

DRAFT A 02/18/2020

DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Hazardous Materials and Waste Management Division

RADIATION CONTROL - RADIATION SAFETY REQUIREMENTS FOR INDUSTRIAL RADIOGRAPHIC OPERATIONS

6 CCR 1007-1 Part 05

[Editor's Notes follow the text of the rules at the end of this CCR Document.]

Adopted by the Board of Health on June 16, 2021; effective August 14, 2021.

PART 5: RADIATION SAFETY REQUIREMENTS FOR INDUSTRIAL RADIOGRAPHIC OPERATIONS

5.1 Purpose and Scope.

[* * * DENOTES UNAFFECTED SECTIONS/PROVISIONS IN THE DRAFT RULE]

* * *

5.1.4 Applicability.

5.1.4.1 Part 5 applies to all licensees or registrants who use sources of radiation for industrial radiography. Radiation machines and sealed radioactive sources are both covered by Part 5, except for sections which are applicable only to sealed radioactive sources.

5.1.4.2 The provisions and requirements of this part are in addition to, and not in substitution for, other requirements of these regulations. In particular, the general requirements and provisions of Parts 1, 2, 3, 4, 8, 10, 17, and 1722 apply to applicants, licensees and registrants subject to this part. Parts 3 and 17 apply to licensing and transportation of radioactive material. Part 2 applies to the registration of radiation machines. Part 5 does not apply to medical uses of x-ray sources of radiation that are governed by Parts 6 and 2420.

5.1.5 Published Material Incorporated by Reference.

~~Published material incorporated in Part 5 by reference is available in accord with 1.4.~~

5.1.5.1. Throughout this Part 5, federal regulations, state regulations, and standards or guidelines of outside organizations have been adopted and incorporated by reference. Unless a prior version of the incorporated material is otherwise specifically indicated, the materials incorporated by reference cited herein include only those versions that were in effect as of the most recent effective date of this Part 5 (August 2021), and not later amendments or editions of the incorporated material.

5.1.5.2. Materials incorporated by reference are available for public inspection, and copies (including certified copies) can be obtained at reasonable cost,

Commented [JSJ1]:

Editorial note 1: All comments (such as this one) shown in the right side margin of this draft document are for information purposes only to assist the reader in understanding the proposed rule change during the review and comment process.

These side margin notes are **not** part of the rule and all comments will be deleted prior to publication of the final rule.

Editorial note 2: Alignment and formatting corrections and minor typographical adjustments may be made in the rule and may not be specifically identified with a side margin comment.

Editorial note 3: The acronym "RATS 2020-1" refers to the U.S. Nuclear Regulatory Commission (NRC) regulatory action tracking system (RATS). This system is used to identify and summarize changes to federal regulations that may be required for adoption by an NRC agreement state. To maintain agreement state status, Colorado's radiation regulations must be compatible with federal regulations of the NRC.

Colorado statute also prescribes that the radiation control regulations must be consistent with the model regulations of the Conference of Radiation Control Program Directors, Inc. (CRCPD). The CRCPD model regulation equivalent to part 5 was last updated in 2015.

Commented [JSJ2]:

These dates reflect anticipated adoption and effective dates based on the current rulemaking schedule. Dates are subject to change pending additional review, approvals, and department rulemaking and Board of Health schedules.

Commented [JSJ3]: This provision amended to incorporate the requirements of Part 22 related to radioactive materials security, and to update a reference due to a prior change in rule numbering.

Commented [JSJ4]:

This section amended for consistency with the Colorado Administrative Procedure Act (24-4-103(12.5)(a)(2), CRS).

during normal business hours from the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division, 4300 Cherry Creek Drive South, Denver, Colorado 80246. Additionally, <https://www.colorado.gov/cdphe/radregs> identifies where the incorporated materials are available to the public on the internet at no cost. Due to copyright restrictions certain materials incorporated in this Part are available for public inspection at the state publications depository and distribution center.

5.1.5.3. Availability from Source Agencies or Organizations.

- (1) All federal agency regulations incorporated by reference herein are available at no cost in the online edition of the Code of Federal Regulations (CFR) hosted by the U.S. Government Printing Office, online at www.govinfo.gov.
- (2) All state regulations incorporated by reference herein are available at no cost in the online edition of the Code of Colorado Regulations (CCR) hosted by the Colorado Secretary of State's Office, online at <https://www.sos.state.co.us/CCR/RegisterHome.do>.
- (3) Copies of the standards or guidelines of outside organizations are available at no cost or for purchase from the source organizations below.
 - (a) American National Standards Institute, Inc.
25 West 43rd Street
New York, New York 10036
Phone (212) 642-4900
ansi.org

5.2 Definitions.

As used in this part, these terms have the definitions set forth as follows:

* * *

"Certifiable cabinet x-ray system" means an existing uncertified x-ray system that has been modified to meet the certification requirements specified in 21 CFR **Part** 1020.40 ~~(April 1, 2009)~~.

"Certified cabinet x-ray system" means an x-ray system that has been certified in accordance with 21 CFR **Part** 1010.2 ~~(April 1, 2009)~~, as being manufactured and assembled pursuant to the provisions of 21 **Part** CFR 1020.40 ~~(April 1, 2009)~~.

* * *

5.3 Exemptions.

5.3.1 ~~Uses of certified and certifiable cabinet x-ray systems are exempt from the requirements of Part 5 except for the following:~~ **Certified and certifiable cabinet x-ray systems are exempt from the requirements of Part 5, but shall follow the requirements of Part 8.**

5.3.1.1 ~~For certified and certifiable cabinet x-ray systems, including those designed to allow admittance of individuals:~~

Commented [JSJ5]:
Provision is updated, parallel with the proposed changes to Part 8. Instead of listing the requirements applicable to cabinet x-ray systems in Part 5, the requirements of Part 8 are applied.

~~(1) No registrant shall permit any individual to operate a cabinet x-ray system until the individual has received a copy of and instruction in the operating procedures for the unit and has demonstrated competence in its use. Records that demonstrate compliance with this subparagraph shall be maintained for Department inspection until disposal is authorized by the Department.~~

Commented [JSJ6]:

The requirements for training that are applicable to cabinet x-ray systems are addressed in the proposed Part 8, Section 8.3.3, and 8.4.11.

~~(2) Tests for proper operation of interlocks must be conducted and recorded at intervals not to exceed six months. Records of these tests shall be maintained for Department inspection until disposal is authorized by the Department.~~

Commented [JSJ7]:

The requirements for testing of interlocks and other safety devices at 6 month intervals and that are applicable to cabinet x-ray systems are addressed in the proposed Part 8, Section 8.4.10.

~~(3) The registrant shall perform an evaluation of the radiation exposure to determine compliance with 4.14.1 and 4.14.3, and 21 CFR 1020.40 (April 1, 2004) (Cabinet X-Ray Systems, 39 Federal Register 12986, April 10, 1974), at intervals not to exceed one year. Records of these evaluations shall be maintained for Department inspection for two years after the evaluation.~~

Commented [JSJ8]:

The requirements for surveys that are applicable to cabinet x-ray systems are addressed in the proposed Part 8, Section 8.2 (cabinet radiography definition), Section 8.4.5, and 8.5.

~~5.3.1.2 Certified cabinet x-ray systems shall be maintained in compliance with 21 CFR 1020.40 (April 1, 2004) (Cabinet X-Ray Systems, 39 Federal Register 12986, April 10, 1974), and no modification shall be made to the system unless prior Department approval has been granted.~~

Commented [JSJ9]:

Section 8.4 of the proposed Part 8, requires cabinet x-ray systems to meet the requirements of 21 CFR 1020.40. Additionally, under the exemption section of Part 8 (Section 8.3.5), modifications to the device would require Department approval.

5.3.21 Industrial uses of hand-held light intensified imaging devices are exempt from the requirements of this Part if the dose rate 45 cm (18 inches) from the source of radiation to any individual does not exceed 0.02 millisievert (2 millirem) per hour. When this dose rate limit is exceeded, such devices shall meet the applicable requirements of this part and the licensing or registration requirements of Part 2 or Part 3, or Part 8 as applicable.

* * *

5.7 Limits on External Radiation Levels From Storage Containers and Source Changers.

The maximum exposure rate limits for storage containers and source changers are 2 millisievert (200 mrem) per hour at any exterior surface, and 0.1 millisievert (10 mrem) per hour at 1 meter from any exterior surface with the sealed source in the shielded position.

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* * *

5.10 Leak Testing and Replacement of Sealed Sources.

Commented [JSJ11]:

Section 5.10 is formatted for alignment of text. No changes to the actual regulatory requirements are being proposed.

5.10.1 The replacement of any sealed source fastened to or contained in a radiographic exposure device and the leak testing of any sealed source must be performed by persons authorized to do so by the Department, the Nuclear Regulatory Commission, or another Agreement State.

5.10.2 The opening, repair, or modification of any sealed source must be performed by persons specifically authorized to do so by the Department, the Nuclear Regulatory Commission, or another Agreement State.

118 5.10.3 Testing and recordkeeping requirements.

119 5.10.3.1 Each licensee who uses a sealed source shall have the source tested for
120 leakage at intervals not to exceed 6 months. The leak testing of the source must
121 be performed using a method approved by the Department, the Nuclear
122 Regulatory Commission, or by another Agreement State. The wipe sample
123 should be taken from the nearest accessible point to the sealed source where
124 contamination might accumulate. The wipe sample must be analyzed for
125 radioactive contamination. The analysis must be capable of detecting the
126 presence of 185 becquerel (0.005 μ Ci) of radioactive material on the test sample
127 and must be performed by a person specifically authorized by the Department,
128 the Nuclear Regulatory Commission, or another Agreement State to perform the
129 analysis.

130 5.10.3.2 The licensee shall maintain records of the leak tests in accordance with 5.27.

131 5.10.3.3 Unless a sealed source is accompanied by a certificate from the transferor that
132 shows that it has been leak tested within 6 months before the transfer, it may not
133 be used by the licensee until tested for leakage. Sealed sources that are in
134 storage and not in use do not require leak testing, but must be tested before use
135 or transfer to another person if the interval of storage exceeds 6 months.

136 5.10.4 Any test conducted pursuant to 5.10.2 and 5.10.3 that reveals the presence of 185 becquerel
137 (0.005 μ Ci) or more of removable radioactive material must be considered evidence that the
138 sealed source is leaking. The licensee shall immediately withdraw the equipment involved from
139 use and shall have it decontaminated and repaired or disposed of in accordance with Department
140 regulations. A report must be filed with the Department within 5 days of any test with results that
141 exceed the threshold in this paragraph, describing the equipment involved, the test results, and
142 the corrective action taken.

143 5.10.5 Each exposure device using depleted uranium (DU) shielding and an "S" tube configuration must
144 be tested for DU contamination at intervals not to exceed 12 months.

145 5.10.5.1 The analysis must be capable of detecting the presence of 185 becquerel (0.005
146 μ Ci) of radioactive material on the test sample and must be performed by a
147 person specifically authorized by the Department, the Nuclear Regulatory
148 Commission, or another Agreement State to perform the analysis.

149 5.10.5.2 Should such testing reveal the presence of DU contamination, the exposure
150 device must be removed from use until an evaluation of the wear of the S-tube
151 has been made.

152 5.10.5.3 Should the evaluation reveal that the S-tube is worn through, the device may not
153 be used again. DU shielded devices do not have to be tested for DU
154 contamination while not in use and in storage.

155 5.10.5.4 Before using or transferring such a device, however, the device must be tested
156 for DU contamination, if the interval of storage exceeds 12 months.

157 5.10.5.5 A record of the DU leak-test must be made in accordance with 5.27.

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* * *

5.13 Permanent Radiographic Installations.

5.13.1 Each entrance that is used for personnel access to the high radiation area in a permanent radiographic installation must have either.

5.13.1.1 An entrance control of the type described in **Part 4, Section 4.19** of these regulations that causes the radiation level upon entry into the area to be reduced; or

* * *

5.14 Labeling, Storage, and Transportation.

5.14.1 The licensee may not use a source changer or a container to store radioactive material unless the source changer or the storage container has securely attached to it a durable, legible, and clearly visible label bearing the standard trefoil radiation caution symbol conventional colors, i.e., magenta, purple or black on a yellow background, having a minimum diameter of 25 mm, and the wording:

CAUTION*

RADIOACTIVE MATERIAL

NOTIFY CIVIL AUTHORITIES [or "NAME OF COMPANY"]

*or "DANGER"

* * *

5.20 Personnel Monitoring.

5.20.1 The licensee or registrant ~~shall~~**may** not permit any individual to act as a radiographer or a radiographer's assistant unless, at all times during radiographic operations, each individual wears, on the trunk of the body, a direct reading dosimeter, an operating alarming ratemeter, and a personnel dosimeter. ~~that is processed and evaluated by an accredited National Voluntary Laboratory Accreditation Program (NVLAP) processor.~~ At permanent radiography installations where other appropriate alarming or warning devices are in routine use, or during radiographic operations using radiation machines, the wearing of an alarming ratemeter is not required.

5.20.1.1 Pocket dosimeters must have a range from zero to 2 millisievert (200 mrem) and must be recharged at the start of each shift. Electronic personal dosimeters may only be used in place of ion-chamber pocket dosimeters.

5.20.1.2 Each personnel dosimeter must be assigned to and worn by only one individual.

5.20.1.3 Film badges must be ~~exchanged at periods not to exceed one month~~**replaced at least monthly** and **all** other personnel dosimeters ~~processed and evaluated by an accredited NVLAP processor~~ must be replaced ~~at periods not to exceed three months~~**quarterly**.

Commented [JSJ12]:
5.14.1 is formatted for alignment of text. No changes to regulatory requirements are proposed.

Commented [JSJ13]: The provisions of 5.20 are revised for consistency with 2020 amendments to [10 CFR Part 34.47](#).

NRC amended this federal rule to authorize the use of modern individual monitoring devices for industrial radiography operations. In the past, NRC has required the use of personnel dosimetry that is processed and evaluated by an accredited National Voluntary Laboratory Accreditation Program (NVLAP) processor. Some new dosimetry devices do not require the type of processing envisioned in the text of the current rule and may instead be read directly by internet-enabled computers, smartphones, and tablets. The design of these newer devices (rather than the qualifications of the processor) allow for collection of accurate dose information. The proposed rule is rephrased to allow the use of individual monitoring devices that do not require NVLAP processing.

Section 5.20 is also formatted for alignment of text.

NRC [RATS 2020-1](#)
NRC Compatibility "C"

- 196 5.20.1.4 ~~After replacement, each personnel dosimeter must be processed as soon as~~
197 ~~possible. All personnel dosimeters must be evaluated at least quarterly or~~
198 ~~promptly after replacement whichever is more frequent.~~
- 199 5.20.2 Direct reading dosimeters, such as pocket dosimeters or electronic personal dosimeters, must be
200 read and the exposures recorded at the beginning and end of each shift, and records must be
201 maintained in accordance with 5.34.
- 202 5.20.3 Pocket dosimeters, or electronic personal dosimeters, must be checked at periods not to exceed
203 12 months for correct response to radiation, and records must be maintained in accordance with
204 5.34. Acceptable dosimeters must read within plus or minus 20 percent of the true radiation
205 exposure.
- 206 5.20.4 If an individual's pocket dosimeter indicates a reading off-scale or if the electronic personal
207 dosimeter reading exceeds 2 millisievert (200 mrem), and the possibility of radiation exposure
208 cannot be ruled out as the cause, the individual's personnel dosimeter must be sent for
209 processing within 24 hours.
- 210 5.20.4.1 In addition, the individual may not resume work associated with use of sources of
211 radiation until a determination of the individual's radiation exposure has been
212 made. This determination must be made by the radiation safety officer or the
213 radiation safety officer's designee.
- 214 5.20.4.1 The results of this determination must be included in the records maintained in
215 accordance with 5.34.
- 216 5.20.5 If the personnel dosimeter that is required by 5.20.1 is lost or damaged, the worker shall cease
217 work immediately until a replacement personnel dosimeter meeting the requirements of 5.20.1 is
218 provided and the exposure is calculated for the time period from issuance to loss or damage of
219 the personnel dosimeter. The results of the calculated exposure and the time period for which the
220 personnel dosimeter was lost or damaged must be included in the records maintained in
221 accordance with 5.34.
- 222 ~~5.20.6 Reports received from the accredited NVLAP personnel dosimeter processor Dosimetry results~~
223 ~~must be retained in accordance with 5.34.~~
- 224 5.20.7 Each alarming ratemeter must:
- 225 5.20.7.1 Be checked to ensure that the alarm functions properly before using at the start
226 of each shift;
- 227 5.20.7.2 Be set to give an audible alarm signal at a preset dose rate of 5 millisievert (500
228 mrem) per hour; with an accuracy of plus or minus 20 percent of the true
229 radiation dose rate;
- 230 5.20.7.3 Require special means to change the preset alarm function; and
- 231 5.20.7.4 Be calibrated at periods not to exceed 12 months for correct response to
232 radiation. The licensee shall maintain records of alarming ratemeter calibrations
233 in accordance with 5.34.
- 234 **5.21 Radiation Surveys.**
- 235 5.21.1 The licensee or registrant shall:

Commented [JSJ14]:
Provision is updated for consistency with the language of [10 CFR Part 34.47\(f\)](#).

Commented [JSJ15]:
Section 5.21 is formatted for alignment.
No changes to regulatory requirements are being proposed.

- 236 5.21.1.1 Conduct all surveys with a calibrated and operable radiation survey instrument
237 that meets the requirements of 5.9;
- 238 5.21.1.2 Conduct a survey of the radiographic exposure device and the guide tube after
239 each exposure when approaching the device or the guide tube.
- 240 (1) The survey must determine that the sealed source has returned to its shielded
241 position before exchanging films, repositioning the exposure head, or dismantling
242 equipment.
- 243 (2) Radiation machines shall be surveyed after each exposure to determine that the
244 machine is off;
- 245 5.21.1.3 Conduct a survey of the radiographic exposure device whenever the source is
246 exchanged and whenever a radiographic exposure device is placed in a storage
247 area as defined in 5.35.2, to ensure that the sealed source is in its shielded
248 position; and
- 249 5.21.1.4 Maintain records in accordance with 5.35.
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- 251 * * *
- 252
- 253 **5.27 Records of Leak Testing of Sealed Sources and Devices Containing DU.**
- 254 5.27.1 Each licensee shall maintain records of leak test results for sealed sources and for devices
255 containing DU.
- 256 5.27.1.1 The results must be stated in units of becquerel (microcurie).
- 257 5.27.1.2 The licensee shall retain each record for 3 years after it is made or until the
258 source in storage is removed.
- 259
- 260 * * *
- 261 **5.29 Utilization Logs.**
- 262 5.29.1 Each licensee or registrant shall maintain utilization logs showing for each source of radiation the
263 following information:
- 264 5.29.1.1 A description, including the make, model, and serial number of the radiation
265 machine or the radiographic exposure device, transport, or storage container in
266 which the sealed source is located;
- 267 5.29.1.2 The identity and signature of the radiographer to whom assigned;
- 268 5.29.1.3 The location and dates of use, including the dates removed and returned to
269 storage; and

Commented [JSJ16]:
Correction of cross-reference error.

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Section 5.27 is formatted for alignment of text.
No changes to regulatory requirements are being proposed.

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Section 5.29 is formatted for alignment of text.
No changes to regulatory requirements are being proposed.

270 5.29.1.4 For permanent radiographic installations, the dates each radiation machine is
271 energized.

272 5.29.2 The licensee or registrant shall retain the logs required by 5.29.1 for 3 years.

273

274 * * *

275 **5.32 Records of Training and Certification.**

276 5.32.1 Each licensee or registrant shall maintain the following records for 3 years:

277 5.32.1.1 Records of training of each radiographer and each radiographer's assistant.

278 (1) The record must include radiographer certification documents and verification of
279 certification status, copies of written tests, dates of oral and practical
280 examinations, the names of individuals conducting and receiving the oral and
281 practical examinations, and a list of items tested and the results of the oral and
282 practical examinations; and

283 5.32.2.1 Records of annual refresher safety training and semi-annual inspections of job
284 performance for each radiographer and each radiographer's assistant.

285 (1) The records must list the topics discussed during the refresher safety training,
286 the dates the annual refresher safety training was conducted, and names of the
287 instructors and attendees.

288 (2) For inspections of job performance, the records must also include a list showing
289 the items checked and any noncompliance observed by the radiation safety
290 officer or designee.

291 * * *

292 **5.34 Records of Personnel Monitoring.**

293 Each licensee or registrant shall maintain the following exposure records specified in 5.20:

294 5.34.1 Direct reading dosimeter readings and yearly operability checks required by 5.20.2 and 5.20.3 for
295 3 years after the record is made;

296 5.34.2 Records of alarming ratemeter calibrations for 3 years after the record is made;

297 ~~5.34.3~~ Personnel dosimeter results ~~received from the accredited NVLAP processor~~ until the Department
298 terminates the license or registration; and

299 5.34.4 Records of estimates of exposures as a result of off-scale personal direct reading dosimeters, or
300 lost or damaged personnel dosimeters, until the Department terminates the license or
301 registration.

302 * * *

303 **5.37 Location of Documents and Records.**

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Section 5.32 is formatted for alignment of text.
No changes to regulatory requirements are being proposed.

Commented [JSJ20]:
Provision is updated for consistency with the language of [10 CFR Part 34.83\(c\)](#). See prior side-margin comment pertaining to Section 5.20 for additional information.

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Section 5.37 is formatted for alignment of text.
No changes to regulatory requirements are being proposed.

- 304 5.37.1 Each licensee or registrant shall maintain copies of records required by this Part and other
305 applicable Parts of these regulations at the location specified in 5.4.11.
- 306 5.37.2 Each licensee or registrant shall also maintain current copies of the following documents and
307 records sufficient to demonstrate compliance at each applicable field station and each temporary
308 jobsite;
- 309 5.37.2.1 The license or registration authorizing use of sources of radiation;
- 310 5.37.2.2 A copy of Parts 1, 4, 5 and 10 of these regulations;
- 311 5.37.2.3 Utilization logs for each source of radiation dispatched from that location as
312 required by 5.29;
- 313 5.37.2.4 Records of equipment problems identified in daily checks of equipment as
314 required by 5.30.1;
- 315 5.37.2.5 Records of alarm system and entrance control checks required by 5.31, if
316 applicable;
- 317 5.37.2.6 Records of dosimeter readings as required by 5.34;
- 318 5.37.2.7 Operating and emergency procedures as required by 5.33;
- 319 5.37.2.8 Evidence of the latest calibration of the radiation survey instruments in use at the
320 site, as required by 5.26;
- 321 5.37.2.9 Evidence of the latest calibrations of alarming ratemeters and operability checks
322 of dosimeters as required by 5.34;
- 323 5.37.2.10 Survey records as required by 5.35 and 4.42 of these regulations as applicable,
324 for the period of operation at the site;
- 325 5.37.2.11 The shipping papers for the transportation of radioactive materials required by
326 Part 17 of these regulations; and
- 327 5.37.2.12 When operating under reciprocity pursuant to Part 3 of these regulations, a copy
328 of the applicable State license or registration, or Nuclear Regulatory Commission
329 license authorizing use of sources of radiation.

330 **NOTIFICATIONS**

331 **5.38 Notifications.**

- 332 5.38.1 In addition to the reporting requirements specified in 4.52 of these regulations, each licensee or
333 registrant shall provide a written report to the Department within 30 days of the occurrence of any
334 of the following incidents involving radiographic equipment:
- 335 5.38.1.1 Unintentional disconnection of the source assembly from the control cable;
- 336 5.38.1.2 Inability to retract the source assembly to its fully shielded position and secure it
337 in this position;
- 338 5.38.1.3 Failure of any component, which is critical to safe operation of the device, to
339 properly perform its intended function; or

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Section 5.38 is formatted for alignment of text.
No changes to regulatory requirements are being proposed.

- 340 5.38.1.4 An indicator on a radiation machine fails to show that radiation is being produced,
341 an exposure switch fails to terminate production of radiation when turned to the
342 off position, or a safety interlock fails to terminate x-ray production.
- 343 5.38.2 The licensee or registrant shall include the following information in each report submitted under
344 5.38.1, and in each report of overexposure submitted under 4.53.2 of these regulations which
345 involves failure of safety components of radiography equipment:
- 346 5.38.2.1 Description of the equipment problem;
- 347 5.38.2.2 Cause of each incident, if known;
- 348 5.38.2.3 Name of the manufacturer and model number of equipment involved in the
349 incident;
- 350 5.38.2.4 Place, date, and time of the incident;
- 351 5.38.2.5 Actions taken to establish normal operations;
- 352 5.38.2.6 Corrective actions taken or planned to prevent recurrence; and
- 353 5.38.2.7 Names and qualifications of personnel involved in the incident.
- 354 5.38.3 Any licensee or registrant conducting radiographic operations or storing sources of radiation at
355 any location not listed on the license or registration for a period in excess of 90 days in a calendar
356 year, shall notify the Department prior to exceeding the 90 days.
- 357 **5.39 Specific Requirements for Personnel Performing Industrial Radiography.**
- 358 5.39.1 At a job site, the following shall be supplied by the licensee or registrant:
- 359 5.39.1.1 At least one operable, calibrated survey instrument for each exposure device or
360 radiation machine in use;
- 361 5.39.1.2 A current whole body personnel dosimeter (OSL dosimeter, TLD or film badge)
362 for each person performing radiographic operations;
- 363 5.39.1.3 An operable, calibrated pocket dosimeter with a range of zero to 2 millisievert
364 (200 milliroentgen) for each person performing radiographic operations;
- 365 5.39.1.4 An operable, calibrated, alarming ratemeter for each person performing
366 radiographic operations using a radiographic exposure device; and
- 367 5.39.1.5 The appropriate barrier ropes and signs.
- 368 5.39.2 Each radiographer at a job site shall have on their person a valid certification identification card
369 issued by a certifying entity.
- 370 5.39.3 Industrial radiographic operations shall not be performed if any of the items in 5.39.1 and 5.39.2
371 are not available at the job site or are inoperable.
- 372 5.39.4 During an inspection, the Department may terminate an operation if any of the items in 5.39.1 and
373 5.39.2 are not available or operable, or if the required number of radiographic personnel are not
374 present.

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Section 5.39 is formatted for alignment of text.
No changes to regulatory requirements are being proposed.

375 5.39.4.1 Operations shall not be resumed until all required conditions are met.
376

PART 5, APPENDIX 5A: CERTIFICATION

5A.1 Requirements for an Independent Certifying Organization.

An independent certifying organization shall:

5A.1.1 Be an organization such as a society or association, whose members participate in, or have an interest in, the field of industrial radiography;

5A.1.2 Make its membership available to the general public nationwide. Membership shall not be restricted because of race, color, religion, sex, age, national origin or disability;

5A.1.3 Have a certification program open to nonmembers, as well as members;

5A.1.4 Be an incorporated, nationally recognized organization that is involved in setting national standards of practice within its fields of expertise;

5A.1.5 Have an adequate staff, a viable system for financing its operations, and a policy and decision-making review board;

5A.1.6 Have a set of written organizational by-laws and policies that provide adequate assurance of lack of conflict of interest and a system for monitoring and enforcing those by-laws and policies;

5A.1.7 Have a committee, whose members can carry out their responsibilities impartially, to review and approve the certification guidelines and procedures, and to advise the organization's staff in implementing the certification program;

5A.1.8 Have a committee, whose members can carry out their responsibilities impartially, to review complaints against certified individuals and to determine appropriate sanctions;

5A.1.9 Have written procedures describing all aspects of its certification program and maintain records of the current status of each individual's certification and the administration of its certification program;

5A.1.10 Have procedures to ensure that certified individuals are provided due process with respect to the administration of its certification program, including the process of becoming certified and any sanctions imposed against certified individuals;

5A.1.11 Have procedures for proctoring examinations, including qualifications for proctors. These procedures must ensure that the individuals proctoring each examination are not employed by the same company or corporation (or a wholly-owned subsidiary of such company or corporation) as any of the examinees;

5A.1.12 Exchange information about certified individuals with the Nuclear Regulatory Commission and other independent certifying organizations and/or Agreement States and allow periodic review of its certification program and related records; and

5A.1.13 Provide a description to the Nuclear Regulatory Commission of its procedures for choosing examination sites and for providing an appropriate examination environment.

5A.2 Requirements for Certification Programs.

All certification programs must:

Commented [JSJ24]:

Prior to final publication, insert a page break at the top of appendix 5A.

All Appendices of Part 5 are formatted for text alignment purposes. No changes to regulatory requirements are being proposed.

- 413 5A.2.1 Require applicants for certification to
- 414 (1) Receive training in the topics set forth in Appendix 5C, Section 5C.2, or equivalent State
415 or Nuclear Regulatory Commission regulations, and
- 416 (2) Satisfactorily complete a written examination covering these topics;
- 417 5A.2.2 Require applicants for certification to provide documentation that demonstrates that the applicant
418 has:
- 419 (1) Received training in the topics set forth in Appendix 5C, Section 5C.2 or equivalent State
420 or Nuclear Regulatory Commission regulations;
- 421 (2) Satisfactorily completed a minimum period of on-the-job training as specified in Appendix
422 5C, Section 5C.2.4; and
- 423 (3) Received verification by a State licensee or registrant or a Nuclear Regulatory
424 Commission licensee that the applicant has demonstrated the capability of independently
425 working as a radiographer.
- 426 5A.2.3 Include procedures to ensure that all examination questions are protected from disclosure;
- 427 5A.2.4 Include procedures for denying an application and revoking, suspending, and reinstating a
428 certification;
- 429 5A.2.5 Provide a certification period of not less than 3 years nor more than 5 years;
- 430 5A.2.6 Include procedures for renewing certifications and, if the procedures allow renewals without
431 examination, require evidence of recent full-time employment and annual refresher training; and
- 432 5A.2.7 Provide a timely response to inquiries, by telephone or letter, from members of the public, about
433 an individual's certification status.
- 434 **5A.3 Requirements for Written Examinations**
- 435 All examinations must:
- 436 5A.3.1 Be designed to test an individual's knowledge and understanding of the topics listed in Appendix
437 5C, Section 5C.2 or equivalent State or Nuclear Regulatory Commission requirements;
- 438 5A.3.2 Be written in a multiple-choice format;
- 439 5A.3.3 Have test items drawn from a question bank containing psychometrically valid questions based
440 on the material in Appendix 5C, Section 5C.2.
441

**PART 5, APPENDIX 5B: INDUSTRIAL RADIOGRAPHY RADIATION SAFETY OFFICER ADEQUATE
RADIATION SAFETY TRAINING AND EXPERIENCE**

The licensee or registrant shall not permit any individual to act as a radiation safety officer for industrial radiography unless and until the individual:

5B.1 Has provided evidence of valid certification (valid identification) through a radiographer certification program by a certifying organization in accordance with the criteria specified in Appendix 5A;

and

5B.2 Has provided evidence of having:

5B.2.1 Satisfactorily completed 40 hours of training including each of the following:

(1) Fundamentals of radiation safety including:

- (a) Characteristics of gamma and x-radiation;
- (b) Units of radiation dose and quantity of radioactivity;
- (c) Hazards of exposure to radiation;
- (d) Levels of radiation from sources of radiation;
- (e) Methods of controlling radiation dose (time, distance, and shielding); and

(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; and

(3) Equipment to be used including:

- (a) Operation and control of radiographic exposure equipment, remote handling equipment, and storage containers, including pictures or models of source assemblies (pigtailed);
- (b) Operation and control of radiation machines;
- (c) Storage, control, and disposal of sources of radiation; and
- (d) Inspection and maintenance of equipment; and

(4) The requirements of pertinent state and federal regulations; and

(5) Case histories of accidents in radiography; and

5B.2.2 Successfully completed a written or oral examination after having received copies of and instruction in the:

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All Appendices of Part 5 are formatted for text alignment purposes. No changes to regulatory requirements are being proposed.

- 473 (1) Requirements of Part 5;
- 474 (2) Requirements of applicable sections of Parts 4, 10 and 17;
- 475 (3) License or registration under which the radiographer will perform industrial radiography;
476 and
- 477 (4) Licensee's or registrant's operating and emergency procedures; and
- 478 5B.2.3 Successfully completed a practical examination which demonstrates understanding of the use of
479 the equipment after receiving training in the:
- 480 (1) Use of the registrant's radiation machines; or
- 481 (2) Use of the licensee's radiographic exposure devices and sealed sources;
- 482 (3) Daily inspection of devices and associated equipment; and
- 483 (4) Use of radiation survey instruments; and
- 484 5B.2.4 Completed hands on and on the job training in the performance of industrial radiography,
485 including at least 2000 hours of hands on experience, as defined in 5.2, as a qualified
486 radiographer in industrial radiographic operations. The on the job training shall include a minimum
487 of:
- 488 (1) 320 hours (2 months) of on the job active participation utilizing radioactive material; and /
489 or
- 490 (2) 160 hours (1 month) of on the job active participation utilizing radiation machines; or
- 491 (3) 480 hours (3 months) of on the job training for individuals utilizing both radioactive
492 materials and radiation machines; and
- 493 5B.2.5 Completed formal training in the establishment and maintenance of a radiation protection
494 program;
- 495 or
- 496 **5B.3 Has demonstrated to the Department an acceptable alternative to 5B.2 when the individual**
497 **has appropriate training and experience in the field of ionizing radiation, and, in addition,**
498 **has adequate formal training with respect to the establishment and maintenance of a**
499 **radiation safety protection program for industrial radiography;**
- 500 and
- 501 **5B.4 Has provided evidence of annual refresher safety training, as defined in 5.2, at intervals**
502 **not to exceed 12 months.**
503

**PART 5, APPENDIX 5C: INDUSTRIAL RADIOGRAPHER ADEQUATE RADIATION SAFETY
TRAINING AND EXPERIENCE**

The licensee or registrant shall not permit any individual to act as a radiographer unless and until the individual:

5C.1 Has provided evidence of valid certification (valid identification) through a radiographer certification program by a certifying organization in accordance with the criteria specified in Appendix 5A;

and

5C.2 Has provided evidence of having:

5C.2.1 Satisfactorily completed 40 hours of training including each of the following:

(1) Fundamentals of radiation safety including:

- (a) Characteristics of gamma and x-radiation;
- (b) Units of radiation dose and quantity of radioactivity;
- (c) Hazards of exposure to radiation;
- (d) Levels of radiation from sources of radiation;
- (e) Methods of controlling radiation dose (time, distance, and shielding); and

(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; and

(3) Equipment to be used including:

- (a) Operation and control of radiographic exposure equipment, remote handling equipment, and storage containers, including pictures or models of source assemblies (pigtailed);
- (b) Operation and control of radiation machines;
- (c) Storage, control, and disposal of sources of radiation; and
- (d) Inspection and maintenance of equipment; and

(4) The requirements of pertinent state and federal regulations; and

(5) Case histories of accidents in radiography; and

5C.2.2 Successfully completed a written or oral examination after having received copies of and instruction in the:

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- 535 (1) Requirements of Part 5;
- 536 (2) Requirements of applicable sections of Parts 4, 10 and 17;
- 537 (3) License or registration under which the radiographer will perform industrial radiography;
538 and
- 539 (4) Licensee's or registrant's operating and emergency procedures; and
- 540 5C.2.3 Successfully completed a practical examination which demonstrates understanding of the use of
541 the equipment after receiving training in the:
- 542 (1) Use of the registrant's radiation machines; or
- 543 (2) Use of the licensee's radiographic exposure devices and sealed sources;
- 544 (3) Daily inspection of devices and associated equipment; and
- 545 (4) Use of radiation survey instruments; and
- 546 5C.2.4 Completed hands on and on the job training in the performance of industrial radiography,
547 including hands on experience, as defined in 5.2, as a qualified radiographer in industrial
548 radiographic operations. The on the job training shall include a minimum of:
- 549 (1) 320 hours (2 months) of on the job active participation utilizing radioactive material; and /
550 or
- 551 (2) 160 hours (1 month) of on the job active participation utilizing radiation machines; or
- 552 (3) 480 hours (3 months) of on the job training for individuals utilizing both radioactive
553 materials and radiation machines;
- 554 or
- 555 **5C.3 Has demonstrated to the Department an acceptable alternative to 5C.2 when the individual**
556 **has appropriate training and experience in the field of ionizing radiation, and, in addition,**
557 **has adequate formal training with respect to radiation protection for industrial**
558 **radiography;**
- 559 and
- 560 **5C.4 Has provided evidence of annual refresher safety training, as defined in 5.2, at intervals**
561 **not to exceed 12 months.**
562

**PART 5, APPENDIX 5D: INDUSTRIAL RADIOGRAPHER'S ASSISTANT ADEQUATE RADIATION
SAFETY TRAINING AND EXPERIENCE**

The licensee or registrant shall not permit any individual to act as a radiographer's assistant unless and until the individual has:

5D.1 Received initial radiation safety training;

and

5D.2 Has provided evidence of having:

5D.2.1 Successfully completed a written examination after having received copies of and instruction in the:

- (1) Requirements of Part 5;
- (2) Requirements of applicable sections of Parts 4, 10 and 17;
- (3) License or registration under which the radiographer will perform industrial radiography; and
- (4) Licensee's or registrant's operating and emergency procedures; and

5D.2.2 Successfully completed a practical examination under the personal supervision of a radiographer which demonstrates understanding of the use of the equipment after receiving training in the:

- (1) Use of the registrant's radiation machines; or
- (2) Use of the licensee's radiographic exposure devices and sealed sources;
- (3) Daily inspection of devices and associated equipment; and
- (4) Use of radiation survey instruments; and

or

5D.3 Has demonstrated to the Department an acceptable alternative to 5D.2 when the individual has appropriate training and experience in the field of ionizing radiation, and, in addition, has adequate formal training with respect to radiation protection for industrial radiography;

and

5D.4 Has provided evidence of annual refresher safety training, as defined in 5.2, at intervals not to exceed 12 months.

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