

**ADELAIDE UNIVERSITY
RADIATION SAFETY MANUAL**

Version 1.3 March 2001

PART 1 POLICY FRAMEWORK

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PART 1 POLICY FRAMEWORK

1 AIMS OF THE RADIATION PROTECTION PROGRAM

The Radiation Protection program at Adelaide University is intended to minimise the possible effects of ionizing radiation used in the university on staff, students and the general public.

The program includes meeting the legislative requirements, the practice of the **ALARA** principle (As Low as Reasonably Achievable, economic and other factors being taken into account) at all levels, the setting of institutional standards, and education and training.

This Radiation Safety manual is part of that program.

2 POLICY

The Radiation Protection and Control Act (1982) and the Regulations under the Act control the use of ionizing radiation in South Australia. A copy of the regulations is held by each Departmental Radiation Safety Officer and by the OH&S unit and can be found on the Web at

The Act and Regulations impose responsibilities on those who work with ionizing radiation and their employers, and on those who own radiation apparatus or radioactive materials, or premises in which radioactive materials are used or stored.

The University of Adelaide is committed to meeting the protection standards for ionizing radiation set by legislation. Where appropriate, relevant Australian Standards are used as guides.

In work with ionizing radiation the **ALARA** principle (As Low as Reasonably Achievable, economic and other factors being taken into account) must be used to ensure that exposures to workers and the public are minimised.

Those supervising work with ionizing radiation should consider the possible risks to themselves and others from the use of radiation and balance the risks against the expected benefits.

These goals are met by a combination of training, physical control measures, supervision and recording, under the supervision of the OH&S Unit, the University Radiation Safety Officer, and the Departmental Radiation Safety Officers.

3 RESPONSIBILITIES IN THE MANAGEMENT OF RADIATION SAFETY

The responsibilities of members of the University under the SA Radiation Protection and Control Act and associated Regulations are:

3.1 Vice-Chancellor and Council

The Vice-Chancellor and Council have the ultimate responsibility for meeting the requirements of the Occupational Health, Safety and Welfare Act, 1986, and the SA Radiation Protection and Control Act, 1982.

3.2 Manager, Human Resources

Ensures that the Manager of the Occupational Health and Safety Unit coordinates radiation safety management at the University.

3.3 Manager, Occupational Health and Safety Unit

Ensures that Radiation registration and licensing requirements are met, including the maintenance of the records of registered radiation workers, of their exposure to ionizing radiation, and of radiation incidents and accidents.

3.4 University Radiation Safety Officer

Reports to the Manager, OH&S Unit and performs the duties required of the University Radiation Safety Officer. These duties in general are similar to those set out for a Radiation Protection Adviser in Australian Standard 2243.4 of 1998 and in the Regulations, and include advice, training, waste management and general supervision of radiation safety in the university.

3.5 Executive Deans

The Deans have overall responsibility for the health, safety and welfare of staff, students and visitors in their Faculty. The Dean therefore oversees the implementation of the University's Radiation Policy and procedures and allocates resources to ensure that the legislative requirements and University standards can be achieved.

3.6 Heads of Departments

Heads of Department have specific delegated responsibility for ensuring that the University standards are achieved in their Department. They nominate the Departmental Radiation Safety Officer (DRSO) if people work with ionizing radiation in their department.

3.7 Departmental Radiation Safety Officers

The DRSO is the link between the department and the University Radiation Safety Officer.

They:

- ensure that radiation work in their Departments is carried out safely
- must be informed prior to commencement of any new work or altered procedures involving radioactive materials or irradiating apparatus
- must be notified of any radiation accidents and direct decontamination procedures in the event of a major spill
- have a responsibility for the initial management of radioactive waste in their Department.

3.8 Supervisors

Supervisors are those ultimately responsible for the use of ionizing radiation and are defined broadly as the equivalent of principle and associate investigators in grant applications

Supervisors of all staff and students who work with ionizing radiation are licenced and are responsible for ensuring:

- that those under their supervision receive appropriate training in radiation protection
- that they are using appropriate work practices
- that if necessary, they hold or obtain the appropriate current radiation licence (Section 4.1.1)
- that staff and graduate students under their supervision have completed a Radiation Worker Registration Form which can be found on the OH&S website.

The completed Radiation Worker registration form must be returned to OH&S through the Departmental Radiation Safety Officer.

3.9 Staff, Higher Degree Students and Visitors

All persons using ionizing radiation are responsible for their own safe use of ionizing radiation and have an obligation to ensure that their work does not affect the safety of other staff, students or the public by any action or inaction. In particular they must ensure that they do not expose others to radiation.

Each person working with ionizing radiation at the University must:

- work in accordance with the Radiation Safety Manual
- strictly observe guidelines in the Manual for exposure limits to radiation
- properly use any personal monitoring devices issued to them (reference..)
- Inform the Departmental Radiation Safety Officer (RSO) in advance (through their supervisor) of any new work or altered procedures involving ionizing radiation, and provide a description of methods, safety precautions and emergency procedures to be used
- understand the chemical and physical properties and biological effects of the radiation or radioactive materials being used
- reduce to a minimum the radiation hazard of the work
- have a knowledge of appropriate accident and emergency procedures. Emergency procedures must be set out in a notice in each laboratory using ionizing radiation.
- understand the regulations, codes of practice and local rules relevant to their work. General rules and procedures are set out in the Radiation Safety Manual. Local rules must be set out in each laboratory.

3.10 Undergraduate Students

The University has been exempted from the obligation to register as radiation workers undergraduate students working with ionizing radiation in laboratory classes (SA Gov. Gazette...) but special care must be taken when undergraduates use ionizing radiation.

All work by undergraduates with ionizing radiation must be under the supervision of a licenced demonstrator or instructor.

Laboratories where unsealed radionuclides are used by undergraduates, and any sealed sources used in undergraduate teaching must be registered.

The quantities of radioactive materials used should be kept to a minimum and specific instruction on handling radioactive materials must be provided.

Undergraduates must not use X-ray analysis units unless these are fully enclosed X-ray units and the work is under continuous supervision.

4 THE LEGAL FRAMEWORK FOR CONTROLLING RADIATION HAZARDS

4.1 LICENCES, REGISTRATIONS AND APPROVALS

4.1.1 Licences

The regulations require that individuals carrying out radiation work must be licensed but some exceptions are made.

The hazard determines who should be licensed.

All supervisors (defined broadly as the equivalent of principle and associate investigators in grant applications) must be licensed. Licences are issued by the Radiation Protection Branch after sitting for an examination and must be renewed annually.

Everyone (staff and students) who works in a Class B registered premise (such as the iodination laboratory in IMVS) must be licensed. (Reg....)

Those who work under supervision in Class C registered laboratories do not need to be licensed but their supervisors must be licensed (Reg). The supervisor is the person who has determined the nature of the work and can be equated to a principle investigator. Students, including graduate students, and technical staff are not usually supervisors.

Everyone who uses a sealed source must be licensed.

Everyone who uses an X-ray generator (other than a fully enclosed or cabinet X-ray set) must be licensed.

The University Radiation Safety Officer provides advice on whether a person should be licensed.

Licence application forms can be obtained onThe forms should be returned to OH&S for forwarding to the Radiation Protection Branch (RPB), Department of Human Services (SA DHS). Assistance with the licence requirements and examination syllabus is available from the University Radiation Safety Officer.

4.1.2 Registrations

Permanent sources of ionizing radiation, such as X-ray generators and sealed sources of radioactive material must be registered.

Premises (rooms, laboratories etc.) in which unsealed sources of radioactive material are used or stored must be registered. These are classified according to the hazard, with Class C being the lowest hazard (Ref..).

Registration application forms can be obtained onThe forms should be returned to OH&S for forwarding to the Radiation Protection Branch (RPB), Department of Human Services (SA DHS). The DRSO must be informed of any applications for registration of rooms or equipment.

4.1.3 Approvals

The University can only dispose of radioactive waste in accordance with an annual plan approved by the Radiation Protection Branch.

Approval is required for the disposal of an X-ray set or sealed radioactive source by sale, gift or decommissioning.

Approval is required for the transfer of unsealed radioactive material to another owner.

All approvals are obtained through OH&S.

4.2 WORKER REGISTRATION AND MONITORING

4.2.1 Worker Registration

In addition to licensing and registration, the University must keep a register of all radiation workers. This is done through the Radiation Worker Registration file kept by the OH&S unit.

All staff, visitors and higher degree students who are using ionizing radiation must be included in the Radiation Worker Registration file. Supervisors must inform the OH&S Unit when someone begins work with ionizing radiation and the worker must complete and return the registration form (available from OH&S web page) through the Departmental Radiation Safety Officer. Information supplied in the Worker Registration form is confidential.

The University Radiation Safety Officer ensures that registered workers are informed of any need to obtain a licence, wear a personal dosimeter or attend suitable training.

4.2.2 Personal Monitoring

The Regulations require the monitoring of the radiation dose of all registered workers. The University has an exemption from this requirement where no simple personal monitoring devices exist (low energy radiation) and where there is a very small risk that radiation workers will receive a radiation dose more than one-tenth of the annual limit for workers. (SA Gov Gazette....).

People working with very low energy sources such as tritium, carbon-14, and sulfur-35 and those with a very small chance of receiving a dose greater than 1 mSv in a year (determined by the type and the maximum quantity of radionuclide they are handling (see ICRP Publication) are not normally issued with a monitor. The dose of 1 mSv per year is one-twentieth of the annual dose limit for workers. Examples of maximum quantities of other nuclides which do not require a worker to be monitored are 40 MBq of P-32 or I-125.

The University Radiation Safety Officer is involved in decisions on whether personal monitoring is needed.

Monitors are issued to users of X-ray machines and sealed sources because the risk of a significant dose is higher with these sources.

Anyone who believes they should be issued with a monitor should contact the University Radiation Safety Officer.

The rules for wearing personal monitors are set down by the supplier of the service (ARPANSA) and must be followed.

A personal monitor must never be worn by any person other than the person to whom it is issued.

Wearers of personal dosimeters are informed of the doses received through their DRSO.

4.3 REPORTING AND RECORDS

The University is required by the Regulations to maintain records of:

1. registered workers and the dose reports from personal monitoring
2. the licences held by staff and higher degree students.
3. registered premises, sources and ionizing apparatus
4. purchases and disposals of unsealed radioactive materials (records are kept by the DRSO)
5. the movements and locations of sealed sources (records kept by users and if the movement is off-site, overseen by the DRSO)
6. the safety checks of X-ray machines (records kept by users)
7. the disposal of any radioactive waste under the approved plan (records kept by DRSO and RSO for the University).

4.4 ACCIDENTS INVOLVING RADIATION

Abnormal events involving radiation are classed as incidents (less serious) and accidents (major). The University is required to investigate incidents and accidents and report both to the Radiation Protection Branch. The procedures for reporting accidents are included in the Radiation Safety Manual.

5 SPECIAL CIRCUMSTANCES

5.1 PREGNANCY

The risk of ionizing radiation causing detriment to the foetus is higher than the risk to the worker and the normal dose limit for a worker is therefore reduced during pregnancy.

The NHMRC (National Health and Medical Research Council) recommends the same level of protection for the foetus as for a member of the public. This is a maximum dose of 1 mSv in a year, which is equivalent to a limit of 0.75 mSv to the abdomen during the pregnancy.

In practice the doses to workers in the university are normally well below 0.1 mSv per year and the risk to the foetus is very small.

If a radiation worker becomes pregnant the following steps **must** be taken:

- The University RSO (OH&S Unit) must be informed (Regulation 14); this information is private and confidential
- Supervisors should be informed of the pregnancy
- A pregnant worker should re-evaluate her work practices and radiation exposure in order to minimise radiation exposure during pregnancy.

5.2 HUMAN RESEARCH

The exposure of human subjects to ionizing radiation for the purposes of research (as distinct from diagnosis or therapy) is strictly controlled. **Explicit** permission must be received from the Radiation Protection Branch, SA DHS for every research project involving ionizing radiation and humans. Some hospital ethics committees have been delegated the power to approve such research.

These special requirements for ionizing radiation are in addition to any other ethical requirements and special justification is required.

A copy of all research proposals involving human subjects and ionizing radiation must be sent to the University Radiation Safety Officer.

5.3 ENTRY TO REGISTERED PREMISES BY NON-RADIATION WORKERS

The University requires all people who are not radiation workers, (including staff, students and outside contractors) to obtain permission from the licensed supervisor of registered radiation areas before entry.

Such persons are considered by Regulation 14 (4) of the SA Radiation Protection and Control Act to be “members of the public”.

5.4 WORK IN NON-UNIVERSITY PREMISES

The University is responsible for university staff and students using ionizing radiation in premises owned by another institution, such as a hospital or CSIRO laboratory. These people must be recorded in the University radiation worker registration list and University policy on supervision, licensing and so on must be followed. In some circumstances appropriate joint supervision by University staff and staff of the other institution should be arranged.