessment
- Radiation Worker Training and Competence Record
- Routine Contamination Survey
- Routine Radiation Survey
- Sealed Source Leak Test Record

Guidance:

- Example Radiation Incident Response Plans
- Management of a Radiation Facility
- Management of Radioactive Waste
- Radiation Risk Assessment
- Transport of Radioactive Materials

Information Sheets

- Training Requirements for Workers Using Ionising Radiations

10. COMPLIANCE

This standard aims to meet the requirements of:

- Health and Safety at Work etc. Act (1974).
- Management of Health and Safety at Work Regulations (1999.)
- The Ionising Radiation Regulations 2017.
- The Environmental Authorisation (Scotland) Regulations 2018.
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (2013).
- Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009.
- Provision of Personal Protective Equipment Regulations 1992.
- Provision and Use of Work Equipment Regulations 1998.
- Managing for Health and Safety HSG65 (2013).
- USHA Leadership and Management in Health and Safety in Higher Education Institutions (2015).
- USHA Health and Safety Management Profile (HASMAP) (2015).

11. DOCUMENT HISTORY

A record of changes to this document are maintained in the SHaW Document Control Register.