Ionizing Radiation Protection for Veterinary Medical Clinics – Part I
By Leslie Ptak, OSHA compliance assistance specialist

Radiographic imaging is an important tool in veterinary medical practice. Radiation exposure is also universally considered a potential health hazard to employees. Because of the nature of veterinary x-ray exposures – an employee typically holds the animal to keep them still, preventing unnecessary exposures to ionizing radiation requires a program of control that involves every member of the care team. This article discusses clinics’ regulatory responsibilities, as well as the policies and processes that veterinary medical clinics can incorporate into their operations to minimize employee exposures to ionizing radiation. This article is presented in two parts. Part II will be published in the next newsletter.

**ALARA** – ALARA is an acronym for “as low as reasonably achievable.” Long a principle of radiation safety, it means making every reasonable effort to maintain exposures to ionizing radiation as far below the dose limits as practical. Every reasonable effort means that a combination of engineering and work practice controls are used every time an exposure is taken to reduce the potential for employee exposure. The four elements of ALARA are to (1) collimate and use the lowest radiation dose needed (decreasing scatter) (2) increase shielding (3) decrease durations of exposure and (4) increase distance from the beam/scatter.

**Health effects** – The health effects of ionizing radiation are well recognized. Latent effects increase with the amount of cumulative lifetime exposure (i.e., all exposures added up over the life of the individual). The most significant risks are an increase in the possibility that a person exposed to ionizing radiation will develop cancer, bone marrow suppression, as well as other health outcomes, such as benign tumors, cataracts, and potentially harmful genetic effects. These genetic effects can include congenital defects in an individual’s offspring.

**Pregnant employees** – The employer is required to have a written, clear and well-communicated policy about pregnancy and potential exposure to ionizing radiation. The policy should make clear that it is the responsibility of the employee to inform her employer, in writing, about her pregnancy. The WDHS RPS regulations have specific requirements to reduce employee exposures to radiation, and these must be addressed in the employer’s radiation safety policy. WDHS RPS regulations include a recommendation that pregnant employees not hold the patient during an exposure, recommendations for additional dosimetry, and an appendix with a “Declaration of Pregnancy” document that addresses the rights of pregnant women who might be exposed to ionizing radiation.

**Veterinary clinic exposures** – Exposure to x-rays can occur when unprotected employees are near an x-ray machine in operation. Clinic staff using fixed, portable and mobile x-ray machines have the potential for chronic exposure to ionizing radiation. Chronic exposure is continuous or intermittent exposure to low doses of radiation over a long period of time. With chronic, low dose exposure, there is a delay
between the exposure and the observed health effect. Acute exposures can also occur. These are exposures to relatively high levels of radiation over a short period of time. Acute exposures and dosimetry readings that exceed the annual dose limit must be reported to WDHS RPS.

<table>
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<tr>
<th>Annual Occupational Dose Limits for Different Parts of the Body</th>
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<td>Whole body (Deep Dose Equivalent or DDE)</td>
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<td>Lens of the Eye (Eye Dose Equivalent or EDE)</td>
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• Source: US Nuclear Regulatory Commission, Subpart C - 10 CFR 20.1201, 20.1207 and 20.1208
• All doses are in units of millirems (mrem) of dose that may be received in a calendar year.

Regulation of workplace radiation exposures – Two agencies have jurisdiction over radiation safety in Wisconsin veterinary medical clinics: the Wisconsin Department of Health Services Radiation Protection Section (WDHS RPS) and the Occupational Safety and Health Administration (OSHA). Another organization, the National Council on Radiation Protection and Measurements provides leading scientific thinking on information, guidance and recommendations on radiation protection and measurements. The information contained in NCRP Report No. 148, Radiation Protection in Veterinary Medicine is considered the standard in keeping radiation exposures as low as achievable. The NCRPM is an advisory panel and does not have regulatory authority to inspect workplaces.

The WDHS RPS has authority over the registration and inspection of all machines that produce ionizing radiation (x-rays, computerized tomography, fluoroscopy, etc.), whether they are used in human medical or veterinary medical applications, industrial settings or research. They also have regulatory authority over the radiation exposures of patients undergoing X-ray procedures, the general public and the employees who take the X-rays. The regulations that apply to veterinary clinics are concentrated in DHS 157.74 through 157.81. Parts DHS 157.22, .23, and .25 address dose limits and also apply.

WDHS RPS updates its rules every three or four years and aligns its requirements with the NCRPM, US Food Drug Administration and Nuclear Regulatory Commission regulations. The agency is currently working on a revision to its Radiation Protection Chapter (DHS 157) and expects to have a final version in the spring of 2017. The revision is not expected to be substantially more protective of employees than what is now required.

Every x-ray machine has to be registered before it can be used, and the registration is renewed annually in December. The WDHS RPS sends registration renewal letters out each November and the registration fee is due by the end of the year. Any changes to the registration (i.e., ownership, new address, new device installed, new contact person, etc.) are to be submitted to WDHS RPS within 30 days of the change made.

The allowable exposure dose limits in OSHA’s Ionizing Radiation standard are outdated (29 CFR 1910.1096); they are based on scientific knowledge from the 1950s. However, the rest of the standard is
still relevant. When OSHA evaluates the hazards of x-rays in workplaces, it uses parts of 1910.1096, the agency’s personal protective equipment standards (Subpart I of 1910), and its general duty clause to address them.

**Have a written program** – A written Radiation Safety Policy is a requirement of the WDHS RPS. It also helps a clinic comply with OSHA’s requirements. Fortunately, the WDHS RPS has created a series of tools to help employers develop their radiation safety programs. The first is a template “GUIDE FOR REGISTRANTS,” which is currently being revised and will be available on the WDHS RSPS web site by spring 2017. The template is intended to be the foundation on which a clinic’s site-specific radiation safety program is developed. The benefit to an employer of a written program is that it (1) communicates your concerns for employees (2) standardizes your policies and procedures (3) addresses each of the regulations that all staff must comply with, and (4) is available for new staff to review when there is turnover. The Radiation Safety Policy must be available to employees at all times.

**Provide appropriate training** – Well trained employees are those best able to follow the principles of ALARA. This is essential because ALARA requires that a combination of engineering controls and work practices be followed. All employees are required to have access to and understand the Radiation Safety Policy. The WDHS RPS sets some training requirements and reviews curriculum and training when they evaluate sites. The agency requires training in the operations and safety measures of clinics, as well as in the specific devices used. The training should be conducted on initial hire and should be reviewed annually. The WDHS RPS also outlines training guidelines for the technicians who take CT scans.

**Signs and Notices** – DHS 157.88 requires that the Notice to Employees (Form No. P-45027, dated 12/10) be posted where employees can see it. OSHA requires that each radiation area be conspicuously posted with a sign or signs bearing the conventional radiation caution symbol. This is the three-bladed design (called a trefoil) that is magenta (purple) or black on a yellow background.

**Get employees involved** – The ALARA concepts are effective, and they rely on individuals adhering to certain behaviors and working as a team. For some staff, that may mean changing attitudes as well as behaviors. Getting employees involved in the development of policies and their implementation will get more results than giving them the message to “just do it.” Encourage employees to help with all aspects of ALARA, such as tracking dosimetry usage, inspecting personal protective equipment, and communicating policies and procedures, etc.

**Resources**

A link to the Wisconsin Department of Health Services Radiation Protection Section is here, [https://www.dhs.wisconsin.gov/radiation/xray/index.htm](https://www.dhs.wisconsin.gov/radiation/xray/index.htm).

A link to DHS 157, which is the WDHS RPS regulation for veterinary clinics, is here, [http://docs.legis.wisconsin.gov/code/admin_code/dhs/110/157](http://docs.legis.wisconsin.gov/code/admin_code/dhs/110/157).

A link to the DHS 157.88 Notice to Employees (Form No. P-45027, dated 12/10), which is required to be posted in the workplace, is here, [https://www.dhs.wisconsin.gov/publications/p4/p45027.pdf](https://www.dhs.wisconsin.gov/publications/p4/p45027.pdf).
A link to the Occupational Exposure Record per Monitoring Period (Form No. F-45003, dated 05/09) is here, https://www.dhs.wisconsin.gov/forms/f4/f45003.pdf.


A link to the National Council on Radiation Protection and Measurements is here, http://ncrponline.org/.

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