



College of Veterinarians of British Columbia

CHECKLIST FOR COMPLIANCE WITH IONIZING RADIATION-EMITTING DEVICES

The designated member (DM) for a veterinary facility that owns/operates ionizing radiation-emitting devices (i.e. x-ray including dental/digital/fixed/portable, fluoroscopy, computed tomography) is required by the *Occupational Health and Safety (OH&S) Regulations* (see [WorkSafeBC, Part 7](#), Division 3, Radiation Exposure and the applicable Guidelines) and the [CVBC Facility Practice Standards](#) (see Section 8 - Diagnostic Imaging Area) to have performed and be immediately available to an Inspector with WorkSafeBC and the CVBC the following documentation:

1. Requirement for a Radiation Survey

The *Occupational Health & Safety Regulations*, Part 7, WorkSafeBC, Guidelines (G7.24 (a) Radiation surveys; issued February 8, 2007) states:

Except as otherwise determined by the Board, the employer must conduct a radiation survey for ionizing radiation in accordance with the standard practice specified under the applicable Safety Code listed in section 7.23(a) or the regulations under the Nuclear Safety and Control Act (Canada);

- a) *at the times required by the Safety Code or regulations, as the case requires,*
- b) *if equipment has been damaged or modified, or*
- c) *if there is an indication of an unusually high exposure of a worker to ionizing radiation”.*

For all other x-ray equipment, the employer must determine the appropriate interval between radiation surveys of the x-ray equipment. In making this determination, the employer should consider the following factors:

- (a) Manufacturer's specifications*
- (b) Requirements of the relevant professional association*
- (c) Nature of shielding used (e.g. lead or drywall)*
- (d) Frequency, nature, and conditions of use of the equipment*
- (e) Nature of patient (animal or human)*
- (f) Single or multiple users of the x-ray equipment*
- (g) Power levels used (kVp and mA settings)*
- (h) Results of personal exposure monitoring*
- (i) Type of x-ray unit (e.g. fixed or portable, radiographic, or fluoroscopic)*
- (j) Age and performance history of the equipment*

College of Veterinarians of British Columbia (CVBC)

1A. Frequency of Radiation Survey

It is expected that the interval between radiation surveys will not normally be more than three years, except in the case of a dental x-ray unit operating only at or below 70 kVp, where a maximum period of five years between surveys is acceptable because of the low power levels and the nature of usage.

This guideline does not alter the requirements of Regulation sections 7.24(b) and (c) which require a survey to also be conducted if the equipment has been damaged or modified, or if there is an indication of an unusually high exposure of a worker to ionizing radiation.

[Safety Code 28](#) (Radiation Protection in Veterinary Medicine) states:

“a Radiation survey must be carried out after any change that may increase radiation output of the equipment or affect protection of the operator or others (e.g. alterations of protective barriers, replacement of the X-ray machine with one capable of operating at a higher X-ray tube voltage and/or tube current, changes in operating procedures or increased workload”).

Radiation Protection Services (RPS), BCCDC maintains a list of [Radiation Protection Surveyors](#) the DM may contract to perform a “Radiation Protection Survey”.

[See: <http://www.bccdc.ca/health-info/health-your-environment/radiation/radiation-in-medicine/diagnostic-x-ray-facility-protection>]

2. Requirement of a Completed Shielding Assessment

All private x-ray/fluoroscopy/computed tomography facilities fall under provincial jurisdiction and now perform their own shielding assessment to provide protection for persons located outside the x-ray room. Two options exist for the DM (or owner) of the equipment:

- a. Perform their own shielding assessment using an appropriate “*Shielding Guidelines*” template from the RPS website. If the requested information to the site is satisfactory the DM (owner) will receive a completed “*Shielding Guideline*” from the RPS website for their records.
- b. If the information is unsatisfactory then the DM will need to hire a consultant. The RPS maintains a list of [Radiation Shielding Design and Assessment Consultants](#). This list is different from the RPS list of [Radiation Protection Surveyors](#). Templates include:
 - #2: [Computed Tomography](#)
 - #5: [Fluoroscopy \(Radioscopy\)](#)
 - #10: [Small Animal Veterinary Radiographic](#) (Guideline for Determining the X-ray Shielding Requirements for a Small Animal Veterinary Facility)
 - Guideline for Determining the X-ray Protection Requirements for [Small Animal Veterinary Medicine Multi-Purpose Room Set-Up](#)

At the time of the “*Radiation Survey*” the Radiation Protection Surveyor will determine whether a Shielding Assessment performed using the “*Shielding Guidelines*” is satisfactory or whether a [Radiation Design and Assessment Consultant](#) must be contracted by the DM (or owner) to address a facility shielding concern. [See: <http://www.bccdc.ca/health-info/health-your-environment/radiation/radiation-in-medicine/diagnostic-x-ray-facility-protection>]



3. Requirement of a “Certificate of Safety”

A “Certificate of Safety” (or its equivalent) for ionizing radiation-emitting equipment is a requirement under the [CVBC Bylaws \(S. 61, Facility Practice Standards\)](#) from a [Radiation Protection Surveyor](#). An ionizing radiation-emitting device assessed by a [Radiation Protection Surveyor](#) to be safe to operate and the testing results will be directly registered by the [Radiation Protection Surveyor](#) into the CVBC ‘Ionizing Radiation-Emitting Equipment Database’ that is maintained by RPS. See [Appendix B - Facility Practice Standards.pdf](#).

4. Requirement for a Copy of Applicable Health Canada Safety Code

There must be a current hard copy of each applicable Safety Code for equipment in use (see S. 69, FPS):

Safety Procedures for the Installation, Use and Control of X-ray Equipment in Large Medical Radiological Facilities	Code 35
Radiation Protection in Veterinary Medicine	Code 28
Radiation Protection in Dentistry	Code 30
Radiation Protection in Computed Tomography Installations	Code 31, see Code 35
Fluoroscopy Equipment	Code 20 A , Part A, section 8.3, see Code 35
Guidelines on Exposure to Electromagnetic Fields from Magnetic Resonance Clinical Systems (MRI)	Code 26
Nuclear Scintigraphy Equipment	Nuclear Safety and Control Act and its relevant regulations

[See: <http://www.bccdc.ca/health-info/health-your-environment/radiation/radiation-in-medicine/diagnostic-x-ray-facility-protection>]

5. Requirement for a Copy of Radiation Issues Notes (RIN)

There must be a hard copy of each applicable Radiation Issues Notes (RIN), available from the [RPS website Veterinary page](#) [<http://www.bccdc.ca/health-info/health-your-environment/radiation/radiation-in-medicine/veterinary>]:

- #4: [Radiation-Induced Skin Injuries from Fluoroscopy](#)
- #7: [Advisory on Personal Radiation Dosimetry Services](#)
- #10: [Proper Care, Selection, Quality Control and Disposal of Lead Aprons](#)
- #13: [Procedures for Reporting and Investigating High Occupational Radiation Exposure Notifications](#)
- #18: [Use of Radiation Badges by Staff in Veterinary Medicine](#)
- #19: [Personal Protection Guidelines for Ambulatory X-Ray Practice](#)
- #20: [Personal Protection Guidelines For Staff In Veterinary Medicine In A Multi-Purpose Room Set-Up](#)
- #21: [Guidelines for Wearing Radiation Monitoring Devices \[Personal Dosimetry\] in Veterinary Facilities](#)
- #23: [Radiation Protection for Persons Assisting During Equine Veterinary X-Ray Procedures](#)
- #24: [Guidelines for Workers Assisting During an X-Ray Procedure at a Small Animal Veterinary Facility](#)
- #25: [Guidelines for Clients Assisting Once During an X-Ray Procedure at a Small Animal Veterinary Facility](#)

College of Veterinarians of British Columbia (CVBC)

6. Requirement for Access to the CVBC 'Radiation Safety Manual'

Access to the [CVBC Radiation Safety Manual: A Quality Management Plan](#) (version 2, 2006) is available from the [RPS website Veterinary page](#). The designated member may wish to consult the Radiation Safety Manual for assistance in meeting their requirements under the [Workers Compensation Act](#) and the [CVBC Facility Practice Standards](#).

7. New Facilities with Name Approval Only

The DM, who has received 'Name Approval' from the CVBC Council for a proposed facility, may install but must not operate ionizing radiation-emitting equipment until a facility practice inspection has taken place and the CVBC Practice Inspector has provided: (1) permission for the facility to provide veterinary services to the public or to another veterinary practice facility; and, (2) the Practice Inspector has provided permission to operate the ionizing radiation-emitting equipment. Prior to the CVBC facility inspection, the DM must complete the requirements as outlined in the 'Undertaking Re: Ionizing Radiation Emitting Devices' (available from the CVBC Office).

At the time of practice facility inspection, the DM must sign the 'Undertaking', witnessed by the Practice Inspector in order to obtain permission to operate their equipment under 'provisional accreditation' from the Practice Inspection Committee (PIC) while waiting, if necessary, for a 'Certificate of Safety' to be issued by the 'Radiation Surveyor'.

8. Requirement for a Veterinary Facility Operating Nuclear Imaging and Radiopharmaceuticals

A veterinary practice facility operating nuclear imaging and radiopharmaceuticals is required to obtain and maintain its license in accordance with the Conditions recorded on their 'Nuclear Substances and Radiation Devices License' from the Canadian Nuclear Safety Commission (CNSC).

9. Requirement to Maintain Workplace Records

Records required by WorkSafeBC to be maintained at each facility is recorded under [OH&S Regulations](#), 7.25, Records:

"The employer must

(a) maintain and make available to the Board,

i. for at least 10 years, records of radiation surveys, and

ii. for the period that the worker I employed plus 10 years, records of exposure monitoring and personal dosimetry data, and

(b) make the records available to workers"

10. Requirement for a Radiation Safety Officer (i.e. Responsible User)

There *must* be at least one person designated as the Responsible User (veterinarian, animal health technologist, registered radiology technician) to undertake responsibility for ensuring:

1. The equipment is maintained properly and functions correctly and that maintenance is performed by competent personnel. Documentation in the form of logs must be kept for each piece of diagnostic imaging equipment using ionizing radiation. Such logs *must* contain but are not necessarily limited to the following: date, owner ID, patients ID, technique information (e.g. mA, kVp, and time), area of study, body part tissue depth, operators name and comments where applicable as well as dosage of contrast material if used (see attached tables);
2. X-rays have been authorized only by a veterinarian;
3. Operating staff are competent (i.e. adequately instructed) in the correct and safe operating procedures for the equipment. This *must* be documented in the employee's file.

All veterinary staff who participates in x-ray procedures, especially those considered as occupationally exposed workers, *must* receive training on basic principles of radiation protection, with a refresher. Per WSBC guidelines, the training *should* include:

- what is the hazard (type of radiation, route of exposure, general knowledge of the applicable dose limits, potential health effects, risks or hazards specific to the application, reproductive hazards);
- how to protect (e.g. precautions required) against exposure (applying principles of minimizing exposure time, distance from source, staying clear of a collimated or directed beam, and shielding, required safe work procedures, required personal protective equipment);
- what to do in the event of an emergency (notify the DM, notify the appropriate agencies as necessary); and,
- where to get further information (equipment operating instructions, written safe work procedures, appropriate Health Canada Safety Code, WSBC/RPS/Health Canada websites, the DM).

If there is a new procedure or new type of equipment, the operator *must* receive training on its proper use or application before commencing work.

4. Radiation levels outside controlled areas are below the permissible limits for each Safety Code. The WSBC Action Level is 1 mSv/ year (the time period for measurement is a calendar year, with a start date of January 01);
5. The facility complies with all applicable regulatory requirements;
6. Establishing safe working conditions according to Federal or provincial statutory requirements;
7. Carrying out routine checks of equipment and facility safety features;
8. Keeping records of "*Radiation Surveys*", including summaries of corrective measures recommended or instituted;
9. Declaring which personnel are occupationally exposed persons;

College of Veterinarians of British Columbia (CVBC)

10. Organizing participation, where necessary, in a personnel radiation monitoring service such as that provided by the National Dosimetry Service (Environmental and Workplace Health, Health Canada, Ottawa, Ontario K1A 1C1);
11. Ensuring that all occupationally exposed persons wear personal dosimeters during radiological procedures **under** the lead apron or when occupational exposures are likely;
12. Keeping records of occupational exposures received by personnel;
13. Investigating each known or suspected case of excessive or abnormal occupational exposure to determine the cause and to take remedial steps to prevent its recurrence;
14. All safety devices (personnel protective clothing, barriers) recommended are in good condition; and,
15. Appropriate warning signs are properly located.

*Note: the **Responsible User** can be an **Imaging Equipment Operator**.*

11. Responsibility of the Imaging Equipment Operator

All operators *must*:

1. have a thorough understanding of safe working methods and of special techniques required in the veterinary practice in which they are employed;
2. ensure other medical staff do not operate radiation equipment unless qualified; and,
3. be aware of the radiation hazards associated with their work and of their duty to protect themselves and others.

Reproductive hazards are specifically discussed in section 7.21 of the *OHS Regulation* and states “*the employer must ensure that every worker who exceeds, or may exceed, the action level, ionizing radiation is fully informed of any potential reproductive hazards associated with exposure to ionizing radiation*”.

A female operator *must* be encouraged to notify her employer if she believes herself pregnant. A female operator *should* immediately notify her employer upon knowledge that she is pregnant, in order that appropriate steps may be taken to ensure that her work duties during the remainder of the pregnancy are compatible with the recommended dose limits as stated in Appendix II. In general, there is no reason to remove pregnant operators, or other pregnant staff members, from their duties of operating X-ray equipment.

If a worker declares her pregnancy to the employer, her effective dose of ionizing radiation from an X-ray machine, for the remainder of the pregnancy, from external and internal sources, *must* be limited by the employer to the lesser of 4 mSv, or the dose limit specified for pregnant workers under the *WSBC regulations*. The pregnant woman *must* not receive more than 1 mSv in the period from 8 to 15 weeks after conception. The external dose shall be measured at the abdomen, by wearing the radiation badge on the waistline under the lead apron. If, before becoming pregnant, the average exposure of this worker is close to 4 mSv/year based on previous exposure histories, shorter wearing periods of the radiation badge than quarterly may be required to ensure that the dose limit is not exceeded. Additional information may be obtained from the [National Dosimetry Service](#).

College of Veterinarians of British Columbia (CVBC)

The Nuclear Safety Commission requirements, “*Nuclear Safety and Control Act (Canada)*”, apply for exposure by a pregnant women from a nuclear substance.

Section 7.21 of the *OH&S Regulation* also states “*when requested by a pregnant worker or by a worker intending to conceive a child, the employer must make counselling available with respect to the reproductive hazards associated with exposure to ionizing radiation*”. Counselling *should* address the specific concerns of the worker. Topics that *should* be covered during the counselling include:

- the specific exposure limits for pregnant workers as discussed;
- levels of radiation that may affect fetal development and cancer induction;
- levels of radiation that may cause sterility;
- relative risks of birth defects and childhood cancer associated with radiation exposure;
- the importance of the ALARA principle for pregnant workers and for worker’s intending to conceive a child; and,
- control measures for preventing inhalation or ingestion of, or contamination by, radioactive materials.

The material used for counselling workers *should* be periodically reviewed and updated because the information about the risks of ionizing radiation is changing rapidly.

12. Responsibility for a Student or an Operator-in-Training

A student, operator-in-training and personnel not experienced in the use of radiation equipment *must* work only under the direct supervision of a qualified operator. Dose equivalent limits for students and operators-in-training *should not* be greater than the limits set for members of the public (i.e. WSBC Action Level of 1 mSv/ year). Deliberate irradiation of an individual for training purposes or equipment evaluation *must* never occur.

The CVBC Bylaws, Standard 64, Facility Practice Standards requires: **Protocols must be in place to ensure that no person under the age of 18 is permitted to have occupational exposure to ionizing radiation from equipment using/producing ionizing radiation**, as follows:

No person under the age of 18 is permitted to have occupational exposure to x-ray equipment.