LA TROBE UNIVERSITY

IONIZING RADIATION SAFETY PROCEDURES

1. PURPOSE

The purpose of these procedures is to ensure that all work involving ionizing radiation is performed in a safe manner and conforms to applicable legislation and accepted standards in radiation protection.

2. DEFINITIONS

Annual Limit of Intake	That quantity of a radio-nuclide which, taken into the body during one year, would lead to a committed effective dose equal to the occupational annual limit on effective dose
Committed effective dose	The effective dose a person is committed to receive from an intake of radioactive material into the body that will be accumulated during the 50 years following its intake
Controlled area	An area to which access is subject to control and in which employees are required to follow specific procedures aimed at controlling exposure to radiation
Effective dose	A measure of dose which takes into account both the type of radiation involved and the radiological sensitivities of the organs and tissues irradiated
Investigation level	A value of effective dose above which an investigation is warranted and is normally three-tenths of that fraction of the annual dose limit corresponding to the period in question
Ionizing radiation	Radiation which is capable of causing ionization, either directly (for example radiation in the form of gamma rays and charged particles) or indirectly (for example, radiation in the form of neutrons)
Irradiating apparatus	Apparatus that is capable of producing ionizing radiation or of accelerating atomic particles
Occupational exposure	Exposure of a person to radiation which occurs in the course of that person's work and which does not include exposure to natural background radiation
Public exposure	Exposure to a person, or persons, to radiation which is neither occupational nor medical exposure
Radiation worker	Designated staff or students whose work necessitates the operation of any irradiating apparatus, or the handling of radioactive material
Radioactive material	Material which spontaneously emits ionizing radiation as a consequence of radioactive decay and with specific activity greater than 100 Bq/g or total activity greater than Appendix X of the Health (Radiation Safety) Regulations 1994
Sealed source	Radioactive material which is physically encapsulated or firmly bonded within metals to prevent dispersion under normal conditions of use and wear
Supervised area	An area in which working conditions are kept under review but in which special procedures to control exposure to radiation are not normally necessary

3. RESPONSIBILITIES

3.1 Head of school (or Divisional Manager)

The Head of School is responsible for ensuring that the conduct of work within their management and control and involving ionizing radiation conforms to the requirements of relevant legislation, codes of practice and University procedures.

The Head of School shall nominate a Department Radiation Supervisor and ensure they have the necessary training, resources and authority to perform the required functions

3.2 Department Radiation Supervisor

The Department Radiation Supervisor (DRS) shall be responsible for:

- Ensuring the implementation and regular review of radiation monitoring and control procedures
- Ensuring immediate action is taken in the event of unsafe practices, accidents or emergencies
- Ensuring that personal monitoring devices are issues to all designated radiation workers and are collected and assessed after the period of use
- Liaising with the University Radiation Safety Officer on matters involving radiation safety, monitoring and control procedures within the School and informing the URSO of any alterations to the radiation inventory affecting licences and registrations

3.3 Principal Researcher

The Principal Researcher is responsible for the conduct of work by staff and students under their supervision. This will include:

- Providing and maintaining a safe working environment, including suitable facilities and handling equipment, shielding, monitoring equipment and waste facilities.
- Ensuring that radiation safety protocols and working rules are documented and followed at all times and that relevant codes of practice are adhered to.
- Ensuring that all persons are adequately trained in the hazards of ionizing radiation and that they are supervised to a level commensurate with their training and experience.

3.4 Staff and students designated as radiation workers

Radiation workers shall:

- Be and remain informed of the radiation hazards associated with their work
- Take every precaution to avoid unnecessary exposure to radiation and ensure that radiation doses are kept as low as reasonably achievable
- Be registered for personal monitoring and wear an appropriate personal monitoring device at any time when that person is likely to be exposed to radiation. The device must be returned for assessment at the end of the prescribed period.
- Report immediately to the Department Radiation Supervisor or the University Radiation Safety Officer any instance of known or suspected unsafe practice or hazardous situation

3.5 University Radiation Safety Officer

The University Radiation Safety Officer is responsible for

- The co-ordination, implementation and review of the University Radiation Safety Procedures
- Approving new activities and changes to existing activities involving ionizing radiation
- Providing advice and assistance on radiation matters to schools and departments
- Maintaining prescribed records, registers and inventories on radiation safety matters

4. PROCEDURES

4.1 Licences and registrations

The Health (Radiation Safety) Regulations 1994 are administered by the Victorian Department of Human Services and the University is licensed under the Regulations to operate, use or otherwise deal with an unsealed radioactive source. Radiation workers who use radiation sources in any other manner or outside Victoria may be required to hold a separate licence.

Registrations are also issued by the Department of Human Services for irradiating apparatus, sealed source apparatus and sealed sources with activity greater than prescribed levels. All registered apparatus must have the registration label affixed to the apparatus. All sealed sources registered must have the registration label affixed to the container.

The use of natural uranium, natural thorium, uranium 233, uranium 235 or plutonium 239 is also regulated under the Nuclear Non-Proliferation (Safeguards) Act 1987 and users of these isotopes may need to obtain a permit.

4.2 New activity notification

All new activities involving the use of radioactive material, changes to existing activities or the purchase or acquisition of irradiating apparatus or sealed sources must be registered on the form given in Appendix X and notified to the URSO. The URSO will assess the activities for adequate radiation safety measures and compliance with regulations and standards and issue an approval accordingly.

Any persons working with ionizing radiation at another institute or organisation as part of their work or study at La Trobe University must also notify the URSO on the form given in Appendix X.

4.3 Health surveillance

4.3.1 Personal monitoring

All designated radiation workers shall wear an appropriate personal monitoring device at any time when they are likely to be exposed to radiation. The monitor must be returned for assessment at the end of the wearing period.

The DRS or other nominated person shall ensure that the school or department issues all designated radiation workers personal monitoring devices and that these devices are collected and assessed immediately after the period of use.

The DRS will assess effective doses and take appropriate action in notifying radiation workers, investigate unusual doses and maintain records.

4.3.2 Biological monitoring

The URSO may direct a designated radiation worker to undergo biological monitoring either following an actual or suspected uptake of radioactive material or as a routine monitoring program as part of a particular procedure (eg radio-iodination work). Biological monitoring referrals shall be to the La Trobe University Medical Centre or as otherwise directed by the URSO

4.3.3 Radiation exposure during pregnancy

Radiation workers are required to notify the DRS immediately on becoming aware of pregnancy. Following confirmation, arrangements shall be made to ensure that three-tenths of the (pro-rata) annual effective dose limits are not exceeded during the remainder of the pregnancy.

4.4 Controlled and Supervised Areas

4.4.1 Controlled areas

All areas in which unsealed radioactive substances, sealed radioactive sources or irradiating apparatus are stored or used shall be designated controlled The location of all controlled areas shall be listed in the University register maintained by the URSO.

A responsible radiation worker, DRS or URSO shall supervise each controlled area.

The standard of facilities and equipment in a controlled area shall conform as a minimum to the requirements of the Regulations and prescribed standards.

Persons who are not designated radiation workers shall not work, or remain for any length of time in controlled areas unless the DRS or URSO have granted approval. The DRS or URSO shall first approve entry into a controlled area by maintenance, contract or cleaning staff and a clearance certificate or other notification must be issued before commencement of work.

The DRS shall inform the URSO of any changes to facilities, conditions or the nature of the operations conducted within any controlled area and of any alteration to the radiation inventory of that area.

4.4.2 Supervised areas

Radiation sources of low activity, such that there is minimal potential for exposures, may be used outside controlled areas provided that the area is clearly marked and is directly controlled by the person working with the sources.

4.5 Radiation hazard signs and labels

All controlled areas shall be indicated by means of radiation hazard signs incorporating the radiation warning symbol and located in places in which they will be readily seen.

Each sealed source apparatus or sealed source storage container shall bear a clearly visible label marked “Caution – Radioactive” and identifying the radioactive substance, its activity and date of measurement. Irradiating apparatus shall have a radiation hazard label with appropriate wording on it.

4.6 Radiation monitoring and testing

4.6.1 External monitoring

Radiation surveys shall be carried out by the URSO and the DRS as necessary in areas where there could be appreciable dose rates (greater than 3/10 of the relevant annual limit) from unintended radiation emissions from apparatus or where substantial activities of sealed sources are used. Guidelines for the conduct of these surveys as given in applicable standards and codes of practice shall be adopted.

4.6.2 Contamination monitoring

Each controlled area shall have available appropriate monitoring equipment that is calibrated and in a ready and working condition.

Surface and personal contamination monitoring in areas where unsealed radioactive material is used shall be carried out regularly by designated radiation workers using the material. The URSO and DRS shall also conduct radiation surveys as necessary.

4.6.3 Radiation Safety Testing

Radiation safety tests of apparatus and sealed sources registered under the Regulations shall be carried out by a specially authorised officer or licensed tester with the full co-operation of the school or department. These tests will be performed in accordance with applicable standards and codes of practice.

4.7 Storage, transport and disposal of radioactive material

4.7.1 Storage

Storage of radioactive material shall be such that they present no hazard to persons in the vicinity and are secure against theft or unauthorised tampering. All storage locations must be registered and approved by the URSO and the DRS or URSO shall conduct monitoring of storage locations as necessary.

4.7.2 Transport

Transportation of any radioactive material from a controlled area (other than routine transfer of radioactive material to a work area) shall be approved by the URSO prior to transportation.

All radioactive material being transported or transferred shall be packaged or contained so as to prevent breakage and release of radioactive material in an emergency or incident.

4.7.3 Disposal of radioactive waste

All radioactive waste shall be segregated into:

- Solid, dry waste
- Aqueous waste
- Non-aqueous waste (eg. solvent waste, scintillation fluid)

Disposal of radioactive material shall first be approved by the URSO.

Low level aqueous waste may be disposed of to the sewer, providing approval is obtained from the URSO, there is sufficient dilution with water to ensure that the maximum concentrations in the Regulations are not exceeded and the drains are clearly labelled with a radiation hazard label.

Solid radioactive waste shall be securely packaged and be labelled with the radioisotope, activity, reference date and school or department. The waste can be deposited into the University Radiation Store by arrangement with the URSO.

Liquid wastes must be stored in suitable non-corrosive containers and be labelled with the radioisotope, activity, reference date and school or department. The URSO can supply special containers for waste scintillation vials.

The University provides a central store facility for radioactive waste and unwanted material at the Bundoora Campus. Contact the URSO to arrange removal of material into the store.

4.8 Accident and emergency procedures

Written procedures for action in an emergency shall be developed, reviewed as necessary and distributed to all radiation workers and displayed in all controlled areas.

The following events must be reported immediately to the DRS and the URSO:

- Suspected exposure of a person to greater than one tenth of the applicable dose limit
- A suspected or actual intake of radioactive material
- Radioactive contamination of a person or their clothing
- Contamination of a surface, substance or material greater than 1 kBq/sq m of an alpha emitting radionuclide or 1 MBq/sq m of a beta or gamma emitting radionuclide
- Any fire or explosion in an area containing radioactive material
- Any loss of radioactive material or damage to a sealed radioactive source

The responsible person shall submit an incident report to the URSO as soon as possible after the incident. The URSO shall notify the Regulatory Authority in accordance with reporting requirements.

5. REFERENCES

Victorian Health (Radiation Safety) Regulations 1994
Nuclear Non-Proliferation (Safeguards) Act 1987
Code of Practice for the Transport of Radioactive Material 1990
NH&MRC Recommendations for limiting exposure to ionizing radiation
NOHSC National standard for limiting occupational exposure to ionizing radiation
Australian Standard AS2243.4-1998 Safety in laboratories Part 4: Ionizing radiations

6. CROSS REFERENCES

Guidelines for emergencies involving ionizing radiation
Incident Reporting Procedures
Restricted Access Procedures
Permit to Work Procedures

7. DOCUMENTATION

Dose report forms	*Issued by personal radiation monitoring services*
Radiation project notification form	*Completed by principal researcher*
Project approval	*Issued by the OHS Section*
Registration certificates	*Issued by relevant regulatory authorities*
Source inventory (sample)	*Maintained by departments*
Survey and inspection reports	*Maintained by departments*
Register of approved researchers	*Maintained by the OHS Section*
Register of controlled areas	*Maintained by the OHS Section*

8. GENERAL INFORMATION (Available from the OHS Section)

Radiation dose limits
Radiation safety course notes
Transport of radioactive substances
Radioactive waste disposal
General laboratory working rules

The Executive Occupational Health and Safety Committee endorsed these draft procedures for comment on 4 September 2000. Comments should be submitted to the Occupational Health and Safety Section by Monday 27 November 2000. The Executive OHS Committee will consider all comments at the following meeting.