DEPARTMENT OF HEALTH AND SOCIAL SERVICES

CHANGES TO REGULATIONS

7 AAC 18. Radiation Sources and Radiation Protection.

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IN A JOINT PROJECT WITH THE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
[REPEALING 18 AAC 85.010 – 18 AAC 85.780]

FILED REGULATIONS

Incorporating Changes Made by the Department of Law

Effective April 9, 2009

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The title of Chapter 18 of Title 7 is amended to read:

Chapter 18. Radiation Sources and Radiation Protection [RADIOACTIVE MATERIALS].

7 AAC 18 is amended by adding a new article heading to read:

Article 1. Radioactive materials.

(Publisher: Place existing 7 AAC 18.010 following Article 1)

Editor's note: As of Register 190, July 2009, the regulations contained in 7 AAC 18.105 – 7 AAC 18.990 became effective simultaneously with the repeal of regulations of the Department of Environmental Conservation that contained the basic substance of 7 AAC 18.105 – 7 AAC 18.990 and appeared in 18 AAC 85.010 – 18 AAC 85.200, 18 AAC 85.220 – 18 AAC 85.270, 18 AAC 85.330 – 18 AAC 85.660, and 18 AAC 85.740 – 18 AAC 85.78018 AAC 85.010 – 18 AAC 85.200, 18 AAC 85.220 – 18 AAC 85.270, 18 AAC 85.330 – 18 AAC 85.660, and 18 AAC 85.740 – 18 AAC 85.780. During the relocation of the regulations to 7 AAC 18, the Department of Health and Social Services made necessary technical and substantive changes to the regulations.

7 AAC 18 is amended by adding a new article and sections to read:

Article 2. Registration and Use of Ionizing Radiation Sources.

7 AAC 18.105. Applicability of 7 AAC 18.110 – 7 AAC 18.990. (a) Except as otherwise specified in AS 18.60.525, the provisions of 7 AAC 18.110 – 7 AAC 18.990 apply to a person in this state who receives, possesses, uses, transfers, owns, or acquires a radiation source.

(b) The provisions of 7 AAC 18.110 – 7 AAC 18.990 may not be construed to limit the dose of radiation that is intentionally applied to a patient for healthcare purposes by, or under the direction of, a practitioner of the healing arts licensed in this state, except that

(1) registrants and operators shall apply the principles of ALARA (as low as is reasonably achievable) to ensure that patients are exposed to the lowest amount of ionizing radiation necessary to obtain the clinically intended result; and

(2) in the course of intentionally applying radiation to a patient for healthcare purposes, operators and registrants shall ensure that exposures to the general public do not exceed the limits specified in 7 AAC 18.240.

(c) Notwithstanding the minimum requirements and the permissible levels of ionizing radiation exposures established in 7 AAC 18.110 – 7 AAC 18.990, registrants and operators shall apply the principles of ALARA to ensure that registrants, operators, and the general public are exposed only to the lowest amount of ionizing radiation necessary to accomplish an intended purpose.

(d) For the purposes of 7 AAC 18.110 – 7 AAC 18.990, the principles of ALARA means making every reasonable effort to maintain exposures to radiation as low as reasonably practical, consistent with the purpose for which the exposure is undertaken, taking into account the state of technology, the economics of improvements in relation to the state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485 AS 18.60.525

7 AAC 18.110. Registration requirement. (a) A person that receives, possesses, uses, transfers, owns, or acquires an ionizing radiation source or radioactive material, except those specifically exempted in AS 18.60.525 and 7 AAC 18.125, shall register by submitting to the department an application, including all applicable fees, on a registration form prescribed and provided by the department.

(b) An applicant to become a registrant, or who is renewing a registration, of an ionizing radiation source shall identify on the registration form the

(1) name, address, and telephone number of the owner or facility;

(2) name, address, and telephone and facsimile numbers of the site of operation;

(3) name, title, and electronic mail address of the individual responsible for radiation protection;

(4) ionizing radiation source type; and

(5) total number of x-ray tubes.

(c) An applicant to become a registrant, or who is renewing a registration, of radioactive materials shall identify on the registration form

(1) the name, address, and telephone number of the owner or facility;

(2) the name, address, telephone number, and electronic mail address of the individual responsible for radiation safety;

(3) a description of the source material, including activity and physical form;

(4) the manufacturer, model name, and serial number, if part of equipment; and

(5) the location, if not at the address of the owner. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

Editor's note: For the purposes of submitting a registration form under 7 AAC 18.110, the department’s contact information is the Department of Health and Social Services, Division of Public Health, Radiological Health Program, 4500 S. Boniface Pkwy., Anchorage, AK 99507-1270; telephone: (907) 334-2100; fax: (907) 334-2161.

7 AAC 18.115. Registration procedure. (a) No later than 30 days after a person, subject to the provisions of 18 AAC 85.110, acquires an ionizing radiation source or radioactive

material, the person shall register the ionizing radiation source or radioactive material with the department.

(b) An application for an initial registration and renewal of registration shall be submitted on a form prescribed and provided by the department, and include all applicable fees. The applicant shall provide all information necessary to complete the form and any other applicable information that the department may request.

(c) An applicant under this section shall complete a separate form for each ionizing radiation source acquired by the applicant.

(d) A registration issued under this section expires on January 1 of the calendar year that is after the date of issuance, except that an initial registration and renewal of a registration that is issued on or after October 15 of a calendar year is valid until January 1 of the calendar year that is after the calendar year that follows the date of issuance.

(e) Before a registrant's registration expires under this section, the registrant shall renew the registration with the department by submitting an application for renewal on a form prescribed and provided by the department, including all applicable fees.

(f) No later than 30 days after any change in the information required for registration of an ionizing radiation source under this section, a registrant shall notify the department in writing of the change to ensure that all information regarding the ionizing radiation source registered with the department is current and accurate.

(g) No later than 30 days after the discontinuance of use or permanent disposal of a registered ionizing radiation source, a registrant, or the personal representative of the registrant's estate, shall notify the department in writing of the discontinuance of use or permanent disposal of each registered ionizing radiation source. If an ionizing radiation source is transferred to a

new owner or owners, the notification to the department must include the name and address of each transferee. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.120. Authorization to operate. (a) Before the initial operation of a device or source capable of producing radioactive material or radiation fields in excess of 200 millisieverts or 20 rems per minute, a registrant shall apply, by submitting an application prescribed and provided by the department, including all applicable fees, for an authorization to operate. The department will issue an authorization to operate only after inspecting the device or radiation source in the location of operation and the department determines that the device or radiation source and the environment meet the requirements necessary for safe operation as specified in 7 AAC 18.110 – 7 AAC 18.990.

(b) An authorization to operate issued by the department under this section may include special conditions if, upon inspection, the department determines that specific requirements are necessary to reduce radiation hazards and assure safe operation.

(c) If a registrant installs, intends to install, operates a device containing radioactive material with a half-life greater than 65 days, other than imaging device calibration sources or clinical markers, or operates a device capable of inducing nuclear instability of portions of the building structure, the registrant must submit a decommissioning plan to the department before the installation or operation of the device or receipt of the material. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

Editor's note: For the purposes of submitting an application under 7 AAC 18.120, the department’s contact information is the Department of Health and Social Services, Radiological

Health Program, 4500 S. Boniface Pkwy., Anchorage, AK 99507-1270; telephone: (907) 334-2100; fax: (907) 334-2161.

7 AAC 18.125. Exemptions. (a) The ionizing radiation sources described in AS 18.60.525(b) – (e) are exempt from the requirements of this chapter.

(b) In addition to the ionizing radiation sources described in (a) of this section, the following sources of ionizing radiation are exempt from the requirements of this chapter:

(1) source material in a chemical mixture, compound, solution, or alloy in which the source material is by weight less than 0.05 percent of the mixture, compound, solution, or alloy;

(2) unrefined and unprocessed ore containing source material;

(3) the possession or use of quantities of radioactive material, or products or materials containing radioactive material, in concentrations that do not exceed those listed in 10 C.F.R in Appendix C to Part 20 (Quantities of Licensed Material Requiring Labeling), as revised as of April 25, 1995, and adopted by reference;

(4) hands or dials of timepieces and other instruments containing luminous radioactive material, except that a person who possesses or uses the material to apply luminous radioactive material to hands or dials of timepieces and instruments is required to meet the requirements of this chapter;

(5) a domestic television receiver, if the dose rate at five centimeters from any outer surface is less than 0.5 millirem per hour;

(6) electrical equipment, except a domestic television receiver, that emits radiation incidental to the equipment's operation for other purposes, if the dose rate to the whole

body at the point of nearest approach to the equipment when any external shielding is removed does not exceed 0.5 rem per year;

(7) a disabled ionizing radiation machine while in storage or transit; and

(8) radioactive material subject to effective registration requirements and control by the United States Nuclear Regulatory Commission under regulations established under 42 U.S.C. and P.L. 109-58 (Energy Policy Act of 2005). (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485 AS 18.60.525

7 AAC 18.130. Vendor registration; notice of transfer. (a) Before a distributor, retailer, qualified expert, or other agent sells, leases, services, calibrates, installs, repairs, or in any other manner transfers or verifies accurate functioning of an ionizing radiation source requiring registration under 7 AAC 18.110, that person shall register with the department by submitting a form prescribed and provided by the department, including all applicable fees.

(b) No later than 30 days after the sale, lease, or other transfer of an ionizing radiation source requiring registration under 7 AAC 18.110, a distributor, retailer, or other agent who sells, leases, or in any other manner transfers the source shall notify the department in writing, identifying each ionizing radiation source, the name and address of each person receiving each source, and the date of each transfer. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.140. Radiation sources from out of state. (a) Except as specified in (c) of this section, a person proposing to bring an ionizing radiation source into this state from out of state for any temporary use shall give written notice to the department at least 15 days before

bringing the source into the state. The notice must include the type of source, the potential energy of the machine or materials, the proposed nature, duration and scope of use, and the exact location of use within this state. The department may grant permission to a person to bring an ionizing radiation source into this state with less than 15 days notice, if the department determines that the 15-day notification required under this subsection imposes an undue hardship on the person.

(b) A person using an out-of-state ionizing radiation source within this state must

(1) comply with all applicable law, including regulations of the department; and

(2) supply the department with any information required in this chapter upon request.

(c) An out-of-state radiation source that is kept within this state for more than 30 days in any period of 12 consecutive months is subject to the registration provisions of this chapter. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.150. Maintenance of records. A registrant of an ionizing radiation source or radioactive material shall keep records of

(1) the receipt, transfer, or disposal of each ionizing radiation source for at least three years following the event; and

(2) exposure incidents or excessive concentrations of ionizing radiation for at least three years from the date of occurrence. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.160. Approval not implied. A registrant may not

(1) advertise or post the fact that an ionizing radiation source is registered with the department; and

(2) state or imply that any specific application or use under the registration or authorization process has been approved by the department. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.170. Inspections. (a) A registrant shall allow the department, or the department's designee, upon request, an opportunity to inspect all ionizing radiation sources in the possession of the registrant and the facility where the sources are used or stored.

(b) A registrant shall make available, upon request, for inspection by the department, or the department's designee, all records pertaining to receipt, possession, use, transfer, or disposal of radioactive materials or ionizing radiation sources.

(c) During an inspection, the department, or the department's designee, may consult privately with an individual who maintains the records specified in (b) of this section, handles radioactive materials, operates an ionizing radiation source, or is otherwise employed at the facility.

(d) For the 90 days following an inspection, a registrant shall post in a conspicuous location in the facility, or make available for viewing upon request, the results of the inspection. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.180. Protection requirements. A registrant, and the registrant's agent, including an operator, is responsible for complying with the applicable ionizing radiation protection requirements of 7 AAC 18.200 – 7 AAC 18.390. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

Article 3. Ionizing Radiation Protection Requirements.

200. Prohibited uses

210. External radiation limits in controlled area

220. Individual monitoring in controlled area

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250. Dose limits for a minor

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260. Limitation on electrical equipment used for teaching purposes

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290. Posting, labeling, and caution signs

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320. General requirements for disposal of radioactive material

330. Intrastate transportation of radioactive material

340. Records

350. Report to employees

355. Report to former employees

360. Report of theft or loss of sources

370. Notification of incident

380. Report of overexposures and excessive levels and concentrations

390. Vacating premises

7 AAC 18.200. Prohibited uses. (a) A person may not direct or order the application of radiation to an individual, except that a practitioner of the healing arts licensed by this state, or a person working under the direction or order of a practitioner of the healing arts licensed by this state, may apply radiation to an individual. Any direction or order to apply, or application of, radiation to an individual must

(1) be in the course of the practitioner's professional practice for clinical purposes; and

(2) comply with the requirements of this chapter.

(b) The application of radiation to an individual for purposes unrelated to the individual’s healthcare, such as for training, practicing, demonstrating, or other purpose for which the individual does not receive a health-based clinical benefit, is prohibited.

(c) The use of a medical fluoroscope

(1) without image intensification for the application of ionizing radiation to an individual is prohibited;

(2) for pre-positioning a patient for a non-fluoroscopic study is prohibited.

(d) The use of a fluoroscope for shoe fitting purposes, other than by a physician or chiropodist, is prohibited. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.210. External radiation limits in controlled area. (a) A registrant shall possess, use, receive, and transfer sources of ionizing radiation in a controlled area with adequate safeguards to assure that an individual worker's total occupational exposure to all sources of ionizing radiation in the registrant's possession during any span of a calendar year, from both external and internal exposures, does not exceed the following dose limits:

(1) an annual limit which is the lesser of the

(A) total effective dose equivalent of five rems (0.05 Sv); or

(B) sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye of 50 rems (0.5 Sv); and

(2) the annual limits to the lens of the eye, to the skin of the whole body, and to the skin of the extremities are a

(A) lens dose equivalent of 15 rems (0.15 Sv); and

(B) shallow-dose equivalent of 50 rem (0.5 Sv) to the skin of the whole body or to the skin of any extremity.

(b) The assigned deep dose equivalent must be for the part of the body receiving the highest exposure. The assigned shallow dose equivalent must be the dose averaged over the contiguous 10 square centimeters of skin receiving the highest exposure. The deep dose equivalent, lens dose equivalent, and shallow dose equivalent may be assessed from surveys or

other radiation measurements for the purpose of demonstrating compliance with the occupational dose limits, if the individual monitoring device was not in the region of highest potential exposure, or the results of individual monitoring are unavailable.

(c) If an individual works for more than one registrant and is exposed, or likely to be exposed, to ionizing radiation from multiple sources, the total combined exposures from all registrants may not exceed the limits specified in (a) of this section. A registrant shall maintain a record for each individual worker that incorporates the annual exposure information for all registrants that the individual works for. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.220. Individual monitoring in controlled area. (a) A registrant shall maintain records showing the ionizing radiation doses of all individuals for whom personnel monitoring is required under 7 AAC 18.280. The registrant shall keep these records on an annual occupational radiation exposure form issued by and available from the department with the information required on that form, or on clear and legible records containing all the same information required on the form. The dose information entered on the form or records must be for increments of time not exceeding 12 consecutive months. The information must include the

(1) name and date of birth of the individual;

(2) name of the registrant;

(3) dose equivalents for periods of one month or a calendar quarter, including

(A) deep dose equivalent;

(B) lens dose equivalent;

(C) shallow dose equivalent whole body;

(D) shallow dose equivalent maximum extremity;

(E) committed dose equivalent;

(F) committed dose equivalent maximally exposed organ;

(G) total effective dose equivalent; and

(H) total organ dose equivalent.

(b) Annual occupational radiation exposure information must be compiled annually and incorporated into the individual's occupational radiation exposure history form required to be maintained under 7 AAC 18.340.

(c) For the purpose of calculating the effective dose equivalent, the values of the weighting factor (W_T) are as follows:

Organ Dose Weighting Factors

Organ or tissue	W_T
Gonads	0.25
Breast	0.15
Red bone marrow	0.12
Lung	0.12
Thyroid	0.03
Bone surfaces	0.03
Remainder[1]	0.30
Whole Body[2]	1.00

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[1] 0.30 results from 0.06 for each of five "remainder" organs, excluding

the skin and the lens of the eye, that receive the highest doses.

[2] For the purpose of weighting the external whole body dose (for adding it to the internal dose), a single weighting factor, W_T=1.0, should be used.

(d) A registrant shall retain and preserve records used in preparing the annual occupational radiation exposure form indefinitely, or until the registrant terminates operation and transfers personnel monitoring records to the department as required under 7 AAC 18.340. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.230. Airborne radioactive material in controlled area. (a) A registrant may not possess, use, receive, or transfer radioactive material in a manner that causes an individual in a controlled area to be exposed to airborne radioactive material in an average concentration in excess of the limits specified in Table I, Part I of this section.

(b) The limits specified in Table I, Part I are based on exposure to the concentrations specified for 40 hours in any period of seven consecutive days. If the number of hours of exposure is less than 40 hours, the limits specified in the table may be increased proportionately. If the number of hours of exposure is greater than 40 hours, the limits specified in the table will be decreased proportionately.

(c) If there is a mixture in air or water of more than one radionuclide, the limiting values for purposes of Table I are as follows:

(1) if the identity and concentration of each radionuclide in the mixture are known, the limiting value are derived as follows:

(A) determine, for each radionuclide in the mixture, the ratio between the concentration in the mixture and the limiting concentration established in Table I;

(B) the sum of the ratios for all radionuclides in the mixture may not exceed unity;

(2) if either the identity or the concentration of any radionuclide in the mixture is not known, the limiting values for purposes of Table I is the same as those shown at the bottom of the table for "Alpha emitters not listed above;"

(3) if the identity of each radionuclide in the mixture is known but the concentration of one or more of the radionuclides in the mixture is not known, the concentration limit for the mixture is the limit specified in Table I for the radionuclide in the mixture having the lowest concentration limit.

(d) Except as authorized by the department under this subsection, an allowance will not be made for particle size or the use of protective clothing or equipment in determining whether an individual is exposed to an airborne concentration in excess of the limits specified in Table I, Part I. The department may authorize a registrant to permit the exposure of an individual in a controlled area to airborne concentrations in excess of the limits specified in Table I, Part I upon receipt by the department of a written request demonstrating that the

(1) concentration is composed in whole or in part of particles of a size that the particles are not respirable and that the individual will not inhale the concentrations; the request must provide a description of the methods used to determine the particle size;

(2) individual will wear appropriate protective equipment and that the individual will not inhale, ingest, or absorb quantities of radioactive material in excess of those that may

otherwise be permitted under this part for an individual in a controlled area during a 40-hour week.

(e) A written request submitted under (d) of this section must contain the following information:

(1) a description of the protective equipment to be employed, including the efficiency of the equipment for the material involved;

(2) procedures for the fitting, maintenance, and cleaning of the protective equipment; and

(3) procedures governing the use of the protective equipment, including supervisory procedures and length of time the equipment will be used by the individuals in each work week.

(e) In this section, "exposure," means that the individual is present in an environment containing an airborne concentration of radioactive materials.

TABLE I

CONCENTRATIONS IN AIR AND WATER ABOVE

NATURAL BACKGROUND

	Part I		Part II	
	Column 1	Column 2	Column 1	Column 2
Radioactive	Air	Water	Air	Water
Material Solubility	(uc/ml)	(uc/ml)	(uc/ml)	(uc/ml)

Bismuth 210 (Bi210)	S	6×10^{-9}	1×10^{-3}	2×10^{-10}	4×10^{-5}
	I	6 x 10-9	1×10^{-3}	2×10^{-10}	4×10^{-5}
Lead 210 (Pb 210)	S	1×10^{-10}	4×10^{-6}	4×10^{-12}	1×10^{-7}
	I	2×10^{-10}	5×10^{-3}	8×10^{-12}	2×10^{-4}
Polonium 210 (Po210)	S	5×10^{-10}	2×10^{-5}	2×10^{-11}	7×10^{-7}
	I	2×10^{-10}	8×10^{-4}	7×10^{-12}	3×10^{-5}
Radium 224 (Ra 224)	S	5×10^{-9}	7×10^{-5}	2×10^{-10}	2×10^{-6}
	I	7×10^{-10}	2×10^{-4}	2×10^{-11}	5×10^{-6}
Radium 226 (Ra 226)	S	3×10^{-11}	4×10^{-7}	3×10^{-12}	3×10^{-8}
	I	5×10^{-11}	9×10^{-4}	2×10^{-12}	3×10^{-5}
Radium 228 (Ra 228)	S	7×10^{-11}	8×10^{-7}	2×10^{-12}	3×10^{-8}
	I	4×10^{-11}	7×10^{-4}	1×10^{-12}	3×10^{-5}
Radon 220 (Rn 220)		3×10^{-7}	-	1×10^{-8}	-
Radon 222 (Rn 222)		1×10^{-7}	-	3×10^{-9}	-
Beta and/or gamma emitters not listed above with half life less than 2 hours	-	1×10^{-6}	-	3×10^{-8}	-
Beta and/or gamma emitters not listed above with half life greater than 2 hours		3×10^{-9}	9×10^{-5}	1×10^{-10}	3×10^{-6}
Alpha emitters not listed above		6×10^{-13}	4×10^{-7}	2×10^{-14}	3×10^{-8}

Soluble (S): Insoluble (I)

(Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.240. External radiation limits in uncontrolled area. (a) Except as authorized by the department under (b) of this section, a registrant may not possess, use, or transfer sources of ionizing radiation in a manner that creates, in any uncontrolled area from the sources in the registrant's possession, ionizing radiation levels which

(1) if an individual were continuously present in the area, may result in the individual's receiving a dose in excess of 0.002 millisievert or two millirems in any one hour; or

(2) cause or are likely to cause an

(A) individual to receive a dose to the whole body in any period of one calendar year in excess of one millisievert or 100 millirems; or

(B) unborn fetus to receive a dose during the entire period of gestation in excess of five millisieverts or 0.5 rems.

(b) A person may submit a written request to the department for proposed limits of ionizing radiation in an uncontrolled area in excess of those specified in (a) of this section resulting from the person's possession or use of sources of ionizing radiation. A written request submitted under this subsection must include information on anticipated average ionizing radiation levels and anticipated occupancy times for each uncontrolled area involved. The department may approve the proposed limits if the applicant demonstrates to the satisfaction of the department that the proposed limits are not likely to cause an individual to receive a dose in excess of one millisievert or 100 millirems to the whole body in any period of one calendar year.

(Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.250. Dose limits for a minor. (a) A registrant may not possess, use, or transfer sources of ionizing radiation in a manner that causes a minor within a controlled area to receive from all sources of ionizing radiation in the registrant's possession a dose in excess of 10 percent of the limits specified in 7 AAC 18.210.

(b) A registrant may not possess, use, or transfer radioactive material in a manner that causes a minor within a controlled area to be exposed to airborne radioactive material in an average concentration in excess of 10 percent of the limits specified in Table I, Part II in 7 AAC 18.230. For purposes of this subsection, a concentration is averaged over periods that are not greater than one week.

(c) The provisions of 7 AAC 18.230(d) apply to exposure subject to (b) of this section. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.252. Dose limits for a student. (a) A registrant may not expose a student to more than 0.1 rem or one millisievert per year for educational purposes.

(b) An experiment or demonstration for teaching purposes shall be planned and performed so that a student receives no more than 0.01 rem or 0.1 millisievert while performing or observing the experiment or demonstration.

(c) For the purpose of this section, “student” means an individual who is in training under the direct supervision of a qualified instructor for the safe and effective use of a radiation producing device. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.255. Dose limits for a declared pregnant woman. (a) A registrant shall ensure that a declared pregnant woman is not subject to occupational exposure to radiation that will result in a total dose equivalent to the woman's embryo or fetus during the entire pregnancy that exceeds 0.5 rem or five millisieverts.

(b) The dose equivalent to an embryo or fetus is the sum of the

(1) deep-dose equivalent to the declared pregnant woman; and

(2) dose equivalent to the embryo or fetus resulting from radionuclides in the embryo or fetus and radionuclides in the declared pregnant woman.

(c) A registrant shall make efforts to avoid substantial variation above a uniform monthly occupational exposure rate to a declared pregnant woman to satisfy the limit specified in (a) of this section.

(d) If the dose equivalent to the embryo or fetus exceeds 0.5 rem or five millisieverts, or is within 0.05 rem or 0.5 millisieverts of the dose, at the time the woman becomes a declared pregnant woman, the registrant is in compliance with (a) of this section if the additional dose equivalent to the embryo or fetus does not exceed 0.05 rem or 0.5 millisieverts during the remainder of the pregnancy.

(e) For the purposes of this section, to become a declared pregnant woman, a woman must voluntarily inform the registrant in writing of the woman's pregnancy and the estimated date of conception. The declaration remains in effect until the declared pregnant woman withdraws the declaration or is no longer pregnant. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.260. Limitation on electrical equipment used for teaching purposes. Electrical equipment used for teaching purposes, and that may emit x-rays incidental to the intended purpose of the equipment, may not be operated in a manner that the external exposure exceeds 10 milliroentgens per hour at 30 centimeters from any accessible surface of the equipment. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.270. Surveys. (a) A registrant shall complete all surveys necessary to establish compliance with this chapter.

(b) If applicable, a survey must include

(1) a physical evaluation of the location of materials and equipment;

(2) measurements of levels of ionizing radiation or concentrations of radioactive material present; and

(3) an annual calibration of radiation survey meters and personnel monitoring devices by a NVLAP accredited laboratory or qualified expert.

(c) For the purpose of this section, "survey" includes an evaluation of all ionizing radiation hazards incident to the production, use, release, disposal, transfer, or presence of radioactive materials or other sources of ionizing radiation under a specific set of conditions. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.280. Personnel monitoring. (a) A registrant shall supply the appropriate individual monitoring device to, and require the use of the device in accordance with, the manufacturer's instructions for use by

(1) an individual, except a patient, who enters a controlled area under circumstances that the individual receives, or is likely to receive, a dose in any calendar year in excess of 10 percent of the applicable value specified in 7 AAC 18.210(a);

(2) a minor who enters a controlled area under circumstances that the minor receives, or is likely to receive, a dose in any calendar year in excess of five percent of the applicable value specified in 7 AAC 18.210(a); and

(3) an individual who enters a high ionizing radiation area or very high radiation area.

(b) A registrant shall retain the records of individual monitoring for at least three years following termination of the individual with task assignments involving potential for radiation exposure or until the registrant terminates operation and transfers personnel records to the department as required under 7 AAC 18.340. (Eff. 4/9/2009, Register 190)

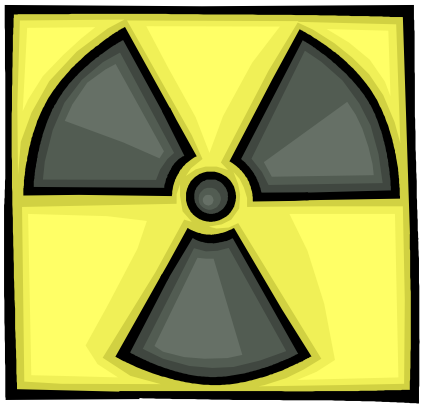
Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.290. Posting, labeling, and caution signs. (a) Except as otherwise authorized by the department, the symbol prescribed by this section must consist of the conventional ionizing radiation caution colors magenta or purple on a yellow or white background. The symbol prescribed by this section is the conventional three bladed design as follows:

RADIATION SYMBOL

(1) bladed areas must be magenta or purple;

(2) background must be yellow or white.



(b) In addition to the contents of signs and labels prescribed in this section, a registrant may provide on or near the signs and labels any additional information that may be appropriate in aiding an individual to minimize exposure to ionizing radiation.

(c) Each ionizing radiation area must be conspicuously posted with a sign or signs bearing the ionizing radiation caution symbol and either of the following words:

(1)

CAUTION

RADIATION AREA

(2)

DANGER

RADIATION AREA

(d) Each high ionizing radiation area must be conspicuously posted with a sign or signs bearing the ionizing radiation caution symbol and either of the following words:

(1)

CAUTION

HIGH RADIATION AREA

(2)

DANGER

HIGH RADIATION AREA

(e) Each high ionizing radiation area must be equipped with a control device that will either cause the level of ionizing radiation to be reduced below that at which an individual may receive a dose of one millisievert in one hour upon entry into the area or will energize a conspicuous visible or audible alarm signal in a manner that the individual entering and the registrant, or supervisor of the area, are made aware of the entry. A control device is not required for a high ionizing radiation area established for a period of 30 days or less.

(f) Each very high radiation area, in which a lethal dose of radiation may be received in less than one hour, must be equipped with a control device that will either cause the level of ionizing radiation to be reduced below that at which an individual may receive a dose of five gray in one hour upon entry into the area or will energize a conspicuous visible or audible alarm

signal in a manner that the individual entering and the registrant, or supervisor of the area, are made aware of the entry. The very high radiation area must be posted with a sign that states the following:

GRAVE DANGER

EXTREME RADIATION AREA

(g) Each airborne radioactivity area must be conspicuously posted with a sign or signs bearing the ionizing radiation caution symbol and either of the following words:

(1)

CAUTION

AIRBORNE RADIOACTIVITY AREA

(2)

DANGER

AIRBORNE RADIOACTIVITY AREA

(h) Each area or room in which any radioactive material is used or stored in an amount exceeding 10 times the quantity of radioactive material specified in Table II in this section must be conspicuously posted with a sign or signs bearing the ionizing radiation caution symbol and either of the following words:

(1)

CAUTION

RADIOACTIVE MATERIAL

(2)

DANGER

RADIOACTIVE MATERIAL

(i) Each area or room in which natural uranium or thorium is used or stored in an amount exceeding 100 times the quantity specified in Table II of this section must be conspicuously posted with a sign or signs bearing the ionizing radiation caution symbol and either of the following words:

(1)

CAUTION

RADIOACTIVE MATERIAL

(2)

DANGER

RADIOACTIVE MATERIAL

(j) Posting of a caution sign is not required for a room or area because of the presence of a sealed source, if the ionizing radiation level at a distance of 12 inches (30 centimeters) from the surface container or housing does not exceed five milliroentgens per hour.

(k) Posting of a caution sign is not required for a room or other area in a hospital because of the presence of patients containing radioactive materials, if there are personnel in attendance who will take the precautions necessary to prevent the exposure of an individual to ionizing radiation or radioactive material in excess of the limits established in this chapter.

(*l*) Posting of a caution sign is not required for an area or room containing radioactive materials for periods of less than eight hours, if the

(1) materials are constantly attended by an individual who will take the precautions necessary to prevent the exposure of an individual to ionizing radiation or radioactive material in excess of the limits established in this chapter; and

(2) the area or room is subject to the registrant's control.

(m) Except as provided in (n) of this section, each container of radioactive material must bear a durable, clearly visible label identifying the radioactive contents. The label must include sufficient information to permit an individual handling or using the container, or working in the vicinity of the container, to take precautions to avoid or minimize exposure. As appropriate, the information must include ionizing radiation levels, kinds of material, estimate of activity, and date for which activity is estimated. The label also must bear the ionizing radiation caution symbol and either of the following words:

(1)

CAUTION

RADIOACTIVE MATERIAL

(2)

DANGER

RADIOACTIVE MATERIAL

(n) Notwithstanding the provisions of (m) of this section, labeling is not required for

(1) a container that does not contain radioactive material in quantities greater than the applicable quantities listed in 7 AAC 18.230 under Table I, Part I, Column 2;

(2) a container that contains only natural uranium or thorium in quantities no greater than 10 times the applicable quantities listed in Table II of this section;

(3) a container that does not contain radioactive material in concentrations greater than the applicable concentrations listed in 7 AAC 18.230 under Table I, Part I, Column 2;

(4) a container attended by an individual who takes the precautions necessary to prevent the exposure of an individual to ionizing radiation or radioactive material in excess of the limits established in 7 AAC 18.210 – 7 AAC 18.255 of this chapter;

(5) a container that is in transport and packaged and labeled in accordance with the regulations of the United States Department of Transportation contained in C.F.R. 49;

(6) a container that is accessible only to an individual authorized to handle, use, or to work in the vicinity of the container, if the contents are identified to the individual by a readily available written record;

(7) manufacturing and processing equipment, such as piping and tanks; and

(8) a room or other area in a hospital because of the presence of patients containing radioactive material, if there is personnel in attendance who take the precautions necessary to prevent the exposure of an individual to radiation or radioactive materials in excess of the limits established in 7 AAC 18.210 – 7 AAC 18.255 of this chapter.

(o) An ionizing radiation machine must be labeled in a manner that cautions an individual that ionizing radiation is produced when the machine is operated.

TABLE II

QUANTITIES APPLICABLE TO POSTING AND DISPOSAL REQUIREMENTS

Radioactive Material	Quantity (microcuries)
Bismuth 210 (Bi 210)	10
Lead 210 (Pb 210)	1
Polonium 210 (Po 210)	0.1
Radium 224 (Ra 224)	10
Radium 226 (Ra 226)	0.1
Radium 228 (Ra 228)	1
Radon 220 (Rn 220)	1
Radon 222 (Rn 222)	1
Thorium (natural)	50
Uranium (natural)	50
Radioactive material not listed above or unknown mixture of above.	0.1

(Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.300. Instruction of personnel. (a) A registrant shall assure that a qualified expert informs each individual working in or frequenting any portion of a controlled area of the occurrence of ionizing radiation or sources of ionizing radiation in that portion of the controlled area.

(b) A registrant shall assure that a qualified expert instructs each individual working in or frequenting any portion of a controlled area about the safety problems associated with

exposure to the sources of ionizing radiation and the precautions or procedures to minimize exposure.

(c) A registrant shall assure that a qualified expert instructs each individual working in or frequenting any portion of a controlled area in the applicable provisions of department regulations for the protection of personnel from exposure to ionizing radiation or radioactive materials. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.310. Storage of sources. A registrant shall

(1) secure all sources of ionizing radiation against unauthorized removal from the place of storage; and

(2) provide reasonable protection against loss, leakage, or dispersion of sources of ionizing radiation by the effects of fire or water. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.320. General requirements for disposal of radioactive material. A registrant may not dispose of any radioactive material subject to the regulations of this chapter, except by transfer to an authorized recipient after providing written notice to the department under 7 AAC 18.140, or as authorized under 18 AAC 85.270 – 18 AAC 85.320. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

Editor's note: For the purpose of submitting the written notice required under 7 AAC 18.320, the department’s contact information is Department of Health and Social Services,

Radiological Health Program, 4500 S. Boniface Pkwy., Anchorage, AK 99507-1270; telephone: (907) 334-2100; fax: (907) 334-2161.

7 AAC 18.330. Intrastate transportation of radioactive material. A registrant may not transport any radioactive material subject to registration under this chapter outside of the confines of the registered location of use, or cause the transport by delivering radioactive material to a carrier for transportation, unless the registrant complies with all requirements appropriate to the mode of transportation, to the packaging of the radioactive material, and to the marking and labeling of the package and transporting vehicle which are contained in the regulations of the United States Department of Transportation contained in 49 C.F.R., as revised as of October 1, 2007, and other federal agencies regulating the transportation of radioactive material, and in AS 18.45.027. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.340. Records. (a) A registrant shall maintain a record of the occupational radiation exposure history for each individual that personnel monitoring is required under 7 AAC 18.280 on a form prescribed and provided by the department, or on a clear and legible record containing all the information specified in this subsection. The form must document each period of time after the individual attained the age of 18 in which the individual received an occupational dose of radiation, and be signed by both the individual and the registrant, or the radiation safety officer, when updated on an annual basis. The form must contain the following information regarding the individual:

(1) individual's name;

(2) date of birth;

(3) previous employment involving radiation exposure;

(4) dates of employment;

(5) periods of exposure;

(6) previous dose history, including

(A) deep dose equivalent;

(B) lens dose equivalent;

(C) shallow dose equivalent whole body;

(D) shallow dose equivalent maximum extremity;

(E) committed dose equivalent;

(F) committed dose equivalent maximally exposed organ;

(G) total effective dose equivalent; and

(H) total organ dose equivalent.

(b) In the preparation of the occupational radiation exposure history under this section, the registrant shall make a reasonable effort to obtain reports from other current or previous employers to establish the individual's previously accumulated occupational dose. For each period that the registrant obtains reports, the registrant shall use the dose shown in the report in preparing the form.

(c) Upon termination of employment of an individual, a registrant shall, upon request, supply the individual and the department with copies of all records compiling information concerning that individual's radiation exposure, including statements of any circumstances in which the dose to the employee from any source of ionizing radiation exceeded the limits specified in this chapter. Employee records must be kept available for inspection by the

department during the tenure of employment of an employee and for at least the three years immediately after the employee leaves employment.

(d) A registrant shall maintain records in the same units used in this chapter, showing the results of surveys required to comply with 7 AAC 18.270.

(e) A registrant shall maintain an accurate accounting for all radioactive material for an ionizing radiation installation. The records must show the radioactive material received, produced, transferred and disposed of, the amounts and form of the radioactive material, and information necessary to account for the difference between the amount of radioactive material received or produced and the amount of radioactive material on hand. The records must be retained under this subsection for at least five years after the final transfer or disposition of any radioactive material.

(f) Copies of all records required under this section must be transferred to the department if the registrant terminates the registrant's business operations and at other times determined by the department. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

Editor's note: For the purpose of transferring records under 7 AAC 18.340, the department’s contact information is Department of Health and Social Services, Radiological Health Program, 4500 S. Boniface Pkwy., Anchorage, AK 99507-1270; telephone: (907) 334-2100; fax: (907) 334-2161.

7 AAC 18.350. Report to employees. A registrant, at the request of an individual employed or associated with the registrant, shall advise the individual annually of the

individual's exposure to ionizing radiation as shown in records maintained by the registrant under 7 AAC 18.220 and 7 AAC 18.340. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.355. Report to former employees. (a) A registrant, at the request of an individual formerly employed or associated with the registrant, shall furnish to the individual a report of the individual's exposure to ionizing radiation as shown in records maintained under 7 AAC 18.340. The registrant shall provide the report to the individual requesting the report within 30 days from the date the request is received by the registrant. The report must cover each calendar year of the individual's employment or association involving exposure to ionizing radiation, or a shorter period requested by the individual. The report must be in writing and contain the following statement: "This report is furnished to you under the regulations of the Department of Health and Social Services regulations. You should preserve this report for future reference."

(b) The registrant may require the requesting individual to provide a government-issued unique identifying code and the dates and locations of employment or association. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.360. Report of theft or loss of sources. A registrant shall immediately report by telephone or facsimile, and confirm in writing to the department, the theft or loss of any registered source of ionizing radiation as soon as practicable after the theft or loss becomes known. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

Editor's note: For the purpose of reporting a theft or loss under 7 AAC 18.360, the department's contact information is Department of Health and Social Services, Division of Public Health, Radiological Health Program, 4500 S. Boniface Pkwy., Anchorage, AK 99507-1270; telephone: (907) 334-2100; fax: (907) 334-2161.

7 AAC 18.370. Notification of incident. (a) A registrant shall immediately notify the department by telephone or facsimile of an incident involving a source of ionizing radiation possessed by the registrant that may have caused or threatens to cause

(1) a dose to the whole body of an individual of 0.25 sieverts, or 25 rems, or more;

(2) exposure of the skin of the whole body of an individual of 1.0 sievert, or 100 rems, or more; or

(3) exposure of the feet, ankles, hands, or forearms of an individual to 2.5 sieverts, or 250 rems, or more.

(b) A registrant shall within 24 hours notify the department by telephone or facsimile and confirming letter of an incident involving a source of radiation possessed by the registrant that may have caused or threatens to cause

(1) a dose to the whole body of an individual of 50 millisieverts, or five rems, or more;

(2) exposure of the skin of the whole body of an individual to 300 millisieverts, or 30 rems, or more;

(3) exposure of the feet, ankles, hands, or forearms of an individual to 500 millisieverts, or 50 rems, or more; or

(4) an exposure to a patient from a diagnostic procedure that results in radiation-induced erythema with wet desquamation within six months of the procedure, excluding radiation therapy doses.

(c) A report filed with the department under this section must be prepared in a manner that the name of an individual who has received exposure to ionizing radiation is stated in a separate part of the report. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

Editor's note: For the purpose of notifying the department of an incident under 7 AAC 18.370, the department's contact information is Department of Health and Social Services, Division of Public Health, Radiological Health Program, 4500 S. Boniface Pkwy., Anchorage, AK 99507-1270; telephone: (907) 334-2100; fax: (907) 334-2161.

7 AAC 18.380. Report of overexposures and excessive levels and concentrations. (a) In addition to the notification required under 7 AAC 18.370, a registrant shall submit a detailed report in writing to the department within 30 days of an incident in which

(1) notification is required under 7 AAC 18.370;

(2) each exposure of an individual to ionizing radiation or concentrations of radioactive material in excess of an applicable limit as set out in 7 AAC 18.200 – 7 AAC 18.390 or as otherwise approved by the department; and

(3) levels of ionizing radiation or concentrations of radioactive material, not involving excessive ionizing radiation doses to any individual, in an uncontrolled area in excess

of 10 times any applicable limits as set out in 7 AAC 18.200 – 7 AAC 18.390 or as otherwise approved by the department.

(b) A report required under this section must describe the

(1) extent of exposure of an individual to ionizing radiation or to radioactive material;

(2) levels of ionizing radiation and concentrations of the radioactive material involved;

(3) cause of the exposure, levels, or concentrations; and

(4) corrective steps taken or planned to assure against a recurrence.

(c) If a registrant is required under this section to report to the department any exposure of an individual to ionizing radiation or concentrations of radioactive material, the registrant shall, not later than the delivery of the report to the department, also notify the individual of the nature and extent of exposure. The notice must be in writing and contain the following statement: "This report is furnished to you under the regulations of the Department of Health and Social Services regulations. You should preserve this report for future reference."

(d) A report filed with the department under this section must be prepared in a manner that the name of an individual who has received exposure to ionizing radiation is stated in a separate part of the report. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

Editor's note: For the purpose of submitting a written report under 7 AAC 18.380, the department’s contact information is Department of Health and Social Services, Radiological Health Program, 4500 S. Boniface Pkwy., Anchorage, AK 99507-1270; telephone: (907) 334-2100; fax: (907) 334-2161.

7 AAC 18.390. Vacating premises. No less than 30 days before vacating or relinquishing possession or control of a premises in which a registered radiation source has been stored or used, a registrant shall notify the department in writing of the registrant's intent to vacate or relinquish and allow the department the opportunity to survey the premises for contamination. If the department identifies contamination, or if the registrant's decommissioning plan is not complete, the department will require the registrant to maintain control over the contaminated premises until the source of contamination is removed. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

Editor's note: For the purpose of submitting the written notice required under 7 AAC 18.390, the department's contact information is Department of Health and Social Services, Radiological Health Program, 4500 S. Boniface Pkwy., Anchorage, AK 99507-1270; telephone: (907) 334-2100; fax: (907) 334-2161.

Article 4. Use of Radiation Sources in the Healing Arts.

400. General safety provisions

405. Waivers

410. Proper use of equipment

420. Instruction of medical radiation device operators

430. Shielding

440. Fluoroscopic installation

450. Medical radiographic installation

460. Mammography installation

470. Veterinary medicine radiographic installation

480. Sealed sources: interstitial, intercavitary, and superficial applications

7 AAC 18.400. General safety provisions. (a) A person may not construct, sell, lease, transfer, lend, or install medical or veterinary x-ray equipment or supplies used in connection with the equipment, unless the equipment and supplies, when properly installed and properly used, meet the requirements of 7 AAC 18.410 – 7 AAC 18.480.

(b) A registrant may not operate or permit the operation of medical or veterinary x-ray equipment unless the equipment and installation meet the applicable requirements of 7 AAC 18.410 - 7 AAC 18.590. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.405. Waivers. (a) A registrant may request a waiver of a specific requirement in 7 AAC 18.430 - 7 AAC 18.590 by submitting a written request to the department.

(b) The department may waive compliance with a specific requirement of 7 AAC 18.430 - 7 AAC 18.590 by an existing machine or installation if

(1) compliance will require replacement or substantial modification of the machine or installation; and

(2) the registrant can demonstrate, to the department's satisfaction, that protection has been achieved through other means equivalent to that required under 7 AAC 18.430 – 7 AAC 18.590. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.410. Proper use of equipment. (a) A registrant of medical or veterinary x-ray equipment is responsible for assuring that all requirements of 7 AAC 18.400 – 7 AAC 18.590 are met.

(b) A registrant of medical or veterinary x-ray equipment shall assure that all x-ray equipment under the registrant's control is operated only by an individual who is adequately instructed in safe operating procedures and competent in safe use of the equipment. The registrant shall provide safety rules to each individual operating x-ray equipment under the registrant's control, including any restrictions on the operating technique required for the safe operation of the particular x-ray apparatus, and require the operator to demonstrate familiarity with these rules. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.420. Instruction of medical radiation device operators. (a) For each individual who operates a medical or veterinary x-ray device, the registrant shall maintain a record of all training and educational programs attended by each operator to establish that the operator is able to independently operate a device capable of emitting ionizing radiation. The record for each operator must identify the

(1) trainer, or training organization, and the training method;

(2) dates of the training;

(3) subjects included in the training curriculum; and

(4) test or certification that establishes that the training was completed.

(b) The minimum acceptable training curriculum for an operator of a medical x-ray device must include

(1) fundamentals of radiation safety, including

(A) characteristics of x-radiation, radiation units, methods for reducing exposures;

(B) radiobiologic effects of radiation exposure and risk or benefit analysis, and principles of ALARA described in 7 AAC 18.105(d);

(C) stochastic effects and nonstochastic effects of radiation exposure;

(D) hazards of excessive exposure to ionizing radiation; and

(E) use of personnel monitoring equipment;

(2) device operation and radiation controls, including

(A) methods for controlling ionizing radiation dose, technique charts, and automatic exposure controllers;

(B) use of positioning procedures and anatomy to minimize repeat rate and critical organ doses;

(C) state and federal radiation control regulations and incident reporting requirements;

(D) radiographic accessories that affect exposure dose; and

(E) special exposure considerations on limitations of computerized and digital systems;

(3) quality control procedures and the role of the procedures in minimizing exposures, including

(A) optimizing image processing for minimum exposures;

(B) periodically verifying the machine for operational accuracy; and

(C) conducting repeat analyses and technical critiques of images; and

(4) the registrant's written operating and emergency procedures.

(c) An operator of medical fluoroscopic equipment must receive a minimum of 10 hours of instruction in the safe operation of the fluoroscope. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.430. Shielding. (a) A medical or veterinary x-ray installation must include the primary barriers and secondary barriers necessary to assure compliance with the provisions of 7 AAC 18.210, 7 AAC 18.240, and 7 AAC 18.250. The requirements of this section are met if the thickness and design of the barriers are equivalent to those computed and designed in accordance with the recommendations of the National Council on Radiation Protection and Measurements (NCRP) in NCRP Report No. 147, *"Structural Shielding Design for Medical X-ray Imaging Facilities,"* issued November 19, 2004, and adopted by reference.

(b) A medical or veterinary x-ray installation must have a lead barrier that is mounted in a manner to ensure that the barrier will not sag or cold-flow because of the barrier's own weight and that are protected against mechanical damage.

(c) All structural joints in a medical or veterinary x-ray installation, including those between different kinds of protective materials and joints at the floor and ceiling, must be designed in a manner that ensures that the overall protection provided by the barrier is not impaired.

(d) A window, window frame, door, and door frame in a medical or veterinary x-ray installation must have the same lead equivalent as that required for the adjacent wall.

(e) A hole in a protective barrier in a medical or veterinary x-ray installation must be covered in a manner that ensures that the overall protection is not impaired. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

Editor's Note: The NCRP Report No. 147, *"Structural Shielding Design for Medical X-ray Imaging Facilities,"* adopted by reference in 7 AAC 18.430(a), is available from NCRP Publications, 7910 Woodmont Avenue, Suite 400, Bethesda, MD 20814-3095 or at the following Internet site: www.ncrponline.org.

7 AAC 18.440. Fluoroscopic installation. (a) A healing arts fluoroscopic installation and C-arm must use an image intensification assembly and a diagnostic-type protective x-ray tube housing and must meet the requirements of this section.

(b) The source-to-panel or source-to-tabletop distance for all healing arts fluoroscopic installations may not be less than 15 inches, except that an FDA-approved mini C-arm may not be less than 10 inches.

(c) The half-value layer (HVL) of the useful beam may not be less than as shown in the following table:

Measured Potential (kilovolts peak)	Half-value Layer (millimeters of aluminum equivalent)
70 and below	1.5
71	2.1
80	2.3
90	2.5
100	2.7

110	3.0
120	3.2

(d) The equipment must be constructed in a manner that ensures that the entire cross section of the useful beam is attenuated by a primary barrier designed to automatically terminate exposure when the barrier is removed from the useful beam, which is usually the image intensification mechanism, and

(1) the required lead equivalent of the barrier may not be less than

(A) 1.5 millimeters for up to 100 kVp;

(B) 1.8 millimeters for greater than 100 and less than 125 kVp; and

(C) 2.0 millimeters for 125 kVp or greater;

(2) a collimator must restrict the cross-sectional dimensions of the useful beam to less than the corresponding dimensions of the barrier; the tube and collimating system must be linked with the image intensification assembly so that the useful beam at the image intensifier input phosphor is confined within the barrier regardless of the panel-screen distance;

(3) the tube mounting and the barrier (the viewing device) must be linked together in a manner that, under conditions of normal use, the barrier always intercepts the entire useful beam; and

(4) collimators and adjustable diaphragms or shutters used to restrict the size of the useful beam must provide the same degree of protection as is required of the tube housing.

(e) The exposure switch must be a dead-man type switch.

(f) A manual-reset, cumulative timing device activated by the exposure switch must be used to either indicate elapsed exposure time by an audible signal or terminate the exposure

when the total exposure exceeds a predetermined limit not exceeding five minutes in one or a series of exposures.

(g) An audible alarm must sound continuously when operating the fluoroscope in high level control (HLC) mode. The limit for HLC is 20 roentgens per minute or 5.16×10^3 coulombs per kilogram per minute.

(h) A shielding device of at least 0.25 millimeters lead equivalent material must be provided for covering the Bucky-slot during fluoroscopy.

(i) Protective drapes, hinges, or sliding panels, of at least 0.25 millimeters lead equivalent material, must be provided between the patient and fluoroscopist to intercept scattered radiation which would otherwise reach the fluoroscopist and other individuals near the machine. These devices may not substitute for the wearing of a protective apron.

(j) For routine fluoroscopy, the exposure rate measured at the point where the center of the useful beam enters the patient may not exceed 2.58×10^3 coulombs per kilogram per minute or 10 roentgens per minute, except during film recording of fluoroscopic images or when an optional high level control (HLC) is activated.

(k) Mobile fluoroscopic equipment must meet the requirements of this section, where applicable, and the following requirements:

(1) in the absence of a table top, a cone or spacer frame must limit the target-to-skin distance to not less than 30 centimeters, except that for mini C-arms and for C-arms used during a surgical application to an extremity, the distance may not be less than 20 centimeters;

(2) image intensification must always be used;

(3) a machine must be inoperable, except when the collimating cone or diaphragm is in place and the entire useful beam is intercepted by the image intensifier; and

(4) the exposure rate measured 30 centimeters from the image intensifier or input phosphor must be as low as practical, but not exceed 10 roentgens per minute.

(*l*) Each person, other than the patient, whose body is likely to be exposed to five milliroentgens per hour or more must wear a protective apron and gloves of at least 0.25 millimeters lead equivalent material in the fluoroscopy room.

(m) The total exposure dose received by the patient for each fluoroscopic procedure must be recorded and maintained with the patient's diagnostic record, or if this information is not available, the exposure parameters used must be recorded, such as kVp, mA, and total exposure time. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.450. Medical radiographic installation. (a) A medical radiographic installation must use a diagnostic type protective x-ray tube housing and must meet the requirements of this section.

(b) Medical radiographic equipment must define the useful beam with a diaphragm, cone, or adjustable collimator capable of restricting the beam to the area of clinical interest, providing the same degree of attenuation as is required of the protective tube housing. These devices must be calibrated in terms of the size of the projected useful beam at specified source-film distances and must limit the target-to-skin distance to not less than 12 inches (30 centimeters).

(c) Radiographic equipment must be equipped with adjustable collimators and light localizers to define the entire field and produce a visible indication of adequate collimation and alignment on the x-ray film. Field size indication on adjustable collimators must be accurately

aligned with the x-ray field to within two percent of the source-image receptor-distance (SID) at all possible positions of the x-ray tube, except when positive beam limitation is functional, in use, and a health physics survey confirms that the positive beam limitation confines the beam to within two percent of the SID.

(d) Except when contraindicated for a particular medical purpose, the aluminum equivalent of the total filtration in the useful beam may not be less than 0.5 millimeters for equipment operating below 50 kVp; may not be less than 1.5 millimeters for equipment operating from 50 kVp to 70 kVp; and may not be less than 2.5 millimeters for equipment operating above 70 kVp. If the filter in the machine is not accessible for examination or the total filtration is unknown, the requirements of this section are met if the half-value layer of the useful beam is not less than that listed for "Other X-Ray Systems" in Table I of 21 C.F.R. 1020.30(m), as revised as of April 1, 2008, and adopted by reference.

(e) A device must automatically terminate the exposure after a preset time or exposure.

(f) The exposure switch must be of a dead-man type switch and must be arranged in a manner that the switch cannot be operated outside a shielded area, except that exposure switches for spot film devices used in conjunction with fluoroscopic tables and for mobile diagnostic radiographic equipment are exempt from this shielding requirement.

(g) The exposure switch for mobile equipment must be arranged in a manner that the operator can stand at least six feet from the patient and well away from the useful beam.

(h) The control panel must include

(1) a device that will give positive indication of the production of x-rays whenever the x-ray tube is energized; and

(2) appropriate devices that will give positive indication of the physical

factors used for the exposure, such as kVp, mA, and exposure time.

(i) All wall, floor, and ceiling areas that may intercept the useful beam must have primary barriers.

(j) A primary barrier in a wall must extend to a height of at least 84 inches or 210 centimeters above the floor.

(k) A secondary barrier must be provided in all wall, floor, and ceiling areas not having a primary barrier or where the primary barrier requirements are lower than the secondary barrier requirements. In a radiographic installation where the average radiographic workload is comparatively low, the conventional structural material in ordinary walls, floors, and ceilings may suffice as a primary barrier and secondary barrier without adding special shielding materials, particularly if the useful beam cannot be directed at occupied areas.

(*l*) The operator's station must be behind a protective barrier that will intercept the entire useful beam and any radiation that has been scattered only once. An operator must be unable to energize the tube while outside the protective barrier, except that spot film devices used in conjunction with fluoroscopic tables are exempted from this requirement.

(m) A window of lead equivalent glass, equal to that required by the adjacent barrier, mirror system, or closed circuit television monitor, must be provided and it must be large enough and placed in a manner that the operator can see the patient during the exposure without having to leave the protective area.

(n) If a patient must be held in position for radiography, a mechanical supporting, or restraining device must be used unless the device will interfere with the diagnosis.

(o) If a patient must be held by an individual, that individual must be protected with appropriate shielding devices, such as protective gloves and apron, and that individual must be positioned in a manner that no part of that individual's body will be struck by the useful beam.

(p) An individual occupationally exposed to radiation may not hold a patient during an exposure, except during an emergency. An individual may not be regularly used for this service.

(q) Only an individual required for the radiographic procedure may be in the radiographic room during exposure and, except for the patient, no unprotected parts of the individual’s body may be in the useful beam.

(r) The useful beam must be restricted to the area of the image receptor, and evidence of beam edges must show up on at least three sides of each radiographic image, except where a properly functioning positive beam limiting device is in place.

(s) A patient must be provided with a shield to protect the gonadal area of the body, unless the use of a shield prohibits a proper diagnosis.

(t) A protective apron and gloves must be tested at least annually to verify the continued integrity of radiation shielding properties sufficient to meet the standards of 7 AAC 18.440(*l*).

(u) A chest photofluorographic installation does not meet radiation safety requirements and may not be used.

(v) Mobile diagnostic radiographic equipment must meet the requirements of this section, except for the

(1) provisions of (q) of this section, if

(A) all individuals, except the patient being examined, are in shielded positions during exposure; and

(B) personnel monitoring is required for all individuals operating mobile x-ray equipment; and

(2) shielding requirement of (f) of this section, except that if a mobile unit is used routinely for more than 30 days in one location, the unit is considered a fixed installation subject to the shielding requirements specified in this section and 7 AAC 18.430.

(w) A registrant who uses film imaging and processing of the images shall establish processing quality control procedures at regular intervals that at least include

(1) documenting chemical change dates;

(2) documenting developer temperatures;

(3) processing a test strip that may be read by densitometer once weekly;

(4) documenting that chemical replenishment rates are maintained within plus or minus 15 percent once weekly;

(5) documenting that fixer retention does not exceed 0.05 milligrams per centimeter; and

(6) performing a two-minute fog test that demonstrates an optical density of no more than 0.05 on film used for imaging individuals or a step wedge image that does not change more than one step, annually or following any changes in the structural integrity of the darkroom.

(x) A registrant who uses electronic, digital, or computerized imaging methods shall establish quality control procedures that include at least

(1) a test of a phantom dose and density that approximates the most common procedure performed in the facility;

(2) a record of exposure changes calculated at least once a month to evaluate potential exposure creep; and

(3) quality control procedures recommended by the manufacturer that are performed on a schedule to verify that the operators are achieving the index or target values specified by the digital imaging manufacturer. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.460. Mammography installation. (a) A mammography installation must meet the requirements of the Mammography Quality Standards Act, as amended by the Mammography Quality Standards Reauthorization Act of 1998, and the regulations promulgated under the Mammography Quality Standards Act at 21 C.F.R. 900.12, as amended as of July 14, 2000, and adopted by reference. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.470. Veterinary medicine radiographic installation. (a) A veterinary x-ray installation must include a

(1) diagnostic type protective x-ray tube housing;

(2) diaphragm, cone, or adjustable collimator that restricts the useful beam to the area of the image receptor and provides the same degree of protection as is required of the protective tube housing;

(3) total filtration in the useful beam of not less than that specified in 7 AAC 18.450(a)(4), except when contraindicated for a particular radiographic purpose;

(4) device to terminate operation after a preset time of exposure;

(5) dead-man type switch; and

(6) wall, ceiling, and floor area equivalent to, or provided with, applicable protective barriers as required in 7 AAC 18.450(a)(9) - (11), or other mechanism that substantially separates controlled and uncontrolled areas.

(b) A registrant of a radiographic installation used in veterinary medicine shall assure that the device is operated under the following conditions:

(1) an individual, other than the operator, may not be in the x-ray room while exposures are being made, unless that individual's assistance is required;

(2) in any application in which an operator, or any other individual who may be assisting, is not located behind a protective barrier, the individual must wear a protective apron having a lead equivalent of not less than 0.5 millimeters during exposures;

(3) an individual may not be regularly employed to hold or support an animal or hold film during an x-ray exposure;

(4) if an animal must be held in position for an exposure, a mechanical supporting or restraining device must be used whenever feasible and any individual who is holding an animal must wear a lead apron, a thyroid collar, and protective gloves;

(5) if an animal must be held by an individual, that individual must be adequately protected and positioned so that no part of the individual’s body is struck by the useful beam and so that the individual’s body is as far as possible from the edge of the useful beam; and

(6) personnel monitoring equipment must be supplied and the equipment’s use must be required by any individual who holds an animal during an exposure.

(c) A hand-held fluoroscopic screen may not be used. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.480. Sealed sources: interstitial, intercavitary, and superficial applications. (a) The provisions of this section apply to registrants who use sealed sources in the healing arts and are in addition to, and not in substitution for, other applicable provisions of this chapter.

(b) Except as otherwise specifically authorized by the department, a registrant or user shall provide accountability of sealed sources and shall keep a permanent record of the issue and return of all sealed sources.

(c) When not in use, a registrant shall keep sealed sources and applicators containing sealed sources in a protective enclosure made of a material and wall thickness necessary to assure compliance with the provisions of 7 AAC 18.210, 7 AAC 18.240, and 7 AAC 18.250.

(d) Before the initial use of a sealed source, a registrant shall test the sealed source for leakage and contamination.

(e) A registrant shall test sealed sources for leakage at least every six months or at a shorter interval if specified by the department.

(f) If there is reason to suspect a sealed source may have been damaged, the registrant shall test the sealed source for leakage before further use.

(g) A leak test performed on a sealed source must be capable of detecting 0.005 microcurie of removable contamination.

(h) A test conducted as required under this section that reveals the presence of 0.005 microcurie or more of removable contamination is considered sufficient to determine that the

sealed source is leaking, and the source must be immediately withdrawn from use and decontaminated and repaired or disposed of in accordance with applicable provisions of 7 AAC 18.320 – 7 AAC 18.330, 18 AAC 85.210, and 18 AAC 85.280 – 18 AAC 85.320. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

Article 5. Industrial Radiography Protection Requirements.

7 AAC 18.500. Industrial radiographer and radiographer's assistant. (a) A registrant of an x-ray machine used in industrial radiography may not permit an individual to act as a radiographer as described in 7 AAC 18.500 - 7 AAC 18.640 until the individual has

(1) been instructed in and is able to demonstrate an understanding of the subjects outlined in 7 AAC 18.510;

(2) received copies of, and instructions in, the applicable regulations contained in this chapter, and the registrant's operating and emergency procedures; and

(3) demonstrated competence to use the x-ray machine and survey instruments that will be employed in the individual's assignment.

(b) A registrant of an x-ray machine used in industrial radiography may not permit an individual to act as a radiographer's assistant until that individual has

(1) received copies of, and instructions in, the registrant's operating and emergency procedures and demonstrated an understanding of the procedures; and

(2) demonstrated competence to use, under personal supervision of the radiographer, the x-ray machine and survey instruments that will be employed in the individual's assignment. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.510. Instruction of industrial radiographer. (a) For each individual who operates a device as an industrial radiographer, the registrant shall maintain a record of all training and educational programs attended by each radiographer. The record for each operator must identify the

(1) trainer, or training organization, and the training method;

(2) dates of the training;

(3) subjects included in the training curriculum; and

(4) test or certification that establishes that the training was completed.

(b) The minimum acceptable training curriculum for an industrial radiographer must include

(1) fundamentals of radiation safety, including the

(A) characteristics of gamma and x-radiation;

(B) units of ionizing radiation dose and quantity of radioactivity;

(C) hazards of excessive exposure to ionizing radiation; and

(D) methods of controlling ionizing radiation dose with time, distance, and shielding;

(2) instruction about the use of personnel monitoring equipment;

(3) operation and control of the radiographic equipment to be used;

(4) the requirements of applicable federal and state regulations; and

(5) the registrant's written operating and emergency procedures. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.520. Operating and emergency procedures. (a) A registrant of an x-ray machine used in industrial radiography shall establish operating and emergency procedures that includes instructions in the following:

(1) the handling and use of the x-ray machine in a manner that ensures that an individual is not exposed to doses in excess of the limits established in 7 AAC 18.210 – 7 AAC 18.250;

(2) methods for controlling access to radiographic areas;

(3) methods and occasions for conducting ionizing radiation surveys;

(4) methods and occasions for locking and securing the x-ray machines;

(5) personnel monitoring and the use of personnel monitoring equipment;

(6) transportation to field locations;

(7) the procedure for notifying proper persons in the event of an accident;

and

(8) maintenance of records.

(b) A registrant of an x-ray machine used in industrial radiography shall assure that an individual who operates the machine as a radiographer has received a copy of, been instructed in, and demonstrated an understanding of operating and emergency procedures established in accordance with this section. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.530. Personnel monitoring control. (a) A registrant of an x-ray machine used in industrial radiography may not permit an individual to act as a radiographer or as a radiographer's assistant unless, at all times during radiographic operations, the individual wears a radiation detecting badge and either a pocket dosimeter, chamber, or other direct reading device. The direct reading device must be capable of measuring doses from zero to at least 200 milliroentgens. A badge may be assigned to and worn by only one individual.

(b) The registrant shall assure that direct reading devices are read and doses recorded daily and that a radiation detecting badge is processed immediately if a pocket dosimeter, chamber, or direct reading device is discharged beyond its range.

(c) The radiation detecting badge reports received from the badge processor and records of pocket dosimeter, chamber, or direct reading device readings shall be retained indefinitely, or until the registrant terminates operation and transfers personnel records to the department. (Eff. 4/9/2009, Register 190)_)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.540. X-ray machine security; storage. (a) During an industrial radiographic operation, direct surveillance must be maintained to protect against unauthorized entry into the ionizing radiation area, except where the area is locked to protect against unauthorized or accidental entry.

(b) An x-ray machine used in industrial radiography must have a locking mechanism designed to prevent unauthorized use and must be kept locked at all times, except when

(1) under the direct surveillance of a radiographer or radiographer's assistant; or

(2) the area is locked to protect against unauthorized or accidental entry.

(c) When stored, an industrial radiographic x-ray machine must be physically secured to prevent tampering or removal by an unauthorized individual. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.550. Survey instruments. (a) For physical surveys required under this chapter, a registrant shall maintain calibrated and operable ionizing radiation survey instruments that have a range from two milliroentgens per hour to one roentgen per hour. An industrial radiographic operation may not be conducted unless calibrated and operable ionizing radiation survey instrumentation is available and used at each site where radiographic exposures are made.

(b) A registrant shall ensure that each survey instrument is calibrated after any service or repair and at regular intervals not to exceed six months. A record shall be maintained of the latest date of calibration.

(c) Records of surveys and calibrations must be retained for at least five years, or since the most recent inspection by the department, whichever is less. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.560. Utilization logs. (a) A registrant shall maintain utilization logs for each x-ray machine used in industrial radiography that shows the following:

(1) a description, including make and model number, of each machine;

(2) the identity of the radiographer to whom the machine or device is assigned;

(3) locations of use and dates of use; and

(4) the voltage, current, and exposure time for each exposure.

(b) A utilization log must be retained for a at least five years, or since the most recent inspection by the department, whichever is less. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.570. Posting of sign in industrial radiography area. An area where industrial radiography is being performed must be conspicuously posted with the appropriate signage as required under 7 AAC 18.290. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.580. Cabinet radiography. Cabinet radiography is exempt from the requirements of 7 AAC 18.500 – 7 AAC 18.570, except that a registrant of a cabinet radiographic unit may not permit an individual to operate the unit until the individual has received a copy of, been instructed in, and demonstrated an understanding of operating procedures for the unit, and has demonstrated competence in the use of the procedures. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.585. Shielded room radiography. Shielded room radiography is exempt from the requirements of 7 AAC 18.500 – 7 AAC 18.570, except that a registrant

(1) may not permit an individual to operate an x-ray machine for shielded room radiography until the individual has received a copy of, been instructed in, and demonstrated an understanding of operating procedures for the unit, and has demonstrated competence in the use of the procedures;

(2) shall supply the appropriate personnel monitoring equipment to, and shall require the use of the equipment by, every individual who operates, who makes set-ups, or who performs maintenance on an x-ray machine for shielded room radiography; and

(3) shall assure that a survey is conducted to determine that the x-ray machine is off before each entry into the shielded room; the survey must be conducted using an instrument that is in good working order and is capable of measuring ionizing radiation of the energies and at the dose rate to be encountered, and that has been properly calibrated within the preceding three months or following the last instrument servicing, whichever is later. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

7 AAC 18.590. Field radiography. Field radiography is exempt from the requirements of 7 AAC 18.500 – 7 AAC 18.570, except that a registrant may not permit entry into the radiographic exposure area until a survey is conducted to determine that the x-ray machine is off before each entry into the radiographic exposure area. The survey must be conducted with an instrument that is in good working order and is capable of measuring ionizing radiation of the energies and at the dose rates to be encountered, and that has been properly calibrated within the preceding three months or following the last instrument servicing, whichever is later. Survey results and records of boundary locations must be retained for at least five years, or since the most recent inspection by the department, whichever is less. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485

Article 6. Definitions.

990. Definitions

7 AAC 18.990. Definitions. Unless the context requires otherwise, in this chapter,

(1) "absorbed dose" means the energy imparted by ionizing radiation per unit mass of irradiated material, and a unit of which is the rad and the gray;

(2) "activity" means the rate of disintegration, transformation, or decay of radioactive material, and for which a unit of activity is the curie and the Becquerel;

(3) "airborne radioactive material" means radioactive material dispersed in the air in the form of a dust, fume, mist, vapor, or gas;

(4) "aluminum equivalent" means the thickness of aluminum allowing, under specific condition, the same attenuation as the material in question;

(5) "Becquerel" means a unit for the measurement of radioactivity that is equal to one disintegration per second;

(6) "bioassay" means the determination of kinds, quantities, concentrations, and locations of radioactive material in the human body, by direct measurement, *in vivo* counting, or by analysis and evaluation of materials excreted or removed from the human body;

(7) "C-arm" means a kind of mobile fluoroscope that allows for quick repositioning of the radiation tube during use;

(8) "cabinet radiography" means industrial radiography with the use of an ionizing radiation machine conducted in an enclosed, interlocked cabinet, in a manner that the

(A) radiation machine does not operate unless all openings are securely closed; and

(B) cabinet is shielded so that every location on the exterior meets conditions for an uncontrolled area;

(9) "collimator" means an adjustable beam-restricting device constructed of attenuating material used to confine a useful beam within a designated solid angle;

(10) "commissioner" means the commissioner of health and social services;

(11) "committed dose equivalent" means the dose equivalent to organs or tissues of reference that will be received from an intake of radioactive material by an individual during the 50-year period following the uptake;

(12) "committed dose equivalent maximally exposed organ" means the largest dose to any organ from the intake of radioactive material;

(13) "committed effective dose equivalent" means the sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to each of these organs or tissues;

(14) "cone" means a type of beam-restricting device that does not permit adjustment of the beam size;

(15) "controlled area"

(A) means an area that is outside of a restricted area, but inside the site boundary, and to which access is controlled by a registrant for purposes of protection of individuals from exposure to radiation and radioactivity;

(B) does not include residential quarters, except that a separate room or rooms in a residential building may be set apart as a controlled area;

(16) "curie" means that quantity of radioactive material that decays at the rate of 3.7×10^{10} disintegrations per second;

(17) "dead-man type switch" means a switch constructed in a manner that a circuit-closing contact can only be maintained by continuous pressure by the operator;

(18) "deep dose equivalent" means the dose equivalent at a tissue depth of one centimeter used as a measure of external whole body exposure;

(19) "department" means the Department of Health and Social Services;

(20) "diagnostic-type tube housing" means an x-ray tube housing constructed in a manner that the leakage X-radiation at a distance of one meter from the target cannot exceed 100 milliroentgens in one hour when the tube is operated at any of the tube's specified ratings;

(21) "diaphragm" means a beam restricting device that is made of a flat piece of attenuating material with an aperture that restricts the useful beam;

(22) "dose"

(A) means

(i) the quantity of radiation absorbed, per unit of mass, by the whole body or by any portion of the body;

(ii) in connection with a period of time, the total quantity of radiation absorbed, per unit of mass, during that period of time;

(B) includes

(i) absorbed dose;

(ii) committed dose equivalent;

(iii) committed effective dose equivalent;

(iv) dose equivalent;

(v) effective dose equivalent; and

(vi) total effective dose equivalent;

(23) "dose equivalent" means the product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest, and a unit of which is the rem and sievert;

(24) "effective dose equivalent" means the sum of the products of the dose equivalent to the organ or tissue and the weighting factors applicable to each of the body organs or tissues that are irradiated;

(25) "enclosure" means a cabinet, box, or other container, provided by the manufacturer or user of a radiation machine, from which the source of the radiation cannot be removed without destroying the function of the source;

(26) "exposure" means being exposed to ionizing radiation or to radioactive material;

(27) "FDA" means the Food and Drug Administration;

(28) "field radiography" means industrial radiography using ionizing radiation machines, except for cabinet radiography and shielded room radiography;

(29) "filter" means material placed in a useful beam to preferentially absorb less penetrating radiations;

(30) "gray" means the SI unit of absorbed dose that is equal to an absorbed dose of one joule per kilogram (100 rads);

(31) "half-value layer" means the thickness of an absorbing material required in order to reduce a beam of radiation to one-half of the beam's incident exposure rate;

(32) "high ionizing radiation area" means an area that is accessible to an individual in which there exists ionizing radiation at a level that a major portion of the individual's body may receive a dose in excess of 100 millirems in a one hour period of time;

(33) "imaging" means the use of radiation of sufficient intensity to enable a photographic-like rendition of internal structures to be seen;

(34) "individual" means a natural person;

(35) "individual monitoring" means the assessment of

(A) dose equivalent by the use of devices designed to be worn by an individual;

(B) committed effective dose equivalent by bioassay or by determination of the time-weighted air concentrations to which an individual has been exposed; and

(C) dose equivalent by the use of survey data;

(36) "individual monitoring device" means a device designed to be worn by an individual for the assessment of dose equivalent, such as a film badge, thermoluminescence dosimeter, pocket ionization chamber, and personal air sampling device;

(37) "industrial radiography" means the examination of the internal structure of materials by nondestructive methods utilizing ionizing radiation sources;

(38) "internal dose" means that portion of the dose equivalent received from radioactive material taken into the body;

(39) "interlocked" means the use of a device to preclude exposure to a radiation hazard either by preventing entry to an area or by automatically removing the hazard;

(40) "ionizing radiation"

(A) means an electromagnetic or particulate radiation capable of producing ions, directly or indirectly, in the radiation's passage through matter;

(B) includes

(i) alpha and beta particles;

(ii) gamma rays;

(iii) high speed electrons;

(iv) neutrons;

(v) protons; and

(vi) x-rays;

(41) "ionizing radiation area" means an area that is accessible to an individual in

which there exists ionizing radiation at a level that a major portion of the individual's body may receive a dose in excess of five millirems in an hour period of time or a dose in excess of 100 millirems in a five consecutive day period;

(42) "ionizing radiation source" means a device capable of producing ionizing radiation;

(43) "kilovolts peak" means the crest value of kilovolts of the potential of a pulsating potential generator and, when only one-half of the wave is used, the value refers to the useful half of the wave;

(44) "lens dose equivalent" means the external exposure to the lens of the eye, measured as the dose equivalent at a tissue depth of 0.3 centimeter;

(45) "lead equivalent" means the thickness of lead, under specified conditions, that allows the same attenuation as the material in question;

(46) "leakage radiation" means radiation emitted from an enclosure, except for the useful beam;

(47) "limits" or "dose limits" means the upper bounds of radiation doses permitted under this chapter;

(48) "medical" means related to a practice engaged in by a practitioner of the healing arts licensed by this state;

(49) "microcurie" means one millionth of a curie or 3.7×10^7 disintegrations per second;

(50) "millisievert" means one-thousandth of a sievert;

(51) "minor" means an individual less than 18 years of age;

(52) "NVLAP" means National Voluntary Laboratory Accreditation Program; a sub-department of the National Institute of Standards and Technology (NIST), Standard Services Division;

(53) "nonstochastic effect"

(A) means a health effect that occurs only after a minimum threshold exposure to radiation, the severity of which varies with the dose;

(B) includes radiation-induced cataract formation;

(54) "occupational dose"

(A) means the dose received by an individual in the course of employment in which the individual's assigned duties involve exposure to radiation or to radioactive material, whether in the possession of the registrant or other person;

(B) does not include doses received

(i) from background radiation;

(ii) from any medical administration the individual has received;

(iii) from exposure to individuals administered radioactive material from voluntary participation in medical research programs; or

(iv) as a member of the public;

(55) "operator" means an individual who conducts an activity resulting in the production of ionizing radiation, or that is intended or expected to cause the production of ionizing radiation;

(56) "person" includes

(A) a business;

(B) a health facility;

(C) an individual;

(D) an institution;

(E) a municipal corporation;

(F) a partnership;

(G) a political subdivision;

(H) a public or private corporation; and

(I) any other entity;

(57) "personnel monitoring equipment" means devices designed to be worn or carried by an individual for the purpose of measuring doses, such as a

(A) film badge;

(B) film ring;

(C) pocket chamber; or

(D) pocket dosimeters;

(58) "practitioner of the healing arts licensed by this state" includes the following practitioners licensed by this state:

(A) chiropractor;

(B) dentist;

(C) nurse practitioner;

(D) osteopaths;

(E) physician, including a surgeon;

(F) physician assistant; and

(G) podiatrist;

(59) "primary protective barrier" means a barrier sufficient to attenuate a useful beam to a required degree;

(60) "protective apron" means an apron made of attenuating materials used to reduce radiation exposure;

(61) "protective barrier"

(A) means a barrier of attenuating materials used to reduce radiation exposure;

(B) includes a

(i) primary protective barrier; and

(ii) secondary protective barrier;

(62) "protective glove" means a glove made of attenuating materials used to reduce radiation exposure;

(63) "qualified expert" means an individual determined by the department to be qualified by education, training, and experience to evaluate radiation matters and make competent recommendations concerning a particular installation or application of a radiation machine;

(64) "rad" means a measure of the dose of an ionizing radiation to a material in terms of the energy absorbed per unit mass of material, and that is the dose corresponding to the absorption of 100 ergs per gram or 0.01 joule per kilogram;

(65) "radiation" means ionizing and non-ionizing radiation and sonic, infrasonic, and ultrasonic waves;

(66) "radiation machine"

(A) means a device capable of producing radiation;

(B) does not include a device that produces ionizing radiation only from radioactive material;

(67) "radiation sources"

(A) has the meaning given in AS 18.60.545; and

(B) includes a radiation machine and radioactive material;

(68) "radioactive material" means a material, solid, liquid, or gas that emits ionizing radiation spontaneously;

(69) "radiographer" means an individual who performs, or who, in attendance at a site where ionizing radiation sources are being used, personally supervises industrial radiographic operations;

(70) "radiographer's assistant" means an individual who uses ionizing radiation sources, related handling tools, or survey instruments in industrial radiography under the personal supervision of a radiographer;

(71) "radionuclide" has the meaning given in AS 18.60.545;

(72) "registrant" means an individual who has registered a radiation source under this chapter;

(73) "rem" means the special unit of any of the quantities expressed as dose equivalent, and which the dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor;

(74) "roentgen" means an amount of X-radiation or gamma radiation in which the associated corpuscular emission per 0.001293 grams of air produces in air ions carrying one electrostatic unit of quantity of electricity of either sign;

(75) "restricted area"

(A) means an area that access is limited by the registrant for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials;

(B) does not include an area used as residential quarters, except that separate rooms in a residential building may be set apart as a restricted area;

(76) "scattered radiation" means radiation that has been deviated in direction during passage through matter;

(77) "sealed source" means radioactive material that is permanently bonded or fixed in a capsule or matrix designed to prevent release and dispersal of the radioactive material under the most severe conditions that will be encountered in normal use and handling;

(78) "secondary protective barrier" means a barrier sufficient to attenuate stray radiation to a required degree;

(79) "shallow-dose equivalent" means the dose equivalent at a tissue depth of 0.007 centimeter and applies to the external exposure of the skin of the whole body or the skin of an extremity;

(80) "shallow-dose equivalent maximum extremity" means the dose equivalent at a tissue depth of 0.007 centimeter and applies to the maximum external exposure of the skin of an extremity;

(81) "shallow-dose equivalent whole body" means the dose equivalent at a tissue depth of 0.007 centimeter based on the external radiation exposure of the skin of the whole body;

(82) "shielded room radiography" means industrial radiography, with the use of ionizing radiation machines, that is conducted in an enclosed room, in which

(A) the interior is not occupied during radiographic operations;

(B) is shielded so that every location on the exterior meets conditions for an uncontrolled area as specified in 7 AAC 18.240; and

(C) the only access is through openings which are interlocked so that the ionizing radiation machine will not operate unless all openings are securely closed;

(83) "shutter" means an adjustable device, generally consisting of lead, fixed to an x-ray tube housing to intercept the useful beam;

(84) "sievert" means the SI unit of any of the quantities expressed as dose equivalent, in which the dose equivalent is equal to the absorbed dose in grays multiplied by the quality factor;

(85) "source material"

(A) means uranium or thorium, or any combination of uranium or thorium, in any physical or chemical form or ores which contain 0.05 percent or more of uranium, thorium, or any combination of them;

(B) does not include special nuclear material;

(86) "special nuclear material" means Uranium^{233}, Uranium^{235}, and plutonium;

(87) "stochastic effects" means health effects, including hereditary effects and cancer incidence, that occurs randomly and for which the probability of the effect occurring, rather than its severity, is assumed to be a linear function of dose without threshold;

(88) "stray radiation"

(A) means radiation not serving any useful purpose; and

(B) includes leakage radiation and scattered radiation;

(89) "survey"

(A) means an evaluation of radiation protection practices;

(B) includes

(i) a physical survey of the location of material and equipment; and

(ii) measurements of levels of radiation or concentration of radioactive materials present;

(90) "technique chart" means a paper or electronic based graph, such as a device-operational software, generated for the particular machine that establishes the optimal exposure by considering the essential variables of a radiographic examination, enabling an operator to select an exposure appropriate for each patient and procedure combination;

(91) "total effective dose equivalent" means the sum of the

(A) deep-dose equivalent for external exposures; and

(B) committed effective dose equivalent for internal exposures;

(92) "total organ dose equivalent" means the shallow-dose equivalent whole body dose plus the maximum organ dose for any internally deposited radionuclide, if applicable;

(93) "uncontrolled area" means an area to which access is not controlled by the registrant for purposes of protection of individuals from exposure to radiation and radioactive materials, and any area used for residential quarters;

(94) "useful beam" means that part of an ionizing radiation that passes through a window, aperture, cone, or other collimating device of a tube housing;

(95) "very high radiation area" means an area that is accessible to an individual in which radiation levels from radiation sources external to the body may result in an individual receiving an absorbed dose in excess of 500 rads (5 grays) in one hour at one meter from a radiation source or one meter from any surface that the radiation penetrates;

(96) "weighting factor" means the proportion of the risk of stochastic effects resulting from irradiation of that organ or tissue to the total risk of stochastic effects when the whole body is irradiated uniformly;

(97) "whole body" means, for purposes of external exposure, the

(A) head;

(B) trunk, including male gonads;

(C) arms above the elbow; and

(D) legs above the knee;

(98) "x-ray" means ionizing electromagnetic radiation emitted by an electrical device in the range of 0.01 nanometers to 20 nanometers. (Eff. 4/9/2009, Register 190)

Authority: AS 18.60.475 AS 18.60.485