



**THE UNIVERSITY
OF QUEENSLAND**
AUSTRALIA

Received in the Office of
28 JUN 2005 (4916)
the Secretary and Registrar

Radiation Safety and Protection Plan

School of Physical Sciences

Teaching facilities using sealed radioactive sources



Radiation Safety Act 1999

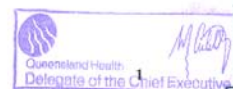
I hereby advise that this radiation safety and protection plan containing 12 pages is approved for:

Licensee UQ SECRETARY AND REGISTRAR Approval No. 72678

Delegate of the Chief Executive M. Kelly Date 23/6/2005

Signed: Douglas Patu
Secretary and Registrar

Date: 16/11/2004



RADIATION SAFETY AND PROTECTION PLAN ERROR! BOOKMARK NOT DEFINED.

TEACHING FACILITIES USING SEALED RADIOACTIVE SOURCES ERROR! BOOKMARK NOT DEFINED.

SCHOOL OF PHYSICAL SCIENCES..... ERROR! BOOKMARK NOT DEFINED.

RADIATION SAFETY AND PROTECTION PLAN FOR THE SCHOOL OF PHYSICAL SCIENCES..... 4

1. PURPOSE AND SCOPE 4

Purpose 4

Source documents 4

2. HAZARD ASSESSMENT 5

3. DUTIES AND RESPONSIBILITIES 5

3.1. The Possession Licensee 5

3.2. The Radiation Safety Officer 7

3.3. Students 8

4. ACCESS CONTROL 8

5. TRAINING 8

Training for staff directly involved in supervising the use of the sealed sources 8

6. SAFE WORKING AND EMERGENCY PROCEDURES 9

Safe working 9

Emergency Procedures 9

Incident Notification 10

Disposal of sealed sources 10

Decontamination procedures 10

7. RADIATION WARNING SIGNS 10

8. QUALITY CONTROL.....	11
Monitoring and review of the Plan.....	11
Radioactive sources	11
Surveys for radioactive contamination	11
9. RECORDS	11
10. ACQUISITION, SUPPLY, DISPOSAL AND RELOCATION OF RADIOACTIVE SUBSTANCES	12
Acquisition.....	12
Supply	12
Disposal.....	12
Relocation interstate or overseas.....	12
ATTACHMENT 1	13
Maximum activities for sources used in teaching - Excerpt from the Radiation Safety Regulation 1999 ..	13
Current inventory	13
ATTACHMENT 2	14
Contact Details.....	14

Radiation Safety and Protection Plan for the School of Physical Sciences

1. PURPOSE AND SCOPE

Purpose

The *Radiation Safety Act 1999* requires that a radiation safety and protection plan be developed. This plan has been formulated for the purpose of ensuring that all practices involving radioactive substances are conducted as safely as possible and in compliance with the *Radiation Safety Act 1999* and the *Radiation Safety Regulation 1999*.

This plan applies to the sealed radioactive substances in the possession of the possession licensee that are used for teaching purposes in the School of Physical Sciences.

Compliance with this radiation safety and protection plan should help ensure that the radiation doses to users and other personnel are below the prescribed limits and are as low as reasonably achievable. This will ensure that the number of people exposed to radiation and the likelihood of unexpected exposure to radiation are also as low as reasonably achievable. However, it is the duty of all concerned to aim to reduce radiation doses further if possible.

This plan outlines the obligations of the possession licensee, the radiation safety officer and persons who use the radioactive substances for which the possession licensee is responsible. These persons need to be familiar with the plan.

Source documents

In addition to the radiation safety and protection plan, the provisions of the following documents must be complied with:

- *Radiation Safety Act 1999* and *Radiation Safety Regulation 1999*
- Radiation safety standard PR001:1999 *Standard for premises at which radiation sources are used to carry out a radiation practice*
- Radiation safety standard PR002:1999 *Standard for premises at which radiation sources are stored*
- National Health & Medical Research Council, *Recommendations for limiting exposure to ionizing radiation (1995)*

2. HAZARD ASSESSMENT

Low activity sealed radioactive sources used in teaching have a very low potential to cause excessive radiation doses from direct exposure to gamma rays or high energy beta rays. While the sources remain intact and leak-free they have a negligible potential to produce internal radiation hazards associated with ingestion, inhalation or skin absorption.

The *Radiation Safety Regulation 1999* prescribes an annual radiation dose limit of 20 mSv for persons involved in using radioactive substances: that is, licensed users and other staff involved in using radiation sources. An annual radiation dose limit of 1mSv is imposed for other staff, and members of the public, students and visitors. The *Radiation Safety Regulation 1999* also prescribes a secondary dose limit of 50 mSv to the hands, feet and the skin generally (per square centimetre of skin) for non-occupationally exposed persons.

Only sources below the activity limits prescribed in Section 49 of the Radiation Safety Regulation 1999 are to be used in teaching facilities of the School of Physical Sciences. The use of these low activity sources, together with the application of appropriate safe working procedures described in this Plan, will ensure doses to staff and students will be well below the prescribed limits.

Personal radiation monitoring with TLD dosimeters or personal alarm dosimeters is not required for either staff or students, nor is any personal protective equipment required.

Details of the current inventory and the maximum activities of sources prescribed under Section 49 of the Regulation are given in Attachment 1.

3. DUTIES AND RESPONSIBILITIES

3.1. The Possession Licensee

The University holds a licence in the name of the Secretary and Registrar to possess the sealed radioactive sources used in the School of Physical Sciences teaching facilities. Attachment 2 will be updated to reflect changes in the name or contact details of any of the persons mentioned.

The possession licensee obtained this licence after demonstrating to the Chief Executive of Queensland Health that the licensee satisfied all of the radiation safety criteria set down by the *Radiation Safety Act 1999*.

The possession licensee must take reasonable steps to ensure any person's health and safety are not adversely affected by exposure to radiation because of the way a person carries out the practice. To do this, the possession licensee must:

- ensure the radiation doses arising from the radiation practice are kept below the limits specified in the *Radiation Safety Regulation 1999* and are as low as reasonably achievable;
- hold a licence to possess radioactive substances, issued under the *Radiation Safety Act 1999*;
- ensure compliance with any conditions imposed on the possession licensee by the Chief Executive of Queensland Health and with those stated in the *Radiation Safety Regulation 1999*;
- ensure the version of the radiation safety and protection plan being used has been approved by the Chief Executive of Queensland Health;

- ensure that appropriate compliance certificates are obtained and renewed for the teaching premises and source storage facilities;
- appoint a radiation safety officer certified under the *Radiation Safety Act 1999*;
- ensure that the radiation safety officer is carrying out his/her functions to permit the possession licensee to be adequately apprised of the radiation safety status of the practice at all times;
- ensure adequate resources are provided to implement this radiation safety and protection plan (eg. provision of appropriate training in radiation safety to employees, provision of adequate protective equipment);
- ensure that the records specified in this radiation safety and protection plan are kept;
- ensure that the approval of the Chief Executive of Queensland Health is obtained before acquiring radioactive substances;
- ensure that the approval of the Chief Executive of Queensland Health is obtained before relocating radioactive substances to a place outside Queensland;
- ensure that if a radioactive substance is sold within Queensland, that the person to whom the radioactive substance is sold has an approval to acquire the radioactive substance;
- ensure that the approval of the Chief Executive, Queensland Health is obtained before disposing of radioactive material greater than the amount and concentration prescribed in the *Radiation Safety Regulation 1999*;
- ensure that the transport of radioactive substances is conducted in accordance with the *Commonwealth Code of practice for the safe transport of radioactive material (2001)*;
- ensure that if there is to be a change in the location where radioactive substances are used or stored, an appropriately accredited person performs an assessment of the premises for compliance with the relevant radiation safety standard before the new facilities are used; and
- notify the Chief Executive of Queensland Health, immediately after an incident - either orally or in writing. If the notice is given orally, written confirmation must be provided within seven (7) days.

3.2. The Radiation Safety Officer

Functions of the RSO

The radiation safety officer (RSO) advises the possession licensee and employees on radiation safety matters associated with the practice. Attachment 2 will be updated if the name or contact details of the radiation safety officer change.

The name of the radiation safety officer appointed by the possession licensee is given in Attachment 2.

The following items must be checked at the commencement of the practice and once every year thereafter by the radiation safety officer:

- all teaching staff for whom the practice is relevant, have read, understood and are complying with the radiation safety and protection plan, including requirements for advising students regarding the safe use of the sources
- the details of the radioactive substances are accurately stated in the plan
- an appropriate licence to possess radioactive substances has been issued to the University
- compliance certificates for the premises where radioactive substances are used and stored have been obtained
- clear and legible area radiation warning signs, as required by the relevant radiation safety standard, must be displayed.

Additionally, the radiation safety officer must:

- on a continuing basis, ensure all that the teaching facility and source storage facilities continue to comply with Radiation Safety Standards PR001:1999 and PR002:1999
- provide, or arrange for the provision of training about radiation hazards and safe working practices for students and staff (see section 5 of this plan);
- conduct and record the results of periodic wipe tests (see section 8 Quality control for details) to ensure the integrity of the sealed sources. The frequency of such tests shall be as designated in Section 8
- ensure that all records pertaining to the acquisition, use and disposal of radioactive sources are appropriately maintained
- advise the possession licensee of any action that may need to be taken to ensure compliance with the radiation safety and protection plan.

Reporting to the possession licensee

The radiation safety officer must also:

- immediately report any radiation incidents;

- report any contravention of the radiation safety and protection plan and/or relevant radiation safety standard;
- report any action that needs to be taken to achieve compliance with the radiation safety and protection plan or radiation safety standard;
- report the effectiveness and extent of compliance with the radiation safety and protection plan (see Section 8. Quality Control); and
- every 2 years, review this radiation safety and protection plan and make recommendations about changes to the plan to ensure its continued effectiveness.

3.3. Students

Students must:

- Understand and comply with the relevant sections of this radiation safety and protection plan;
- Obey all instructions and directions issued by the RSO concerning radiation hazards, safe working practices, and precautions to be taken to avoid excessive exposure;
- Use all appropriate devices supplied for the purpose of radiation protection;
- Notify the practice RSO of any defect in equipment or procedures which might affect radiation safety.

4. ACCESS CONTROL

With the use of small sealed sources in teaching, a specific authorisation for each student is not required. However, access to the sealed sources by students must be permitted only in the course of teaching and shall be supervised by the RSO or an appropriate member of the teaching staff. Access to the stored sources must be controlled by the RSO and access shall be restricted to staff members who are responsible for supervising sessions in which the sources are used.

Sources shall be kept in a locked metal container while not being used. The container shall be stored in a secure area under the control of the RSO.

5. TRAINING

One of the duties of the radiation safety officer is to provide, or arrange for the provision of, appropriate training to the staff and students in radiation safety matters. The RSO must also ensure that both staff and students understand and comply with the relevant parts of this radiation safety and protection plan.

Training for staff directly involved in supervising the use of the sealed sources

Persons in this category must be given training specific to enable them to supervise the use of small sealed sources in a safe manner and to instruct students in the required safety measures. Such training shall be given when required for the person's employment; refresher training is to be given periodically as determined by the RSO. The training shall address the following topics:

- General properties of ionising radiation and the associated hazards

- Nature of the hazards specific to working with various isotopes
- The facility safe working and emergency procedures
- Ways to minimise radiation doses to students and others in the workplace, including the use of any protective equipment used in handling sources
- Correct use of radiation monitoring equipment
- Responsibilities under the University possession licence for access control and custody of the sealed sources

6. SAFE WORKING and EMERGENCY PROCEDURES

Safe working

- Sources may only be removed from storage by the laboratory session supervisor for use either for a demonstration experiment or distributed to students for group experiments.
- Teaching staff and students shall not handle sources directly. Appropriate forceps or tongs are provided and must always be used.
- Staff and students shall not remove any sources from the designated teaching area without the approval of the RSO
- Students shall use the sources only for the purposes given in written experimental outlines approved by the RSO
- The supervisor shall verify that all sources used in a teaching session are accounted for at the end of the session and are returned to the storage container and appropriately secured in the designated storage area.

Emergency Procedures

Events that may be considered as emergencies and the responses which apply in each case are detailed below.

Lost or stolen sources

- Where a source cannot be accounted for by a teaching supervisor, the supervisor shall advise the RSO as soon as practicable.
- The RSO shall attempt to locate the source. Where this is unsuccessful, the RSO shall promptly advise the University Radiation Protection Adviser (RPA) who must notify the Possession Licensee and the regulatory authority as soon as practicable.

Damaged sources

- The RSO shall place the damaged source in a sealable plastic bag and arrange for the University RPA to monitor the bench or area where the damage occurred with an appropriate survey meter to determine whether any radioactive material has been released
- If there is no evidence of contamination but the source is visibly damaged, fails a leakage test or is otherwise rendered unusable, the RSO shall arrange for the University RPA to take charge of the source for disposal
- If active material appears to have been released the RSO shall contact the University RPA as soon as possible while maintaining access control to the area.

- Should the source container itself be damaged, the RSO shall contact the University RPA as soon as practicable while maintaining access control
- The University RPA shall not release the area from control until contamination has been removed and the source secured.

Following an incident such as those described above, the RSO, with the assistance of the University RPA shall investigate the incident and present the Possession Licensee with a report describing the incident, including an assessment of whether any person has received or could receive a radiation dose in excess of the prescribed limits. Any actions recommended to prevent a recurrence shall also be stated.

Incident Notification

A written incident report is to be produced by the RSO and submitted through the possession licensee to the Chief Executive of Queensland Health at the address shown in Attachment 2 within seven (7) days of the occurrence of an incident. This report is to include an incident description that provides the following information:

- Names of the persons involved
- Details of radioactive substances involved and the location of the incident
- Estimates of radiation exposure to individuals
- Recovery and/or decontamination measures taken
- Proposals to prevent a recurrence.

Disposal of sealed sources

When a sealed sources is no longer required for teaching purposes or is otherwise redundant, the RSO shall contact the University RPA to arrange for the transfer of the source to either a supplier or other or organisation or person authorised to take possession of the source. The University RPA shall assist in arranging for the necessary Queensland Health approvals to be obtained.

Decontamination procedures

The University RPA shall be contacted if there is any evidence of a sealed source leaking. Results of monitoring and of any decontamination performed by the RPA shall be recorded in a log book of laboratory use.

7. RADIATION WARNING SIGNS

While sources are in use, radiation warning signs must be placed at the laboratory entrances in compliance with the Radiation safety standard PR001:1999 *Standard for premises at which radiation sources are used to carry out a radiation practice*. The storage cabinet shall also be labelled with a sign advising of the presence of radioactive sources and shall bear the radiation trefoil – in compliance with PR002:1999 *Standard for premises at which radiation sources are stored*.

The actual storage container for the sources must be labelled to indicate the radioactive nature of the contents.

8. QUALITY CONTROL

Monitoring and review of the Plan

The RSO, on behalf of the possession licensee, should review **annually** the implementation and effectiveness of the plan. To do this, the RSO should examine records of radiation monitoring; source acquisition and disposal; incident reports, training details and any other documents that may be relevant. The RSO may also discuss radiation safety issues with teaching staff to ensure that they are familiar with the requirements of the plan. Any deficiencies in the effectiveness or implementation of the plan should be communicated to the possession licensee together with proposals for improvement.

Radioactive sources

The RSO shall carry out a visual check and inventory verification of the sources and record the results at the commencement of each teaching semester.

For sources more than 10 years old, an annual source leakage test shall be performed in accordance with the guidelines given in the QHSS *Removable Radioactive Contamination (Wipe) Test Kit Instructions*. See Attachment 3. For sources less than 5 years old, wipe testing shall be undertaken as soon as practicable after the approval of this Plan and at 5 yearly intervals thereafter until the sources are 10 years old, after which annual testing will be required.

The actions to be taken in the event of an apparently damaged or leaking source are detailed in Section 6 above.

Surveys for radioactive contamination

Given that the activity of each source is low and the likelihood of a source leaking is also low, there is little justification for contamination surveys of the kind required in laboratories where unsealed sources are used. The wipe testing regime described above is considered adequate for detection of contamination given the level of risk involved.

9. RECORDS

The following records must be maintained by the RSO .

- The current radiation safety and protection plan approved by the Chief Executive of Queensland Health
- Approval notifications for the acquisition of radioactive substances
- Compliance certificate assessment reports and other radiation safety audit reports
- Results of all quality assurance procedures performed
- Inventory and location of radioactive substances
- Records of source acquisition and disposal
- Incident reports

10. ACQUISITION, SUPPLY, DISPOSAL AND RELOCATION OF RADIOACTIVE SUBSTANCES

This section outlines the legislative requirements associated with the acquisition, supply, disposal and relocation of radioactive substances.

Acquisition

The approval of the Chief Executive of Queensland Health is to be sought and obtained prior to acquiring radioactive substances. It is the responsibility of the RSO to ensure that the possession licensee is kept fully informed as to the radioactive substances currently required and approved for use in teaching.

Supply

If the radioactive substances is to be sold to another person in Queensland, the possession licensee must ensure that the proposed new owner has:

a licence to possess the type of radioactive substances to be purchased; and
an approval to acquire the radioactive substances. .

Disposal

Sources may only be disposed of in compliance with Part 4 of the Regulation. The RSO shall obtain the advice of the University RPA should the disposal of any sources be considered. Regardless of their activity level, sealed sources can only be disposed of by transfer to another authorised person or organisation.

Relocation interstate or overseas

The approval of the Chief Executive of Queensland Health is to be sought and obtained prior to the relocation (including sale) of a radioactive substance to a place outside Queensland. Application forms are available from Radiation Health. The Chief Executive must be notified within seven (7) days after the device has been relocated.

Attachment 1

Maximum activities for sources used in teaching - Excerpt from the Radiation Safety Regulation 1999

Sealed radioactive substances used in teaching—Act, s 210

49.(1) This section applies to a sealed radioactive substance containing a radionuclide mentioned in column 1 of the following table if the activity of the radionuclide is not more than the activity mentioned in column 2 of the table shown opposite the radionuclide—

Column 1 Radionuclide	Column 2 Activity (kBq)
cobalt-60	200
strontium-90	80
caesium-137	200
radium-226	20
americium-241	20

(2) For section 210 of the Act, the substance is exempt from section 13 of the Act if it is being used for teaching the characteristics and properties of radiation or radiation sources. NB Section 13 of the Act relates to requirements for user licences. If the sources used for teaching are below these values, user licences are not required to be held by staff members.

Current inventory

Location in Parnell Building		Radionuclide	Activity in kBq	Serial number (where known)	Date
Storage	Use				
Room 204	Room 204	Sr90	70	6576	1994
		Sr90	70	6575	1994
		Sr90	70	6574	1994
		Co60	222	108A	1994
		Co60	222	109A	1994
		Co60	140 ¹	3078	1994
Room 220	220 and 209	Am241	4	6377	1980s
		Am241	Not known	No s.n.	"
		Am241	4	6378	"
		Co60	200	6631	"
		Co60	200	8823	"
		Co60	37	No s.n.	"
		Sr90	4	No s.n.	1980s
		Sr90	4	No s.n.	"
		Sr90	4	No s.n.	"

¹ Measured in 2004

ATTACHMENT 2

Contact Details

Possession Licensee

The University of Queensland. The University Radiation Protection Adviser should be contacted for enquiries in relation to the corporate possession licence.

Radiation Safety Officer

Dr Gary Tuck, Physics, Ph 3365 3426
tuck@physics.uq.edu.au

University Radiation Protection Adviser

Michael Williamson, OHS Unit, Steele Building. Ph 3365 4504, fax: 3365 1577
m.williamson@mailbox.uq.edu.au

The Chief Executive, Queensland Health

c/-Director
Radiation Health
450 Gregory Terrace
FORTITUDE VALLEY 4006

Telephone: (07) 3406 8000
Facsimile: (07) 3406 8030
Mobile 041 327 9672 (emergencies and out of hours calls)