

## VETERINARY-USE X-RAY MACHINES

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(For assistance, please contact EHS at (402) 472-4925, or visit our web site at <http://ehs.unl.edu/>)

This Safe Operating Procedure (SOP) discusses special requirements for veterinary x-ray equipment. Currently, all veterinary-use x-ray machines at UNL are categorized as “diagnostic only.” None are fluoroscopic. All uses are subject to prior approval by the Radiation Safety Committee (RSC), and the equipment must be operated under the supervision of an individual licensed to practice veterinary medicine. State regulations for x-rays in the healing arts are provided in Nebraska Title 180, **Control of Radiation**, primarily Section 6. The major requirements of Section 6 are summarized below.

### General Requirements

- When an apron is worn, dosimetry (torso badge) must be worn at the collar outside the apron.
- Dosimetry in the form of a torso badge must be worn by all operators of veterinary x-ray machines.
- The veterinary x-ray supervisor or designee must maintain the following:
  - Model and serial numbers of all certifiable components and user’s manuals for those components.
  - Tube rating charts and cooling curves.
  - Records of surveys (EHS maintains), calibrations, maintenance, and modifications performed on the x-ray system(s).
  - A scale drawing must be available of the room in which a stationary x-ray system is located and indicate equipment arrangement and use(s) of adjacent areas including an estimation of the occupancy by an individual in such areas. The drawing must include results of the initial facility survey including radiation levels at pertinent locations and type and thickness of materials or lead equivalency of protective barriers. The information must be reviewed by a qualified expert (Health Physicist).
- X-ray Use Log is required.
- Film processing for each installation of a radiographic x-ray system using analog image receptors (e.g., radiographic film) must conform to applicable waste management procedures and safety requirements.

### Veterinary Requirements – Diagnostic X-ray Systems

- The control panel containing the main power switch shall bear the warning statement, legible and accessible to view: “**WARNING:** This x-ray unit may be

dangerous to patient and operator unless safe exposure factors and operating instructions are observed.”

- Leakage from the protective tube housing must not exceed 100 mR/hr at 1 meter.
- Radiation from components other than the Diagnostic Source Assembly must not exceed 2 mR/hr at 5cm from any accessible surface of the component.
- Useful beam aluminum equivalent filtration shall not be less than: 0.5 mm aluminum for machines up to 50 kVp; 1.5 mm aluminum equivalent for machines between 50 to 70 kVp; and 2.5 mm aluminum equivalent above 70 kVp. Filtration controls which link kVp with the minimum amount of filtration required are acceptable.
- Technique factors to be used during an exposure must be documented before the exposure begins.
- Structural shielding in the room must be designed and installed so that no dose greater than 2 mR/hr is emitted to a room or area external to the x-ray room.
- The machine must have a device to terminate the exposure after a preset time or exposure.
- The machine must be equipped with a dead-man exposure switch with a cord that will allow the operator to stand out of the useful beam and at least 6 feet from the animal during all x-ray exposures.

### **Operating Procedures**

- The operator must be protected from direct scatter radiation by a whole-body protective barrier, such as a lead apron, equivalent to 0.25 mm lead equivalent or shall be so positioned that the nearest portion of the body is at least 2 meters from the tube head and the nearest edge of the image receptor.
- Unless assistance is required, only the operator may be in the x-ray room during the exposure.
- Mechanical supporting or restraining devices should be used to hold animals in position during radiography. If a human is required to restrain the animal, that individual shall be positioned so that no part of their body will be struck by the useful beam. Individuals assisting must also be protected with appropriate shielding devices, such as protective gloves and apron.

### **PERSONNEL REQUIREMENTS**

- **Instruction.** At a minimum, each person conducting or supervising the operation of a veterinary-use x-ray machine must be credentialed by graduation from an accredited Veterinarian Technicians Program.
- **Personnel Monitoring.** Dosimetry consisting of a torso badge must be used by x-ray equipment operators. Students-in-training are not issued dosimeters because they are operating under the supervision of a competent person who is badged.