



SOP RSC 5.2 Veterinary Radiation Therapy

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Procedures and Facilities

The potential hazards are greater in radiation therapy than in the diagnostic use of radiation because of the larger exposures involved (often more than 1000 times those used in radiography) and also, in many cases, because of the use of more penetrating radiations.

The safe use of sealed radioactive sources that emit gamma radiation represents the possibility of greater hazard than the use of x-ray therapy machines. The use of such sources therefore requires considerable expertise and persons using them in radiation therapy need to have adequate training and extensive supervised experience in the handling of radioactive materials for therapeutic purposes.

Radiation therapy of animals must only be performed by, or under the direct supervision of, personnel:

- (a) specifically trained and experienced in such procedures; and
- (b) who are appropriately authorised by the relevant regulatory authority.

The therapeutic use of radiation must only be undertaken using special equipment and facilities designed for the purpose.

The facilities for the treatment and housing of the animal must be adequate for protection of:

- (a) the persons caring for the animal; and
- (b) any other person in the vicinity.

Sealed Radioactive Sources – Gamma-Ray Emitters

The storage and handling of the sources must be in accordance with the requirements of documents in Part 9 below.

An up-to-date register must be maintained of all sealed radioactive sources that includes details of:

- (a) where appropriate, the serial number or other identification of each sealed radioactive source;
- (b) the physical or chemical form of the radioactive material;
- (c) a photograph or diagram of the source;
- (d) the date of receipt and its activity on that date; and
- (e) the date and manner of ultimate disposal (including those sources permanently implanted in animals).

A radiation survey meter must be readily available that is:

- (a) in good working order; and
- (b) suitable for the type of radiation being used.



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An appropriate personal monitoring device must be worn by each person handling radioactive materials.

At all times during the use of removable sealed radioactive sources in treatment:

- (a) the animal must be housed:
 - (i) under regular supervision,
 - (ii) in strictly secure circumstances in an enclosure such as a kennel, box or stall, set aside for that purpose, and
 - (iii) so that escape of the animal with sources in situ is most unlikely;
- (b) the enclosure must be located:
 - (i) in a position that is at least 3 metres from any normally occupied areas, and
 - (ii) as far as practicable from frequently used corridors, passageways or other thoroughfares;
- (c) the sealed radioactive sources to be used must be taken into the enclosure in their shielded container and then applied directly to the animal;
- (d) upon removal of the sources from the animal and before the animal is released from the enclosure, the sealed radioactive sources must be:
 - (i) checked,
 - (ii) all accounted for,
 - (iii) immediately returned into the shielded container, and
 - (iv) returned to the store;
- (e) if any damage to sources is observed following removal from the animal, the person responsible for the radioactive sources must be notified as soon as possible;
- (f) no person is permitted to enter the enclosure apart from essential feeding and care of the animal;
- (g) if a radioactive mould or applicator slips or becomes dislodged, the operator must notify the veterinary surgeon responsible for the treatment of the animal as soon as possible; and
- (h) appropriate radiation warning signs and instructions must be displayed on the enclosure.

In the case of permanent implantation of radioactive sources into an animal, the animal must be housed and attended to unless or until the total activity in the animal is less than:

- (a) for companion animals (i.e. domestic pets or animals normally in regular contact with humans), 1.2 GBq (~32 mCi) of gold-198; or
- (b) for field animals (i.e. animals normally held in a paddock or very large yard and not in contact with humans), 6 GBq (~160 mCi) of gold-198.



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For companion animals, the housing and care referred to above must be at the premises of the veterinary surgeon.

When the activity of the source is less than the values given above and the animal is released into the custody of an adult, that person must be provided with:

- (a) a suitably shielded container; and
- (b) appropriate written instructions that:
 - (i) apart from essential feeding and care, persons must not remain closer than one metre from the animal for 4 days after discharge of the animal,
 - (ii) no animal be ridden, groomed or have any extensive contact with humans until at least 14 days after discharge,
 - (iii) if any radioactive seed or grain from the implant becomes accidentally dislodged, it is only retrieved using tweezers, pliers or other long-handled implements, placed in the suitably shielded container referred to above and kept in safe custody until disposed of,
 - (iv) details of how to dispose of a source should it become dislodged, and
 - (v) on no account should any radioactive seed or grain be handled in the fingers or kept as a curio.

If an animal dies before treatment is completed, the person responsible for the radioactive material must:

- (a) be notified as soon as possible; and
- (b) arrange for removal of the sources.

Sealed Radioactive Sources – Beta Particle Emitters

The only radioactive element in common use as a sealed radioactive source of beta particles for radiation therapy is strontium-90. This is made up in a form suitable for surface application to thin accessible lesions. It is important to note that a strontium-90 applicator, although appearing quite innocuous, is a very delicate and potentially hazardous device. Manufacturers suggest that expected life of a strontium-90 applicator is 15 years although this may be able to be extended with careful handling.

▪ Use of an Applicator

A strontium-90 applicator must only be used by a person appropriately authorised by the relevant regulatory authority to do so.

The applicator must be fitted with an appropriate handling device for use.

The active face of the plate must not be viewed directly.



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▪ **Damage, Loss or Disposal of an Applicator**

A plate that has been damaged in any way¹ must be returned immediately to an appropriate body for checking, possible repair and testing for radioactive leakage.

The loss of an applicator must be reported to the relevant regulatory authority immediately.

Strontium-90 applicators must only be disposed of subject to authorisation by the relevant regulatory authority.

▪ **Storage of Strontium-90 Applicators**

A strontium applicator must be stored in a container that is designed:

- (a) with the smallest overall external dimension of the box not less than 0.1 m;
- (b) to protect the plate from damage;
- (c) to provide adequate radiation shielding; and
- (d) so that the plate cannot move or be dislodged during transport.

The plate must always be kept in its special container when:

- (a) not in use; or
- (b) being transported.

The outside of the box must carry the:

- (a) appropriate radiation warning symbol;
- (b) name of the radioisotope (strontium-90);
- (c) nominal activity;
- (d) date of measurement; and
- (e) name, address and contact telephone number of the Responsible Person.

Storage of Veterinary Sources of Radiation

Storage of Radioactive Sources Used in Veterinary Medicine

A sealed or unsealed radioactive source used in veterinary medicine should be securely stored if it:

- (a) is not required for immediate use; or
- (b) has been removed from use.

When a sealed and unsealed radioactive source used in veterinary medicine is placed in storage:

- (a) the radioactive source should be stored so that the likelihood of damage to the source is minimised. Damage to a gauge in storage could result from a fall, collision, corrosion etc.;
- (b) the source container should be clearly labelled as containing a radioactive source;
- (c) the source container should be locked or otherwise secured; and
- (d) the source container should be monitored to ensure that:
 - (i) the source is actually inside the container, and

¹ For example, the boss broken off or the flat active section bent or scratched.



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- (ii) the dose rate at the surface of the container will not result in any person exceeding the relevant dose limit specified in local legislation and in RPS1.

A store used for radioactive sources should:

- (a) be of solid construction and made of durable materials;
- (b) be designed, located, constructed and, if necessary, shielded so that:
 - (i) the radiation levels at any accessible place outside the store do not result in an ambient dose equivalent rate or directional dose equivalent rate, as appropriate, exceeding $10 \mu\text{Sv}\cdot\text{h}^{-1}$,
 - (ii) no person will receive a radiation dose in excess of the appropriate limit specified in local legislation and in RPS1, and
 - (iii) the resultant radiation dose rate in any occupied area is as low as reasonably achievable;
- (c) be under the control of a person nominated by the Responsible Person;
- (d) be kept locked;
- (e) be subject to strict access control;
- (f) not be used for other purposes; and
- (g) bear a conspicuous notice displaying the radiation hazard warning symbol, when a radioactive source is in the store. The letters and symbol of the notice should be in black on a yellow background. An example of a suitable notice is given below in Part 6.

A store used for the storage of a sealed and unsealed radioactive source used in veterinary medicine should not be located:

- (a) near to explosives, combustible or corrosive materials or photographic or x-ray film;
- (b) in an area prone to flooding or other potential hazard that may damage the store and/or its contents; or
- (c) in an area that allows unrestricted access to the public.

EXAMPLE OF A WARNING NOTICE FOR A RADIOACTIVE MATERIAL STORE





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DOCUMENTATION

None

AUDIT

Staff radiation exposures to be reviewed quarterly.

REFERENCES

NSW Health Policy Directive [Correct Patient, Correct Procedure, Correct Site](#)

[ARPANSA Safety Guide for Radiation Protection in Nuclear Medicine \(2008\) \(RPS 14.2\)](#)

AS/NZ 2982.2010 Laboratory Design and Construction

[ARPANSA Code of Practice for the Exposure of Humans to Ionizing Radiation for Research Purposes \(2005\) \(RPS 8\)](#)

[ARPANSA Code of Practice & Safety Guide. Radiation Protection in Veterinary Medicine RPS 17 \(July 2009\)](#)

REVISION & APPROVAL HISTORY

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Dec 2014	Version 1	William Bartolo, Bartolo Safety Management Service
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