



Queensland
Government

Radiation Health use only

Radiation Safety Act 1999

Approval No.: _____

This radiation safety and protection plan is approved for:

Possession Licensee

Delegate of the Chief Executive

Date

Radiation Safety and Protection Plan

Plain X-ray Imaging of Small Animals for Veterinary Diagnostic Purposes

(Digital imaging only)

Name of possession licensee

Signature of possession licensee or corporate representative

Date

1. Introduction

For the purposes of this document, the possession licensee is identified on page 1 of this document.

It is a requirement of the *Radiation Safety Act 1999* that reasonable steps are taken to ensure that any person's health and safety are not adversely affected by exposure to radiation. This requirement of the Act will be met if all persons in this practice comply with this plan.

This plan will also:

- help ensure that the radiation doses to all persons involved in the practice are minimised; and
- assist the possession licensee in attaining a satisfactory level of compliance with the *Radiation Safety Act 1999*.

2. Scope

This plan applies only to fixed or portable X-ray apparatus used for plain X-ray imaging of small animals for veterinary diagnostic purposes using digital imaging systems. The plan is also only suitable for small veterinary practices.

All persons who are employed at this practice will comply with this plan. These persons must also comply with the following documents:

- *Code of Practice and Safety Guide for Radiation Protection in Veterinary Medicine (2009)* published by ARPANSA,
- *Radiation Safety Act 1999* and *Radiation Safety Regulation 2021*.

3. Hazard Assessment

X-ray apparatus present a radiation hazard when they are being used. Exposure to radiation can cause injury or fatal illness to a person. This risk of injury or harm to health depends on the type of radiation and extent of the exposure and might only be observed after many years have elapsed. Consequently, the exposure of individuals to radiation should be either prevented or reduced to a level where the risk of adverse health effects is minimised.

In veterinary radiography, radiation doses to users, other employees, animals, and members of the public will depend on several factors such as the number of exposures, the exposure settings used, work practices and the apparatus itself. Radiation doses are relatively low in comparison with those experienced by persons involved in some diagnostic procedures on humans but can become significant because of poor work practices or if X-ray apparatus does not comply with the relevant standard.

It is important to take care with the exposure factors used in digital systems as it is possible to make exposures resulting in higher levels of radiation than is clinically necessary whilst still obtaining diagnostic images.

Provided this plan is complied with, and the X-ray apparatus and the premises in which it is used continue to meet the relevant radiation safety standards:

- the health risk to persons from the small animal veterinary radiography practice should be minimized, and
- there is no requirement for personal radiation monitoring or personal alarm dosimeters to be provided at this practice.

4. Functions of the Radiation Safety Officer

This practice has a radiation safety officer (RSO) who has been appointed to:

- monitor radiation safety,
- report to the possession licensee about radiation safety, and
- maintain awareness of the radiation safety legislation and keep abreast of the trends in radiation safety.

The contact details of the RSO are displayed at the entrance to, or within, the X-ray room.

(a) On-going RSO duties

On an on-going basis, the RSO will:

- provide, or arrange for, training about radiation hazards and safe working practices,
- monitor the radiation safety status of the X-ray apparatus and premises to identify whether the relevant radiation safety standards are being complied with,
- maintain the register of X-ray apparatus,
- identify ways of minimising radiation doses,
- advise staff on safe working practices, and
- investigate radiation incidents.

Additionally, the RSO will report to the possession licensee:

- any radiation incidents,
- any contravention of this plan or relevant radiation safety standard, and
- any action that needs to be taken to achieve compliance with this plan or relevant radiation safety standard.

(b) Annual RSO duties

Each year, the RSO will check, and record the results of, the following items in a logbook, and ensure that any identified problems are rectified as soon as possible:

- users and all other employees understand, and are complying with, this plan,
- the details of each X-ray apparatus (including its location) are accurately recorded in the practice's register of X-ray apparatus, and match the inventory held by Queensland Health,
- the Possession Licence is current and remains appropriate,
- all users of X-ray apparatus hold current and appropriate Use Licences, and are authorised by the possession licensee to use the X-ray apparatus in this practice,
- all maintenance and operational checks, as required by this plan, are conducted within the stated timeframes, and any relevant problems have been appropriately rectified,
- all repairs to the X-ray apparatus and ancillary equipment are recorded,
- personal protective equipment and safety devices, as required by this plan, are readily available,
- compliance certificates for the X-ray apparatus and premises have been obtained within the necessary time frames (three and five years respectively), and
- the effectiveness of, and extent of compliance with, this plan.

Additionally, if the RSO is not the same person as the possession licensee, the RSO will provide an annual written report to the possession licensee. This report will include, but not be limited to, the following:

- the results of the annual checks described in section 4(b) of this plan,
- any identified ways of minimising radiation dose received by persons,
- any contravention of this plan or relevant radiation safety standard, and what action needs to be taken to ensure compliance with the plan or standard,
- the results of a review of this plan to ensure its continued effectiveness against actual clinical practice, and
- recommendations about any necessary changes to the plan.

5. Access Control

The X-ray apparatus used in this practice is subject to strict access control. When not in use, the X-ray apparatus will be set so that it is incapable of producing X-rays (for example, by removing the key and keeping it in a secure location under the control of the possession licensee).

Portable X-ray apparatus will be locked in a secure location under the control of the possession licensee. If portable X-ray apparatus needs to be used in the field, it will remain under the control of the user and will be locked in a secure location when not actually in use.

6. Training

The RSO provides, or arranges for the provision of, appropriate training to all persons who are employed at this practice. All employees will undertake and satisfactorily complete the following training when they start employment and undergo annual refresher training thereafter. Participation at this training will be recorded in the training logbook.

(a) Training for all employees

A radiation safety training program that addresses the following will be provided to all persons:

- radiation hazards specific to this practice,
- specific responsibilities of each category of employee,
- safe work practices, including minimising radiation dose to patients and users,
- regulatory obligations, and
- other details of this radiation safety and protection plan.

(b) Additional training for users

In addition to the above, users of X-ray apparatus will also be provided specific instructions on the:

- *Code of Practice and Safety Guide for Radiation Protection in Veterinary Medicine (2009)*,
- features of, and how to use, the X-ray apparatus, and
- selection of the lowest exposure factors to achieve the desired clinical outcome.

Persons involved in using digital imaging systems will also be provided refresher training in the use of digital imaging systems and post processing procedures.

7. Safe Work Practices

Users will take reasonable steps to ensure that the radiation dose received by any person is as low as reasonably achievable. To achieve this, the following safe work practices will be adhered to at this practice.

(a) General requirements

- X-ray imaging will only be undertaken if justified – that is there is a reasonable indication for the procedure, and it can be performed without undue radiation hazard to users and other staff.
- Users of X-ray apparatus must hold current and appropriate Use Licences.
- Only Use Licensees who are authorised to use the apparatus by the possession licensee have access to, and are allowed to use, the X-ray apparatus.
- No person who is under the age of 16 will be directly involved in work with radiation.

(b) Use of X-ray apparatus

- A person must not hold any part of the X-ray tube housing during a radiation exposure.
- The X-ray tube assembly must be rigidly supported by a dedicated stand which provides adequate stability.
- The image receptor must not be held in position by hand.
- The primary beam must be restricted to the area to be examined by means of the collimator.
- Under no circumstances must any person be exposed to the primary beam.
- An animal must not be held during imaging unless, for clinical reasons, other means of immobilisation are not practicable. Immobilisation should be achieved by mechanical means, tranquilisation, or anaesthesia whenever possible.
- The same individual should not be asked to hold animals repeatedly.
- If it is clinically necessary to hold an animal during X-ray examinations, it will be restrained by the minimum number of persons necessary. Additionally, the persons must be 18 years or older, should not be pregnant, and must wear personal protective equipment.
- When performing X-ray imaging, the user and any assistants must remain behind a protective screen or, if there is no screen, wear personal protective clothing and position themselves as far as practicable from the X-ray tube assembly, the animal and the path of the primary X-ray beam.
- Users must ensure that the appropriate exposure factors are used. Established exposure techniques must not be adjusted to compensate for inadequate imaging without thorough investigation into the reasons.
- The lowest possible exposure settings should be used in digital systems because the image processing software can produce diagnostic quality images even when using exposure factors lower than those used with film.

Radiography in a dedicated X-ray room

- An examination table incorporating appropriate radiation shielding will be used.
- Doors to the X-ray room must be closed during the diagnostic imaging examination.
- A person must not be present in the room during X-ray imaging unless their presence is necessary for the conduct of the imaging procedure.

Radiography at field sites

X-ray imaging will only be conducted outside of a dedicated X-ray room if it is not practicable to bring the animal into the room.

(c) Image receptors

To ensure that radiographs are of consistent diagnostic quality, this practice will only use image receptors that are of an appropriate size and that are compatible with the X-ray apparatus being used.

(d) Register of exposures

- This practice will keep the following information about each exposure:
 - the name of the animal and its owner,
 - date the radiographic examination is performed,
 - particulars of the radiographic examination, and
 - the name of the user of the X-ray apparatus.
- Users must ensure this information is recorded after each examination (including any rejects).
- Users must ensure that each image is permanently marked with this information (by including it in the metadata of the image) and incorporated into the animal's records.

(e) Personal protective equipment and safety devices

This practice will provide the following personal protective equipment and safety devices for users and assistants:

- Protective aprons with lead equivalence of at least 0.25 mm are available for all persons involved in X-ray imaging where they are required to hold an animal during the X-ray examination, or when they are unable to stand behind a protective barrier. Lead aprons are to be stored unfolded to help prevent the formation of cracks.
- Protective sleeves and gloves with lead equivalence of at least 0.5 mm for all persons who need to hold an animal during the X-ray examination.
- An examination table with radiation shielding equivalent to 0.5 mm of lead on the side and 1.0 mm of lead on the top.
- Assorted sandbags and restraints for animal positioning.
- Tripods and stands for the X-ray head and image receptor holders.

(f) Reporting to the RSO

Users and other staff are required to report to the RSO any contravention of this radiation safety and protection plan, or any radiation incident.

8. Operational Checks

The operational checks detailed in the following table will be performed by an appropriately trained person authorised by the possession licensee. Any identified problems are to be rectified.

Results of all operational checks will be recorded in the practice's operational check logbook.

Frequency	Operational Check
Weekly	Check the quality of a test digital image (e.g. first clinical image of the day) by comparing it with a reference radiograph to ensure that it exhibits the desired qualities of contrast, density and sharpness.
Monthly	Perform a retake/reject analysis to determine the reason for the retake or reject (which may include problems with the image receptor, the X-ray apparatus or the user).
Six monthly	Check the condition of personal protective equipment.
	Check that safety devices are in good condition and that they perform the function they are intended to perform.
	Check that exposure factors for specific examinations are readily available.
	Check that the correct contact details of the RSO are displayed at the entrance to, or within, the X-ray room.
	Check that X-ray apparatus warning signs are displayed on each control panel and are in good condition

9. Repair and Maintenance

To ensure images are produced with optimal diagnostic quality and radiation doses continue to be minimized, all maintenance will be carried out in accordance with the schedule specified by the manufacturer. Maintenance and repairs will only be conducted by a qualified service person.

If X-ray apparatus needs to be used during repair or maintenance, the RSO will check that the person making the exposure holds an appropriate use licence.

Following the repair of X-ray apparatus, the RSO will check that the apparatus continues to comply with the *Standard for ionising radiation apparatus – medical imaging (2021)*. This may necessitate having the apparatus tested for compliance with the standard by an accredited person.

Records of all repair and maintenance will be kept in the practice's equipment maintenance logbook.

10. Records

The following records will be maintained and kept in a readily accessible location:

- current Possession Licence issued under the *Radiation Safety Act 1999*
- current approved radiation safety and protection plan
- annual reports by the radiation safety officer
- radiation safety audit reports
- training logbook
- equipment maintenance logbook

- operational check logbook
- register of examinations performed
- register of X-ray apparatus (details of the apparatus and its location)
- approvals to acquire or relocate X-ray apparatus
- X-ray apparatus disposal records
- incident reports.

11. General Regulatory Requirements

This practice will comply with the legislative requirements associated with the movement or change of ownership of X-ray apparatus, and the compliance testing of the X-ray apparatus and the premises in which it is used. The RSO will be the usual point of contact in relation to these matters.

(a) Acquisition, supply and relocation

X-ray apparatus will not be acquired by this practice without first having the approval of the Chief Executive of Queensland Health (approval will be sought through making an application for approval to acquire a radiation apparatus).

X-ray apparatus will not be supplied to another person in Queensland unless that person has first obtained an 'Approval to Acquire' the specific X-ray apparatus.

X-ray apparatus will not be relocated (permanently supplied to a person outside of Queensland) without first having the approval of the Chief Executive of Queensland Health (approval will be sought through making an application for approval to relocate a radiation source).

(b) Disposal

If X-ray apparatus is to be disposed of, it will first be made permanently incapable of producing X-rays. Within seven days following the disposal, the possession licensee will give the Chief Executive of Queensland Health written notice of the disposal.

(c) Compliance testing of X-ray apparatus

Before initial use, and every three years thereafter, the X-ray apparatus will be assessed, by an appropriately accredited person, for compliance with Queensland's Radiation Safety Standard *Standard for ionising radiation apparatus – medical imaging (2021)*. Only X-ray apparatus with a certificate of compliance will be used.

(d) Compliance testing of premises

Before initial use, and every five years thereafter, each room where X-ray apparatus is used will be assessed, by an appropriately accredited person, for compliance with Queensland's Radiation Safety Standard *Standard for premises - ionising radiation sources (2021)*. Only premises which have a certificate of compliance may be used to carry out radiography.

If there has been a change in the location of X-ray apparatus (including its location within a room), workload or use of an adjacent room, the possession licensee will ensure that an appropriately accredited person performs an assessment of the premises for compliance with the relevant radiation safety standard before the apparatus is used.

12. Incident Response and Reporting

A radiation incident is an incident adversely affecting, or likely to adversely affect, the health or safety of any person because of the emission of radiation.

The most likely radiation incident at this practice is an actual or suspected malfunction of the X-ray apparatus. In this case, the following procedure will be observed:

- The user must switch off the X-ray apparatus as quickly as possible at the main supply.
- The user must take precautions to prevent the use of the X-ray apparatus by:
 - posting a sign which states that the X-ray apparatus must not be used; and
 - removing the key to the X-ray apparatus or taking other appropriate action.
- The user must advise the RSO of the incident.
- The X-ray apparatus will not be used until it has been assessed and repaired if necessary (and also compliance tested if necessary) and the possession licensee authorises its use.
- The RSO will determine the radiation dose to each person involved in the incident.

(a) Notification

After any radiation incident, a written report will be prepared by the RSO and submitted through the possession licensee to the Radiation Health Unit within 7 days after the incident. This report will include:

- a description of the incident and the events leading up to it (including location, persons involved, details of the X-ray apparatus)
- a description of the action taken to remedy the incident
- the likely cause of the incident
- estimates of radiation exposure to individuals (if applicable)
- proposals to prevent a recurrence of the incident.

Additionally, the possession licensee will immediately notify the Chief Executive of Queensland Health, either orally or in writing, if one of the following events happen:

- The X-ray apparatus is, or appears to have been, lost or stolen.
- There is a radiation incident for which there are no remediation procedures stated in this plan.
- Equipment that uses, measures or controls radiation emitted from the X-ray apparatus malfunctions with the result, or likely result, that there is, or will be, an unintended emission of radiation or a person is, or will be, unintentionally exposed to radiation.