

Radiation (Ionising) Safety Procedures

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1. 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 relevant Task Specific Radiation Management Plans.



2. Scope

- a. These procedures:
 - i. apply to all Flinders University workers, students, contractors and others using or exposed to ionising radiation whilst undertaking work, research 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.

As Low As is Reasonably Achievable (ALARA) principle	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.
Australian Safeguards and Non-proliferation Office (ASNO)	Regulator which oversees the regulation and management of nuclear materials.
EPA	South Australian Environment Protection Authority
lonising radiation	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.
Ionising radiation apparatus	Apparatus capable of producing ionising radiation by accelerating atomic particles.
Licensed user	A person who holds an EPA licence to use or handle radioactive substances or operate ionising radiation apparatus for the work undertaken.
Personal monitoring	Measurement over a specified period of time using an approved dosimeter, of the radiation dose received by a person who is occupationally exposed to radiation.
Radiation Incidents	Any unintended occurrence involving a radiation source or apparatus which results in, or has the potential to result in, an exposure to ionising radiation to any person or the environment that is outside the range of that normally expected for a particular practice.
Radiation Safety Manual	Document that outlines general radiation safety principles and practice at Flinders University.
University Radiation Management Plan (URMP)	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.
Radiation worker	A radiation worker is a person who by reason of their profession, trade or occupation:

3. Definitions





	i. uses any source of ionising radiation, or
	 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
	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.
	In the University, radiation worker = staff and higher degree students or visitors (e.g. visiting academics) undertaking work or research on University projects where they are using radiation sources or apparatus.
Registered premises	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.
Sealed radioactive sources	A radioactive substance bonded within metals or sealed in a capsule or other container in such a way as to:
	 minimise the possibility of escape or dispersion of the radioactive substance, and
	ii. allow the emission of ionising radiation for use as required.
Task-Specific Radiation Management Plan	A University Stand-alone documents that detail how each radiation task/activity will be managed.
	The documents will as a minimum outline 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.
Unsealed radioactive sources	A radioactive substance that is not in a sealed capsule.
Waste Management Plan	An EPA-approved plan which gives details of all aspects of the management of the radioactive waste including the type, quantities of radioactive material and the means of disposal.

4. General Requirements

- a. All work involving ionising radiation must be performed in a safe manner and compliant.
- 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, including members of the public to radiation dose limits above those specified in the *Radiation Protection and Control Regulations 2022*.
- d. Ionising radiation must be managed in accordance with relevant legislation, Codes of Practice, the <u>WHS Risk Management Procedures</u>, Radiation Management Plans, Radiation Management License, 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. 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.
- h. 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.
- i. Proposed modifications to any ionising apparatus or sealed/unsealed sources, or use thereof, must not be carried out unless approved by the URSO and EPA prior to such modifications.
- j. Radiation premises, sources and apparatus must be maintained, stored and labelled in line with *Radiation Protection and Control Regulations 2022*.
- k. Transport of radioactive material/apparatus:
 - i. off of the University premises can only be conducted after approval by the URSO and the EPA
 - ii. must be conducted in accordance with <u>Code of Practice for the Safe Transport of Radioactive</u> <u>Materials 2019</u>
 - iii. on University premises must first be approved by USRO and details of transport arrangements recorded in the task specific RMP
 - iv. must be undertaken in a manner to ensure that the risk of personal or environmental exposure or contamination, including if an incident, is managed.
- I. 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.

5. Risk Management

- a. The University with the assistance of the University Radiation Safety Officer (URSO) will prepare, implement, maintain and review a University Radiation Management Plan in line with the requirements of <u>Code of Compliance for Radiation Management Plans 2022</u>.
- b. Task-specific RMPs must also be produced. These will be produced by the licensed supervisor for the specific radiation work being undertaken in their area. They must meet the requirements for safe use of radiation, including all the elements required in the <u>Code of Compliance for Radiation Management</u> <u>Plans 2022</u>.
- c. The Task-specific RMPs must be submitted to the WHS Unit prior to commencement of radiation work. The EPA will be provided a copy upon request.





- d. The University must provide adequate facilities for radiation work to be conducted. Where unsealed sources are used these facilities must be designed, maintained and registered in line with the requirements in the <u>Radiation Protection and Control Regulations 2022</u> and where relevant the Australian Standards 2243.4 2018.
- e. 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 and fit for purpose- i.e. the radiation type being used.
- f. 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.
- g. Required **radiation signage** must be present on all radiation apparatus, sealed and unsealed sources and premises as required in the *Radiation Protection and Control Regulations 2022*.
- h. Task specific RMPs must also identify the licensing and supervisory requirements, including if direct or indirect supervision and any specific training or competency needed.
- i. In vivo research involving deliberate exposure of any persons must not be undertaken without prior approval of the EPA.

6. Radiation Emergency Response, Contingency Planning and Incident Reporting

6.1. Emergency and Contingency Plans

- a. The University must have an emergency plan including for radiation incidents that outlines:
 - i. any required arrangements for first responders and emergency personnel
 - ii. a Sensitive Areas Register_where radiation areas are identified to assist in the protection of Emergency Personnel, Contractors and Others.
- b. Local Area Contingency Plans:
 - i. areas must have a local contingency plan that details any specific responses. This information must also be included with the Task Specific RMPs
 - ii. provide specific instructions as to how each incident is to be dealt with and brought under control, paying particular regard as to how control may be restored and the exposure of persons may be kept as low as reasonably achievable
 - iii. identify any appropriate emergency equipment.

6.2. Radiation Incident Reporting

- a. Workers, students or others must report any incident involving ionising radiation immediately to their supervisor/ area manager or the Area RSO.
- b. The University RSO, or the WHS Unit must then be informed as soon as practicable and they must also be reported in FlinSafe and investigated as per the <u>Accident, Incident and Hazard Reporting and Investigation Procedures</u>.

6.3. Notifiable Radiation Incidents

a. Radiation incidents that are notifiable are classified in **Schedule 3** of the <u>Radiation Protection and</u> <u>Control Regulations 2022</u>. They must be reported by the University RSO or WHS Unit to the EPA orally as soon as reasonable practicable (no more than 24 hrs) and then in writing within 7 days.





- b. A notifiable radiation incident includes:
 - i. incorrect medical exposure of a patient
 - ii. receiving radiation exposure that leads to a radiation injury or doses that exceed the annual dose limit
 - iii. loss or theft of a radioactive source or apparatus
 - iv. incidents that occur during transport of radioactive materials
 - v. unauthorised or unintentional release of radioactive material into the environment
 - vi. damage to or malfunction of a radiation apparatus or source
 - vii. contamination of any surface as a result of a spillage of more than 100 times the exempt activity of the radioactive material
 - viii. out of control radiation source, including if not safely secured, shielded or contamination not confined and unable to be able to be brought under control.

Further details can be found in the University RMP and the <u>Radiation Protection and Control Regulations</u> <u>2022</u>.

7. Licensing and Registration

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

7.1. Radiation Management Licence

A permit is issued by the EPA to the University Responsible Officer, [Vice President (Corporate Services)] for radiation activities undertaken by the University. (Management license also known as license to possess).

7.2. Radiation Users License

- a. EPA-issued licences which must be held by all people who use or handle radioactive material or apparatus unless the activity/ task has been specifically identified by the EPA as exempt.
- b. The licenses issued are personal license and are for the specific type of work the person will undertaking.
- c. These licences must be renewed annually by the individual and a copy provided to the WHS Unit.

7.3. Sealed Sources

- a. Must be registered with the EPA, where the activity or nature of the source is specified in the Regulations.
- b. Re-registration is required annually and evidence of stocktake and wipe testing must be provided to the EPA if requested.

7.4. Unsealed Sources

- a. Must only be used or stored in a registered premises.
- b. The user of unsealed radioactive material must maintain an accurate record/ register (see f below).





7.5. Apparatus

- a. all apparatus must be registered by the EPA prior to its arrival onsite. This must be done via the URSO and WHS Unit.
- b. 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 <u>Radiation Protection and Control Regulations 2022</u>.
- c. Renewal of apparatus registration must occur annually after confirmation of location.

7.6. Premises/Facility

- a. any premises/ facility 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 Regulations.
- b. the premises/ facility must have signage displayed on all entry doors, have contact details and the radiation symbol. Access must be restricted when the area is not occupied.
- c. Each radiation premises/ facility must have its registration renewed annually with the EPA.
- d. Each premises/ facility must have available a **register of all radioactive materials** and the register must include:
 - i. the radionuclide
 - ii. the activity or nominal activity
 - iii. the date to which the activity refers
 - iv. the name of the person in whose care the material has been placed
 - v. the date upon which the material was first taken onto the premises
 - vi. includes any use, storage or disposal.

8. Radiation Workers

- a. All radiation workers must ensure they hold the appropriate EPA licence for their radiation work, where identified this is required by the URSO.
- b. Specific exemptions exist where a person may be able to work under the supervision1 of a licensed person. This exemption is specific to types of work and must be confirmed by the URSO.
- c. Exemption for undergraduate students exists for teaching purposes².
- d. All licensed workers must ensure their licence conditions are adhered to at all times.
- e. All staff and students using radiation as part of University activities must be registered with the University as a <u>radiation worker</u> (excluding undergraduate students). This is required even if the user does not require them to personally hold an EPA license.
- f. All radiation workers must complete the University <u>Radiation Protection Training</u> every **2 years**. They must also have adequate knowledge and training in the radiation hazards and practises relevant to the



¹ Must specify if this is direct or indirect supervision required.

² A specific exemption exists for teaching activities in tertiary education as long as the undergraduate student activities occur under the direct supervision of a Licensed User.



specific work they will be undertaking and ensure they apply the training in a manner to ensure their own health and safety and that of other persons.

- g. Radiation workers must have read and comply with the Task Specific RMP and any other associated safe working procedures and documentation.
- h. Radiation workers must use safety equipment provided, including personal protective equipment.
- i. All workers must understand emergency response and local contingency plans and procedures for their area and activity.
- j. All incidents including any potential fault or defects in any device, or material that is likely to result in a radiation incident must be report immediately to their supervisor or the area RSO.

9. Personal Dosimeters

- a. Any person who is occupationally exposed to radiation must be monitored using a personal dosimeter unless specific EPA criteria can be met confirming it is not a requirement.
- b. The requirement to wear or not wear a personal dosimeter must be recorded in the Task Specific RMP and accepted by the EPA³.
- c. Not wearing a personal dosimeter would only apply to activities where under all foreseeable scenarios (including credible accident scenarios)—exposure will be less than 1 mSv per year³.
- d. Upon submission of their <u>Radiation Worker Registration Form</u>, workers must provide information about the radiation type and nature of the proposed radiation use and any previous radiation exposure. The URSO will consider the above information and inform the worker of the type of personal dosimeter to be used where required.
- e. Radiation workers issued a personal dosimeter must:
 - i. wear them when undertaking all radiation work and they must not allow others to wear their dosimeters
 - ii. return their dosimeters to the Area RSO (unless an alternative arrangement has been made) for processing by the specified required date.
- f. The Area RSO must send dosimeters to an approved organisation for processing by the specified date.
- g. Results from the dosimeters are returned to the University via the WHS Unit and Area RSO.
- h. Exposure doses must not exceed annual effective dose of 20 mSv averaged over 5 consecutive years or members of the public 1 mSv/year.
- i. Any readings that are abnormal or higher than expected or exceed the set effective dose will be investigated by the URSO and work procedures will be modified as required to keep exposures as low as reasonably achievable (ALARA).
- Results for each worker must be kept in line with the <u>Radiation Protection and Control Regulations</u> <u>2022</u>. Records must be kept confidential.

³ Must meet EPA criteria and evidence/ justification that it does to be recorded in the Task Specific RMP



k. Radiation workers actively working with radiation must inform their supervisors if they become **pregnant** so that work practices can be re-evaluated and ensure the worker is not exposure to radiation exceeding the limit for the general public.

10. Area & Apparatus Monitoring

- a. Where radiation sources (sealed or unsealed) are present, appropriate calibrated contamination monitors are to be accessible by workers so they can monitor themselves or the work areas for contamination.
- b. Sealed sources are visually inspected for physical condition and wipe testing will occur periodically by the URSO.
- c. Checks on radiation apparatus for safety features operation and leak testing will occur as specified in the the <u>Radiation Protection and Control Regulations 2022</u> and documented in the Task Specific RMPs.

11. 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 or as outlined in the Task Specific RMP
- c. premises inspected annually.

12. Record Keeping

- a. The University (via the WHS Unit) must keep, in addition to any record keeping referred to above, the following records:
 - i. a register of all radiation sources (sealed and unsealed). These records must also be held in the area where the material is located
 - ii. a register of all radiation apparatus and any inspection, testing and shielding compliance or decommissioning records
 - iii. a register of all radiation premises
 - iv. a register of all licenced workers
 - v. personal radiation monitoring results
 - vi. a record of any approved waste that has been disposed
 - vii. calibration records for any monitoring devices (e.g. Geiger monitors)

viii. any other inspection or audits.

b. Records must be kept for extensive time periods as per the WHS record keeping schedule.

13. 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) database
 - iii. all contacts and locations identified to the regulator must be confirmed annually and status of security measures provided.

14. Responsibilities

a. Vice- President	As the nominated University Responsible Person, must ensure:
(Corporate Services)	 there are adequate resources and systems are in place to safely manage the radiation risks to the University and to maintain legislative compliance
·	 that an appropriately trained and qualified University Radiation Safety Officer is appointed.
b. Vice- Presidents	Responsible for areas that store or use any radioactive materials or apparatus and must ensure that:
and Executive Deans of	 systems are in place to ensure that these procedures and relevant Radiation Management Plans are implemented effectively in their College/Portfolio
College, and Portfolio	 workers, students, contractors and visitors are aware of their responsibilities and are provided with adequate information, training and instruction
Heads	 iii. there are adequate resources and facilities for effective radiation safety management, and these are kept in good order
	 iv. control measures are implemented in their College/Portfolio so that exposure is ALARA and legislative requirements and standards are achieved
	v. Area Radiation Safety Officers are appointed.
c. Managers	Ensure that:
and	i. the ALARA principle is used when planning research or teaching programmes.
3000113013	ii. staff and students or others they supervise (radiation workers) who work with ionising radiation are:
	 fully informed about hazards associated with activities being carried out.
	 appropriately trained and licensed for the work.
	 provided with personal monitoring where necessary.
	iii. all required equipment (including personal protective equipment) and controls are available and in good working order.
	iv. appropriate supervision is provided
	 v. the lonising Radiation Safety Manual and relevant task specific RMP and associated safe working procedures are prepared and adhered to





	vi. radiation worker registration forms are completed and submitted to the WHS Unit and the URSO
	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
	viii. the Area Radiation Safety Officer is informed of any new radiation work, and of any radiation events
	ix. appropriate registers and records are maintained
	x. ensure appropriate where required personal and other monitoring occurs
	 xi. 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.
d. Associate	Ensure that:
Director, WHS (or nominee)	 applications for radiation licences and permits for apparatus, premises and sources are submitted and paid to the EPA annually, and associated records are maintained
	 a register of radiation workers and the records of radiation exposure are maintained
	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
	 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
	v. the URSO provides radiation worker training
	vi. the University RMP and Radiation Safety Manual and any associated documents are regularly reviewed and kept up to date
e. University Radiation Safety Officer	 Advise management on how to maintain compliance with the requirements of SA legislation, including that appropriate radiation licences and registrations are held by Flinders University.
(URSO)	ii. Advise managers and workers on all aspects of radiation safety applicable to the radiation work being undertaken.
	 iii. Ensure that these Radiation Safety Plans and any associated documentation (e.g. RMPs) are regularly reviewed.
	 iv. If personal doses occur above normal dose limits, investigate what practices have resulted in the exposure.
	 Respond to and investigate any radiation events and report as necessary to the regulator (EPA and/or ASNO) as relevant.
	vi. Review applications to bring on site ionising radiation apparatus and sources and identify any controls required and legislative requirements.
	 vii. Ensure inspections of dose rates and interlocks of apparatus are conducted as required by SA legislation and keep records of these inspections.





		viii. Provide radiation awareness training.
		 Assess radiation worker applications and provide advice about any licensing or personal monitoring requirements.
		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.
		xi. Assist in the development of the Waste Management Plan.
		xii. Assess and approve any relocated, disposed of, or ownership transfer to another area or outside organisation.
		xiii. Ensure that relevant safe working procedures and contingency plans are suitable and are available to Area RSOs.
f	Area	i. Manage, on a day-to-day basis, ionising radiation activities in their area.
1	Radiation Safety Officers (RSO)	 Ensure the implementation and regular review of ionising radiation monitoring and control procedures.
		iii. Ensure that immediate action is taken in the event of unsafe practices, incidents or emergencies.
		iv. Assist in the distribution and returning of personal dosimeters for area of responsibility.
		v. Provide general advice about radiation use.
		 vi. Liaise with the University Radiation Safety Officer (URSO) on matters involving ionising radiation safety, monitoring and control procedures within their area.
		vii. Inform the URSO of any changes to the radiation inventory affecting licences and registrations.
g.	Staff and higher degree students	 Comply with safety instructions and procedures, undertake any required training, use control measures and personal protective equipment to ensure their own health and safety and others and to not deliberately cause a radiation event.
		Take every precaution to avoid unnecessary exposure to radiation and ensure that radiation doses are kept as low as reasonably achievable (ALARA).
		iii. Wear any personal dosimeters as required.
		iv. Report immediately any radiation event to their supervisor, the Area RSO, WHS Unit and refer to the relevant task specific RMP and Radiation Safety Manual for the immediate responses.
		 Complete the radiation worker registration form and provide updates where there are significant changes to their work.
		 vi. Ensure they hold a current licence for the radiation activities they undertake and operate within those conditions on the issued license.
		vii. Ensure that any sources they use are on the University radiation register and appropriate record keeping (e.g. usage logs/ records) must be maintained.





	viii. Inform the Area RSO in advance (through their supervisor) of any new work or altered procedures involving ionising radiation and prepare the required task specific RMP.
	 ix. Undertake the University Radiation Protection training at least every two years when actively working with radiation.
	x. Report all radiation incidents to their supervisor.
	xi. Inform their supervisor and the WHS Unit immediately if they become pregnant.
h. Non radiation workers, visitors and contractors	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.

15. Supporting Policies and Procedures

Work Health and Safety Policy

WHS Risk Management Procedures

Personal Protective Equipment Procedures

Ionising Radiation Safety Manual

University Radiation Management Plan

Accident, Incident & Hazard Reporting and Investigation Procedures

16. Legal Framework

Radiation Protection and Control Act 2021

Radiation Protection and Control Regulations 2022

Nuclear Non-Proliferation (Safeguards) Act 1987

17. Forms

Radiation Worker Registration Form





Approval Authority	Vice-President (Corporate Services)	
Responsible Officer	Director, People and Culture	
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