25 TEXAS ADMINSTRATIVE CODE (TAC)

§289.255

Radiation Safety Requirements and Licensing and Registration Procedures for Industrial Radiography

Texas Regulations for Control of Radiation

(revisions effective March 22, 2015, are shown as shaded text)

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Radiation Safety Requirements and Licensing and Registration Procedures for Industrial Radiography (Continued)

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§289.255. Radiation Safety Requirements and Licensing and Registration Procedures for Industrial Radiography.

(a) Purpose.

(1) The requirements in this section establish radiation safety requirements and licensing and registration procedures for using sources of radiation for industrial radiography and for certification of industrial radiographers.

(2) The requirements in this section apply to licensees and registrants who possess sources of radiation for industrial radiography, including radiation machines, accelerators, and sealed radioactive sources.

(3) Each licensee and registrant is responsible for ensuring compliance with this chapter, license and registration conditions, and orders of the agency.

(4) Each licensee and registrant is responsible for ensuring that radiographic personnel performing activities under a license or registration comply with this chapter, license and registration conditions, and orders of the agency.

(b) Scope.

(1) The requirements of this section are in addition to and not in substitution for other applicable requirements of this chapter.

(2) The requirements of the following sections of this chapter apply to all licensed industrial radiographic operations:

(A) §289.201 of this title (relating to General Provisions for Radioactive Material);

(B) §289.202 of this title (relating to Standards for Protection Against Radiation from Radioactive Materials);

(C) §289.203 of this title (relating to Notices, Instructions, and Reports to Workers; Inspections);

(D) §289.204 of this title (relating to Fees for Certificates of Registration, Radioactive Material Licenses, Emergency Planning and Implementation, and Other Regulatory Services);

(E) §289.205 of this title (relating to Hearing and Enforcement Procedures)

(F) §289.251 of this title (relating to Exemptions, General Licenses, and General License Acknowledgements);

(G) §289.252 of this title (relating to Licensing of Radioactive Material); and

(H) §289.257 of this title (relating to Packaging and Transportation of Radioactive Material).

(3) The requirements of the following sections of this chapter apply to all registered industrial radiographic operations:

(A) §289.203 of this title;

(B) §289.204 of this title;

(C) §289.205 of this title;

(D) §289.226 of this title (relating to Registration of Radiation Machine Use and Services); and

(E) §289.231 of this title (relating to General Provisions and Standards for Protection Against Machine-Produced Radiation).

(4) The requirements of §289.228 of this title (relating to Radiation Safety Requirements for Industrial Radiation Machines) apply to persons using analytical and other industrial radiation machines subject to this section.

(5) The requirements of §289.229 of this title (relating to Radiation Safety Requirements for Accelerators, Therapeutic Radiation Machines, Simulators and Electronic Brachytherapy Devices) apply to persons using accelerators subject to this section.

(c) Definitions. The following words and terms, when used in this section, shall have the following meaning, unless the context clearly indicates otherwise.

(1) Additional authorized use/storage site--Authorized use/storage locations specifically named on a license or certificate of registration other than the main site specified on a license or certificate of registration or other than temporary job sites.

(2) ANSI--American National Standards Institute.

(3) Annual refresher safety training--A review conducted or provided by the licensee or registrant for its employees on radiation safety aspects of industrial radiography. The review may include, as appropriate, the results of internal audits, new procedures or equipment, new or revised regulations, accidents or errors that have been observed, and should also provide opportunities for employees to ask safety questions.

(4) Associated equipment--Equipment that is used in conjunction with a radiographic exposure device to make radiographic exposures that drives, guides, or comes in contact with the source, (such as, guide tube, control tube, control cable (drive cable), removable source stop, "J" tube and collimator when it is used as an exposure head).

(5) Cabinet x-ray system--An x-ray system with the x-ray tube installed in an enclosure independent of existing architectural structures except the floor on which it may be placed. An x-ray tube used within a shielded part of a building, or x-ray equipment that may temporarily or occasionally incorporate portable shielding, is not considered a cabinet x-ray system. The cabinet x-ray system is intended to:

(A) contain at least that portion of a material being irradiated;

(B) provide radiation attenuation; and

(C) exclude personnel from its interior during generation of radiation.

(6) Certifiable cabinet x-ray system--An existing uncertified x-ray system that has been modified to meet the certification requirements specified in Title 21, Code of Federal Regulations (CFR), §1020.40.

(7) Certification identification (ID) card--The document issued by the agency to individuals who have completed the requirements stated in subsection (e)(2)(A) of this section.

(8) Certified cabinet x-ray system--An x-ray system that has been certified in accordance with Title 21, CFR, §1010.2 as being manufactured and assembled on or after April 10, 1975, according to the provisions of Title 21, CFR, §1020.40.

(9) Certifying entity--An entity that is:

(A) an independent certifying organization;

(B) an Agreement State whose industrial radiographer certification program meets the applicable parts of Title 10, CFR, Part 34, Appendix A, Parts II and III for radioactive material; or

(C) a radiation control agency whose x-ray and/or combination certification requirements are found to be equivalent to criteria established by the Conference of Radiation Control Program Directions, Inc. (CRCPD).

(10) Collimator--A radiation shield that is placed on the end of a guide tube or directly onto a radiographic exposure device to restrict the size of the radiation beam when the sealed source is cranked into position to make a radiographic exposure.

(11) Conference of Radiation Control Program Directors, Inc. (CRCPD)--A 501(c)(3) nonprofit non-governmental professional organization dedicated to radiation protection to serve as a common forum for the many governmental radiation protection agencies to communicate with each other and to promote uniform radiation protection regulations and activities.

(12) Control cable (drive cable)--The cable that is connected to the source assembly and used to drive the source from and return it to the shielded position.

(13) Control mechanism (drive mechanism)--A device that enables the source assembly to be moved from and returned to the shielded position. A drive mechanism is also known as a crank assembly.

(14) Control tube--A protective sheath for guiding the control cable. The control tube connects the control drive mechanism to the radiographic exposure device.

(15) Crank-out device--The control cable, control tube, and drive mechanism used to move the sealed source to and from the shielded position to make an industrial radiographic exposure.

(16) Exposure head--A device that locates the gamma radiography sealed source in the selected working position. An exposure head is also known as a source stop.

(17) Fluoroscopic imaging assembly--A subsystem in which x-ray photons produce a fluoroscopic image. It includes the image receptors such as the image intensifier and spot-film device, electrical interlocks, if any, and structural material providing linkage between the image receptor and source assembly.

(18) GED--General educational development.

(19) Guide tube--A flexible or rigid tube, such as a "J" tube, for guiding the source assembly and the attached control cable from the exposure device to the exposure head. The guide tube may also include the connections necessary for attachment to the exposure device and to the exposure head.

(20) Independent certifying organization--An independent organization that meets all of the criteria of Title 10, CFR, Part 34, Appendix A, for radioactive material, or comparable standards for x-ray machines.

(21) Industrial radiography (radiography)--A nondestructive testing method using ionizing radiation, such as gamma rays or x rays, to make radiographic images for the purpose of detecting flaws in objects without destroying them.

(22) Lay-barge radiography--Industrial radiography performed on any water vessel used for laying pipe.

(23) Lock-out survey--A radiation survey performed to determine that a sealed source is in its fully shielded position before moving the radiographic exposure device or source changer to a different temporary job site or before securing the radiographic exposure device or source changer against unauthorized removal.

(24) Offshore--Within the territorial waters of the State of Texas. The territorial waters of Texas extend to the three marine league line or nine nautical miles from the Texas coast.

(25) On-the-job training (hands-on experience)--Experience in all of the areas considered to be directly involved in the radiography process. The hours of on-the-job training do not include safety meetings, classroom training, travel, darkroom activities, film development and interpretation, or use of a cabinet x-ray unit.

(26) Permanent radiographic installation--A shielded room, cell, or vault, not located at a temporary jobsite, in which radiography is performed and meets the criteria of subsection (n) of this section.

(27) Permanent storage site--Any location that is specifically named on a license or certificate of registration and that is used only for storage of sources of radiation.

(28) Personal supervision--Guidance and instruction provided to a radiographer trainee by a radiographer trainer who is present at the site, in visual contact with the trainee while the trainee is using sources of radiation, associated equipment, and survey meters, and in such proximity that immediate assistance can be given if required.

(29) Pipeliners--A directional beam radiographic exposure device.

(30) Platform radiography--Industrial radiography performed on an offshore platform or other structure over a body of water.

(31) Practical examination--A demonstration through practical application of the safety rules and principles in industrial radiography including use of all appropriate equipment and procedures.

(32) Radiation safety officer (RSO)--An individual named by the licensee or registrant who has a knowledge of, responsibility for, and authority to enforce appropriate radiation protection rules, standards, and practices on behalf of the licensee or registrant and who meets the requirements of subsection (e)(4) of this section.

(33) Radiographer--Any individual who has successfully completed the training, testing, and documentation requirements of subsection (e)(2)(A) of this section and who is responsible to the licensee or registrant for assuring compliance with the requirements of the agency's regulations and conditions of the license or certificate of registration. These individuals may be referred to as certified industrial radiographers or certified radiographers. The individual may also:

(A) perform industrial radiographic operations; or

(B) be in attendance at the site where the sources of radiation are being used.

(34) Radiographer certification--Written approval received from a certifying entity stating that an individual has satisfactorily met certain established radiation safety, testing, and experience criteria.

(35) Radiographer trainee--Any individual who has successfully completed the training and documentation requirements of subsection (e)(1)(A) of this section and who shall use sources of radiation and associated equipment or radiation survey instruments under the personal supervision of a radiographer trainer.

(36) Radiographer trainer--A radiographer who instructs and supervises radiographer trainees during on-the-job training and who meets the requirements of subsection (e)(3) of this section.

(37) Radiographic exposure device--Any instrument containing a sealed source fastened or contained therein, in which the sealed source or shielding thereof may be moved, or otherwise changed, from a shielded to unshielded position for purposes of making a radiographic exposure (e.g., camera).

(38) Radiographic operations--All activities associated with the presence of x-ray machines or radioactive sources in a radiographic exposure device during the use of the machine or device or transport (except when being transported by a common or contract transport). Radiographic operations include surveys to confirm the adequacy of boundaries, setting up equipment, and any activity inside restricted area boundaries.

(39) Radiographic personnel--Any radiographer, radiographer trainer, or radiographer trainee.

(40) Residential location--Any area where structures are located in which people lodge or live, and the grounds on which these structures are located including, but not limited to, houses, apartments, condominiums, and garages.

(41) S-tube--A tube through which the radioactive source travels when inside a radiographic exposure device.

(42) Shielded position--The location within the radiographic exposure device or source changer where the sealed source is secured and restricted from movement.

(43) Shielded-room radiography--Industrial radiography conducted in a room shielded so radiation levels at every location on the exterior meet the limitations specified in §289.202(n) of this title or §289.231(o) of this title, as applicable. A shielded room is also known as a bay or bunker.

(44) Source assembly (pigtail)--An assembly that consists of the sealed source and a connector that attaches the source to the control cable. The source assembly may also include a ball stop used to secure the source in the shielded position.

(45) Source changer--A device designed and used to replace sealed sources in radiographic exposure devices, including those used to transport and store sealed sources.

(46) Storage area--Any location, facility, or vehicle that is used to store and secure a radiation machine, radiographic exposure device, a storage container, or a sealed source when it is not used for radiographic operations. Storage areas are locked or have a physical barrier to prevent accidental exposure, tampering, or unauthorized removal of the machine, device, container, or source.

(47) Storage container--A device in which the sealed source is secured and stored.

(48) Storage facility--A structure designed to house one or more sources of radiation to provide security and shielding at a permanent storage site. A storage facility is also known as a vault.

(49) Temporary job site--Any location where industrial radiography is performed other than the specific use location(s) listed on a license or certificate of registration. If use of sources of radiation is authorized at a temporary job site, storage incident to that use is also authorized.

(50) Trainee status card--The document issued by the agency following completion of the requirements of subsection (e)(1)(A) of this section.

(51) Transport container--A package that is designed to provide radiation safety and security when sealed sources are transported and meets all applicable requirements of the United States Department of Transportation (DOT).

(52) Underwater radiography--Industrial radiography performed when the radiographic exposure device and/or related equipment are beneath the surface of the water.

(d) Exemptions.

(1) Uses of certified and certifiable cabinet x-ray systems are exempt from the requirements of this section except for the requirements of subsections (a), (b)(3), (c), and (t)(8) of this section.

(2) Industrial uses of hand-held light intensified imaging devices are exempt from the requirements in this section if the exposure rate 18 inches from the source of radiation to any individual does not exceed 2 millirem per hour (mrem/hr) (0.02 millisievert per hour (mSv/hr)). Devices with exposure rates that exceed the 2 mrem/hr (0.02 mSv/hr) level shall meet the applicable requirements of this section and §289.252 of this title or §289.226 of this title, as applicable. This exemption will apply only to those radiation machines that do not allow a person or body part to be exposed to the radiation beam.

(3) Radiation machines determined by the agency to constitute a minimal threat to human health and safety in accordance with §289.231(ll)(3) of this title, are exempt from the requirements in this section except for the requirements of paragraph (1) of this subsection.

(4) Facilities that utilize radiation machines for industrial radiography only at permanent radiographic installations are exempt from the requirements of this section except for the requirements of subsections (a), (b)(1), (b)(3) - (5), (c), (e)(1), (j), (n), (t)(1), and (t)(7).

(e) Requirements for qualifications of radiographic personnel.

(1) Radiographer trainee. No licensee or registrant shall permit any individual to act as a radiographer trainee until the individual possesses the original or a copy of an agency-issued trainee status card or certification ID card.

(A) To obtain an agency-issued trainee status card, the licensee, registrant, or the individual shall document to the agency on RC Form 255-E or equivalent that such individual has successfully completed a course of at least 40 hours on the applicable subjects outlined in subsection (x)(1) of this section. The course shall be one accepted by the agency, another agreement state, or the United States Nuclear Regulatory Commission (NRC).

(B) The trainee shall carry a copy of the completed RC Form 255-E, in the interim period after submitting documentation to the agency and before receiving a trainee status card. The copy of the completed RC Form 255-E that was submitted to the agency may be used in lieu of the trainee status card for a period of 30 days from the date recorded by the trainee on the documentation.

(C) The individual shall notify the agency in writing of the need for a replacement trainee status card. The individual shall carry a copy of documentation of the request while performing industrial radiographic operations until a replacement trainee status card is received from the agency.

(D) Records required by subparagraph (A) of this paragraph shall be made and maintained in accordance with subsection (v)(1) of this section.

(E) Each licensee and registrant shall maintain for agency inspection clear and legible records that demonstrate that the applicable requirements of this paragraph are met. A copy of the trainee status card will satisfy the documentation requirements of this paragraph.

(2) Radiographer. No licensee or registrant shall permit any individual to act as a radiographer until the individual possesses a valid radiographer certification.

(A) To obtain a radiographer certification, an individual shall submit the fee as prescribed in subsection (h)(1) of this section and comply with the following:

(i) complete the requirements of paragraph (1)(A) of this subsection;

(ii) document to the Agency on RC Form 255-R, completion of on-the-job training as a radiographer trainee supervised by one or more radiographer trainers authorized on a license or certificate of registration;

(I) The radiographer trainee shall carry a legible trainee status card in accordance with paragraph (1) of this subsection while obtaining the on-the-job training specified in subclauses (II) - (VII) of this clause.

(II) The on-the-job training shall include at least 200 hours of active participation in radioactive materials industrial radiographic operations or 120 hours of active participation in x-ray industrial radiographic operations, as applicable.

(III) Individuals performing industrial radiography utilizing radioactive materials and x-ray machines shall complete both segments (320 hours) of on-the-job training.

(IV) The hours of on-the-job training do not include safety meetings, classroom training, travel, darkroom activities, film development and interpretation, or use of a cabinet x-ray unit.

(V) One year of documented experience of on-the-job training as authorized by another agreement state or the NRC may be substituted for the requirements of subclauses (II) or (III) of this clause. The documentation shall be submitted to the agency on RC Form 255-OS or equivalent.

(VI) The trainee shall be under the personal supervision of a radiographer trainer whenever a radiographer trainee:

(-a-) uses radiation machines, radiographic exposure devices, or associated equipment; or

(-b-) performs radiation surveys required by:

(-1-) subsection (t)(6) of this section to determine that the radiation machine has stopped producing radiation; or

(-2-) subsection (u)(9) of this section to determine that the sealed source has returned to the shielded position after an exposure.

(VII) The personal supervision shall include the following.

(-a-) The radiographer trainer's physical presence at the site where the sources of radiation are being used;

(-b-) The availability of the radiographer trainer to give immediate assistance if required; and

(-c-) The radiographer trainer's direct observation of the trainee's performance of the operations referred to in this section.

(iii) successfully complete within the last five years the appropriate agency-administered examination prescribed in subsection (g)(2) of this section or the appropriate examination of another certifying entity that affords the same or comparable certification standards as those afforded by this clause and clauses (i) and (ii) of this subparagraph; and

(iv) possesses a current certification ID card issued in accordance with subsection (h)(2) of this section or by another certifying entity that affords the same or comparable certification standards as those afforded by this clause or clauses (i) - (iii) of this subparagraph.

(B) Reciprocal recognition by the agency of an individual radiographer certification may be granted according to subsection (h)(5)(A) and (B) of this section.

(C) Once an individual has completed the requirements of paragraph (2)(A)(iv) of this subsection, the licensee or registrant is not required to submit the documentation referenced in paragraph (2)(A)(i) and (ii) of this subsection for renewal of a radiographer certification.

(D) Records required by subparagraph (A) of this paragraph shall be made and maintained in accordance with subsection (v)(1) of this section.

(E) Each licensee and registrant shall maintain for agency inspection clear and legible records that demonstrate that the applicable requirements of this paragraph are met for all industrial radiographic personnel. A copy of the certification ID card will satisfy the documentation requirements of this paragraph.

(3) Radiographer trainer.

(A) No licensee or registrant shall permit any individual to act as a radiographer trainer until:

(i) it has been documented to the agency on RC Form 255-T or equivalent that such individual has:

(I) met the radiographer certification requirements of paragraph (2)(A) of this subsection; and

(II) one year of documented experience as a certified radiographer.

(ii) such individual is in receipt of a valid trainer certification card issued by the agency and under which the individual is acting as a radiographer trainer; and

(iii) determination is made by the agency that the individual is not currently under order from the agency prohibiting the individual from acting as a radiographer trainer.

(B) The specific duties of the radiographer trainer include, but are not limited to, the following:

(i) providing personal supervision to any radiographer trainee at the site where the sources of radiation are being used; and

(ii) preventing any unauthorized use of a source of radiation by a radiographer trainee.

(4) RSO for industrial radiography.

(A) An RSO shall be designated on every industrial radiography license and certificate of registration issued by the agency. A single individual may be designated as RSO for more than one license or certificate of registration if authorized by the agency.

(B) The RSO's qualifications shall be submitted to the agency and shall include as a minimum:

(i) possession of a high school diploma or a certificate of high school equivalency based on the GED test;

(ii) completion of the training and testing requirements of paragraphs (1)(A) and (2)(A)(iii) of this subsection; and

(iii) two years of documented radiation protection experience, including knowledge of industrial radiographic operations with at least 40 hours of active participation in industrial radiographic operations.

(C) The specific duties of the RSO include, but are not limited to, the following:

(i) establishing and overseeing operating, safety, emergency, and as low as reasonably achievable (ALARA) procedures, and to review them regularly to ensure that the procedures are current and conform with the requirements of this chapter;

(ii) overseeing and approving all phases of the training program for radiographic personnel so that appropriate and effective radiation protection practices are taught;

(iii) ensuring that required radiation surveys and leak tests are performed and documented in accordance with this chapter, including any corrective measures when levels of radiation exceed established limits;

(iv) ensuring that personnel monitoring devices are calibrated and used properly by occupationally-exposed personnel;

(v) ensuring that timely notifications to employees are made as required by §289.203 of this title;

(vi) ensuring that timely notifications to the agency are made as required by this section and §289.202 of this title or §289.231 of this title, as applicable;

(vii) ensuring that any required interlock switches and warning signals are functioning and that radiation signs, ropes, and barriers are properly posted and positioned;

(viii) investigating, determining the cause, taking steps to prevent the recurrence, and reporting to the agency each:

(I) known or suspected case of radiation exposure to an individual or radiation level detected in excess of limits established by this chapter; and

(II) theft or loss of a source(s) of radiation;

(ix) having a thorough knowledge of management policies and administrative procedures of the licensee or registrant;

(x) assuming control and having the authority to institute corrective actions including shutdown of operations when necessary in emergency situations or unsafe conditions;

(xi) maintaining records as required by this chapter in accordance with subsection (v)(1) of this section;

(xii) ensuring the proper storing, labeling, transport, and use of exposure devices and sources of radiation;

(xiii) ensuring that inventory and inspection and maintenance programs are performed in accordance with subsections (k) and (m) of this section;

(xiv) ensuring that personnel are complying with the requirements of this chapter and the conditions of the license or the certificate of registration; and

(xv) ensuring that the operating, safety, and emergency procedures of the licensee or registrant are met in accordance with subsections (t)(5)(A) - (C) and (G) and (u)(8)(A) - (C) and (I) of this section.

(f) Additional requirements.

(1) No licensee or registrant shall permit any individual to act as a radiographer trainee, radiographer, radiographer trainer, or RSO until such individual has met the certification requirements in accordance with subsection (e) of this section, as applicable, and has:

(A) received copies of and demonstrated an understanding of the following by successful completion of a written or oral examination administered by the licensee or registrant covering this material:

(i) the requirements contained in this section and the applicable requirements of §289.201 of this title, §289.202 of this title, §289.203 of this title, §289.231 of this title, and §289.257 of this title;

(ii) the appropriate conditions of the license(s) and certificate(s) of registration;

(iii) the licensee's or registrant's operating, safety, and emergency procedures; and

(B) demonstrated competence in the use of sources of radiation, radiographic exposure devices, associated equipment, related handling tools, and radiation survey instruments, that may be employed in industrial radiographic assignments by successful completion of a practical examination administered by the licensee or registrant covering such use.

(2) A radiographer and radiographer trainer shall ensure that radiographic operations to which the individual is assigned are conducted in accordance with the requirements of this section.

(3) Records of the administration of and the examinations required by paragraph (1) of this subsection shall be made and maintained in accordance with subsection (v)(1) of this section. Records shall include the following:

(A) copies of written tests administered by the licensee or registrant;

(B) dates of oral and practical examinations and names of individuals conducting and receiving the oral and practical examinations; and

(C) a list of items tested and the results of the oral and practical examinations.

(g) Application and fee for radiographer certification examinations.

(1) Application.

(A) An application for taking the examination shall be on forms prescribed and furnished by the agency.

(B) The non-refundable and non-transferable application fee for examination shall be $120.

(C) The appropriate fee shall be submitted with the application for examination when filing with the agency.

(D) The application and the non-refundable and non-transferable fee shall be submitted to the agency on or before the dates specified by the agency.

(E) Applicants who fail to appear at a scheduled exam and do not reschedule 48 hours prior to their assigned exam session shall apply for a future exam session in accordance with subparagraphs (A) - (D) of this paragraph.

(2) Examination. The examination shall be given for the purpose of determining the qualifications of applicants.

(A) The scope of the examination and the methods of procedure, including determination of the passing score, shall be prescribed by the agency. The examination will assess the applicant's knowledge to safely use sources of radiation and related equipment and the applicant's knowledge of this section, and the applicable requirements of §289.201 of this title, §289.202 of this title, and §289.231 of this title.

(B) The examination will be administered by the agency or persons authorized by the agency.

(C) A candidate failing an examination may apply for re-examination in accordance with paragraph (1) of this subsection and will be re-examined. A candidate shall not retake the same version of the agency-administered examination.

(D) The examination shall normally be offered once each month. Times, dates, and locations of the examination will be furnished by the agency.

(E) The examination will be in the English language.

(F) To take the examination, an individual shall present a government-issued photo identification card, such as a driver's license, at the time of the examination.

(G) Calculators will be permitted during the examination. However, calculators or computers with preprogrammed data or formulas, including exposure calculators, will not be permitted during the examination.

(H) The examination will be a "closed-book" examination.

(I) Any individual observed by an agency proctor to be compromising the integrity of the examination shall be required to surrender the examination, the answer sheet, and all scratch paper. Such individual will not be allowed to complete the examination, will forfeit the examination fee, and will leave the examination site to avoid disturbing other examinees. Such individual shall wait 90 days before taking a new examination and shall resubmit a new application and a $120 non-refundable and non-transferable examination fee.

(J) Examination material shall be returned to the agency at the end of the examination. No photographic or other copying of examination questions or materials shall be permitted. Disclosure by any individual of the contents of any examination prior to its administration is prohibited.

(K) The names and scores of individuals taking the examination shall be a public record.

(h) Radiographer certification.

(1) An application for radiographer certification shall be on RC Form 255-R, RC Form 255-OS, or equivalent.

(A) The non-refundable fee for radiographer certification shall be $110.

(B) The appropriate fee shall be submitted with the application for radiographer certification when filing with the agency.

(2) A certification ID card shall be issued to each individual who successfully completes the requirements of subsection (e)(2)(A)(i) - (iii) of this section.

(A) Each individual's certification ID card shall contain the individual's photograph. The agency will take the photograph at the time the examination is administered.

(B) The certification ID card remains the property of the agency and may be revoked or suspended under the provisions of paragraph (4) of this subsection.

(C) Any individual who needs to replace a certification ID card shall submit to the agency a written request for a replacement certification ID card, stating the reason a replacement certification ID card is needed. A non-refundable fee of $35 shall be paid to the agency for each replacement of a certification ID card. The prescribed fee shall be submitted with the written request for a replacement certification ID card. The individual shall carry a copy of the request while performing industrial radiographic operations until a replacement certification ID card is received from the agency.

(D) Each certification ID card is valid for a period of five years, unless revoked or suspended in accordance with paragraph (4) of this subsection. Each certification ID card expires at the end of the day, in the month and year stated on the certification ID card.

(3) Renewal of a radiographer certification.

(A) Applications for examination to renew a radiographer certification shall be filed in accordance with subsection (g)(1) of this section.

(B) The examination for renewal of a radiographer certification shall be administered in accordance with subsection (g)(2) of this section.

(C) A renewal certification ID card shall be issued in accordance with paragraph (2) of this subsection.

(4) Suspension or revocation of a radiographer certification.

(A) Any radiographer who violates the requirements of this chapter, or provides any material false statement in the application or any statement of fact required in accordance with this chapter, may be required to show cause at a formal hearing why the radiographer certification should not be suspended or revoked in accordance with §289.205 of this title.

(B) When an agency order has been issued for an industrial radiographer to cease and desist from the use of sources of radiation or the agency suspends or revokes the individual's radiographer certification, the radiographer shall surrender the certification ID card to the agency until the order is changed or the suspension expires.

(C) An individual whose radiographer certification has been suspended or revoked by the agency or another certifying entity shall comply with the process and/or conditions of the suspension or revocation orders before certification is reinstated, or the individual is permitted by the agency to apply for a new certification.

(5) Reciprocity of a radiographer certification.

(A) Reciprocal recognition by the agency of an individual radiographer certification will be granted provided that:

(i) the individual holds a valid certification in the appropriate category and class issued by a certifying entity, as defined in subsection (c) of this section;

(ii) the requirements and procedures of the certifying entity issuing the certification afford the same or comparable certification standards as those afforded by subsection (e)(2)(A)(i) - (iii) of this section; and

(iii) the individual submits a legible copy of the certification to the agency prior to entry into Texas.

(B) Enforcement actions with the agency, another agreement state, or the NRC or sanctions by an independent certifying entity may be considered when reviewing a request for reciprocal recognition from a licensee, registrant, or certified radiographer.

(C) Certified radiographers who are granted reciprocity by the agency shall maintain the certification upon which the reciprocal recognition was granted, or prior to the expiration of such certification, shall meet the requirements of paragraph (3) of this subsection.

(i) Receipt, transfer, and disposal of sources of radiation and devices using depleted uranium (DU) for shielding.

(1) Each licensee and registrant shall make and maintain records in accordance with subsection (v)(1) of this section, showing the receipt, transfer, and disposal of sources of radiation and devices using DU for shielding.

(2) These records shall include the following, as appropriate:

(A) date of receipt, transfer, or disposal;

(B) name of the individual making the record;

(C) radionuclide;

(D) number of curies (becquerels) or mass (for DU);

(E) manufacturer, model, and serial number of each source of radiation and/or device;

(F) for the person transferring the source of radiation, the name of the transferee, the number of the transferee's radioactive material license authorizing possession of the material, and the regulatory agency issuing the license to the transferee; and

(G) for the person receiving the source of radiation, the name of the transferor, the number of the transferor's radioactive material license authorizing possession of the material, and the regulatory agency issuing the license to the transferor.

(j) Radiation survey instruments.

(1) Each licensee and registrant shall have a sufficient number of calibrated, appropriate, and operable radiation survey instruments at each location where sources of radiation are present to perform the radiation surveys required by this section and §289.202(p)(1) and (3) of this title and §289.231(s)(1) and (2) of this title, as applicable. These radiation survey instruments shall be capable of measuring a range from 2 mrem/hr (0.002 mSv/hr) through 1 rem per hour (rem/hr) (0.01 sievert per hour (Sv/hr)).

(2) Each radiation survey instrument shall be calibrated:

(A) by a person licensed or registered by the agency, another agreement state, or the NRC to perform such service;

(B) at energies appropriate for the licensee's or registrant's use;

(C) at intervals not to exceed six months and after each instrument servicing other than battery replacement;

(D) at two points located approximately one-third and two-thirds of full-scale on each scale for linear scale instruments; for logarithmic scale instruments, at mid-range of each decade, and at two points of at least one decade; and for digital instruments, at three points between 2 and 1,000 mrem/hr (0.02 and 10 mSv/hr); and

(E) to demonstrate an accuracy within plus or minus 20% of the true radiation level at each point checked.

(3) Each radiation survey instrument shall be checked with a radiation source at the beginning of each day of use and at the beginning of each work shift to ensure it is operating properly.

(4) Records of the calibrations required by paragraph (2) of this subsection shall be maintained in accordance with subsection (v)(1) of this section.

(k) Quarterly inventory.

(1) Each licensee and registrant shall perform a physical inventory at intervals not to exceed three months to account for all sources of radiation and for devices containing DU received or possessed.

(2) Records of the quarterly inventories required by paragraph (1) of this subsection shall be made and maintained in accordance with subsection (v)(1) of this section.

(3) The record shall include the following for each source of radiation, as appropriate:

(A) manufacturer, model, and serial number;

(B) radionuclide;

(C) number of curies (except for DU);

(D) location of each source of radiation;

(E) date of the inventory; and

(F) name of the individual making the inventory.

(l) Utilization logs.

(1) Each licensee and registrant shall make and maintain current logs of the use, removal, and return to storage of each source of radiation. The information shall be recorded in the log when the source is removed from and returned to storage. The logs shall include:

(A) a unique identification, for example, make, model and serial number, of the following:

(i) each radiation machine;

(ii) each radiographic exposure device containing a sealed source or transport and storage container in which the sealed source is located; and

(iii) each sealed source;

(B) the name and signature of the radiographer using the source of radiation;

(C) the location(s) and date(s) where each source of radiation is used; and

(D) the date(s) each source of radiation is removed from storage and returned to storage.

(2) Utilization logs may be kept on clear legible records containing all the information required by paragraph (1) of this subsection.

(3) Records of utilization logs shall be made and maintained in accordance with subsection (v)(1) of this section.

(m) Inspection and maintenance of radiation machines, radiographic exposure devices, transport and storage containers, associated equipment, source changers, and survey instruments.

(1) Each day before using equipment, the radiographer shall:

(A) perform visual and operational checks on radiation machines, survey instruments, radiographic exposure devices, transport and storage containers, associated equipment and source changers to ensure that:

(i) the equipment is in good working condition;

(ii) the sources are adequately shielded in radiographic exposure devices; and

(iii) required labeling is present and legible;

(B) determine the survey instrument is responding using check sources or other appropriate means; and

(C) remove the equipment from service until repaired if equipment problems are found.

(2) Each licensee and registrant shall perform and shall have written procedures for the following:

(A) inspection and routine maintenance of radiation machines, radiographic exposure devices, source changers, associated equipment, transport and storage containers, and survey instruments at intervals not to exceed three months to ensure the proper functioning of components important to safety. All appropriate components shall be maintained in accordance with manufacturers' specifications. Radiation machines, radiographic exposure devices, transport containers and source changers being stored are exempted from this requirement provided that each radiation machine, radiographic exposure device, transport container, or source changer is inspected and repaired prior to being returned to service. This inspection and maintenance program shall cover, as a minimum, the items listed in subsection (x)(2) of this section; and

(B) inspection and maintenance necessary to maintain the Type B packaging used to transport radioactive material. The inspection and maintenance program shall include procedures to assure that Type B packages are shipped and maintained in accordance with the certificate of compliance or other approval.

(3) Records of daily checks of equipment, equipment problems found in daily checks and quarterly inspections, and of any maintenance performed in accordance with paragraph (1) of this subsection shall be made and maintained in accordance with subsection (v)(1) of this section.

(4) The record shall include the following:

(A) date of check or inspection;

(B) name of inspector;

(C) equipment involved;

(D) any problems found; and

(E) what repairs or maintenance, if any, were done.

(n) Permanent radiographic installations.

(1) Permanent radiographic installations shall have high radiation area entrance controls (for example, a control device that energizes a conspicuous visible and audible alarm signal and/or continuous direct or electronic surveillance) as described in §289.202(s)(1) - (4) of this title or §289.231(t)(1) - (4) of this title, or if applicable, §289.229 of this title.

(2) The entrance controls shall be tested for proper operation at the beginning of each day of equipment use.

(3) The alarm system shall be tested for proper operation with a source of radiation each day before the installation is used for radiographic operations. The test shall include a check for the visible and audible signals.

(4) Entrance control devices that reduce the radiation level upon entry (designated in paragraph (1) of this subsection) shall be tested monthly.

(5) If an entrance control device or alarm is operating improperly, it shall be immediately labeled as defective and repaired within seven calendar days. The facility may continue to be used during this seven-day period, provided the licensee or registrant implements the continuous surveillance requirements of subsection (q) of this section, ensures that radiographic personnel use an alarming ratemeter, and complies with the requirements of subsection (u)(8)(G) of this section.

(6) Records of alarm systems and entrance control tests and repairs required by this subsection shall be made and maintained in accordance with subsection (v)(1) of this section.

(o) Notification of incidents.

(1) The agency shall be notified of the loss or theft of sources of radiation, overexposures, and excessive levels in accordance with §289.202(ww) - (yy), and (bbb) of this title or §289.231(gg) - (jj) of this title, as applicable.

(2) In addition, whenever one of the following events occurs, each licensee or registrant shall make the initial notification report by telephone to the agency within 24 hours and submit a written report to the agency within 30 days:

(A) a source assembly cannot be returned to the fully-shielded position and properly secured;

(B) the source assembly becomes unintentionally disconnected from the control cable;

(C) any component critical to safe operation of the radiographic exposure device fails to properly perform its intended function;

(D) an indicator on a radiation machine fails to show that radiation is being produced;

(E) an exposure switch on a radiation machine fails to terminate production of radiation when turned to the off position; or

(F) a safety interlock fails to terminate x-ray production.

(3) The licensee or registrant shall include the following information in each report submitted in accordance with paragraph (2) of this subsection:

(A) a description of the equipment problem;

(B) cause of each incident, if known;

(C) manufacturer and model and serial number of equipment involved in the incident;

(D) location, time, and date of the incident;

(E) actions taken to establish normal operations;

(F) corrective actions taken or planned to prevent recurrence; and

(G) names of personnel involved in the incident.

(p) Individual monitoring.

(1) The individual monitoring program shall meet the applicable requirements of §289.202 of this title or §289.231 of this title.

(2) During industrial radiographic operations, the following shall apply.

(A) No licensee or registrant shall permit an individual to act as a radiographer, radiographer trainer, or radiographer trainee unless each individual wears, on the trunk of the body at all times during radiographic operations:

(i) an individual monitoring device that meets the applicable requirements of §289.202(p)(3) and (4), (q), and (r) of this title or §289.231(s)(3) of this title;

(ii) a direct-reading pocket dosimeter or an electronic personal dosimeter; and

(iii) an operable alarming ratemeter.

(B) For permanent radiographic installations where other appropriate alarming or warning devices are in routine use, the wearing of an alarming ratemeter is not required.

(C) Pocket dosimeters shall meet the criteria in ANSI 13.5-1972 at the time of manufacture and shall have a range of zero to 200 mrem (2 mSv). Electronic personal dosimeters may only be used in place of ion-chamber pocket dosimeters.

(D) Pocket dosimeters shall be recharged at the start of each work shift.

(E) As a minimum, direct reading pocket dosimeters shall be recharged and electronic personal dosimeters reset, and "start" readings recorded:

(i) immediately before checking out any source of radiation from an authorized storage location for the purposes of conducting industrial radiographic operations; and

(ii) before beginning radiographic operations on any subsequent calendar day (if the source of radiation has not been checked back into an authorized storage site).

(F) Whenever radiographic operations are concluded for the day, the "end" readings on pocket dosimeters or electronic personal dosimeters shall be recorded and the accumulated occupational doses for that day determined and recorded.

(G) If an individual's pocket dosimeter is discharged beyond its range (for example, goes "off-scale"), or if an individual's electronic personal dosimeter reads greater than 200 mrem (2 mSv) and the possibility of radiation exposure cannot be ruled out as the cause, industrial radiographic operations by that individual shall cease and the individual's monitoring device shall be processed immediately. The individual shall not return to work with sources of radiation until a determination of the radiation exposure has been made. This determination shall be made by the RSO or the RSO's designee. The results of this determination shall be included in the records maintained in accordance with paragraphs (5) and (6) of this subsection and subsection (v)(1) of this section.

(H) Each individual monitoring device shall be assigned to and worn by only one individual.

(I) Film badges shall be replaced at periods not to exceed one month and other personnel dosimeters processed and evaluated by an accredited National Voluntary Laboratory Accreditation Program (NVLAP) processor shall be replaced at periods not to exceed three months. After replacement, each individual monitoring device shall be returned to the supplier for processing within 14 calendar days of the exchange date specified by the personnel monitoring supplier or as soon as practicable. In circumstances that make it impossible to return each individual monitoring device within 14 calendar days, such circumstances shall be documented and available for review by the agency.

(J) If an individual monitoring device is lost or damaged, the worker shall cease work immediately until a replacement individual monitoring device is provided and the exposure is calculated for the time period from issuance to loss or damage of the individual monitoring device. The results of the calculated exposure and the time period for which the individual monitoring device was lost or damaged shall be included in the records maintained in accordance with paragraph (6) of this subsection and subsection (v)(1) of this section.

(3) Pocket dosimeters or electronic personal dosimeters shall be checked for correct response to radiation at periods not to exceed one year. Acceptable dosimeters shall read within plus or minus 20% of the true radiation exposure.

(4) Each alarming ratemeter shall:

(A) be checked without being exposed to radiation prior to use at the start of each work shift, to ensure that the audible alarm is functioning properly;

(B) be set to give an alarm signal at a preset dose rate of 500 mrem/hr (5 mSv/hr) or lower with an accuracy of plus or minus 20% of the true radiation dose rate;

(C) require special means to change the preset alarm function;

(D) be calibrated for correct response to radiation at intervals not to exceed one year; and

(E) have an audible alarm sufficient to be heard by the individual wearing the alarming ratemeter in a work environment or have other visual or physical notification of alarming conditions.

(5) The following records required by this subsection shall be made and maintained by the licensee or registrant for inspection by the agency in accordance with the following time requirements and subsection (v)(1) of this section.

(A) Records of pocket dosimeter or electronic personal dosimeter readings and yearly operational response checks shall be maintained for three years. If the dosimeter readings were used to determine external radiation dose (for example, no individual monitoring device exposure records exist), the records shall be maintained for agency inspection until disposal is authorized by the agency.

(B) Records of pocket dosimeter and electronic personal dosimeter readings of personnel exposures shall be maintained for three years.

(C) Records of estimates of exposures as a result of off-scale personal direct-reading dosimeters, or lost or damaged individual monitoring devices shall be maintained until disposal is authorized by the agency.

(6) The following records required by this subsection shall be maintained in accordance with the following time requirements and subsection (v)(1) of this section.

(A) Records of alarming ratemeter calibrations shall be maintained for three years.

(B) Records of individual monitoring device results received from the device processor shall be maintained until disposal is authorized by the agency.

(q) Access control.

(1) During each industrial radiographic operation, radiographic personnel shall maintain continuous visual surveillance of the operation to protect against unauthorized entry into a radiation area or high radiation area, except at permanent radiographic installations where all entryways are locked and the requirements of subsection (n) of this section are met.

(2) Radiographic exposure devices shall not be left unattended except when in storage or physically secured against unauthorized removal or tampering.

(r) Posting. All areas in which industrial radiography is being performed shall be posted conspicuously in accordance with §289.202 of this title or §289.231 of this title, as applicable, including the following.

(1) Radiation areas. Each radiation area shall be posted conspicuously with a sign(s) displaying the radiation caution symbol and the words "CAUTION, RADIATION AREA" or "DANGER, RADIATION AREA."

(2) High radiation area. Each high radiation area shall be posted conspicuously with a sign(s) displaying the radiation caution symbol and the words "CAUTION, HIGH RADIATION AREA" or "DANGER, HIGH RADIATION AREA."

(3) Whenever practicable, ropes and/or barriers shall be used in addition to appropriate signs to designate areas in accordance with §289.202(n)(1) of this title or §289.231(o)(1) of this title, as applicable, and to help prevent unauthorized entry.

(4) During pipeline industrial radiographic operations, sufficient radiation signs and other barriers shall be posted to prevent unmonitored individuals from entering the area in accordance with §289.202(n)(1) of this title or §289.231(o)(1) of this title, as applicable.

(5) In lieu of the requirements of subsection (r)(1) and (2) of this section, a restricted area may be established in accordance with §289.202(n)(1) of this title or §289.231(o)(1) of this title, as applicable, and be posted in accordance with subsection (r)(1) and (2) of this section, for example, both signs may be posted at the same location at the boundary of the restricted area.

(6) Exceptions listed in §289.202(bb) of this title or §289.231(y) of this title, as applicable, do not apply to industrial radiographic operations.

(s) Specific requirements for radiographic personnel performing industrial radiography.

(1) At a job site, the following shall be supplied by the licensee or registrant:

(A) at least one operable, calibrated survey instrument for each exposure device or radiation machine in use;

(B) an individual monitoring device that meets the requirements of §289.202(p)(3) and (4), (q), and (r) of this title or §289.231(s)(3) of this title, as applicable, for each worker;

(C) an operable, calibrated pocket dosimeter or electronic personal dosimeter with a range of zero to 200 mrem (2 mSv) for each worker;

(D) an operable, calibrated, alarming ratemeter for each worker; and

(E) the appropriate barrier ropes and signs.

(2) Each radiographer at a job site shall carry a valid certification ID card issued by the agency or another certifying entity whose certification offers the same or comparable certification standards.

(3) Each radiographer trainee at a job site shall carry a trainee status card issued by the agency or equivalent documentation in accordance with subsection (e)(1) of this section.

(4) Radiographic personnel shall not perform radiographic operations if any of the items in paragraphs (1) - (3) of this subsection are not available at the job site or are inoperable. Radiographic personnel shall ensure that the items listed in paragraph (1) of this subsection, radiographic exposure devices, and radiation machines are used in accordance with the requirements of this section.

(5) During an inspection by the agency, an agency inspector may terminate an operation if any of the items in paragraphs (1) - (3) of this subsection are not available and operable or if the required number of radiographic personnel are not present. Operations shall not be resumed until all required conditions are met.

(t) Radiation safety and registration requirements for the use of radiation machines.

(1) Registration requirements for industrial radiographic operations.

(A) Radiation machines used in industrial radiographic operations shall be registered in accordance with §289.226 of this title.

(B) In addition to the registration requirements in §289.226(e) and (i) of this title, an application for a certificate of registration shall include the following information.

(i) A schedule or description of the program for training radiographic personnel that specifies:

(I) initial training;

(II) annual refresher training;

(III) on-the-job training;

(IV) procedures for administering the oral and written examination to determine the knowledge, understanding, and ability of radiographic personnel to comply with the requirements of this chapter, the conditions of the certificate of registration, and the registrant's operating, safety, and emergency procedures; and

(V) procedures for administering the practical examination to demonstrate competence in the use of sources of radiation and radiation survey instruments that may be employed in industrial radiographic assignments.

(ii) Written operating, safety, and emergency procedures that are made available to each individual operating a radiation machine, including any restrictions of the operating technique required for the safe operation of the particular x-ray system;

(I) The registrant shall document that each individual operating a radiation machine has read the operating and safety procedures and shall maintain this documentation for inspection by the agency. The documentation shall include the following:

(-a-) name and signature of individual;

(-b-) date individual read the operating and safety procedures; and

(-c-) initials of the RSO;

(II) The operating and safety procedures shall include, but are not limited to, the items listed in subsection (x)(3) of this section;

(iii) A description of the internal audit program to ensure that radiographic personnel follow the requirements of this chapter, the conditions of the certificate of registration, and the registrant's operating, safety, and emergency procedures at intervals not to exceed six months;

(iv) A list of permanent radiographic installations, descriptions of permanent storage use sites, and the location(s) where all records required by this section and other sections of this chapter will be maintained. Radiographic equipment shall not be stored or used at a permanent site unless such site is specifically authorized by the certificate of registration. A storage site is permanent if radiation machines are stored at that location and if one or more of the following applies:

(I) the registrant establishes telephone service that is used for contracting or providing industrial radiographic services for the registrant;

(II) industrial radiographic services are advertised for or from the site;

(III) radiation machines stored at that location are used for industrial radiographic operations conducted at other sites; or

(IV) the registrant conducts radiographic operations or stores radiation machines at any location not listed on the certificate of registration for a period in excess of 90 days in a calendar year, in which case the registrant shall notify the agency prior to exceeding the 90 days;

(v) A description of the organization of the industrial radiographic program, including delegations of authority and responsibility for operation of the radiation safety program; and

(vi) Procedures for verifying and documenting the certification status of radiographers and for ensuring that the certification of individuals acting as radiographers remains valid.

(C) A certificate of registration will be issued if the requirements of this paragraph of this subsection and §289.226(e) and (i) of this title are met.

(2) Locking of radiation machines. The control panel of each radiation machine shall be equipped with a locking device that will prevent the unauthorized use of an x-ray system or the accidental production of radiation. The radiation machine shall be kept locked and the key removed at all times except when under the direct visual surveillance of a radiographer.

(3) Permanent storage precautions for the use of radiation machines. Radiation machines shall be secured while in storage to prevent tampering or removal by unauthorized individuals.

(4) Requirements for radiation machines used in industrial radiographic operations.

(A) Equipment used in industrial radiographic operations involving radiation machines manufactured after October 1, 1987, shall be certified at the time of manufacture to meet the criteria set forth by ANSI N43.5 (relating to Radiological Safety Standards for the Design of Radiographic and Industrial X-Ray Equipment), except accelerators used in industrial radiography.

(B) The registrant's name and city or town of an authorized use site listed on the certificate of registration shall be prominently displayed with a durable, legible, clearly visible label(s) on both sides of all vehicles used to transport radiation machines for temporary job site use.

(5) Operating and internal audit requirements for the use of radiation machines.

(A) Each registrant shall conduct an internal audit program to ensure that the requirements of this chapter, the conditions of the certificate of registration, and the registrant's operating, safety, and emergency procedures are followed by radiographic personnel.

(B) Each radiographer's and radiographer trainee's performance during an actual radiographic operation shall be audited and documented at intervals not to exceed six months.

(C) If a radiographer or a radiographer trainee has not participated in a radiographic operation during the six months since the last audit, the radiographer or the radiographer trainee shall demonstrate knowledge of the training requirements of subsection (f)(1) of this section by an oral or written and practical examination administered by the registrant before the individual can next participate in a radiographic operation.

(D) The agency may consider alternatives in those situations where the individual serves as both radiographer and RSO.

(E) In those operations where a single individual serves as both radiographer and RSO and performs all radiography operations, an audit program is not required.

(F) The registrant shall provide annual refresher safety training, as defined in subsection (c) of this section, for each radiographer trainee, radiographer, or radiographer trainer at intervals not to exceed 12 months.

(G) No individual, other than a radiographer or a radiographer trainee, who is under the personal supervision of a radiographer trainer, shall manipulate controls or operate radiation machines used in industrial radiographic operations. Only one radiographer is required to operate radiation machines during industrial radiography.

(H) Radiographic operations shall not be conducted at storage sites unless specifically authorized by the certificate of registration.

(I) Records of annual refresher training and audits of job performance specified in this subsection shall be made and maintained in accordance with subsection (v)(1) of this section.

(J) Records of annual refresher safety training and audits of job performance made in accordance with this subsection shall include the following:

(i) list of the topics discussed during the refresher safety training;

(ii) dates the annual refresher safety training was conducted;

(iii) names of the instructors and attendees; and

(iv) for audits of job performance, the records shall also include a list showing the items checked and any non-compliance observed by the RSO or designee.

(6) Radiation surveys for the use of radiation machines.

(A) No industrial radiographic operation shall be conducted unless at least one calibrated and operable radiation survey instrument, as described in subsection (j) of this section, is used for each radiation machine energized.

(B) A physical radiation survey shall be made after each radiographic exposure using radiation machines to determine that the machine is "off."

(C) All potential radiation areas where industrial radiographic operations are to be performed shall be posted in accordance with subsection (r) of this section, based on estimated dose rates, before industrial radiographic operations begin. An area survey shall be performed during the first radiographic exposure to confirm that subsection (r) of this section requirements have been met and that unrestricted areas do not have radiation levels in excess of the limits specified in §289.231(o)(1)(B) of this title.

(D) Records of the surveys required by subparagraph (C) of this paragraph shall be made and maintained in accordance with subsection (v)(1) of this section. If a survey was used to determine an individual's exposure due to loss of personnel monitoring data, the records of the survey shall be maintained for agency inspection until disposal is authorized by the agency.

(7) Requirements for radiation machines in shielded rooms.

(A) Radiation machines in shielded rooms, shall comply with all applicable requirements of this section.

(B) Radiation machines in shielded rooms shall be evaluated at intervals not to exceed one year to ensure compliance with the applicable requirements of this section and §289.231(o)(1) - (3) of this title.

(C) Records of the annual evaluation of radiation machines in shielded rooms required by subparagraph (B) of this paragraph shall be made and maintained in accordance with subsection (v)(1) of this section.

(8) Requirements for certified and certifiable cabinet x-ray systems.

(A) Certified and certifiable cabinet x-ray systems, including those designed to allow admittance of individuals, are exempt from the requirements of this section except that:

(i) No registrant shall permit any individual to operate a cabinet x-ray system until the individual has received a copy of and instruction in the operating procedures for the unit.

(ii) Tests for proper operation of interlocks shall be conducted and recorded at intervals not to exceed 12 months.

(iii) The registrant shall perform an evaluation to determine compliance with §289.231(o)(1) - (3) of this title and Title 21, CFR, §1020.40 at intervals not to exceed one year.

(B) Records of operating instructions in cabinet x-ray systems required by subparagraph (A)(i) of this paragraph and interlock tests required by subparagraph (A)(ii) of this paragraph shall be made and maintained in accordance with subsection (v)(1) of this section.

(C) Records of the evaluation of certified cabinet x-ray systems required by subparagraph (A)(iii) of this paragraph shall be made and maintained in accordance with subsection (v)(1) of this section.

(9) All reciprocal recognition of certificates of registration by the agency will be granted in accordance with §289.226(s) of this title.

(u) Radiation safety and licensing requirements for the use of sealed sources.

(1) Licensing requirements for industrial radiographic operations.

(A) Sealed sources used in industrial radiographic operations shall be licensed in accordance with §289.252 of this title.

(B) In addition to the licensing requirements in §289.252 of this title, an application for a license shall include the following information.

(i) A schedule or description of the program for training radiographic personnel that specifies:

(I) initial training;

(II) annual refresher training;

(III) on-the-job training;

(IV) procedures for administering the oral and written examinations to determine the knowledge, understanding, and ability of radiographic personnel to comply with the requirements of this chapter, the conditions of the license, and the licensee's operating, safety, and emergency procedures; and

(V) procedures for administering the practical examination to demonstrate competence in the use of sources of radiation, radiographic exposure devices, related handling tools, and radiation survey instruments that may be employed in industrial radiographic assignments.

(ii) Written operating, safety, and emergency procedures that are made available to each individual operating a sealed source in radiographic operations, including any restrictions of the operating technique required for the safe operation of the particular sealed source.

(I) The licensee shall document that each individual operating a sealed source in radiographic operations has read the operating and safety procedures and shall maintain this documentation for inspection by the agency. The documentation shall include the following:

(-a-) name and signature of individual;

(-b-) date individual read the operating and safety procedures; and

(-c-) initials of the RSO;

(II) The operating and safety procedures shall include, but are not limited to, the items listed in subsection (x)(3) of this section;

(iii) A description of the internal audit program to ensure that radiographic personnel follow the requirements of this chapter, the conditions of the license, and the licensee's operating, safety, and emergency procedures at intervals not to exceed six months.

(iv) A list of permanent radiographic installations, descriptions of permanent storage and use sites, and the location(s) where all records required by this section and other sections of this chapter will be maintained. If records are to be maintained at a headquarters office in Texas and no use or storage is authorized for the site, this site will be designated as the main site. Radioactive material shall not be stored or used at a permanent use site unless such site is specifically authorized by the license. Any licensee conducting radiographic operations or storing radioactive material at any location not listed on the license for a period in excess of 180 days in a calendar year, shall notify the agency prior to exceeding the 180 days. A storage site is permanent if radioactive material is stored at that location and if any one or more of the following applies:

(I) the licensee establishes telephone service that is used for contracting or providing industrial radiographic services for the licensee;

(II) industrial radiographic services are advertised for or from the site;

(III) radioactive material stored at that location is used for industrial radiographic operations conducted at other sites; or

(IV) the licensee conducts radiographic operations or stores radioactive material at any location not listed on the license for a period in excess of 180 days in a calendar year.

(v) A description of the organization of the industrial radiographic program, including delegations of authority and responsibility for operation of the radiation safety program.

(vi) A description of the program for inspection and maintenance of radiographic exposure devices and transport and storage containers, including items in subsection (x)(2) of this section and the applicable items in subsection (m) of this section.

(vii) If a license application includes underwater radiography, as a minimum a description of:

(I) radiation safety procedures and radiographer responsibilities unique to the performance of underwater radiography;

(II) radiographic equipment and radiation safety equipment unique to underwater radiography; and

(III) methods for gas-tight encapsulation of equipment.

(viii) If a license application includes offshore platform and/or lay-barge radiography, as a minimum a description of:

(I) transport procedures for radioactive material to be used in industrial radiographic operations;

(II) storage facilities for radioactive material; and

(III) methods for restricting access to radiation areas;

(ix) Procedures for verifying and documenting the certification status of radiographers and for ensuring that the certification of individuals acting as radiographers remains valid.

(x) If the applicant intends to perform leak testing of sealed sources or exposure devices containing DU shielding, the applicant shall describe the procedures for performing the leak test and the qualifications of the person authorized to do the leak test.

(xi) If the applicant intends to analyze its own wipe samples, the application shall include a description of the procedures to be followed. The description shall include at least the following:

(I) instruments to be used;

(II) methods of performing the analysis; and

(III) pertinent experience of the person(s) who will analyze the wipe samples; and

(xii) If the applicant intends to perform "in-house" calibrations of survey instruments, the applicant shall describe methods to be used and the relevant experience of the person(s) who will perform the calibrations. All calibrations shall be performed in accordance with subsection (j) of this section.

(C) A license will be issued if the requirements of this paragraph of this subsection and §289.252 of this title are met.

(2) Limits on external radiation levels from storage containers and source changers. The maximum exposure rate limits for storage containers and source changers are 200 mrem/hr (2 mSv/hr) at any exterior surface, and 10 mrem/hr (0.1 mSv/hr) at 1 meter from any exterior surface with the sealed source in the shielded position.

(3) Locking of radiographic exposure devices, storage containers and source changers.

(A) Each radiographic exposure device, storage container, and source changer shall have a lock or outer locked container designed to prevent unauthorized or accidental removal or exposure of a sealed source. Each exposure device and source changer shall be kept locked and, if a keyed lock, the key removed at all times except when under the direct visual surveillance of a radiographer or an individual specifically authorized by the agency, except at a permanent radiographic installation.

(B) Each radiographic exposure device, storage container, and source changer shall be locked and the key removed from any keyed lock prior to being transported from one location to another and also prior to being stored at a given location.

(4) Permanent storage precautions for the use of sealed sources.

(A) Radiographic exposure devices, source changers, and transport containers that contain sealed sources shall be secured while in storage to prevent tampering or removal by unauthorized individuals.

(B) Radiographic exposure devices, source changers, or transport containers that contain radioactive material may not be stored in residential locations. This section does not apply to storage of radioactive material in a vehicle in transit for use at temporary job sites, if the licensee complies with paragraph (9)(G) of this subsection and if the vehicle does not constitute a permanent storage location as described in paragraph (1)(B)(iv) of this subsection.

(5) Performance requirements for industrial radiography equipment. Equipment used in industrial radiographic operations shall meet the following minimum criteria.

(A) Each radiographic exposure device, source assembly, sealed source, and associated equipment shall meet the criteria set forth by ANSI N432-1980. This publication is available online at http://pbadupws.nrc.gov/docs/ML0508/ML050840139.pdf and may be purchased from the American National Standards Institute, Inc., 25 West 43rd Street, New York, New York 10036; Telephone (212) 642-4900.

(i) All newly manufactured radiographic exposure devices and associated equipment acquired by licensees after September 1, 1993, shall comply with the requirements of this section.

(ii) All radiographic exposure devices and associated equipment in use after January 1, 1996, shall comply with the requirements of this section.

(iii) In lieu of subparagraph (A) of this paragraph, equipment used in industrial radiographic operations need not comply with §8.9.2(c) of the Endurance Test in ANSI N432-1980, if the prototype equipment has been tested using a torque value representative of the torque that an individual using the radiography equipment can realistically exert on the lever or crankshaft of the drive mechanism.

(B) Engineering analysis may be submitted by a licensee to demonstrate the applicability of previously performed testing on similar individual radiography equipment components. Upon review, the agency may find this an acceptable alternative to actual testing of the component in accordance with subparagraph (A) of this paragraph.

(C) In addition to the requirements specified in subparagraph (A) of this paragraph the following requirements apply to radiographic exposure devices, source changers, source assemblies and sealed sources.

(i) Radiographic exposure devices intended for use as Type B transport containers shall meet the applicable requirements of §289.257 of this title.

(ii) Modification of radiographic exposure devices, source changers, source assemblies, and associated equipment is prohibited, unless the design of any replacement component, including source holder, source assembly, controls or guide tubes would not compromise the design safety features of the system.

(D) In addition to the requirements specified in subparagraphs (A) - (C) of this paragraph, radiographic exposure devices, source assemblies, and associated equipment that allow the source to move outside the device shall meet the following criteria.

(i) The source assembly shall be designed so that the source will not become disconnected if cranked outside the guide tube. The source assembly shall be such that it cannot be unintentionally disconnected under normal and reasonably foreseeable abnormal conditions.

(ii) The control cable shall be positively connected to the source assembly before the source assembly can be driven out of the fully shielded position in a radiographic exposure device or source changer.

(iii) The radiographic exposure device shall automatically secure the source assembly when it is cranked back into the fully shielded position within the radiographic exposure device. This securing system shall only be released by means of a deliberate operation on the radiographic exposure device.

(iv) The outlet nipple and control cable fittings of each radiographic exposure device shall be equipped with safety plugs or covers that will protect the source assembly from damage and from other foreign matter, such as water, mud, or sand, during storage and transportation.

(v) Each sealed source or source assembly shall have attached to it or engraved on it, a durable, legible, visible label with the words "DANGER. RADIOACTIVE." The label may not interfere with the safe operation of the exposure device or associated equipment.

(vi) Guide tubes shall be used when moving the source out of the radiographic exposure device.

(vii) Guide tubes shall be able to withstand a crushing test that closely approximates the crushing forces that are likely to be encountered during use, and be able to withstand a kinking resistance test that closely approximates the kinking forces that are likely to be encountered during use.

(viii) An exposure head, endcap, or similar device designed to prevent the source assembly from extending beyond the end of the guide tube shall be attached to the outermost end of the guide tube during radiographic operations.

(ix) The guide tube exposure head connection shall be able to withstand the tensile test for control units as specified in ANSI N432-1980.

(x) Source changers shall provide a system for ensuring that the source will not be accidentally withdrawn from the changer when connecting or disconnecting the control cable to or from a source assembly.

(6) Leak testing, repair, opening, and replacement of sealed sources and devices. Leak testing, repair, opening, and replacement of sealed sources and devices shall be performed according to the following criteria.

(A) Leak testing of sealed sources shall be done in accordance with §289.201(g) of this title, except records of leak tests shall be maintained in accordance with subsection (v)(1) of this section.

(B) The replacement, leak testing analysis, repair, opening, or any modification of a sealed source shall be performed only by persons specifically authorized to do so by the agency, the NRC, or another agreement state.

(C) Each exposure device using DU shielding and an "S" tube configuration shall be tested for DU contamination.

(i) Tests for DU contamination shall be performed at intervals not to exceed 12 months.

(ii) The analysis shall be capable of detecting the presence of 0.005 microcuries (185 Bq) of radioactive material on the test sample and shall be performed by a person specifically authorized by the agency, the NRC, or an agreement state to perform the analysis.

(iii) Should such testing reveal the presence of DU contamination, the exposure device shall be removed from use until an evaluation of the wear of the S-tube has been made.

(iv) Should the evaluation reveal that the S-tube is worn through, the device may not be used again.

(v) DU shielded devices do not have to be tested for DU contamination while in storage and not in use.

(vi) The device shall be tested for DU contamination before using or transferring such a device, if the interval of storage exceeds 12 months.

(D) A record of the DU leak test shall be made and maintained in accordance with subsection (v)(1) of this section.

(7) Labeling and storage.

(A) Each transport container shall have permanently attached to it a durable, legible, clearly visible label(s) that has, as a minimum, the standard trefoil radiation caution symbol conventional colors, for example, magenta, purple or black on a yellow background, having a minimum diameter of 25 millimeters, and the following wording "CAUTION. RADIOACTIVE MATERIAL. NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY)" or "DANGER. RADIOACTIVE MATERIAL. NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY)." In addition, transport containers shall meet applicable requirements of the DOT.

(B) Radiographic exposure devices, source changers, and storage containers shall be physically secured to prevent tampering or removal by unauthorized personnel. The licensee shall store radioactive material in a manner that will minimize danger from explosion or fire.

(C) The licensee shall lock and physically secure the transport package containing radioactive material in the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal.

(D) The licensee's name and city or town of an authorized use site listed on the license shall be prominently displayed with a durable, clearly visible label(s) on both sides of all vehicles used to transport radioactive material for temporary job site use.

(E) The licensee shall ensure that each radiographic exposure device has attached to it a durable, legible, clearly visible label bearing the following:

(i) chemical symbol and mass number of the radionuclide in the device;

(ii) activity and the date on which this activity was last measured;

(iii) manufacturer, model and serial number of the sealed source;

(iv) licensee's name, address, and telephone number; and

(v) as a minimum, the standard radiation caution symbol as defined in §289.202 of this title, and the following wording "CAUTION. RADIOACTIVE MATERIAL -- DO NOT HANDLE. NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY)" or "DANGER. RADIOACTIVE MATERIAL -- DO NOT HANDLE. NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY)."

(F) Each radiographic exposure device shall have a permanently stamped, legible, and clearly visible unique serial number.

(8) Operating and internal audit requirements for the use of sealed sources of radiation.

(A) Each licensee shall conduct an internal audit program to ensure that the requirements of this chapter, the conditions of the license, and the licensee's operating, safety, and emergency procedures are followed by radiographic personnel.

(B) Each radiographer's and radiographer trainee's performance during an actual radiographic operation shall be audited and documented at intervals not to exceed six months.

(C) If a radiographer or a radiographer trainee has not participated in a radiographic operation during the six months since the last audit, the radiographer or the radiographer trainee shall demonstrate knowledge of the training requirements of subsection (f)(1) of this section by an oral or written and practical examination administered by the licensee before these individuals can next participate in a radiographic operation.

(D) The agency may consider alternatives in those situations where the individual serves as both radiographer and RSO.

(E) In those operations where a single individual serves as both radiographer and RSO, and performs all radiography operations, an audit program is not required.

(F) Each licensee shall provide annual refresher safety training, as defined in subsection (c) of this section, for each radiographer and radiographer trainee at intervals not to exceed 12 months.

(G) Each licensee shall provide, as a minimum, two radiographic personnel for each exposure device in use for any industrial radiography conducted at a location other than at a permanent radiographic installation (shielded room, bay, or bunker) meeting the requirements of subsection (n)(1) of this section. If one of the personnel is a radiographer trainee, the other shall be a radiographer trainer authorized by the license.

(H) Collimators shall be used in industrial radiographic operations that use crank-out devices except when physically impossible.

(I) No individual other than a radiographer or a radiographer trainee who is under the personal supervision of a radiographer trainer shall manipulate controls or operate radiographic exposure devices and associated equipment used in industrial radiographic operations.

(J) Radiographic operations shall not be conducted at storage sites unless specifically authorized by the license.

(K) Records of annual refresher training and audits of job performance specified in this subsection shall be made and maintained in accordance with subsection (v)(1) of this section.

(L) Records of annual refresher safety training and audits of job performance made in accordance with this subsection shall include the following:

(i) list of the topics discussed during the refresher safety training;

(ii) dates the annual refresher safety training was conducted;

(iii) names of the instructors and attendees; and

(iv) for audits of job performance, the records shall also include a list showing the items checked and any non-compliance observed by the RSO or designee.

(9) Radiation surveys for the use of sealed sources of radiation.

(A) No industrial radiographic operation shall be conducted unless at least one calibrated and operable radiation survey instrument, as described in subsection (j) of this section, is used at each site where radiographic exposures are made.

(B) A survey with a radiation survey instrument meeting the requirements of subsection (j)(1) - (3) of this section shall be made after each radiographic exposure to determine that the sealed source has been returned to its fully shielded position, and before exchanging films, repositioning the exposure head, or dismantling equipment. The entire circumference of the radiographic exposure device shall be surveyed. If the radiographic exposure device has a source guide tube, the survey shall also include the source guide tube and any collimator.

(C) All potential radiation areas where industrial radiographic operations are to be performed shall be posted in accordance with subsection (r) of this section, based on calculated dose rates, before industrial radiographic operations begin. An area survey shall be performed during the first radiographic exposure (for example, with the sealed source in the exposed position) to confirm that the requirements of subsection (r) of this section have been met.

(D) Each time re-establishment of the restricted area is required, the requirements of subparagraph (C) of this paragraph shall be met.

(E) The requirements of subparagraph (D) of this paragraph do not apply to pipeline industrial radiographic operations when the conditions of exposure including, but not limited to, the radiographic exposure device, duration of exposure, source strength, pipe size, and pipe thickness remain constant.

(F) A lock-out survey, in which all accessible surfaces of the radiographic exposure device or source changer are surveyed, shall be performed.

(G) Surveys shall be performed in the storage location to ensure that radiation levels do not exceed the limits specified in §289.202(n)(1) of this title. These surveys shall be performed initially with the maximum amount of radioactive material present in the storage location and thereafter at the time of the quarterly inventory and whenever storage conditions change.

(H) A survey meeting the requirements of subparagraph (B) of this paragraph shall be performed on the radiographic exposure device and the source changer after every sealed source exchange.

(I) Records of the surveys required by subparagraphs (C), (D), and (F) - (H) of this paragraph shall be made and maintained in accordance with subsection (v)(1) of this section. If a survey was used to determine an individual's exposure due to loss of personnel monitoring data, the records of the survey shall be maintained for agency inspection until disposal is authorized by the agency.

(10) Requirements for shielded rooms containing sealed sources.

(A) Shielded rooms containing sealed sources shall comply with all applicable requirements of this section.

(B) Shielded rooms containing sealed sources shall be evaluated at intervals not to exceed one year to ensure compliance with the applicable requirements of this section and §289.202(n)(1) - (3) of this title.

(C) Tests for proper operation of interlocks shall be conducted and recorded in accordance with subsection (n) of this section.

(D) Records of evaluations required by subparagraph (B) of this paragraph shall be made and maintained in accordance with subsection (v)(1) of this section.

(E) Records of interlock tests required by subparagraph (C) of this paragraph shall be made and maintained in accordance with subsection (v)(1) of this section.

(11) Underwater, offshore platform, and lay-barge radiography.

(A) Underwater, offshore platform, and/or lay-barge radiography shall not be performed unless specifically authorized in a license issued by the agency in accordance with paragraph (1) of this subsection.

(B) In addition to the other requirements of this section, the following requirements apply to the performance of offshore platform or lay-barge radiography.

(i) Cobalt-60 sources with activities in excess of 20 curies (nominal) (3.7 terabecquerels) and iridium-192 sources with activities in excess of 100 curies (nominal) (740 gigabecquerels) shall not be used in the performance of offshore platform or lay-barge radiography.

(ii) Collimators shall be used for all industrial radiographic operations performed on offshore platforms or lay-barges.

(12) Prohibitions.

(A) Industrial radiography performed with a sealed source that is not fastened to or contained in a radiographic exposure device (fishpole technique) is prohibited unless specifically authorized in a license issued by the agency.

(B) Retrieval of disconnected sources or sources that cannot be returned by normal means to a fully shielded position or automatically secured in the radiographic exposure device, shall not be performed unless specifically authorized by a license condition.

(13) All reciprocal recognition of licenses by the agency will be granted in accordance with §289.252(ee) of this title.

(v) Record/document requirements. Each licensee and registrant shall maintain the following records/documents at each site at the time intervals specified and make available to the agency for inspection.

(1) Time requirements for record keeping. The following are time requirements for record keeping.

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Specific Subsection	Name of Record	Time Interval Required for Record Keeping
(e)(1)(A) and (2)(A) and (f)(1)	Training and Certification Records	5 years
(i)	Receipt, Transfer, and Disposal of DU	3 years
(j)(2)	Survey Instrument Calibrations	3 years
(k)	Quarterly Inventory	3 years
(l)	Utilization Logs	3 years
(m)	Inspection and Maintenance	3 years
(n)	Permanent Radiographic Installation Tests	3 years
(p)	Individual Monitoring Devices	Until disposal is authorized by the agency
	Estimates of Exposure	Until disposal is authorized by the agency
	Direct-Reading Pocket or Electronic Personal Dosimeter Readings	3 years or until disposal is authorized by the agency if dosimeters were used to determine external radiation dose
	Pocket Dosimeter Calibrations and Yearly Response Checks	3 years
	Alarming Ratemeter Calibrations	3 years
(t)(5) and (u)(8)	Internal Audit Program	3 years

Specific Subsection	Name of Record	Time Interval Required for Record Keeping
(t)(5)(F) and (u)(8)(F)	Annual Refresher Training	3 years
(t)(6) and (u)(9)	Radiation Surveys	3 years or until disposal is authorized by the agency if a survey was used to determine an individual's exposure
(t)(7)(C)	Annual Evaluation of Radiation Machines in Shielded Rooms	3 years
(t)(8)(A)(i)	Operating Instructions In Cabinet X-Ray Systems	3 years
(t)(8)(A)(ii)	Tests of X-Ray Interlocks	3 years
(t)(8)(A)(iii)	Evaluation of Certified Cabinet X-Ray Systems	3 years
(u)(6)	Leak Tests	3 years
(u)(10)(D)	Annual Evaluation of Shielded Rooms Containing Sealed Sources	3 years
(u)(10)(E)	Test of Sealed Source Interlocks	3 years
(v)(3)	Records at Temporary Job Sites	During temporary job site operations

(2) Records and documents required at additional authorized use/storage sites.

(A) Each licensee or registrant maintaining additional authorized use/storage sites where industrial radiography operations are performed shall maintain copies of the following records and documents specific to that site available at each site for inspection by the agency for a period of three years:

(i) a copy of the appropriate license or certificate of registration authorizing the use of licensed or registered sources of radiation;

(ii) operating, safety, and emergency procedures in accordance with subsection (x)(3) of this section;

(iii) applicable sections of this chapter as listed in the license or certificate of registration;

(iv) records of receipt, transfer, and disposal of sources of radiation and devices using DU for shielding at the additional site in accordance with subsection (i) of this section;

(v) records of the latest survey instrument calibrations in use at the site in accordance with subsection (j) of this section;

(vi) records of the latest calibrations of alarming ratemeters and operational checks of pocket dosimeters and/or electronic personal dosimeters in accordance with subsection (p) of this section;

(vii) inventories in accordance with subsection (k) of this section;

(viii) utilization records for each radiographic exposure device and radiation machine dispatched from that location in accordance with subsection (l) of this section;

(ix) records of equipment problems identified in daily checks of equipment in accordance with subsection (m) of this section, if applicable;

(x) records of alarm systems and entrance control checks in accordance with subsection (n) of this section;

(xi) training records in accordance with subsection (f) of this section;

(xii) records of direct-reading dosimeter readings in accordance with subsection (p) of this section;

(xiii) audits in accordance with subsections (t)(5)(A) - (C) and (u)(8)(A) - (C) of this section;

(xiv) latest radiation survey records in accordance with subsections (t)(6)(D) and (u)(9)(I) of this section;

(xv) records of interlock testing in accordance with subsections (t)(8)(A)(ii) and (u)(10)(C) of this section;

(xvi) records of annual evaluation of cabinet x-ray systems in accordance with subsection (t)(7)(C) of this section;

(xvii) records of leak tests for specific devices and sources at the additional site in accordance with subsection (u)(6) of this section;

(xviii) shipping papers for the transportation of sources of radiation in accordance with §289.257 of this title;

(xix) a copy of the NRC license, agreement state license, or state certificate of registration authorizing the use of sources of radiation, when operating under reciprocity in accordance with §289.226 of this title and §289.252 of this title; and

(xx) individual monitoring records in accordance with subsection (p) of this section.

(B) The following records required for each additional authorized use site in accordance with this subsection shall also be maintained at the main authorized site:

(i) records of receipt, transfer, and disposal of sources of radiation and devices using DU for shielding at the additional site in accordance with subsection (i) of this section;

(ii) inventories in accordance with subsection (k) of this section; and

(iii) individual monitoring records in accordance with subsection (p) of this section.

(3) Records required at temporary job sites. Each licensee and registrant conducting industrial radiography at a temporary job site shall have the following records available at that site for agency inspection:

(A) a copy of the appropriate license or certificate of registration or equivalent document authorizing the use of sources of radiation;

(B) operating, safety, and emergency procedures in accordance with subsection (x)(3) of this section;

(C) applicable sections of this chapter as listed in the license or certificate of registration;

(D) latest radiation survey records required in accordance with subsections (t)(6)(D) and (u)(9)(I) of this section for the period of operation at the site;

(E) the daily pocket dosimeter records for the period of operation at the site;

(F) utilization records for each radiographic exposure device or radiation machine used at that location in accordance with subsection (l) of this section;

(G) the latest instrument calibration and leak test records for devices at the site. Acceptable records include tags or labels that are attached to the devices or survey instruments and decay charts for sources that have been manufactured within the last six months; and

(H) a copy of the NRC license, agreement state license, or state certificate of registration authorizing the use of sources of radiation, when operating under reciprocity in accordance with §289.226 of this title or §289.252 of this title.

(w) Form of records.

(1) Each record required by this section shall be legible throughout the specified retention period.

(2) The record shall be the original or a reproduced copy or a microform provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of reproducing a clear copy throughout the required retention period.

(3) The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period.

(4) Records, such as letters, drawings, and specifications, shall include all pertinent information, such as stamps, initials, and signatures.

(5) The licensee or registrant shall maintain adequate safeguards against tampering with and loss of records.

(x) Appendices.

(1) Subjects to be included in training courses for radiographer trainees. Training provided to qualify individuals as radiographer trainees in compliance with subsection (e)(1)(A) of this section shall be presented on a formal basis. The training shall include the following subjects.

(A) Fundamentals of radiation safety to include the following:

(i) characteristics of radiation;

(ii) units of radiation dose in rems (sieverts) and quantity of radioactivity in curies (becquerels);

(iii) significance of radiation dose to include:

(I) radiation protection standards;

(II) biological effects of radiation dose;

(III) hazards of exposure to radiation; and

(IV) case histories of radiography accidents;

(iv) levels of radiation from sources of radiation; and

(v) methods of controlling radiation dose to include:

(I) working time;

(II) working distances; and

(III) shielding.

(B) Radiation detection instrumentation to include the following:

(i) use, operation, calibration and limitations of radiation survey instruments;

(ii) survey techniques; and

(iii) use of individual monitoring devices.

(C) Radiographic equipment to be used, including the following:

(i) remote handling equipment;

(ii) operation and control of radiographic exposure devices and sealed sources, including pictures or models of source assemblies (pigtails);

(iii) storage and transport containers, source changers;

(iv) operation and control of x-ray equipment;

(v) collimators;

(vi) storage, control, and disposal of radioactive material; and

(vii) inspection and maintenance of equipment.

(D) Requirements of pertinent federal and state regulations.

(E) Generic written operating, safety, and emergency procedures (see subsection (x)(3) of this section).

(2) General requirements for inspection of industrial radiographic equipment.

(A) Radiographic exposure devices shall be inspected for:

(i) abnormal surface radiation levels anywhere on camera, collimator, or guide tube;

(ii) condition of safety plugs;

(iii) proper operation of locking mechanism;

(iv) condition of pigtail connector;

(v) condition of carrying device (straps, handle, etc.); and

(vi) proper and legible labeling.

(B) Guide tubes shall be inspected for:

(i) rust, dirt, or sludge buildup inside the guide tube;

(ii) condition of guide tube connector;

(iii) condition of source stop;

(iv) kinks or damage that could prevent proper operation; and

(v) presence of radioactive contamination.

(C) Control cables and drive mechanisms shall be inspected for:

(i) proper drive mechanism with camera, as appropriate;

(ii) changes in general operating characteristics;

(iii) condition of connector on control cable;

(iv) control cable flexibility, wear, and rust;

(v) excessive wear or damage to crank-out devices;

(vi) damage to control cable conduit that could prevent the cable from moving freely;

(vii) proper connector mating between the control cable and the pigtail;

(viii) proper operation of source position indicator, if applicable; and

(ix) presence of radioactive contamination.

(D) Pipeliners shall be inspected for:

(i) abnormal surface radiation;

(ii) changes in the general operating characteristics of the unit;

(iii) proper operation of shutter mechanism;

(iv) chafing or binding of shutter mechanism;

(v) damage to the device that might impair its operation;

(vi) proper operation of locking mechanism;

(vii) proper drive mechanism with camera, as appropriate;

(viii) condition of carrying device (strap, handle, etc.); and

(ix) proper and legible labeling.

(E) X-ray equipment shall be inspected for:

(i) change in the general operating characteristics of the unit;

(ii) wear of electrical cables and connectors;

(iii) proper and legible labeling of console;

(iv) proper console with machine, as appropriate;

(v) proper operation of locking mechanism;

(vi) proper operation of timer run-down cutoff; and

(vii) damage to tube head housing that might result in excessive radiation levels.

(3) Operating, safety, and emergency procedures. The licensee's or registrant's operating, safety, and emergency procedures shall include instructions in at least the following:

(A) handling and use of sources of radiation for industrial radiography such that no individual is likely to be exposed to radiation doses that exceed the limits established in §289.202 of this title;

(B) methods and occasions for conducting radiation surveys, including lock-out survey requirements;

(C) methods for controlling access to industrial radiography areas;

(D) methods and occasions for locking and securing sources of radiation;

(E) personnel monitoring and the use of personnel monitoring equipment, including steps to be taken immediately by industrial radiographic personnel in the event a pocket dosimeter is found to be off-scale (see subsection (p)(2)(G) of this section);

(F) methods of transporting equipment to field locations, including packing of sources of radiation in the vehicles, placarding of vehicles, and controlling of sources of radiation during transportation, including applicable DOT requirements;

(G) methods or procedures for minimizing exposure of individuals in the event of an accident, including procedures for a disconnect accident, a transportation accident, and loss of a sealed source;

(H) procedures for notifying proper personnel in the event of an accident;

(I) specific posting requirements;

(J) maintenance of records (see subsection (v)(1) of this section);

(K) inspection, maintenance, and operational checks of radiographic exposure devices, source changers, storage containers, transport containers, source guide tubes, crank-out devices, and radiation machines;

(L) method of testing and training in accordance with subsections (e) and (f) of this section; and

(M) source recovery procedures if the licensee is authorized to perform source recovery.