

## RADIATION MANAGEMENT PLAN – EXPLANATORY NOTE

- This template is a guide to development of a local Radiation Management Plan for organisational units that use ionising radiation in teaching or research. (There will be a separate template with added sections to accommodate the additional requirements for units where irradiation of humans is performed.) Development of the local Plan should be undertaken by the local Radiation Safety Officer and other appropriate persons, in discussion with the university Radiation Protection Officer.
- Text in < > indicates sections where specific local information should be added. Useful local information can also be added in other sections as desired.
- Any text not in <> should be retained in full.
- The intent of the Radiation Management Plan is that it will provide staff and postgraduate students who use ionising radiation with a guide to all the information they need concerning radiation use in their unit. It is designed as a standalone document, but may be incorporated into a laboratory manual or other document.
- To comply with the Monash *Local OHS Document Control & Retention Procedure*, the footer of this document should be edited to indicate the local Plan's
  - Version number
  - Responsible officer (usually the RSO or local OHS committee)
  - Date of first issue
  - Date of last review
  - Date of last update
  - Location of document on local intranet/website

The date of next review should be set to no more than 1 year from last review.

# RADIATION MANAGEMENT PLAN

**MONASH UNIVERSITY, LICENCE NUMBER 300042088**

<DEPARTMENT/CENTRE/ORG UNIT NAME>

<DATE OF LAST UPDATE>

## CONTACTS

| Name  | Position   | Contact details   |
|---|--|---|
| Monash Security                                 |  | 333   |
|   | Radiation Safety Officer (RSO)                             |   |
|   | <Deputy><Alternate> RSO                                    |   |
| Margaret Rendell                                | Radiation Protection Officer (RPO), OHS, Monash University | Phone : 03 9905 1060<br>Mobile : 0418 334 238<br>Email : <a href="mailto:Margaret.Rendell@monash.edu">Margaret.Rendell@monash.edu</a> |
|   | <Others as relevant>                                       |   |
|   | <Service provider for maintenance of equipment>            |   |
| ARPANSA   | Personal monitoring service Centre <xxxx>                  | 03 9433 2211  |
| Department of Health radiation emergency number |  | <b>1300 790 733</b>   |

## LICENCED SOURCES

| Details of source | Department of Health<br>Registration number | Licence conditions            |
|-------------------|---|-------------------------------|
|                   |   | Personal use licence required |
|                   |   |                               |
|                   |   |                               |
|                   |   |                               |

## AREAS WHERE RADIATION IS USED

| Building | Room number | Source(s) |
|----------|-------------|-----------|
|          |             |           |
|          |             |           |
|          |             |           |
|          |             |           |

## RADIATION MONITORS

| Details of monitor | Used for | Location |
|--------------------|----------|----------|
|                    |          |          |
|                    |          |          |
|                    |          |          |
|                    |          |          |

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## 1. GENERAL INTRODUCTION

This document describes the Radiation Management Plan (RMP) for possession and use of the listed radiation sources. It provides the framework for safe use of ionising radiation, and outlines the safety practices and procedures to be followed.

All persons using ionising radiation and all persons who supervise radiation workers or areas where radiation is used are expected to be familiar with and follow these requirements at all times.

<Information about the scope of radiation work within the department>

### 1.1 THE PERSONS WHO SHOULD READ THIS DOCUMENT

This document should be read by and be accessible to any person who will

- Undertake any activity using radiation sources;
- Work in a designated radiation area while sources are in use;
- Supervise radiation users;
- Supervise areas where radiation is used.

### 1.2 REVIEW OF THIS DOCUMENT

The RSO shall review this RMP on an annual basis or more often as required by changes to research or teaching activities. Changes may also be initiated by the Radiation Protection Officer, OH&S, in response to changes in legislative requirements or licence conditions.

### 1.3 RADIATION PRINCIPLES

The benefit of using radiation should outweigh the risks involved. This is the principal of **Justification** as defined by the International Commission on Radiological Protection (ICRP).

A further principle, **Optimisation**, requires that exposure to ionising radiation should be controlled such that doses are “As Low As Reasonably Achievable” (ALARA), taking into account economic and societal factors.

The Risk Assessment process identifies hazard controls to be implemented to **Limit** dose to researchers and to the general public to below 1mSv/annum. (See Risk Assessment, section 7, Action Limits, Section 8.2).

### 1.4 REGULATORY REQUIREMENTS

The use of ionising radiation at Monash University must comply with

- Radiation Act 2005 (Victoria) and the associated Radiation Regulations 2017
- Radiation Amendment Act 2013
- (Commonwealth) Nuclear Non-Proliferation (Safeguards) Act 1987 and associated Regulations.

and any additional Codes of Practice or other requirements listed in the University’s radiation management licence. These additional requirements are listed in conjunction with the sources to which they apply, in the source listing at the front of this document.

## 1.5 PENALTIES FOR LEGISLATIVE CONTRAVENTION

The Radiation Act 2005 establishes a number of serious offences relating to ionising radiation practices, including unlicensed activities, incident reporting, non-compliance with licence conditions, and causing a person to receive a radiation dose above the annual dose limit.

Contraventions of, or failure to comply with, the Radiation Act 2005 and/or Radiation Regulations 2017 will incur a penalty. A penalty can be up to 9000 penalty units for an organisation. The penalty for a person using a radiation source without a use licence (unless the source or person is exempt from this requirement) is 1200 penalty units. Currently (2017/18) one penalty unit is \$158.57.

## 2. LICENCING

### 2.1 RADIATION MANAGEMENT LICENCE

Monash University holds a Radiation Management licence (number 300042088) from the Victorian Department of Health.

Under this licence, a specified list of sources and activities are permitted. The licenced apparatus and material for <this organisational unit>, and their associated conditions, are listed at the front of this document.

Any additional apparatus or material must be added to the licence before acquisition. See Purchasing, Section 5. Delivery from the supplier must not occur until notification of the licence addition has been received from the RPO, or the University risks a fine for breaching the conditions of its Radiation Management Licence.

### 2.2 USE LICENCES

All users of radiation sources must have a current radiation use licence for the category(s) of source they are using, issued by the Radiation Safety Section, Department of Health, Victoria, unless their activity falls into one of a number of exemption categories. Where use of a source requires a use licence, this is specifically noted in the source list.

The requirement for a use licence applies to both staff and students, except where the student is working under the supervision of a staff member with a use licence. Individuals are responsible for obtaining their own licence, and must be aware of and comply with the conditions of their licence.

Organisational units that possess sources which require a use licence must maintain a record of licenced users of that source (including the date of licence expiry).

<how the list of use licences is kept in this organisational unit>

### 2.3 SAFEGUARDS MATERIAL (URANIUM, THORIUM AND PLUTONIUM)

In addition to the requirements of the Victorian Radiation Act, any uranium, thorium or plutonium (in any non-natural form, including chemical salts) is regulated under the Commonwealth Nuclear Non-Proliferation (Safeguards) Act.

A permit must be held for any location at which such material is held. Contact the RPO for more details about permit acquisition and the associated record-keeping requirements.

<details of local permit areas>

### 3. RESPONSIBILITIES

Summary of radiation responsibilities:

|  |
|--|
| <b>Head of Academic Unit</b>   |
| ensure that adequate resources are available for provision and maintenance of the radiation safety program, including personal dosimetry, monitoring, calibrations, shielding and containment, waste disposal, and maintenance and distribution of the local Radiation Management Plan |
| appoint a Radiation Safety Officer (RSO) and deputy RSO  |
| ensure that a system is in place to ensure that staff and students complete the training requirements provided by OH&S   |
| <b>Supervisors</b>   |
| ensure staff and students undertake recommended OHS training in the use of ionising radiation, and are provided with the local Radiation Management Plan   |
| ensure local standards and practices comply with university policies and procedures  |
| ensure all radiation risk assessments and Safe Work Instructions that are developed are included for distribution as indicated in the local Radiation Management Plan  |
| ensure monitoring, shielding and containment equipment that is appropriate to the tasks undertaken is provided and used; and   |
| ensure they implement the <i>Radiation use during pregnancy or breastfeeding procedure</i> where appropriate.  |
| <b>Staff, students and visitors using radiation</b>  |
| comply with OHS instructions, policies and procedures using control measures and/or personal protective equipment to ensure their own health and safety as well as the health and safety of others   |
| follow the Safe Work Instructions for the activities they undertake  |
| be familiar with the local Radiation Management Plan   |
| consult with the RSO before: <ul style="list-style-type: none"><li>– undertaking work with ionising radiation sources</li><li>– any new processes with ionising radiation are started (for example use of a new radioisotope).</li></ul>   |
| ensure that they hold a current 'use licence' for the radiation activities they undertake (where required)   |
| <b>Radiation Safety Officer</b>  |
| oversee the purchase of radioactive substances for the unit  |
| ensure sources purchased by and used in the unit are covered by the University's radiation management licence  |
| maintain personal dosimetry programs for users of radioactive substances   |
| provide advice, information, instruction and training on the local use, storage, transport and disposal of radiation sources, including through distribution of the local Radiation Management Plan  |
| assist with risk management of hazards and risks associated with ionising radiation  |
| formulate and implement local OHS policies and procedures with regard to radiation sources   |
| review the radiation safety aspects of new research projects and teaching activities   |
| provide the initial response to, and investigation of, accidents and emergencies involving radiation sources, including reporting to the Radiation Protection Officer (RPO), OH&S and assisting with the development of corrective actions   |
| maintain records related to the purchase, use, storage, transport and disposal of radioactive substances   |
| maintain records of personal use licences, activities covered, and expiry dates  |

|  |
|--|
| monitor OHS standards and compliance with OHS policies and procedures at a local level with regard to radiation sources  |
| assist with the promotion of ionising radiation safety awareness.  |
| <b>University Radiation Protection Officer</b>   |
| manage the university's Radiation Management Licence including licencing of new sources  |
| provide advice, information, instruction and training on university policies and procedures concerning ionising radiation safety, and assistance with complex issues |

Complete lists of responsibilities for ionising radiation safety as they apply to Head of Department, OH&S, RPO, Radiation Safety Officer, and radiation users may be found in the Monash OH&S procedures "OHS roles, responsibilities and committees", "Using ionising radiation at Monash University", "Ionising radiation dosimetry procedures", "Disposal of radioactive waste", "Ionising radiation: source purchase and licencing" and "Protecting unborn children from the effects of maternal exposure to chemicals, biologicals, animals and radiation" (reproduced in full in Appendix 1).

#### **4. COMMENCING NEW WORK OR MODIFYING EXISTING PRACTICES**

Before new work is commenced, or existing practices are modified, the following need to be considered.

##### **4.1 PURCHASING**

See Section 5.

##### **4.2 TRAINING**

See Section 6

##### **4.3 RISK ASSESSMENT**

A new risk assessment must be completed, or an existing Risk Assessment reviewed and updated. Existing Risk Assessments are documented as detailed in Appendix 2.

Any Risk Assessments with a residual radiation risk assessed as "medium" or higher must be discussed at the local OHS Committee.

##### **4.4 PERSONAL DOSIMETRY**

If the risk assessment determines that personal dosimetry is necessary, see Section 8.

##### **4.5 USE LICENCE**

Determine if a personal use licence is needed (see Section 2.2)

##### **4.6 DEVELOP NEW SWIS IF NECESSARY**

SWIs must incorporate the controls identified in the risk assessment. See Section 7.2.

#### **5. PURCHASING**

All sources purchased must be listed on the University's Radiation Management Licence BEFORE purchase. All purchases of radioactive sources must be conducted according to the "Ionising radiation: source purchase and licencing" procedure (reproduced in Appendix 1).

##### **5.1 RADIOACTIVE MATERIAL**

Only isotopes listed on the licence may be purchased. Care must be taken to ensure the holdings in this organisational unit do not exceed the licence



quantity. To ensure this, the RSO must maintain a register of unsealed radioactive material held.

<local rules for purchase and accounting of radioactive material>

## 5.2 X-RAY APPARATUS AND SEALED RADIATION SOURCES (INCLUDING APPARATUS)

X-ray apparatus and sealed sources must be added to the University's Radiation Management Licence before the item can be received by the University. The RSO initiates the licence acquisition process by contacting the RPO.

After acquisition, this RMP must be reviewed to reflect the new item and any new practices.

## 6. TRAINING

Training in the use of ionising radiation must be provided at a range of levels, including by laboratory supervisors, safety personnel, and OH&S.

All staff, honours and postgraduate students that work with unsealed sources of radiation must complete the online courses "Basic Principles of Ionising Radiation" and "Practical Principles of Ionising Radiation".

<Details of any university or external training requirements for other sources, as determined by the RSO and RPO>

All staff, honours and postgraduate students that work with ionising radiation must be provided with induction and training in local procedures, which must include

- description of the radiation hazard;
- how to minimise dose;
- how to access existing local RA & SWI;
- how to access this document.

Records of training must be kept.

<details of local training requirements>

## 7. RISK ASSESSMENTS AND SAFE WORK INSTRUCTIONS

### 7.1 RISK ASSESSMENTS

Risk management must be completed on all processes/procedures/activities that involve ionising radiation:

- before activities involving ionising radiation commence;
- before the introduction of new procedures, processes or equipment that use ionising radiation;
- when procedures or processes or equipment that use ionising radiation are modified;

In each case, a new risk assessment must be completed, or an existing Risk Assessment reviewed and updated.

Any Risk Assessments with a residual radiation risk assessed as "medium" or higher must be discussed at the local OHS Committee.

For guidance material on developing Risk Assessments, see <http://www.monash.edu/ohs/risk-management>

For access to current Risk Assessments for <this organisational unit>, see Appendix 2.

## 7.2 SAFE WORK INSTRUCTIONS

Following risk management of ionising radiation procedures, processes or equipment, researchers or supervisors of laboratories/studios/workshops must incorporate the implemented controls into safe work instructions, laboratory procedures or safety manuals.

Guidelines for development of Safe Work Instructions can be found in Appendix 1.

For local Safe Work Instructions, see Appendix 3.

<local rules/templates for development of safe work instructions>

## 8. PERSONAL DOSIMETRY

Personal dosimetry at Monash University is undertaken in accordance with the procedure *Ionising radiation dosimetry procedures*, reproduced in full in Appendix 1.

### 8.1 WHO SHOULD WEAR A DOSIMETER

All users of ionising radiation should wear a personal dosimeter (“radiation badge”), unless this has been shown to be unnecessary by risk assessment.

All persons entering a dedicated radiation area must wear a personal dosimeter unless ALL work undertaken in the area has been assessed as not needing personal dosimetry.

When a person has been supplied with a dosimeter, they must wear that dosimeter at all times while undertaking radiation work or in a radiation area at Monash.

Dosimeters for <this unit> are supplied through <ARPANSA Centre number xxxx>.

<Local procedures for when supply of a personal dosimeter is impracticable (e.g. temporary workers or visitors).

This requirement can be fulfilled with instant read dosimeters such as electronic personal dosimeters or quartz fibre dosimeters. Records of these dosimeter readings must be kept locally. Alternatively, in some circumstances a dosimeter supplied to the person by another organisation may be used.>

### 8.2 ACTION LIMITS

The regulatory limit for occupationally exposed persons is 20mSv/year, however Monash applies an Action Limit of 1mSv/year, in line with the regulatory limit for members of the public.

Records of personal dosimetry results are checked and maintained by the University RPO and the RSO.

If a person receives a dose of above 1mSv/annum, or a pro-rata dose likely to lead to a dose of above 1mSv/annum, the university RPO will initiate an investigation to determine if practices or controls can be modified to reduce the doses received. This does not indicate that the person has received a dose of health concern.

The RSO may also investigate if a person receives a dose which is significantly higher than other workers undertaking the same or similar activities.

## **9. SECURITY, SHIELDING AND SIGNAGE**

### **9.1 SECURITY**

Access to ionising radiation sources must be restricted to authorised users. This may mean

- a locked cupboard or fridge for isotopes in a shared laboratory;
- key locking on large apparatus;
- a radiation room with access restricted to radiation users.

<specific security arrangements within this unit>

### **9.2 SHIELDING**

All shielding should be optimised so that dose rates are minimised according to the ALARA principle.

For rooms with apparatus or for dedicated hot lab facilities, shielding requirements must be determined in the planning phase, in consultation with the RPO (this information is required for licence acquisition).

For other uses, any requirements for additional shielding (e.g. lead bricks) will be determined through the risk management process, and the requirements incorporated into Safe Work Instructions.

Shielding must be reassessed if the frequency of use changes, practices change, or the occupancy of the surrounding area changes.

### **9.3 SIGNAGE**

All access points to rooms where radiation is used, and all storage areas within rooms, must have an appropriate sign in accordance with AS2243.4 and any Departmental or Faculty signage rules.

At a minimum, this will consist of

- the word HAZARD or WARNING or similar;
- the radiation trefoil symbol;
- a brief description of the nature of the hazard e.g. 'Ionising Radiation', 'X-rays', 'Radioactive Material'

in black, on a yellow background.

## **10. LABELLING**

All radiation sources should be labelled with an accurate and sufficiently durable label.

Radioactive material must be labelled with at minimum:

- isotope ;
- activity ;
- (for stock solutions) date of activity;
- name of user.

Where small samples make this impractical, the samples can be collected in a holder or container labelled with this information.

Radiation apparatus must be labelled with at minimum the trefoil symbol.

## 11. QA AND MONITORING PROGRAMS

For personal monitoring (dosimetry), see Section 8.

### 11.1 QA AND CALIBRATION

Handheld radiation contamination and survey monitors should undergo periodic calibration. This can be organised through OH&S or locally. Records of calibration should be kept locally.

<local calibration arrangements>

<QA, servicing and calibration requirements for local equipment>

There is a list of monitoring equipment and calibration/servicing contacts at the front of this document

### 11.2 CONTAMINATION MONITORING FOR UNSEALED MATERIAL

Where the isotope is detectable by a hand-held monitor, contamination monitoring should be undertaken by the radiation worker prior to and following use of unsealed material to limit exposure to residual calibration.

Where contamination is found, decontamination should take place, followed by repeat monitoring.

### 11.3 AREA SURVEYS

Periodic area surveys must be undertaken (using a handheld monitor or wipe testing, as appropriate) of:

- the exterior of storage areas;
- isotope working areas and hot labs;
- exterior of apparatus.

and of the exterior of moveable shielding, each time it is moved and replaced. Records of all surveys are to be kept locally.

<local area monitoring procedures>

## 12. PREGNANCY AND BREASTFEEDING

Radiation work during pregnancy or breastfeeding is regulated by the university procedure *Protecting unborn and breast-fed children from the effects of maternal exposure to chemicals, biologicals, animals and radiation*, reproduced in full in Appendix 1.

This procedure ensures that pregnant and breastfeeding radiation workers can choose whether or not they continue working with radiation (subject to satisfaction on the part of Monash University that the child and the mother are not at significant risk).

### 13. DISPOSAL

Disposal of radioactive material, sealed sources, sealed source apparatus and X-ray equipment is subject to safety and regulatory requirements.

Correct disposal of solid and liquid waste from work with radioactive material is outlined in the university procedure *Disposal of radioactive waste*, reproduced in full in Appendix 1.

<local procedures, SWIs for waste>

Permission must be obtained from the Department of Health and Human Services before disposal of any sealed source or sealed source apparatus (including via return to supplier), and the disposal must be facilitated through an appropriately licenced external company. Return to manufacturer via the supplier is the preferred pathway. Contact the RPO for more details.

Disposal of X-rays must follow the Department of Health and Human Services safety guidelines. Contact the RPO for more details, and to notify that an X-ray source needs to be removed from the university's Radiation Management Licence.

### 14. ADMINISTRATION OF RADIATION TO ANIMALS

The animal ethics application guides appropriate treatment of animals.

In addition, the radiation hazard of the procedure to researchers and support staff needs to be considered. The Risk Assessment must consider both external radiation hazards to staff and students (X-rays, highly active sources) and contamination from the activities undertaken, in handling of live and dead animals, animal faeces and urine, and contaminated bedding and cages.

If the work is to be undertaken in an animal house, the Risk Assessment must be supplied to the animal house managers to allow the correct SWIs to be implemented by animal house staff. Ideally the SWIs will be developed in collaboration between the researchers, the Departmental RSO, the Animal House RSO, and the university RPO if necessary.

<details of any existing local procedures, SWIs>

### 15. TRANSPORT

When transporting sealed or unsealed radioactive sources between laboratories or buildings on campus, the following should be considered:

- when choosing routes and times, consider the distance and ease of travel, and how populated/crowded the route may be. Choose a practical route which minimises the risk.
- ensure that packaging is robust and includes secondary containment in case of spills.
- ensure that a second radiation worker accompanies you during the transport. In case of accident one person stays at the scene and the other person gets assistance.
- minimise your exposure during the transport, eg: use a trolley to maximise the distance between the ionising radiation source and your body (note: if a trolley is used the source must be secured so that it cannot readily fall off the trolley).

- never leave an ionising radiation source unattended.

Monash University does not hold a licence for vehicle transport of radioactive material (including sealed sources) on public roads – this includes internal campus roads. Any road transport of amounts of radioactive material above those detailed in Schedule 1 of the *Radiation Regulations 2017* must be consigned to an appropriately licenced Dangerous Goods courier. Contact the university RPO for advice on packaging requirements for consignment.

## 16. EMERGENCY AND INCIDENT PROCEDURES

In general emergencies, reference should be made to the Monash University Emergency Procedures booklet.

Any significant radiation incident must be reported to the Radiation Safety Officer, who will contact the RPO for advice if needed.

<local procedures for small radiation spills>

<any other relevant local procedures>

There are some radiation incidents which need to be notified to the Department of Health and Human Services within a given time frame.

Report to OHS ideally within 24 hours

- Unplanned exposure of person that may be >1mSv;
- Loss of control of source;
- Damaged or malfunctioning source;
- Uncontrolled contamination;
- Loss or theft of source.

If the RPO can't be contacted within 48 hours, contact Department of Health and Human Services and ask for advice.

All incidents should in addition be reported using the university Hazard and Incident reporting system.

**APPENDIX 1.**

(all Monash University radiation procedures will be reproduced here)

**APPENDIX 2.**

<reproductions of local risk assessments, or guidance as to how to locate them>

**APPENDIX 3.**

<reproductions of local Safe Work Instructions, or guidance as to how to locate them>