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## **Radiation (Ionising) Safety Procedures**

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### **1. Governing Policy**

[Work Health and Safety Policy](#)

[Work Health and Safety Management System](#)

### **2. Purpose**

- a. These procedures describe the requirements for:
  - i. the identification, assessment, control and use of ionising radiation, and
  - ii. ensuring the University meets the requirements of the following legislation:
    - [Work Health and Safety](#)
    - [Radiation Protection and Control](#)
    - [Nuclear Non-Proliferation \(Safeguards\)](#)
- b. These procedures must be read in conjunction with the Ionising [Radiation Safety Manual](#) and the relevant Radiation Management Plans.

### 3. Scope

- a. These procedures:
- i. apply to all Flinders University workers, students, contractors and others using or exposed to ionising radiation whilst undertaking work or study for the University or on any premises under the control of Flinders University
  - ii. do not cover non-ionising radiation (e.g. ultraviolet, microwaves or lasers).
- b. Where work is carried out in another state or territory, the corresponding jurisdictional requirements apply and must be followed by University workers and students.

### 4. Definitions

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| <b>As Low As is Reasonably Achievable (ALARA) principle</b>      | Managing and controlling workplace and public exposure to ionising radiation at levels as low as is reasonably achievable, taking into account economic and social factors.   |
| <b>Australian Safeguards and Non-proliferation Office (ASNO)</b> | Regulator which oversees the regulation and management of nuclear materials.  |
| <b>EPA</b>   | South Australian Environment Protection Authority.  |
| <b>Ionising radiation</b>  | Electromagnetic or particulate radiation capable of producing ions directly or indirectly in passage through matter but does not include electromagnetic radiation of a wavelength greater than 100 nanometres  |
| <b>Ionising radiation apparatus</b>                              | Apparatus capable of producing ionising radiation by accelerating atomic particles.   |
| <b>Licensed user</b>   | A person who holds an EPA licence to use or handle radioactive substances or operate ionising radiation apparatus for the work undertaken.  |
| <b>Personal monitoring</b>                                       | Measurement over a specified period of time, of the radiation dose received by a person who is occupationally exposed to radiation.   |
| <b>Radiation events</b>  | Radiation incidents, accidents and emergencies graded as follows: <ul style="list-style-type: none"><li>• Incidents – minor</li><li>• Accidents – serious and reportable to the EPA</li><li>• Emergencies – very serious and requiring the EPA to be notified immediately.</li></ul>  |
| <b>Radiation Safety Manual</b>                                   | Document that outlines general radiation safety principles and practice at Flinders University.   |
| <b>University Radiation Management Plan (URMP)</b>               | An operational document that provides an overall summary of how the University will fulfil the requirements of the radiation legislation as it applies to the University.   |
| <b>Activity-Specific Radiation Management Plan (ARMP)</b>        | Stand-alone documents that detail how each radiation task/activity will be managed.<br><br>Sets out the facility, the nature of radiation sources or apparatus, risks, the controls to manage those risks, safe working procedures, licensing requirements and other measures that may be relevant to ensuring exposure is ALARA for that activity and meet required legislation. |
| <b>Radiation worker</b>  | A person who by reason of his or her profession, trade or occupation:   |

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|-------------------------------------|--|
|                                     | <ul style="list-style-type: none"> <li>i. uses any source of ionising radiation, or</li> <li>ii. is directly involved in any activity or operation in which any ionising radiation is used or produced and who may be exposed to ionising radiation as a result of being directly involved in such activity or operation, or</li> <li>iii. is directly involved in the transport of a radioactive substance and is likely in the course of that profession, trade or occupation to receive an annual effective dose in excess of 1 millisievert.</li> </ul> <p>In the University, radiation worker = staff and higher degree by research students or visitors (e.g. visiting academics) working on University projects and using radiation sources or apparatus.</p> |
| <b>Registered premises</b>          | Any land, building or structure whether fixed or moveable, or any part of any land, building or structure that is licenced by the EPA for radiation work.  |
| <b>Sealed radioactive sources</b>   | <p>A radioactive substance bonded within metals or sealed in a capsule or other container in such a way as to:</p> <ul style="list-style-type: none"> <li>i. minimise the possibility of escape or dispersion of the radioactive substance, and</li> <li>ii. allow the emission of ionising radiation for use as required.</li> </ul>  |
| <b>Unsealed radioactive sources</b> | A radioactive substance that is not in a sealed capsule.   |
| <b>Waste Management Plan</b>        | An EPA-approved annual plan which gives details of all aspects of the management of the radioactive waste including the quantities of radioactive material used and disposed, and the means of disposal.   |

## 5. General requirements

- a. All work involving ionising radiation must be performed in a safe manner.
- b. When working with ionising radiation, all radiation workers must endeavour to keep exposure to workers, students, contractors, visitors, the public and the environment as low as reasonably achievable (ALARA).
- c. Radiation work must not expose any person to radiation dose limits above those specified in the [Radiation Protection and Control \(Ionising Radiation\) Regulations 2015](#).
- d. Ionising radiation must be managed in accordance with relevant legislation, Codes of Practice, the [WHS Risk Management Procedures](#), Radiation Management Plans, the [Ionising Radiation Safety Manual](#) and the principles and standards outlined in these procedures.
- e. The University must appoint a University Radiation Safety Officer (USRO), who has relevant knowledge of the principles and practices of the radiation work being conducted by the University.
- f. Colleges/Portfolios where ionising radiation is used, must appoint a local Area Radiation Safety Officer (Area RSO) with relevant knowledge of the principles and practices of the radiation work being conducted by the College/Portfolio.
- g. The University must notify the EPA the details of all person(s) appointed as Radiation Safety Officers (URSO and Area RSOs).
- h. Before any radioactive materials or apparatus are brought onto a Flinders University site the approval of the URSO must be first obtained and the relevant applications and approvals received from the EPA.

- i. Managers and supervisors must ensure that no radiation apparatus or sources are installed, relocated, sold, disposed of, or transfer ownership to another area inside or outside the organisation, without the prior approval of the USRO and the EPA.
- j. Proposed modifications to any ionising apparatus or sealed/unsealed sources, or use thereof, must not be carried out unless approved by the USRO and EPA prior to such modifications
- k. Radiation premises, sources and apparatus must be maintained, stored and labelled in line with the [Radiation Protection and Control \(Ionising Radiation\) Regulations 2015](#).
- l. Transport of radioactive material from the University:
  - i. can only be conducted after approval by the USRO and the EPA, and
  - ii. must be conducted in accordance with the [Radiation Protection and Control \(Transport of Radioactive Substances\) Regulations 2018](#)
- m. The University must maintain a register of all radiation sources, apparatus and premises. These registers must be supplied annually to the EPA and, where relevant, ASNO.

## 6. Risk management

- a. Risks to health and safety associated with ionising radiation must be managed in accordance with the legislation, codes of practice, Australian Standards, the University Radiation Management Plan and Safety Manual and these procedures.
- b. The University Radiation Safety Officer (URSO) must prepare, implement, maintain and review a University Radiation Management Plan (RMP).
- c. Activity-specific RMPs must be produced by the licensed supervisor for that radiation work being undertaken under that issued license
- d. Activity-specific RMPs must include the requirements for safe use of radiation, including, as a minimum:
  - i. detailed risk assessment
  - ii. safe work procedures (SWP)
  - iii. licensing
  - iv. monitoring
  - v. any shield or other controls
  - vi. emergency procedures and
  - vii. responsibilities for the relevant radiation work.
- e. Activity-specific RMPs must be submitted to the USRO and the WHS Unit prior to commencement of radiation work.
- f. The University must provide adequate facilities for radiation work to be conducted. Where unsealed sources are used these facilities must be designed and maintained in line with the requirements in the [Radiation Protection and Control \(Ionising Radiation\) Regulations 2015](#).
- g. Facilities where unsealed radioactive materials are handled must have access to appropriate emergency provisions (such as eye wash, safety showers and spill kits) and ensure calibrated monitoring devices are accessible.
- h. Supervisors of radiation workers must ensure that all apparatus, sealed sources, monitoring equipment, warning devices, controls such as fume cupboards, interlocks, other safety devices, labels and protective clothing are supplied and maintained in good working order at all times.
- i. Required radiation signage must be present on all radiation apparatus, sealed and unsealed sources and premises as required in the [Radiation Protection and Control \(Ionising Radiation\) Regulations 2015](#).

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- j. In vivo research involving deliberate exposure of any persons must not be undertaken without prior approval of the EPA or an EPA-recognised Research Ethics Committee.

## 7. Licensing and registration

The University must ensure that the following EPA radiation licences/registrations are in place and are reviewed and renewed annually:

- a. Licence to Possess: a permit is issued by the EPA to the University Responsible Officer, [Vice President (Corporate Services)] for radiation activities undertaken by the University.
- b. Radiation Users: EPA-issued licences which must be held by all people who use or handle radioactive material or apparatus (personal license)<sup>1</sup>. The licence must be specific for the type of work they are undertaking. These licences must be renewed annually by the individual and a copy provided to the WHS Unit.
- c. Sealed Sources: sealed sources must be registered with the EPA, where the activity or nature of the source is as specified in the Regulations.
- d. Unsealed Sources: must only be used in registered premises (e.g. Type B or C). The user of unsealed radioactive material must maintain an accurate record of usage, including the quantity of unsealed material used, handled, stored and disposed, and the date of these activities. This record must be kept in the area where these activities occur.
- e. Apparatus: all apparatus must be registered by the EPA prior to its arrival onsite. This must be done via the URSO and WHS Unit.

*Exception is apparatus that produces ionising radiation incidental to its function and meets certain parameters (including electron microscopes and apparatus containing a cathode ray tube or an electronic valve) – see the [Radiation Protection and Control \(Ionising Radiation\) Regulations 2015](#).*

- f. Premises/Facility: any area where sealed or unsealed radioactive material is to be produced, used, handled or stored must be registered with the EPA and must comply with all relevant [Radiation Protection and Control \(Ionising Radiation\) Regulations 2015](#) and, where practical, AS/NZ2982:2010.

## 8. Radiation workers

- a. All radiation workers must ensure they hold the appropriate EPA licence and must ensure the licence conditions are adhered to at all times,<sup>2</sup>.
- b. All staff and students using radiation as part of University activities must be registered with the University as a [radiation worker](#). This is required even if the use of radiation for their activity does not require an EPA license.
- c. All radiation workers must complete the University [Radiation Protection Training](#) with a refresher every 2 years. They must also have adequate training in the radiation hazards and practises relevant to the specific work they will be undertaking.
- d. All radiation workers must have read the activity-specific RMP and the Radiation Safety Manual and any other associated safe working procedures or documentation.

## 9. Personal monitoring

- a. Any person who is occupationally exposed to radiation must be monitored using a personal dosimeter unless a specific EPA exemption has been granted.<sup>3</sup>

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<sup>1</sup> Unless the activity is otherwise exempted by the EPA.

<sup>2</sup> A specific exemption exists for undergraduate activities as long as they comply with the Code of Practice for the Safe Use of Ionising Radiation in Secondary Schools and are under the direct supervision of a Licensed User.

<sup>3</sup> Gazetted Exemptions are listed in the University RMP.

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- b. Those who are required to wear a personal monitor device must upon submission of their [Radiation Worker Registration Form](#), provide information about the radiation type and nature and any previous radiation use.
  - c. The URSO will consider the above information and inform the worker of the type of personal monitoring device to be used.
  - d. The Area RSO will provide the worker with the correct monitor and instructions on use.
  - e. Radiation workers issued a personal monitoring device must:
  - f. wear them when undertaking radiation work and they must not allow others to wear their monitors
  - g. return their monitors to the Area RSO (unless an alternative arrangement has been made) for processing by the specified required date.
  - h. The Area RSO must send monitors to ARPANSA or other approved organisation for processing by the specified date.
  - i. Results from the personal monitors are returned to the University via the WHS Unit and Area RSO. Any readings that are abnormal or higher than expected or exceed the set cumulative effective dose will be investigated by the URSO.
  - j. Results for each worker must be kept in line with the [Radiation Protection and Control \(Ionising Radiation\) Regulations 2015](#). Records must be kept confidential.
  - k. Radiation workers actively working with radiation should inform their supervisors if they become pregnant so that work practices can be re-evaluated.
  - l. Where unsealed sources are present, appropriate calibrated monitoring devices are to be accessible by radiation workers.

## 10. Radiation events – incidents, accidents and emergencies

Radiation events are graded as incidents (minor), accidents (serious) and emergencies (very serious). Responses depend on the severity of the event as follows:

### 10.1.1. Radiation incident

- a. Workers, students or others must report any incident involving ionising radiation to their supervisor, the Area RSO and the WHS Unit as soon as practicable.
- b. Any such incidents must be reported in FlinSafe and investigated as per the [Accident, Incident and Hazard Reporting and Investigation Procedures](#).

### 10.1.2. Radiation accident

- a. Must be reported as soon as reasonably practical to the URSO and to the WHS Unit, and be recorded in FlinSafe.
- b. The accident must be investigated by the URSO & WHS Unit and a report provided to the EPA within 7 days as per [Radiation Protection and Control \(Ionising Radiation\) Regulations 2015](#).

### 10.1.3. Radiation emergency

- a. Must be reported immediately to the URSO and the EPA.
- b. Further details can be found in the University RMP and the [Radiation Protection and Control \(Ionising Radiation\) Regulations 2015](#).

## 11. Emergency procedures

- a. The activity specific RMP must include emergency procedures that will, so far as is reasonably practicable, reduce the risk of exposure of workers or other persons in the event of an accident or emergency involving ionising radiation.

- b. Radiation Areas which pose a potential risk for emergency personnel, contractors or others must be recorded on the University Sensitive Areas Register.

## 12. Audits of radiation sources, apparatus or premises

The following must be audited by the URSO to ensure they meet legislative requirements:

- a. All radioactive material (sealed and unsealed) – audited annually, and reports of audit provided to the EPA and ASNO.
- b. Apparatus – inspected in line with licensing requirements (usually 3 or 6 months) or as outlined in the URMP.
- c. Premises – inspected annually.

## 13. Record keeping

The University (via the WHS Unit) must keep, in addition to any record keeping referred to above, the following records:

- a. A register of all radiation sources (sealed and unsealed). These records must also be held in the area where the material is located.
- b. A register of all radiation apparatus and any inspection, testing and shielding compliance or decommissioning records.
- c. A register of all radiation premises.
- d. A register of all licenced workers.
- e. Personal radiation monitoring results.
- f. A record of any approved waste that has been disposed.
- g. Calibration records for any monitoring devices (e.g. Geiger monitors).
- h. Any other inspection or audits.

## 14. ASNO materials and requirements

- a. Some radioactive materials (nuclear materials) are also regulated by the Australian Safeguards and Non-proliferation Office (ASNO) under the Nuclear Non-Proliferation (Safeguards) Act 1987.
- b. In addition to all the requirements set by the EPA, the following additional requirements of ASNO apply:
  - i. the University must hold an ASNO site permit and the conditions specified on the permit must be met
  - ii. all ASNO materials must be audited annually and registered on the (NUMBAT) data base
  - iii. All contacts and locations identified to the regulator must be confirmed annually and status of security measures provided.

## 15. Waste management

- a. The University Radiation Safety Officer in conjunction with the WHS Unit must prepare a radioactive waste management plan and submit this annually to the EPA.
- b. The plan must specify details of all aspects of the management of the radioactive waste including the quantities of material used, to be disposed and the route.
- c. Disposal must only occur with prior approval of the URSO and the EPA and must be in line with the waste management plan.
- d. Records of all material disposed must be documented and the source registers updated as required.



## 16. Responsibilities

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| <p><b>a. Vice-President (Corporate Services)</b></p>                             | <p>As the nominated University Responsible Person, must ensure:</p> <ol style="list-style-type: none"> <li>i. there are adequate resources and systems in place to safely manage the radiation risks to the University and to maintain legislative compliance</li> <li>ii. that an appropriately trained and qualified University Radiation Safety Officer is appointed.</li> </ol>  |
| <p><b>b. College Vice-Presidents and Executive Deans and Portfolio Heads</b></p> | <p>Responsible for areas that store or use any radioactive materials or apparatus and must ensure that:</p> <ol style="list-style-type: none"> <li>i. systems are in place to ensure that these procedures and relevant Radiation Management Plans are implemented effectively in their College/Portfolio</li> <li>ii. workers, students, contractors and visitors are aware of their responsibilities and are provided with adequate information, training and instruction</li> <li>iii. there are adequate resources and facilities for effective radiation safety management, and these are kept in good order</li> <li>iv. control measures are implemented in their College/Portfolio so that exposure is ALARA and legislative requirements and standards are achieved</li> <li>v. <a href="#">Area Radiation Safety Officers</a> are appointed.</li> </ol>  |
| <p><b>c. Managers and supervisors</b></p>  | <p>Ensure that:</p> <ol style="list-style-type: none"> <li>i. the ALARA principle is used when planning research or teaching programs</li> <li>ii. staff and students or others they supervise (radiation workers) who work with ionising radiation are:             <ul style="list-style-type: none"> <li>• fully informed about hazards associated with activities being carried out</li> <li>• appropriately trained and licensed for the work</li> <li>• provided with personal monitoring where necessary</li> </ul> </li> <li>iii. all required equipment (including personal protective equipment) and controls are available and in good working order</li> <li>iv. appropriate supervision is provided</li> <li>v. the Ionising Radiation Safety Manual and relevant activity specific RMP and associated safe working procedures are prepared and adhered to</li> <li>vi. radiation worker registration forms are completed and submitted to the WHS Unit and the URSO</li> <li>vii. there is a process for radiation apparatus and sources under their control to be recorded, labelled and stored in a safe and secure manner</li> <li>viii. the Area Radiation Safety Officer is informed of any new radiation work, and of any radiation events</li> <li>ix. appropriate registers and records are maintained</li> <li>x. contractors receive appropriate information about any ionizing radiation hazards they may be exposed to when carrying out their work and are not permitted to enter radiation areas without appropriate authorisation and controls in place.</li> </ol> |
| <p><b>d. Associate Director, WHS</b></p>   | <p>Ensure that:</p> <ol style="list-style-type: none"> <li>i. applications for radiation licences and permits for apparatus, premises and sources are submitted and paid to the EPA annually, and associated records are maintained</li> </ol>   |



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|   | <ul style="list-style-type: none"> <li>ii. a register of radiation workers and the records of radiation exposure are maintained</li> <li>iii. reported radiation events are recorded on FlinSafe, investigated in conjunction with the URSO, and reported within the University and to the relevant Regulators as required</li> <li>iv. annual audits of sources, apparatus, premises and waste are undertaken by the USRO and reports and registers are maintained and submitted to the Regulators as required</li> <li>v. the URSO provides radiation worker training at least annually</li> <li>vi. the University RMP and Radiation Safety Manual and any associated documents are regularly reviewed and kept up to date.</li> </ul>   |
| <p><b>e. University Radiation Safety Officer (URSO)</b></p> | <ul style="list-style-type: none"> <li>i. Advise management on how to maintain compliance with the requirements of SA legislation, including that appropriate radiation licences and registrations held by Flinders University.</li> <li>ii. Advise managers and workers on all aspects of radiation safety applicable to the radiation work being undertaken.</li> <li>iii. Ensure that these Radiation Safety Procedures and any associated documentation (e.g. RMPs) are regularly reviewed.</li> <li>iv. Ensure that personal doses reported are within acceptable limits and investigate when they are not.</li> <li>v. Respond to and investigate any radiation events and report as necessary to the regulator (EPA and/or ASNO) as relevant.</li> <li>vi. Review applications to bring on site ionising radiation apparatus and sources and identify any controls required and legislative requirements.</li> <li>vii. Ensure inspections of dose rates and interlocks of apparatus are conducted as required by SA legislation, and keep records of these inspections.</li> <li>viii. Provide annual radiation awareness training.</li> <li>ix. Assess radiation worker applications and provide advice about any licensing or personal monitoring requirements.</li> <li>x. Audit annually the use and condition of ionizing radiation sources, apparatus, and premises, including checking that all items are present on the University register and adequate records and registers are kept.</li> <li>xi. Assist in the development of the Waste Management Plan.</li> <li>xii. Assess and approve any relocated, disposed of, or ownership transfer to another area or outside organisation.</li> <li>xiii. Ensure that relevant safe working procedures and contingency plans are available to Area RSOs and other relevant radiation workers.</li> </ul> |
| <p><b>f. Area Radiation Safety Officers (RSO)</b></p>       | <ul style="list-style-type: none"> <li>i. Manage, on a day-to-day basis, ionising radiation activities in their area.</li> <li>ii. Ensure the implementation and regular review of ionising radiation monitoring and control procedures.</li> <li>iii. Ensure that immediate action is taken in the event of unsafe practices, incidents or emergencies.</li> <li>iv. Keep radiation dose reports for area of responsibility.</li> <li>v. Provide training about local laboratory rules and procedures.</li> <li>vi. Liaise with the University Radiation Safety Officer (URSO) on matters involving ionising radiation safety, monitoring and control procedures within their area.</li> </ul>   |

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|   | vii. Inform the URSO of any changes to the radiation inventory affecting licences and registrations.  |
| <b>g. Staff and students</b>                              | <ul style="list-style-type: none"> <li>i. Comply with safety instructions and procedures, undertake any required training, and use control measures and/or personal protective equipment to ensure their own health and safety and others and to not deliberately cause a radiation event.</li> <li>ii. Take every precaution to avoid unnecessary exposure to radiation and ensure that radiation doses are kept as low as reasonably achievable (ALARA).</li> <li>iii. Report immediately any radiation event to their supervisor, the Area RSO, WHS Unit and refer to the relevant activity specific RMP and Radiation Safety Manual for the immediate responses.</li> <li>iv. Complete the radiation worker registration form and provide updates where there are significant changes to their work.</li> <li>v. Ensure they hold a current licence for the radiation activities they undertake and operate within those conditions on the issued license.</li> <li>vi. Ensure that any sources they use are on the University radiation register and appropriate record keeping (e.g. usage logs/ records) must be maintained.</li> <li>vii. Inform the Area RSO in advance (through their supervisor) of any new work or altered procedures involving ionising radiation and prepare the required activity-specific RMP.</li> <li>viii. Undertake the University Radiation Protection training at least every two years when actively working with radiation.</li> <li>ix. Inform their supervisor and the WHS Unit immediately if they become pregnant.</li> </ul> |
| <b>h. Non radiation workers, visitors and contractors</b> | Must obtain permission from the licenced supervisor of the area before entering any radiation premises in which radioactive materials are present or ionising radiation apparatus could be in use.  |

## 17. Related procedures

[WHS Risk Management Procedures](#)

[Personal Protective Equipment Procedures](#)

[Ionising Radiation Safety Manual](#)

University Radiation Management Plan

[Accident, Incident & Hazard Reporting and Investigation Procedures](#)

## 18. Legal framework

[Radiation Protection and Control Act 2021](#)

[Radiation Protection and Control \(Ionising Radiation\) Regulations 2015](#)

[Radiation Protection and Control \(Transport of Radioactive Substances\) Regulations 2018](#)

[Nuclear Non-Proliferation \(Safeguards\) Act 1987](#)

## 19. Forms

[Radiation Worker Registration Form](#)

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|----------------------------|-------------------------------------|
| <b>Approval Authority</b>  | Vice-President (Corporate Services) |
| <b>Responsible Officer</b> | Director, People and Culture        |
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**\* Unless otherwise indicated, this procedure will still apply beyond the review date.**

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