

TITLE 32: ENERGY
CHAPTER II: ILLINOIS EMERGENCY MANAGEMENT AGENCY
SUBCHAPTER b: RADIATION PROTECTION

PART 350
RADIATION SAFETY REQUIREMENTS FOR
INDUSTRIAL RADIOGRAPHIC OPERATIONS

SUBPART A: GENERAL PROVISIONS

Section	
350.10	Purpose
350.20	Scope
350.25	Incorporations by Reference
350.30	Definitions
350.40	Exemptions
350.50	Receipt, Transfer and Disposal of Sources of Radiation
350.60	Form and Location of Records

SUBPART B: EQUIPMENT CONTROL

Section	
350.1000	Requirements for Radiography Equipment Using Radiographic Exposure Devices
350.1005	Requirements for Radiography Equipment Using Radiation Machines
350.1010	Limits on Levels of Radiation for Radiographic Exposure Devices, Source Changers and Transport Containers
350.1020	Locking of Sources of Radiation
350.1030	Storage Precautions
350.1040	Radiation Survey Instruments
350.1050	Testing for Leakage or Contamination, Repair, Tagging, Opening, Modification and Replacement of Sealed Sources
350.1060	Quarterly Inventory
350.1070	Utilization Logs
350.1080	Inspection and Maintenance
350.1090	Permanent Radiographic Installations

SUBPART C: PERSONAL RADIATION SAFETY REQUIREMENTS FOR
RADIOGRAPHERS AND RADIOGRAPHER TRAINEES

Section	
350.2010	Training and Testing
350.2020	Operating and Emergency Procedures
350.2030	Personnel Monitoring Control
350.2040	Supervision of Radiographer Trainees

SUBPART D: PRECAUTIONARY PROCEDURES IN RADIOGRAPHIC OPERATIONS

Section	
350.3010	Access Control and Security
350.3020	Posting
350.3030	Radiation Surveys and Survey Records
350.3040	Records Required at Temporary Job Sites
350.3045	Operating Requirements
350.3048	Notification of Incidents
350.3050	Special Requirements and Exemptions for Enclosed Radiography Systems
350.3060	Special Requirements and Exemptions for Enclosed Radiography Systems, other than those Described in Section 350.3050 that are Designed to Allow Admittance of Individuals (Repealed)
350.3070	Special Requirements and Exemptions for Certified and Non-Certified Cabinet X-Ray Systems Designed to Exclude Individuals (Repealed)
350.3080	Special Requirements for Mobile or Portable Radiation Machines (Repealed)
350.3090	Special Requirements for Underwater and Lay-Barge Radiography
350.4000	Prohibitions
350.4010	Licensing and Registration Requirements for Industrial Radiographic Operations
350.4020	Radiation Safety Officer
350.4030	Reciprocity
350.APPENDIX A	Subjects to be Covered During the Instruction of Radiographers (Repealed)
350.APPENDIX B	General Requirements for Inspection of Industrial Radiographic Equipment
350.APPENDIX C	Retention Requirements for Records

AUTHORITY: Implementing and authorized by Section 10 of the Radiation Protection Act of 1990 [420 ILCS 40/10].

SOURCE: Filed and effective April 20, 1974, by the Department of Public Health; transferred to the Department of Nuclear Safety by P.A. 81-1516, effective December 3, 1980; codified at 7 Ill. Reg. 14744; recodified at 10 Ill. Reg. 11265; amended at 10 Ill. Reg. 17287, effective September 25, 1986; amended at 13 Ill. Reg. 13592, effective August 11, 1989; amended at 18 Ill. Reg. 7263, effective May 2, 1994; expedited correction at 18 Ill. Reg. 10943, effective May 2, 1994; amended at 19 Ill. Reg. 8250, effective June 12, 1995; amended at 19 Ill. Reg. 16591, effective November 27, 1995; emergency amendment at 22 Ill. Reg. 21101, effective November 17, 1998, for a maximum of 150 days; amended at 23 Ill. Reg. 2900, effective February 25, 1999; recodified from the Department of Nuclear Safety to the Illinois Emergency Management Agency at 27 Ill. Reg. 13641; amended at 28 Ill. Reg. 12598, effective October 1, 2004; amended at 30 Ill. Reg. 9167, effective April 28, 2006; amended at 39 Ill. Reg. 9935, effective July 1, 2015.

SUBPART A: GENERAL PROVISIONS

Section 350.10 Purpose

This Part establishes radiation safety requirements for persons using sources of radiation for industrial radiography. The requirements of this Part are in addition to, and not in substitution for, other applicable requirements of 32 Ill. Adm. Code: Chapter II, Subchapters b and d.

(Source: Amended at 18 Ill. Reg. 7263, effective May 2, 1994)

Section 350.20 Scope

This Part shall apply to all licensees or registrants who use sources of radiation for industrial radiography. Except when the requirements of this Part are clearly applicable only to sealed radioactive sources, or to radiation machines, the requirements of this Part apply to both sealed radioactive sources and radiation machines used for performing industrial radiography procedures. Section 350.3050 of this Part contains special requirements for enclosed radiography and cabinet x-ray systems. Section 350.3090 of this Part contains special requirements for underwater and lay-barge radiography. Nothing in this Part shall apply to the use of sources of radiation in the healing arts. Each licensee and registrant is responsible for ensuring that persons performing activities under a license or certificate of registration comply with 32 Ill. Adm. Code: Chapter II, Subchapters b and d, license conditions, if any, and orders of the Agency.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.25 Incorporations by Reference

- a) All rules, standards and guidelines of agencies of the United States or nationally recognized organizations or associations that are incorporated by reference in this Part are incorporated as of the date specified in the reference and do not include any later amendments or editions. Copies of these rules, standards and guidelines that have been incorporated by reference are available for public inspection and copying at the Illinois Emergency Management Agency, 1035 Outer Park Drive, Springfield, Illinois.
- b) In addition, copies of ANSI standards may be obtained directly from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 and from the American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018.

(Source: Amended at 30 Ill. Reg. 9167, effective April 28, 2006)

Section 350.30 Definitions

As used in this Part, the following definitions apply:

"Agency" means the Illinois Emergency Management Agency.

"ALARA" means as low as is reasonably achievable as defined in 32 Ill. Adm. Code 310.20.

"Annual refresher safety training" means a review conducted or provided by the licensee or registrant for its employees on radiation safety aspects of industrial radiography.

"Associated equipment" means equipment used in conjunction with a radiographic exposure device to make radiographic exposures where the equipment drives, guides, or comes into contact with the source (e.g., guide tube, control tube, control device cable, removable source stop, "J" tube and collimator when it is used as an exposure head).

"Cabinet radiography" means industrial radiography conducted in an enclosure or cabinet so shielded that doses to individual members of the public at every location on the exterior meet the limitations specified in 32 Ill. Adm. Code 340.310(a).

"Cabinet x-ray system" means an x-ray system with the x-ray tube installed in an enclosure which, independent of existing architectural structures except the floor on which it may be placed, is intended to contain at least that portion of a material being irradiated, provide radiation attenuation and exclude personnel from its interior during generation of x radiation. Included are all x-ray systems designed primarily for the inspection of carry-on baggage at airline, railroad and bus terminals and in similar facilities. An x-ray tube used within a shielded part of a building or x-ray equipment which may temporarily or occasionally incorporate portable shielding is not considered a cabinet x-ray system.

"Certifying entity" means an independent certifying organization meeting the requirements in Appendix A of 10 CFR 34 or an Agreement State meeting the requirements in Appendix A, Parts II and III of 10 CFR 34.

"Collimator" means a radiation shield of lead or other heavy metal which is placed on the end of a guide tube or directly onto a radiographic exposure device to restrict the size and shape of the radiation beam when the sealed source is moved into position to make a radiographic exposure.

"Control cable" or "Drive cable" means the cable that is connected to the source assembly and used to drive the source to and from the exposure location.

"Control drive mechanism" means a device that enables the source assembly to be moved to and from the exposure device.

"Control tube" means a protective sheath for guiding the control cable. The control tube connects the control drive mechanism to the radiographic exposure device.

"Drive cable" (see "Control cable").

"Enclosed radiography" means industrial radiography conducted in an enclosed cabinet or room and includes cabinet radiography and shielded-room radiography.

"Exposure head" or "Source stop" means a device that locates the gamma radiography sealed source in the selected working position.

"Field examination" or "Practical examination" means a demonstration through practical application of the safety rules and principles of industrial radiography, including use of all appropriate equipment and procedures.

"GED" means general equivalency diploma.

"Guide tube" or "Projection sheath" means a flexible or rigid tube (i.e., "J" tube) for guiding the source assembly and the attached control cable from the exposure device to the exposure head. The guide tube may also include the connections necessary for attachment to the exposure device and to the exposure head.

"Hands-on experience" means experience in all of those areas considered to be directly involved in the radiography process, and includes taking radiographs, calibration of survey instruments, operational and performance testing of survey instruments and devices, film development, posting of radiation areas, transportation of radiography equipment, posting of records and radiation area surveillance, etc., as applicable. Excessive time spent in only one or two of these areas, such as film development or radiation area surveillance, should not be counted toward the 2 years of experience required for a radiation safety officer in Section 350.4020(b)(3) of this Part or the experience for a radiographer as required by 32 Ill. Adm. Code 405.80.

"Independent certifying organization" means an independent organization that meets all the criteria of Appendix A of 10 CFR 34.

"Industrial radiography" or "radiography" means an examination of the structure of materials by non-destructive methods, utilizing ionizing radiation to make radiographic images.

"Lay-barge radiography" means industrial radiography performed on any water vessel used for laying pipe.

"Lixiscope" means a portable light-intensified imaging device using a sealed source.

"Lock-out survey" means a radiation survey performed to determine that a sealed source is in its shielded position. The lock-out survey is performed before

moving the radiographic exposure device or source changer to a new location. The lock-out survey is also performed when securing the radiographic exposure device or source changer against unauthorized removal.

"Permanent radiographic installation" means an installation or structure designed or intended for radiography and in which radiography is regularly performed.

"Permanent use or storage location" means a location listed on a radioactive material license or a certificate of registration where sources of radiation are used or stored.

"Personal supervision" means the provision of guidance and instruction to a radiographer trainee by a radiographer who is:

physically present at the site;

in visual contact with the radiographer trainee while the trainee is using sources of radiation; and

in such proximity that immediate assistance can be given if required.

"Pigtail" (see "Source assembly").

"Pill" (see "Sealed source").

"Projection sheath" (see "Guide tube").

"Radiation safety officer" means an individual who is both designated as a radiation safety officer in accordance with Section 350.4020 of this Part and who meets the requirements of Section 350.4020 of this Part and 32 Ill. Adm. Code 310.20.

"Radiographer" means any individual who performs or personally supervises industrial radiographic operations. Radiographers shall meet the requirements of Section 350.2010(a) of this Part and shall comply with the requirements of 32 Ill. Adm. Code: Chapter II, Subchapters b and d, all license conditions, if any, and orders of the Agency.

"Radiographer certification" means written approval, received from the Agency in accordance with 32 Ill. Adm. Code 405, stating that an individual has satisfactorily met certain established radiation safety and experience criteria.

"Radiographer trainee" means any individual who uses sources of radiation and related handling tool or radiation survey instruments under the personal supervision of a radiographer. Radiographer trainees shall meet the requirements of Section 350.2010(b) of this Part and shall comply with the requirements of 32

Ill. Adm. Code: Chapter II, Subchapters b and d, all license conditions, if any, and orders of the Agency.

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

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

"Radiography" (see "Industrial radiography").

"S-tube" means a tube through which the radioactive source travels when inside a radiographic exposure device.

"Sealed source" or "Pill" means any capsule or matrix as defined in 32 Ill. Adm. Code 310.20.

"Shielded position" means the location within the radiographic exposure device or storage container which, by manufacturer's design, is the proper location for storage of the sealed source.

"Shielded-room radiography" means industrial radiography conducted in a room so shielded that doses to individual members of the public at every location on the exterior meet the limitations as specified in 32 Ill. Adm. Code 340.310(a) (i.e., bay, bunker, cell).

"Source assembly" or "Pigtail" means an assembly that consists of the sealed source and a connector that attaches the source to the control cable. The source assembly may also include a stop ball used to secure the source in the shielded position.

"Source changer" means a device designed and used for replacement of sealed sources in radiographic exposure devices, including those source changers also used for transporting and storage of sealed sources.

"Storage container" means the structure in which sealed sources are secured and stored at a permanent storage location as described in Section 350.4010(c)(5) of this Part.

"Source stop" (see "Exposure head").

"Temporary job site" means any location that is not specifically listed on a radioactive material license or certificate of registration where industrial radiography is performed for 180 days or less during any consecutive 12 months.

"Transport container" means a package that is designed and constructed to provide radiation safety and security when sealed sources are transported and meets all applicable regulations of the U.S. Department of Transportation.

"Underwater radiography" means industrial radiography performed when the radiographic exposure device and related equipment are beneath the surface of water.

(Source: Amended at 30 Ill. Reg. 9167, effective April 28, 2006)

Section 350.40 Exemptions

- a) The following are exempt from the requirements of this Part:
 - 1) Cabinet x-ray systems designed to exclude individuals, except that the systems must satisfy the provisions of Section 350.3050(c) of this Part, which apply specifically to cabinet x-ray systems; and
 - 2) Lixiscopes used in industrial applications.
- b) Devices exempted by subsection (a) of this Section are subject to the requirements of 32 Ill. Adm. Code 320 and 330 and other applicable provisions of 32 Ill. Adm. Code: Chapter II, Subchapters b and d.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.50 Receipt, Transfer and Disposal of Sources of Radiation

Each licensee or registrant shall maintain records showing the receipt, transfer and disposal of sources of radiation. These records shall include the date of receipt, transfer or disposal, the name of the individual making the record, the radionuclide, the number of gigabecquerels or curies and the make, model and serial number of each source of radiation and device, as appropriate. Records shall be maintained for Agency inspection until the radioactive material license or certificate of registration is terminated.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.60 Form and Location of Records

- a) Each record required by this Part shall be legible throughout the specific retention period. The record may be the original or a reproduced copy or a microform provided that the copy or microform is authenticated by authorized personnel and

that the microform is capable of reproducing a clear copy throughout the required retention period. The record may also be stored in electronic media with the capability for producing legible, accurate and complete records during the required retention period. Records such as letters, drawings and specifications shall include all pertinent information, stamps, initials and signatures. The licensee or registrant shall maintain adequate safeguards against tampering with and loss of records.

- b) Each licensee or registrant shall maintain copies of records required by this Part and other applicable Parts of 32 Ill. Adm. Code at the location(s) specified in Section 350.4010(c)(7) of this Part.

(Source: Added at 28 Ill. Reg. 12598, effective October 1, 2004)

SUBPART B: EQUIPMENT CONTROL

Section 350.1000 Requirements for Radiography Equipment Using Radiographic Exposure Devices

- a) Equipment used in industrial radiographic operations involving the use of radiographic exposure devices shall meet the following minimum criteria:
 - 1) Each radiographic exposure device, source assembly, or sealed source and all associated equipment:
 - A) Manufactured on or before July 1, 1994, and used after January 10, 1996, shall meet the requirements specified in American National Standards Institute (ANSI) N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography", published January 1981, as NBS Handbook 136, exclusive of subsequent amendments or editions. This publication may be purchased from the American National Standards Institute, Inc., 25 West 43rd Street, New York NY 10036; Telephone: (212) 642-4900. However, equipment used in industrial radiographic operations need not comply with section 8.9.2(c) of the Endurance Test in ANSI N432-1980, if the prototype equipment has been tested using a torque value representative of the torque that an individual using the radiography equipment can realistically exert on the lever or crankshaft of the drive mechanism; and/or
 - B) Manufactured after July 1, 1994, and used after January 10, 1996, shall meet the requirements specified in ANSI N43.9-1991, "American National Standard for Gamma Radiography – Specifications for Design and Testing of Apparatus", published 1991, exclusive of subsequent amendments or editions.

- 2) Each radiographic exposure device shall have attached to it one or more durable, legible, clearly visible labels bearing the:
 - A) Chemical symbol and mass number of the radionuclide in the device;
 - B) Activity of the sealed source and the date this activity was last measured;
 - C) Model and serial number of the sealed source;
 - D) Manufacturer of the sealed source; and
 - E) Licensee's name, address and telephone number.
- 3) Each radiographic exposure device intended for use as a Type B transport container shall meet the applicable requirements of 32 Ill. Adm. Code 341.
- 4) Radiographic exposure devices, source assemblies, source changers and associated equipment that allow the source to be moved out of the device for routine operation shall meet the following additional requirements:
 - A) The coupling between the source assembly and the control cable shall be designed in a manner that the source assembly will not become disconnected if cranked outside the guide tube. The coupling shall be such that it cannot be unintentionally disconnected under normal conditions.
 - B) The device shall automatically secure the source assembly when it is cranked back into the shielded position within the device. This securing system shall only be released by means of a deliberate operation of 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, which 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, if manufactured on or before July 1, 1994, and used after January 10, 1996, shall have passed a kinking test that

closely approximates the kinking forces likely to be encountered during use and the crushing tests for the control units specified in ANSI N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography", published January 1981, as NBS Handbook 136, exclusive of subsequent amendments or editions. Guide tubes manufactured after July 1, 1994, and used after January 10, 1996, shall have passed a kinking test that closely approximates the kinking forces likely to be encountered during use and the crushing tests for the control units specified in ANSI N43.9-1991, "American National Standard for Gamma Radiography – Specifications for Design and Testing of Apparatus", published 1991, exclusive of subsequent amendments or editions.

- F) Use of a guide tube shall be necessary to move the source out of the device.
 - G) An exposure head, endcap or similar device designed to prevent the source assembly from extending beyond the end of the guide tube shall be attached to the outermost end of the guide tube during radiographic operations.
 - H) The guide tube exposure head connection, if these parts were manufactured on or before July 1, 1994, and used after January 10, 1996, shall be able to withstand the tensile test for control units specified in ANSI N432-1980, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography", published January 1981, as NBS Handbook 136, exclusive of subsequent amendments or editions. If these parts were manufactured after July 1, 1994, and used after January 10, 1996, the guide tube exposure head connection shall be able to withstand the tensile test for control units specified in ANSI N43.9-1991, "American National Standard for Gamma Radiography – Specifications for Design and Testing of Apparatus", published 1991, exclusive of subsequent amendments or editions.
 - I) Source changers shall provide a system for assuring that the source will not be accidentally withdrawn from the changer when connecting or disconnecting the drive cable to or from a source assembly.
- b) Modification of any radiographic exposure device, source assembly, source changer and associated equipment is prohibited unless the Agency, the U.S. Nuclear Regulatory Commission or an Agreement State has determined that the design of any replacement component, including source holder, source assembly, control or guide tube would not compromise the design safety features of the

system.

- c) Each radiographic exposure device, source changer and storage container shall be provided with a lock or lockable outer container designed to prevent unauthorized or accidental removal or exposure of a sealed source.
- d) Each radiographic exposure device and each transport container shall bear a permanent, durable, legible, clearly visible marking or label that has, as a minimum, the standard radiation caution symbol, depicted in 32 Ill. Adm. Code 340.Illustration A, and the following wording:

CAUTION (OR DANGER)
RADIOACTIVE MATERIAL
NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY)

In addition, transport containers shall meet the applicable requirements of 32 Ill. Adm. Code 341.

(Source: Amended at 39 Ill. Reg. 9935, effective July 1, 2015)

Section 350.1005 Requirements for Radiography Equipment Using Radiation Machines

The control panel of each radiation machine used in industrial radiographic operation shall be equipped with:

- a) A locking device to prevent the unauthorized use of the x-ray system or the accidental production of x-rays; and
- b) A device that will give a positive indication of the production of x-rays whenever the radiation machine is energized.

(Source: Added at 18 Ill. Reg. 7263, effective May 2, 1994)

Section 350.1010 Limits on Levels of Radiation for Radiographic Exposure Devices, Source Changers and Transport Containers

- a) Radiographic exposure devices manufactured prior to July 1, 1994, shall not be used for industrial radiography unless they meet the following minimum criteria:
 - 1) Radiographic exposure devices and source changers measuring less than 10 centimeters (4 inches) from the sealed source storage position to any exterior surface of the device shall have no radiation level in excess of 12.9 $\mu\text{C}/\text{kg}$ (50 mR) per hour at 15 centimeters (6 inches) from any exterior surface of the device.
 - 2) Radiographic exposure devices measuring a minimum of 10 centimeters

(4 inches) from the sealed source storage position to any exterior surface of the device shall not have radiation levels in excess of 2 mSv (equivalent to 200 mrem, 200 mR, or 51.6 $\mu\text{C}/\text{kg}$) per hour at any exterior surface, and 0.1 mSv (equivalent to 10 mrem, 10 mR, or 2.58 $\mu\text{C}/\text{kg}$) per hour at 1 meter (39.4 inches) from any exterior surface.

- 3) The radiation levels specified in subsections (1) and (2) of this Section shall be determined with the sealed source in the shielded position (i.e., "off").
- b) Radiographic exposure devices, source changers and transport containers manufactured on or after July 1, 1994, and used after January 10, 1996, shall not have a maximum exposure rate in excess of 2 mSv (200 mrem) per hour at any exterior surface and 0.1 mSv (10 mrem) per hour at 1 meter from any exterior surface with the sealed source in the shielded position.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.1020 Locking of Sources of Radiation

- a) Each radiographic exposure device, source changer and storage container shall be kept locked at all times except when under the direct surveillance of a radiographer or radiographer trainee, or as authorized pursuant to Section 350.3010 of this Part.
- b) Each radiographic exposure device and source changer shall be locked and the key removed from any keyed lock prior to being moved or transported and also prior to being stored at a given location.
- c) Each sealed source shall be secured in its shielded position by locking the radiographic exposure device or source changer each time the sealed source is returned to its shielded position.
- d) Radiation machines shall be locked and the key removed at all times except when under the direct surveillance of a radiographer or a radiographer trainee or as may be otherwise authorized pursuant to Section 350.3010 of this Part.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.1030 Storage Precautions

Locked radiographic exposure devices, source changers, storage containers, transport containers that contain sealed sources and radiation machines shall be secured to prevent tampering or removal by unauthorized personnel. The licensee shall store radioactive material in a manner that will minimize danger from explosion or fire.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.1040 Radiation Survey Instruments

- a) The licensee or registrant shall maintain sufficient calibrated and operable radiation survey instruments to make physical radiation surveys as required by this Part and 32 Ill. Adm. Code 340.510(a). Instrumentation required by this Section shall have a range that 0.02 mSv (0.516 μ C/kg, 2 mrem or 2 mR) per hour through 0.01 Sv (258 μ C/kg or 1 R) per hour can be measured.
- b) Each radiation survey instrument shall be calibrated:
 - 1) At energies appropriate for use;
 - 2) At intervals not to exceed 6 months and after each instrument servicing other than battery replacement;
 - 3) To accuracy that can be demonstrated within plus or minus 20 percent;
 - 4) At two or more widely separated points, other than zero, on each scale, or one point of each scale for digital devices. For instruments without multiple scales, calibration shall be performed at six points equally spaced across the range of 0.02 mSv (0.516 μ C/kg 2 mrem or 2 mR) per hour to 0.01 Sv (258 μ C/kg, 1 rem or 1 R) per hour; and
 - 5) By a person licensed by the Agency, the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State to perform such service.
- c) Records of calibrations shall be maintained for 5 years after the calibration date for inspection by the Agency.
- d) Immediately prior to use, a radiation survey instrument shall be checked to ensure that it is operating properly by bringing it near a source of radiation and observing a response. Instruments that fail to respond shall not be used.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.1050 Testing for Leakage or Contamination, Repair, Tagging, Opening, Modification and Replacement of Sealed Sources

- a) The licensee shall permit only persons specifically authorized by the Agency, the U.S. Nuclear Regulatory Commission, an Agreement State or a Licensing State to:
 - 1) Replace any sealed source fastened to or contained in a radiographic

- device;
- 2) Test a sealed source for leakage or contamination; or
 - 3) Repair, tag, open or modify any sealed source.
- b) An applicant that desires to conduct its own tests for leakage or contamination shall establish procedures to be followed when testing sealed sources for leakage or contamination and shall submit a description of such procedures to the Agency for approval. The description shall include the:
- 1) Instrumentation to be used;
 - 2) Method of performing the tests; and
 - 3) Pertinent experience of the individual(s) who will perform the test.
- c) Each sealed source shall be tested for leakage or contamination in accordance with 32 Ill. Adm. Code 340.410. In the absence of a certificate from a transferor indicating that a test has been made within the 6-month period prior to the transfer, the sealed source shall not be put into use until tested and the test results confirm that the sealed source is not leaking or contaminated.
- d) An acceptable leak test for sealed sources in the possession of a radiography licensee would be to test at the nearest accessible point to the sealed source storage position, or other appropriate measuring point, by a procedure approved pursuant to subsection (b) of this Section. Records of tests for leakage or contamination shall be kept in accordance with 32 Ill. Adm. Code 340.1135.
- e) If in accordance with 32 Ill. Adm. Code 340.410 a sealed source is determined to be leaking or contaminated, the licensee shall immediately withdraw the equipment involved from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with 32 Ill. Adm. Code 340. Within 5 days after obtaining results of a test showing a sealed source to be leaking or contaminated, the licensee shall file a report with the Agency in accordance with 32 Ill. Adm. Code 340.1260.
- f) A sealed source that is not fastened to or contained in a radiographic exposure device shall have permanently attached to it a durable tag at least 2.54 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

- g) Each 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 capable of detecting the presence of 185 Bq (0.005 μ Ci) of radioactive material on the test sample, and shall be performed by a person specifically authorized by the Agency, the U.S. Nuclear Regulatory Commission or another Agreement State to perform the analysis. Should the testing reveal the presence of DU contamination, the exposure device shall be removed from use until an evaluation of the wear of the S-tube has been made. Should the evaluation reveal that the S-tube is worn through, the device shall not be used again. DU shielded devices do not have to be tested for DU contamination while not in use and in storage. Before using or transferring the device, however, the device shall be tested for DU contamination, if the interval of storage exceeds 12 months. A record of the DU leak test shall be made and kept in units of becquerel (Bq) or microcurie (μ Ci) and maintained for inspection by the Agency for 5 years after the records are made or until the source in storage is removed, whichever time interval is longer. Licensees shall be in compliance with the DU leak testing requirement of this subsection beginning October 1, 2004.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.1060 Quarterly Inventory

Each licensee or registrant shall conduct a physical inventory at intervals not to exceed 3 months to account for all sources of radiation it has received or possesses. The inventory shall cover all sources of radiation not exempted by Section 350.40 of this Part, including, but not limited to, sealed sources, radiation machines and radiographic exposure devices containing depleted uranium. The records of the inventories shall be maintained for 5 years from the date of the inventory for inspection by the Agency and shall include the manufacturer, model, serial number, radionuclide and number of gigaBecquerels or curies or mass for DU in each device, if applicable, location of each source of radiation, date of the inventory and the name of the individual performing the inventory.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.1070 Utilization Logs

Each licensee or registrant shall maintain current logs, which shall be kept available for inspection by the Agency for 5 years from the date of the recorded event, showing for each source of radiation the following information:

- a) A unique identifying number or code (e.g., serial number) for each radiation machine. For each radiographic exposure device, a description, make, model and serial number of the radiographic exposure device, or transport or storage container in which the sealed source is located;

- b) The name of the radiographer using the radiation machine. For radiographic exposure device, the identity and signature of the radiographer to whom assigned;
- c) The locations where used and dates each source of radiation is removed from storage and returned to storage; and
- d) For radiation machines used in permanent radiographic installations, the date(s) each radiation machine is energized.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.1080 Inspection and Maintenance

- a) Each licensee or registrant shall ensure that visual and operability checks for obvious defects in survey instruments, radiation machines, radiographic exposure devices, transport and storage containers, associated equipment, source changers, source guide tubes and crank-out devices are performed at the beginning of each day of use, or work shift, to ensure that:
 - 1) The equipment is in good working condition;
 - 2) The sources are adequately shielded; and
 - 3) Required labeling is present.
- b) Each licensee or registrant shall conduct a program of at least quarterly inspection and maintenance of radiation machines, radiographic exposure devices, transport containers and source changers to assure proper functioning of components listed in Appendix B of this Part. All appropriate parts shall be maintained in accordance with manufacturer's specifications. Records of inspection and maintenance shall be maintained for inspection by the Agency for 5 years.
- c) If any inspection conducted pursuant to subsection (a) or (b) of this Section reveals damage to components listed in Appendix B of this Part, the device shall be labeled as defective and shall be removed from service until repairs have been made.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.1090 Permanent Radiographic Installations

Permanent radiographic installations using radiographic exposure device(s) having high radiation area entrance controls of the type described in 32 Ill. Adm. Code 340.610(a)(2), 340.610(a)(3) and 340.610(b) shall also meet the following requirements:

- a) Each entrance that is used for personnel access to the high radiation area shall have both visible and audible warning signals to warn of the presence of radiation. The visible signal shall be activated by radiation. The audible signal shall be activated when an attempt is made to enter the installation while the source is exposed.
- b) The entrance control device or alarm system shall be tested for proper operation prior to beginning operations on each day of use. The radiography system shall not be used if any entrance control device or alarm system is operating improperly. If an entrance control device or alarm system is operating improperly, it shall be labeled as defective immediately and repaired. Before the radiography system is returned to service, the radiation safety officer shall retest the entrance control device or alarm system and approve the repair.
- c) Records of tests performed pursuant to subsection (b) of this Section shall be maintained for inspection by the Agency for 5 years.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

SUBPART C: PERSONAL RADIATION SAFETY REQUIREMENTS FOR RADIOGRAPHERS AND RADIOGRAPHER TRAINEES

Section 350.2010 Training and Testing

- a) The licensee or registrant shall not permit any individual to act as a radiographer, as defined in this Part, until such individual:
 - 1) Has been certified by the Agency pursuant to 32 Ill. Adm. Code 405.90(a) for the class of radiography (i.e., radioactive materials, radiation machines, or both) that the licensee or registrant is authorized to perform and the certification has neither expired nor been suspended or revoked by the Agency;
 - 2) Has received copies of this Part, 32 Ill. Adm. Code 340 and 400, a copy of the license or certificate of registration issued to the licensee or registrant and copies of and instructions in the licensee's or registrant's operating and emergency procedures;
 - 3) Has been instructed in the use of the licensee's or registrant's sources of radiation, radiographic exposure devices, related handling tools and radiation survey instruments; and
 - 4) Has demonstrated, to the satisfaction of the licensee or registrant, an understanding of the instructions provided pursuant to subsections (a)(2) and (3) of this Section as evidenced by having successfully completed a written test and a field examination.

- b) The licensee or registrant shall not permit any individual to act as a radiographer trainee, as defined in this Part, until such individual:
 - 1) Has been certified by the Agency pursuant to 32 Ill. Adm. Code 405.90(b) for the class of radiography (i.e., radioactive materials, radiation machines, or both) that the licensee or registrant is authorized to perform and the certification has neither expired nor been suspended or revoked by the Agency; and
 - 2) Has met the requirements of subsections (a)(2) through (a)(4) of this Section.
- c) Records of the training specified in this Section, including copies of written tests and dates of oral tests and field examinations, shall be maintained for inspection by the Agency for 3 years following termination of employment or until the radioactive material license or certificate of registration is terminated.
- d) Except as provided in subsection (f) of this Section, each licensee or registrant shall conduct an internal audit program to ensure that the Agency's radioactive material license conditions and the licensee's or registrant's operating and emergency procedures are followed by each radiographer and radiographer trainee. The licensee or registrant shall audit the job performance of each radiographer and radiographer trainee. The internal audit program shall:
 - 1) Include observation by the licensee or registrant of the job performance of each radiographer and radiographer trainee during an actual industrial radiographic operation at intervals not to exceed 6 months.
 - 2) Provide that, if a radiographer or a radiographer trainee has not participated in an industrial radiographic operation for more than 6 months since the last audit, the individual's job performance shall be observed and recorded by the licensee or registrant when the individual next participates in an industrial radiographic operation.
- e) Records of these audits shall be maintained for inspection by the Agency for 5 years from the date of the audit.
- f) In those operations where a single individual serves as both radiographer and radiation safety officer, and performs each radiography operation, an internal audit program is not required.
- g) The licensee or registrant shall provide annual refresher safety training for each radiographer and radiographer trainee at intervals not to exceed 12 months. The review shall include, as a minimum, the results of internal audits, new procedures or equipment, new or revised regulations, accidents or errors that have been

observed and shall also provide opportunities for employees to ask safety questions.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.2020 Operating and Emergency Procedures

The licensee's or registrant's operating and emergency procedures shall include instructions in at least the following:

- a) Handling and use of sources of radiation to be employed such that no individual is likely to be exposed to radiation doses in excess of the limits established in 32 Ill. Adm. Code 340;
- b) Methods and occasions for conducting radiation surveys;
- c) Methods for controlling access to radiographic areas;
- d) Methods and occasions for locking and securing sources of radiation;
- e) Personnel monitoring and the use of individual monitoring devices, including steps that shall be taken immediately by radiographic personnel in the event that an ionization chamber (i.e., pocket dosimeter) is found to be off-scale;
- f) Transportation to field locations, including packing of sources of radiation in the vehicles, placarding of vehicles and control of sources of radiation during transportation;
- g) Methods or procedures for minimizing exposure of individuals in the event of an accident, including procedures to follow in the event of a disconnect accident, a transportation accident and loss of a sealed source;
- h) The procedure for notifying proper personnel in the event of an accident or loss of a sealed source;
- i) Maintenance of records (see Appendix C of this Part); and
- j) The inspection and maintenance of radiographic exposure devices, source changers, storage containers, transport containers, source guide tubes, crank-out devices and radiation machines.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.2030 Personnel Monitoring Control

- a) The licensee or registrant shall not permit any individual to act as a radiographer

or as a radiographer trainee unless, at all times during radiographic operations, each individual wears a direct reading pocket ionization chamber (i.e., pocket dosimeter) and an individual monitoring device provided and evaluated by a qualified dosimetry processor as described in 32 Ill. Adm. Code 340.510(d) Each device shall be assigned to and worn by only one individual. After replacement, each individual monitoring device must be processed as soon as possible.

- b) Pocket ionization chambers (i.e., pocket dosimeters) shall meet the criteria in ANSI N13.5-1972, "Performance Specifications for Direct Reading and Indirect Reading Pocket Dosimeters for X- and Gamma Radiation" published 1972, exclusive of subsequent amendments or editions.
- c) The use of pocket ionization chambers (i.e., pocket dosimeters) is subject to the following requirements:
 - 1) Pocket ionization chambers shall be recharged at least daily or at least at the start of each work shift;
 - 2) Pocket ionization chambers shall be read and exposures recorded at least at the beginning and end of each worker's shift involving the use of a source of radiation;
 - 3) Pocket ionization chambers shall be checked for correct response to radiation at periods not to exceed 1 year. Acceptable dosimeters shall read within plus or minus 30 percent of the true radiation exposure. Records of pocket ionization chamber (i.e., pocket dosimeter) calibrations shall be maintained for inspection by the Agency for 5 years; and
 - 4) If an individual's pocket ionization chamber is discharged beyond its range (i.e., goes "off-scale"), industrial radiographic operations by that individual shall cease immediately and the individual's monitoring device shall be sent immediately for processing. The individual shall not use sources of radiation until a determination of the individual's radiation dose has been made. The determination must be made by the RSO or the RSO's designee. The results of this determination must be included in records maintained in accordance with subsection (d) of this Section.
 - 5) If the individual monitoring device that is required by subsection (a) of this Section is lost or damaged, the worker shall cease work immediately until a replacement monitoring device meeting the requirements in subsection (a) of this Section is provided and the exposure is calculated for the time period from issuance to loss or damage of the individual monitoring device. The results of this calculated exposure and the time period for which the monitoring device was lost or damaged must be included in the records maintained in accordance with subsection (d) of this Section.

- d) Reports received from the individual monitoring device processor; records of daily pocket ionization chamber (i.e., pocket dosimeter) readings, records of estimates of exposures associated with off-scale pocket ionization chambers; and/or lost or damaged individual monitoring devices shall be kept for inspection by the Agency until the radioactive material license or certificate of registration is terminated or until the Agency authorizes their disposition, in writing, following a determination by the Agency that the records contain inaccurate personnel monitoring information.
- e) In addition to other requirements of this Section, each individual performing radiography with sealed sources at a location other than a permanent radiography installation shall wear an alarm ratemeter. Each alarm ratemeter shall:
 - 1) Be checked prior to use at the start of each shift to ensure that the alarm functions properly (sounds);
 - 2) Be set to give an alarm signal at a preset dose rate of 5mSv (500 mrem) per hour or less;
 - 3) Require special means to change the preset alarm function; and
 - 4) Be calibrated, at periods not to exceed 1 year, for correct response to radiation. Ratemeters shall alarm within plus or minus 20 percent of the true radiation dose rate. Records of alarm ratemeter calibrations shall be maintained for inspection by the Agency for 5 years.
- f) The alarm ratemeter shall be used in addition to, and not as a substitute for, the portable survey instrument required by Section 350.3030 of this Part. The alarm ratemeter is intended to provide additional assurance that the radiation exposure levels are within regulatory limits.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.2040 Supervision of Radiographer Trainees

Except when under the personal supervision of a radiographer, a radiographer trainee shall not use radiographic exposure devices, sealed sources, or related source handling tools or conduct radiation surveys required by Sections 350.3030(b) and 350.3030(c) of this Part to determine that the sealed source has returned to the shielded position after an exposure. The personal supervision shall include, at a minimum:

- a) The radiographer's physical presence at the site where the sources of radiation are being used;
- b) The availability of the radiographer to give immediate assistance if required; and

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

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

SUBPART D: PRECAUTIONARY PROCEDURES IN RADIOGRAPHIC OPERATIONS

Section 350.3010 Access Control and Security

- a) During each radiographic operation, the radiographer or radiographer trainee shall maintain a direct surveillance of the operation to protect against unauthorized entry into a high radiation area, as defined in 32 Ill. Adm. Code 310, except:
 - 1) Where the high radiation area is equipped with a control device or alarm system as described in 32 Ill. Adm. Code 340.610(a), or
 - 2) Where the high radiation area is locked to protect against unauthorized or accidental entry.
- b) Sources of radiation shall not be left unattended except when secured against unauthorized use, access or removal.

(Source: Amended at 19 Ill. Reg. 8250, effective June 12, 1995)

Section 350.3020 Posting

Notwithstanding any provisions in 32 Ill. Adm. Code 340.930(a), areas in which radiography is being performed shall be conspicuously posted as follows:

- a) Each high radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

CAUTION (OR DANGER)
HIGH RADIATION AREA

- b) Each radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the wording required in subsection (a) of this Section, or the words:

CAUTION (OR DANGER)
RADIATION AREA

- c) Whenever practicable, ropes or barriers shall be used in addition to appropriate signs to designate radiation areas and to help prevent unauthorized entry.

- d) Notwithstanding the requirements of 32 Ill. Adm. Code 340.920(a), each radiation area may be posted in accordance with 32 Ill. Adm. Code 340.920(b) (i.e., both signs may be posted at the same location at the boundary of the radiation area).

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.3030 Radiation Surveys and Survey Records

- a) No industrial radiographic operation shall be conducted unless at least one calibrated and operable radiation survey instrument, as described in Section 350.1040 of this Part, is available and used at each site where radiographic exposures are made.
- b) A survey with a radiation survey instrument shall be made after each use of a radiographic exposure device 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 also include the source guide tube and any attached collimator.
- c) A lock-out survey, in which all accessible surfaces of the radiographic exposure device or source changer are surveyed with a radiation survey instrument, shall be made to determine that each sealed source is in its shielded position prior to securing the radiographic exposure device or source changer as specified in Section 350.1020 of this Part.
- d) A physical radiation survey shall be made after each radiographic exposure using a radiation machine to determine that the machine is "off".
- e) Radiation surveys shall be performed in areas where industrial radiography operations are to be performed and shall meet the following requirements:
 - 1) Before industrial radiographic operations begin, all radiation areas and high radiation areas (as determined by calculated exposure rates) in which radiographic operations are to be performed shall be posted in accordance with Section 350.3020 of this Part. An area survey shall be performed during the first radiographic exposure (i.e., with the sealed source in the exposed position) to confirm that the requirements specified in Section 350.3020 of this Part have been met and that doses to individual members of the public do not exceed the limits specified in 32 Ill. Adm. Code 340.310(a).
 - 2) The survey required in subsection (e)(1) of this Section shall be repeated each time the exposure device is relocated or the exposed position of the sealed source is changed.

- 3) The requirements specified in subsection (e)(2) of this Section do not apply to repetitive industrial radiographic operations when the conditions of exposure, including, but not limited to, the radiographic exposure device, duration of exposure, source strength, pipe size and pipe thickness, remain constant.
- f) If a vehicle is to be used for storage of radioactive material, a vehicle survey shall be performed after securing radioactive material in the vehicle and before commencement of transport to ensure that doses to individual members of the public do not exceed the limits specified in 32 Ill. Adm. Code 340.310(a) at the exterior surface of the vehicle.
- g) Surveys shall be performed on storage containers to ensure that doses to individual members of the public do not exceed the limits specified in 32 Ill. Adm. Code 340.310(a). These surveys shall be performed initially with the maximum amount of radioactive material present in the storage location and thereafter at the time of the quarterly inventory and whenever storage conditions change.
- h) A survey meeting the requirements of subsection (b) of this Section shall be performed on the radiographic exposure device and the source changer after every sealed source exchange.
- i) Records shall be kept of the surveys required by subsections (c) through (h) of this Section. The records shall be maintained for inspection by the Agency for 5 years after completion of the survey. If the survey was used to determine an individual's exposure, however, the records of the survey shall be maintained until the radioactive material license or certificate of registration is terminated or until the Agency authorizes their disposition, in writing, following a determination by the Agency that the records contain inaccurate information that could result in an inaccurate determination of an individual's exposure.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.3040 Records Required at Temporary Job Sites

Each licensee or registrant using a source of radiation at a temporary job site shall maintain and have available at the temporary job site, for inspection by the Agency, the following records:

- a) The radioactive material license, certificate of registration or equivalent document;
- b) Operating and emergency procedures;
- c) Relevant regulations of the Agency;

- d) Survey records required pursuant to Section 350.3030 of this Part for the period of operation at the site;
- e) Daily pocket ionization chamber (i.e., pocket dosimeter) records for the period of operation at the site;
- f) If using radioactive material, daily alarm ratemeter records for the period of operation at the site; and
- g) Both the latest instrument calibration records and sealed source leakage or contamination test records for specific devices in use at the site. Acceptable records include tags or labels that are affixed to the device or survey meter and decay charts showing leakage or contamination test results for sources that have been manufactured within the last 6 months.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.3045 Operating Requirements

- a) When radiography is performed at a location other than a permanent radiographic installation, a minimum of two radiographic personnel shall be present to operate the radiographic exposure device. At least one of the radiographic personnel shall be a radiographer. The other radiographic personnel may be either a radiographer or radiographer trainee.
- b) Collimators shall be used in industrial radiographic systems that use crank-out devices except when physically impossible.
- c) Other than a radiographer, or a radiographer trainee who is under the personal supervision of a radiographer, no person shall manipulate controls or operate equipment used in industrial radiographic operations.
- d) At each job site, the following shall be supplied by the licensee or registrant:
 - 1) The appropriate barrier ropes and signs;
 - 2) At least one operable, calibrated survey instrument;
 - 3) A current whole body individual monitoring device for each worker; and
 - 4) An operable, calibrated pocket ionization chamber (i.e., pocket dosimeter) with a range of zero to 2 mSv (51.6 μ C/kg, 200 mrem or 200 mR) for each worker.
- e) Each worker who performs industrial radiography with a sealed source at a location other than a permanent radiography installation shall have on his or her

person an operable, calibrated alarm ratemeter.

- f) Each radiographer or radiographer trainee at a job site shall have on his or her person a valid industrial radiographer certification card issued by the Agency pursuant to the provisions of 32 Ill. Adm. Code 405.
- g) Industrial radiographic operations shall not be performed if any of the items in subsections (d), (e) and (f) of this Section are unavailable at the job site or are inoperable.
- h) The licensee shall not transport radioactive material unless the material is packaged, and the package is labeled, marked and accompanied with appropriate shipping papers in accordance with 32 Ill. Adm. Code 341.
- i) The licensee shall lock and physically secure the transport package containing radioactive material in the transporting vehicle to prevent accidental loss, tampering or unauthorized removal of the radioactive material from the vehicle.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.3048 Notification of Incidents

- a) The licensee or registrant shall notify the Agency of stolen, lost or missing sources of radiation, overexposures, excessive radiation levels and leakage or contamination of sealed sources in accordance with 32 Ill. Adm. Code 340.1210 through 340.1230 and 340.1260. In addition, each licensee or registrant shall submit a written report within 30 days to the Agency whenever one of the following events occurs:
 - 1) A sealed source cannot be returned to the shielded position and properly secured;
 - 2) A sealed source becomes disconnected from a drive cable;
 - 3) Failure of any component necessary for safe operation of a device to properly perform its intended function; or
 - 4) An indicator on a radiation machine fails to show that radiation is being produced or an exposure switch fails to terminate production of radiation when turned to the "off" position.
- b) The licensee or registrant shall include the following information in each report submitted pursuant to subsection (a) of this Section that involves failure of safety components of radiography equipment:
 - 1) Description of the equipment problem;

- 2) Cause of each incident, if known;
- 3) Name of the manufacturer and model of equipment involved in the incident;
- 4) Place, date and time of the incident;
- 5) Actions taken to establish normal operations;
- 6) Corrective actions taken or planned to prevent recurrence; and
- 7) Names and qualifications of personnel involved in the incident.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.3050 Special Requirements and Exemptions for Enclosed Radiography Systems

- a) Except as exempted by subsection (c) of this Section, the following additional requirements apply to enclosed radiography systems, including systems used in shielded-room radiography. Enclosed radiography systems (including cabinet systems) that are designed to allow admittance of individuals shall be designed and constructed so that:
 - 1) All requirements of this Part and of 32 Ill. Adm. Code 340.310(a) and 340.320 are complied with;
 - 2) Each door fastening mechanism will allow the door to be opened from the inside at all times;
 - 3) Visible and audible alarms are installed and are activated immediately prior to each initiation of an exposure; and
 - 4) A reliable interlock or other mechanism is installed at each means of access to the enclosure which will preclude access to an area of radiation hazard either by preventing entry or by automatically reducing the hazard.
- b) Each system for enclosed radiography specified in subsection (a) of this Section shall be evaluated initially by the licensee or registrant and at intervals not to exceed 1 year to assure compliance with the requirements of this Part and 32 Ill. Adm. Code 340.310(a) and 340.320. Records of these evaluations shall be maintained for inspection by the Agency for a period of 5 years after the evaluation.
- c) Cabinet x-ray systems designed to exclude individuals are exempt from the

requirements of this Part except that:

- 1) The registrant shall comply with the requirements of 32 Ill. Adm. Code 320 and 340;
- 2) The registrant shall not permit any individual to operate a cabinet x-ray system until the individual has been instructed in the operating and emergency procedures for the unit and has demonstrated, to the satisfaction of the registrant, competence in its use;
- 3) Each cabinet x-ray system shall be manufactured and assembled in conformance with the regulations in 21 CFR 1020.40, published April 1, 2002, exclusive of subsequent amendments or editions;
- 4) The registrant shall maintain for review by the Agency information regarding the operating parameters and workload of each cabinet system; and
- 5) Tests for proper operation of interlocks installed in accordance with 21 CFR 1020.40 shall be conducted and recorded in accordance with Section 350.1090 of this Part.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.3060 Special Requirements and Exemptions for Enclosed Radiography Systems, other than those Described in Section 350.3050 that are Designed to Allow Admittance of Individuals (Repealed)

(Source: Repealed at 18 Ill. Reg. 7263, effective May 2, 1994)

Section 350.3070 Special Requirements and Exemptions for Certified and Non-Certified Cabinet X-Ray Systems Designed to Exclude Individuals (Repealed)

(Source: Repealed at 18 Ill. Reg. 7263, effective May 2, 1994)

Section 350.3080 Special Requirements for Mobile or Portable Radiation Machines (Repealed)

(Source: Repealed at 18 Ill. Reg. 7263, effective May 2, 1994)

Section 350.3090 Special Requirements for Underwater and Lay-Barge Radiography

- a) Underwater radiography or lay-barge radiography shall not be performed unless specifically authorized in a radioactive material license issued by the Agency, the U.S. Nuclear Regulatory Commission or an Agreement State in accordance with Section 350.4010 of this Part or equivalent.

- b) In addition to the other requirements of this Part, the following rules apply to the performance of lay-barge radiography:
 - 1) Cobalt-60 sources with activities in excess of 740 GBq (20 Ci) (nominal) and iridium-192 sources with activities in excess of 3.70 TBq (100 Ci) (nominal) shall not be used in the performance of lay-barge industrial radiography.
 - 2) Collimators shall be used in the performance of lay-barge radiography.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.4000 Prohibitions

Retrieval of disconnected sealed sources of radioactive material or sealed sources that cannot be returned by normal means to a shielded position or properly secured shall not be performed unless specifically authorized by a radioactive material license issued by the Agency, the U.S. Nuclear Regulatory Commission or an Agreement State.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.4010 Licensing and Registration Requirements for Industrial Radiographic Operations

- a) Radioactive material used in industrial radiographic operations shall be licensed in accordance with 32 Ill. Adm. Code 330.
- b) Radiation machines used in industrial radiographic operations shall be registered in accordance with 32 Ill. Adm. Code 320.

AGENCY NOTE: If a licensee does not use radiation machines and uses only radioactive material, then the licensed activities do not need to be registered in accordance with the requirements of 32 Ill. Adm. Code 320.

- c) In addition to the licensing requirements in 32 Ill. Adm. Code 330, an application for a license shall include the following information:
 - 1) A schedule or description of the program for training radiographic personnel that specifies:
 - A) Initial training;
 - B) Periodic training;
 - C) On-the-job training; and

- D) Methods to be used by the licensee or registrant to determine the knowledge, understanding and ability of radiographic personnel to comply with Agency rules, licensing or registration requirements, and the operating and emergency procedures of the applicant;
- 2) Written operating and emergency procedures, including all items listed in Section 350.2020 of this Part;
- 3) A description of the internal inspection system or other management control to ensure that radiographic personnel comply with license conditions, regulations and orders of the Agency and the applicant's operating and emergency procedures;
- 4) A description of the organization of the industrial radiographic program, including delegation of authority and responsibility for operation of the radiation safety program;
- 5) A list of proposed permanent radiographic installations and descriptions of proposed permanent storage and use locations. Radioactive material shall not be stored at a permanent storage location or used at a permanent use location unless the storage or use location is specifically authorized by the license. A storage or use location is permanent if radioactive material is stored or used at the location for more than 180 days during any consecutive 12 months;
- 6) A description of the program for inspection and maintenance of radiographic exposure devices, transport containers and storage containers (including applicable items in Sections 350.1080 and Appendix B of this Part);
- 7) The location(s), i.e., address, where all records required by this Part and other applicable Parts of 32 Ill. Adm. Code will be maintained;
- 8) For applicants seeking authorization to perform underwater radiography, a description of:
 - A) Radiation safety procedures and radiographer responsibilities unique to the performance of underwater radiography;
 - B) Radiographic equipment and radiation safety equipment unique to underwater radiography; and
 - C) Methods for watertight encapsulation of equipment; and
- 9) For applicants seeking authorization to perform lay-barge radiography, a

description of:

- A) Transport procedures for radioactive material to be used in industrial radiographic operations;
 - B) Storage facilities for radioactive material; and
 - C) Methods for restricting access to radiation areas.
- d) Each licensee or registrant shall maintain a copy of its license or registration, documents incorporated by reference, amendments to each of these items and the application for each of these items until 3 years after being superseded by new documents approved by the Agency, or until the Agency terminates the license or registration.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.4020 Radiation Safety Officer

- a) Each licensee or registrant performing industrial radiography shall designate a Radiation Safety Officer (RSO).

AGENCY NOTE: The Agency will list the name of the RSO on each radioactive material license.

- b) The RSO's qualifications shall include, but not be limited to:
- 1) Possession of a high school diploma or a certificate of high school equivalency based on the GED test;
 - 2) Completion of the training and testing requirements of Section 350.2010(a)(2), (3) and (4) of this Part;
 - 3) 2 years of documented experience related to radiation protection, including knowledge of industrial radiographic operations; and
 - 4) For licensees only, the RSO shall also maintain certification as an industrial radiographer as specified in Section 350.2010(a)(1) of this Part.
- c) The specific duties of the RSO shall include, but need not be limited to, the following:
- 1) Establish and oversee operating, emergency and ALARA procedures, and review them at least annually to ensure that the procedures are current and conform with 32 Ill. Adm. Code: Chapter II, Subchapters b and d;

- 2) Oversee the radiation protection training program for radiographic personnel;
 - 3) Ensure that required radiation surveys and leak tests are performed and documented in accordance with 32 Ill. Adm. Code: Chapter II, Subchapters b and d;
 - 4) Ensure that corrective measures are taken when levels of radiation exceed established limits;
 - 5) Ensure that individual monitoring devices are calibrated and used properly by industrial radiographic personnel, that records are kept of the monitoring results and that timely notifications are made as required by this Part and 32 Ill. Adm. Code 400;
 - 6) Ensure that required interlock switches and warning signals are functioning and that radiation signs, ropes and barriers are properly posted and positioned;
 - 7) Investigate and report to the Agency each known or suspected case of excessive radiation exposure to an individual or radiation level detected in excess of limits established by 32 Ill. Adm. Code: Chapter II, Subchapters b and d and each theft or loss of sources of radiation, determine the cause and take steps to prevent recurrence;
 - 8) Assume control and have the authority to institute corrective actions in emergency situations or unsafe conditions;
 - 9) Maintain records as required by 32 Ill. Adm. Code: Chapter II, Subchapters b and d (see Appendix C of this Part);
 - 10) Ensure proper storage, labeling, transport and use of exposure devices and sources of radiation;
 - 11) Ensure that quarterly inventory and inspection and maintenance programs are performed in accordance with Sections 350.1060 and 350.1080 of this Part; and
 - 12) Ensure that personnel comply with 32 Ill. Adm. Code: Chapter II, Subchapters b and d, the conditions of the license and the operating and emergency procedures of the licensee or registrant.
- d) The licensee or registrant shall ensure that the duties in subsection (c) of this Section are executed.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.4030 Reciprocity

The Agency shall grant reciprocal recognition of radioactive material licenses in accordance with 32 Ill. Adm. Code 330.900.

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)

Section 350.APPENDIX A Subjects to be Covered During the Instruction of Radiographers (Repealed)

(Source: Repealed at 19 Ill. Reg. 8250, effective June 12, 1995)

Section 350.APPENDIX B General Requirements for Inspection of Industrial Radiographic Equipment

- a) Panoramic devices (devices in which the sealed source is physically removed from the shielded container during exposure) shall be inspected for:
 - 1) Radiographic Exposure Unit
 - A) Abnormal surface radiation levels anywhere on camera, collimator or guide tube;
 - B) Condition of safety plugs;
 - C) Proper operation of locking mechanism;
 - D) Condition of pigtail connector;
 - E) Condition of carrying device (e.g., straps, handle, etc.); and
 - F) Proper labeling.
 - 2) Source Guide Tube
 - A) Rust, dirt or sludge buildup inside the source tube;
 - B) Condition of source tube connector;
 - C) Condition of source stop;
 - D) Kinks or damage that could prevent proper operation; and
 - E) Presence of radioactive contamination.

- 3) Control Cables and Drive Mechanism
 - A) Proper drive mechanism with camera, as appropriate;
 - B) Changes in general operating characteristics;
 - C) Conditions of connector on drive cable;
 - D) Drive cable flexibility, wear and rust;
 - E) Excessive wear or damage to crank assembly parts;
 - F) Damage to drive cable conduit that could prevent the cable from moving freely;
 - G) Connection of the control cable connector with the pigtail connector for proper mating;
 - H) Proper operation of source position indicator, if applicable; and
 - I) Presence of radioactive contamination.
- b) Directional beam devices containing radioactive material shall be inspected for:
 - 1) Abnormal surface radiation;
 - 2) Changes in the general operating characteristics of the device;
 - 3) Proper operation of shutter mechanism;
 - 4) Chafing or binding of shutter mechanism;
 - 5) Damage to the device which might impair its operation;
 - 6) Proper operation of locking mechanism;
 - 7) Proper drive mechanism with camera, as appropriate;
 - 8) Condition of carrying device (e.g., strap, handle, etc.); and
 - 9) Proper labeling.
- c) X-ray equipment shall be inspected for:
 - 1) Change in the general operating characteristics of the device;

- 2) Wear of electrical cables and connectors;
- 3) Proper labeling of console;
- 4) Proper console with machine, as appropriate;
- 5) Proper operation of locking mechanism;
- 6) Timer run-down cutoff;
- 7) Damage to tube head housing that might result in excessive radiation levels; and
- 8) Positive indication of x-ray production.

Source: Added at 18 Ill. Reg. 7263, effective May 2, 1994)

Section 350.APPENDIX C Retention Requirements for Records

<u>Specific Section</u>	<u>Name of Record</u>	<u>Record Retention Period</u>
350.50	Receipt, Transfer and Disposal	Until the radioactive material license or certificate of registration is terminated
350.1040(c)	Survey Instrument Calibration	5 years
350.1050(c)	Leakage or Contamination Tests	5 years
350.1060	Quarterly Inventory	5 years
350.1070	Utilization Logs	5 years
350.1080	Quarterly Inspection and Maintenance	5 years
350.1090	High Radiation Area Control Devices or Alarm Systems	5 years
350.2010(c)	Training and Testing Records	Until the radioactive material license or certificate of registration is terminated. 3 years after termination of employment
350.2010(d)	Internal Audit Program	5 years
350.2030(c)	Pocket Ionization Chamber (i.e., Pocket Dosimeter) Calibrations	5 years
350.2030(d)	Personnel Monitoring Records Pocket Ionization Chamber (i.e., Pocket Dosimeter) Readings	Until the radioactive material license or certificate of registration is terminated
350.2030(e)(4)	Alarm Ratemeter Calibrations	5 years
350.3030	Radiation Surveys	5 years or until the radioactive material license or certificate of registration is terminated if a survey was used to determine an individual's exposure
350.3040	Records at Temporary Job Sites	During temporary job site operations
350.3050	Initial and Annual Evaluations of Enclosed Radiography Systems	5 years

350.4010	License, documents incorporated by reference and amendments to each of these items	Until the radioactive material license is terminated by the Agency or until 3 years after being superseded by new documents approved by the Agency
----------	--	--

(Source: Amended at 28 Ill. Reg. 12598, effective October 1, 2004)