

Radiation Safety - Regulatory Compliance and Risk Management Procedure

Section 1 - Purpose and Scope

- (1) This Procedure states requirements for work health and safety (WHS) risk management of radiation practices and radiation apparatus except lasers (see [Laser Safety Procedure](#)) at The University of Queensland (UQ) and applies to all UQ workers involved with ionising radiation.
- (2) Compliance with this Procedure, specific Radiation Safety and Protection Plans (RSPP) and Standard Operating Procedures (SOP), will assist in ensuring radiation safety and compliance with the [Radiation Safety Act 1999](#) (the Act) and [Radiation Safety Regulation 2021](#) (the Regulation).
- (3) [The Act](#) applies to all UQ work activities involving ionising radiation apparatus, sealed radioactive substances and unsealed radioactive substances.
- (4) This Procedure should be read in conjunction with other UQ [radiation safety](#) procedures and guidelines.

Section 2 - Process and Key Controls

- (5) Radiation is highly regulated and has licensing requirements for teaching, research and operational activities that use radiation apparatus, sealed radioactive substances and unsealed radioactive substances. As such the following key controls are required:
- a. Licences and approvals applicable to the whole of UQ are managed by the Radiation Protection Consultant (RPC), while other approvals and certificates are managed by local Radiation Safety Officers (RSOs) with the assistance of the RPC.
 - b. An individual who uses a radiation source or apparatus requires a Use Licence.
 - c. Licenses and approvals must be obtained prior to any radiation equipment being purchased and RSPP in place and approved prior to use.
 - d. Radioactive waste must be disposed of in a timely manner (on a continuous basis) and the register of radioactive waste updated accordingly (see [Management and Disposal of Radioactive Waste Procedure](#)).
 - e. The risk management process must be applied to all radiation practices and must be overseen by the RPC and the local RSO.

Section 3 - Key Requirements

Part A - Queensland Legislative Requirements

Possession Licence and Radiation Safety and Protection Plan (RSPP)

- (6) [The Act](#) requires UQ to have a Possession Licence for the possession of radiation sources and a RSPP for each related radiation practice. UQ has Possession Licences to cover the radiation sources at different campuses (see

clauses 48-49).

Use Licence

(7) A Use Licence is required for any UQ worker working with radioactive substances or radiation apparatus unless a specific exemption is allowed for a particular radiation source (or practice) by [the Regulation](#) (Part 12 Exemptions). For example, some sub-licensable radioactive substances, or those apparatus with significant engineering controls, may be used by unlicensed persons.

(8) In general, only appropriately licensed persons are permitted to use radiation sources. Workers with a Use Licence performing radiation work must comply with the RSPP for the practice in which they are working. They are also required to comply with any specific conditions attached to their licence.

(9) Students learning to carry out a radiation practice may do so without a Use Licence only while under the direct supervision, and in the presence of a current licence holder. Where the practice involves irradiation of a human, a Use Licence must be obtained before beginning work.

Training

(10) Persons who apply for Use Licences must complete appropriate training in radiation safety relevant to their work. Access to this training will be determined by the supervisor and the RSO in consultation with the user.

- a. UQ provides two online modules in Workday: [Introduction to Radiation Safety for Radioactive Substances](#) and [X-ray Safety](#) for analytical X-ray equipment.
- b. The Health, Safety and Wellness Division (HSW Division) offers training for the safe handling of radioactive substances.
- c. Work specific practical training is also provided by the local RSOs or appropriately experienced workers who hold Use Licences.

(11) Upon completion of the three components of the training, a competency letter must be provided by the person providing the third component of the training to support the Use Licence application to Queensland Radiation Health (QRH). The user is responsible for the application to QRH and RSO can be contacted for advice.

(12) In addition to the above mandatory UQ training, training specific to the practice is required as outlined below:

- a. Diagnostic X-ray equipment.
- b. Cyclotron.
- c. Moisture gauge.

Compliance Certificate for Premises and Apparatus

(13) Radiation practices can only be performed if the radiation source and premises (where applicable) are verified as complying with the relevant safety standard. This includes using the radiation source and storing radioactive material. Workers must confirm the compliance status of the premises and apparatus they will be using with their RSO prior to beginning any research. The list of premises and radiation apparatus requiring compliance certificates can be found on [QRH website](#).

(14) Workers can contact the local RSO or the RPC for the detail of an accredited certifier. The current compliance certificates must be displayed on the radiation apparatus or room walls/doors where radiation sources are used.

Approval to Acquire

(15) When workers wish to obtain radioisotopes or purchase a new piece of radiation apparatus, they must ensure

their School or Centre has a specific [Approval to Acquire](#) issued by QRH under [the Act](#). The ATA application form can be found on [QRH Website](#).

(16) [Approvals to Acquire](#) unsealed radioisotopes are issued for either one-off or continuing supply.

(17) Approvals for sealed sources or X-ray machines are only issued on a one-off basis.

(18) The local RSO can provide advice regarding the status and nature of continuing approvals and may assist in applying for a new approval if one is necessary.

Approval to Relocate

(19) An [Approval to Relocate](#) (ATR) a radiation source is required if the radiation source will be permanently moved to a place outside of Queensland. The ATR application form can be found on [QRH website](#). The Register of radiation apparatus (see clause 25) must then be updated.

Disposal

(20) Disposal of radioactive waste must be done in accordance with Schedule 3 of the Regulation, refer to UQ's [Management and Disposal of Radioactive Waste Procedure](#).

(21) Radiation apparatus can be disposed of safely provided it is rendered incapable of ever producing radiation and relevant signage removed. This may be achieved by permanently inactivating the main components involved in the production of radiation, for example the X-ray tube.

(22) If a radiation apparatus is disposed of, it is a requirement under [the Act](#) that QRH must be notified within seven days after the disposal of the apparatus.

(23) This notification will be completed by the RPC (refer to UQ's [Management and Disposal of Radioactive Waste Procedure](#) for further information).

(24) The Register of radiation apparatus (see clause 25) must be updated.

Register of Radiation Apparatus

(25) This register is a central shared document, e.g., via MS Teams, that is maintained and kept up to date by the RSOs and RPC. The content of the register includes: list of UQ - radiation apparatus (ionising radiation and class 3 and 4 Laser Apparatus) and associated RSPP, RSO, Laser Safety Officer (LSO), licences and equipment and premise certification. The register includes laser apparatus because such are defined as radiation apparatus under [the Act](#) (see [Laser Safety Procedure](#)).

Part B - Commonwealth Requirements

Import Permit (Radioactive Substances only)

(26) Before a person imports radioactive materials into Australia, they must obtain an [Import Permit](#) from the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). The local RSO must be contacted to provide guidance in this process.

(27) Where radioisotopes are purchased from a supply company with an Australian agent, import arrangements are often undertaken by the agents themselves, who may have a 12-month permit for a particular class of radioisotopes, e.g., for import of P-32 sources for biomolecular research. This is a Commonwealth requirement that is independent of the [Approval to Acquire](#) issued by QRH. Assistance must be sought from the local RSO or RPC regarding the requirements.

Use of Nuclear Materials Regulated by the [Nuclear Non-proliferation \(Safeguards\) Act 1987](#)

(28) Various isotopes of uranium and thorium are subject to this Commonwealth legislation and UQ maintains a permit issued under the [Nuclear Non-proliferation \(Safeguards\) Act 1987](#) that allows for possession of such. The most common of these materials is uranyl acetate which is used in electron microscopy. Schools and Centres that possess prescribed amounts of these materials are also required to hold Possession Licences under Queensland legislation. In addition, where the amounts to be used by individual workers exceed the limits in Schedule 1 of [the Regulation](#), appropriate Use Licences must be held.

Part C - Radiation Risk Management

(29) Before a worker can use radiation sources regulated by [the Act](#), several requirements must be met:

- a. The worker must have access to, and approval to use, certified facilities for the handling, use, storage and disposal of radiation sources.
- b. The facility must hold appropriate approvals and operate according to an approved and current RSPP.
- c. The facility must be overseen by a certified RSO responsible for the safe and legal operation of the practice, including induction, monitoring and reporting as specified in [the Act](#) and [the Regulation](#).
- d. A current Possession Licence must be in place for the isotope(s) used in the facility and an [Approval to Acquire](#) for these isotope(s) may also be required.
- e. Current Use Licences may be required for workers for the handling of licensable unsealed or sealed radiation sources or some radiation apparatus.
- f. A completed risk assessment (refer to [Health and Safety Risk Assessment Procedure](#)) that has been approved by the Supervisor.
- g. Ethics approval may be required if working with humans or animals.

(30) The worker must consult with the local RSO or RPC to:

- a. Identify an existing RSPP or develop a new RSPP to cover the proposed radiation activity.
- b. Submit an application through RPC for a possession licence and forwarding the new RSPP to QRH, if no existing RSPP is available.
- c. Confirm approval of an application for the amendment of the existing Possession Licence to cover this type of radiation source.
- d. Confirm the [Approval to Acquire](#) radiation sources with the local RSO.
- e. Confirm, when required by legislation, facilities and equipment are certified for compliance by an accredited person.
- f. Apply for a Use Licence if required and receive the licence.
- g. Request personal radiation monitors through local RSO if applicable.
- h. Plan and arrange for ongoing disposal of radiation sources during the planning stage.

Requirement for Risk Assessment

(31) All persons working with radiation sources are required to carry out a risk assessment in [UQSafe](#). The risk assessment must consider all foreseeable risks that may result in harm to persons or in an unintended release to the environment. Refer to the [Health and Safety Risk Assessment Procedure](#).

Identification of Hazards

(32) Workers must consider what radiation and other hazards are present in the task. The following hazards should be

considered:

- a. External exposure to X-rays, gamma rays, beta and neutron radiation;
- b. Internal irradiation following ingestion, inhalation, skin absorption or wound entry of any type of radioactive substance;
- c. A combination of internal and external irradiation.
- d. Radiation waste;
- e. Animal bites/scratches;
- f. Biological exposures e.g., human blood/saliva (e.g., dentistry), aerosols'
- g. Hazards associated with field work; and
- h. Other hazards, e.g., mechanical hazards, electrical hazards, chemical hazards.

(33) To assist with radiation hazard identification, the UQ guideline on [Radiation Safety Data Sheets](#) for unsealed radioisotopes contains a list of links to the commonly used unsealed radioisotopes in appropriately certified radiation laboratories within UQ.

Evaluation of Risks

(34) The risks associated with the use of radiation in research and teaching will be greatly influenced by the skills, training, and experience of the user and the standard of the associated facilities and equipment. Legislation requires compliance certification for certain types of facilities and equipment prior to use.

(35) The following factors need to be considered during risk evaluation:

- a. Whether the practice is routine, well-established or new;
- b. The type of radiation to be used (alpha, beta, gamma, X-ray, neutron);
- c. Selection of appropriate isotopes and their maximum radioactivity when being used 'unsealed';
- d. The form of the isotope; solid, liquid, gaseous, and what engineering or isolation controls are in place;
- e. The nature of the equipment in which a sealed source is to be used;
- f. Possible exposure to the direct or attenuated beam in X-ray analysis work; and
- g. Any other hazards associated with the task e.g., animal, human, microbiological, chemical etc.

Treatment of Risks

(36) The [International Commission on Radiological Protection](#) (ICRP) and state legislation require workers to ensure that all doses are kept as low as reasonably achievable (ALARA). This process is called optimisation.

(37) Workers may be required to wear personal dosimeters at all times when working with the radiation source and must record any unusual levels of exposure and seek further advice if the measured level exceeds allowable limits e.g., acceptable exposure limits for pregnant workers is significantly lower. See UQ's [Personal Radiation Monitoring Procedure](#) for further information.

(38) The RSPP required for each practice will clearly stipulate appropriate risk treatments for the practice. Regular review of the RSPP is a requirement in [the Act](#) and aims to ensure the RSPP is a useful risk management document for the current work undertaken in the facility.

(39) Radiation risks may be controlled by a combination of engineered and procedural measures, including shielding, local exhaust and limiting exposure time, often supplemented by the use of personal protective equipment. For most practices, the measures selected will be largely generic to the practice category.

(40) Other equipment such as monitors and samplers, including scintillation counters, may be used to identify

contaminations and releases.

Controlled Area with Warning Signage

(41) A controlled area must be clearly sign posted with warning signs with appropriate wording as prescribed for the radiation apparatus.

(42) The Hazardous Room Record in Archibus (facilities database) should be updated by the Work Health and Safety Coordinator (WHSC) to include the radiation hazard. The name of the RSO should be added to the record.

(43) The door/s to each area where the radiation apparatus is used are to be sign posted with details of the minimum personal protective equipment (PPE) required to enter the controlled work area.

Research Project Approval

(44) Workers planning to use radiation sources for their research projects, must submit details to the local RSO and the RPC for review and both need to approve.

(45) The initial discussion of a project with the local RSO and if necessary, RPC, should be the stage at which any licensing requirements and concerns are resolved. Where the particular use of radiation is a new, or involves techniques that are not well established, the submitting worker must identify whether alternatives to radiation exist and if not, cite reasons for the use of radiation sources in the project.

(46) The project assessment form is available from local RSOs or [HSW Division website](#) for the following practices:

- a. Radiation apparatus (only required for equipment that is not fully enclosed).
- b. Unsealed radioactive substances in research.

UQSafe

(47) [UQSafe](#) is used by the UQ radiation safety network to manage licensing compliance documents. Local RSOs must ensure documents are uploaded to [UQSafe](#) promptly and updated as required.

Section 4 - Roles, Responsibilities and Accountabilities

Possession Licensee

(48) UQ has been granted three Possession Licences for the radiation sources under [the Act](#). The Possession Licensee is responsible for ensuring compliance with both the legislation and specific licence conditions.

- a. The Chief Operating Officer of UQ is the nominee for one possession licence that encompasses the majority of UQ's radiation equipment, radioactive substances and Class 4 lasers used in medical, cosmetic or related procedures.
- b. Director of the Centre for Advanced Imaging (CAI) is the licence nominee of another possession licence for the radiation equipment and radioactive substances used in CAI.
- c. Director of the Herston Imaging Research Facility (HIRF) is the licence nominee of the third possession licence for the radiation equipment and radioactive substances in HIRF.

(49) The Possession Licensee can nominate a nominee to carry out activities on their behalf and this can be any Senior Executive member. To be nominated, the Senior Executive member must contact the HSW Division RPC so the process

can be completed and QRH be informed of the nomination.

Nominee

(50) The Nominee's responsibilities, which can be delegated to Executive Deans, Institute Directors or Heads of School (HOS), are as follows:

- a. Implement an RSPP for the practice to be followed by all persons involved in carrying out the radiation practice.
- b. Appoint an RSO.
- c. Apply for [Approval to Acquire](#) for each radiation source or continuing to acquire unsealed sources (if applicable).
- d. Ensure radiation sources in their area of responsibility, the premises in which they are used, and where radioactive substances are stored, comply with the relevant [Radiation Safety Standards](#) whenever the radiation practice is being carried out.
- e. Apply for [Approval to Relocate](#) a radiation source to a place outside of Queensland's jurisdiction.
- f. Ensure the disposal of radioactive material is in a manner consistent with their RSPP and the concentration of radionuclides in the material is less than that prescribed in the Regulation.
- g. Apply for an [Approval to Dispose](#) if the Possession Licensee wishes to dispose of radioactive material in excess of the disposal levels prescribed in the Regulation.
- h. Ensure compliance with both the legislation and the licence conditions.

Radiation Safety Officer (RSO)

(51) [The Act](#) requires each Possession Licensee to appoint a qualified RSO. The RSO is required to:

- a. Hold an RSO Certificate relevant to the radiation practice.
- b. Advise the Possession Licensee/nominee about the radiation safety status of the practice and ways to remedy issues or improve safety.
- c. Inform the HSW Division, via the RPC, of the status of radiation safety of the practice.
- d. Identify whether the licensee's approved RSPP for the practice is being complied with by recommending the activities to be taken to ensure compliance with the RSPP.
- e. Identify and advise the Possession Licensee/nominee of ways to minimise exposure to radiation to people from the radiation source.
- f. Provide or arrange the provision of training to users.
- g. Identify whether [the Act](#), Regulation, RSPPs and applicable radiation safety standards for the radiation source and premises where the practice is being carried out are being complied with, and report to the Possession Licensee/nominee any contravention and recommend the actions that need to be taken to ensure compliance with the standards.
- h. Review the RSPP regularly to ensure its continued effectiveness and advise the Possession Licensee/nominee of the results of the review.
- i. Provide or arrange the provision of personal monitors when required.
- j. Ensure the disposal of radioactive waste is compliant with the legislation and the RSPP.
- k. Keep and maintain required records, e.g., register of radiation apparatus, register of radioactive waste, radiation monitoring results, equipment maintenance, source shipments, waste management and records of training.
- l. Supervise the management of radioactive waste and provide specialist advice and assistance where necessary to ensure safety, e.g., incident recovery and clean-up operations.
- m. Audit the storage of radioactive waste at least every six months as per the [Management and Disposal of Radioactive Waste Procedure](#).

- n. Report as required to the Possession Licensee/nominee and the HSW Division regarding any issues or changes that may affect the Possession Licence.
- o. Ensure users are appropriately licensed where applicable.
- p. Monitor and review of personal radiation dose where applicable.
- q. Ensure risk assessment, licence, approval and compliance certificates are in place and current.
- r. Review relevant documentation to ensure the effectiveness of RSPP, SOP, risk assessment, etc.
- s. Ensure all persons have access to the relevant RSPPs.
- t. Ensure audits of radiation practices and compliance with radiation safety legislation, including records of radiation licences, RSPPs, approvals and Compliance Certificates are kept in radiation database and recorded in the register of radiation apparatus.
- u. Assist with the decontamination and cleanup if required, reporting and investigation.
- v. Conduct regular review of relevant documentation such as RSPP, SOP, risk assessment, etc. to ensure the document effectiveness.

Radiation Protection Consultant (RPC)

(52) The RPC provides overall guidance to all UQ workers on matters pertaining to radiation. The RPC monitors the implementation of UQ's RSPPs as approved by the regulatory authority, provides support for radiation governance and compliance across UQ and monitors compliance with radiation safety legislation.

(53) The RPC is the primary source of advice and expertise for:

- a. Radiation legislative and scientific requirements;
- b. RSPPs;
- c. Radiation research project approvals;
- d. Overall guidance to RSOs; and
- e. Radiation safety training for radiation users.

(54) In addition, the RPC provides reports regularly via the Director, Health Safety and Wellness, to Possession Licence nominees about any issues or changes that may affect the Possession Licence.

User

(55) The primary responsibilities of a user are to:

- a. Hold the relevant licence if required;
- b. Abide by the conditions stated in their licence;
- c. Ensure any radiation dose received by a person is not higher than the limits prescribed in [the Regulation](#) and are as low as reasonably achievable;
- d. Minimise risks to persons in the environment to reduce harm;
- e. Update the register of radioactive waste;
- f. Dispose of their radioactive waste appropriately; and
- g. Ensure the therapeutic or diagnostic procedure prescribed by authorised persons, or under approved human ethics program, if applicable.
- h. Notify the RSO of any incident;
- i. Clean up after a spill (after first seeking advice from RSO or RPC);
- j. Report the incident in [UQSafe](#) database;
- k. Assist with the incident investigation; and

- I. Maintain accountability for radiation sources used under the Possession Licence authority and ensure the licensee is adequately informed of any issues that might affect radiation safety or of any actions needed to be taken to ensure compliance with the RSPP and Regulation.

Health, Safety and Wellness Division

(56) Health, Safety and Wellness Division (HSW Division) is responsible for maintaining the required level of central oversight and assurance by:

- a. employing an RPC to oversee the safe management of radiation use at UQ;
- b. assessing whether organisational units and UQ workers can demonstrate compliance with UQ radiation procedure, guidelines, RSPP and licence conditions; and
- c. reporting to Queensland Radiation Health and investigating any incidents, as required.

Radiation Safety Officer Network

(57) This is a formal network of UQ RSOs. The forum allows the RPC and RSOs to consult on, and review regulatory, organisational and technical radiation matters at UQ.

(58) The RSO Network meets four times a year and is chaired by the RPC. All participants are invited to contribute discussion and presentation items for the meeting. The RSO community provide secretariat duties as needed. All presentations and minutes are retained by HSW Division.

Section 5 - Monitoring, Review and Assurance

(59) The RPC oversees radiation safety arrangements at UQ and reviews the specific aspects of radiation safety regularly. Local RSOs communicate radiation safety issues to the RPC as required.

Section 6 - Recording and Reporting

(60) Radiation licences, RSPPs, approvals and Compliance Certificates are kept in [UQSafe](#) and reviewed regularly by RSOs to ensure currency.

(61) The local RSO is responsible to report any non-compliance within the Organisational Unit to the Nominee and inform the RPC.

Incident Reporting

(62) All incidents must be reported in [UQSafe](#) as soon as practicable and a notified to the RPC.

(63) Some incidents are notifiable as dangerous events and must be reported to the regulator within seven days of the occurrence. These include:

- a. the source is, or appears to have been, lost or stolen;
- b. the source is damaged; or
- c. the equipment that uses, measures or controls radiation emitted from the source malfunctions with the result, or likely result, that there is, or will be, an unintended emission of the radiation or a person is, or will be, unintentionally exposed to the radiation.

(64) As part of this notification process, a written incident report is to be produced by the Use Licensee or local RSO and submitted through local management protocols to the HSW Division who will in turn, provide it to the QRH. Local

personnel must not submit such a report to the Regulator directly.

(65) This report will include:

- a. incident description (including date, time and location);
- b. person(s) and radiation source(s) involved;
- c. action taken; and
- d. proposals to prevent a recurrence.

Safety Officer Appointment Form

(66) The Safety Officer Appointment Form must be completed for each person appointed as a Radiation Safety Officer and forwarded to HSW Division.

Section 7 - Appendix

Definitions

Term	Definition
Accredited Person (Equipment and Premises Compliance Tester)	An individual with skills, knowledge and experience in assessing particular radiation sources or premises where they are used or stored for compliance with radiation safety standards. A person who has a related Accreditation Certificate (issued by QRH) is allowed to issue Certificates of Compliance for the types of radiation sources or premises detailed in their certificate.
Ionising Radiation	Electromagnetic or particulate radiation capable of producing ions but does not include electromagnetic radiation of a wavelength greater than 100 nanometres.
Possession Licensee	Either a corporation or an individual with overall ownership and control of the radiation source. This person takes primary responsibility for ensuring the appropriate safety measures are in place to ensure that people and the environment are not negatively affected by radiation as a result of the radiation practice.
Radiation Apparatus	An apparatus that, when energised, emits an amount of ionising radiation during a particular period higher than the amount prescribed, for the period, under a regulation.
Radioactive Substance	Radioactive material (whether or not it is sealed) - (a) containing more than the concentration or activity of a radionuclide prescribed under the Regulation ; or (b) prescribed under the Regulation to be a radioactive substance.
Radiation Practice	An activity in relation to a radiation source that may result, whether or not intentionally, in exposing anyone to radiation, but does not include the transport of a radioactive substance.
Radiation Protection Consultant (RPC)	A qualified expert appointed by the responsible person to supervise radiation safety activities and to ensure radiation safety. An RPC is deemed to have the authority to implement procedures and to intervene in situations where safety has been or is being compromised.
Radiation Safety Officer (RSO)	For a radiation practice, means a person who holds a relevant certificate issued under the Act and who the Possession Licensee has appointed as the Radiation Safety Officer for the particular practice.
Radiation Safety and Protection Plan (RSPP)	Is the risk management plan for a particular type of radiation practice. The relevant RSPP must be complied with by all users and other persons involved in the practice.
Radiation Source	Including sealed or unsealed radioactive substances and radiation apparatus
Sealed Radiation Source	A radioactive substance sealed in a way that minimises the possibility of its escape or dispersion; and allows the emission or transmission of ionising radiation.
Unsealed Radiation Source	A radioactive substance that is not a sealed radioactive substance.

Term	Definition
UQ Workers	<p>For the purposes of this Procedure includes:</p> <ul style="list-style-type: none"> - staff - continuing, fixed-term, research (contingent funded) and casual staff; - contractors, subcontractors and consultants; - visiting academics and researchers; - academic title holders, visiting academics, Emeritus Professors, adjunct and honorary title-holders Industry Fellows and conjoint appointments; - Higher Degree by Research students; and - volunteers and students undertaking work experience.

Status and Details

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