

RADIATION PROTECTION SUPERVISOR (RPS)

SUITABILITY & DUTIES



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Radiation Protection Adviser

Introduction

These notes are about the appointment, qualifications and responsibilities of Radiation Protection Supervisors (RPS) working in the field of veterinary radiography. Although the emphasis is on small animal radiography the general principles apply to all disciplines.

Their purpose is to provide the RPS with appropriate instruction to satisfy the requirements of Regulation 18 of the Ionising Radiations Regulations, 2017.

The legal definition of the role is that the RPS should:

- know and understand the requirements of the Regulations and local rules relevant to the work with ionising radiation;
- command sufficient authority from the people doing the work to allow them to supervise the radiation protection aspects of that work;
- understand the necessary precautions to be taken and the extent to which these precautions will restrict exposures;
- be given sufficient time and resources to carry out their functions:
- know what to do in an emergency.

The following abbreviations are used:

| | |
|-------|---------------------------------------|
| IRR17 | Ionising Radiations Regulations, 2017 |
| ACOP | Approved Code of Practice |
| RPS | Radiation Protection Supervisor |
| RPA | Radiation Protection Adviser |
| PHE | Public Health England |
| PPE | Personal Protective Equipment |
| ADS | Approved Dosimetry Service |
| HSE | Health & Safety Executive |
| TLD | Thermoluminescent Dosimeter |
| OSL | Optically Stimulated Dosimeter |
| PED | Personal Electronic Dosimeter |

Appointment of an RPS

Radiation employers must appoint an RPS in writing who will be responsible for the day to day management and safety of the X-ray facility. The RPS need not be present at every radiographic examination but will be a senior member of staff working on the premises. Multi branch practices need to assess the number of suitable personnel available to cover all sites. It may be feasible for an individual to cover more than one site so long as close control of day to day activities is maintained. Consideration should be given to having more than one RPS at a single site if there are multiple activities (eg small animal and equine radiography/scintigraphy). The RPS has to be familiar with the activity being supervised.

Any RPS appointed by the employer should be clear about the role they are expected to fulfil. The name of each RPS appointed has to be given in the local rules covering the area they will supervise.

Attributes of a suitable RPS

Persons appointed as RPS should have

General knowledge of:

- Nature & risks of ionising radiations (page 4).
- IRR17 & ACOP (page 5).
- Basic principles of radiation protection (page 6).
- Risk assessment (page 8).
- Dosimetry & dosimeters (page 9).

Thorough knowledge of:

- Guidance Notes (page 11).
- Local Rules and Written Arrangements (page 11).
- Contingency Plans (page 12).
- Where to seek advice (page 13).

Sufficient authority

The RPS is likely to be either the employer or an employee of the veterinary practice. It is unlikely that an individual without an MRCVS, (R)VN or (in some rare instances) a medical radiographer qualification would be a suitable choice for the role of RPS in a veterinary practice.

Training

It is the responsibility of the employer to ensure that those employees who are engaged in work with ionising radiation are given appropriate training in the field of radiation protection and receive such information and instruction as is suitable for them to know:

- the risks to health created by exposure to ionising radiation;
- the precautions which should be taken;
- the importance of complying with the medical, technical and administrative requirements of these Regulations.

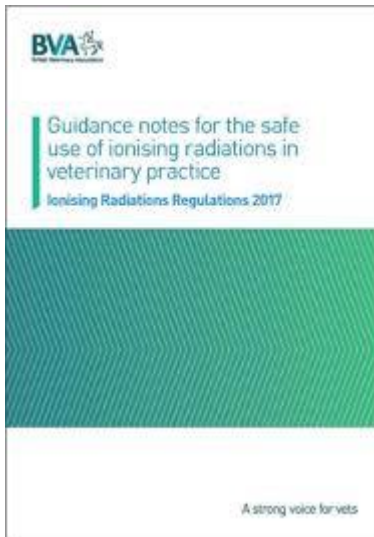
The RPS is specifically defined as an individual requiring training in order to perform their particular function. The level of training will vary from individual to individual and may be minimal or extensive. IRR17 recognises that in some instances a few hours targeted training may be all that is required. The present HSE position is that recent, specific radiation protection training is compulsory. MRCVS or RVN qualifications are not deemed sufficient. Although the RPS does not have to present for each use of ionising radiation the HSE consider that a single RPS at any site is usually insufficient. Additional RPSs are certainly essential at sites with multiple modalities and/or branches. Mixed practices with equine facilities require an additional RPS familiar with the work involved.

A number of bodies provide RPS training courses. Some of these may be rather generic and you should check that the course content is relevant. RpaVet currently offers a live, online course. See www.rpavet.co.uk for available dates. HSE require training to be renewed at least every 5 years and may be due prior to this if there are significant legislative changes.

Nature & risks of ionising radiations

It is assumed that veterinary surgeons and qualified veterinary nurses have acquired some knowledge of the nature & risks of ionising radiations during the course of their training. The RPS will have acquired additional knowledge subsequent to specific CPD activities. However, it is important to remember that ionising radiations cannot be detected by any of the physical senses and are capable of causing somatic &/or genetic tissue damage which may not become apparent until some time after exposure.

IRR17 & ACOP



IRR17



ACOP

As with all Regulations under the Health & Safety at Work Act, the Ionising Radiations Regulations, 2017 is accompanied by an Approved Code of Practice titled “Working with ionising radiation”. Unlike most ACOPs, this includes some guidance.

NOTE:

- IRR17 is a statutory, enforceable instrument.
- ACOP gives practical advice on how to comply with the law in respect of those specific matters on which the Code gives advice. You may use alternative methods to those set out in the Code in order to comply with the law.

However, the Code has a special legal status. If you are prosecuted for breach of health and safety law, and it is proved that you did not follow the relevant provisions of the Code, you will need to show you that you have complied with the law in some other way or a court will find you at fault.

ACOP is accompanied by guidance which does not form part of the ACOP. Following the guidance is not compulsory and you are free to take other action but it should be noted that safety inspectors seek to secure compliance with the law and may refer to the guidance as illustrating best practice.

- They cover all uses of ionising radiations.

Basic principles of radiation protection

An understanding of the basic principles of radiation protection will help to explain the reason for many of the regulations in IRR17 which might otherwise appear arbitrary.

Aim of radiation protection

To ensure that persons working with ionising radiations are exposed to doses which are As Low As Reasonably Practicable (ALARP) and Dose Limits are not exceeded.

Factors to be considered

1. Involvement

Persons not essential to the X-ray examination must be excluded from areas where they might be exposed to ionising radiation (ie the controlled area) – hence there must be warning signs & lights. Only the minimum number of persons necessary to perform the examination must be involved.

2. Total X-ray dose – must be minimised

The total dose is a function of both beam energy (kV) and number of X-rays (mAs).

Radiography should only take place when there is a clear clinical need (justification).

Avoid repeat exposures by the use of correct technique. Although digital processing may be able to adjust the final image this should not be a substitute for incorrect selection of exposure factors. The maximum available mA (and hence shortest exposure time) should be used consistent with selecting the correct focal spot size.

There should be complete familiarity with either digital software applications or (rarely) film/screen combination selection appropriate to the clinical application.

Reduction in scatter

A grid should be used for radiography of body parts thicker than 10 cm. This will usually apply even with digital processing.

Unless a specific Bucky or DR table is used, the table should be lead lined or lead rubber placed under the cassette.

High kV settings should be avoided and the beam collimated to the area of interest.

3. Distance from source of radiation

X-rays obey the inverse square law. Thus doubling the distance from the source of radiation will reduce the intensity to one quarter.

Never expose any part of the body, even if protected, to the primary X-ray beam.

Do not restrain the patient manually unless its condition precludes chemical restraint.
MANUAL RESTRAINT SHOULD BE A (VERY) RARE EVENT.

Although not ideal, in some practices where there is insufficient fixed shielding, the operator will be within the controlled area when an exposure is made. Appropriate PPE must be worn and the operator must stand as far away from the primary beam as practicable and a minimum distance of 2 metres. This arrangement would only ever be acceptable where radiographic workload is very low.

4. Barriers

If possible, stand behind a barrier which is resistant to X-ray penetration such as a brick wall, lead lined door or protective screen.

5. Means of protection

Restriction of exposure to ionising radiation should be achieved by all practicable means using the following hierarchy:

1. Physical controls - such as shielding of the X-ray room, warning signs & lights which illuminate automatically. If reasonably practicable, warning lights must be fail-safe.
2. Organisational controls - safe systems of work (local rules & written arrangements), designation of controlled area, staff training.
3. PPE - use of aprons, thyroid protectors & gloves.
 - Physical control measures, once in place, are always in place.
 - Organisational controls depend on compliance with the rules.
 - PPE should not be used as a substitute for the first two groups of control measures.

Hence the hierarchy.

Risk Assessment

Outline of a risk assessment for new activities using ionizing radiation

PRACTICE NAME & ADDRESS

This assessment will be reviewed and updated annually or sooner if there are changes to the X-ray facility or procedures.

The following matters need to be considered (note that not all will necessarily apply):

- a) the nature of the sources of ionizing radiation to be used (eg diagnostic X-ray tube), or likely to be present, including accumulation of radon in the working environment
- b) estimated radiation dose rates to which anyone can be exposed, including members of the public
- c) the likelihood of contamination arising and being spread
- d) the results of any previous personal dosimetry or area monitoring relevant to the proposed work
- e) advice from the manufacturer or supplier of equipment about its safe use and maintenance
- f) engineering control measures and design features already in place or planned
- g) any planned systems of work
- h) estimated levels of airborne and surface contamination likely to be encountered
- i) the effectiveness and the suitability of personal protective equipment to be provided
- j) the extent of unrestricted access to the working areas where dose rates or contamination levels are likely to be significant
- k) possible accident situations, their likelihood and potential severity
- l) the consequences of possible failures of control measures – such as electrical interlocks, ventilation systems and warning devices – or systems of work
- m) steps to prevent identifies accident situations, or limit their consequences.

Dosimetry & Dosemeters

- Personal dosimeters must be supplied by an ADS. A full list is available online (HSE). Note that some suitable commercial providers may not be listed but these will refer to a listed ADS.
- Dosimeters must be changed at regular intervals. Quarterly monitoring is appropriate for veterinary practices.
- Dosimeters must never be shared.
- An appropriate number of additional dosimeters should be available for temporary staff such as locums and for members of the public who assist with restraint of horses. An Instadose dosimeter is a practical PED solution for short-term use.
- If recommended by the RPA, an additional dosimeter may be positioned in or near the controlled area to monitor environmental radiation and detect any deterioration in control measures.
- Staff should wear their dosimeters throughout the working day and not just when involved in radiography. When not in use, dosimeters should be kept away from heat, damp or radiation.
- Loss or damage to dosimeters must be reported to the RPS.
- Dosimeters should be worn under protective clothing.
- All dosimeters are subject to a threshold level below which no record is made. This threshold is accumulative (ie many very low exposures can be summated to reach the threshold level).
- The following types of personal dosimeters may be suitable:
 - TLDs. Threshold 0.02 mSv.
 - Aluminium oxide dosimeters (Luxel+). Threshold 0.01 mSv.
 - PEDs – eg for lay assistant (equine radiography); students; locums.
 - Extremity dosimeters – may be recommended by the RPA where persons handle radioactive substances or are involved in other close intervention procedures.
- Dose records must be retained for not less than 2 years.
- **Personal dosimetry may not be required if certain criteria are met (see BVA Guidance Notes).**

Dose Limits

Dose limits should never be exceeded. Should this occur, HSE will undoubtedly carry out a searching investigation. The limits are as follows:

- Persons – 18yrs of age or more 20mSv per year
- Persons – under 18yrs 6mSv per year
- Members of the public 1mSv per year

Members of the public (eg owners) should never be involved in small animal radiography but their assistance with restraint in equine radiography can be justified. Owners or their representatives involved in equine radiography must give their informed, written consent and assist only with restraint.

Dose Investigation Level

- Should any member of staff receive, or appear likely to receive a dose of ionising radiations equal to, or greater than the Dose Investigation Level, an immediate investigation must be held.
- This investigation will involve the Radiation Employer, the RPS and the RPA.
- The purpose of the investigation is to identify the reason for the overdose and take all necessary steps to ensure that the problem does not continue or escalate to a point where a dose limit might be exceeded.
- The Dose Investigation Level must be stated in the Local Rules.
- A Dose Investigation Level of 1 mSv per year is appropriate for veterinary radiography.

NOTE THAT IN VETERINARY PRACTICE IT SHOULD BE EMPHASISED THAT EXPOSURE TO IONIZING RADIATION SHOULD NOT APPROACH AN INVESTIGATION LEVEL.

Guidance Notes



- Deals specifically with veterinary uses of ionising radiations.
- Has itself no legal status but failure to follow the guidance will count against the defendant if a prosecution is brought under IRR17.
- A copy should be available to all clinical staff for reference.
- RPS should be thoroughly familiar with the contents of the Guidance Notes.

All practices must have a copy of the latest edition. Note that the 2014 edition will be replaced in due course to accommodate IRR17 and HSE interpretation of the legislation.

Local Rules & Written Arrangements

Radiation Employers must draw up Local Rules. However, these are usually written by, or in consultation with the RPA.

Essential contents

Local rules should contain the following information:

- details of the management and supervision of the work;
- procedures for ensuring staff have received sufficient information, instruction and training;
- the dose investigation level specified for the purposes of regulation 9(8);
- identification or summary of any contingency arrangements indicating the reasonably foreseeable accidents to which they relate (regulation 13(2));
- name(s) of the appointed RPS(s) (regulation 18(5));
- the identification and description of the area covered, with details of its designation (regulation 19(1));

(g) a summary of the working instructions appropriate to the radiological risk associated with the source and operations involved, including the written arrangements relating to non-classified persons entering or working in controlled areas (regulation 19(3)).

Optional contents

Employers may also find it useful to include a brief summary or reference to the general arrangements in that area for:

- (a) testing and maintenance of engineering controls and design features, safety features and warning devices;
- (b) radiation and contamination monitoring;
- (c) examination and testing of radiation monitoring equipment;
- (d) personal dosimetry;
- (e) arrangements for pregnant and breastfeeding staff;
- (f) details of significant findings of the risk assessment, or where it can be found;
- (g) a programme for reviewing whether doses are being kept as low as reasonably practicable and local rules remain effective;
- (h) procedures for initiating investigations etc;
- (i) procedures for contacting and consulting the appointed RPA, including the information on relevant aspects of the health and safety management system in an annex to the local rules. This will supplement the key points mentioned in the essential content section. Requirements on the health and safety management system are also subject to regulation 5 of the Management Regulations.

- Local Rules & Written Arrangements must be readily available. There should be clear indication within the controlled area as to the (convenient) location of the local rules.
- Local Rules must be read, understood and obeyed by all staff. In particular, the RPS must understand the reasons behind the rules and ensure compliance with them.

Contingency Plan

The most likely radiation accident is the continuous emission of X-rays usually due to a faulty exposure switch.

In the event of such an accident, the following actions must be taken:

1. Isolate the X-ray machine from the electrical supply. This should always be possible from a radiation safe position, either at the override switch or at the consumer unit.
2. The X-ray machine should remain isolated from the electrical supply (remove the plug from the socket if appropriate) and decommission the machine by placing a suitable notice on it.
3. Battery powered generators may have to be left in the controlled area until discharged. A suitable warning notice must be placed to inform there is no entry to the controlled area. Timer failure in a battery powered unit is extremely unlikely.
4. Report the incident to the RPS as soon as possible.
5. Have the fault rectified by a qualified engineer.

A summary of the contingency plan must be included in the Local Rules.

Summary of Duties of the RPS

- Ensure compliance with the Local Rules & Written Arrangements and encourage general safety awareness.
- Authorise Radiographers – ie those persons suitably qualified and trained to take charge of an X-ray examination. Ensure other staff receive suitable training in safe radiography and are adequately supervised where necessary.
- Ensure exposure records are kept & monitor workload (if required by the RPA).
- Monitor staff dose levels.
- Monitor condition of equipment including PPE.
- Deal with and report emergencies.

Where to seek advice

If a problem arises for which the RPS does not have an answer, the following sources may be consulted

1. The Local Rules & Written Arrangements.
2. The Guidance Notes.
3. The Employer.
4. The Radiation Protection Adviser.

Shared working

If radiography is undertaken by staff employed by two Radiation Employers working in the same premises but at different times, a situation of Shared Working exists. An example is the relationship between the PDSA and Vets Now at some Pet Hospitals.

In such cases, the two Radiation Employers must consult with each other and agree a joint approach to compliance with IRR17. This will involve

- Each Radiation Employer must appoint their own RPS since the working hours of each group of staff are different.
- Each Radiation Employer must draw up their own Local Rules & Written Arrangements but one employer may simply require their staff to observe the Local Rules of the other.
- Each Employer must be responsible for dose monitoring arrangements for their own staff.
- Each RPS must be responsible for appointing Radiographers from their own staff.

Handover form

A handover form must be completed by both the site and visiting worker where appropriate (eg service engineer, RPA).



RADIATION PROTECTION ADVISER



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