NOTICES OF FINAL RULEMAKING

The Administrative Procedure Act requires the publication of the final rules of the state's agencies. Final rules are those which have appeared in the *Register* first as proposed rules and have been through the formal rulemaking process including approval by the Governor's Regulatory Review Council or the Attorney General. The Secretary of State shall publish the notice along with the Preamble and the full text in the next available issue of the *Register* after the final rules have been submitted for filing and publication.

NOTICE OF FINAL RULEMAKING

TITLE 12. NATURAL RESOURCES

CHAPTER 1. RADIATION REGULATORY AGENCY

PREAMBLE

1. Sections Affected	Rulemaking Action
R12-1-102	Amend
R12-1-107	New Section
R12-1-311	Amend
R12-1-319	Amend
R12-1-403	Amend
R12-1-407	Amend
R12-1-413	Amend
R12-1-416	Amend
R12-1-418	Amend
R12-1-419	Amend
R12-1-430	Amend
R12-1-439	Amend
R12-1-444	Amend
R12-1-445	Amend
R12-1-450	Amend
R12-1-451	New Section
R12-1-452	New Section
Article 5	Amend
R12-1-502	Repeal
R12-1-502	New Section
R12-1-503	Repeal
R12-1-503	New Section
R12-1-504	Amend
R12-1-505	Repeal
R12-1-505	New Section
R12-1-506	Amend
R12-1-507	Amend
R12-1-508	Amend
R12-1-509	Repeal
R12-1-509	New Section
R12-1-510	Repeal
R12-1-510	New Section
R12-1-511	Repeal
R12-1-512	Amend
R12-1-513	New Section
R12-1-515	New Section
R12-1-516	New Section
R12-1-517	New Section
R12-1-521	Repeal
R12-1-522	Amend
R12-1-523	Amend
R12-1-524	Amend
R12-1-525	New Section
R12-1-533	Amend
R12-1-534	Repeal
R12-1-539	New Section

R12-1-540	New Section
R12-1-543	New Section
Appendix A	New Appendix
R12-1-612	Amend
Article 7	Amend
R12-1-703	Amend
R12-1-704	Amend
R12-1-706	Amend
R12-1-712	Amend
R12-1-713	Amend
R12-1-714	Amend
R12-1-716	Amend
Exhibit A	Amend
R12-1-801	Amend
R12-1-803	Amend
R12-1-804	Amend
R12-1-805	Amend
R12-1-806	Amend
R12-1-807	New Section
R12-1-808	New Section
R12-1-809	New Section
Article 10	Amend
Article 11	New Article
R12-1-1104	New Section
R12-1-1106	New Section
R12-1-1108	New Section
R12-1-1110	New Section
R12-1-1112	New Section
R12-1-1114	New Section
R12-1-1116	New Section
R12-1-1118	New Section
R12-1-1120	New Section
R12-1-1122	New Section
R12-1-1126	New Section
R12-1-1128	New Section
R12-1-1130	New Section
R12-1-1132	New Section
R12-1-1134	New Section
R12-1-1136	New Section
R12-1-1138	New Section
R12-1-1146	New Section
Appendix A	New Appendix
R12-1-1215	Amend
R12-1-1302	Amend
R12-1-1701	New Section
R12-1-1702	Repeal
R12-1-1702	New Section
R12-1-1715	Amend
R12-1-1718	Repeal
R12-1-1718	New Section
R12-1-1723	Amend
R12-1-1724	New Section
R12-1-1725	New Section
R12-1-1726	New Section
R12-1-1727	New Section
R12-1-1728	New Section
R12-1-1751	Repeal
R12-1-1751	New Section

2. The statutory authority for the rulemaking, including both the authorizing statute (general) and the statutes the rules are implementing (specific):

Authorizing statute: A.R.S. § 30-654(B)

Implementing statutes: A.R.S. §§ 30-657, 30-672, 30-673, and 30-683

3. The effective date of the rules:

July 3, 2004

4. A list of all previous notices appearing in the Register addressing the final rules:

Notice of Rulemaking Docket Opening: 8 A.A.R. 798, February 22, 2002
Notice of Rulemaking Docket Opening: 8 A.A.R. 2113, May 10, 2002
Notice of Rulemaking Docket Opening: 8 A.A.R. 4301, October 11, 2002
Notice of Proposed Rulemaking: 9 A.A.R. 927, March 21, 2003

5. The name and address of agency personnel with whom persons may communicate regarding the rules:

Name: Daniel H. Kuhl

Address: Arizona Radiation Regulatory Agency
4814 S. 40th Street
Phoenix, AZ 85040

Telephone: (602) 255-4845, ext. 233

Fax: (602) 437-0705

E-mail: dkuhl@arra.state.az.us

6. An explanation of the rules, including the agency's reasons for initiating the rules:

Introductory Statement: Many of the changes are the result of deficiencies in Arizona's rules that become apparent when comparing them to Nuclear Regulatory Commission (NRC) regulations. Many years ago Arizona signed an Agreement with the NRC to enforce Arizona's radiation regulatory program according to NRC standards. New requirements added to Articles 3, 4, 5, and 17 are made for this reason. Other changes are made to Article 5 that will aid the radiography licensee understand the radiographer certification process that was added to this Article in June of 2001. Article 7 is being amended to establish whom may receive radiopharmaceuticals from a nuclear pharmacy and whom is authorized to assist in brachytherapy procedures. Lastly, Articles 7, 8, 10, and 13 underwent a five-year review in March 2002. Many changes and additions are noted as a result of this review.

Article 1: A few definitions are updated to meet current federal standards, and the definition for "individual monitoring device" is expanded to include the latest technology. R12-1-107 is a new rule created in an attempt to regulate any individual's misconduct involving radiation sources.

Article 3: New standards are added to R12-1-311 to regulate persons transferring devices that contain radioactive material to "generally licensed" persons. R12-1-319 is amended to reference new standards for license termination that are being added to Article 4, and an existing requirement in R12-1-323.

Article 4: R12-1-403 is amended to add new definitions and amend existing definitions to improve understanding of the new federal standards added to this Article. R12-1-407 is amended to clarify ALARA programs for users of radioactive gases. Persons involved in planned special exposures, regulated under R12-1-413, will be required to file a report to the Agency no later than 30 days after the planned special exposure. R12-1-416 is amended to take into account the radiation emitted from patients treated under R12-1-719. Amendments are made to R12-1-418, R12-1-419, R12-1-430, R12-1-439, R12-1-444, and R12-1-445 so that Arizona's rules will be compatible with NRC standards. R12-1-450 is amended to include a device or equipment in the rule's required inventory if the device or equipment contains a sealed source. New regulations, required by the NRC, concerning standards for license termination, are added in R12-1-451 and R12-1-452. Included in R12-1-452 are the acceptable surface contamination levels for radioactive material.

Article 5: Article 5 is amended so that Arizona rules are consistent with the latest standards found in 10 CFR 34. The individual changes are too numerous to list. Also, it should be noted that most of Arizona's radiography licensees work outside of Arizona and are generally knowledgeable of NRC requirements. One of these changes worth mentioning is the repeal of the radiography field audit required in R12-1-521(E). However, the licensee will still be required to perform an annual review of the entire program in accordance with R12-1-407. Redundancy is eliminated with this change. A noteworthy addition by the Agency is the administrative requirement in R12-1-525 for all RAM radiography programs to notify the Agency of daily field operations, which will aid the Agency in locating field operations for inspection purposes.

Article 6: R12-1-612 is being amended to require that technique settings for adult and pediatric patients be posted at a CT operating console.

Article 7: The rule changes in Article 7 are made because of recent changes in the federal regulations for medical use of radioactive material by the NRC in 10 CFR 35. R12-1-703 is being amended to clarify the qualifications of authorized users, associated training requirements are updated in R12-1-704, along with qualifications for technologists that handle radiopharmaceuticals. R12-1-706 is being amended to define which medical licensees will be required to have a Radiation Safety Committee (RSC) to oversee the use of radioactive materials for therapy purposes. This is a significant change because some hospitals will be able to do away with their RSC and some private clinics will now be required to have a

RSC. R12-1-712 is amended to change the inventory frequency of sealed sources from quarterly to a frequency of every six months. R12-1-713 is amended to remove the use of dose calibrators by medical licensees that receive RAM in unit dosages from a manufacturer or nuclear pharmacy. The unit dosage cannot be manipulated by the user without a dose calibrator. R12-1-714 and R12-1-716 are amended to emphasize the importance of the qualified expert's role in brachytherapy. Editorial changes are made to R12-1-717 to clarify existing requirements. Exhibit A is amended to update an incorporated reference and to include yttrium-90 to the Group IV therapy radiopharmaceuticals.

Article 8: As stated earlier, most of the changes are made as result of five-year reviews. The current rules were compared to the suggested state regulations of the Conference of Radiation Control Program Directors (CRCPD). Of specific interest are the new requirements in R12-1-807, R12-1-808, and R12-1-809, concerning analytical x-ray system surveys, postings, and user training.

Article 10: The heading to Article 10 is being amended to reflect that its content affects ionizing radiation users and not nonionizing radiation users that are regulated under Article 14.

Article 11: This article is new and will contain the industrial x-ray rules formerly located in Article 5.

Article 12: R12-1-1215 incorrectly lists "reciprocal" as an administrative division, when in fact the out-of-state user working in Arizona is actually treated, for administrative purposes, as a user in one of the radiation user categories defined under R12-1-1302. Reciprocal recognition under R12-1-320, which authorizes the possession and use of radioactive material under a general license in R12-1-1302(D)(16), is not specific enough to be a classification within the administrative sanction division that best describes the out-of-state user's licensed activities.

Article 13: R12-1-1302(D)(11) is amended to include a current incorporated reference.

Article 17: Article 17 is undergoing extensive revision so that Arizona rules are consistent with the latest well logging standards in 10 CFR 39. As stated earlier, Arizona is required to stay compatible with many of the NRC regulations. Of special interest are the following new requirements for uranium sinker bars, energy compensated sources, and tritium neutron generators. Other amendments include standards for use of sources in uncased holes, Agency notification in the event of an incident, and radiation safety responsibilities in a well logging agreement, as well as design and performance criteria for radioactive sources.

7. A reference to any study relevant to the rules that the agency reviewed and either relied on in its evaluation of or justification for the rules or did not to rely on in its evaluation of or justification for the rules, where the public may obtain or review each study, all data underlying each study, and any analysis of each study and other supporting material:

None

8. A showing of good cause why the rules are necessary to promote a statewide interest if the rules will diminish a previous grant of authority of a political subdivision of this state:

Not applicable

9. The summary of the economic, small business, and consumer impact:

The Article 1 definition amendments, resulting from a comparison to NRC standards, should not pose a financial burden for the regulated community. The addition of R12-1-107, regulating the misconduct of a person that may be involved in the intentional, nonmedical radiation exposure of another person or contamination of a site, could be part of an enforcement action, as defined in Article 12. An enforcement action may result in a civil penalty.

The change to R12-1-311 is extensive and could result in a financial burden to the affected manufacturing licensees. It is believed these costs will be minimal when compared to the known costs already associated with the device's manufacture and the current regulations that already affect the licensees that manufacture devices containing radioactive material. Because many of the affected Arizona manufacturers are already regulated by the Agency, they are already familiar with the need to meet radiation safety standards. The amendment is only offering changes to existing radiation safety standards. Also, the reader should note that there are no licensees in the state of Arizona that are affected by these new rules.

The amended definitions in R12-1-403 will assist the reader to understand the other NRC required changes in Article 4. The definition changes will not present any additional costs to the radiation users. The newly required ALARA level for airborne radioactive material in R12-1-407 may present a minimal increase in cost to the regulated community. The affect should be small because the affected licensees are already required to calculate the concentration levels in the restricted and unrestricted areas impacted by the discharge of radioactive material. The reporting requirement for planned special exposures in R12-1-413 will present only minimal additional cost to the affected licensees. The licensees are already required to maintain these records for Agency review, as this requirement is imposed on the Agency by the NRC. It is important to note that this rule has never been implemented in Arizona. The amendment to R12-1-416 will result in an additional calculation for those medical licensees that release patients under R12-1-719. The cost of this calculation will be minimal to nonexistent. Amendments to the standards in R12-1-418, R12-1-419, R12-1-430, R12-1-439, R12-1-444, and R12-1-445 should have little economic impact with the

minor changes being made. The standards affected are established by the NRC, and as previously stated, Arizona must adopt NRC standards. R12-1-450 is amended for clarification purposes. There should be no additional economic burden resulting from the change. R12-1-451 and R12-1-452 are added to include standards for terminating radioactive material licenses. Licensees possessing sealed sources should not be affected economically by the additional termination requirements. The cost associated with termination of a radiation use program will be unchanged because the Agency already regulates these activities. The actual costs are unknown and will vary depending on the amount, form, and radionuclide that are used at the licensee's facility. Only large users of unsealed sources including universities, large medical centers, and research centers, should be affected under the decommissioning requirements in R12-1-323. It is assumed less than ten licensees in Arizona may be impacted by the termination rules. In past rulemaking, the Agency has made every effort to protect the state and its citizens from the costs and radiation hazards associated with the termination of licensed programs. In the past, if significant amounts of radioactive material were to be licensed, the applicant was required to submit to the Agency a decommissioning plan with the application for a license, as required in R12-1-323. Currently, the Agency is requiring licensees comply with termination standards through the use of license conditions.

With the exception of R12-1-525, Article 5 is undergoing a major revision to keep Arizona compatible with NRC standards in 10 CFR 34. It is doubtful, even with the extensive changes, that any significant costs will result from these amendments because all of our licensees contract for work throughout the United States and are already familiar with these new standards. In fact, the mandatory certification exam that radiographers have been taking to function in Arizona is based on the new federal standards. There is one exception to this discussion on costs. It deals with the employment of qualified radiography radiation safety officers (RSO). The Agency will be grand-fathering in the existing active RSOs. New licensees will be required to hire individuals who meet the proposed training and experience requirements for new RSOs. It is believed the new standards may result in higher salaries for the newly qualified RSOs. The new requirements for RSOs are in R12-1-512. Finally, these federal radiography standards have undergone extensive national review and have already been adopted by many states. R12-1-525 is added by the Agency to assist in performing meaningful safety inspections of radiography programs that use radioactive material. The cost to the licensee should only be the time and expense of faxing a current radiography work schedule to the Agency on a daily basis. The cost associated with this activity should be minimal.

R12-1-612 is undergoing a minor change to require the posting of both an adult and a pediatric technique chart near the operating console of a Computerized Tomographic (CT) radiography unit. The cost will be minimal for this minor administrative function.

The licensing requirements in R12-1-703 are being amended to clarify language associated with physicians using radioactive material regulated under Article 7, and to add qualifications for technologists handling radioactive material under the supervision of a physician. This change will not result any additional costs. The cost of employing technologists, who meet a specific qualification standard, will be addressed when the rules of the Medical Radiologic Technology Board of Examiners are amended to reflect the latest change to the statutes governing technologists.

R12-1-704, R12-1-706, R12-1-712, R12-1-714, R12-1-716, and R12-1-717 are amended to clarify existing requirements and update procedures to current federal standards. There should not be a remarkable increase in costs associated with these changes. With the changes to R12-1-713 the licensee's costs associated with maintaining a dose calibrator will diminish, should a licensee decide to not use one. The costs affected are the cost of purchase, daily operation and quality assurance, and maintenance provided by the manufacturer and physicist consultants. The amount of savings is unknown at this time.

The five-year review recently conducted on Article 8 produced a number of changes that will not result in any significant economic impact. The majority of changes were made for clarification purposes and to bring Arizona's analytical x-ray rules up to CRCPD standards. Also, the Addition of R12-1-807, R12-1-808, and R12-1-809, which came about as part of the review, should not result in any significant impact as well. Adequate surveys and postings are already required by Article 4. Training is required in Article 10. The new rules simply clarify and specify the details of each of these activities.

Moving the industrial x-ray rules from Article 5 to Article 11 and the changes to Articles 10, 12, and 13 are made for clarification purposes and should not result in any economic impact.

Article 17 has a number of changes that may impact persons that operate well logging/wireline businesses or use the services of well logging/wireline businesses. The changes to this Article arise from a five-year review that included a review against CRCPD standards. The changes are grouped together according to their potential impact. The definitions in R12-1-1701 are new and will help the reader understand the new rules and have no economic impact. The amendments to R12-1-1702, R12-1-1715, R12-1-1718, R12-1-1723, and R12-1-1751 are made to bring the rules up to current standards and should have little additional impact on the affected parties. The new regulations in R12-1-1725, R12-1-1726, and R12-1-1727 may result in an economic impact for licensees in the future, because no licensees are performing activities in Arizona that would be affected by the new rules. The future impact may be small because there are few licensees that perform well logging or wireline services in Arizona. Currently, there are three Arizona licensees and two that actively enter Arizona under reciprocity. The potential associated costs are expected to be small and occur only when shallow water holes are logged. There are no deep petroleum wells in Arizona that could be affected by higher costs associated with a failed safety system. Two final rules, R12-1-1724 and R12-1-1728, which are new, offer the greatest potential for economic impact. The actual amount has not been evaluated. The

potential for contamination is great if procedures are not followed. The first rule requires that contamination from breached sources be controlled. In past incidents outside of Arizona the costs associated with the cleanup of a leaking well logging source was in the millions of dollars. To protect aquifers, well holes should be cased. Failure to properly case a hole could result in contaminated drinking water, in addition to the contaminated well site. Again, this could be very costly. Therefore, it is believed that although the cost associated with casing the hole will be somewhat expensive, the cost is actually quite small relative to the cost of a cleanup resulting from a breached source and contaminated aquifer.

10. A description of the changes between the proposed rules, including supplemental notices, and final rules (if applicable):

Changes were made as result of the comments listed in Section 11 below. The changes are listed with the associated comment that initiated the change. Other changes recommended by the Agency staff, Agency Board, and Governor's Regulatory Review Council (G.R.R.C.) are also listed or discussed in this report. Additionally, numerous grammatical and spelling changes are made at the request of the G.R.R.C. staff.

Of significance in regard to Board recommendations, is the separation of the rules regulating industrial radiography using radioactive material from the industrial x-ray rules in Article 5. A decision has been made to move the industrial x-ray rules from Article 5 to Article 11. The radiography rules that relate to the use of sealed sources will remain in Article 5. The changes listed below affecting rules in Article 5 will be made in Article 11 as needed. The Article 11 rules are not listed here because of the similarity to Article 5. Any rules in Article 5 that affect x-ray users have been moved to Article 11.

1. The following change to R12-1-319 is needed to clarify existing requirements associated with termination of licensed programs. It is believed that the change is not substantive in nature, simply directing affected licensees to rules that may affect the license termination process. A reference to R12-1-323 is added to R12-1-319, which is already open for amendment.

(Change) **D.** The Agency may terminate a specific license upon a written request by the licensee~~.~~ , based on whether the licensee has met the termination criteria in R12-1-451, R12-1-452, and the decommissioning requirements in R12-1-323.

(Old) **D.** The Agency may terminate a specific license upon a written request by the licensee, if the termination criteria in A.A.C. R12-1-451 and R12-1-452 have been met.

2. There are some editorial changes needed in R12-1-801. The changes will help the reader understand the intent of the rule.

R12-1-801. Scope

The rules in this Article establish requirements for the use of analytical x-ray equipment by persons registered under R12-1-204. The provisions of this Article ~~are not in substitution for~~ supplement other applicable provisions of this Chapter.

3. R12-1-510 is not written in a manner that clearly delineates which group of radiographers is affected by it. The following change is offered to clarify which radiography groups are affected by this rule.

(Change)

A. If industrial radiography is performed at a location other than a permanent radiographic installation, a licensee shall ensure that the radiographer is accompanied by at least one other radiographer or radiographer's assistant, qualified under R12-1-543. The additional radiographer or radiographer's assistant shall observe the operations and be capable of providing immediate assistance to prevent unauthorized entry. Industrial radiography is prohibited if only one qualified individual is present.

B. A licensee shall ensure that each industrial radiographic operation is conducted at a location of use authorized on the license in a permanent radiographic installation, unless another permanent location is specifically authorized by the Agency.

(Old)

A. Whenever radiography is performed at a location other than a permanent radiographic installation, the radiographer shall be accompanied by at least one other qualified radiographer or an individual who has at a minimum met the requirements of R12-1-543(C). The additional qualified individual shall observe the operations and be capable of providing immediate assistance to prevent unauthorized entry. Radiography may not be performed if only one qualified individual is present.

B. All radiographic operations conducted at locations of use authorized on a license or registration shall be conducted in a permanent radiographic installation, unless specifically authorized by the Agency.

4. The Agency is removing R12-1-713(E) from the final rules because it is not a NRC compatibility requirement. It is believed this rule is unnecessary because the radiopharmacy prescription and records maintained by a nuclear medi-

cine department contain the necessary information required by the rule, and the fact that a diagnostic dosage typically exposes the patient to a radiation level that is commonly observed with diagnostic x-ray procedures.

5. The following change in language is made to R12-1-1751(A) to ensure that the Agency is involved in the abandonment of well logging source downhole. It is believed the change is not substantive and is recommended by G.R.R.C. staff.

(Change)

A. If, after making a reasonable effort to recover a sealed source or device that contains radioactive material using methods that are not likely to result in damage or rupture and contamination, a licensee determines that the source or device is lodged in a well, the licensee shall:

1. Immediately notify the Agency by telephone of the circumstances that resulted in the inability to retrieve the source and, if there is no evidence of contamination, obtain the following from the Agency:
   a. A determination that the source is irretrievable and abandonment is necessary because further efforts to recover the source are likely to result in an immediate threat to public health and safety, and
   b. An approval to implement abandonment procedures;
2. Advise the well owner or operator, as applicable, of the abandonment procedures implemented under R12-1-1702(A) and (C); and
3. Either ensure that abandonment procedures are implemented within 30 days after the Agency classifies the source as irretrievable or request an extension of time if unable to complete abandonment procedures.

(Old)

A. If a sealed source or device that contains radioactive material is lodged in a well, and efforts to recover the sealed source have not been successful, the licensee shall:

1. Immediately notify the Agency by telephone of the circumstances that resulted in the inability to retrieve the source and
   a. Obtain Agency approval to implement abandonment procedures; or
   b. Inform the Agency that the licensee implemented abandonment before receiving Agency approval. because the licensee believed there was an immediate threat to public health and safety; and
2. Advise the well owner or operator, as applicable, of the abandonment procedures under R12-1-1702(A) and (C); and
3. Either ensure that abandonment procedures are implemented within 30 days after the sealed source has been classified as irretrievable or request an extension of time if unable to complete the abandonment procedures.

11. A summary of the comments made regarding the rules and the Agency response to them:

The following concerns were provided to the Agency in written format during the public hearing held on April 21. This written summary was provided by Radiation Safety Engineering, Inc.

1. The words "that is" should be inserted before "material to the Agency" in R12-1-107(A)(2). The Agency agrees, and will make the recommended change.

(Change)2. Knowingly submit to the Agency, or a licensee, registrant, or applicant, or a licensee's, registrant's, or applicant's contractor or subcontractor, information that is incomplete or inaccurate.

2. There is some confusion as to whether R12-1-107 clearly applies only to those individuals who "deliberately" or "knowingly" participate in misconduct. After a great deal of discussion with G.R.R.C. staff following a review of comments received during the public meeting, it was decided the intent of the language in the original rule was not clear. After determining that the removal of the term "deliberate" would not be a substantive change, it was removed from the rule to clarify and establish the mental state that a person must be in to be affected by the rule. The Agency made conforming changes to R12-1-107 to reflect this change.
3. The proposed table for acceptable surface contamination levels in R12-1-452(G) does not contain values for alpha emitters based on the alpha emitters radiotoxicity. The contamination values in NRC Reg Guide 1.86 *"Termination of Operating Licenses For Nuclear Reactors"* should be used because there is a different hazard level for the alpha emitters.

   The Agency believes that an inappropriate reference may have been used to create the referenced table. The source used was from the Conference of Radiation Control Program Directors (CRCPD) suggested state regulations for the control naturally occurring radioactive material (NORM). Because the Agency agrees, the recommended change will be made.

(Change)

(New Table)

TABLE 1

ACCEPTABLE SURFACE CONTAMINATION[1] LEVELS

RADIONUCLIDE[1]	AVERAGE[2,3,]	MAXIMUM[2,4,]	REMOVABLE[2,5,]
U-nat, U-235, U-238, and associated decay products	5,000 dpm/100 cm^2	15,000 dpm/100cm^2	1,000 dpm/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Pa-231, Ac-227, !-125, I-129	100dpm/100cm^2	300 dpm/100cm^2	20dpm/100cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232 I-126, I-131, I-133	1000 dpm.100cm^2	3000 dpm/100cm^2	200 dpm/100cm^2
Beta-gamma (Exceptions noted above)	5,000 dpm/100 cm^2	15,000 dpm/100cm^2	1,000 dpm/100 cm^2

[1] Where surface contamination by both alpha and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

[2] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed on an instrument calibrated for background, efficiency, and geometric factors associated with the instrumentation, in accordance with R12-1-449.

[3] Measurements of average contamination level should not be averaged over more than one square meter. For objects of less surface area, the average shall be derived for each object.

[4] The maximum contamination level applies to an area of not more than 100 cm^2.

[5] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an instrument calibrated in accordance with R12-1-449. When removable contamination on objects of surface area A (where A is less than 100 sq. cm) is determined, the entire surface shall be wiped and the contamination level multiplied by 100/A to convert to a “per 100 sq. cm” basis.

(Old)

TABLE 1

ACCEPTABLE SURFACE CONTAMINATION1 LEVELS

	AVERAGE[2,3,6]	MAXIMUM[2,4,6]	REMOVABLE[2,3,5,6]
Alpha	5,000 dpm/100 cm^2	15,000 dpm/100cm^2	1,000 dpm/100 cm^2
Beta-gamma	5,000 dpm/100 cm^2	15,000 dpm/100cm^2	1,000 dpm/100 cm^2

[1] Where surface contamination by both alpha and beta-gamma emitting nuclides exists, the limits established for alpha and beta-gamma emitting nuclides should apply independently.

[2] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[3] Measurements of average contamination level should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each object.

[4] The maximum contamination level applies to an area of not more than 100 cm^2.

[5] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area A (where A is less than 100 sq. cm) is determined, the entire surface should be wiped and the contamination level multiplied by 100/A to convert to a "per 100 sq. cm" basis.

[6] The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 2μGy/hr (0.2 mrad/hr) at 1 cm and 10 μGy/hr (1.0 mR/hr) at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

4. The amendment to R12-1-612(D)(2)(d) incorrectly references technique factors that are not appropriate for CT x-ray systems. Only subsection R12-1-607(D)(4)(a) should be referenced in regard to adult and pediatric CT technique tables.
   The Agency agrees and will make the needed change.

(Change)

d. A current technique chart ~~containing the CT's operating parameters~~ that contains the information required in R12-1-607(D)(4)(a) for both adult and pediatric patients, ~~if~~ as applicable, is available at the CT operating console, and a procedure for determining whether a CT has been performed according to instructions of a physician.

(Old) d. A current technique chart containing ~~the CT's operating parameters~~ the information required in R12-1-607(D)(4) for both adult and pediatric patients, if applicable, shall be available at the CT operating console, and a procedure for determining whether a CT has been performed according to instructions of a physician.

5. A reference is made to the old title of the organization that sets the standard for dosimetry systems in R12-1-716(F)(1). Also, typographical errors Mbq should be MBq, and Tbq should be TBq in R12-1-1715(E)(4) and (5), R12-1-1726(A), and R12-1-1727(A) and (B). The Agency agrees and will incorporate the changes as suggested. Typographical corrections are not listed below.

(Change) **F.** No change

1. The licensee's qualified expert shall perform full calibration measurements using a dosimetry system that ~~has been~~ is calibrated by the ~~National Bureau of Standards~~ National Institute of Standards and Technology or by a ~~Regional Calibration Laboratory~~ regional calibration laboratory accredited by the American Association of Physicists in Medicine. The licensee shall ensure that the dosimetry system ~~shall have been~~ is calibrated ~~within the previous~~ every two years and after any servicing that may ~~have affected~~ affect system calibration.

The following concerns were brought to the Board's attention during the public hearing held at the Agency on April 21. The concerns listed here are in the same order as the concerns presented during the meeting.

1. A great deal of concern was generated for the new rule concerning deliberate misconduct, R12-1-107. It was decided the rule should be amended to clarify the mental state necessary to issue a violation based on the language in the rule.
2. A comment was received concerning the new rule in R12-1-311 affecting licensees that distribute devices containing generally licensed radioactive material. Will the new rule affect those licensees that have already made distributions prior to the effective date of the rule? The answer is yes. The intent of the rule has been in effect for quite sometime. The change simply clarifies the existing licensing requirements. No change resulted from this discussion.
3. There was concern for the use of a new term "distinguishable from background" as defined in R12-1-401. Use of this term comes into play with the new decommissioning requirements in R12-1-451 and R12-1-452. Use of the term becomes clearer when one reviews the definition of background in Article 1. No change resulted from this discussion.
4. A representative of AMEC, a local industrial radiography company, was concerned that a declared pregnancy could not be terminated, for radiation exposure purposes under R12-1-415, even though the pregnancy had gone full term and the female employee had not undeclared herself not pregnant. This cannot happen. Once the infant is born, the woman is no longer pregnant. This discussion issue is not directly relevant to this rule package because R12-1-415 is not being amended.

5. A Board member had concern for an incorporated reference in R12-1-416 that was dated after the date of this review, July 2003. This was an editorial mistake. The correct date for this incorporation was July 2002. However, the July 1, 2003, edition which appeared in the proposed rules, will be used because it is the most current noticed version. This person made a similar comment about R12-1-444. The incorporated reference will also be July 2003, so that a consistent version of the regulations is used.
6. The same Board member had concern for his interpretation of R12-1-416(A)(1), in regard to the radiation received during medical exposures. The regulation states very clearly that radiation from medical exposures shall not be included in the annual allowable limit of 100 mRem for a member of the public.
7. A discussion concerning the appropriateness of Table 1, ACCEPTABLE SURFACE CONTAMINATION1 LEVELS in R12-1-452, was held between the representatives of Radiation Safety Engineering and the Board. As noted in this report under written comments, the table will be revised to correct deficiencies concerning alpha emitting radionuclides. Additionally, the Agency was asked to contact the CRCPD about the inappropriateness of their table that was incorporated into R12-1-452. However, the Agency believes the CRCPD table is correct, when applied to naturally occurring radioactive material (NORM), as is the intent of the table.
8. The representative from AMEC has concern for her company's ability to meet the requirements in R12-1-502(A)(2)(C), which requires a licensee to verify the certification status of all radiographers upon employment. The representative from AMEC stated that Texas, one of the certifying bodies, is uncooperative in making radiographer information available to the public. A telephone call to the Texas Program Chief of the Radiographer Certification Program disclosed that anyone has access to the certification status of a radiographer and that compliance histories may be available, if employment histories are available to enable a radiographer misconduct investigation to be made.
9. The members of the regulated community attending the meeting generated a great deal of interest in the confusion created by regulating three types of industrial radiation in Article 5. To add to the confusion, some users are licensed while others are registered. Because of this confusion, it was recommended by the regulated community, and supported by the Board, that the x-ray and radioactive material rules in Article 5 be separated. The Agency believes this can be accomplished at this time. It is important to put on record that most states combine the industrial sealed source and x-ray radiography regulations in a single area of their regulations, as reported by one of the licensees attending the public hearing for this rulemaking.
   A good example of the problem in Article 5 is R12-1-508, which describes procedures for radiographic exposure devices. Does this rule affect enclosed and cabinet radiography, or shielded room operations? This is a required NRC rule that does not clearly delineate the fact that only radioactive material users are affected.
   Agreement states are allowed three years to adopt NRC mandated rules. Arizona is lagging in adopting the NRC rules, but it is in the best interest of public safety that the rules be clarified at this time.
10. The staff of Radiation Safety Engineering brought to light additional concerns regarding Article 5 and the confusion created when definitions in both Article 1 and Article 5 are used to implement the proposed industrial radiography rules in Article 5. The definitions of "radiographic exposure device" and "radiographic operations" refer to radiography that involves the use of radioactive sources, and fail to include activities using x-rays. The Agency believes this a deficiency that should be corrected as soon as possible. Therefore, these definitions will be amended in this package.
11. A specific concern with the new industrial radiography rules in R12-1-509 is the need for visual supervision of the radiography radiation operations while films are being developed out-of-sight of the controlled area. Radiography should not be performed if surveillance is not adequate. Also, the assistant can operate the radiography system under the direct supervision of the radiographer.
12. There was concern generated by a Board member that not all of the application requirements in R12-1-511 had been carried into the new license application rules in R12-1-502. A review of the proposed application requirements in R12-1-502 disclosed that registration requirements had been inadvertently dropped. Corrections were made to include the missed requirements in R12-1-1104. This change is made with the moving of the x-ray radiography rules to a new Article 11 as described elsewhere in this report.

(Change)

R12-1-1104. Registration Requirements

A. The Agency shall review an application for registration of a radiation machine for use in industrial radiography and approve the registration if an applicant meets all of the following requirements:
   1. The applicant satisfies the general requirements in Article 2 and any special requirements contained in this Article.
   2. The applicant submits a program for training radiographer's assistants that complies with R12-1-1146.
   3. The applicant submits procedures for verifying and documenting the certification status of each radiographer and for ensuring that the certification remains valid.

B. An applicant shall submit written operating and emergency procedures, as prescribed in R12-1-1128.

C. An applicant shall submit a description of a program for review of job performance of each radiographer and radiographer's assistant at intervals that do not exceed six months, as prescribed in R12-1-1146(E).

D. An applicant shall submit a description of the applicant's overall organizational structure as it applies to radiation safety responsibilities in industrial radiography, including specified delegation of authority and responsibility.

E. An applicant shall submit and list the qualifications of each individual designated as an RSO under R12-1-1120 and indicate which designee is responsible for ensuring that the registrant's radiation safety program is implemented.
F. If an applicant intends to perform "in-house" calibrations of survey instruments, the applicant shall describe each calibration method to be used, the relevant experience of each person who will perform a calibration, and procedures to ensure that all calibrations are performed according to the procedures prescribed in R12-1-1108.
G. An applicant shall identify and describe the location of all field stations and permanent radiographic installations.
H. An applicant shall identify each location where records required by this Chapter will be maintained.

13. There is concern that the RSO training requirements in R12-1-512 have not been drafted in a manner that clearly specifies and delineates the affected radiation users. Because the intent of the rule is to provide standards for industrial radiography users, the Agency agrees that a problem exists with the language in the rule and that correction is needed.

(Change) A. A licensee shall have a radiation safety officer (RSO) who is responsible for implementing procedures and regulatory requirements in the daily operation of the radiation safety program.

(Old) A. Each licensee and registrant shall have an RSO who will ensure that radiation safety activities are being performed in accordance with approved procedures and regulatory requirements in the daily operation of the licensee's program.

14. Does the written notice of field operations to the Agency in R12-1-525 affect registrants using x-ray in the practice of field radiography? The response is no. The person making the comment at the meeting believes the rule does not clearly delineate the affected users. Even though the Agency does not agree with this concern, language will be added to relieve the person's concern.

(Change)

R12-1-525. ~~Reserved~~ Notification of Field Work
Each day radioactive material is used for industrial radiography, a licensee shall notify the Agency of any planned field radiography. The notice shall be in writing and specify the location of the field work, the name of the supervising individual at the job site, and the expected duration of the work at the job site listed in the notice. A facsimile that provides the required information is sufficient notice.

(Old)

R12-1-525. Agency Notification of Field Work
Each day radiation sources are used in the practice of industrial radiography, as defined in R12-1-510(A), a licensee shall notify the Agency of the planned field radiography. The notification shall be in writing, and shall specify the location of the field work, the name of the supervising individual at the job-site, and the expected duration of the work at the job-site listed in the notification. A facsimile describing the expected field work will be accepted in lieu of a letter to the Agency.

15. R12-1-539 has not been clearly drafted to reflect which types of permanent radiography installations are affected by the rule. The Agency agrees there is some confusion created by the rule language, and that the rule should be amended to clarify the intent. The following rule change is offered in this regard:

(Change)

R12-1-539. ~~Reserved~~ Permanent Radiographic Installations
A. If a licensee maintains a permanent radiographic installation that does not fall within the definition of "enclosed radiography" in R12-1-102, the licensee shall ensure that each entrance, used for personnel access to the high radiation area, has either:
1. An entrance control device of the type described in R12-1-420(A)(1) that reduces the radiation level upon entry into the area, or
2. Both conspicuous visible and audible alarm signals to warn of the presence of radiation. The licensee shall ensure that the visible signal is actuated by radiation if a source is exposed and the audible signal is actuated if someone attempts to enter the installation while a source is exposed.

B. A licensee with an alarm signal shall test the alarm signal for proper operation with a radiation source each day before the installation is used for radiographic operations. The test shall include a check of both the visible and audible signals. A licensee with an entrance control device shall test each device referenced in subsection (A)(2) monthly. If an entrance control device or alarm signal is operating improperly, the licensee shall immediately label the device or signal as "defective" and repair the device or signal within seven calendar days. The licensee may continue to use the facility during this seven-day period, if the licensee implements continuous surveillance requirements of R12-1-509 and uses an alarming rate meter.
C. A licensee shall maintain each record of alarm system and entrance control device test for three years after the record is made.

(Old)

R12-1-539. Permanent Radiographic Installations
A. Each entrance that is used for personnel access to the high radiation area in a permanent radiographic installation shall

have either:

1. An entrance control of the type described in A.A.C. R12-1-420(A)(1) that reduces the radiation level upon entry into the area, or
2. Both conspicuous visible and audible warning signals to warn of the presence of radiation. The visible signal shall be actuated by radiation whenever the source is exposed. The audible signal shall be actuated when an attempt is made to enter the installation while the source is exposed.

B. The alarm system shall be tested for proper operation with a radiation source each day before the installation is used for radiographic operations. The test shall include a check of both the visible and audible signals. The entrance control devices that reduce the radiation level upon entry referenced in subsection (A)(1) shall be tested monthly. If an entrance control device or an 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 implements the continuous surveillance requirements of A.A.C. R12-1-509 and uses an alarming rate-meter.

C. Each licensee and registrant shall maintain records of alarm system and entrance control device tests for 3 years after it is made.

16. Two questions came up concerning the training requirements in R12-1-543. The first question concerned the recertification process. The second question concerned whether this rule affected enclosed x-ray radiographers. Recertification can be initiated by an employer verifying to the certifying body or the Agency, the continuous training and experience of a radiographer, or by the radiographer retaking the certification exam. The second question is best answered by referring to those installations regulated under R12-1-539. Employees of those installations have to be recertified as described above.
17. A comment was received during the meeting that is being corrected as result of a written comment provided at the conclusion of the meeting. The proposed language in R12-1-612(D)(2)(d) contained elements that are inappropriate for a CT unit. The rule correction needed to meet the technique requirements for CT units is listed in number four above.
18. The survey required in R12-1-714(C)(1) is not applicable to brachytherapy procedures that are very short in duration. The required survey would not provide any useful information in regard to the safety aspects of the radiation being emitted from the patient. Because the Agency agrees a maximum therapy time-frame will be inserted in the rule.

(Change) 1. An authorized user ~~A physician~~ on a radioactive material license ~~or~~ , qualified expert, or person approved by the licensee's radiation safety officer shall measure the maximum radiation level at a distance of 1 meter (40 in.) from the patient in whom a brachytherapy ~~sources have~~ source has been inserted, using a calibrated survey instrument. This radiation level shall be entered on the patient's chart and ~~other~~ signs posted as required in subsection ~~(D)~~ (E). If the radioactive source is inserted for intravascular brachytherapy purposes for 10 seconds or less, the survey in this subsection is not required.

(Old)1. An authorized user ~~A physician~~ on a radioactive material license or qualified expert ~~qualified designee~~ shall measure the maximum radiation level at a distance of 1 meter (40 in.) from the patient in whom brachytherapy sources have been inserted, using a calibrated survey instrument. This radiation level shall be entered on the patient's chart and other signs posted as required in subsection (D).

19. It would appear from the language in R12-1-801 that there are analytical systems that are exempt from the rules in Article 8. Yes, there are x-ray systems that are exempt. These exemptions, specified in Article 2, are exempted because of low radiation output. An example of an exempted system is an electron microscope.
20. There was concern that the 1 gram hammer used in the tests described in R12-1-1718 may be a misprint. There is concern that the lightness of the hammer may not provide an effective test of the sealed source capsule. A review of the NRC well logging regulations in 10 CFR 39 found the same hammer size used in the drop test. The test is effective because it is pointed and dropped from a height of 1 meter.
21. At the request of the acting Board Chairman, Mr. Seale, an attempt was made to contact the absent Board member, Dr. Levy, regarding to any concerns he may have about this rule package. A message was left with his secretary at his office and an e-mail was left on his computer. He was provided with a copy of the revised rule package for his final approval.

12. Any other matters prescribed by statute that are applicable to the specific agency or to any specific rule or class of rules:

None

13. Incorporations by reference and their location in the rules:

Rule	Incorporation
R12-1-416	40 CFR 190
R12-1-439(A)	10 CFR 20, Appendix G
R12-1-444	40 CFR 190
R12-1-503(A)	N432-1980, *Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography*
R12-1-503(B)(2)	10 CFR 71

R12-1-522(A)(6)	49 CFR 171-173
R12-1-540(B)(11)	10 CFR 71.5
R12-1-543(B)	10 CFR 71
R12-1-543(C)	10 CFR 71
R12-1-703(C)(2)(a)	10 CFR 32.72
R12-1-704(C)	10 CFR 35
Exhibit A, Group I(B)(1)	10 CFR 32.72,
Exhibit A, Group I(B)(2)	10 CFR 35(Subpart J)
R12-1-1302(D)(11)	10 CFR 61
R12-1-1718(B)	USASI N5.4-1968, "Classification of Sealed Radioactive Sources"
R12-1-1718(C)	ANSI/HPS N43.6-1997, "Sealed Radioactive Sources--Classification"

14. Were the rules previously made as emergency rules?

No

15. The full text of the rules follows:

TITLE 12. NATURAL RESOURCES

CHAPTER 1. RADIATION REGULATORY AGENCY

ARTICLE 1. GENERAL PROVISIONS

Section

R12-1-102. Definitions

R12-1-107. ~~Repealed~~ Misconduct

ARTICLE 3. RADIOACTIVE MATERIAL LICENSING

Section

R12-1-311. Special Requirements for a Specific License to Manufacture, Assemble, Repair, or Distribute Commodities, Products, or Devices ~~Which~~ that Contain Radioactive Material

R12-1-319. Modification, Revocation, ~~and~~ or Termination of ~~Licenses~~ a License

ARTICLE 4. STANDARDS FOR PROTECTION AGAINST IONIZING RADIATION

Section

R12-1-403. Definitions

R12-1-407. Radiation Protection Programs

R12-1-413. Planned Special Exposures

R12-1-416. Dose Limits for Individual Members of the Public

R12-1-418. Surveys and Monitoring

R12-1-419. Conditions Requiring Individual Monitoring of External and Internal Occupational Dose

R12-1-430. ~~Posting Exceptions~~ Exceptions to Posting Requirements

R12-1-439. Transfer for Disposal and Manifests

R12-1-444. Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Limits

R12-1-445. Notification of Incidents

R12-1-450. Sealed Sources

R12-1-451. Termination of a Radioactive Material License or a Licensed Activity

R12-1-452. Radiological Criteria for License Termination

ARTICLE 5. ~~INDUSTRIAL RADIOGRAPHIC OPERATIONS~~ SEALED SOURCE INDUSTRIAL RADIOGRAPHY

Section

R12-1-502. ~~Radiographic Equipment Standards and Equipment Failure Notification~~ License Requirements

R12-1-503. ~~Storage precautions~~ Performance Requirements for Equipment

R12-1-504. Radiation Survey Instruments

R12-1-505. ~~Leak Testing, Repair, Tagging, Opening, Modification, and Replacement of Sealed Sources~~ Leak Testing and Replacement of Sealed Sources

R12-1-506. Quarterly Inventory

R12-1-507. Utilization Logs

R12-1-508. Inspection and Maintenance of Radiographic Exposure Devices, Transport and Storage Containers, ~~Associated Equipment~~, Source Changers, ~~and~~ Survey Instruments, and Associated Equipment

ARTICLE 6. USE OF X-RAYS IN THE HEALING ARTS

ARTICLE 7. ~~USE OF RADIONUCLIDES IN THE PRACTICE OF MEDICINE~~ MEDICAL USES OF RADIOACTIVE MATERIAL

ARTICLE 8. RADIATION SAFETY REQUIREMENTS FOR ANALYTICAL X-RAY OPERATIONS

ARTICLE 10. NOTICES, INSTRUCTIONS, AND REPORTS TO IONIZING RADIATION WORKERS; INSPECTIONS

ARTICLE 11. ~~REPEALED~~ INDUSTRIAL USES OF X-RAYS, NOT INCLUDING ANALYTICAL X-RAY SYSTEMS

R12-1-1718. ~~Design, Performance and Certification Criteria for Sealed Sources Used in Downhole Operations~~ Design and Performance Criteria for Sources
R12-1-1723. Personnel Monitoring
R12-1-1724. ~~Reserved~~ Radioactive Contamination Control
R12-1-1725. ~~Reserved~~ Uranium Sinker Bars
R12-1-1726. ~~Reserved~~ Energy Compensation Source
R12-1-1727. ~~Reserved~~ Neutron Generator Source
R12-1-1728. ~~Reserved~~ Use of a Sealed Source in a Well Without a Surface Casing
R12-1-1729. Reserved
R12-1-1730. Reserved
R12-1-1735. Reserved
R12-1-1736. Reserved
R12-1-1737. Reserved
R12-1-1738. Reserved
R12-1-1739. Reserved
R12-1-1740. Reserved
R12-1-1744. Reserved
R12-1-1745. Reserved
R12-1-1746. Reserved
R12-1-1747. Reserved
R12-1-1748. Reserved
R12-1-1749. Reserved
R12-1-1750. Reserved
R12-1-1751. ~~Notification of Incidents, Abandonment, and Lost Sources~~ Notification of Incidents and Lost Sources; Abandonment Procedures for Irretrievable Sources

ARTICLE 1. GENERAL PROVISIONS

R12-1-102. Definitions

Terms defined in A.R.S. § 30-651 have the same meanings when used in this Chapter. The following terms have the definitions below. Additional subject specific definitions are used in other Articles.

"A_1" No change
"A_2" No change
"Absorbed dose" No change
"Accelerator" No change
"Accelerator produced material" No change
"Act" No change
"Activity" No change
"Adult" No change
"Agency," or "ARRA" No change
"Agreement State" No change
"Airborne radioactive material" No change
"Airborne radioactivity area" No change
"ALARA" No change
"Analytical x-ray equipment" No change
"Analytical x-ray system" No change
"Annual" No change
"Background radiation" No change
"Becquerel" No change
"Bioassay" No change
"Brachytherapy" No change
"Byproduct material" No change
"Calendar quarter" No change
"Calibration" No change
"Certifiable cabinet x-ray system" No change
"Certified cabinet x-ray system" No change
"CFR" No change
"Chelating agent" No change
"Civil penalty" No change
"Collective dose" No change

"Committed dose equivalent" No change
"Committed effective dose equivalent" No change
"Curie" No change
"Current license or registration" No change
"Deep-dose equivalent" No change
"Depleted uranium" No change
"Dose" No change
"Dose equivalent (H_T)" No change
"Dose limits" No change
"Dosimeter" No change
"Effective dose equivalent (H_E)" No change
"Effluent release" No change
"Embryo/fetus" No change
"Enclosed beam x-ray system" No change
"Enclosed radiography" No change
"Cabinet radiography" No change
"Shielded room radiography" No change
"Entrance or access point" No change
"Exhibit" No change
"Explosive material" No change
"Exposure" No change
"Exposure rate" No change
"External dose" No change
"Extremity" No change
"Fail-safe characteristics" No change
"Field radiography" No change
"Field station" No change
"Former U.S. Atomic Energy Commission (AEC) or U.S. Nuclear Regulatory Commission (NRC) licensed facilities" No change
"Generally applicable environmental radiation standards" No change
"Gray" No change
"Hazardous waste" No change
"Healing arts" No change
"Health care institution" No change
"High radiation area" No change
"Human use" No change
"Impound" No change
"Individual" No change
"Individual monitoring" No change
"Individual monitoring device" ~~or "individual monitoring equipment"~~ means ~~an instrument~~ a device designed to be worn by a single individual for the assessment of dose equivalent. For purposes of ~~these rules~~ this Chapter, "dosimeter~~,~~" and "personnel dosimeter," ~~and "personnel monitoring equipment"~~ are equivalent terms. Examples of individual monitoring devices are film badges, ~~thermoluminescent~~ thermoluminescence dosimeters (TLDs), pocket ionization chambers, optical stimulation devices, and personal ("lapel") air sampling devices.
Individual monitoring equipment" means one or more individual monitoring devices. For purposes of this Chapter, "personnel monitoring equipment" is an equivalent term.
"Industrial radiography" No change
"Injection tool" No change
"Inspection" No change
"Interlock" No change
"Internal dose" No change
"Irradiate" No change
"Laser" No change
"Lens dose equivalent" No change
"License" No change
"Licensed material" No change
"Licensed practitioner" No change
"Licensee" No change
"Licensing State" No change

"Limits" No change
"Local components" No change
"Logging supervisor" No change
"Logging tool" No change
"Lost or missing licensed or registered source of radiation" No change
"Low-level waste" No change
"Major processor" No change
"Medical dose" No change
"Member of the public" No change
"MeV" No change
"Mineral logging" No change
"Minor" No change
"Monitoring" No change
"Multiplier" No change
"NARM" No change
"Normal operating procedures" No change
"Natural radioactivity" No change
"NRC" No change
"Nuclear waste" No change
"Occupational dose" means the dose received by an individual ~~in a restricted area~~ in the course of employment ~~while engaged in activities licensed or registered by the Agency~~ in which the individual's assigned duties involve exposure to sources of radiation, whether in the possession of ~~the~~ a licensee, registrant, or other person. Occupational dose does not include a dose received~~:~~ from background radiation, ~~as a patient from medical practices, from voluntary participation in medical research programs, or as a member of the public.~~ medical administration of radiation to the individual, exposure to an individual who has been administered radioactive material and released in accordance with R12-1-719, voluntary participation in a medical research program, or as a member of the public.
"Open beam system" No change
"Package" No change
"Particle accelerator" No change
"Permanent radiographic installation" No change
"Personnel dosimeter" No change
"Personnel monitoring equipment" No change
"Personal supervision" No change
"Pharmacist" No change
"Physician" No change
"Primary beam" No change
"Public dose" means the dose received by a member of the public from radiation ~~and to~~ from radioactive material released by ~~the~~ a licensee or registrant, or exposure to ~~sources~~ a source of radiation used in a licensed or registered ~~operations~~ operation. It does not include an occupational dose~~,~~ or a dose received from background radiation, ~~a dose received as a patient from medical practices, or a dose from voluntary participation in medical research programs~~ medical administration of radiation to the individual, exposure to an individual who has been administered radioactive material and released in accordance with R12-1-719, or voluntary participation in a medical research program.
"Pyrophoric liquid" No change
"Pyrophoric solid" No change
"Qualified expert" No change
"Quality Factor" No change
"Quarter" No change
"Rad" No change
"Radiation" No change
"Radiation area" No change
"Radiation dose" No change
"Radiation machine" No change
"Radiation safety officer" No change
"Radioactive marker" No change
"Radioactive material" No change
"Radioactivity" No change
"Radiographer" No change
"Radiographer's assistant" No change
"Radiographic exposure device" No change

"Registrant" No change
"Registration" No change
"Regulations of the U.S. Department of Transportation" No change
"Rem" No change
"Research and Development" No change
"Restricted area" No change
"Roentgen" No change
"Safety system" No change
"Sealed source" No change
"Shallow dose equivalent" No change
"Shielded position" No change
"Sievert" No change
"Site boundary" No change
"Source changer" No change
"Source holder" No change
"Source material" No change
"Source material milling" No change
"Source of radiation" or "source" No change
"Special form radioactive material" No change
"Special nuclear material in quantities not sufficient to form a critical mass" No change
"Storage area" No change
"Storage container" No change
"Subsurface tracer study" No change
"Survey" No change
"TEDE" No change
"Teletherapy" No change
"Temporary job site" No change
"Test" No change
"These rules" No change
"Total Effective Dose Equivalent" (TEDE) No change
"Total Organ Dose Equivalent" (TODE) No change
"Unrefined and unprocessed ore" No change
"Unrestricted area" No change
"U.S. Department of Energy" No change
"Waste" No change
"Waste handling licensees" No change
"Week" No change
"Well-bore" No change
"Well-logging" No change
"Whole body" No change
"Wireline" No change
"Wireline service operation" No change
"Worker" No change
"WL" No change
"WLM" No change
"Workload" No change
"Year" No change

R12-1-107. ~~Repealed~~ Misconduct

A. A licensee, registrant, applicant for a license or certificate of registration, or employee of a licensee, registrant, or applicant; or any contractor (including a supplier or consultant), subcontractor, or employee of a contractor or subcontractor of any licensee or certificate of registration holder who provides to any licensee, registrant, applicant, contractor, or subcontractor, any components, equipment, materials, or other goods or services that relate to a licensee's, registrant's, or applicant's activities in this Chapter, shall not:

1. Knowingly engage in conduct that violates or will result in a violation by a licensee, registrant, or applicant, of any statute, rule, regulation, or order; or any term, condition, or limitation of any license or registration issued by the Agency; or
2. Knowingly submit to the Agency, or a licensee, registrant, or applicant, or a licensee's, registrant's, or applicant's contractor or subcontractor, information that is incomplete or inaccurate.

B. The Board shall impose the applicable civil penalty listed in R12-1-1216 on a person who violates subsection (A)(1) or

(A)(2). For this purpose the person is classified as a Division II licensee and the violation is classified as a Severity II violation.

C. For the purposes of this Section, "misconduct" means conduct prohibited under subsection (A).

D. A person who is not a licensee, registrant, or applicant and knowingly violates a rule for the safe use of radiation sources in A.A.C.Title 12, Chapter 1 is subject to the enforcement actions in Title 12, Chapter 1, Article 12.

ARTICLE 3. RADIOACTIVE MATERIAL LICENSING

R12-1-311. Special Requirements for a Specific License to Manufacture, Assemble, Repair, or Distribute Commodities, Products, or Devices ~~Which~~ that Contain Radioactive Material

A. No change
1. No change
   a. No change
   b. No change
2. No change

B. No change
1. No change
   a. No change
   b. No change
   c. No change
2. No change
   a. No change
   b. No change
   c. No change
      i. No change
      ii. No change
   d. No change
      i. No change
      ii. No change
      iii. No change
3. No change

C. No change
1. No change
2. No change

D. No change
1. No change
   a. No change
   b. No change
      i. No change
      ii. No change
      iii. No change
   c. No change
      i. No change
      ii. No change
      iii. No change
   d. No change
2. No change
   a. No change
   b. No change
   c. No change
   d. No change
   e. No change
   f. No change
   g. No change
   h. No change
   i. No change
   j. No change
3. No change
4. ~~Each~~ A person licensed under subsection (D) to distribute devices to ~~general~~ a generally licensed ~~persons~~ person shall furnish to a generally licensed person to whom radioactive material is transferred, either directly or through an inter-

mediate person:

a. ~~Furnish a~~ A copy of the general license requirements contained in R12-1-306(B) ~~to each person to whom the individual, directly or through an intermediate person, transfers radioactive material in a device for use according to the general license contained in R12-1-306(B)~~ and a note explaining that use of the device is regulated by the NRC, Agreement State, or Licensing State under requirements substantially the same as those in R12-1-306(B); or~~.~~

b. ~~Furnish a~~ A copy of the general license contained in the NRC~~,~~ ~~or~~ Agreement State's~~,~~ or Licensing State's regulation equivalent to R12-1-306(B)~~., or alternatively, furnish a copy of the general license contained in R12-1-306(B) to each person to whom the individual, directly or through an intermediate person, transfers radioactive material in a device for use according to the general license of the NRC, Agreement State, or Licensing State. If a copy of the general license in R12-1-306(B) is furnished to a person, it shall be accompanied by a note explaining that the use of the device is regulated by the U.S. NRC, Agreement State, or Licensing State under requirements substantially the same as those in R12-1-306(B).~~

~~c. Report to the Agency all transfers of devices to persons for use under the general license in R12-1-306(B). The report shall identify each general licensee by name and address, an individual by name or position who serves as the contact person for the general licensee, the type and model number of device transferred, and the quantity and type of radioactive material contained in the device. If 1 or more intermediate persons will temporarily possess the device at the intended place of use prior to its possession by the user, the report shall identify each intermediate person by name, address, contact, and relationship to the intended user. If no transfers have been made to persons generally licensed under R12-1-306(B) during the reporting period, the report shall so indicate. The report shall cover each calendar quarter and be filed within 30 days after the end of the quarter.~~

~~d. Report to the NRC all transfers of devices to persons for use under the NRC general license in 10 CFR 31.5.~~

~~e. Report to the responsible Agreement State or Licensing State agency all transfers of devices to persons for use under a general license in an Agreement State's regulation equivalent to R12-1-306(B).~~

~~i. The report shall identify each general licensee by name and address, an individual by name or position who serves as the contact person for the general licensee, the type and model of the device transferred, and the quantity and type of radioactive material contained in the device. If 1 or more intermediate persons will temporarily possess the device at the intended place of use prior to its possession by the user, the report shall identify each intermediate person by name, address, contact, and relationship to the intended user. The report shall be submitted within 30 days after the end of each calendar quarter in which a device is transferred to the generally licensed person.~~

~~ii. If no transfers have been made to NRC licensees during the reporting period, this information shall be reported to the NRC.~~

~~iii. If no transfers have been made to a particular state during the reporting period, this information shall be reported to the responsible state agency upon request of the agency; and~~

~~f. Keep records showing the name, address, and the contact person for each general licensee to whom the distributor, directly or through an intermediate person, transfers radioactive material in devices for use according to the general license provided in R12-1-306(B), or equivalent regulations of the NRC, an Agreement State, or Licensing State. The records should show the date of each transfer, the isotope and the quantity of radioactivity in each device transferred, the identity of any intermediate person, and compliance with the report requirements of this Section.~~

5. A person licensed under subsection (D) to initially transfer devices to a generally licensed person, shall comply with the following requirements:

a. The person licensed under subsection (D) shall report all transfers of devices to persons for use under a general license obtained under R12-1-306(B), and all receipts of devices from persons licensed under R12-1-306(B) to the Agency, NRC, or other affected Agreement State. The report shall be submitted on a quarterly basis, in a clear and legible form, and contain the following information:

i. The identity of each general licensee by name and mailing address for the location of use. If there is no mailing address for the location of use, the person licensed under subsection (D) shall submit an alternate address for the general licensee, along with information on the actual location of use;

ii. The name, title, and telephone number of a person identified by the general licensee as having knowledge of and authority to take required actions to ensure compliance with the applicable laws;

iii. The date of transfer;

iv. The type, model number, and serial number of the device transferred; and

v. The quantity and type of byproduct material contained in the device.

b. If one or more intermediate persons will temporarily possess the device at the intended place of use before its possession by the intended user, the report shall include the information required of the general licensee in subsection (D)(5)(a) for both the intended user and each intermediate person, clearly identifying the intended user and each intermediate person.

c. For devices received from a general licensee, licensed under R12-1-306(B), the report shall include:

i. The identity of the general licensee by name and address;
ii. The type, model number, and serial number of the device received;
iii. The date of receipt; and
iv. In the case of a device not initially transferred by the reporting licensee, the name of the manufacturer or initial transferor.

d. If the person licensed under subsection (D) makes a change to a device possessed by a general licensee so that the label must be changed to update required information, the report shall identify the general licensee, the device, and the changes to information on the device label.

e. The report shall cover a calendar quarter, be filed within 30 days of the end of each calendar quarter, and clearly indicate the period covered by the report.

f. The report shall clearly identify the person licensed under subsection (D) submitting the report and include the license number of the licensee.

g. If no transfers are made to or from persons generally licensed under R12-1-306(B) during a reporting period, the person licensed under subsection (D) shall submit a report indicating the lack of activity.

6. The person licensed under subsection (D) shall maintain records of all transfers for Agency inspection. Records shall be maintained for three years after termination of the license to manufacture the generally licensed devices regulated under R12-1-306(B).

E. No change
1. No change
2. No change

F. No change
1. No change
2. No change

G. No change
1. No change
2. No change
   a. No change
   b. No change

H. No change
1. No change
2. No change
   a. No change
   b. No change
   c. No change
   d. No change
   e. No change
   f. No change
   g. No change
3. No change
   a. No change
   b. No change
4. No change
   a. No change
   b. No change
5. No change

I. No change
1. No change
2. No change

J. No change
1. No change
   a. No change
   b. No change
      i. No change
      ii. No change
   c. No change
   d. No change
2. No change

K. No change
1. No change

2. No change
   a. No change
   b. No change
3. No change
4. No change
5. No change
   a. No change
   b. No change

L. No change
1. No change
   a. No change
   b. No change
      i. No change
      ii. No change
      iii. No change
      iv. No change
      v. No change
      vi. No change
      vii. No change
      viii. No change
   c. No change
2. No change
   a. No change
   b. No change
   c. No change
   d. No change
   e. No change
   f. No change
   g. No change
   h. No change
   i. No change
   j. No change

M. No change
1. No change
   a. No change
   b. No change
   c. No change
2. No change
3. No change
4. No change
   a. No change
   b. No change
      i. No change
      ii. No change
   c. No change
   d. No change
   e. No change
   f. No change
      i. No change
      ii. No change
      iii. No change
      iv. No change
      v. No change
      vi. No change

R12-1-319. Modification, Revocation, ~~and~~ or Termination of ~~Licenses~~ a License

A. No change
B. No change
C. No change
D. The Agency may terminate a specific license upon a written request by the licensee~~.~~ , based on whether the licensee has

met the termination criteria in R12-1-451, R12-1-452, and the decommissioning requirements in R12-1-323.

ARTICLE 4. STANDARDS FOR PROTECTION AGAINST IONIZING RADIATION

R12-1-403. Definitions

"Air-purifying respirator" No change
"ALI" No change
"Assigned protection factor (APF)" No change
"Atmosphere-supplying respirator" No change
"Class" No change
"Constraint" or "dose constraint" means a value above which specified licensee or registrant actions are required.
"Critical group" No change
"DAC" No change
"DAC-hour" No change
"Declared pregnant woman" means a woman who has voluntarily informed the licensee or registrant in writing of ~~the~~ her pregnancy and the estimated date of conception. The declaration remains in effect until the declared pregnant woman withdraws the declaration in writing or is no longer pregnant.
"Decommission" means to remove a facility or site safely from service and reduce residual radioactivity to a level that permits release of the property for unrestricted use and termination of the license or release of the property under restricted conditions and the termination of the license.
"Demand respirator" No change
"Deterministic effect" [see "Nonstochastic effect"] No change
"Disposable respirator" No change
"Distinguishable from background" means that the detectable concentration of a radionuclide is statistically greater than the background concentration of that radionuclide in the vicinity of a site or, in the case of structures, in similar materials using accepted measurement, survey, and statistical techniques.
"Dosimetry processor" No change
"Filtering face piece (dust mask)" No change
"Fit factor" No change
"Fit test" No change
"Helmet" No change
"Hood" No change
"Inhalation class" [see "Class"] No change
"Loose-fitting face piece"No change
"Lung class" [see "Class"] No change
"Nonstochastic effect" No change
"Planned special exposure" No change
"Positive pressure respirator" No change
"Powered air-purifying respirator (PAPR)" No change
"Pressure demand respirator" No change
"Probabilistic effect" [see "Stochastic effect"] No change
"Qualitative fit test (QLFT)" No change
"Quantitative fit test (QNFT)" No change
"Reference Man" No change
"Residual radioactivity" means radioactivity in structures, materials, soils, groundwater, or other media at a site, resulting from activities under a licensee's control. This includes radioactivity from all licensed and unlicensed sources used by the licensee, but excludes background radiation. It also includes radioactive materials that remain at the site because of routine or accidental release of radioactive material at the site or a previous burial at the site, even if the licensee complied with reagent provisions of A.A.C. Title 12, Chapter1.
"Respiratory protective equipment" No change
"Sanitary ~~Sewerage~~ sewerage" No change
"Stochastic effect" No change
"Supplied-air respirator (SAR)" or "airline respirator" No change
"Tight-fitting face piece" No change
"User seal check (fit check)" No change
"Very high radiation area" means an area, accessible to individuals, in which radiation levels from radiation sources external to ~~the~~ an individual's body could result in ~~an~~ the individual receiving an absorbed dose in excess of 5 Gy (500 rad) in one hour at one meter from a radiation source or one meter from any surface that the radiation penetrates. (At very high doses received at high dose rates, units of absorbed dose, the gray and rad should be used, rather than units of dose equivalent, the sievert and rem)

"Weighting factor" No change

R12-1-407. Radiation Protection Programs

A. No change
B. No change
C. No change
D. To implement the ALARA requirements in subsection (B), and notwithstanding the requirements in R12-1-416, each licensee or registrant governed by A.A.C. Title 12, Chapter 1, Article 3 shall limit air emissions of radioactive material to the environment so that individual members of the public likely to receive the highest dose will not receive a total effective dose equivalent in excess of 0.1mSv (10 mrem) per year from the emissions. If a licensee or registrant subject to this requirement exceeds this limit, the licensee or registrant shall report the incident to the Agency, in accordance with R12-1-444, and take prompt corrective action to prevent additional violations.
~~D.~~**E.** Records.
1. No change
   a. No change
   b. No change
2. ~~The~~ A licensee or registrant shall retain the records required by subsection ~~(D)(1)(a)~~ (E)(1)(a)~~above~~ for three years after the termination of the license or registration. The licensee or registrant shall retain the records required by subsection ~~(D)(1)(b)~~(E)(1)(b) ~~above~~ for three years after the record is made.
3. No change

R12-1-413. Planned Special Exposures

A. No change
1. No change
2. No change
3. No change
   a. No change
   b. No change
   c. No change
4. No change
5. No change
   a. No change
   b. No change
6. No change
7. No change

B. Records.
1. No change
   a. No change
   b. No change
   c. No change
   d. No change
   e. No change
   f. No change
   g. No change
   h. No change
2. No change

C. A licensee shall submit a report to the Agency no later than 30 days after a planned special exposure conducted in accordance with subsection (A). The report shall contain the date of the planned exposure and the information required by subsection (B).

R12-1-416. Dose Limits for Individual Members of the Public

A. No change
1. The total effective dose equivalent to any individual member of the public from the licensed or registered operation does not exceed 1 mSv (0.1 rem) in a year, ~~exclusive of~~ excluding the dose contribution from background radiation, medical administration of radiation, exposure to an individual who has been administered radioactive material and released in accordance with R12-1-719, voluntary participation in a medical research program, and the licensee's or registrant's disposal of radioactive material into sanitary sewerage in accordance with R12-1-436; and
2. The dose in any unrestricted area from an external ~~sources~~ source excluding the dose contribution from an individual who has been administered radioactive material and released in accordance with R12-1-719, does not exceed 0.02 mSv (0.002 rem) in any one hour.

B. No change

C. No change
1. No change
2. No change
3. No change

D. A licensee or registrant shall comply with the U.S. Environmental Protection Agency's ~~generally~~ applicable environmental radiation standards in 40 CFR 190, ~~1992 Edition~~ 2003 edition, published July 1, ~~1992~~ 2003, by the Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408, which are incorporated ~~herein~~ by reference, ~~and~~ on file with the Agency ~~Office of the Secretary of State, containing~~ and contain no future editions or amendments.

E. No change

F. No change

G. No change
1. No change
2. No change
   a. No change
   b. No change

H. No change

I. No change

R12-1-418. Surveys and Monitoring

A. No change
1. No change
2. Under the circumstances to evaluate:
   a. ~~Radiation~~ The magnitude and extent of radiation levels,
   b. No change
   c. No change

B. No change
1. No change
2. No change

C. No change

D. No change
1. No change
2. No change
   a. No change
   b. Records of the results of measurements and calculations ~~results~~ used to determine individual intakes of radioactive material and ~~used in the assessment of~~ to assess an internal dose;
   c. No change
   d. No change

R12-1-419. Conditions Requiring Individual Monitoring of External and Internal Occupational Dose

A. No change

B. No change
1. No change
2. ~~Minors and declared pregnant women likely to receive, in 1 year from sources external to the body, a dose in excess of 10% of any of the applicable limits in R12-1-414 or R12-1-415;~~ Minors likely to receive, in one year, from radiation sources external to the body, a deep dose equivalent in excess of 1 mSv (0.1 rem), a lens dose equivalent in excess of 1.5 mSv (0.15 rem), or a shallow dose equivalent to the skin or to the extremities in excess of 5 mSv (0.5 rem).
3. ~~Individuals entering a high or very high radiation area; and~~ Declared pregnant women likely to receive during the entire pregnancy, from radiation sources external to the body, a deep dose equivalent in excess of 1 mSv (0.1 rem)
4. No change
   a. No change
   b. No change
   c. No change
   d. No change
   e. No change
   f. No change
   g. No change
5. Individuals entering a high or very high radiation area.

C. No change

1. No change
2. No change
3. No change

D. No change
1. No change
2. ~~Minors and declared pregnant women likely to receive, in 1 year, a committed effective dose equivalent in excess of 0.5 mSv (0.05 rem).~~ Minors likely to receive, in one year, a committed effective dose equivalent in excess of 1 mSv (0.1 rem); and
3. Declared pregnant women likely to receive, during the entire pregnancy, a committed effective dose equivalent in excess of 1 mSv (0.1 rem).

E. No change
1. No change
   a. No change
   b. No change
   c. No change
   d. No change
   e. No change
   f. No change
2. No change
3. No change
4. No change
5. No change

R12-1-430. ~~Posting Exceptions~~ Exceptions to Posting Requirements

A. No change
1. No change
2. No change

B. A licensee or registrant is not required to post a caution ~~signs~~ sign in a ~~rooms~~ room or other ~~areas~~ area in ~~hospitals~~ a hospital that ~~are~~ is occupied by ~~patients that have~~ an individual who has been administered radioactive material ~~under R12-1-429, provided that confinement of the patient is not required by a condition of the radioactive material license~~, if the individual meets the criteria for release in R12-1-719.

C. No change

D. No change

R12-1-439. Transfer for Disposal and Manifests

~~**A.** Each shipment of radioactive waste designated for disposal at a licensed low-level radioactive waste disposal facility shall be accompanied by a shipment manifest as specified in subsection (D)(1).~~

~~**B.** Each shipment manifest shall include a certification by the waste generator as specified in subsection (D)(2).~~

~~**C.** Each person involved in the transfer of waste for disposal or in the disposal of waste, including the waste generator, waste collector, waste processor, and disposal facility operator, shall comply with the requirements specified in subsection(D)(3).~~

~~**D.** Requirements for manifests and transfer of low-level radioactive waste to land disposal facilities:~~

~~1. The shipment manifest shall contain the name, address, and telephone number of the person generating the waste. The manifest shall also include the name, address, and telephone number or the name and U.S. Environmental Protection Agency hazardous waste identification number of the person transporting the waste to the land disposal facility. The manifest shall also indicate: a physical description of the waste, the volume, radionuclide identity and quantity, the total radioactivity, and the principal chemical form. The solidification agent shall be specified. Waste containing more than 0.1% chelating agents by weight shall be identified and the weight percentage of the chelating agent estimated. Wastes classified as Class A, Class B, or Class C in Appendix D, Section I shall be clearly identified by class in the manifest. The total quantity of the radionuclides hydrogen-3, carbon-14, technetium-99, and iodine-129 shall be shown. The manifest required by this paragraph may be shipping papers used to meet U.S. Department of Transportation or U.S. Environmental Protection Agency regulations or requirements of the receiver, provided all the required information is included. Copies of manifests required by this section may be legible carbon copies or legible photocopies.~~

~~2. The waste generator shall include in the shipment manifest a certification that the transported materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation and the Agency. An authorized representative of the waste generator shall sign and date the manifest.~~

~~3. Control and Tracking~~

~~a. Any radioactive waste generator who transfers radioactive waste to a land disposal facility or a licensed waste~~

collector shall comply with the requirements in subsections (D)(3)(a)(I) through (viii). Any radioactive waste generator who transfers radioactive waste to a licensed waste processor who treats or repackages waste shall comply with the requirements of subsections (D)(3)(a)(iv) through (vii). A licensee shall:

i. Prepare all wastes so that the waste is classified according to Appendix D, Section I and is characterized as required in Appendix D, Section II;
ii. Label each package of waste to identify whether it is Class A waste, Class B waste, or Class C waste, in accordance with Appendix D, Section III;
iii. Conduct a quality control program, including management evaluation of audits, to ensure compliance with Appendix D, Sections I and II;
iv. Prepare shipping manifests to meet the requirements of subsections (D)(1) and (D)(2);
v. Forward a copy of the manifest to the intended recipient, at the time of shipment, or deliver the manifest to a collector at the time the waste is collected, obtaining acknowledgment of receipt in the form of a signed copy of the manifest or equivalent documentation from the collector;
vi. Include 1 copy of the manifest with the shipment;
vii. Retain a copy of the manifest and documentation of acknowledgment of receipt as the record of transfer of licensed material as required by R12-1-318; and
viii. For any shipment or any portion of a shipment for which acknowledgment of receipt is not received within the times in this Section, conduct an investigation in accordance with subsection (D)(3)(e).

b. Any waste collector licensee who handles only prepackaged waste shall:
i. Acknowledge receipt of the waste from the generator within 1 week of receipt, by returning a signed copy of the manifest or equivalent documentation to the generator;
ii. Prepare a new manifest to reflect consolidated shipments; the new manifest shall serve as a listing or index for the detailed generator manifests. Copies of the generator manifests shall be a part of the new manifest. The waste collector may prepare a new manifest without attaching the generator manifests, provided the new manifest contains for each package the information specified in subsection (D)(1). The collector licensee shall certify that nothing has been done to the waste that would invalidate the generator's certification;
iii. Forward a copy of the new manifest to the land disposal facility operator at the time of shipment;
iv. Include the new manifest with the shipment to the disposal site;
v. Retain a copy of the manifest and documentation of acknowledgment of receipt as the record of transfer of licensed material as required by R12-1-318, and retain information from generator manifest until disposition is authorized by the Agency; and
vi. For any shipments or any portion of a shipment for which acknowledgment of receipt is not received within the times in this Section, conduct an investigation in accordance with subsection (D)(3)(e).

c. Any licensed waste processor who treats or repackages wastes shall:
i. Acknowledge receipt of the waste from the generator within 1 week of receipt by returning a signed copy of the manifest or equivalent documentation;
ii. Prepare a new manifest that meets the requirements in subsections (D)(1) and (D)(2). Preparation of the new manifest reflects that the processor is responsible for the waste;
iii. Prepare all wastes so that the waste is classified according to Appendix D Section I and meets the waste characteristics requirements in Appendix D Section II;
iv. Label each package of waste to identify whether it is Class A waste, Class B waste, or Class C waste, in accordance with Appendix D, Section III;
v. Conduct a quality control program, including management evaluation of audits, to ensure compliance with Appendix D, Sections Section I and II;
vi. Forward a copy of the new manifest to the disposal site generator or waste collector at the time of shipment, or deliver the manifest to a collector at the time the waste is collected, obtaining acknowledgment of receipt in the form of a signed copy of the manifest or equivalent documentation by the collector;
vii. Include the new manifest with the shipment;
viii. Retain copies of original manifests and new manifests and documentation of acknowledgment of receipt as the record of transfer of licensed material required by R12-1-318; and
ix. For any shipment or portion of a shipment for which acknowledgment of receipt is not received within the times in this Section, conduct an investigation in accordance with subsection (D)(3)(e).

d. The land disposal facility operator shall:
i. Acknowledge receipt of the waste within 1 week of receipt by returning a signed copy of the manifest or equivalent documentation to the shipper. The shipper to be notified is the licensee who last possessed the waste and transferred the waste to the operator. The returned copy of the manifest or equivalent documentation shall indicate any discrepancies between materials listed on the manifest and materials received;
ii. Maintain copies of all completed manifests or equivalent documentation until the Agency authorizes their disposition; and

~~iii. Notify the shipper, that is, the generator, the collector, or processor, and the Agency when any shipment or portion of a shipment has not arrived within 60 days after the date that the advance manifest was received.~~

~~e. Any shipment or portion of a shipment for which acknowledgment is not received within the times in this Section shall be:~~

~~i. Investigated by the shipper if the shipper has not received notification or receipt within 20 days after transfer; and~~

~~ii. Traced and reported to the shipper. The investigation shall include tracing the shipment and filing a report with the Agency. Each licensee who conducts a trace investigation shall file a written report with the Agency within 2 weeks of completion of the investigation.~~

A. Any licensee shipping radioactive waste intended for ultimate disposal at a licensed land disposal facility (for purposes of this rule "land disposal facility" means the land, buildings, structures, and equipment that are intended to be used for the disposal of radioactive waste. A geologic repository is not a land disposal facility) shall comply with 10 CFR 20 Appendix G, 2003 edition, published January 1, 2003, by the Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408 which is incorporated by reference and on file with the Agency. This incorporation by reference contains no future editions or amendments.

B. An authorized representative of the waste generator shall provide the certification required in 10 CFR 20, Appendix G, Section II, which is incorporated by reference under subsection (A).

R12-1-444. Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Limits

A. No change
1. No change
2. No change
   a. No change
   b. No change
   c. No change
   d. The limits for an individual member of the public in R12-1-416; ~~or~~
   e. Any applicable limit in the license or registration; or
   f. The ALARA limit on air emissions in R12-1-407;
3. No change
   a. No change
   b. No change
4. Radiation levels or concentrations of radioactive material in excess of the standards in 40 CFR 190, ~~1999 Edition~~ 2003 edition, published July 1, ~~1999~~ 2003, by the Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408 which is incorporated by reference and on file with the Agency ~~and the Office of Secretary of State~~, if the licensee is subject to these federal standards, or there is a license condition referencing the 40 CFR 190 standards. This incorporation by reference contains no future editions or amendments.

B. No change
1. No change
   a. No change
   b. No change
   c. No change
   d. No change
2. Each report filed according to subsection (A) shall include for each occupationally overexposed individual ~~exposed~~: ~~the name, Social Security Number~~, name, social security number, and date of birth. With respect to the limit for ~~the~~ an embryo or fetus in R12-1-415, the identifiers in the report should be those of the declared pregnant woman. The report shall be prepared so that ~~this~~ information regarding each overexposed individual is stated in a separate and detachable ~~portion~~ part of the report.

C. No change

R12-1-445. Notification of Incidents

~~A. Notwithstanding other requirements for notification, each licensee or registrant shall immediately report to the Agency each event involving a source of radiation possessed by the licensee or registrant that may have caused or threatens to cause any of the following conditions:~~

~~1. An individual to receive:~~

~~a. A total effective dose equivalent of 0.25 Sv (25 rem) or more;~~

~~b. A lens eye dose equivalent of 0.75 Sv (75 rem) or more; or~~

~~c. A shallow dose equivalent to the skin or extremities or a total organ dose equivalent of 2.5 Gy (250 rad) or more; or~~

~~2. The release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24~~

~~hours, the individual could have received an intake 5 times the occupational ALI. This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures.~~

~~**B.** If the Agency's telephone does not answer within three minutes, the Duty Officer of the Arizona Department of Public Safety is to be called and advised of:~~
~~1. The existing radiation emergency,~~
~~2. The need to notify the Radiation Regulatory Agency's Duty Officer,~~
~~3. The caller's identity and the name of the affected licensee or registrant,~~
~~4. The location of the incident, and~~
~~5. A telephone number where the caller can be reached.~~

~~**C.** Each licensee or registrant shall, within 24 hours of discovery of the event, report to the Agency each event involving loss of control of a licensed or registered source of radiation possessed by the licensee or registrant that may have caused, or threatens to cause, any of the following conditions:~~
~~1. An individual to receive, in a period of 24 hours:~~
~~a. A total effective dose equivalent exceeding 0.05 Sv (5 rem);~~
~~b. A lens dose equivalent exceeding 0.15 Sv (15 rem); or~~
~~c. A shallow dose equivalent to the skin or extremities or a total organ dose equivalent exceeding 0.5 Sv (50 rem), or~~
~~2. The release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake in excess of 1 occupational ALI. This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot cells or process enclosures.~~

~~**D.** The licensee or registrant shall prepare each report filed with the Agency according to this Section so that names of individuals who have received exposure to sources of radiation are stated in a separate and detachable portion of the report.~~

~~**E.** Licensees or registrants shall make the reports required by subsections (A) and (C) by telephone, telegram, mailgram, or facsimile.~~

~~**F.** The provisions of this Section do not apply to doses that result from planned special exposures, provided the does from the planned special exposures are within the planned limits and are reported according to R12-1-413.~~

A. Immediate notification: Each licensee or registrant shall immediately report to the Agency any event involving a radiation source that may have caused or threatens to cause any of the following conditions:
1. An individual to receive:
a. A total effective dose equivalent of 0.25 Sv (25 rem) or more;
b. A lens dose equivalent of 0.75 Sv (75 rem) or more; or
c. A shallow-dose equivalent to the skin or extremities of 2.5 Gy (250 rads) or more; or
2. The release of radioactive material, inside or outside of a restricted area, so if an individual had been present for 24 hours, the individual could have received five times the annual limit on intake (this subsection do not apply to a location where personnel are not normally stationed during routine operations, such as a hot-cell or process enclosure).

B. Twenty-four hour notification: Each licensee or registrant shall, within 24 hours of discovery of the event, report to the Agency any event involving loss of control of a radiation source possessed by the licensee or registrant that may have caused, or threatens to cause, any of the following conditions:
1. An individual to receive, in a period of 24 hours
a. A total effective dose equivalent exceeding 0.05 Sv (5 rem);
b. A lens dose equivalent exceeding 0.15 Sv (15 rem); or
c. A shallow-dose equivalent to the skin or extremities exceeding 0.5 Gy (50 rads); or
2. The release of radioactive material, inside or outside of a restricted area, so, if an individual had been present for 24 hours, the individual could have received an intake in excess of one occupational annual limit of intake (this subsection does not apply to a location where personnel are not normally stationed during routine operations, such as a hot-cell or process enclosure).

C. A licensee or registrant shall prepare any report filed with the Agency according to this Section so that names of individuals who have received exposure to radiation or radioactive material are stated in a separate and detachable part of the report.

D. A licensee or registrant shall report to the Agency by telephone in response to the requirements of this Section.

E. If the Agency does not respond to the initial telephone call, the licensee or registrant shall report to the Department of Public Safety and continue with reasonable efforts to contact the Agency Duty Officer until contact is made.

F. The provisions of this Section do not apply to a dose that results from a planned special exposure, if the dose is within the limits for planned special exposures and reported according to R12-1-413(C).

R12-1-450. Sealed Sources

A. No change

B. ~~Any~~ A licensee who possesses and uses ~~sealed sources~~ a sealed source ~~containing radioactive material~~, or any device or

equipment that contains a sealed source, shall follow the radiation safety and handling instructions approved by the Agency~~;~~ or follow the radiation safety and handling instructions furnished by the manufacturer on the label attached to the source, on the permanent container of the ~~sources~~ source, or in ~~the~~ a leaflet or brochure that accompanies the source, and maintain the instructions in a legible and conveniently available form. If the handling instructions, leaflet, or brochure is no longer available ~~or~~ and a copy cannot be obtained from the manufacturer, the licensee shall notify the Agency that the source handling information is no longer available.

C. No change
1. No change
2. No change
3. No change
   a. No change
   b. No change
   c. No change
   d. No change
   e. No change

D. No change
E. No change
F. No change

R12-1-451. Termination of a Radioactive Material License or a Licensed Activity

A. As the final step before terminating a radioactive material use program licensed under R12-1-312, the licensee shall:
1. Certify to the Agency the disposition of all licensed material, including accumulated wastes, by submitting a complete description of a disposal plan with signed receipts from all licensed persons receiving the licensed material; and
2. Conduct a radiation survey of the premises where the licensed activities were carried out to demonstrate that the premises are suitable for release in accordance with the criteria for decommissioning in R12-1-452 and submit to the Agency a report of the results of this survey, unless the licensee demonstrates in some other manner acceptable to the Agency that the premises are suitable for release in accordance with the criteria for decommissioning in R12-1-452.

B. Before terminating a licensed program, each licensee authorized to possess radioactive material with a half-life greater than 120 days, in any unsealed form, shall forward the following records to the Agency:
1. Records of disposal of the licensed material required by R12-1-435, R12-1-436, R12-1-437, and R12-1-438; and
2. Records required by R12-1-418(D)(2)(d).

C. If a licensed activity is transferred or assigned in accordance with subsection (E), each licensee authorized to possess radioactive material with a half-life greater than 120 days, in any unsealed form, shall transfer the following records to the new licensee and the new licensee shall maintain these records until the license is terminated:
1. Records of disposal of licensed material required by R12-1-435, R12-1-436, R12-1-437, and R12-1-438; and
2. Records required by R12-1-418(D)(2)(d).

D. Before the Agency terminates a license, each licensee shall forward the records required by subsection (E) to the Agency.

E. A person licensed under R12-1-312 shall maintain required records regarding decommissioning of a facility in a location identified on the license until the Agency releases the site for unrestricted use. Before transfer or assignment of licensed activities, a licensee shall transfer all records required by this Section to the transferee. If records relating to facility decommissioning are kept for other purposes, the transferee shall refer to these records and provide their location on the transferee's application for a license. The transferee shall maintain the records until the Agency terminates the transferee's new license. The new licensee shall maintain the following decommissioning records for Agency review:
1. Records of spills or other occurrences involving the spread of contamination in and around the facility, equipment, or site. The licensee shall maintain a record of any instance when contamination remains after cleanup procedures or there is a reasonable likelihood that a contaminant has spread to an inaccessible area, as in the case of possible seepage into porous material such as concrete. These records shall include any known information that identifies any radionuclide involved and its quantity, form, and concentration.
2. As-built drawings showing modifications of structures and equipment in restricted areas where radioactive materials are used or stored, and locations of possible inaccessible contamination, such as buried pipes. If as-built drawings are referenced, the licensee need not index each relevant document individually. If drawings are not available, the licensee shall provide records with known information concerning these areas and locations, as prescribed in subsection (E)(1).
3. Except for areas that contain depleted uranium used only for shielding or as penetrators in unused munitions, a list, contained in a single document and updated every two years, of the following:
   a. Any area designated or formerly designated as a restricted area as defined under R12-1-102;
   b. Any area outside of a restricted area for which documentation is required under subsection (B)(1);
   c. Any area outside of a restricted area where wastes have been buried;
   d. Any area outside of a restricted area that contains regulated radioactive material that will require the licensee to either decontaminate the area for decommissioning under R12-1-452 or obtain disposal approval under R12-1-

435; and
e. Any restricted area where wastes have been buried.
4. Records of the cost estimate performed for the decommissioning funding plan or the amount certified by the Agency for decommissioning and the method for assuring funding, if either a funding plan or certification is used.

R12-1-452. Radiological Criteria for License Termination

A. General provisions and scope:
1. The criteria in this Section apply to the decommissioning of facilities licensed under Article 3 of this Chapter. The criteria do not apply to uranium and thorium recovery facilities already subject to 10 CFR 40, Appendix A, or to uranium solution extraction facilities.
2. The criteria in this Section do not apply to sites that:
a. Have been decommissioned before the effective date of this Section; or
b. Have previously submitted and received Agency approval of a license termination plan (LTP) or decommissioning plan.
3. If a site has been decommissioned and the license terminated in accordance with the criteria in this Section, the Agency shall not require additional cleanup unless, based on new information, the Agency determines that the criteria of this Section were not met and residual radioactivity at the site is a threat to public health and safety.
4. When calculating the TEDE for the average member of the critical group, a licensee shall use the peak annual dose expected within the first 1000 years after decommissioning.

B. Radiological criteria for unrestricted use. The Agency considers a site acceptable for unrestricted use if the licensee reduces residual radioactivity, distinguishable from background radiation, to a TEDE for an average member of the critical group that does not exceed 0.15 mSv (15 mrem) per year, including radiation from groundwater sources of drinking water, and the residual radioactivity is as low as reasonably achievable (ALARA). To determine the level that is ALARA, the Agency and the licensee shall take into account any detriment, such as deaths from transportation accidents, that is likely to result from decontamination and waste disposal.

C. Criteria for license termination under restrictive conditions. The Agency considers a site acceptable for license termination if the licensee meets all of the following restrictive conditions:
1. The licensee demonstrates that a reduction in residual radioactivity, necessary to comply with subsection (B), will result in net public or environmental harm or is not being made because the residual level of radioactivity is ALARA. To determine the level that is ALARA, the Agency and the licensee shall take into account any detriment, such as deaths from transportation accidents, that is likely to result from decontamination and waste disposal;
2. The licensee establishes one or more legally enforceable institutional controls that reduce residual radioactivity, distinguishable from background radiation, to a TEDE for the average member of the critical group that does not exceed (0.15 mSv) 15 mrem per year, including radiation from groundwater sources of drinking water;
3. The licensee demonstrates financial assurance that complies with R12-1-323(C), which enables an independent third party, including a governmental custodian of the site, to assume and carry out responsibilities for control and maintenance of the site;
4. The licensee submits a decommissioning plan or License Termination Plan (LTP) to the Agency, indicating the licensee's intent to decommission in accordance with R12-1-323 and specifying that the licensee intends to decommission by restricting use of the site. The licensee shall document in the LTP or decommissioning plan how comments from individuals and institutions in the community, who may be affected by the decommissioning, have been sought and addressed after analysis.
a. If a licensee is restricting use of the site, the licensee shall seek comments from the public concerning the proposed decommissioning, regarding all of the following matters:
i. Whether the institutional controls proposed by the licensee will reduce residual radioactivity, distinguishable from background radiation, to a TEDE for the average member of the critical group that does not exceed 0.15 mSv (15 mrem) per year; are enforceable; and do not impose an unreasonable burden on the local community or other affected parties; and
ii. Whether the licensee has provided financial assurance that complies with R12-1-323(C), which enables an independent third party, including a governmental custodian of the site, to assume and carry out responsibilities for control and maintenance of the site;
b. In seeking comments on the issues identified in subsection (C)(4)(a), the licensee shall provide for:
i. Participation by representatives of a broad cross section of community interests that may be affected by the decommissioning;
ii. An opportunity for a comprehensive discussion of the issues by all of the community representatives; and
iii. A publicly available document that contains or access to each oral and written comment that reflects the viewpoints of community representatives on each issue and the extent of agreement or disagreement among representatives on each issue; and
5. The licensee reduces residual radioactivity, distinguishable from background radiation, at the site so that if the institutional controls are no longer in effect, the TEDE for the average member of the critical group is as low as reasonably

achievable and does not exceed 1 mSv (100 mrem) per year; unless the licensee:

a. Demonstrates that a further reduction in residual radioactivity necessary to comply with subsection (C)(5) is not technically achievable or economically feasible, or will result in net public or environmental harm;

b. Provides for durable institutional controls; and

c. Provides financial assurance that complies with R12-1-323(C), which enables an independent third party, including a governmental custodian of the site, to carry out periodic rechecks of the site, no less frequently than every five years; assures that each institutional control remains in place according to subsection (C)(3); and assumes and carries out responsibilities for maintenance of the institutional control.

D. Alternate criteria for license termination:

1. Based on circumstances that relate to a specific license, the Agency may terminate the license using the following alternate criteria for subsections (B) or (C)(2), if the licensee demonstrates that the TEDE from residual radioactivity, distinguishable from background radiation, for an average member of the critical group does not exceed 0.15 mSv (15 mrem) per year, and if the licensee:

   a. Ensures that public health and safety is protected by submitting an analysis of possible sources of exposure, prepared by a independent qualified expert, which indicates whether it is likely that the dose from all human-made sources combined, other than medical sources, is more than the 1 mSv/y (100 mrem/y) limit in R12-1-416;

   b. Employs to the extent practicable, restrictions on site use, according to the provisions of subsection (C) to minimize exposures at the site;

   c. Reduces doses to ALARA levels, taking into consideration any detriment, such as deaths from transportation accidents, that is likely to result from decontamination and waste disposal; and

   d. Submits a decommissioning plan or License Termination Plan (LTP) to the Agency that indicates the licensee's intent to decommission in accordance with R12-1-323, and specifies that the licensee proposes to decommission by use of alternate criteria. The licensee shall document in the decommissioning plan or LTP how comments from individuals and institutions in the community, who may be affected by the decommissioning, have been sought and addressed after analysis. In seeking comments, the licensee shall provide for:

      i. Participation by representatives of a broad cross section of community interests that may be affected by the decommissioning;

      ii. An opportunity for a comprehensive discussion of the issues by all of the community representatives; and

      iii. A publicly available document that contains or access to each oral and written comment that reflects viewpoints of community representatives on each issue and the extent of agreement and disagreement among the representatives on each issue.

2. The use of alternate criteria to terminate a license requires approval by the Agency after consideration of any comments provided by the U.S. Environmental Protection Agency and any public comments submitted under subsection (E).

E. Public notification and public participation:

1. Upon the receipt of an LTP or decommissioning plan from a licensee, or a proposal by a licensee for release of a site under subsection (C) or (D), or whenever the Agency determines that notice will serve the public interest, the Agency shall notify and solicit comments from:

   a. Local and state governments in the vicinity of the site and any Indian Nation or other indigenous people that have treaty or statutory rights that could be affected by the decommissioning; and

   b. The U.S. Environmental Protection Agency.

2. To comply with subsection(E)(1) the Agency shall publish a notice in a local newspaper, send letters to state or local organizations on its mailing list, hold a public hearing that is readily accessible to individuals in the vicinity of the site, and solicit comments from the public.

F. Minimization of contamination. After the effective date of this Section, an applicant for a license, other than a renewal, shall describe in the application how facility design and procedures for operation will facilitate eventual decommissioning and minimize, to the extent practicable, the generation of radioactive waste and contamination of the facility and the environment.

G. The Agency considers a site acceptable for unrestricted use if the residual radioactivity, distinguishable from background radiation, is equal to or less than the values in Table 1.

TABLE 1

ACCEPTABLE SURFACE CONTAMINATION1 LEVELS

RADIONUCLIDE[1]	AVERAGE[2,3]	MAXIMUM[2,4]	REMOVABLE[2,5]

U-nat, U-235, U-238, and associated decay products	5,000 dpm/100 cm^2	15,000 dpm/100cm^2	1,000 dpm/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Pa-231, Ac-227, !-125, I-129	100dpm/100cm^2	300 dpm/100cm^2	20dpm/100cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232 I-126, I-131, I-133	1000 dpm.100cm^2	3000 dpm/100cm^2	200 dpm/100cm^2
Beta-gamma (Exceptions noted above)	5,000 dpm/100 cm^2	15,000 dpm/100cm^2	1,000 dpm/100 cm^2

[1] Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides apply independently.
[2] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed on an instrument calibrated for background, efficiency, and geometric factors associated with the instrumentation, in accordance with R12-1-449.
[3] Measurements of average contamination level shall not be averaged over more than one square meter. For objects of less surface area, the average shall be derived for each object.
[4] The maximum contamination level applies to an area of not more than 100 cm^2.
[5] The amount of removable radioactive material per 100 cm^2 of surface area shall be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an instrument calibrated in accordance with R12-1-449. When removable contamination on objects of surface area A (where A is less than 100 sq. cm) is determined, the entire surface shall be wiped and the contamination level multiplied by 100/A to convert to a "per 100 sq. cm" basis.

ARTICLE 5. ~~INDUSTRIAL RADIOGRAPHIC OPERATIONS~~ SEALED SOURCE INDUSTRIAL RADIOGRAPHY

R12-1-502. ~~Radiographic Equipment Standards and Equipment Failure Notification~~ License Requirements

~~**A.** Each registrant shall ensure that each x-ray machine has a lock designed to prevent unauthorized use or accidental production of radiation and is kept locked at all times except when under the direct surveillance of a radiographer or radiographer's assistant.~~

~~**B.** Exposure devices shall:~~
~~1. Have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from the shielded position; and~~
~~2. Be kept locked when not under the direct surveillance of a radiographer or radiographer's assistant unless alternate safety measures approved by the RSO are followed.~~

~~**C.** Source storage containers and source changers shall:~~
~~1. Have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position; and~~
~~2. Be kept locked if they contain sealed sources, unless they are under the direct surveillance of a radiographer or a radiographer's assistant.~~

~~**D.** Equipment used in industrial radiographic operations shall meet the following minimum criteria:~~
~~1. Each radiographic exposure device, sealed source, and all associated equipment shall meet the requirements specified in American National Standards Institute Publication N43.9-1991 (previously N432-1980) "American National Standard for Gamma-Radiography-Specifications for Design and Testing-Apparatus," 1991 Edition, published October 24, 1991 by the American National Standards Institute, incorporated by reference and on file with the Agency and the Office of Secretary of State. This incorporation by reference contains no future editions or amendments. The incorporated material may be purchased from the American National Standards Institute, Inc., 1430 Broadway, New York, New York, 10018.~~
~~2. In addition to the requirements specified in subsection (D)(1), the following requirements apply to radiographic exposure devices and associated equipment.~~

a. The licensee shall have available for review documented proof that each device and associated equipment meets the requirements of R12-1-502(D)(1);
b. The licensee shall ensure that each radiographic exposure device has attached to it, a durable, legible, clearly visible label bearing the:
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. Model number and serial number of the sealed source;
iv. Manufacturer of the sealed source; and
v. Licensee's name, address, and telephone number.
c. The licensee shall ensure that radiographic exposure devices intended for use as Type B transport containers meet the applicable requirements of 10 CFR 71.51, 2000 Edition, published January 1, 2000, by the Office of the Federal Register, National Archives and Records Ad ministration, incorporated by reference and on file with the Agency and the Office of Secretary of State. This incorporation by reference contains no future editions or amendments.
d. Modification of radiographic exposure devices 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.

3. In addition to the requirements specified in subsections (D)(1) and (D)(2), the following requirements apply to radiographic exposure devices and associated equipment that allow the source to be moved out of the device for routine radiographic operations.
a. The coupling between the source assembly and the control cable shall be designed so that the source assembly will not become disconnected if positioned outside the guide tube. The coupling shall be constructed so that it cannot be unintentionally disconnected under normal and reasonably foreseeable abnormal conditions.
b. The device shall automatically secure the source assembly when it is retrieved back into the fully shielded position within the device. This securing system shall only be released by means of a deliberate operation on the exposure device.
c. The outlet fittings, lock box, and drive cable fittings on each radiographic exposure device shall be equipped with safety plugs or covers that shall be installed during storage and transportation to protect the source assembly from water, mud, sand, or other foreign matter.
d. Each sealed source or source assembly shall have attached to it or engraved in it, a durable, legible, visible label with the words: "DANGER-RADIOACTIVE". The label shall not interfere with the safe operation of the exposure device or associated equipment.
e. The guide tube shall have passed the crushing tests for the control tube as specified in ANSI N43.9-1991 and a kinking resistance test that closely approximates the kinking forces likely to be encountered during use.
f. Guide tubes shall be used when moving the source out of the device.
g. An exposure head or similar device designed to prevent the source assembly from passing out the end of the guide tube shall be attached to the outermost end of the guide tube during radiographic operations.
h. The guide tube exposure head connection shall be able to withstand the tensile test for control units specified in ANSI N43.9-1991.
i Source changers shall provide a system of ensuring that the source will not be accidentally withdrawn from the changer when connecting or disconnecting the drive cable to or from a source assembly.
j. All newly manufactured radiographic exposure devices and associated equipment acquired by licensees after January 10, 1992, shall comply with the requirements of this Section.
k. All radiographic exposure devices and associated equipment in use after January 10, 1996, shall comply with the requirements of this Section.

E. In addition to the notification requirements in Article 4, each licensee or registrant shall submit a written report within 30 days to the Agency whenever one or more of the following equipment failures occurs:
1. A source assembly cannot be returned to the fully shielded position and properly secured;
2. A source assembly is unintentionally disconnected from the drive cable;
3. Any component critical to safe operation of the radiographic exposure device fails to properly perform its intended function;
4. An indicator on a radiation-producing machine fails to show that radiation is being produced, an exposure switch fails to terminate production of radiation when turned to the off position, or a safety interlock fails to terminate X-ray production; or
5. Personnel overexposure submitted under R12-1-444, involving failure of safety components of radiography exposure devices, source storage containers, or source changers.

F. Each report required in subsection (E) shall contain the following information:
1. A description of the equipment problem;
2. Cause of each incident, if known;

~~3. Manufacturer and model number of equipment involved in the incident;~~
~~4. Location, time, and date of the incident:~~
~~5. Actions taken to regain normal operations;~~
~~6. Corrective actions taken or planned to prevent recurrence; and~~
~~7. Names of personnel involved in the incident.~~

A. The Agency shall review an application for a specific license for the use of radioactive material in industrial radiography and approve the license if an applicant meets all of the following requirements:
1. The applicant satisfies the general requirements in R12-1-309 and any special requirements contained in this Article; and
2. The applicant submits a program for training radiographers and radiographers' assistants that complies with R12-1-543, except that:
   a. After the effective date of this Section, an applicant is not required to describe its initial training and examination program for radiographers;
   b. An applicant shall affirm that an individual who is acting as an industrial radiographer is certified in radiation safety by a certifying organization, as required in R12-1-543, before permitting the individual to act as a radiographer. This affirmation substitutes for a description of the applicant's initial training and examination program for radiographers in the subjects outlined in R12-1-543(G); and
   c. An applicant shall submit procedures for verifying and documenting the certification status of each radiographer and for ensuring that the certification remains valid.

B. The applicant shall submit written operating and emergency procedures as prescribed in R12-1-522.

C. The applicant shall submit a description of a program for review of job performance of each radiographer and radiographers' assistant at intervals that do not exceed six months as prescribed in R12-1-543(E).

D. The applicant shall submit a description of the applicant's overall organizational structure as it applies to radiation safety responsibilities in industrial radiography, including specified delegation of authority and responsibility.

E. The applicant shall submit a list of the qualifications of each individual designated as an RSO under R12-1-512 and indicate which designee is responsible for ensuring that the licensee's radiation safety program is implemented in accordance with approved procedures.

F. If an applicant intends to perform leak testing on any sealed source or exposure device that contains depleted uranium (DU) shielding, the applicant shall submit a description of the procedures for performing the leak testing and the qualifications of each person authorized to perform leak testing. 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 the:
1. Instruments to be used,
2. Methods of performing the analysis, and
3. Relevant experience of the person who will analyze the wipe samples.

G. If the applicant intends to perform "in-house" calibrations of survey instruments, the applicant shall describe each calibration method to be used and the relevant experience of each person who will perform a calibration. A licensee shall perform all calibrations according to the procedures prescribed in R12-1-504.

H. The applicant shall identify and describe the location of all field stations and permanent radiographic installations.

I. The applicant shall identify each location where records required by this Chapter will be maintained.

R12-1-503. ~~Storage precautions~~ Performance Requirements for Equipment

~~Locked radiographic exposure devices, source changers, storage containers, and x-ray machines shall be physically secured to prevent tampering or removal by unauthorized persons.~~

A. A licensee shall ensure that equipment used in industrial radiographic operations meets the following minimum criteria:
1. Each radiographic exposure device, source assembly or sealed source, and all associated equipment meet the requirements in American National Standards Institute, N432-1980 Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography, 1980 edition, published as NBS Handbook 136 and issued January 1981 by the American National Standards Institute, which is incorporated by reference and on file with the Agency. This incorporation by reference contains no future editions or amendments. This publication may be purchased from the American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018 Telephone (212) 642-4900; or
2. An engineering safety analysis demonstrates the applicability of previously performed testing on similar individual radiography equipment components. Based on a review of the analysis, the Agency may find that previously performed testing can be substituted for testing of the component under the standards in subsection (A)(1).

B. In addition to the requirements in subsection (A), the following requirements apply to each radiographic exposure device, source changer, source assembly, and sealed source:
1. A licensee shall ensure that each radiographic exposure device has attached to it a durable, legible, and clearly visible label bearing:
   a. The chemical symbol and mass number of the radionuclide in the device;
   b. The activity of the source and the date on which this activity was last measured;
   c. The model (or product code) and serial number of the sealed source;

d. The manufacturer's description of the sealed source; and
e. The licensee's name, address, and telephone number.

2. A licensee shall ensure that each radiographic exposure device intended for use as a Type B transport container meets the applicable requirements of 10 CFR 71, 2003 edition, published January 1, 2003, by the Office of the Federal Register National Archives and Records Administration, Washington, D.C. 20408, which is incorporated by reference and on file with the Agency. This incorporation by reference contains no future editions or amendments.
3. A licensee shall not modify any radiographic exposure device, source changer, source assembly, or associated equipment, unless the design of the replacement component, including source holder, source assembly, controls, or guide tubes is consistent with and does not compromise the design safety features of the system.

C. In addition to the requirements in subsections (A) and (B), the following requirements apply to each radiographic exposure device, source assembly, and associated equipment that allows the source to be moved out of the device for radiographic operations or to a source changer:
1. The license shall ensure that the coupling between the source assembly and the control cable is designed so that the source assembly does not become disconnected if it is positioned outside of the guide tube and is constructed so that an unintentional disconnect will not occur under normal and reasonably foreseeable abnormal conditions;
2. The device automatically secures the source assembly if it is retracted into the fully shielded position within the device and the securing system is released from the exposure device only by means of a deliberate operation;
3. The outlet fittings, lock box, and drive cable fittings on each radiographic exposure device are equipped with safety plugs or covers installed for storage and transportation to protect the source assembly from water, mud, sand, or other foreign matter;
4. Each sealed source or source assembly has attached to it or is engraved with a durable, legible, and visible label with the words: "DANGER--RADIOACTIVE". The licensee shall ensure that the label does not interfere with safe operation of the equipment;
5. The guide tube is able to withstand a crushing test that closely approximates the crushing forces that are likely to be encountered during use, and a kinking resistance test that closely approximates the kinking forces that are likely to be encountered during use;
6. A guide tube is used if a person moves the source out of the device;
7. An exposure head or similar device, designed to prevent the source assembly from passing out of the end of the guide tube, is attached to the outermost end of the guide tube during industrial radiography operations;
8. The guide tube exposure head connection is able to withstand the tensile test for control units specified in ANSI N432-1980, incorporated by reference in subsection (A); and
9. Source changers provide a system for ensuring that the source is not accidentally withdrawn from the changer when a person is connecting or disconnecting the drive cable to or from the source assembly.

D. A licensee shall ensure that radiographic exposure devices and associated equipment in use after January 10, 1996 comply with the requirements of this Section.

E. Notwithstanding subsection (A), a licensee with equipment used in industrial radiographic operations need not comply with Sec. 8.92(C) of the Endurance Test in American National Standards Institute 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.

R12-1-504. Radiation Survey Instruments

~~**A.** A licensee or registrant shall maintain sufficient calibrated and operable radiation survey instruments to make physical radiation surveys required by this Article and Article 4 of this Chapter. Instrumentation required by this Article shall have a range that allows 20 microsievert (2 millirem) per hour through 10 millisievert (1 rem) per hour to be measured.~~

~~**B.** Each radiation survey instrument shall be calibrated:~~
~~1. Based on the scales and associated energies at which the meter will be used and at intervals not to exceed:~~
~~a. Three months and after each instrument servicing for instruments used in radiographic operations utilizing sealed sources, or~~
~~b. One year for instruments used in radiographic operations utilizing only x-ray machines;~~
~~2. So that accuracy within plus or minus 20% of the calibration source can be demonstrated; and~~
~~3. For linear scale instruments, at two points located approximately 1/3 and 2/3 of full-scale on each scale; 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 0.02 and 10 mSv (2 and 1000 mRem) per hour.~~

~~**C.** Records of the calibrations shall be retained for three years after the calibration date.~~

A. A licensee shall maintain at least two calibrated and operable radiation survey instruments at each location where sources of radiation are present to make radiation surveys required by this Article and Article 4 of this Chapter. Instrumentation required by this Section shall be capable of measuring a range from 0.02 millisieverts (2 millirems) per hour through 0.01 sievert (1 rem) per hour.

B. A licensee shall ensure that each radiation survey instrument required under subsection (A) is calibrated:
1. At intervals that do not exceed six months, and after instrument servicing, except for battery changes;

2. For linear scale instruments, at two points located approximately one-third and two-thirds of full-scale on each scale; for logarithmic scale instruments, at mid-range of each decade, and at two points of at least one decade; and for digital instruments, at 3 points between 0.02 and 10 millisieverts (2 and 1000 millirems) per hour; and
3. So that an accuracy within plus or minus 20% of the calibration source can be demonstrated at each point checked.

C. A licensee shall maintain calibration records for each radiation survey instrument, and maintain each record for three years after it is made.

R12-1-505. ~~Leak Testing, Repair, Tagging, Opening, Modification, and Replacement of Sealed Sources~~ Leak Testing and Replacement of Sealed Sources

~~A.~~ ~~A licensee shall ensure that the replacement of any sealed source fastened to or contained in a radiographic exposure device and the leak testing, repair, tagging, opening, or modification of any sealed source is performed by persons specifically licensed to do so by the Agency, the U.S. Nuclear Regulatory Commission, or an Agreement or Licensing State.~~

~~B.~~ ~~Each sealed source shall be tested for leakage at intervals not to exceed six months. In the absence of a certificate from a transferor that a test has been made within the six months before the transfer, the sealed source shall not be used until it is tested.~~

~~C.~~ ~~The leak test shall be capable of detecting the presence of 185 becquerel (0.005 microcurie) of removable contamination. The leak test for a sealed source in a radiographic exposure device or source changer shall consist of swab testing the exit port using a procedure submitted in detail as part of the license application. Records of leak test results shall be kept in units of microcuries or becquerel and maintained for three years after the leak test is performed.~~

~~D.~~ ~~Any leak test that reveals the presence of removable contamination in excess of the amount specified in subsection (C shall be considered evidence that the sealed source is leaking. The licensee shall immediately withdraw the equipment involved from use and decontaminate, repair, or dispose of it in accordance with this Chapter. The licensee shall file a report with the Agency within five days after receiving the results of the test, describing the equipment involved, the test results, and the corrective action taken.~~

~~E.~~ ~~Each radiographic exposure device using depleted uranium (DU) shielding and an "S" tube configuration shall be tested for DU contamination at intervals not to exceed 12 months. The analysis shall be performed in accordance with subsections (A) and (C). Should leak testing reveal the presence of 185 Bq (0.005 microcuries) or more of removable DU contamination, the exposure device shall be removed from service until an evaluation of the wear on the S-tube has been conducted. The exposure device shall not be used if the evaluation reveals that the S-tube is worn through. DU shielded exposure devices do not have to be tested for DU contamination while in storage. However, before using or transferring a radiographic exposure device, the device shall be tested for DU contamination if it has been stored for more than 12 months. Records of the DU leak test shall be maintained in accordance with subsection (C). Licensees will have three months from the effective date of this rule to comply with the DU leak testing requirements in this subsection.~~

~~F.~~ ~~A sealed source that is not fastened to or contained in a radiographic exposure device or source changer shall have permanently attached to it a durable tag at least 2.5 centimeters (1 inch) square bearing the prescribed radiation caution symbol in conventional colors, magenta or purple on a yellow background, and at least the instructions: "DANGER -RADIOACTIVE MATERIAL - DO NOT HANDLE - NOTIFY CIVIL AUTHORITIES IF FOUND"~~

A. A licensee shall ensure that replacement of any sealed source fastened to or contained in a radiographic exposure device and leak testing of any sealed source is performed by a person authorized to do so by the Agency, NRC, or another Agreement State.

B. A licensee shall ensure that opening, repairing, or modifying any sealed source is performed by a person specifically authorized to do so by the Agency, NRC, or another Agreement State.

C. A licensee that uses a sealed source shall have the source tested for leakage by a qualified person at intervals that do not exceed six months. The person who performs leak testing of the source shall use a method approved by the Agency, NRC, or by another Agreement State. A wipe sample shall be taken from the nearest accessible point to the sealed source where contamination might accumulate. The wipe sample shall be analyzed for radioactive contamination. The licensee shall ensure that the analysis is capable of detecting the presence of 185 Bq (0.005 microcurie) of radioactive material on the test sample and a person specifically authorized by the Agency, NRC, or another Agreement State performs the analysis. The licensee shall maintain records of the leak tests in accordance with this Section.

D. Unless a sealed source is accompanied by a certificate from the transferor that shows that the sealed source has been leak tested within six months before the transfer, a licensee shall not use the sealed source until it is tested for leakage. A licensee is not required to test a sealed source that is in storage, but shall test each sealed source before use or transfer to another person if the interval of storage exceeds six months.

E. A licensee shall immediately withdraw equipment containing a leaking source from use and have it decontaminated and repaired or dispose of the source in accordance with this Chapter. The licensee shall file a report with the Director of the Agency within five days of any test with results that exceed the threshold in this subsection, and describe the equipment involved, the test results, and corrective action taken. If a leak test conducted under this Section reveals the presence of 185 Bq (0.005 microcurie) or more of removable radioactive material the Agency classifies the sealed source as leaking.

F. A licensee shall test for DU contamination at intervals that do not to exceed 12 months a radiographic exposure device that uses depleted uranium (DU) shielding and an "S" tube configuration. The licensee shall ensure that the analysis is

capable of detecting the presence of 185 Bq (0.005 microcuries) of radioactive material on the test sample and a person specifically authorized by the Agency, NRC, or another Agreement State performs the analysis. If the testing reveals the presence of 185 Bq (0.005 microcuries) or more of removable DU contamination, the licensee shall remove the exposure device from use until an evaluation of the wear on the S-tube is completed. If the evaluation reveals that the S-tube is worn through, the licensee shall ensure that the device is not used again. The licensee is not required to test for DU contamination if the radiographic exposure device is in storage. Before using or transferring the radiographic exposure device, the licensee shall test the device for DU contamination if the interval of storage exceeds 12 months. The licensee shall maintain records of the DU leak test in accordance with subsection (G).

G. A licensee shall maintain records of leak test results for each sealed source and for each device that contains DU. The licensee shall ensure results are in Becquerels (microcuries), and retain each record for three years after it is made or until the source is removed from storage and tested, which ever is longer.

R12-1-506. Quarterly Inventory

~~Each licensee or registrant shall conduct a quarterly physical inventory to account for all sources of radiation received or possessed. The records of the inventories shall be retained for three years from the date of the inventory and shall show for each source the associated radioactivity, the kind of radioactive material, the number and models of x-ray machines, if applicable, the location of all sources of radiation, the date of the inventory, and the signature of the individual performing the inventory.~~

A. A licensee shall conduct a quarterly physical inventory to account for all sealed sources and devices that contain depleted uranium.

B. A licensee shall maintain a record of the quarterly inventory required under subsection (A) for three years after it is made.

C. The record required in subsection (B) shall include the date of the inventory, name of the individual who conducted the inventory, radionuclide, number of becquerels (curies) or mass (for DU) in each device, location of sealed source and associated devices, and manufacturer, model, and serial number of each sealed source and device as applicable.

R12-1-507. Utilization Logs

~~Each licensee or registrant shall maintain current logs, which shall be retained for three years from the date of the recorded event and which show the following information for each source of radiation:~~

~~1. A description, including make, model, and serial number of each radiographic exposure device or storage container in which a source of radiation is located;~~
~~2. The identity of the radiographer to whom the source of radiation is assigned;~~
~~3. Locations where the source of radiation was used and dates of use; and~~
~~4. The voltage, current, and exposure time for each radiographic exposure employing an x-ray machine.~~

A. A licensee shall maintain for each sealed source a utilization log that provides all of the following information:

1. A description, including the make, model, and serial number of each radiographic exposure device, and each sealed source transport and storage container that contains a sealed source;
2. The identity and signature of the radiographer using the source; and
3. The plant or site where the source is used and dates of use, including the date each source is removed from and returned to storage.

B. A licensee shall retain the log required by subsection (A) for three years after the log is made.

R12-1-508. Inspection and Maintenance of Radiographic Exposure Devices, Transport and Storage Containers, ~~Associated Equipment~~, Source Changers, ~~and~~ Survey Instruments, and Associated Equipment

~~**A.** Each licensee shall perform visual and operability checks on radiographic exposure devices, transport and storage containers, associated equipment, source changers, and survey instruments or damage to before use each day the equipment is used. Survey instrument operability checks shall performed using a check source.~~

~~**B.** Each licensee shall perform inspection and maintenance on radiographic exposure devices, transport and storage containers, associated equipment, source changers, and survey instruments at intervals not to exceed three months and before their initial use to ensure proper functioning of components important to safety. All parts shall be maintained in accordance with the licensee's written procedures and manufacturer's specifications. Records of inspection and maintenance shall be retained for three years from the date the record is made.~~

~~**C.** If any inspection reveals defects or damage to components critical to radiation safety, the radiographic exposure devices, transport and storage containers, associated equipment, source changers, or survey instruments shall be removed from service until repairs have been made.~~

A. A licensee shall perform visual and operability checks on each survey instrument, radiographic exposure device, transport and storage container, source changer, and associated equipment before use on each day the equipment is to be used to ensure that the equipment is in good working condition, the source is adequately shielded, and required labeling is present. A survey instrument operability check shall be performed using a check source or other authorized means. If an equipment problem is found, the licensee shall remove the equipment from service until it is repaired.

B. A licensee shall have written inspection and maintenance procedures to ensure that:

1. Radiographic exposure devices, source changers, transport and storage containers, survey instruments, and associated equipment that require inspection and maintenance at intervals that do not exceed three months or before first use of

the equipment are functioning properly and safely. Replacement components shall meet design specifications. If an equipment problem is discovered, the licensee shall remove the equipment from service until it is repaired; and

2. Type B packages are shipped and maintained in accordance with the certificate of compliance or other approval.

C. A licensee shall maintain records of daily checks and quarterly inspections of radiographic exposure devices, transport and storage containers, source changers, survey instruments, and associated equipment, and retain each record for three years after it is made. The record shall include the date of the check or inspection, name of the inspector, equipment involved, any problems found, and any repair or needed maintenance performed.

R12-1-509. ~~Permanent Radiographic Installations~~ Surveillance

~~A licensee or registrant shall ensure that a permanent radiographic installation having high radiation area entrance controls of the types described in R12-1-420(A) meets the following requirements:~~

1. ~~Each entrance that is used for personnel access to the high radiation area in a permanent radiographic installation shall have both visible and audible warning signals to warn persons of the presence of radiation. The visible signal shall be activated by radiation whenever the source is exposed. The audible signal shall be activated by an attempt to enter the installation while the source is exposed; and~~
2. ~~The control device or alarm system shall be tested for proper operation at the beginning of each workday the installation is used. Records of the tests shall be retained for three years from the date the record is made.~~

During each radiographic operation, a radiographer or the radiographer's assistant, as permitted by R12-1-510, shall maintain continuous direct visual surveillance of the operation to protect against unauthorized entry into a high radiation area, except at permanent radiographic installations where all entrances are locked and the licensee is in compliance with R12-1-539.

R12-1-510. ~~Operating Personnel~~ Radiographic Operations

~~Each licensee and registrant shall provide, at least, two radiographic personnel for each radiographic 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 R12-1-509(1). If one of the personnel is a radiographer's assistant, the other shall be a certified radiographer authorized by the license.~~

A. If industrial radiography is performed at a location other than a permanent radiographic installation, a licensee shall ensure that the radiographer is accompanied by at least one other radiographer or radiographer's assistant, qualified under R12-1-543. The additional radiographer or radiographer's assistant shall observe the operations and be capable of providing immediate assistance to prevent unauthorized entry. Industrial radiography is prohibited if only one qualified individual is present.

B. A licensee shall ensure that each industrial radiographic operation is conducted at a location of use authorized on the license in a permanent radiographic installation, unless another permanent location is specifically authorized by the Agency.

R12-1-511. ~~License and Registration Application for Industrial Radiography~~ Repealed

~~If a licensee has satisfied the licensing requirements in R12-1-309, the Agency shall issue a specific license or registration for industrial radiography if:~~

1. ~~The applicant has a program to provide the instruction specified in R12-1-521 for radiographers and if applicable, a program to provide instruction to enclosed radiography x-ray machine operators. The applicant shall submit to the Agency a schedule or description of the training program that specifies the:~~
   a. ~~Initial training;~~
   b. ~~Periodic training;~~
   c. ~~On-the-job training; and~~
   d. ~~Means of testing to be used by the licensee or registrant to determine a radiographer's or assistant radiographer's knowledge and understanding of, and ability to comply with, the Agency's rules and licensing requirements, and the operating and emergency procedures of the applicant.~~
2. ~~The applicant has established and submits to the Agency written operating and emergency procedures to fulfill the requirements of this Chapter.~~
3. ~~The applicant has an internal inspection program adequate to ensure that Agency rules, Agency license and registration provisions, and the applicant's operating and emergency procedures are followed by radiographers and radiographers' assistants, and enclosed radiography x-ray machine operators. The inspection program shall include internal inspections at intervals not to exceed three months and inspection record retention for two years.~~
4. ~~The applicant submits to the Agency a description of the overall organizational structure of the instruction program, including specified delegations of authority and responsibility for operation of the program.~~
5. ~~The sealed source radiographer applicant who desires to conduct leak tests has established procedures to be followed in leak testing sealed sources for possible leakage and contamination and submits to the Agency a description of the procedures including:~~
   a. ~~Instrumentation to be used;~~
   b. ~~Method of performing tests, for example, points on equipment to be smeared and method of taking smear; and~~
   c. ~~Pertinent experience of the person who will perform the test; and~~

~~6. The applicant complies with appropriate provisions of this Article and Article 3.~~

R12-1-512. Radiation Safety Officer (RSO)

~~**A.** Each licensed or registered industrial radiography operation shall have a Radiation Safety Officer. The Radiation Safety Officer (RSO) shall oversee radiation safety activities to ensure they are being performed in accordance with state statutes and rules.~~

~~**B.** The minimum qualifications, training, and experience for an industrial radiography RSO are as follows:~~

~~1. Completion of the training and testing requirements in R12-1-521;~~

~~2. Completion of one year (2000 hours) of practical experience as a qualified radiographer in industrial radiographic operations; and~~

~~3. Completion of training approved by the Agency in the establishment and maintenance of a radiation safety program.~~

~~**C.** The Agency shall consider a candidate if the candidate has training and experience in the field of ionizing radiation, differing from the training and experience in subsection (B), and has had formal training with respect to the establishment and maintenance of a radiation safety program.~~

~~**D.** An RSO shall:~~

~~1. Establish, oversee, and review all operating, emergency, and ALARA procedures as required by R12-1-407;~~

~~2. Oversee and approve all phases of the training program for radiography personnel, ensuring that appropriate and effective radiation protection practices are taught;~~

~~3. Ensure that required radiation surveys and leak tests are performed and documented in accordance with these rules and take corrective measures if levels of radiation exceed established limits;~~

~~4. Ensure that personnel monitoring devices are calibrated and used properly by occupationally-exposed personnel, that records are kept of the monitoring results, and that timely notifications are made as required by R12-1-444; and~~

~~5. Ensure that operations are conducted safely and institute corrective actions, including cessation of operations when necessary.~~

~~**E.** Licensees and registrants have six months from July 1, 2001, to meet the requirements of subsections (B) and (C).~~

A. A licensee shall have a radiation safety officer (RSO) who is responsible for implementing procedures and regulatory requirements in the daily operation of the radiation safety program.

B. Except as provided in subsection (C), the licensee shall ensure that the RSO satisfies the following minimum requirements:

1. The training and testing requirements in R12-1-543,
2. Two thousand hours of hands-on experience as a qualified radiographer for an industrial radiographic operation, and
3. Formal training in the establishment and maintenance of a radiation safety program.

C. If the licensee uses an individual in the position of RSO who does not have the training and experience required in subsection (B), the licensee shall provide the Agency with a description of the individual's training and experience in the field of ionizing radiation and training with respect to the establishment and maintenance of a radiation safety protection program so the Agency can determine whether the individual is qualified to perform under subsection (D).

D. The specific duties and authorities of the RSO include, but are not limited to:

1. Establishing and overseeing operating, emergency, and ALARA procedures as required in Article 4 of this Chapter and reviewing them every year to ensure that the procedures in use conform to current Agency rules and license conditions;
2. Overseeing and approving all phases of the training program for radiographic personnel, ensuring that appropriate and effective radiation protection practices are taught;
3. Overseeing radiation surveys, leak tests, and associated documentation to ensure that the surveys and tests are performed in accordance with the rules and taking corrective measures if levels of radiation exceed established action limits;
4. Overseeing the personnel monitoring program to ensure that devices are calibrated and used properly by occupationally exposed personnel and ensuring that records are kept of the monitoring results and timely notifications are made as required in R12-1-444; and
5. Overseeing operations to ensure that they are conducted safely and instituting corrective actions, which may include ceasing operations if necessary.

R12-1-513. ~~Repealed~~ Form of Records

A licensee shall maintain records in accordance with R12-1-405.

R12-1-515. ~~Repealed~~ Locking Radiographic Exposure Devices, Storage Containers, and Source Changers

A. Except at permanent radiographic installations governed by R12-1-539, a licensee shall ensure that each radiographic exposure device has a lock or an outer container with a lock designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The licensee shall ensue that the exposure device or its container, if applicable, is locked (and if a keyed lock, with the key removed) if the device or container is not under the direct surveillance of a radiographer or a radiographer's assistant. During radiographic operations, the radiographer or radiographer's assistant shall secure the sealed source assembly in the shielded position each time the source is returned to the shielded position.

B. A licensee shall ensure that each sealed source storage container and source changer has a lock or an outer container with a lock designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The licensee shall ensure that each storage container and source changer is locked (and if a keyed lock, with the key removed) if the storage container or source changer contains a sealed source and is not under the direct surveillance of a radiographer or a radiographer's assistant.

R12-1-516. ~~Repealed~~ Records of Receipt and Transfer of Sealed Sources

A. A licensee shall maintain records that show each receipt and transfer of a sealed source or device that uses DU for shielding and retain each record for three years after it is made.

B. The records shall contain separate entries for each transaction, including the date, name of the individual making the record, radionuclide, number of Becquerels (curies) or mass (for DU), and manufacturer, model, and serial number of each sealed source or device, as applicable.

R12-1-517. ~~Repealed~~ Posting

A licensee shall post any area in which industrial radiography is performed as required by R12-1-429. Exceptions listed in R12-1-430 do not apply to industrial radiographic operations.

R12-1-521. ~~Radiographer and Radiographer's Assistant Qualifications, Radiographer Certification, and Audits~~ Repealed

~~**A.** A licensee or registrant shall not permit any individual to act as a radiographer until the individual:~~
~~1. Has been instructed in the following subjects:~~
~~a. Fundamentals of radiation safety;~~
~~i. Characteristics of gamma, neutron, and x radiation~~
~~ii. Units of dose and activity~~
~~iii. Significance of radiation dose, radiation protection standards, and biological effects of radiation;~~
~~iv. Levels of radiation from sources of radiation~~
~~v. Methods of controlling radiation dose by minimizing working time, maximizing working distance, and use of shielding;~~
~~b. Radiation detection instrumentation to be used;~~
~~i. Use of radiation survey instruments, including their operation, calibration, and limitations;~~
~~ii. Survey techniques~~
~~iii. Use of personnel monitoring equipment, including film badges, thermoluminescent dosimeters, alarm rate meters, and direct reading dosimeters;~~
~~c. Radiographic equipment to be used;~~
~~i. Remote handling equipment~~
~~ii. Radiographic exposure devices and sealed sources~~
~~iii. Storage containers and source changers~~
~~iv. Operation and control of x-ray equipment~~
~~d. Requirements of federal regulations and state rules;~~
~~e. The licensee's or registrant's written operating and emergency procedures;~~
~~f. Case histories of radiography accidents; and~~
~~2. Has received copies of this Article, Articles 4, and 10, the license or certificate of registration, and the licensee's or registrant's operating and emergency procedures; and~~
~~3. Has demonstrated competence to use the source of radiation, related handling tools, and survey instruments which will be employed in his or her assignment; and~~
~~4. Has demonstrated understanding of the requirements in this subsection by successful completion of a written test, approved by the Agency in accordance with R12-1-511, with a score of 70% or better and a field examination with a score of 100% on the subjects covered.~~

~~**B.** The licensee or registrant shall not permit any individual to act as a radiographer's assistant until the individual:~~
~~1. Has received copies of and instructions in the licensee's or registrant's operating and emergency procedures; and~~
~~2. Has demonstrated competence to use under the personal supervision of the radiographer the sources of radiation, related handling tools, and radiation survey instruments which will be employed in the assignment; and~~
~~3. Has demonstrated understanding of the requirements in this subsection by successful completion of a written or oral test, approved by the Agency in accordance with R12-1-511, with a score of 70% or better and a field examination with a score of 100% on the subjects covered.~~

~~**C.** A licensee or registrant shall not permit an individual to act as an industrial radiographer until the individual is certified by passing the certification examination provided by the Conference of Radiation Control Program Directors (CRCPD), or any other radiographer certification examination the Agency deems equivalent. The licensee or registrant shall provide the Agency with proof of a candidate's passing score on the certification examination if the licensee or registrant is requesting that the candidate be added as an authorized user, and the proof of a passing score shall be maintained at the job site where a radiographer is performing field radiography. An uncertified individual may act as a radiographer until October 1, 2001.~~

~~After October 1, 2001, an individual is no longer authorized to use radioactive material unless the individual is certified under this subsection.~~

~~**D.** Each licensee or registrant shall retain records of training and testing which demonstrate that the requirements of this rule are met for each radiographer and radiographer's assistant.~~

~~**E.** Each licensee or registrant shall conduct an internal audit program to ensure that the rules of this Chapter, the conditions of the license, and the operating and emergency procedures are followed by each radiographer and radiographer's assistant. The audit program shall include:~~

~~1. The observation of the performance of each radiographer and radiographer's assistant during an actual radiographic operation at intervals not to exceed three months;~~

~~2. A provision that, if a radiographer or a radiographer's assistant has not participated in a radiographic operation for more than three months since the last audit, that individual's performance must be observed and recorded the next time the individual participates in a radiographic operation; and~~

~~3. The retention of inspection records on the performance of radiographers or radiographers' assistants for three years.~~

R12-1-522. Operating and Emergency Procedures

~~A licensee's or registrant's operating and emergency procedures shall include, at a minimum, the following instructions:~~

~~1. Methods used to maintain individual radiation exposure below the limits in Article 4, "Standards for Protection Against Radiation" when handling and using sources of radiation;~~

~~2. Methods and occasions for conducting radiation surveys;~~

~~3. Methods for controlling access to radiographic areas;~~

~~4. Methods and occasions for locking and securing radiographic exposure devices and storage containers;~~

~~5. Personnel monitoring and the use of personnel monitoring equipment, including steps that must be taken immediately by radiography personnel in the event a pocket dosimeter is found to be off-scale;~~

~~6. Transportation to field locations, including packing of sources of radiation and storage containers in the vehicles, posting and placarding of vehicles, and control of sources of radiation during transportation;~~

~~7. Minimizing the exposure of individuals in the event of an accident;~~

~~8. The procedure for notifying the Agency in the event of an accident;~~

~~9. Maintenance of records; and~~

~~10. The inspection and maintenance of radiographic exposure devices, storage containers, and radiation machines.~~

A. A licensee shall ensure that the operating and emergency procedures include, at a minimum, instructions in the following, as applicable:

1. Handling and use of sealed sources or radiographic exposure devices, so that persons are not exposed to radiation that exceeds the limits in Article 4 of this Chapter;
2. Methods and occasions for conducting radiation surveys;
3. Methods for controlling access to radiographic areas;
4. Methods and occasions for locking and securing radiographic exposure devices, transport and storage containers, and sealed sources;
5. Personnel monitoring and associated equipment;
6. Transportation of sealed sources to field locations, including packing radiographic exposure devices and storage containers in vehicles, placarding vehicles, and maintaining control of the sealed sources during transportation, as required in 49 CFR 171-173, 2002 edition, published October 1, 2002, by the Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408, which is incorporated by reference and on file with the Agency. This incorporation contains no future editions or amendments;
7. Inspection, maintenance, and operability checks of radiographic exposure devices, survey instruments, transport containers, and storage containers;
8. Actions to be taken immediately by radiography personnel if a pocket dosimeter is found to be off-scale or an alarm rate meter sounds an alarm;
9. Procedures for identifying and reporting defects and noncompliance, as required by R12-1-448 and R12-1-535;
10. Procedures for notifying the RSO and the Agency in the event of an accident;
11. Methods for minimizing exposure of persons in the event of an accident;
12. Procedures for recovering a source if the licensee is responsible for source recovery; and
13. Maintenance of records.

B. The licensee shall maintain copies of current operating and emergency procedures until the Agency terminates the license. Superseded procedures shall be maintained for three years after being superseded. Additionally, a copy of the procedures shall be maintained at field stations in accordance with R12-1-540.

R12-1-523. Personnel Monitoring ~~Control~~

~~**A.** A licensee or registrant shall not permit any individual to act as a radiographer or as a radiographer's assistant unless, at all times during radiographic operations, each individual wears on the trunk of the body a direct reading pocket dosimeter, a film badge or a thermoluminescent dosimeter (TLD), and an alarm rate meter at all times during radiographic opera-~~

~~tions. For permanent radiographic installations where other appropriate alarm warning devices are in routine use, the wearing of an alarm rate meter is not required.~~

~~**B.** Pocket Dosimeters:~~

~~1. Pocket dosimeters shall:~~

~~a. Meet the criteria in American National Standards Publication N13.5-1972, "Performance Specifications For Direct Reading and Indirect Reading Pocket Dosimeters for X- and Gamma Radiation," 1972 Edition, published December 9, 1971, by the American National Standards Institute, incorporated by reference and on file with the Agency and the Office of the Secretary of State. This incorporation by reference contains no future editions or amendments. The incorporated material may be purchased from the American National Standards Institute, Inc. 1430 Broadway, New York, New York, 10018.~~

~~b. Have a range of 0 to 2 millisieverts (200 mRem).~~

~~2. Pocket dosimeters shall be recharged at the start of each work shift.~~

~~3. At a minimum, pocket dosimeters shall be recharged and initial use readings recorded:~~

~~a. Immediately before checking out any source of radiation from an authorized storage location for the purpose of conducting industrial radiography operations; and~~

~~b. Before beginning radiographic operations on any subsequent calendar day (if the source of radiation has not been checked back into an authorized storage location).~~

~~4. If radiographic operations are concluded for the day, final use readings on pocket dosimeters shall be recorded and the accumulated occupational doses for that day determined and recorded.~~

~~5. If an individual's pocket dosimeter is discharged beyond its range (for example, goes "off scale"), industrial radiography operations by that individual shall be discontinued until the individual's film badge or TLD has been processed. The individual shall not return to work with sources of radiation until a determination of the individual's radiation exposure has been made.~~

~~6. Pocket dosimeters shall be checked for correct response to radiation at periods not to exceed 1 year. Acceptable dosimeters shall read within plus or minus 20% of the true radiation exposure. Records of pocket dosimeter response shall be maintained for three years after the record is made.~~

~~7. Records of pocket dosimeter readings of personnel exposure shall be maintained for two years after the record is made. If the dosimeter readings were used to determine external radiation dose (for example, no film badge or TLD exposure records exist), the records shall be maintained according to R12-1-419.~~

~~**C.** Film badges and TLDs:~~

~~1. Each film badge or TLD shall be assigned to and worn by only 1 individual.~~

~~2. Film badges and TLDs shall be replaced monthly. After replacement, each film badge or TLD shall be returned to the supplier for processing within 14 calendar days of the exchange date specified by the personnel monitoring supplier. If a film badge or TLD cannot be processed in 14 days, the circumstances resulting in the delay shall be documented and available for Agency review.~~

~~3. If a film badge or TLD is lost or damaged, the worker affected shall cease work immediately until a replacement film badge or TLD is provided and the exposure is calculated for the time period from issuance to loss or damage.~~

~~4. Records of film badge or TLD personnel monitoring shall be maintained according to R12-1-419.~~

~~**D.** Alarm rate meters:~~

~~1. Each alarm rate meter shall be tested to ensure that the audible alarm functions properly before use at the start of each work shift.~~

~~2. Each alarm rate meter shall be set to give an alarm at a preset dose rate of 5 millisieverts/hr (500 mRem/hr).~~

~~3. Each alarm rate meter shall require special means to change the preset alarm function.~~

~~4. Each alarm rate meter shall be calibrated at periods not to exceed one year for correct response to radiation. Acceptable rate meters shall give an alarm within plus or minus 20% of the true radiation dose rate.~~

~~5. Records of alarm rate meter calibration shall be maintained for two years for Agency inspection from the date the record is made.~~

A. An individual shall not act as a radiographer or a radiographer's assistant unless, at all times during radiographic operations, the individual wears, on the trunk of the body, a direct reading dosimeter, an operating alarm rate meter, and either a film badge, a TLD, or an optically stimulated luminescence (OSL) dosimeter. At permanent radiography installations where other required alarming or warning devices are in routine use, an alarm rate meter is not required.

1. A licensee shall provide pocket dosimeters that have a range from zero to 2 millisieverts (200 millirems) and ensure that the dosimeters are recharged at the start of each shift. Electronic personnel dosimeters are permitted in place of ion-chamber pocket dosimeters.
2. The licensee shall assign a film badge, TLD, or OSL dosimeter to one individual, who shall wear the assigned equipment.
3. The licensee shall replace film badges at least monthly and replace TLDs or OSL dosimeters at least quarterly.
4. After replacement, the licensee shall ensure that each film badge or TLD is processed as soon as possible.

B. A radiographer or radiographer's assistant shall record exposures noted from direct reading dosimeters, such as pocket

dosimeters or electronic personnel dosimeters, at the beginning and end of each shift.

C. A licensee shall ensure that each pocket dosimeter or electronic personnel dosimeter is checked at least yearly for correct response to radiation, and discontinue use of a dosimeter if it is not accurate within plus or minus 20% of the true radiation exposure.

D. If an individual's pocket dosimeter has an off-scale reading, or the electronic personnel dosimeter reads greater than 2 millisieverts (200 millirems), and radiation exposure cannot be ruled out as the cause, a licensee shall send the individual's film badge, TLD, or OSL dosimeter for processing within 24 hours. The licensee shall not allow the individual to work with licensed, radioactive material until the individual's radiation exposure has been determined. Using the information from the badge or dosimeter, the RSO or the RSO's designee shall calculate the affected individual's cumulative radiation exposure, as prescribed in Article 4 of this Chapter and include the results in records maintained in accordance with subsection (G).

E. If an individual's monitoring device is lost or damaged, the individual shall cease work immediately until the licensee provides a replacement film badge, TLD, or OSL dosimeter and the RSO or the RSO's designee calculates the exposure for the time period from issuance to discovery of the lost or damaged film badge, TLD, or OSL dosimeter. The licensee shall include the calculated exposure and the time period for which the film badge, TLD, or OSL dosimeter was lost or damaged in the records maintained in accordance with subsection (G).

F. For each alarm rate meter, a licensee shall ensure that:

1. At the start of a shift, the alarm functions (sounds) before using the device;
2. Each device is set to give an alarm signal at a preset dose rate of 5 mSv/hr (500 mrem/hr), with an accuracy of plus or minus 20% of the true radiation dose rate;
3. A special means is necessary to change the preset alarm function on the device; and
4. Each device is calibrated at periods that do not to exceed 12 months for correct response to radiation.

G. A licensee shall maintain the following personnel monitoring records:

1. The dosimeter reading and the yearly operability check required by subsections (B) and (C) for three years after each record is made;
2. A record of each alarm rate meter calibration for three years after the record is made;
3. Any report received from a film badge, TLD, or OSL processor until the Agency terminates the license; and
4. Any estimation of an exposure evidenced by an off-scale personnel direct-reading dosimeter or lost or damaged film badge, TLD, or OSL dosimeter until the Agency terminates the license.

R12-1-524. Supervision of ~~radiographers' assistants~~ a Radiographer's Assistant

~~If a radiographer's assistant uses radiographic exposure devices, associated equipment, or sealed sources, or conducts radiation surveys required by R12-1-533 to determine that the sealed source has returned to the shielded position after an exposure, the radiographer's assistant shall be under the personal supervision of a radiographer.~~

If a radiographer's assistant uses a radiographic exposure device, associated equipment, or a sealed source or conducts a radiation survey required by R12-1-533(B) to determine that the sealed source has returned to the shielded position after an exposure, the licensee shall ensure that the assistant is under the personal supervision of a radiographer. For purposes of this Section "personal supervision" means:

1. The radiographer is physically present at the site where the sealed source is being used,
2. The radiographer is available to give immediate assistance if required, and
3. The radiographer is able to observe the assistant's performance directly.

R12-1-525. ~~Reserved~~ Notification of Field Work

Each day radioactive material is used for industrial radiography, a licensee shall notify the Agency of any planned field radiography. The notice shall be in writing and specify the location of the field work, the name of the supervising individual at the job site, and the expected duration of the work at the job site listed in the notice. A facsimile that provides the required information is sufficient notice.

R12-1-533. Radiation Surveys ~~and Survey Records~~

~~A.~~ ~~A licensee or registrant shall provide and use at least one calibrated and operable radiation survey instrument, as described in R12-1-504, at each site where radiographic exposures are made and at each storage area when an exposure device, storage container, or sealed source is placed in storage.~~

~~B.~~ ~~A radiographer or radiographer's assistant shall conduct a survey with a radiation survey instrument after each radiographic exposure to determine that the sealed source has been returned to its shielded position. The entire circumference of the radiographic exposure device shall be surveyed. If the radiographic exposure device has a source guide tube, the survey shall include the guide tube.~~

~~C.~~ ~~A radiographer or radiographer's assistant shall conduct a radiation survey to determine the exposure levels from a sealed source if the sealed source has been returned to its shielded position and the radiographic exposure device placed in a storage area. The entire circumference of the radiographic exposure device shall be surveyed.~~

~~D.~~ ~~Records of all radiation surveys performed with a survey meter, as required in this Article, shall be retained for three years after completion of the survey, except that records of a survey to determine an individual's dose shall be retained for the~~

~~period of time specified in R12-1-418(D)(2).~~

A. A licensee shall conduct surveys with a calibrated and operable radiation survey instrument that meets the requirements of R12-1-504.

B. Using a survey instrument that complies with subsection (A), the licensee shall conduct a survey of the radiographic exposure device and the guide tube after each exposure before approaching the device or the guide tube. The survey shall be performed to determine that the sealed source is in the shielded position before the radiographer or radiographer's assistant exchanges films, repositions the exposure head, or dismantles the equipment.

C. The licensee shall conduct a survey of the radiographic exposure device with a calibrated radiation survey instrument any time the source is exchanged or the device is placed in a storage area, as defined in R12-1-102, to ensure that the sealed source is in the shielded position.

D. The licensee shall maintain a record of each exposure device survey conducted before the device is placed in storage under subsection (C), if that survey is the last one performed during the workday. Each record shall be maintained for three years after the record is made.

R12-1-534. ~~Records Required at Temporary Job Sites~~ Repealed

~~Each licensee or registrant conducting industrial radiography at a temporary job site shall maintain the following records at that site:~~

1. ~~A copy of the appropriate license or registration certificate;~~
2. ~~Operating and emergency procedures;~~
3. ~~Applicable Agency rules;~~
4. ~~Survey records required under R12-1-533 for the period of operation at the site;~~
5. ~~Daily dosimeter records for the period of operation at the site;~~
6. ~~The latest instrument calibration and leak test record for specific devices in use at the site, or instead of the instrument calibration record, a legible label detailing the calibration results affixed to the instrument by the licensed person performing the calibration; and~~
7. ~~A radiographer certification card, or other proof of certification, for each radiographer working at the temporary job site.~~

R12-1-539. ~~Reserved~~ Permanent Radiographic Installations

A. If a licensee maintains a permanent radiographic installation that does not fall within the definition of "enclosed radiography" in R12-1-102, the licensee shall ensure that each entrance, used for personnel access to the high radiation area, has either:

1. An entrance control device of the type described in R12-1-420(A)(1) that reduces the radiation level upon entry into the area, or
2. Both conspicuous visible and audible alarm signals to warn of the presence of radiation. The licensee shall ensure that the visible signal is actuated by radiation if a source is exposed and the audible signal is actuated if someone attempts to enter the installation while a source is exposed.

B. A licensee with an alarm signal shall test the alarm signal for proper operation with a radiation source each day before the installation is used for radiographic operations. The test shall include a check of both the visible and audible signals. A licensee with an entrance control device shall test the device monthly. If an entrance control device or alarm signal is operating improperly, the licensee shall immediately label the device or signal as "defective" and repair the device or signal within seven calendar days. The licensee may continue to use the facility during this seven-day period, if the licensee implements continuous surveillance requirements of R12-1-509 and uses an alarming rate meter.

C. A licensee shall maintain each record an alarm system or entrance control device test for three years after the record is made.

R12-1-540. ~~Reserved~~ Location of Documents and Records

A. A licensee shall maintain a copy of each record required by this Article and other applicable Articles of this Chapter at a location specified under R12-1-502(I).

B. A licensee shall maintain a copy of each record listed below at each field station and temporary job site;

1. The license that authorizes use of radioactive material;
2. A copy of Articles 4, 5, and 10 of this Chapter;
3. Utilization logs for each radiographic exposure device dispatched from that location, as required by R12-1-507;
4. Records of equipment problems identified in daily checks of equipment, as required by R12-1-508(A);
5. Records of alarm system and entrance control checks as required by R12-1-539;
6. Records of direct-reading dosimeters, such as pocket dosimeters and electronic personnel dosimeters as required by R12-1-523;
7. Operating and emergency procedures as required by R12-1-522;
8. A report on the most recent calibration of the radiation survey instruments in use at the site as required by R12-1-504;
9. A report on the most recent calibration of each alarm rate meter, and operability check of each pocket dosimeter and electronic personnel dosimeter as required in R12-1-523;

10. Most recent survey record as required by R12-1-533;
11. The shipping papers for the transportation of radioactive material required by 10 CFR 71.5, 2003 edition, published January 1, 2003, by the Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408, which is incorporated by reference and on file with the Agency (this incorporation contains no future editions or amendments); and
12. If operating under reciprocity in accordance with R12-1-320, a copy of the NRC or Agreement State license authorizing the use of radioactive materials.

R12-1-543. Training

A. A licensee shall not allow an individual to act as a radiographer until the individual has received training in the subjects in subsection (G), has participated in a minimum of two months of on-the-job training, and is certified through a radiographer certification program by a independent certifying organization in accordance with the criteria specified in Appendix A.
1. A licensee shall provide the Agency with proof of an individuals's certification and a written request that the individual be added to a license as a certified radiographer.
2. A licensee shall maintain proof of certification at the job site where a radiographer is performing field radiography.
3. A licensee that employs certified radiographers in Arizona shall ensure that:
   a. Each radiographer has obtained initial certification within the last five years, and
   b. An uncertified radiographer works only as a radiographer's assistant until certified.
4. A radiographer shall recertify every five years by:
   a. Taking an approved radiography certification examination in accordance with this subsection; or
   b. Providing written evidence that the radiographer is active in the practice of industrial radiography and has participated in continuing education during the previous five-year period.
5. If an individual cannot provide the written evidence required in subsection (4)(b), the individual shall retake the certification examination.
6. A radiographer shall provide the licensee with proof of certification in the form of a card issued by the certifying organization that contains:
   a. A picture of the certified radiographer,
   b. The radiographer's certification number,
   c. The date the certification expires, and
   d. The radiographer's signature.

B. A licensee shall not allow an individual to act as a radiographer until the individual:
1. Has received copies of and instruction in the requirements of this Article; applicable Sections of Articles 4 and 10 and R12-1-107; applicable DOT regulations in 10 CFR 71, January 1, 2003 edition, by the Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408, which is incorporated by reference, contains no future editions or amendments, and is on file with Agency; the Agency license or licenses under which the radiographer will perform industrial radiography; and the licensee's operating and emergency procedures;
2. Has demonstrated an understanding of the licensee's license and operating and emergency procedures by successfully completing a written or oral examination that covers the relevant material;
3. Has received training in:
   a. Use of the licensee's radiographic exposure devices and sealed sources,
   b. Daily inspection of devices and associated equipment, and
   c. Use of radiation survey instruments; and
4. Has demonstrated an understanding of the use of radiographic exposure devices, sources, survey instruments, and associated equipment described in subsection (B)(3) by successfully completing a practical examination covering this material.

C. A licensee shall not allow an individual to act as a radiographer's assistant until the individual:
1. Has received copies of and instruction in the requirements of this Article; applicable Sections of Articles 4 and 10 and R12-1-107; applicable DOT regulations in 10 CFR 71, January 1, 2003 edition, by the Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408, which is incorporated by reference, contains no future editions or amendments, and is on file with Agency; the Agency license or licenses under which the radiographer's assistant will perform industrial radiography; and the licensee's operating and emergency procedures;
2. Has developed competence to use, under the personal supervision of the radiographer, the licensee's radiographic exposure devices, sealed sources, associated equipment, and radiation survey instruments; and
3. Has demonstrated understanding of the instructions provided under subsection (C)(1) by successfully completing a written test on the subjects covered and has demonstrated competence using the hardware described in subsection (C)(2) by successfully completing a practical examination.

D. A licensee shall provide refresher safety training for each radiographer and radiographer's assistant at intervals not to exceed 12 months.

E. Unless an individual serves as both a radiographer and an RSO, the RSO or the RSO's designee shall design and imple-

ment an inspection program to examine the job performance of each radiographer and radiographer's assistant and to ensure that the Agency's rules and license requirements, and the licensee's operating and emergency procedures are followed. The inspection program shall:

1. Include observation of the performance of each radiographer and radiographer's assistant during an actual industrial radiographic operation, at intervals that do not exceed six months; and
2. If a radiographer or a radiographer's assistant has not participated in an industrial radiographic operation for more than six months, the radiographer shall demonstrate knowledge of the training requirements in subsection (B)(3) and the radiographer's assistant shall demonstrate knowledge of the training requirements of subsection (C)(2) by a practical examination before participating in a radiographic operation.

F. A licensee shall maintain records of the training required in this Section including certification documents, written and practical examinations, refresher safety training documents, and inspection documents, in accordance with subsection (I).

G. A licensee shall include the following subjects in the training required under subsection (A):

1. Fundamentals of radiation safety, including:
   a. Characteristics of gamma radiation,
   b. Units of radiation dose and quantity of radioactivity,
   c. Hazards of exposure to radiation,
   d. Levels of radiation from licensed material, and
   e. Methods of controlling radiation dose (time, distance, and shielding);
2. Radiation detection instruments, including:
   a. Use, operation, calibration, and limitations of radiation survey instruments;
   b. Survey techniques; and
   c. Use of personnel monitoring equipment;
3. Equipment topics, including:
   a. Operation and control of radiographic exposure equipment, use of remote handling equipment, and use of storage containers, using pictures or models of source assemblies (pigtails);
   b. Storage, control, and disposal of licensed material; and
   c. Inspection and maintenance of equipment;
4. The requirements of pertinent Agency rules; and
5. Case histories of accidents in radiography.

H. A licensee shall maintain records of radiographer certification in accordance with subsection (I)(1) and provide proof of certification as required in subsection (A)(1).

I. A licensee shall maintain the following records for three years after each record is made:

1. Records of training for each radiographer and each radiographer's assistant. For radiographers, the records shall include radiographer certification documents and verification of certification status. All records shall include copies of written tests, dates of oral and practical examinations, and names of individuals who conducted and took the oral and practical examinations; and
2. Records of annual refresher safety training and semi-annual inspections of job performance for each radiographer and each radiographer's assistant. The records for the annual refresher safety training shall list topics discussed during training, the date of training, and names of each instructor and attendee. For inspections of job performance, the records shall include a list of the items checked during the inspection and any non-compliance observed by the RSO.

Appendix A.

Standards for Organizations that Provide Radiography Certification

Note: For purposes of this Article an "independent certifying organization" means an organization that meets all of the criteria in this Appendix.

I. Requirements for an Organization that Provides Radiographer Certification

To qualify to provide radiographer certification an organization shall:

A. Be a society or association, with members who participate in, or have an interest in, the field of industrial radiography;

B. Not restrict membership because of race, color, religion, sex, age, national origin, or disability;

C. Have a certification program that is open to nonmembers, as well as members;

D. Be an incorporated, nationally recognized organization that is involved in setting national standards of practice within its fields of expertise;

E. Have a staff comparable to other nationally recognized organizations, a viable system for financing its operations, and a policy-and decision-making review board;

F. Have a set of written, organizational by-laws and policies that address conflicts of interest and provide a system for monitoring and enforcing the by-laws and policies;

G. Have a committee, with members who can carry out their responsibilities impartially, review and approve the certification guidelines and procedures, and advise the organization's staff in implementing the certification program;

H. Have a committee, with members who can carry out their responsibilities impartially, review complaints against certified individuals and determine sanctions;
I. Have written procedures describing all aspects of the organization's certification program;
J. Maintain records of the current status of each individual's certification and administration of the certification program;
K. Have procedures to ensure that certified individuals are provided due process with respect to administration of the certification program, including a process for becoming certified and a process for imposing sanctions against certified individuals;
L. Have procedures for proctoring examinations and qualifying proctors. The organization, through these procedures, shall ensure that an individual who proctors an examination is not employed by the same company or corporation (or a wholly-owned subsidiary of the company or corporation) that employs an examinee;
M. Exchange information about certified individuals with the Agency, other independent certifying organizations, the NRC, or Agreement States and allow periodic review of its certification program and related records; and
N. Provide a description to the Agency of its procedures for choosing examination sites and providing a favorable examination environment.

II. Requirements for a Certification Program

An independent certifying organization shall ensure that its certification program:
A. Requires an applicant for certification to:
1. Obtain training in the subjects listed in R12-1-543(G) or equivalent NRC or Agreement State regulations, and
2. Satisfactorily complete a written examination that covers these subjects;
B. Requires an applicant for certification to provide documentation demonstrating that the applicant has:
1. Received training in the subjects listed in R12-1-543(G) or equivalent NRC or Agreement State regulations;
2. Satisfactorily completed the on-the-job training required in R12-1-543(A); and
3. Received verification by an Agreement State or a NRC licensee that the applicant has demonstrated the capability of independently working as a radiographer;
C. Provides procedures that protect examination questions from disclosure;
D. Provides procedures for denying certification to an applicant and revoking, suspending, and reinstating a certificate;
E. Provides a certification period that is not less than three years or more than five years, procedures for renewing certifications and, if the procedures allow renewals without examination, a system for assessing evidence of recent full-time employment and annual refresher training; and
F. Provides a timely response to inquiries, by telephone or letter, from members of the public, about an individual's certification status.

III. Requirements for a Written Examination

An independent certifying organization shall ensure that its examination:
A. Is designed to test an individual's knowledge and understanding of the subjects listed in R12-1-543(G);
B. Is written in a multiple-choice format; and
C. Has psychometrically valid questions drawn from a question bank and based on the material in R12-1-543(G).

ARTICLE 6. USE OF X-RAYS IN THE HEALING ARTS

R12-1-612. Computerized Tomographic Systems

A. No change
1. No change
2. No change
3. No change
4. No change
5. No change
6. No change
7. No change
8. No change
9. No change
10. No change

B. No change
1. No change
2. No change

C. No change
1. No change
   a. No change
   b. No change
2. No change
   a. No change

b. No change
3. No change
   a. No change
   b. No change
   c. No change
4. No change
5. No change
6. No change
7. No change
8. No change

D. No change
1. No change
2. No change
   a. No change
   b. No change
   c. No change
   d. A current technique chart ~~containing the CT's operating parameters~~ that contains the information required in R12-1-607(D)(4)(a) for both adult and pediatric patients, ~~if~~ as applicable, is available at the CT operating console, and a procedure for determining whether a CT has been performed according to instructions of a physician.
3. No change

E. No change
1. No change
   a. No change
   b. No change
   c. No change
   d. No change
2. Is ~~included~~ followed in the evaluation of the CT's operation, ~~and~~ that the interval between tests does not exceed two months, and that system conditions are specified by the registrant's qualified expert.
3. No change
4. No change
5. No change

F. No change
1. No change
2. No change
   a. No change
   b. No change
3. No change
   a. No change
   b. No change
4. No change
   a. No change
   b. No change
5. No change

ARTICLE 7. ~~USE OF RADIONUCLIDES IN THE PRACTICE OF MEDICINE~~ MEDICAL USES OF RADIOACTIVE MATERIAL

R12-1-703. License for Medical Use of Radioactive Material

A. In addition to the requirements ~~set forth~~ in R12-1-309, the Agency shall issue a specific license for medical use of radioactive material ~~in medical institutions, which will be issued~~ if:
1. No change
2. No change
3. No change
4. No change

B. No change
1. No change
   a. No change
   b. No change
   c. No change
2. No change

a. No change
i. No change
ii. No change
iii. No change
iv. No change
b. No change
c. No change

C. No change
1. No change
a. No change
b. ~~The applicant, or any physician designated in the application as an individual~~ Each authorized user listed on the application meets the qualifications in R12-1-704;
c. All other personnel who will be involved in the preparation and use of the radioactive material ~~have adequate training and experience in the handling of radioactive material appropriate to their participation in the uses included in the group or groups~~ are qualified for their activities involving radioactive material in accordance with the statutes and rules of the Medical Radiologic Technology Board of Examiners (MRTBE);
d. No change
e. No change
2. No change
a. For Groups I, II, IV, and V, a licensee or registrant shall not receive, possess, or use radioactive material as a radiopharmaceutical unless manufactured in the form to be administered to ~~the~~ a patient, labeled, packaged, and distributed according to a specific license issued by the Agency under R12-1-311(J), a specific license issued by the U.S. Nuclear Regulatory Commission under 10 CFR 32.72, ~~2000 Edition~~ 2003 edition, published January 1, ~~2000~~ 2003, by the Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408, incorporated by reference and on file with the Agency ~~and the Office of Secretary of State~~ (This incorporation by reference contains no future editions or amendments), or a specific license issued by an Agreement State or a Licensing State under equivalent rules.
b. No change
i. No change
ii. No change
c. No change
i. No change
ii. No change
iii. No change
d. No change
3. No change
4. No change

D. In addition to the requirements ~~set forth~~ in R12-1-309, the Agency shall issue a specific license for medical use of sealed sources only if the ~~applicant or, if the application is made by a medical institution, the individual user has~~ applicant's proposed authorized users have the qualifications listed in R12-1-704.

R12-1-704. Supervision

A. No change
B. No change
C. A physician~~, having~~ who has the training and experience listed in 10 CFR 35, ~~1998 Edition~~ 2003 edition, published January 1, ~~1998~~ 2003, by the Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408, which is incorporated by reference and on file with the Agency ~~and the Office of Secretary of State~~, or a physician under the supervision of a physician ~~having~~ who has the qualifications listed above, may use radioactive material for medical purposes. This incorporation by reference contains no future editions or amendments.
D. No change
E. No change
F. Only a physician listed on a valid radioactive material license is authorized to:
1. Supervise the use of radioactive material in the practice of medicine, and
2. Sign a preceptor statement verifying the training and experience of a physician who wants to be listed as an authorized user.

R12-1-706. Radiation Safety Committee

A. A licensee subject to this Article shall have a Radiation Safety Committee if:
1. The licensee is authorized in a radioactive material license to use radioactive material under Group IV or V in Exhibit A for two or more medical purposes; or

2. The licensee is authorized in a radioactive material license to use sealed sources for two or more therapy modalities regulated under R12-1-714, R12-1-716, R12-1-717, and R12-1-718.

~~A.~~B. No change
1. No change
   a. No change
   b. No change
   c. No change
   d. No change
      i. No change
      ii. No change
      iii. No change
      iv. No change
      v. No change
      vi. No change
   e. No change
2. No change
   a. No change
   b. No change
   c. No change

R12-1-712. Sealed Sources

A. ~~Each medical and nuclear pharmacy~~ A licensee subject to this Article shall conduct a ~~quarterly~~ physical inventory every six months to account for all radioactive sealed sources received and possessed. ~~Records~~ A record of the inventories shall be maintained for three years for inspection by the Agency and shall include the quantities, kinds of radioactive material, location of sources, the date of the inventory, and signature of the person performing the inventory.

B. A licensee subject to this Article ~~shall use~~ using a radioactive sealed ~~sources~~ source for a medical ~~purposes~~ purpose, shall use it in accordance with ~~as prescribed in~~ R12-1-450(A) and (B).

R12-1-713. Dose Calibrators and Determination of Dosages

A. ~~A medical use licensee shall possess a dose calibrator and use it to measure the amount of radioactivity administered to a person and to insure that the amount given to the person is the authorized user's prescribed amount.~~ A licensee subject to this Article shall not administer to a person radioactive material in an unsealed form that has not had its radioactivity determined, using one of the methods described in subsections (C) or (D).

B. A licensee shall make and record in a patient use log the dosage determination in subsection (A) before any medical use.

C. For unit dosages, the licensee shall make the determination by:
1. Direct measurement of the radioactivity in a dose calibrator; or
2. Decay correction, based on the radioactivity or radioactivity concentration determined by a properly licensed:
   a. Manufacturer, or
   b. Nuclear pharmacy.

D. For other than unit dosages, the licensee shall make the determination by:
1. Direct measurement of the radioactivity in a dose calibrator;
2. A combination of subsection (D)(1) and applicable mathematical calculation; or
3. A combination of volumetric measurement and applicable mathematical calculation, based on a radioactivity measurement determined by a supplier listed in subsection (C)(2)(a) or (C)(2)(b).

E. The licensee shall calibrate a dose calibrator in accordance with nationally recognized standards or manufacturer's instructions.

R12-1-714. Brachytherapy

A. No change
1. No change
2. No change
3. ~~Each licensee shall conduct a quarterly physical inventory to account for all brachytherapy sources and devices containing brachytherapy sources received and possessed. Records of the inventories shall be maintained for inspection by the Agency and shall include the quantities and kinds of radioactive material, location of sources and devices, and the date of the inventory.~~
4.3. ~~Each~~ A licensee shall follow the radiation safety and handling instructions approved by the Agency, or ~~; or follow the radiation safety and handling instructions~~ furnished by the manufacturer on the label attached to the brachytherapy source, the device ~~containing a~~ that contains the brachytherapy source, or the permanent container ~~containing~~ that houses the brachytherapy source, or in the leaflet or brochure ~~which~~ that accompanies the brachytherapy source or device~~,~~; and maintain ~~these such~~ the instructions in a legible and easily accessible form. If the handling instructions, label, leaflet, or brochure is no longer available ~~or~~ and a copy cannot be obtained from the manufacturer, the licensee

shall notify the Agency that ~~the Agency shall be notified~~ the source information is no longer available.

~~5.~~4. An authorized user ~~A physician,~~ transporting a brachytherapy source or applicator ~~containing~~ that contains a brachytherapy source for ~~his or her own~~ use in the practice of medicine, shall transport the brachytherapy source or applicator according to the requirements in 12 A.A.C. 1, Article 15.

B. No change

C. No change

1. An authorized user ~~A physician~~ on a radioactive material license ~~or~~ , qualified expert, or person approved by the licensee's radiation safety officer shall measure the maximum radiation level at a distance of 1 meter (40 in.) from the patient in whom a brachytherapy ~~sources have~~ source has been inserted, using a calibrated survey instrument. This radiation level shall be entered on the patient's chart and ~~other~~ signs posted as required in subsection ~~(D)~~ (E). If the radioactive source is inserted for intravascular brachytherapy purposes for 10 seconds or less, the survey in this subsection is not required.
2. An authorized user ~~A physician~~ on a radioactive material license ~~or~~ , qualified expert, or person approved by the licensee's radiation safety officer shall measure and record the radiation level in the patient's room and the ~~surrounding area~~ adjacent patient rooms. The licensee shall maintain the record three years for Agency inspection.
3. No change

D. A qualified expert who meets the following training and experience requirements shall perform all physics procedures necessary to prepare a patient for a therapeutic application of radiation. The qualified expert shall:

1. Be certified by the American Board of Radiology in: Therapeutic Radiological Physics, Radiological Physics, Roentgen-Ray and Gamma-Ray Physics, or X-ray and Radium Physics; or the American Board of Medical Physicists in Radiation Oncology Physics; or
2. Have the following minimum training and experience:
   a. A Master's or Doctor's degree in physics, biophysics, radiological physics, or health physics;
   b. One year of full-time training in therapeutic radiological physics; and
   c. One year of full-time experience at a radiotherapy facility, including personal experience calibrating brachytherapy radiation sources and planning associated patient treatment.
3. A candidate who does not meet the ~~standards in subsections~~ standard in subsection (D)(1) ~~and~~ or (D)(2), may request a license amendment for an exemption from these training or experience requirements in accordance with A.R.S. § 30-654(B)(13). The request shall include the name of the proposed qualified expert, a description of the individual's training and experience, including information similar to that specified in subsection (D)(2), and a written endorsement, based on personal knowledge of the individual's qualifications, by a physicist certified by the American Board of Radiology in one of the specialties listed in subsection (D)(1).

E. Signs and records.

1. In addition to the requirements in R12-1-429, ~~the~~ a licensee shall mark the bed, cubicle, or room of ~~the~~ a hospital brachytherapy patient with a sign indicating the presence of brachytherapy sources. This sign shall incorporate the radiation symbol and specify the radionuclide, activity, date, and individual to contact for radiation safety instructions. The sign is not required if any of the exceptions in R12-1-430 apply.
2. No change
   a. No change
   b. No change
   c. No change
   d. No change

F. A licensee shall select a qualified expert to assist the authorized user in determining the therapeutic sealed source output.

R12-1-716. Teletherapy

A. No change

1. No change
2. No change
3. No change
4. No change
5. No change
6. No change
7. No change
   a. No change
   b. No change
8. No change
9. No change
10. No change

B. No change

C. No change

D. No change
1. The licensee's qualified expert~~, qualified by training and experience under subsection (G),~~ shall perform full calibration measurements on each teletherapy unit:
   a. No change
   b. No change
      i. No change
      ii. No change
      iii. No change
   c. No change
2. No change
   a. No change
   b. No change
   c. No change
   d. No change
   e. No change
3. No change
4. The qualified expert shall correct the exposure rate or dose rate values mathematically for cobalt-60 at intervals that do not exceed one month and for cesium-137 at intervals that do not exceed six months ~~intervals not exceeding 1 month~~.

E. No change
1. The licensee's qualified expert or other authorized agent shall perform spot check measurements on each teletherapy unit at intervals that do not ~~exceeding~~ exceed one month.
2. No change
   a. No change
   b. No change
   c. No change
   d. No change
   e. No change
3. The qualified expert shall establish spot check measurement procedures. If the qualified expert does not perform the spot check measurements, the results of the spot check measurements shall be reviewed by the qualified expert within 15 days.

F. No change
1. The licensee's qualified expert shall perform full calibration measurements using a dosimetry system that ~~has been~~ is calibrated by the ~~National Bureau of Standards~~ National Institute of Standards and Technology or by a ~~Regional Calibration Laboratory~~ regional calibration laboratory accredited by the American Association of Physicists in Medicine. The licensee shall ensure that the dosimetry system ~~shall have been~~ is calibrated ~~within the previous~~ every two years and after any servicing that may ~~have affected~~ affect system calibration.
2. No change

~~**G.** The licensee shall determine if a person is an expert, qualified by training and experience to calibrate a teletherapy unit, establish procedures for spot check measurements, and review the results of such measurements. The licensee shall determine that the qualified expert:~~
~~1. Is certified by the American Board of Radiology in: Therapeutic Radiological Physics, Radiological Physics, Roentgen-Ray and Gamma-Ray Physics, or X-ray and Radium Physics; or the American Board of Medical Physicists in Radiation Oncology Physics; or~~
~~2. Has the following minimum training and experience:~~
   ~~a. A Master's or Doctor's degree in physics, biophysics, radiological physics or health physics;~~
   ~~b. One year of full-time training in therapeutic radiological physics; and~~
   ~~c. One year of full-time experience in radiotherapy facility, including personal calibration and spot check of at least one teletherapy unit.~~
~~3. Licensees, that have their teletherapy units calibrated by persons who do not meet the criteria in subsections (1) and (2) for minimum training experience, may request a license amendment excepting them from these training requirements. The request should include the name of the proposed qualified expert, a description of the expert's training and experience, including information similar to that specified in subsection (2), reports of at least 1 calibration and 1 spot check, based on measurements personally made by the proposed qualified expert within the last 10 years, and a written endorsement of the qualified expert's qualifications by a physicist certified by the American Board of Radiology in one of the specialties listed in subsection (1), based on personal knowledge.~~

~~**H.**~~**G.** The licensee shall maintain for inspection by the Agency~~:~~ records of measurements, tests, corrective actions, and instrument calibrations made under subsections (D) and (E), and records of the licensee's evaluation of the qualified expert's training and experience under subsection ~~(G)~~ (H).

1. The licensee shall preserve records of the following for three years after completion of each full calibration:
   a. Full calibration measurements~~;~~, and
   b. Calibration of the instruments used to make the full calibration measurements.
2. The licensee shall preserve records of the following for three years after completion of each spot check:
   a. Spot check measurements and corrective actions~~;~~, and
   b. Calibration of instruments used to make spot check measurements.
3. The licensee shall preserve records of the licensee's evaluation of the qualified expert's training and experience for three years after the qualified expert's last performance of a full calibration on the licensee's teletherapy unit.

H. A licensee shall ensure that all physics procedures performed to prepare for application of radiation to a patient for therapy purposes are performed by a qualified expert who:
1. Is certified by the American Board of Radiology in Therapeutic Radiological Physics, Radiological Physics, Roentgen-Ray and Gamma-Ray Physics, or X-ray and Radium Physics or the American Board of Medical Physicists in Radiation Oncology Physics; or
2. Has the following minimum training and experience:
   a. A Master's or Doctor's degree in physics, biophysics, radiological physics, or health physics;
   b. One year of full-time training in therapeutic radiological physics; and
   c. One year of full-time experience at a radiotherapy facility, which included personal calibration of gamma stereotactic therapy system and associated patient treatment planning.
3. If an individual does not meet the standard in subsection (H)(1) or (H)(2), the licensee may request a license amendment that exempts the individual from these training requirements in accordance with A.R.S. § 30-654(B)(13). The request shall include the name of the proposed qualified expert, a description of the individual's training and experience, including information similar to that specified in subsection (H)(2), and a written endorsement based on personal knowledge of the individual's qualifications, by a physicist certified by the American Board of Radiology in one of the specialties listed in subsection (H)(1).

Exhibit A
Groups of Medical Uses of Radioactive Material

Group I.

A. No change
1. No change
2. No change
3. No change
4. No change
5. No change
6. No change
7. No change
8. No change
9. No change
10. No change
11. No change

B. No change
1. Obtained from a manufacturer or preparer licensed according to 10 CFR 32.72, ~~1998~~ 2003 ~~Edition~~ edition, published January 1, ~~1998~~ 2003, by the Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408, or equivalent Agreement State requirements. This incorporation by reference is on file with the Agency ~~and the Office of Secretary of State,~~ and contains no future editions or amendments; or
2. Prepared by a nuclear pharmacist or a physician who is an authorized user on a radioactive material license~~,~~ and meets the training and experience requirements in 10 CFR 35(Subpart J), or an individual under the supervision of an authorized user that meets the training and experience requirements in 10 CFR 35(Subpart J), ~~of either as specified in 10 CFR 35.25, 1998~~ 2003 ~~Edition~~ edition, published January 1, ~~1998~~ 2003; by the Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408, ~~both references are~~ which is incorporated by reference~~,~~ and on file with the Agency ~~and the Office of Secretary of State~~. This incorporation contains ~~These incorporations contain~~ no future editions or amendments.

Group II.

C. No change
1. No change
2. No change
3. No change
4. No change
5. No change
6. No change

7. No change
8. No change
9. No change
10. No change
11. No change
12. No change
13. No change
14. No change
15. No change

D. No change
1. No change
2. No change

Group III.

E. No change
1. No change
2. No change
3. No change
4. No change

F. No change
1. No change
2. No change

Group IV.

G. No change
1. No change
2. No change
3. No change
4. No change
5. Yttrium-90

H. No change
1. No change
2. No change

Group V.

I. No change
1. No change
2. No change

J. No change
1. No change
2. No change

ARTICLE 8. RADIATION SAFETY REQUIREMENTS FOR ANALYTICAL X-RAY OPERATIONS

R12-1-801. Scope

The rules in this Article establish requirements for the use of analytical x-ray equipment by persons registered under R12-1-204. The provisions of this Article ~~are not in substitution for~~ supplement other applicable provisions of this Chapter.

R12-1-803. ~~Enclosed Beam~~ Enclosed-beam X-ray Systems

A. No change

B. No change

C. ~~A registrant shall provide individuals performing maintenance, servicing, or alignment procedures, where bypassing of interlocks or other safety devices to gain access to the interior of the enclosure is required, with appropriate personnel monitoring devices (that is, wrist or finger badges). These individuals shall wear the devices while performing the work.~~ A person who maintains or services analytical x-ray systems, shall:
1. Obtain permission in advance from the radiation safety officer before bypassing interlocks or other safety devices,
2. Label equipment as "out of service" until maintenance or service is completed,
3. Wear extremity personnel monitoring devices, and
4. Ensure that interlocks or other safety devices are operating upon completion of maintenance or service.

~~**D.** Intentional bypassing of safety devices shall be authorized in advance by the individual responsible for radiation protection. Bypassing shall be terminated as soon as the activity described in subsection (C) is completed, or the equipment shall be labeled as out-of-service with a conspicuous sign until repairs are completed.~~

R12-1-804. ~~Open Beam~~ Open-beam X-ray Systems

A. No change
1. No change
2. No change

B. No change
1. No change
2. No change
3. No change
4. No change

C. No change

D. No change
1. No change
2. No change
3. No change

E. ~~On open-beam configurations installed after the effective date of these rules, a registrant shall equip each port on the radiation source housing with a shutter that cannot be opened unless a collimator or a coupling has been connected to the port.~~ A registrant shall use only systems constructed so that:
1. Each x-ray tube housing is equipped with an interlock that automatically shuts off the tube if the tube is removed from the radiation source housing or the housing is disassembled; and
2. With all shutters closed, radiation measured at a distance of 5 centimeters from the surface of the system is not capable of producing a dose that exceeds 25 Sv (2.5 mRem) in one hour for the specified tube rating of the x-ray tube.

~~**F.** A registrant shall equip each x-ray tube housing with an interlock that shuts off the tube if the tube is removed from the housing or if the housing is disassembled.~~

~~**G.**~~**F.** A registrant shall supply each x-ray ~~generator~~ generating system with a protective cabinet that limits leakage radiation measured at a distance of 5 cm (2 in) from the cabinet surface, so that ~~it~~ the system is not capable of producing a dose equivalent ~~in excess of~~ that exceeds 25 µSv (2.5 mrem) in one hour.

~~**H.**~~**G.** A registrant shall ensure that the local components of an analytical x-ray system are located and arranged and have sufficient shielding or access control ~~so that no~~ for the specified tube rating to prevent the radiation ~~levels exist~~ level in any area ~~surrounding~~ adjacent to the local component group ~~which could result in a dose to an individual present in the areas surrounding the local components, in excess of~~ from exceeding the dose limits in R12-1-416. ~~of this Chapter. For systems utilizing x-ray tubes, these limits shall be met at any specified tube rating.~~

~~**I.**~~**H.** A registrant shall perform a radiation survey of the local component group of each analytical x-ray system ~~sufficient~~ to demonstrate compliance with subsection ~~(H).~~ (G) upon: ~~The survey shall be performed following installation, change in configuration, or maintenance, affecting the radiation levels in the areas surrounding the local component group. Records of surveys shall be maintained for 3 years or until the analytical x-ray system is no longer used, which ever is shorter.~~
1. Installation,
2. Change in configuration, or
3. Maintenance that affects the radiation level in any area adjacent to the local component group.

I. A registrant shall maintain a record of each survey for three years or until the analytical x-ray system is no longer used, whichever period is shorter.

R12-1-805. Administrative Responsibilities

A. ~~A registrant shall designate an individual at each facility who is responsible for maintaining radiation safety. This individual, designated the Radiation Safety Officer,~~ A registrant shall designate a radiation safety officer who shall:
1. Establish and maintain operational procedures so that the radiation exposure of each worker is kept ~~as far below the maximum permissible dose as is practical~~ ALARA;
2. No change
3. No change
4. No change
5. No change
6. No change
7. No change
8. No change

B. No change
1. No change
2. No change
3. No change
4. Recognition of symptoms of acute localized radiation exposure; and
5. Proper procedure for reporting an actual or suspected exposure~~; and~~.

C. No change

R12-1-806. Operating Requirements

A. A ~~Radiation Safety Officer~~ radiation safety officer shall establish written emergency procedures ~~pertaining to radiation safety for each analytical x-ray system~~ and post the procedures in a conspicuous location. The procedures shall include the telephone number of the ~~Radiation Safety Officer~~ radiation safety officer. ~~. A registrant shall notify the Radiation Safety Officer in case of a known or suspected radiation exposure accident and arrange for medical examination for the person exposed~~

B. ~~A registrant shall provide normal operating~~ A registrant shall ensure that written operating procedures are available for ~~to~~ all analytical x-ray equipment workers. An individual shall not operate analytical x-ray equipment in any manner other than that specified in the procedures unless the individual ~~has obtained the Radiation Safety Officer's~~ obtains the radiation safety officer's written approval.

C. No change

D. No change

E. ~~The registrant shall secure unused~~ A registrant shall ensure that unused ports on radiation source housings ~~in the closed position, preventing~~ are closed and secured against unauthorized access to the radiation source.

F. No change

1. No change
2. No change

G. ~~The registrant shall test safety~~ A registrant shall ensure that each safety and warning device ~~devices and warning devices~~ is tested for proper operation at intervals ~~not to~~ that do not exceed one month~~.~~ and maintain a record of each test ~~Records of tests shall be maintained for Agency inspection~~ for three years ~~following the completion of each test~~ from the date the test is completed.

R12-1-807. Surveys

A. To ensure that personnel exposure does not result in a dose to an individual that exceeds the dose limits specified in Article 4, a registrant shall perform a radiation survey upon:

1. Installation of the equipment and at least once each year after installation;
2. Change in the initial arrangement, number, or type of local components in the system;
3. Maintenance that involves disassembly or removal of a local component in the system;
4. Maintenance that involves alignment, if alignment requires the generation of the primary x-ray beam while any local component of the system is disassembled or removed;
5. A visual inspection of the local components in the system that reveals an abnormal condition; or
6. Determination that personnel are being exposed to radiation in excess of established levels recorded in monitoring records for personnel during previous monitoring periods or the occupational dose limits specified in Article 4.

B. The radiation surveys in subsection (A) are not required if the registrant demonstrates that the local components of an analytical x-ray system are located and arranged, and have sufficient shielding or access control, to limit personnel exposure to a level that is ALARA and below the occupational dose limits in Article 4. The Agency shall determine ALARA radiation levels based on the specified x-ray tube rating.

R12-1-808. Posting

A registrant shall conspicuously post each area or room that contains analytical x-ray equipment with a sign or signs that bear the radiation symbol and the words "CAUTION - X-RAY EQUIPMENT" or words with a similar meaning.

R12-1-809. Training

A registrant shall not be allow an individual to operate or maintain analytical x-ray equipment unless the individual has received training and demonstrated competence in:

1. Identifying radiation hazards associated with use of the equipment;
2. Recognizing and using radiation warning and safety devices, including interlocks that are incorporated into the equipment, and understanding why these devices are sometimes not installed;
3. Taking precautions associated with use of the equipment;
4. Recognizing symptoms of an acute localized exposure; and
5. Following proper procedure for reporting a suspected personnel exposure.

ARTICLE 10. NOTICES, INSTRUCTIONS, AND REPORTS TO IONIZING RADIATION WORKERS; INSPECTIONS

ARTICLE 11. ~~REPEALED~~ INDUSTRIAL USES OF X-RAYS, NOT INCLUDING ANALYTICAL X-RAY SYSTEMS

R12-1-1104. ~~Repealed~~ Registration Requirements

A. The Agency shall review an application for registration of a radiation machine for use in industrial radiography and approve the registration if an applicant meets all of the following requirements:

1. The applicant satisfies the general requirements in Article 2 and any special requirements contained in this Article,

2. The applicant submits a program for training radiographer's assistants that complies with R12-1-1146, and
3. The applicant submits procedures for verifying and documenting the certification status of each radiographer and for ensuring that the certification remains valid.

B. An applicant shall submit written operating and emergency procedures, as prescribed in R12-1-1128.

C. An applicant shall submit a description of a program for review of job performance of each radiographer and radiographer's assistant at intervals that do not exceed six months, as prescribed in R12-1-1146(E).

D. An applicant shall submit a description of the applicant's overall organizational structure as it applies to radiation safety responsibilities in industrial radiography, including specified delegation of authority and responsibility.

E. An applicant shall submit and list the qualifications of each individual designated as an RSO under R12-1-1120 and indicate which designee is responsible for ensuring that the registrant's radiation safety program is implemented.

F. If an applicant intends to perform "in-house" calibrations of survey instruments, the applicant shall describe each calibration method to be used, the relevant experience of each person who will perform a calibration, and procedures to ensure that all calibrations are performed according to the procedures prescribed in R12-1-1108.

G. An applicant shall identify and describe the location of all field stations and permanent radiographic installations.

H. An applicant shall identify each location where records required by this Chapter will be maintained.

R12-1-1105. Reserved

R12-1-1106. Equipment Performance

A registrant shall ensure that each x-ray machine has a lock or other security system designed to prevent unauthorized use or accidental production of radiation and is secured against unauthorized use at all times, except when under the direct surveillance of a radiographer or radiographer's assistant.

R12-1-1107. Reserved

R12-1-1108. Radiation Survey Instruments

A. A registrant shall maintain at least two calibrated and operable radiation survey instruments at each location where sources of radiation are present to make radiation surveys required by this Article and Article 4 of this Chapter. Instrumentation required by this Section shall be capable of measuring a range from 0.02 millisieverts (2 millirems) per hour through 0.01 sievert (1 rem) per hour.

B. A registrant shall ensure that each radiation survey instrument required under subsection (A) is calibrated:
1. At intervals that do not exceed six months, and after instrument servicing, except for battery changes;
2. For linear scale instruments, at two points located approximately one-third and two-thirds of full-scale on each scale; for logarithmic scale instruments, at mid-range of each decade, and at two points of at least one decade; and for digital instruments, at 3 points between 0.02 and 10 millisieverts (2 and 1000 millirems) per hour; and
3. So that an accuracy within plus or minus 20% of the calibration source can be demonstrated at each point checked.

C. A registrant shall make a record each time a radiation survey instrument is calibrated, and maintain each record for three years after it is made.

R12-1-1109. Reserved

R12-1-1110. Quarterly Inventory

A. A registrant shall conduct a quarterly physical inventory to account for all x-ray machines received and possessed under the registration.

B. A registrant shall maintain a record of the quarterly inventory required under subsection (A) for three years after it is made.

C. The record required by subsection (B) shall include the date of the inventory, name of the individual who conducted the inventory, location of each x-ray machine, and manufacturer, model, and serial number of each x-ray machine.

R12-1-1111. Reserved

R12-1-1112. Utilization Logs

A. A registrant shall maintain for each x-ray machine a utilization log that provides all of the following information:
1. A description, including the make, model, and serial number of each x-ray machine;
2. The identity and signature of the radiographer using the machine; and
3. The plant or site where the machine is used and dates of use, including each date when the machine is removed from or returned to storage.

B. A registrant shall retain a log required by subsection (A) for three years after the log is made.

R12-1-1113. Reserved

R12-1-1114. Inspection and Maintenance of Radiation Machines, Survey Instruments, and Associated Equipment

A. A registrant shall perform visual and operability checks on survey instruments and radiation machines before use on each day the equipment is to be used to ensure that the equipment is in good working condition and required labeling is present.

Survey instrument operability checks shall be performed using check sources or other authorized means. If equipment problems are found, the registrant shall remove the equipment from service until it is repaired.

B. A registrant shall have written inspection and maintenance procedures for radiation machines and survey instruments that require inspection and maintenance, at intervals that do not exceed three months or before first use of the equipment and to ensure the proper functioning of components important to safety. Replacement components shall meet design specifications. If equipment problems are discovered, the registrant shall remove the equipment from service until the equipment is repaired.

C. A registrant shall maintain records of equipment problems found in daily checks and quarterly inspections and retain each record for three years after it is made. The record shall include the date of the check or inspection, name of the inspector, equipment involved, any problems found, and any repair or needed maintenance performed.

R12-1-1115. Reserved

R12-1-1116. Surveillance

During each radiographic operation a radiographer, or the radiographer's assistant as permitted by R12-1-1118, shall maintain continuous direct visual surveillance of the operation to protect against unauthorized entry into a high radiation area, except at permanent radiographic installations where all entrances are locked and the registrant is in compliance with R12-1-1136.

R12-1-1117. Reserved

R12-1-1118. Industrial Radiographic Operations

A. If industrial radiography is performed at a location other than a permanent radiographic installation, a registrant shall ensure that the radiographer is accompanied by at least one other radiographer or radiographer's assistant, qualified under R12-1-1146. The additional radiographer or radiographer's assistant shall observe the operations and be capable of providing immediate assistance to prevent unauthorized entry. The registrant shall not allow industrial radiography if only one qualified individual is present.

B. A registrant shall ensure that each industrial radiographic operation is conducted at a location of use authorized on the registration of a permanent radiographic installation, unless another permanent location is specifically authorized by the Agency.

R12-1-1119. Reserved

R12-1-1120. Radiation Safety Officer (RSO)

A. A registrant shall have a radiation safety officer (RSO) who is responsible for implementing procedures and regulatory requirements in the daily operation of the radiation safety program.

B. A registrant shall ensure that the RSO has satisfied the following minimum requirements:

1. The training and testing requirements in R12-1-1146;
2. Two thousand hours of hands-on experience as a qualified radiographer for an industrial radiographic operation; and
3. Formal training in the establishment and maintenance of a radiation safety program.

C. A registrant may use an individual in the position of RSO who does not have the training and experience required in subsection (B), if the registrant provides the Agency with a description of the individual's training and experience in the field of ionizing radiation and training with respect to the establishment and maintenance of a radiation safety protection program.

D. The specific duties and authorities of the RSO include, but are not limited to:

1. Establishing and overseeing operating, emergency, and ALARA procedures as required in Article 4 of this Chapter, and reviewing the procedures every year to ensure that they conform to current Agency rules and registration conditions;
2. Overseeing and approving all phases of the training program for radiographic personnel, ensuring that appropriate and effective radiation protection practices are taught;
3. Overseeing radiation surveys and associated documentation to ensure that the surveys are performed in accordance with the rules and taking corrective measures if levels of radiation exceed established action limits;
4. Overseeing the personnel monitoring program to ensure that monitoring devices are calibrated and used properly by occupationally exposed personnel and ensuring that records are kept of the monitoring results and timely notifications are made as required in R12-1-444; and
5. Overseeing operations to ensure that they are conducted safely and instituting corrective actions, which may include ceasing operations if necessary.

R12-1-1121. Reserved

R12-1-1122. Form of Records

A registrant shall maintain records in accordance with R12-1-405.

R12-1-1123. Reserved

R12-1-1124. Reserved

R12-1-1125. Reserved

R12-1-1126. Posting

A registrant shall post any area in which industrial radiography is being performed as required by R12-1-429. Exceptions listed in R12-1-430 do not apply to industrial radiographic operations.

R12-1-1127. Reserved

R12-1-1128. Operating and Emergency Procedures

A. A registrant shall have operating and emergency procedures that include, at minimum, instructions in the following, as applicable:
1. Use of radiation machines, so that persons are not exposed to radiation that exceeds the limits in Article 4 of this Chapter;
2. Methods and occasions for conducting radiation surveys;
3. Methods for controlling access to radiographic areas;
4. Methods and occasions for locking and securing a radiation machine;
5. Personnel monitoring and associated equipment;
6. Inspection, maintenance, and operability checks of a radiation machine and survey instruments;
7. Actions to be taken immediately by radiography personnel if a pocket dosimeter is found to be off-scale or an alarm rate meter sounds an alarm;
8. Procedures for identifying and reporting defects and noncompliance, as required by R12-1-448;
9. The procedure for notifying the RSO and the Agency in the event of an accident;
10. Minimizing exposure of persons in the event of an accident, and
11. Maintenance of records.

B. The registrant shall maintain copies of current operating and emergency procedures until the Agency terminates the registration. Superseded procedures shall be maintained for three years after a change is made. Additionally, records shall be maintained in accordance with R12-1-1138.

R12-1-1129. Reserved

R12-1-1130. Personnel Monitoring

A. An individual shall not act as a radiographer or a radiographer's assistant unless, at all times during radiographic operations, the individual wears, on the trunk of the body, a direct reading dosimeter, an operating alarm rate meter, and either a film badge, a TLD, or an optically stimulated luminescence (OSL) dosimeter. At permanent radiography installations where other required alarm or warning devices are in routine use, an alarm rate meter is not required.
1. A registrant shall provide pocket dosimeters that have a range from zero to 2 millisieverts (200 millirems) and ensure that the dosimeters are recharged at the start of each shift. Electronic personnel dosimeters are permitted in place of ion-chamber pocket dosimeters.
2. The registrant shall assign a film badge, TLD, or OSL dosimeter to one individual, who shall wear the assigned equipment.
3. The registrant shall replace film badges at least monthly and replace TLDs or OSL dosimeters at least quarterly.
4. After replacement, the registrant shall ensure that each film badge or TLD is processed as soon as possible.

B. A radiographer or radiographer's assistant shall record exposures noted from direct reading dosimeters, such as pocket dosimeters or electronic personnel dosimeters, at the beginning and end of each shift.

C. A registrant shall check each pocket dosimeter or electronic personnel dosimeter at least yearly for correct response to radiation, and discontinue use of a dosimeter if it is not accurate within plus or minus 20% of the true radiation exposure.

D. If an individual's pocket dosimeter has an off-scale reading, or the electronic personnel dosimeter reads greater than 2 millisieverts (200 millirems), and radiation exposure cannot be ruled out as the cause, a registrant shall send the individual's film badge, TLD, or OSL dosimeter for processing within 24 hours. The registrant shall not allow the individual to work with a radiation machine until the individual's radiation exposure is determined. Using the information from the badge or dosimeter, the RSO or the RSO's designee shall calculate the affected individual's cumulative radiation exposure, as prescribed in Article 4 of this Chapter and include the results in records maintained in accordance with subsection (G).

E. If an individual's monitoring device is lost or damaged, the individual shall cease work immediately until the registrant provides a replacement film badge, TLD, or OSL dosimeter and the RSO or the RSO's designee calculates the exposure for the time period from issuance to discovery of a lost or damaged film badge, TLD, or OSL dosimeter. The registrant shall include the calculated exposure and the time period for which the film badge, TLD, or OSL dosimeter was lost or damaged in the records maintained in accordance with subsection (G).

F. For each alarm rate meter a registrant shall ensure that:
1. At the start of a shift each individual with an alarm rate meter checks that the alarm functions (sounds) before using the device;

2. Each device is set to give an alarm signal at a preset dose rate of 5 mSv/hr (500 mrem/hr) with an accuracy of plus or minus 20% of the true radiation dose rate;
3. A special means is necessary to change the preset alarm function on the device; and
4. Each device is calibrated at periods that do not to exceed 12 months for correct response to radiation.

G. Each registrant shall maintain the following personnel monitoring records:
1. Each dosimeter reading and the yearly operability check required by subsections (B) and (C) for three years after each record is made;
2. A record of each alarm rate meter calibration for three years after the record is made;
3. Any report received from the film badge, TLD, or OSL processor. The registrant shall maintain these records until the Agency terminates the registration; and
4. Any estimation of an exposure evidenced by an off-scale personnel direct-reading dosimeter or a lost or damaged film badge, TLD, or OSL dosimeter. The records shall be maintained until the Agency terminates the registration.

R12-1-1131. Reserved

R12-1-1132. Supervision of a Radiographer's Assistant

If a radiographer's assistant uses a radiation machine or conducts a radiation survey required by R12-1-1134(B), the registrant shall ensure that the assistant is under the personal supervision of a radiographer. For purposes of this Section "personal supervision" means:
1. The radiographer is physically present at the site where the radiation machine is being used;
2. The radiographer is available to give immediate assistance if required; and
3. The radiographer is able to observe directly the assistant's performance.

R12-1-1133. Reserved

R12-1-1134. Radiation Surveys

A. A registrant shall conduct surveys with a calibrated and operable radiation survey instrument that meets the requirements of R12-1-1108.

B. A registrant shall conduct a survey of a radiographic machine any time the machine is placed in storage to ensure that the machine will not expose personnel to radiation.

C. A registrant shall maintain a record of each exposure survey conducted before a machine is placed in storage under subsection (B), if that survey is the last one performed during the workday. Each record shall be maintained for three years after it is made.

R12-1-1135. Reserved

R12-1-1136. Permanent Radiographic Installations

A. If a registrant maintains a permanent radiographic installation that does not fall within the definition of "enclosed radiography" in R12-1-102, the registrant shall ensure that each entrance used for personnel access to the high radiation area has either:
1. An entrance control device of the type described in R12-1-420(A)(1), which reduces the radiation level upon entry into the area, or
2. Both conspicuous visible and audible alarm signals to warn of the presence of radiation. The registrant shall ensure that the visible signal is actuated by radiation if the x-ray tube is energized and the audible signal is actuated if a person attempts to enter the installation while the x-ray tube is energized.

B. A registrant shall test the alarm system for proper operation with a radiation source each day before the installation is used for radiographic operations. The test shall include a check of both the visible and audible signals. The registrant shall test each device referenced in subsection (A)(1) monthly. If an entrance control device or alarm signal is operating improperly, the registrant shall immediately label the device or signal as "defective" and repair the device or signal within seven calendar days. The registrant may continue to use the facility during this seven-day period, if the registrant implements continuous surveillance requirements of R12-1-1116 and uses an alarm rate meter.

C. A registrant shall maintain each record of alarm system and entrance control device tests for three years after the record is made.

R12-1-1137. Reserved

R12-1-1138. Location of Documents and Records

A. A registrant shall maintain a copy of each record required by this Article and other applicable Articles of this Chapter at the location specified on the registration application.

B. A registrant shall maintain a copy of the following at each field station and temporary job site:
1. The registration that authorizes use of a radiation machines;
2. A copy of Articles 4, 10, and 11 of this Chapter;
3. Utilization logs for each radiation machine dispatched from that location, as required by R12-1-1112;

4. Records of equipment problems identified in daily checks of equipment, as required by R12-1-1114;
5. Records of alarm system and entrance control device checks, as required by R12-1-1136;
6. Records of direct-reading dosimeters such as pocket dosimeters and electronic personnel dosimeters, as required by R12-1-1130;
7. Operating and emergency procedures, as required by R12-1-1128;
8. A report on the most recent calibration of the radiation survey instruments in use at the site, as required by R12-1-1108;
9. A report on the most recent calibration of each alarm rate meter and operability check of each pocket dosimeter, or electronic personnel dosimeter, as required by R12-1-1130;
10. Most recent survey record, as required by R12-1-1134; and
11. If a registrant is operating in the state under R12-1-207, a copy of the out-of-state machine registration and a written authorization from the Agency to operate in the state.

R12-1-1139. Reserved

R12-1-1140. Reserved

R12-1-1141. Reserved

R12-1-1142. Reserved

R12-1-1143. Reserved

R12-1-1144. Reserved

R12-1-1145. Reserved

R12-1-1146. Training

A. A registrant shall not allow an individual to act as a radiographer until the individual has received training in the subjects in subsection (G), has participated in a minimum of two months of on-the-job training, and is certified through a radiographer certification program by a independent certifying organization in accordance with the criteria specified in Appendix A.

1. A registrant shall provide the Agency with proof of an individuals's certification upon request.
2. A registrant shall maintain proof of an individual's certification at the job site where the individual is performing field radiography.
3. A registrant that employs a certified radiographer in Arizona shall ensure that:
   a. The radiographer has obtained initial certification or recertification within the last five years; and
   b. An uncertified radiographer works only as a radiographer's assistant until certified.
4. A radiographer shall recertify every five years by:
   a. Taking an approved radiography certification examination in accordance with this subsection; or
   b. Providing written evidence that the radiographer is active in the practice of industrial radiography and has participated in continuing education during the previous five-year period.
5. If an individual cannot provide the written evidence required in subsection (4)(b), the individual shall retake the certification examination.
6. A radiographer shall provide the registrant with proof of certification in the form of a card issued by the certifying organization that contains:
   a. A picture of the certified radiographer,
   b. The radiographer's certification number,
   c. The date the certification expires, and
   d. The radiographer's signature.

B. A registrant shall not allow an individual to act as a radiographer until the individual:

1. Receives copies of and instruction in the requirements of this Article, applicable Sections of Articles 4 and 10 and R12-1-107, the Agency registration or registrations under which the individual will perform industrial radiography, and the registrant's operating and emergency procedures;
2. Demonstrates an understanding of the registrant's registration and operating and emergency procedures by successful completion of a written or oral examination that covers the relevant material;
3. Receives training in:
   a. Use of the registrant's radiation machine,
   b. Daily inspection of the radiation machine, and
   c. Use of radiation survey instruments; and
4. Demonstrates an understanding of the use of the radiation machines and survey instruments described in subsection (B)(3) by successful completion of a practical examination covering this material.

C. A registrant shall not allow an individual to act as a radiographer's assistant until the individual:

1. Receives copies of and instruction in the requirements of this Article, applicable Sections of Articles 4 and 10 and R12-1-107, the Agency registration or registrations under which the radiographer will perform industrial radiography, and the registrant's operating and emergency procedures;
2. Develops competence to use, under the personal supervision of the radiographer, the registrant's radiation machine and radiation survey instruments; and
3. Demonstrates understanding of the instructions provided under subsection (C)(1) by successfully completing a written test on the subjects covered and demonstrates competence using the hardware described in subsection (C)(2) by successfully completing a practical examination.

D. A registrant shall provide refresher safety training for each radiographer and radiographer's assistant at intervals that do not exceed 12 months.

E. Except where an individual serves both as a radiographer and an RSO, the RSO or the RSO's designee shall design and implement an inspection program to examine the job performance of each radiographer and radiographer's assistant and ensure that the Agency's rules and registration requirements, and the registrant's operating and emergency procedures, are followed. The inspection program shall:
1. Include observation of the performance of each radiographer and radiographer's assistant during an actual industrial radiographic operation, at intervals that do not exceed six months; and
2. Provide that, if a radiographer or a radiographer's assistant has not participated in an industrial radiographic operation for more than six months since the last inspection, each radiographer shall demonstrate knowledge of the training requirements in subsection (B)(3) and each radiographer's assistant shall demonstrate knowledge of the training requirements of subsection (C)(2) by a practical examination before these workers can participate in a radiographic operation.

F. A registrant shall maintain records of the training required in this Section, including certification documents, written and practical examinations, refresher safety training documents, and inspection documents, in accordance with subsection (I).

G. A registrant shall include the following subjects in the training required under subsection (A):
1. Fundamentals of radiation safety, including:
   a. Characteristics of x-ray radiation;
   b. Units of radiation dose and quantity of radioactivity;
   c. Hazards of exposure to radiation;
   d. Levels of radiation from x-ray machines; and
   e. Methods of controlling radiation dose (time, distance, and shielding);
2. Radiation detection instruments, including:
   a. Use, operation, calibration, and limitations of radiation survey instruments;
   b. Survey techniques; and
   c. Use of personnel monitoring equipment;
3. Equipment topics, including:
   a. Operation and control of radiation machines; and
   b. Inspection and maintenance of each radiation machine and survey instrument;
4. The requirements of pertinent Agency rules; and
5. Case histories of accidents in radiography.

H. A registrant shall maintain records of radiographer certification in accordance with subsection (I)(1) and provide proof of certification as required in subsection (A)(1).

I. A registrant shall maintain the following records for three years after each record is made:
1. Records of training for each radiographer and each radiographer's assistant. For radiographers, the records shall include radiographer certification documents and verification of certification status. All records shall include copies of written tests, dates of oral and practical examinations, and names of individuals who conducted and took the oral and practical examinations; and
2. Records of annual refresher safety training and semi-annual inspections of job performance for each radiographer and each radiographer's assistant. The records for the annual refresher safety training shall list topics discussed during training, the date of training, and names of each instructor and attendee. For inspections of job performance, the records shall include a list of items checked during the inspection and any non-compliance observed by the RSO.

Appendix A.

Standards for Organizations that Provide Radiography Certification

Note: For purposes of this Article an "independent certifying organization" means an organization that meets all of the criteria in this Appendix.

I. Requirements for an Organization that Provides Radiographer Certification

To qualify to provide radiographer certification an organization shall:

A. Be a society or association, with members who participate in, or have an interest in, the field of industrial radiography;
B. Not restrict membership because of race, color, religion, sex, age, national origin, or disability;
C. Have a certification program that is open to nonmembers, as well as members;
D. Be an incorporated, nationally recognized organization that is involved in setting national standards of practice within its fields of expertise;
E. Have a staff comparable to other nationally recognized organizations, a viable system for financing its operations, and a policy-and decision-making review board;
F. Have a set of written, organizational by-laws and policies that address conflicts of interest and provide a system for monitoring and enforcing the by-laws and policies;
G. Have a committee, with members who can carry out their responsibilities impartially, review and approve the certification guidelines and procedures, and advise the organization's staff in implementing the certification program;
H. Have a committee, with members who can carry out their responsibilities impartially, review complaints against certified individuals and determine sanctions;
I. Have written procedures describing all aspects of the organization's certification program;
J. Maintain records of the current status of each individual's certification and administration of the certification program;
K. Have procedures to ensure that certified individuals are provided due process with respect to administration of the certification program, including a process for becoming certified and a process for imposing sanctions against certified individuals;
L. Have procedures for proctoring examinations and qualifying proctors. The organization, through these procedures, shall ensure that an individual who proctors an examination is not employed by the same company or corporation (or a wholly-owned subsidiary of the company or corporation) that employs an examinee;
M. Exchange information about certified individuals with the Agency, other independent certifying organizations, the NRC, or Agreement States and allow periodic review of its certification program and related records; and
N. Provide a description to the Agency of its procedures for choosing examination sites and providing a favorable examination environment.

II. Requirements for a Certification Program

An independent certifying organization shall ensure that its certification program:
A. Requires an applicant for certification to:
1. Obtain training in the subjects listed in R12-1-1146(G) and
2. Satisfactorily complete a written examination that covers these subjects;
B. Requires an applicant for certification to provide documentation demonstrating that the applicant has:
1. Received training in the subjects listed in R12-1-1146(G);
2. Satisfactorily completed the on-the-job training required in R12-1-1146(A); and
3. Received verification a registrant that the applicant has demonstrated the capability of independently working as a radiographer;
C. Provides procedures that protect examination questions from disclosure;
D. Provides procedures for denying certification to an applicant and revoking, suspending, and reinstating a certificate;
E. Provides a certification period that is not less than three years or more than five years, procedures for renewing certifications and, if the procedures allow renewals without examination, a system for assessing evidence of recent full-time employment and annual refresher training; and
F. Provides a timely response to inquiries, by telephone or letter, from members of the public, about an individual's certification status.

III. Requirements for a Written Examination

An independent certifying organization shall ensure that its examination:
A. Is designed to test an individual's knowledge and understanding of the subjects listed in R12-1-1146(G) or equivalent NRC or Agreement State requirements;
B. Is written in a multiple-choice format; and
C. Has psychometrically valid questions drawn from a question bank and based on the material in R12-1-1146(G).

ARTICLE 12. ADMINISTRATIVE PROVISIONS

R12-1-1215. License and Registration Divisions
A. No change
1. No change
2. No change
3. Division III licenses and registrations:
   Class A Laser Facility
   Class A Industrial Radiofrequency Facility
   Depleted Uranium
   Gas Chromatograph

General Depleted Uranium
General Industrial
General Medical
General Veterinary Medicine
Health Physics Class B
Laboratory
Leak Detector
Limited Industrial
Medical Materials Class C
Other Ionizing Radiation Machine
Other Nonionizing Radiation Machine
Portable Gauge
Possession Only
Radioactive waste transfer-for-disposal
~~Reciprocal~~
Unclassified
Veterinary Medicine
X-ray Machine Class C

B. No change

C. ~~Out-of-state licensees issued a general license for reciprocal recognition under R12-1-321 are classified in accordance with an appropriate specific license type defined in R12-1-1302.~~ The Agency shall classify each person that possesses an out-of-state specific license for the use of radioactive material and operates in Arizona under reciprocal recognition, as prescribed in R12-1-320 and authorized in R12-1-1302(D)(16), by placing the person into the administrative sanction division listed in subsection (A) that best defines the out-of-state, licensed activities.

D. For administrative purposes, the following ~~individuals~~ persons are classified with the Division III licensees and registrants in subsection (A)(3):

1. Any ~~individual~~ person not required to register the use of a general license;
2. Any ~~individual~~ person not required to obtain a specific license;
3. Any ~~individual~~ person not required to register a source of radiation who violates the Act or 12 A.A.C. 1; and
4. Any person registered to provide x-ray machine service ~~servicing registrant~~.

ARTICLE 13. LICENSE AND REGISTRATION FEES

R12-1-1302. License and Registration Categories

A. No change

1. No change
2. No change
3. No change
4. No change

B. No change

1. No change
2. No change
3. No change
4. No change
5. No change
6. No change

C. No change

1. No change
2. No change
3. No change
4. No change
5. No change
6. No change
7. No change
8. No change
9. No change
10. No change
11. No change
12. No change
13. No change

14. No change
15. No change
16. No change
17. No change

D. No change
1. No change
   a. No change
   b. No change
2. No change
3. No change
4. No change
5. No change
6. No change
7. No change
8. No change
9. No change
10. No change
11. A low-level, radioactive waste disposal facility license is ~~1 which~~ a license that is issued for a "disposal facility," as that term is used in R12-1-439 and R12-1-442, which has a closure or long-term care plan and is constructed and operated according to the requirements in 10 CFR 61, ~~1998 Edition~~ 2003 edition, published January 1, ~~1998~~ 2003, by the Office of the Federal Register, National Archives and Records Administration, Washington, D.C. 20408, which is incorporated by reference and on file with the Agency~~ and the Office of the Secretary of State, containing~~, and contains no future editions or amendments~~; and has a closure or long-term care plan meeting the requirements of 10 CFR 61~~.
12. No change
13. No change
14. No change
15. No change
16. No change
17. No change
18. No change
19. No change

E. No change
1. No change
2. No change
3. No change
4. No change
5. No change
6. No change

F. No change
1. No change
2. No change
3. No change
4. No change
5. No change
6. No change
7. No change
8. No change
9. No change
10. No change
11. No change
12. No change

ARTICLE 17. WIRELINE SERVICE OPERATIONS AND SUBSURFACE TRACER STUDIES

R12-1-1701. ~~Reserved~~ Definitions

"Energy compensation source (ECS)" means a small sealed source, with activity that does not exceed 3.7 Mbq (100 microcuries), contained within a logging tool or other tool component.

"Tritium neutron generator target source" means a tritium source contained within a tritium neutron generator tube that produces neutrons for use in well logging applications.

R12-1-1702. ~~Written Agreement~~ Agreement with Well Owner or Operator

~~**A.** Before beginning operation of a wireline service a licensee shall enter into a written agreement with the well operator, well owner, drilling contractor, or land owner. At minimum the agreement shall contain the following provisions:~~

~~1. If a sealed source is lodged downhole each party shall:~~

~~a. Cooperate in making a reasonable effort to recover the sealed source; and~~

~~b. Unless other provision is made, bear an equal responsibility for recovery costs;~~

~~2. If in the opinion of the licensee, the recovery effort could rupture the source; the parties shall not attempt to recover the source;~~

~~3. If the job site is contaminated with radioactive material from a leaking source, the parties shall ensure that it is decontaminated before release for unrestricted use, and that equipment and personnel are decontaminated before release from the job site;~~

~~4. If the licensee determines that the sealed source should be abandoned downhole, the parties shall comply with R12-1-1751(C) and the applicable laws implemented by the Oil and Gas Conservation Commission, the Department of Water Resources, and the Department of Environmental Quality.~~

~~**B.** The licensee shall maintain a copy of the agreement at the field station during logging operations. The licensee shall retain a copy of the written agreement for three years after completion of the well logging operation.~~

A. A licensee that performs wireline service (well logging) with a sealed source shall enter into a written agreement with the employing well owner or operator that identifies the party responsible for complying with each of the following requirements. The responsible party shall:

1. Make a reasonable effort to recover any sealed source that may be lodged in the well;
2. Not attempt to recover a sealed source in a manner which, in the licensee's opinion, is likely to result in its rupture;
3. Perform the radiation monitoring required in R12-1-1723(A);
4. Decontaminate anyone or anything contaminated with licensed material before releasing personnel or equipment from the site or releasing the site for unrestricted use; and
5. If a source is classified by the Agency as irretrievable after reasonable efforts at recovery, implement the following requirements within 30 days:
   a. Immobilize the irretrievable well logging source and seal it in place with a cement plug;
   b. Provide a means to prevent inadvertent intrusion that could damage the source, unless the site is rendered inaccessible to subsequent drilling operations; and
   c. Mount a permanent identification plaque, constructed of long-lasting material, such as stainless steel, brass, bronze, or Monel, in a conspicuous location adjacent to the well. The responsible party shall ensure that the plaque size is at least 17 cm (7 inches) square and 3 mm (1/8 inch) thick and the following information is written on the plaque:
      i. The word "CAUTION,"
      ii. The radiation symbol (the color requirement in R12-1-428(A) does not apply),
      iii. The date the source was abandoned,
      iv. The name of the well owner or operator that employed the licensee;
      v. The well name and identification number or other designation,
      vi. An identification of each source by radionuclide and quantity of radionuclide,
      vii. The depth of the source and depth to the top of the plug, and
      viii. The following warning, "DO NOT RE-ENTER THIS WELL," and
   d. Notify the Oil and Gas Conservation Commission, Department of Water Resources, or Department of Environmental Quality of the abandoned source, as required by law.

B. A licensee shall maintain a copy of the agreement at the field station during logging operations. The licensee shall retain a copy of the written agreement for three years after completion of the well logging operation.

C. A licensee may apply in accordance with A.R.S. § 30-654(B)(13) for Agency approval, on a case-by-case basis, of proposed procedures to abandon an irretrievable well logging source in a manner not otherwise authorized in subsection (A)(5).

D. A written agreement between the licensee and the well owner or operator is not required if the licensee and the well owner or operator are employed by the same corporation or other business entity. If so, the licensee shall comply with the requirements in subsections (A)(1) through (A)(5).

R12-1-1704. Reserved

R12-1-1705. Reserved

R12-1-1706. Reserved

R12-1-1707. Reserved

R12-1-1708. Reserved

R12-1-1709. Reserved

R12-1-1710. Reserved

R12-1-1711. Reserved

R12-1-1715. Leak Testing of Sealed Sources

~~A licensee shall test each sealed source that contains radioactive material for leakage according to R12-1-417. Records of the leak tests shall be retained for a period of three years from the date of the test, and a copy shall accompany the source to job sites.~~

A. A licensee that uses a sealed source shall ensure that the source is tested for leakage according to subsection (C). The licensee shall maintain a record of leak test results in units of Becquerels (Bq) or microcuries, for inspection by the Agency for three years after the leak test is performed.

B. A person authorized under R12-1-417(C) shall wipe a sealed source using a leak test kit or a similar method approved by the Agency, NRC, or another Agreement State. The authorized person shall take the wipe sample from the nearest accessible point to the sealed source where contamination might accumulate, and ensure the wipe sample is analyzed for radioactive contamination. The authorized person shall use a method of analysis capable of detecting the presence of 185 Bq (0.005 microcuries) of radioactive material on the test sample.

C. Test frequency.
1. A licensee shall ensure that each sealed source (except an energy compensation source (ECS)) is tested in accordance with R12-1-417. In the absence of a certificate from a transferor that a test has been performed within six months before transfer, a licensee shall not use the sealed source until it is tested.
2. A licensee shall ensure that each ECS that is not exempt from testing under subsection (E) is tested at intervals that do not exceed three years. In the absence of a certificate from a transferor that a test has been performed within three years before transfer, a licensee shall not use the ECS until it is tested.

D. Removal of leaking source from service.
1. If a test conducted according to this Section reveals the presence of 185 Bq (0.005 microcuries) or more of removable radioactive material, a licensee shall remove the sealed source from service immediately and have it decontaminated, repaired, or disposed of by an Agency, NRC, or Agreement State licensee that is authorized to perform these functions. The licensee shall check the equipment associated with the leaking source for radioactive contamination and, if the equipment is contaminated, have it decontaminated or disposed of by an Agency, NRC, or Agreement State licensee that is authorized to perform the chosen function.
2. A licensee shall submit a report to the Agency, within five days of receiving positive test results. The report shall describe the equipment involved in the leak, the test results, any contamination that resulted from the leaking source, and each corrective action taken up to the date on the report.

E. The following sealed sources are exempt from the periodic leak test requirements in subsections (A) through (D):
1. Hydrogen-3 (tritium) sources;
2. Sources that contain licensed material with a half-life of 30 days or less;
3. Sealed sources that contain licensed material in gaseous form;
4. Sources of beta- or gamma-emitting radioactive material with an activity of 3.7 MBq [100 microcuries] or less; and
5. Sources of alpha- or neutron-emitting radioactive material with an activity of 0.37 MBq [10 microcuries] or less.

R12-1-1718. ~~Design, Performance and Certification Criteria for Sealed Sources Used in Downhole Operations~~ Design and Performance Criteria for Sealed Sources

~~**A.** Except for a sealed source that contains radioactive material in gaseous form, a licensee shall use a sealed source for downhole operations after July 14, 1989, that is certified by the manufacturer as meeting minimum criteria, specifically that each source:~~
1. ~~Is doubly encapsulated;~~
2. ~~Contains radioactive material of a chemical and physical form that is as insoluble and nondispersible as practical; and~~
3. ~~Has been individually pressure tested to at least 170 meganewtons per square meter (24,656 pounds per square inch absolute) without failure.~~

~~**B.** Except for a sealed source that contains radioactive material in gaseous form, a license shall use a sealed source only if the prototype maintains its integrity after each of the following tests:~~
1. ~~Thermal shock, generated by first holding the source at a temperature of -40 degrees Celsius ©) for 20 minutes, then holding the source at a temperature of 600 degrees C for one hour, and finally dropping the temperature from 600 degrees C to 20 degrees C in 15 seconds.~~
2. ~~Heavy impact, generated by a five kilogram steel hammer 2.5 centimeters in diameter, dropped from a height of 1 meter onto the source.~~
3. ~~Vibration, generated by varying frequency from 25 Hz to 500 Hz and maintaining an amplitude of 49 m/sec2 (5g) for 30 minutes.~~
4. ~~Focused impact, generated by a 1 gram hammer with a 0.3 centimeter diameter pin, dropped from a height of 1 meter~~

~~onto the source, so that the end of the pin strikes the source.~~

~~**C.** A licensee shall retain certification documents for a period of three years after source disposal. If the source is abandoned downhole, the licensee shall retain certification documents indefinitely.~~

A. A licensee shall use a sealed source for well logging applications if the sealed source:
1. Is doubly encapsulated;
2. Contains licensed material in a chemical and physical form that is insoluble and nondispersible; and
3. Meets the requirements of subsection (B), (C), or (D).

B. For a sealed source manufactured on or before July 14, 1989, a licensee may use a sealed source in well logging applications that meets the requirements of USASI N5.4-1968, Classification of Sealed Radioactive Sources, available from the American National Standards Institute at 25 West 43rd Street, 4th floor, New York, NY 10036, which is incorporated by reference and on file with the Agency, or the requirements in subsection (C) or (D). This incorporation by reference contains no future editions or amendments.

C. For a sealed source manufactured after July 14, 1989, a licensee may use a sealed source in well logging applications that meets the oil-well logging requirements of ANSI/HPS N43.6-1997, Sealed Radioactive Sources--Classification, available from the American National Standards Institute at 25 West 43rd Street, 4th floor, New York, NY 10036, which is incorporated by reference and on file with the Agency. This incorporation by reference contains no future editions or amendments.

D. For a sealed source manufactured after July 14, 1989, a licensee may use a sealed source in well logging applications if the sealed source's prototype has been tested and found to maintain its integrity after each of the following required tests:
1. Temperature. The test source is held at -40° C for 20 minutes and 600° C for one hour, and then subjected to a thermal shock with a temperature drop from 600° C to 20° C within 15 seconds.
2. Impact. A 5 kg steel hammer, 2.5 cm in diameter, is dropped from a height of 1 m onto the test source.
3. Vibration. The test source is subjected to vibration in the 25 Hz to 500 Hz range at 5 g amplitude for 30 minutes.
4. Puncture. A 1 gram hammer with a pin, 0.3 cm in diameter, is dropped from a height of 1 m onto the test source.
5. Pressure. The test source is subjected to an external pressure of 1.695×10^7 pascals (24,600 pounds per square inch absolute).

E. The requirements in subsections (A), (B), (C), and (D) do not apply to a sealed source that contains licensed material in gaseous form.

F. The requirements in subsections (A), (B), (C), and (D) do not apply to an energy compensation source (ECS).

R12-1-1723. Personnel Monitoring

A. ~~A licensee shall not permit any individual to act as a logging supervisor or to assist in the handling of sources of radiation unless each individual wears either a film badge or a thermoluminescent dosimeter (TLD). Each film badge or TLD shall be assigned to and worn by only one individual.~~ A licensee shall not permit an individual to act as a logging supervisor or logging assistant or assist in handling sources of radiation unless the licensee provides the individual with monitoring devices in accordance with R12-1-419.

B. ~~If necessary in order to aid in determining the extent of an individual's exposure to concentrations of radioactive material, the licensee shall provide bioassay for individuals conducting tracer studies.~~ If the level of exposure to an individual using licensed radioactive material in subsurface tracer studies exceeds exposure limits in Article 4, the licensee shall provide a bioassay for the individual.

C. The licensee shall maintain personnel ~~Personnel~~ monitoring records ~~shall be maintained in~~ according to ~~R12-1-419(C)~~ R12-1-419(E).

R12-1-1724. ~~Reserved~~ Radioactive Contamination Control

A. If a licensee detects evidence that a sealed source has ruptured or licensed materials have caused contamination, the licensee shall immediately initiate the emergency procedures required by R12-1-1722.

B. If contamination results from the use of licensed material in well logging, the licensee shall decontaminate all affected areas, equipment, and personnel.

C. During efforts to recover a source lodged in a well, the licensee shall continuously monitor, with a radiation detection instrument that complies with R12-1-1714 or a logging tool with a radiation detector, the well and any circulating fluids from the well to check for contamination resulting from damage to the source.

R12-1-1725. ~~Reserved~~ Uranium Sinker Bars

A licensee may use a uranium sinker bar for a well logging application only if it is legibly impressed with the words "Caution Radioactive-Depleted Uranium" and "Notify Civil Authorities (or company name) if Found."

R12-1-1726. ~~Reserved~~ Energy Compensation Source

A. A licensee may use an energy compensation source (ECS) in a logging tool, or other tool component, if the ECS contains a quantity of radioactive material that does not exceed 3.7 MBq (100 microcuries).

B. If used in a well with a surface casing, an ECS is subject to all Sections of this Article except R12-1-1702, R12-1-1728, and R12-1-1751.

C. If used in a well logging hole without a surface casing, an ECS is subject to all Sections of this Article.

R12-1-1727. ~~Reserved~~ Neutron Generator Source

A. A licensee may use a tritium neutron generator source to produce neutrons for well logging applications.

B. If the activity of a tritium neutron generator source does not exceed 1.11 TBq (30 Curies) and the source is used in a well with a surface casing, the source is subject to all Sections of this Article except R12-1-1702 and R12-1-1751.

C. If the activity of a neutron generator source is equal to or exceeds 1.11 TBq (30 Curies) or the source is used in a well without a surface casing, the source is subject to all Sections of this Article.

R12-1-1728. ~~Reserved~~ Use of a Sealed Source in a Well Without a Surface Casing

A licensee may use a sealed source in a well without a surface casing if the licensee follows a procedure for reducing the probability that the source will be lodged in the well. The procedure shall be separately approved by the Agency or in a license issued by the Agency, NRC, or another Agreement State.

R12-1-1729. Reserved

R12-1-1730. Reserved

R12-1-1735. Reserved

R12-1-1736. Reserved

R12-1-1737. Reserved

R12-1-1738. Reserved

R12-1-1739. Reserved

R12-1-1740. Reserved

R12-1-1744. Reserved

R12-1-1745. Reserved

R12-1-1746. Reserved

R12-1-1747. Reserved

R12-1-1748. Reserved

R12-1-1749. Reserved

R12-1-1750. Reserved

R12-1-1751. ~~Notification of Incidents, Abandonment, and Lost Sources~~ Notification of Incidents and Lost Sources; Abandonment Procedures for Irretrievable Sources

~~**A.** A licensee shall provide notice of incidents and sources lost in situations other than downhole logging operations according to Article 4 of this Chapter.~~

~~**B.** If a sealed source or device that contains radioactive material is lodged in a well hole the licensee shall notify the Agency of the planned procedures for recovery before attempting recovery and shall:~~

~~1. Monitor at the surface for the presence of radioactive contamination with a radiation survey instrument or logging tool during logging tool recovery operations; and~~

~~2. Notify the Agency immediately by telephone if radioactive contamination is detected at the surface or if the source appears to be damaged.~~

~~**C.** If it becomes apparent that efforts to recover the radioactive source will not be successful, the licensee shall:~~

~~1. Advise the well operator of the Agency rules regarding abandonment and an appropriate method of abandonment, which includes:~~

~~a. Immobilizing and sealing in place the radioactive source with a cement plug;~~

~~b. Setting a whipstock or other deflection device; and~~

~~c. Mounting a permanent identification plaque at the surface of the well that provides information required by subsection (D)~~

~~2. Notify the Agency by telephone, giving the circumstances of the loss and requesting approval of the proposed abandonment procedures; and~~

~~3. File a written report with the Agency within 30 days of the abandonment that contains the following information:~~

~~a. Date of occurrence and a brief description of attempts to recover the source;~~

~~b. A description of the radioactive source involved, including radionuclide, quantity, and chemical and physical form;~~

~~c. Surface location and identification of well;~~

~~d. Results of efforts to immobilize and set the source in place;~~
~~e. Depth of the radioactive source;~~
~~f. Depth of the top of the cement plug;~~
~~g. Depth of the well; and~~
~~h. Information contained on the permanent identification plaque.~~

~~**D.** If a sealed source that contains radioactive material is abandoned downhole, the licensee shall provide a permanent plaque for posting the well or well-bore. This plaque shall:~~
~~1. Be constructed of long-lasting material at least 7 inches square; and~~
~~2. Contain the following information engraved on its face in lettering at least 1/4 inch high:~~
~~a. The word "CAUTION" in lettering at least twice the letter size of the other information;~~
~~b. The radiation symbol without the conventional color requirement;~~
~~c. The date of abandonment;~~
~~d. The name of the well operator or well owner;~~
~~e. The well name and well identification number or numbers, or other designation;~~
~~f. The sealed source or sources by radionuclide and quantity of activity;~~
~~g. The source depth and the depth to the top of the plug; and~~
~~h. An appropriate warning, depending on the specific circumstances of each abandonment.~~

~~**E.** The licensee shall immediately notify the Agency by telephone and subsequently by confirming letter if the licensee knows or has reason to believe that radioactive material has been lost in or adjacent to an underground potable water source. The notice shall designate the well location and describe the magnitude and extent of loss of radioactive material, assess the consequences of the loss, and explain efforts planned or being taken to mitigate these consequences.~~

A. If, after making a reasonable effort to recover a sealed source or device that contains radioactive material using methods that are not likely to result in damage or rupture and contamination, a licensee determines that the source or device is lodged in a well, the licensee shall:
1. Immediately notify the Agency by telephone of the circumstances that resulted in the inability to retrieve the source and, if there is no evidence of contamination, obtain the following from the Agency:
   a. A determination that the source is irretrievable and abandonment is necessary because further efforts to recover the source are likely to result in an immediate threat to public health and safety, and
   b. An approval to implement abandonment procedures;
2. Advise the well owner or operator, as applicable, of the abandonment procedures implemented under R12-1-1702(A) and (C); and
3. Either ensure that abandonment procedures are implemented within 30 days after the Agency classifies the source as irretrievable or request an extension of time if unable to complete abandonment procedures.

B. A licensee shall immediately notify the Agency by telephone and subsequently, within 30 days, by confirmatory letter if the licensee knows or has reason to believe that a sealed source has been ruptured or the well has otherwise been contaminated. The letter shall describe the well location, the magnitude and extent of radioactive contamination, the consequences of the rupture, and the efforts planned or initiated to mitigate the consequences.

C. A licensee shall notify the Agency of the theft or loss of any radioactive material, radiation overexposure, excessive levels and concentrations of radiation, and incidents as required by R12-1-443, R12-1-444, and R12-1-445.

D. A licensee shall, within 30 days after a sealed source has been classified as irretrievable, report in writing to the Agency. The licensee shall send a copy of the report to each state or federal agency that issued permits or otherwise approved of the drilling operation. The report shall contain the following information:
1. Date of occurrence;
2. A description of the irretrievable well logging source involved, including the name of the radionuclide and its quantity, and the chemical and physical form of the radionuclide;
3. Surface location and identification of the well;
4. Results of efforts to immobilize and seal the source in place;
5. A brief description of the attempted recovery effort;
6. Depth of the source;
7. Depth of the top of the cement plug;
8. Depth of the well;
9. The reasons why further efforts to recover the source are likely to result in an immediate threat to public health and safety, necessitating abandonment;
10. Information contained on the permanent identification plaque; and
11. State and federal agencies receiving a copy of the report.