

# Procedure: Radiation safety

## Purpose

This procedure describes how the Australian National University (the University) establishes, implements and maintains best practice and compliance with radiation legislation and the University's Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) licence conditions with respect to radiation safety. This procedure meets the compliance requirements of the *Work Health and Safety Act 2011 (Cth)*, the *Work Health and Safety Regulations 2011 (Cth)* and ARPANS Act, 1998. This procedure is based on the requirements listed in the University's ARPANSA Licence conditions and is linked to the University's Work health and safety and Radiation safety policies and is one of the Safe Work Procedures within the WHS Management System.

## Definitions

An **Authorised Person** refers to a person who is permitted to work with and has been trained and evaluated as competent to use radioactive sources or radiation apparatus by the designated Radiation Safety Officer (RSO) of a local area of the University (also see Radiation Worker).

**Controlled Apparatus** refers to any of the following (see [ARPANSA webpage](#)):

- an apparatus that produces ionising radiation when energised or that would, if assembled or repaired, be capable of producing ionising radiation when energised; or
- an apparatus that produces ionising radiation because it contains radioactive material; or
- an apparatus prescribed by the regulations that produces harmful non-ionizing radiation when energised.

**Controlled Material** refers to any natural or artificial material which emits ionising radiation spontaneously.

**Coordinating Radiation and Laser Safety Officer (CRSO/ CLSO)** refers to a staff member appointed by a local area to assist in the coordination of radiation safety within their local area. They coordinates the reporting with Work Environment Group.

**Dose** is a generic term which can mean absorbed dose, equivalent dose or effective dose, depending on context. It is an amount related to an individual's exposure.

**Emergency Procedures** are basic plans, established in advance, stating what action to take in an emergency. These are used to minimise the consequences of an incident, such as injuries or damage to property or the environment.

**Equipment maintenance** refers to performance of adjustments or procedures specified by the product manufacturer that are performed by internal University personnel (e.g. an operator) to assure intended performance or safety.

**Equipment service** refers to performance of adjustments or procedures that are performed by external personnel (e.g. field service rep) that affect any aspect of the product's performance or safety.

**Exposure** refers to the circumstances of being exposed to radiation. Different types of exposure include:

- Occupational exposure (e.g. Ultra Violet light, Laboratory);
- Medical exposure (e.g. Computed Tomography (CT) scans, medicines); and
- Public (non-work related exposure).

**Hazard** is a source or a situation with a potential for harm in terms of human injury or ill-health, damage to property, damage to environment, or a combination of these.

**Ionisation** is the process in which an electron is given enough energy to break away from an atom resulting in the formation of two charged particles or ions. Ionisation results in the release of enough energy to cause chemical changes by breaking chemical bonds, which may cause damage to living tissue.

**Ionising radiation** for the purpose of radiation protection, radiation capable of producing ion pairs in biological material(s).

**Local area** refers to a College, Research School or Service Division of the University.

**Licence** refers to a source licence or a facility licence issued by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) to the University with the Vice Chancellor named as the licence holder.

**Laser operator** refers to a person who has completed safety training and has been supervised, trained, evaluated, deemed competent and authorised to use the relevant controlled laser/s. Authorisation may be alternatively given by the designated Laser Safety Officer (LSO) of a local area of the University.

**Laser Safety Officer (LSO)** refers to a person(s) at the University who possesses the necessary skill, training, experience and qualifications to effectively manage the radiation protection program for their designated local area. See Duties and Responsibilities of the LSO in the [Radiation safety policy](#).

**Non-Ionising Radiation** is any electromagnetic radiation of a wavelength greater than 100 nm in air or vacuum (for example, optical radiation from lasers, infrared, ultraviolet, visible light, microwaves, and radiofrequency waves).

**Occupational exposure** is the exposure of a person, which occurs in the course of the person's work.

**Packaging** is the assembly of components necessary to enclose the radioactive contents completely.

**Precautionary Principle** is defined by the World Health Organisation (WHO) as a risk management concept that provides a flexible approach to identifying and managing possible adverse consequences to human health, even when it has not been established that the activity or exposure is harmful.

**Radiation** includes ionising radiation (alpha, beta, gamma, x-rays, and neutrons) and non-ionising radiation (infrared, visible light, ultraviolet, microwaves, radiofrequency waves, and magnetic fields).

**Radiation Dealing** in relation to a controlled apparatus or controlled material means any of the following:

- Possess, or have control of, the apparatus or material;
- Use or operate the apparatus, or use the material;
- storage of controlled apparatus and/or material; or
- Dispose of the apparatus or material.

**Radioactive substance** is a substance that spontaneously emits ionising radiation as a consequence of radioactive decay.

**Radioactive contamination** is the presence of a radioactive substance(s) in a material or in a place where it is undesirable or could be harmful.

**Radiological incident** refers to an unexpected deviation from normal conditions leading to an actual, or potential, abnormal situation that may cause excessive exposure, irradiation or contamination of persons or contamination of the working environment.

**Radiation monitor** is a device that measures radiation in terms of an exposure assessment (e.g. microsievert per hour).

**Radiation detector** is a device that detects radiation (e.g. displays counts per second).

**Radiation Safety Officer (RSO)** refers to a person(s) at the University who possesses the necessary skill, training, experience and qualifications to effectively manage the radiation protection program for their designated local area. See Duties and Responsibilities of the RSO in the [Radiation safety policy](#).

**Radiation work** (unless explicitly stated otherwise) refers to any activity involving interaction with controlled apparatus/ material (see above) including but not limited to acquisition, operation, maintenance and disposal.

**Radiation worker** is anyone who carries out radiation related work at/for the University. A worker normally includes staff, volunteers, contractors, students and visitors at the University. An authorised radiation worker or authorised person refers to a person who has met the minimum requirements of a radiation worker (as mentioned in Table 6 below) and has been granted access to specific locations.

**Risk** refers to any potential injury or harm and is the combination of likelihood and severity of the injury.

**Risk Management** refers to coordinated activities to direct and control an organisation's risks.

**Sealed Source** refers to controlled material permanently contained in a capsule, or closely bound in a solid form, which is strong enough to be leak tight for the intended use of the controlled material and any foreseeable abnormal events likely to affect the controlled material.

**Security in relation to controlled material or apparatus** is the prevention of, detection of, and response to, criminal or intentional unauthorised acts involving or directed at radioactive material, associated facilities, or associated activities.

**Sievert (Sv)** is the Scientific International (SI) unit for both equivalent dose and effective dose. Terms used in this procedure include millisievert (mSv) and microsievert ( $\mu$ Sv).

**Unsealed source** is a radioactive source in which the radioactive material is neither permanently sealed in a capsule nor closely bonded and in solid form.

**Ultraviolet (UV)** is the ultraviolet part of the electromagnetic spectrum.

**WHS** refers to Work Health and Safety.

**Worker** is defined as anyone who carries out work for the University. A worker includes staff, volunteers, contractor, students and visitors at the University.

## Procedure

### Scope

1. The University has developed this procedure to implement the Radiation policy and principles. This includes complying with legislation, licence conditions and relevant standards, thus reducing exposure and risks to health, safety and the environment. This procedure lays out a training framework to ensure personnel receive the appropriate training to perform their duties.

### Legislative requirements

2. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) has issued the University a Source Licence (S0027) and three Facilities Licences (F0073, F0074 and F0075) to hold ionising and non-ionising radiation apparatus and/ or material and conduct research and teaching. Refer to the [Radiation Safety Policy](#) for additional information.

3. The University's [Nuclear Safety Procedure](#) addresses dealings regulated under the *Nuclear Safeguards and Non-Proliferation (Safeguards) Act, 1987 (Cth)*.

### Managing risk

4. The University uses a risk-based approach to minimise risks when working with, storing, handling, transporting and disposing of radioactive materials and apparatus associated with the University's research and teaching.

5. Managing radiation risk involves conducting an assessment to:

- establish the context associated with radiation use;
- identify the hazards;
- assess the risks associated with those hazards;
- control the risks; and
- review the process for effectiveness and compliance.

Table 1: Risk Management Principles and the Australian Standards/New Zealand Standards (AS/NZS ISO 31000: 2009)

Stage	Description
1	Establish the Context: Consider the scope and nature of work within

	the laboratory area when working with radioactive substances or apparatus.
2	Identify the Hazards: Hazard identification is covered in detail in the University's safety courses.
3	Assess the risks associated with the hazards: Assess both real and potential exposures.
4	<p>Control the risks: Provide suitable measures to reduce identified risks to As Low as Reasonably Achievable (ALARA). The plan for controlling workplace radiation exposure in the workplace is based on a hierarchy of controls, including: avoidance or elimination of source; substitution of a less hazardous source; isolation of radiation sources through shielding, containment and remote handling techniques;</p> <p>engineering controls to reduce radiation levels;</p> <p>administrative controls, including safe work practices, work methods that make use of time, distance and shielding to reduce exposure, training, safety signage, intakes of radioactive materials in the workplace;</p> <p>approved Personal Protective Equipment (PPE), where other means of controlling exposure are not practicable or sufficient.</p> <p>Note: Risk control is usually implemented through a combination of controls, rather than just one.</p>
5	Review the process: Regular reviews are a requirement of the <i>Regulations</i> . Also, consider whether new processes and techniques are available. If an incident (or near miss) occurs, incorporate recommendations and improvements into the protocols.

2. Radiation workers working with Non-Ionising Radiation should apply the Precautionary Principle. The Principle of Optimisation of Protection is used to minimise exposure and ensure legal dose limits are not exceeded.

## Responsibilities

3. In order to ensure that the University's obligations are met the [Radiation safety policy](#) and the [Nuclear safety procedure](#) state the responsibilities for people working with radiation apparatus and/ or materials. To ensure that personnel can meet these responsibilities, this procedure provide duties (listed below) that the relevant personnel should perform.

### *Supervisor and research leaders*

4. Supervisors and research leaders are accountable to the Dean/Director and have the following duties:

- document proposed radiation work and research;
- conduct only justified (shall be documented) research and dealings (i.e. there must be a net benefit to the researcher or the community, considering social, economic and other relevant factors);
- Work with the relevant RSO/LSO to develop, document and implement a plan to manage the safety of all aspects of the proposed activity (research and dealings).
- comply with the University's 'new work' approval process (refer to paragraph 25);
- conduct [hazard assessments](#). Where there are [high or extreme risks](#) (after implementing controls), contact the relevant RSO/LSO before proceeding;
- ensure that hazards are effectively managed such that individual exposures are below ARPANSA exposure limits and kept to the lowest level achievable, consistent with best practice;
- ensure that all necessary training (records kept) and supervision is provided to all radiation workers;
- provide proper resources (e.g. work area, safety devices and personal protective equipment);
- communicate with, local RSO and LSO;
- report any incidents, exposures or hazards via [the Workplace safety incident and hazard reporting tool](#); and
- report any Workplace Health and Safety (WHS) concerns or matters within their jurisdiction to the local RSO/ LSO.

### *Radiation workers*

5. All radiation workers are required to meet the responsibilities stated in the [Radiation safety policy](#) and [Nuclear Safety Procedure](#), in addition extra responsibilities are provided in this procedure (refer paragraph 10–25) for specific cases as applicable. The following apply to all radiation workers:

- do not operate equipment or enter a facility if not authorised;
- ensure that training obligations are met before work commences;
- be familiar with emergency plans;
- comply with all relevant safe work procedures, operation restrictions & work practices;
- identify and raise (with supervisor, RSO/LSO or HSR) any concerns or changes that impact on workplace safety or the risk assessment; and
- ensure that equipment, safety controls and PPE are functional and not damaged.

### *Pregnant radiation workers*

6. Females working with radiation will notify their supervisor (or the RSO/ LSO or Work Environment Group) as soon as they suspect they are pregnant. Once the pregnancy is confirmed, the supervisor must actively seek to further control exposure and provide information to the radiation worker on the risks to the embryo or foetus when the parent is working with radiation. When a radiation worker is no longer able to continue working with radiation, the supervisor (in consultation with the RSO) should provide suitable alternative tasks.

7. Where a pregnant radiation worker continues to work with ionising radiation, a more stringent dose limit must be applied to the embryo or foetus. ARPANSA requires the same level of protection as for the public (i.e. a dose of 1 mSv a year during pregnancy).

8. These conditions also apply to breastfeeding radiation workers

9. Radiation monitoring badges should be worn at the level of the waist for a pregnant radiation worker or the chest for a breast-feeding radiation worker. Refer to [ARPANSA Radiation Protection Series – 1](#).

### *Workers with a medical condition or implants*

10. Workers with a medical condition or a medical implant that may be affected by exposure to radiation (e.g. a heart pacemaker in a magnetic field) should discuss this with their supervisor, the RSO or the Work Environment Group (WEG).

Supervisors and managers of the local area should provide suitable alternative tasks where the worker is no longer able to work with radiation for health reasons. For further information, contact the WEG ([whs@anu.edu.au](mailto:whs@anu.edu.au)).

*University workers at external organisations*

11. Workers planning to work with radiation at external organisations are to document the type of radiation they will be working with and have their ANU supervisor and relevant RSO/LSO approve the work.
12. Where the external organisation provides the radiation monitoring, the RSO (in consultation with the WEG) must consider how to combine external results with the University dose results.
13. University radiation workers must comply with the external organisation's induction and training requirements.

*Non-radiation workers*

14. Any personnel who have not met the requirements of a radiation worker shall be directly supervised by an appropriately trained and authorised University radiation worker at all times when dealing with a controlled apparatus or material.

*Visiting radiation workers at the University*

15. All visiting radiation workers including honorary appointments, summer students and non-ANU contractors will work with an ANU supervisor while they are working on ANU projects, on ANU grounds or in ANU buildings. Before any work starts, the supervisor shall approve the work and work conditions.
16. Workers will meet (or exceed) all the set University radiation standards. They need to be aware of:
  - their roles and responsibilities and how they may influence safety;
  - the University and local area standards for working with radiations; and
  - issues relating to age, pregnancy and medical implants.
17. Workers must meet the local RSO/ LSO and discuss the work with them.
18. Any worker working in or visiting a radiation area must undertake the local area induction prior to commencing work.

Table 2: New radiation worker or visitor local area induction process

<b>When the duration of work at the ANU is expected to be:</b>	<b>Then the following is mandatory</b>
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<p>Less than 20 days</p> <p>Includes radiation workers visiting from other organisations, honorary appointments, summer students and non- ANU contractors.</p>	<p>A local area workplace radiation induction.</p> <p>Full local area induction.</p> <p>Any additional local area requirements.</p>
<p>More than 20 days</p>	<p>A local area workplace radiation induction.</p> <p>Full local area induction.</p> <p>Successful completion of <a href="#">ANU radiation safety course</a>.</p> <p>An additional local area requirements.</p>

19. Where there is potential for new radiation workers or visitors to receive a radiation dose the supervisor must ensure that a Personal Dose Monitoring Badge is issued after completion of the local area induction process.

*Trade contractors, workshop and maintenance workers*

20. When seeking access to hazardous and restricted locations, trade contractors, workshop and maintenance workers (including equipment technicians) must:

- adhere to the [Control of access to restricted locations procedure](#);
- obtain prior approval from the laboratory or area supervisor, or in their absence, the RSO/LSO; and
- in an emergency consult with RSO, Facility manager or head of the research group and gain approval for access if they need urgent access. This also applies to after-hours access.

*Facilities & Services supervisors of trade contractors*

21. Facilities and Services supervisors must ensure that prior approval and access has been granted by the laboratory/ facility manager and RSO (or WHS

officer) before allowing access to trade contractors.

### New work approval

22. The local RSO, LSO and WEG can help to decide which approval level is correct for any new work. Approval for new work involving radiation may occur through:

- Local area assessment; or
- Radiation Safety Advisory Group (RSAG) assessment; or
- ARPANSA approval; or
- The Australian Safeguards and Non Proliferation Office (ASNO) notification.

#### *Local area assessment*

23. A local area assessment is suitable when a new activity/project is conducted using a radioactive isotope or controlled apparatus currently in use within the local area and arrangements are in place to correctly transfer expertise with the isotope, procedure or apparatus to the new work location. The material or apparatus must exist in the School's ARPANSA inventory.

24. The process outlined in Table 3 applies.

Table 3: University local area new work approval process

Step	Who	Action
1	Activity leader in consultation with supervisor or research leader:	<p>Conduct a hazard assessment as per the <a href="#">WHS Hazard management procedure</a>.</p> <p>Develop a radiation safety management plan:</p> <p>For ionising radiation use <a href="#">the ionising radiation apparatus application form</a>; or <a href="#">ionising radiation isotope application form</a></p> <p>For non-ionising radiation also use the <a href="#">Laser application form</a> and the <a href="#">Non-ionising radiation equipment application form</a>.</p>

2	Supervisor or research leader	<p>Develop safe work practices to ensure compliance with relevant codes of practice and the licence conditions, based on</p> <p>The results of the hazard assessment;</p> <p>ARPANSA documents <a href="#">Radiation Protection Series</a> and <a href="#">Radiation Health Series</a>; and</p> <p><a href="#">Australian Standards</a>.</p>
3	Supervisor or research leader	<p>Send the completed hazard assessment and radiation safety management plan including safe work practices to the Coordinating RSO (CRSO) or LSO for approval.</p> <p>CRSO or CLSO should validate that the control measures are in place (via inspection as necessary) and provide feedback as needed.</p> <p><b>Note:</b> The CRSO or CLSO should provide the local WHS Committee with details of the new experiment.</p>
4	CRSO or CLSO	CRSO or CLSO will send complete documentation to WEG for information.
5	Local area	Once all measures in place and approval given, the activity may commence.

### *RSAG assessment*

2. A RSAG assessment is suitable when there is:
  - a new protocol that uses existing material or apparatus;

- a new radiation producing apparatus;
- a new sealed source;
- a new unsealed source not currently listed in the school's inventory;
- an unsealed source of a radioisotope that exceeds the cumulative activity for that radioisotope shown on the inventory;
- an unsealed source of a radioisotope of different physical form (i.e. solid, liquid, gas) than shown on the inventory for that radioisotope;
- an unsealed source of a radioisotope that is to be used differently than shown on the inventory for that radioisotope (i.e. the risks are significantly different);
- transfer of radioactive material into long-term storage; and
- Some other situations as determined by the WEG or RSOs/LSOs.

3. The following RSAG new work approval process applies.

Table 4: RSAG new work approval process

Stage	Who	Description
1	Researcher or Group Leader	<p>Completes the correct application form:</p> <p><a href="#">New radiation work application form</a>; and one of the following:</p> <p><a href="#">Ionising radiation apparatus application form</a>;</p> <p><a href="#">Ionising radiation isotope application form</a>;</p> <p><a href="#">Non ionising radiation equipment application form</a>; or</p> <p><a href="#">Laser application form</a>.</p> <p>Sends the completed forms to the Local RSO/ LSO.</p>

2	Local RSO/ LSO	Checks the forms for completeness and sends the completed forms to the Coordinating RSO for comments.
3	Coordinating RSO	The Coordinating RSO adds any comments and sends the completed forms to the WEG on <a href="mailto:whs@anu.edu.au">whs@anu.edu.au</a> .
4	WEG	Checks the forms, adds any further comments required and sends the forms to the RSAG.
5	RSAG	Considers the application and returns the forms to WEG with decision for distribution.
6	WEG	Records the assessment and returns the RSAG approved application to the Researcher or Group Leader and the Coordinating RSO/LSO.
7	Local area	Once all measures in place and approval given, the activity may commence.

### *ARPANSA approval*

2. ARPANSA assessment and approval is required for:

- A new radiation dealing that involves radiation apparatus or materials not currently listed in the University inventory (ARPANSA Workbook);
- Changes that significantly influence the safety of a radiation area or process (according to Regulations 51 of the ARPANS Regulations);
- Disposal or transfer of ARPANSA controlled radiation apparatus; and
- Disposal or transfer of controlled ionising radiation sources.

Table 5: ARPANSA new work approval process

Stage	Who	Description
1	Researcher or Group Leader	<p><b>If:</b> it is a new radiation dealing;  <b>Then:</b> complete the process as for a New Work Approval application to the Radiation Safety Advisory Group.</p> <p><b>If:</b> it is a transfer of a controlled source or apparatus between Commonwealth agencies;  <b>Then:</b> complete the ARPANSA transfer request form (<a href="http://www.arpansa.gov.au/Regulation/RegulatoryForms.cfm#2">http://www.arpansa.gov.au/Regulation/RegulatoryForms.cfm#2</a>)</p> <p><b>If:</b> it is a movement to a State organisation;  <b>Then:</b> complete an ARPANSA disposal request form (<a href="http://www.arpansa.gov.au/Regulation/RegulatoryForms.cfm#2">http://www.arpansa.gov.au/Regulation/RegulatoryForms.cfm#2</a>)</p> <p><b>If:</b> it is a disposal of a controlled source or apparatus (i.e. the material is leaving the Commonwealth's control)  <b>Then:</b> complete the ARPANSA disposal request form (<a href="http://www.arpansa.gov.au/Regulation/RegulatoryForms.cfm#2">http://www.arpansa.gov.au/Regulation/RegulatoryForms.cfm#2</a>)</p> <p>Send the completed forms to the local RSO/LSO.</p>
2	Local RSO/LSO	Checks the form for completeness and sends the completed form(s) to the Coordinating RSO for comments.

3	Coordinating RSO	Adds comments, if required, and sends the completed forms to WEG on <a href="mailto:whs@anu.edu.au">whs@anu.edu.au</a>
4	WEG	Checks the forms and helps the Coordinating RSO complete the appropriate ARPANSA application/forms and sends them to the local Director for approval.
5	Local Director	Approves the application and sends it to WEG for submission.
6	ARPANSA	Assesses the application and returns it to the WEG for action.
7	WEG	Notifies local area of the ARPANSA decision.

### *ASNO Notification*

3. ASNO notification is required when:
  - new experiments involve a nuclear source purchase; or
  - disposal occurs in accordance with the University permit and the [Nuclear safety procedure](#).
4. Any proposed new nuclear material must be discussed with University's ASNO liaison officer (contact: [whs@anu.edu.au](mailto:whs@anu.edu.au)).

### **New radiation laboratory designs**

5. Any new (wet chemistry) radiation laboratories must comply with AS/NZS 2982 Laboratory design and construction and [AS/NZS 2243.4 Safety in laboratories: ionising radiation](#).
6. Radiation measured outside laboratories housing radiation apparatus or radioactive material must be below the public exposure limits set by ARPANSA.

**Note:** Contact Work Environment Group on [whs@anu.edu.au](mailto:whs@anu.edu.au) for advice.

## Existing laboratory compliance

7. The following audit checklists are to be used to assess an area's compliance with the current Australian Standards on laboratory safety:

- [Ionising radiation apparatus/ material](#);
- [Non-ionising radiation](#);
- [Lasers](#); or
- [Laser system or equipment](#).

8. These checklists should be used if there is proposed changes in existing laboratories. RSO/ LSO are to use these checklists as part of their audit program.

9. Discuss any deficiencies with the local RSO/ LSO and local management. If there is a dispute, contact Work Environment Group on [whs@anu.edu.au](mailto:whs@anu.edu.au) for advice.

## Training, qualifications and experience

10. Activities with safety implications shall only be conducted under the control of qualified, experienced and authorised personnel, and under [approved written protocols](#). Table 6 lists minimum training, qualifications, and experience.

Table 6: Training, qualifications and experience requirements

Worker	Education, Qualifications or Training	Related Experience	Authorisation
New workers who will be working with radiation.	Worker will not be able to work in radiation area at the University until they have successfully completed radiation safety course and are deemed competent in the laboratory procedures.	Special circumstances may be considered due to past experience but exam must be passed and competence demonstrated.	RSO/ LSO authorise work with radiation according to demonstrated level of training/skills required.  Electronic Security Pass to specific area/lab issued by

	Depending on role, immediate supervisor completes <a href="#"><u>Pre-employment work environment report (PEWER) form</u></a>		local RSO/ LSO only if access level safety training met.
Undergraduate Student	Year 12, training/ Studying	None, requires direct supervision from a competent and authorised worker	Supervisor
Equipment maintenance officer/ technician	Relevant technical qualifications, University safety course (highly recommended)	Relevant technical expertise and understanding of the hazards associated with the equipment and acknowledgement of the University's procedures.	Supervisor, RSO
Radiation worker, Controlled laser user, PhD and honours students	Local area induction course, University radiation (operator laser safety) safety course, on the job training in techniques and processes	Minimal experience, but needs supervision until demonstrated proficiency and authorised for unsupervised work (should understand theory, and for isotope work	Supervisor

		conduct a dry run of the experiment)	
Supervisor	Local area induction course, PhD, University safety course, University WHS for managers, laser safety officer course (level 2)	1 year +, with practical experience	Dean/Director
Deputy Radiation Safety Officer, Laser Safety Officer	Local area induction course, University safety course, laser safety officer course (level 2)	1 yr +, with practical experience. The deputy RSO/ LSO may occupy the role of RSO/ LSO for up to 6 months to cover absences of the incumbent RSO/ LSO.	Business/ Laboratory Manager, RSO
Radiation Safety Officer, Laser Safety Officer	Local area Induction course, University safety course, or radiation safety training and encouraged to attend an external radiation safety course. Laser safety officer course (level 2)	3 years minimum in radiation safety, with practical experience	Dean/Director
Coordinating	Local area induction course	3 years minimum in radiation safety,	Dean/Director

Radiation Safety Officer, Laser Safety officer	and University safety courses (ionising machines, lasers and radiation safety Training). A coordinating RSO/ LSO may also be a RSO/ LSO or a user of radiation. Laser safety officer course (level 2) plus experience.	with practical experience. A coordinating RSO/ LSO should be able to network with the other area RSOs and attend the University's RSAG. They are responsible to the Dean/Director to maintain the area's ARPANSA inventory.	
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### Acceptable alternate training

2. External courses or other institutional courses may be recognised as a substitute for the University safety courses by agreement with the local area RSO/ LSO, WEG or University RSAG. New workers with external training are encouraged to complete the University Radiation or Laser Safety course(s).

### Re-training

3. Personnel relying solely on the University safety courses should refresh their training every five years. All radiation-trained personnel should revisit the University radiation web sites regularly, or upon notification of changes or additions to information on the web sites.

## Ionising radiation

### Handling radioactive materials at the University

#### *Ionising radiation store requirements*

4. Stores for radioactive substances should comply with the following:
- ensure the store is secure and restricted to authorised personnel only;
  - ensure only radioactive substances are stored there;
  - keep a register (for waste stores) or a Chemical Inventory (for radiation stores) that is readily accessible to authorised workers only;

- appoint a person to be responsible for the store housekeeping;
- display a radiation warning sign at the entrance(s) to the store;
- place containers of radioactive substances on spillage trays;
- ensure the store has enough light to read the labels and good ventilation (natural or mechanical);
- display emergency contact details; and
- Store packages and containers to prevent physical damage, reduce the effects of the chemical properties, contain spills or leaks; and separate packages from incompatible materials (packages will not need to be opened once placed in the store).

5. The RSO should assess and record minimum and maximum radiation dose rates at least annually.

**Note.** Radiation levels should be measured outside the entrance of the store and on any major path or public area next to the store.

#### *Storage of radioactive substances*

6. All radioactive substances should be stored in appropriate storage containers. Radioactive substances should be stored separately from non-radioactive substances. The storage containers should be appropriately shielded and:

- strong;
- durable;
- made of compatible material;
- kept closed; and
- labelled clearly and appropriately with radioactive isotope information.

7. Unsealed radioactive residues at tracer levels may be stored in glass vessels with correct polyethylene or rubber stoppers.

8. Ionising radiation can induce decomposition of water, so vented containers may be needed to store aqueous radioactive solutions.

9. Thermally unstable radioactive substances need particular care and are to be stored in vented containers.

10. Storage containers for beta-emitting isotopes should be chosen to reduce [bremsstrahlung radiation](#).

11. During building renovations/ demolition, RSO or Facilities Manager should

bring to contractor's attention all controlled apparatus in their respective areas. Complete Controlled apparatus identification and local listing form <Link to be provided> prior to commencement of their work.

*Labelling of storage containers and ionising apparatus*

12. All storage containers are required to have a label that correctly identifies the radioactive substance. The label shall contain the following information:

- name of radio nuclide;
- activity level/details;
- description of contents;
- physical form;
- chemical form;
- encapsulating material; and
- Chemical Management System barcode.

See: [Appropriate label for storage container](#)

13. Long-lived radioactive material that is no longer required needs special storage containers and labelling. Contact your RSO for further information.

14. All radiation apparatus listed on the University ARPANSA inventory must be labelled.

See: [Appropriate label for ionising apparatus](#)

*Transporting radioactive material*

Table 7: Transporting radioactive material

Mode of transport	Packaging Requirements	Approval
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<p><b>Within the University buildings:</b> this includes between the radiation store and laboratory laboratory to laboratory to radiation store laboratory to radiation store</p>	<p>Radioactive material must be contained properly. It should be have primary and secondary containment. It should be labelled with a radiation trefoil and substance or material identification and shielded to reduce exposure to an acceptable level (&lt; 10 µSv/hr or &lt;500 counts/s) at 1cm from package.</p>	<p>Supervisor/ lab leaders</p>
<p>Between the University buildings</p>	<p>All material must be appropriately packaged, labelled and secured. Tertiary containment is required for unsealed sources.</p>	<p>RSOs</p>
<p>By rail, road and waterways</p>	<p>Package must comply with <a href="#">Radiation Protection Series C-2-Code for the Safe Transport of Radioactive Material (2014)</a></p>	<p>RSOs and University WHS</p>
<p>By Air</p>	<p>Transportation by air must comply with the <a href="#">Civil Aviation Act, 1988</a> and International Air Transport Association (IATA) requirements. An IATA certified person must package and provide the documentation for material transported (off campus or) by air.</p>	<p>RSOs and University WHS</p>

*Transfer of controlled material or controlled apparatus within the University*

15. Transfer within the University may only occur between areas covered by the ARPANSA licence and only with the approval of the RSOs in both the areas involved. RSOs are responsible for:

- notifying WEG of the transfer on the next [ARPANSA quarterly report](#);
- updating the Source Inventory Workbook (SIWB) with the new location of the controlled material or controlled apparatus; and
- where control of the source is passed to another budget area, the prefix of the University identifier in the SIWB is to be changed to reflect that change of ownership.

*Transfer of controlled material or controlled apparatus to another Commonwealth agency*

16. Transfer of controlled material or controlled apparatus may occur between the University and another licensed Commonwealth Agency. The RSO from the area transferring the material must complete a [Transfer Notice](#) within seven days of the transfer and send it to the CRSO who sends the form to WEG for submission to ARPANSA.

17. For information on transferring nuclear material within the University or externally, contact the WEG at [Whs@anu.edu.au](mailto:Whs@anu.edu.au).

*Transfer to a Non-Commonwealth Agency and disposal of controlled material or controlled apparatus*

18. Licence holders shall receive prior approval from ARPANSA. Transfer of a controlled apparatus or controlled material listed in the SIWB to a non-Commonwealth agency is defined as “Disposal” and requires prior approval from ARPANSA. The RSO/ LSO from the area transferring the material must complete a disposal request form and send it to CRSO/ CLSO who sends the form to WEG for submission to ARPANSA.

19. Licence holders must ensure that disposal of controlled material or apparatus follows:

- The [National Directory for Radiation Protection \(RPS 6\)](#);
- [The Code of Practice for the Near-surface Disposal of Radioactive Waste in Australia \(RHS 35\)](#); the
- [Code of Practice for the Safe Transport of Radioactive Material \(RPS C-2\)](#); and
- The [Code of Practice for the Security of Radioactive Sources \(RPS 11\)](#).

**Disposal of radioactive waste**

20. [Radioactive laboratory waste](#) released under a Radiation licence issued by the ACT Radiation Council does not require written approval. Disposal must be done in accordance with the local area Radiation Waste Management Plan.

21. The Radiation Waste Management plan shall be endorsed by the RSAG and lodged with the WEG. Transfer of low level radioactive waste from the University to an approved location shall be done in accordance with the local area transfer procedure contained in their Radiation Waste Management Plan. The local RSO shall be notified prior to any waste leaving and they shall ensure that the transfer is fully documented.

22. Disposal of radioactive waste material usually involves one of the following:
- returning it to the manufacturer or supplier for processing;
  - concentrating and containing it;
  - storing the material and allowing it to decay; or
  - diluting the material.
23. Every effort is to be made to minimise the generation of hazardous and radioactive waste under the [Hazardous waste management procedure](#). If an experiment is to produce radioactive waste, the experiment designer must consider how to dispose of any residue, contaminated equipment and waste at the design stage. A protocol or waste disposal route must be available (and approved by radiation safety advisory group) before the work can commence. The local RSO is able to assist.
24. Details for disposing of radioactive waste are located in the [Hazardous waste management procedure](#).
25. For disposing of controlled material or apparatus contact local area RSO/ LSO.
26. For disposing of nuclear material consult the [Nuclear safety procedure](#) and send the completed form to University ASNO Liaison Officer on [whs@anu.edu.au](mailto:whs@anu.edu.au) for approval.

### **Import of radiation sources**

27. Under the [Customs \(Prohibited Imports\) Regulations 1956](#), a permit from ARPANSA is required for the import of radioactive substances into Australia. Refer to the [Non-medical import permits](#) page for more details.
28. To apply for a non-medical import permit, complete the appropriate application form:
- **Non-medical single shipment** – [Application for permission to import non-medical radioactive substances – Single shipment permit](#)
  - **Non-medical 12 month permit** – [Application for permission to import non-medical radioactive substances – Twelve month permit](#)
29. Submit complete form with required documents to the local area RSO.
30. Local area RSO will submit the form to WEG for submission to ARPANSA.
31. WEG will notify the local area RSO after receiving ARPANSA decision.

## Minimum age limits

32. Persons under the age of 16 are not to work in a hazardous or restricted radiation controlled area unless directly supervised, and are not to be exposed to conditions where that person may be exposed to radiation exceeding the effective dose limit for members of the public.

33. No one under the age of 18 years old is to work in a hazardous or restricted radiation controlled area unless directly supervised. Refer to the: [Control of access to hazardous and restricted locations procedure](#).

## Monitoring

### *Personal Ionising Radiation Monitoring*

34. As a minimum safety precaution, radiation workers must:

- wear issued radiation monitoring dosimeters during their radiation work; and
- maintain their monitoring dosimeters and keep them clean as advised in the manufacturer's guidelines.

See: [Personal](#) and [area monitoring Supporting Documents](#) for details about dose limits.

35. The following table applies to personal monitoring.

Table 8: Personal monitoring

When a worker ...	Then ...
Begins work with the University in a radiation department, or performs work involving radiation exposure	RSO, supervisor or monitoring agency may request cumulative radiation dose reports or incident reports from past employment or exposure.
Ends their employment with the University	They are entitled to request a copy of their cumulative dose report and their incident report.

2. ARPANSA recommends that the annual dose received by radiation workers should not exceed 20 mSv, averaged over five consecutive years, with no more than 50 mSv in any one year. The following protocols in table 9 apply.

Table 9: ANU dose constraints

Where a worker's dose results ...	Then ...
> 80 $\mu\text{Sv}$ per month or >250 $\mu\text{Sv}$ in a reporting quarter, or >1000 $\mu\text{Sv}$ per year	Report the dose results using the <a href="#">University's notification system</a> .
Approach <a href="#">recommended dose limits</a>	Strictly monitor and review the radiation work to ensure the dose remains within set limits.

*Area, zone and equipment monitoring*

2. The Work Environment Group can conduct [personal](#) and [area monitoring](#) to identify where dose exceeds worker dose constraints, or where changes have occurred. Documented (ionising and non-ionising) radiation monitoring results provide information that assists in creating actions that reduce the radiation dosage to personnel. This also includes regularly monitoring equipment for leaks or contamination that could lead to personal exposure.

*Environmental Monitoring*

3. The release of radioactive material into the environment is strictly regulated and controlled. Refer Disposal of hazardous waste procedure for further information.

4. Radon, a naturally occurring radioactive gas that originates from rock and concrete, permeates into buildings. When the ventilation is poor, radon levels may increase. The WEG can arrange radon monitoring of buildings on request. Consult your RSO or the [WEG](#) for further information.

*Testing sealed sources*

5. The RSO should arrange for leak testing for each sealed source or its housing whenever leakage is suspected. Testing results shall be kept in accordance with records management processes.

## Record keeping

### *Local areas*

6. Local areas shall maintain:
  - RSO/ LSO contact details;
  - radioactive waste disposal records;
  - ACT Radiation Council radiation licences for waste disposal; and
  - local WHS committee minutes and agenda that discuss radiation issues.

### *RSOs*

7. RSOs/ LSOs should maintain:
  - access to the ARPANSA Source Inventory Workbook;
  - University safety course material;
  - applications for new work;
  - safety assessments, reviews and approvals;
  - personal ionising radiation dose records, including: personal radiation monitoring service records; Optically Stimulated Luminescence (OSL) monitors whole of body and extremity results; WEG exposure assessment reports and radiation dose report file;
  - records of ionising radiation doses that workers have received, including details of monitoring results and dose calculation methods. These are to be kept during the working lifetime of the person and afterwards for no less than 30 years after the last dose assessment and at least until the person reaches or would have reached the age of 75 years;
  - area, zone and equipment monitoring results;
  - radiation store radiation survey results and dose rates;
  - radiation apparatus and laboratory design specifications for new or refurbished installations;
  - local area annual monitor efficiency testing and or calibration results
  - medical records of optical examination for persons using class 3B and 4 lasers; and
  - sealed source records comprising of the serial number or other identification of each source;
  - the physical nature of the source, the radionuclide, its date of receipt and its

activity upon receipt; all movements of the source in the University and the date and manner of disposal of the source when it leaves the University.

#### *Radiation Laboratory Leaders*

8. The Radiation Laboratory Leaders should maintain:
- documentation for new work and movement;
  - documentation of internal transfer and/or consumption of unsealed radiation sources; and
  - safe operating procedures, protocols and hazard assessments (which are reviewed periodically).

#### *Personnel File*

9. The following documents shall be kept on the personnel file of those working with radiation:
- training and qualifications;
  - relevant radiation experience;
  - a copy of medical records ;
  - a copy of the final cumulative radiation dose report upon leaving the University (or wearer register identification); and
  - a copy of any relevant radiation incident report(s) and investigation results.

#### *WEG*

10. WEG will maintain:
- the University ARPANSA Licence and conditions;
  - training attendance records (University safety course details only);
  - minutes of RSAG meetings;
  - WEG member's exposure assessment reports;
  - centralised environmental monitoring results (e.g. radon);
  - incident and Investigation reports; and
  - records of audits and verification of completed corrective actions.

#### *Availability of records*

11. An individual's exposure report should be available to them on request. Records are to be made available for inspection to the proper authority following request. Records that can no longer be retained must be sent to ARPANSA.

## Security arrangements

12. The University [shall implement ARPANSA security requirements for sealed radioactive sources according to RPS11- code of practice for the security of radioactive sources \(2007\)](#) to decrease the likelihood of unauthorised access to, or acquisition of, the source by persons with malicious intent.

13. Radiation areas are hazardous locations under the [control of access to restricted locations](#). Except for emergency services personnel in an emergency, only authorised persons may access a radiation area. An authorised person must accompany all visitors or trades persons at all times.

14. An initial security inspection of a radiation area should be conducted to ensure that the area also meets the security requirements of AS 2243.4 Safety in laboratories – Ionising radiation and AS 2243.5 Safety in laboratories– Non-ionising radiation. Regular area audits should also identify any security concerns.

## Radioactive sources and apparatus not in use

15. Radioactive sources and apparatus not in use must be secured according to the AS 2243.4 and AS 2243.5 to ensure that there is no unauthorised access or operation.

## Emergency procedures

Table 10: Emergency Procedures overview

When there is a:	Then:
<b>Spillage</b>	Immediately notify immediate supervisor and local RSO;  if safe to do so, notify closest workers first and evacuate the area immediate to the spill.  Follow the requirements outlined in <a href="#">Laboratory spill management</a>  <b>Note:</b> Any serious injury to a person should be treated

	<p>immediately, taking care to reduce the spread of contamination. Emergency treatment for serious or life-threatening injury takes priority over treatment for contamination.</p>
<p>Fire/ Explosion</p>	<p>Immediately notify immediate supervisor and local RSO;</p> <p>Follow the procedures in <a href="#">University's emergency procedures</a>.</p> <p><b>Note:</b> If there is a fire or explosion inform the senior officer of the attending fire brigade of radioactive hazards.</p> <p><b>Warning:</b> Fire and explosion are likely to spread radioactive contamination.</p>
<p>Chemical Incident</p>	<p>Immediately notify immediate supervisor and local RSO;</p> <p>Follow the <a href="#">chemical management procedure</a>.</p>
<p>Biological Incident</p>	<p>Immediately notify immediate supervisor and local RSO and follow procedures in the Biological safety procedure &lt;link to be provided&gt;.</p>
<p>Need for First Aid</p>	<p>Immediately notify immediate supervisor and local RSO;</p> <p>Follow the <a href="#">Provision of first aid services procedure</a>, which describes in detail early First Aid treatment in an emergency.</p>
<p>Need to decontami nate people</p>	<p>Immediately notify immediate supervisor and local RSO;</p> <p>Follow the procedures in Laboratory Spill management, which explains the process to decontaminate.</p>

	<p><b>Note:</b> Anyone who may have had an accidental intake of radioactive material must be referred to the RSO as soon as possible to determine if there is a need for medical monitoring. Help on this matter is available through the local RSO, Work Environment Group, ACT Radiation Health Section and Canberra Hospital.</p>
Flood	Ensure radioactive substances are stored so water damage cannot occur.

### Reporting incidents involving radiation

16. Reporting and investigating all incidents, significant exposures and dangerous occurrences helps the University avoid repeating incidents. The following table applies to reporting any incident involving ionising radioactive materials or ionising radiation producing apparatus.

17. Protection of the individual(s) takes priority over reporting. Follow the [Provision of first aid services](#) and [Emergency response procedures](#).

Table 11: Incident reporting

Step	Action
1	Immediately, report the incident to the area supervisor and local RSO.
2	Complete an Incident report via the <a href="#">Workplace safety incident and hazard reporting tool</a> .
3	The (WEG) will report the incident to <a href="#">ARPANSA by phone as soon as soon as practical to-do so and with written notification</a> within 24 hours if it is: <ul style="list-style-type: none"> <li>a spill of more than 20 ALI (Annual Limit on Intake) or;</li> <li>radioactive contamination on a person or clothing exceeding 50 Derived Work limits (DWL) or;</li> <li>above The International Nuclear and Radiological Event (<a href="#">INES</a>) scale of an incident.</li> </ul>

4	The WEG will report all radiation incidents to ARPANSA according to the University's licence requirements (Quarterly Report).
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2. The local RSO and the area supervisor will provide initial emergency assistance. Additional assistance in dealing with the emergency may be needed from:

- The RSO;
- WEG;
- University Security;
- University Maintenance workers ;
- Emergency Services personnel; or
- ActewAGL (Utility provider) workers at 13 10 93 (24 hours).

### **Testing, calibration and efficiency checks of radiation monitors and detectors**

3. Radiation detectors (only those detectors used to monitor radiation for the purpose of ensuring the safety of people and the environment) must have their efficiency checked every year and be calibrated at least every five years. [Radiation detectors and monitors Supporting Document](#) give details of the [ARPANSA](#) calibration and efficiency requirements. RSOs should conduct the efficiency checks as outlined in [Radiation detectors and monitors](#).

#### *Radiation monitors and special radiation detectors*

4. Radiation monitors (only those monitors used to monitor radiation for the purpose of ensuring the safety of people and the environment) that provide a dose rate must be calibrated annually by an accredited external testing facility. Special radiation detectors for low energy x-ray detection or neutrons should also be tested annually. Simple operational checks shall be conducted regularly and before each use for all types of radiation monitors or detectors.

### **Non-Ionising Radiation – Lasers**

5. This procedure is mandated for controlled lasers, which produce ultraviolet, visible or infrared radiation and laser pointers. In general all lasers used within the University shall be classified in accordance with AS/NZS IEC 60825.1 Safety of laser products Part 1: Equipment classification and requirements (or equivalent) and all use of lasers shall meet the requirements of AS/NZS IEC 60825.14 Safety of laser products Part 14: A user's guide. Refer to [ARPANSA Laser radiation basics](#)

and [AS/NZS IEC 60825.1 Safety of laser products Part 1: Equipment classification and requirements](#), and [AS/NZS IEC 60825.14 Safety of laser products Part 14: A user's guide](#).

*Reporting incidents involving controlled lasers and controlled non-ionising apparatus*

6. Reporting and investigating all incidents, significant exposures and dangerous occurrences helps the University avoid repeating incidents. The following table applies to reporting any incident controlled laser apparatus and controlled non-ionising apparatus

7. Protection of the individual(s) takes priority over reporting Follow the [Provision of First Aid services](#) and [Emergency response procedures](#) first.

Table 12: Controlled laser and controlled non-ionising apparatus incident reporting

Step	Action
1	Immediately, report the incident to the area supervisor and local RSO. All laser incidents should be reported locally and investigated.
2	<a href="#">Report the Incident via the Workplace safety incident and hazard reporting tool as per the WHS Incident management procedure.</a>
3	The (WEG) will report the incident to <a href="#">ARPANSA by phone as soon as soon as practical to-do so and with written notification</a> within 24 hours if it is: <ul style="list-style-type: none"> <li>• A laser exposure that results in noticeable eye or skin damage.</li> </ul>
4	The WEG will report all incidents involving controlled lasers to ARPANSA according to the University's licence requirements (Quarterly Report).

2. The local LSO and the area supervisor will provide initial emergency assistance. Additional assistance in responding to the emergency may be needed from:

- The RSO;
- WEG;
- University Security;

- University Maintenance workers ;or
- Emergency Services personnel.

*Training*

3. All personnel involved with the operation and management of controlled lasers are to be appropriately trained, i.e. to a level commensurate with the risk and their role. Training requirements for this procedure are detailed in table 6.

*Laser Safety Officers*

4. Local laser safety officers are appointed in areas where controlled lasers are housed or operated and are charged with the responsibility of ensuring compliance with the University policy and procedures.

5. A coordinating laser safety officer may be appointed at a University level to provide local LSOs a path to raise complex approvals (see Tables 3, 4 & 5) and specialist advice to the RSAG.

6. All LSOs shall be aware of their duties and be provided with training commensurate with those duties, see table 6.

*Contingency plan for traumatic eye exposure*

7. Where class 3B and 4 lasers are being used laser radiation safety management plans are to include a contingency plan for actions to be taken if a traumatic eye injury occurs. Serious eye trauma has resulted in the casualty going into shock and in extreme cases death has occurred and thus should be treated as a medical emergency. All personnel involved are to be familiar with the plan.

Table 13: Actions in the case of traumatic eye injuries

Step	Action
1	Immediately, call ambulance, cover casualty’s eye and monitor/treat for shock
2	As soon as possible after casualty is stabilised, report the incident to the area supervisor and local LSO.
3	Report the Incident via the <a href="#">Workplace safety incident and hazard reporting tool</a> as per <a href="#">the WHS Incident management procedure</a> .

4	The (WEG) will report the incident to <a href="#">ARPANSA by phone as soon as practical to-do so and with written notification</a> within 24 hours if it is notifiable.
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2. Once the medical emergency is dealt with the appropriate accident reporting procedure shall then be followed.

*Laser accident/incident investigations*

3. Incidents involving lasers will be investigated in accordance with the [WHS incident management procedure](#).

*Laser Eye Testing*

4. Staff involved with class 3B or 4 lasers shall undergo an ophthalmic screening (prior to working with lasers) to assess the baseline condition of their eyes. Refer to the [Health surveillance procedure](#) for further information on the testing requirement.

5. Routine ophthalmic examinations of employees working with laser equipment have no value as part of a health surveillance program (AS/NZS IEC 60825.14 Safety of laser products, part 14: A User's guide). So only medically advisable ophthalmic exams shall be carried out, e.g. in the case of an exposure above the Maximum Permissible Exposure (MPE) or a traumatic exposure.

6. Routine eye tests e.g. visual acuity, amsler grid etc. may be carried out as part of ongoing eye health program, as a validation of controls or as a precursor to more invasive tests after a suspected exposure.

*Pre-Work or pre-purchase planning for laser activities*

7. Only justified (documented) research or dealings with controlled lasers shall be conducted at the University. All laser activity shall be planned, managed and approved using the processes stated in tables 3, 4 or 5 of this document as appropriate. Laser activity proposal shall adhere strictly to the hierarchy of control, for example in general approval for an activity will not be given for use of a class 4 laser when a lower class could be used.

8. Where practicable the approvals process detailed in tables 3, 4 or 5 shall be commenced and developed as much as possible prior to purchase. Prior to purchasing a laser the supervisor or worker responsible for the activity shall confirm compliance of the device with the appropriate product safety standard (AS/NZS IEC 60825.1 or equivalent). Compliance should be confirmed as soon as possible (as far as reasonably practicable) on delivery before acceptance (taking control of the laser) and upon acceptance entered into the ARPANSA Source

Inventory Workbook.

9. All lasers shall not be commissioned until approval for the activity is obtained and necessary documentation is complete.

*Storage and transport of controlled lasers*

10. When controlled lasers are not being used they shall be stored in a decommissioned state, i.e. a state whereby they cannot be simply activated by a passer-by. For example in a secure room with the keys or power supply physically separated.

11. Unless a controlled apparatus is transferred off the source licence, the licence holder is responsible for its safety at all times. Any time that a controlled laser is transported around or between facilities a locally recorded safety plan must be implemented and the location change recorded in the inventory workbook by WEG.

*Short term variation to approved activities and maintenance*

12. Short term variations to activities that have not been foreseen in the original activity approval shall be separately approved by the local LSO or coordinating LSO as appropriate. Short term variations to activities shall be documented and approved using the new work approval process.

13. Where possible, regular maintenance activities shall be considered in the overarching work approval detailed in tables 3, 4 and 5. Laser radiation safety management plans should be written in a way that foresees and accounts for maintenance activities and plausible events. However, where this has not occurred maintenance shall be approved through a short term variation.

**General controls for all lasers**

14. All work procedures using lasers shall be planned, managed and conducted in a way that meets the requirements of this procedure and the requirements [of AS/NZS IEC 60825.14 and the AS/NZS IEC 60825.1.](#)

*Laser Eyewear*

15. In general, risks shall be managed in such a way that eyewear is not required. Where this is not achievable or additional redundancy is required laser protective eyewear may be prescribed. In these cases the supervisor shall consult with the appropriate LSO who shall determine the appropriate laser safety eyewear rating. The eyewear performance shall be specified to reduce the maximum reasonably foreseeable exposure to safe levels and shall consider eyewear resistance to damage and impacts to user comfort/vision. For more information

refer [to AS/ NZS 1337- Requirements for eye protectors against laser radiation](#).

16. Where class 4 lasers are being used laser protective eyewear should not be considered in isolation of the skin hazard. In such cases it may be appropriate to consider face shields rather than glasses or goggles.

17. Eyewear users shall check the condition of their eyewear before each use and store to prevent damage from scratching or contact with water or chemicals. Users should always read manufacturer's instructions regarding the proper care and use of eyewear.

#### *Safety Associated with Servicing of Lasers*

18. In addition to the following requirements, if servicing is not included in the overarching approved safety management plan it is to be formally approved as a short term variation to the approved activity, see above.

19. Approved and properly trained personnel shall service laser systems in line with licence conditions. The supervisors and/or LSO must ensure that any person who repairs or maintains controlled apparatus has the appropriate qualification and training irrespective of being University staff or contractor.

20. If University staff are to perform service, a written service procedure with safe practice information must be documented. All enclosures, interlocks, and safety devices (shutter, etc.) must be replaced and verified operational prior to returning the laser to service.

21. The above requirements still apply to when servicing is conducted off site unless the controlled laser is transferred off the University source licence to another jurisdiction.

#### *Disposal, transfer and destruction*

22. ARPANSA approval is required prior to disposal, transfer or destruction of controlled lasers. All such activities shall be carried out in accordance with the requirement of this procedure, see table 5.

#### *Laser Pointers*

23. Laser pointers are a common tool for many lecturers to highlight or direct a person's attention to a relevant location. A presentation laser pointer should be a class I or class II laser product and labelled as such. Class 3 (III) laser pointers are not suitable for presentations and their use is restricted. **DO NOT** purchase laser pointers overseas unless they are clearly labelled and meet the criteria.

24. Handheld battery operated lasers that emit laser radiation in excess of 1mW are considered a prohibited weapon under the *ACT Prohibited Weapons Act 1996*

and require a police permit. Additionally a large percentage of “laser pointers” also exceed the ARPANS limit and are therefore for a controlled laser (s). The use without approval per this procedure is a breach of the University’s license conditions. These dangerous lasers should only be used by trained and aware staff with a legitimate reason.

### **Ultraviolet**

25. Ultraviolet (UV) radiation (wavelengths from 200 to 400 nm) may be produced by low pressure gas discharge lamps for germicidal control in biological safety cabinets, or UV curing, reaction vessels and in Trans illuminators. The [Ultraviolet radiation supporting document](#) outlines the precautions required while working with UV sources. Refer to [ARPANSA UV radiation Basics](#), [Radiation Protection Series 12: Occupational Exposure to Ultraviolet Radiation](#) and [AS 2243.5 Safety in laboratories –Non-ionising radiation – Electromagnetic, sound and ultrasound](#).

### **Infra-Red**

26. Infra-Red (IR) radiation (wavelengths between 760 nm and 1 mm) may be produced by IR lamps or associated hot materials (such as furnaces). [Refer to AS/NZS IEC 62471- Photo biological safety of lamps and lamp systems](#)

### **Radio frequency**

27. Radio frequency (RF) is the portion of the electromagnetic spectrum with frequencies between 3 kHz and 300 GHz. Sources of RF include microwave ovens, induction heaters, plasma sources, and radio transmitters. Refer to [ARPANSA RF radiation basics webpage](#) and [Radiation Protection Series 3- Radiation Protection for Maximum Exposure Levels to radiofrequency Fields- 3kHz to 300GHz](#).

### **Visible light**

28. Visible light is the part of the electromagnetic spectrum between 400nm to about 760 nm. The maximum sensitivity of the human eye occurs at 555nm. Sunlight is the main source of visible light and eyes are at high risk of damage from non-ionising UV radiation.

### **Other non-ionising radiation**

29. For concerns about any non-ionising radiation contact the WEG (via [whs@anu.edu.au](mailto:whs@anu.edu.au)) for further information and assessment. Refer to [ARPANSA](#) and [Electromagnetic spectrum](#).

**Note:** Non-ionising radiation apparatus producing potentially hazardous

exposures are also managed within the University's radiation licence.

## Sources

Legal and other requirements
<i>Work Health And Safety Act 2011(Cth)</i>
<i>Work Health And Safety Regulations 2011(Cth)</i>
<i>Australian Radiation Protection and Nuclear Safety Act 1998 (Cth)</i>
<i>Australian Radiation Protection and Nuclear Safety Regulations 1999 (Cth)</i>
<i>Australian Radiation Protection and Nuclear Safety Agency(Cth)– Radiation Protection Series</i>
<i>Australian Radiation Protection and Nuclear Safety Agency(Cth)– Radiation Health Series</i>
<i>AS/NZS 2243.1– Safety in laboratories – Planning and operational aspects</i>
<i>AS 2243.4– Safety in laboratories – Ionising radiation</i>
<i>AS/NZS 2243.5– Safety in laboratories – Non-ionizing radiation – Electromagnetic, sound and ultrasound</i>
<i>AS/NZS 2982– Laboratory design and construction</i>
<i>AS/ NZS ISO 31000– Risk Management– principles and guidelines</i>
<i>AS/NZS IEC 60825.1 Safety of laser products, Part 1: Equipment classification and requirements.</i>

*AS/NZS IEC 60825.14 Safety of laser products, part 14: A User's guide*

*AS/NZS 1336 – Recommended practices for occupational eye protection.*

*AS/ NZS 1337– Requirements for eye protectors against laser radiation.*

*AS/ NZS IEC 62471– Photo biological Safety of Lamps and Lamp System.*

## Document information

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