

**34.41 Security.**

During each radiographic operation not conducted in a permanent radiographic installation, the radiographer or radiographer's assistant shall maintain direct surveillance of the operation to protect against unauthorized entry into a high radiation area, as defined in Part 20 of this chapter.

9. Section 34.43 is amended to read as follows:

**34.43 Radiation surveys.**

(a) At least one calibrated and operable radiation survey instrument shall be available at the location of radiographic operations whenever radiographic operations are being performed.

(b) A survey with a radiation detection instrument shall be made after each radiographic exposure to determine that the sealed source has returned to its shielded position in the radiographic exposure device. The entire circumference of the device shall be surveyed. If the radiographic exposure device has a source guide tube, the survey shall include the guide tube.

(c) When the use of a radiographic exposure device or storage container is to be terminated at the end of a work period, a survey with a radiation detection instrument shall be made of the locked radiography device or storage container to determine that the sealed source is in its shielded position. A record of the surveys required by this paragraph (c) shall be kept for two years.

(d) An area survey of the perimeter of the restricted area with a radiation detection instrument shall be made with the source exposed before or during the initial radiographic exposure on each shift and when the source-target configuration for an exposure is substantially different from that of the preceding exposure. These surveys are not required for radiography performed in a permanent radiographic installation.

10. Appendix A is amended to read as follows:

**APPENDIX A****I. FUNDAMENTALS OF RADIATION SAFETY**

- A. Characteristics of gamma radiation.
- B. Units of radiation dose (mrem) and quantity of radioactivity (curie).
- C. Hazards of excessive exposure of radiation.
- D. Levels of radiation from licensed material.
- E. Methods of controlling radiation dose.
  1. Working time.
  2. Working distances.
  3. Shielding.

**II. RADIATION DETECTION INSTRUMENTATION TO BE USED**

- A. Use of radiation survey instruments.
  1. Operation.
  2. Calibration.

3. Limitations.
- B. Survey techniques.
- C. Use of personnel monitoring equipment.
  1. Film badges and thermoluminescent dosimeters.
  2. Pocket dosimeters.

**III. RADIOGRAPHIC EQUIPMENT TO BE USED**

- A. Remote handling equipment.
- B. Radiographic exposure devices.
- C. Storage containers.

**IV. INSPECTION AND MAINTENANCE PERFORMED BY THE RADIOGRAPHER****V. CASE HISTORIES OF RADIOGRAPHY ACCIDENTS**

11. The second sentence of the citation of authority is amended to read as follows:

**AUTHORITY:** \* \* \* For the purposes of Sec. 223 68 Stat. 958 as amended; 42 U.S.C. 2273 §§ 34.11(d), 34.25(c), 34.26, 34.27, 34.28(b), 34.29, 34.31(c), 34.33(b), 34.33(e), and 34.43(c) issued under Sec. 161o, 68 Stat. 950, as amended, 42 U.S.C. 2201(o).

(Sec. 161, Pub. L. 83-703, 69 Stat. 948; Sec. 201, Pub. L. 93-438, 88 Stat. 1242 (42 U.S.C. 2201, 5841).)

Dated at Washington, D.C. this 20th day of March 1978.

For the Nuclear Regulatory Commission.

SAMUEL J. CHILK,  
Secretary of the Commission.

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[7590-01]

[10 CFR Part 34]

**LICENSES FOR RADIOGRAPHY AND RADIATION SAFETY REQUIREMENTS FOR RADIOGRAPHIC OPERATIONS**

**Advance Notice of Proposed Rulemaking on Design of Radiographic Exposure Devices**

**AGENCY:** U.S. Nuclear Regulatory Commission.

**ACTION:** Advance notice of proposed rulemaking.

**SUMMARY:** The Nuclear Regulatory Commission is undertaking development of safety design requirements for radiographic exposure devices. When completed they will be published as proposed amendments to NRC regulations. The new requirements will be intended to reduce radiation overexposures caused by equipment failure. Interested persons are invited to submit written comments on preliminary draft requirements and to take part in a public meeting to be held April 18.

**DATES:** Comments should be received by May 26, 1978. A public hearing will be held April 18, 1978.

**ADDRESSES:** Comments or suggestions for consideration in connection

with the development of the design requirements may be sent to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch. Copies of comments received may be examined at the Commission's Public Document Room at 1717 H Street NW., Washington, D.C. Comments also may be submitted in writing or presented orally at the Public meeting on April 18, 1978, in Room P118, Phillips Building, 7920 Norfolk Avenue, Bethesda, Md.

**FOR FURTHER INFORMATION CONTACT:**

Mr. Donovan A. Smith, Transportation and Product Standards Branch, Division of Engineering Standards, Office of Standards Development, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, 301-443-6910.

**SUPPLEMENTARY INFORMATION:** Please take notice that the NRC is undertaking the development of design requirements for radiographic exposure devices intended for use under licenses issued pursuant to 10 CFR Part 34, "Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations." To aid the NRC in this undertaking, interested persons are invited to submit information, comments and suggestions with respect to such requirements. Submissions may be in writing and sent to the Secretary of the Commission or may be presented in writing or orally at an informal public meeting to be held April 18, 1978, beginning at 9:30 a.m. in Room P118 of the U.S. NRC's Phillips Building, 7920 Norfolk Avenue, Bethesda, Md.

**BACKGROUND**

Sealed sources of gamma emitting isotopes, principally iridium-192 and cobalt-60, are extensively used in industry to nondestructively test metallic materials for defects. For example, the integrity of welded connections between sections of a pipeline to be used for transporting oil are routinely checked radiographically at the time of construction of the pipeline. In performing radiography, the sealed radioactive source is handled as part of a radiographic exposure device. That device incorporates components that are important to radiation safety. On occasion, a component has failed to perform its intended function and that failure has contributed to unnecessary exposures to the radiographer and others in the immediate vicinity. In addition, improvements in design could reduce overexposures caused by operator error.

**PROPOSED ACTION**

In order to reduce the number of component failures (particularly those

that may not be readily detected) and unnecessary exposures, the NRC is developing a set of radiation safety design features which it believes should be incorporated into radiography exposure devices. At this early stage of development, the Commission is inclined to place considerable emphasis on design features which give positive indication that a sealed source is not in a shielded location. The Commission believes that radiographic exposure devices, particularly those not used in permanent radiographic installations where gamma alarm systems are feasible, should have a positive means of preventing an operator from believing a source is in a shielded position when it is not. This emphasis on positive indication of source location is not intended to detract from the radiographer's use of radiation survey meters. Rather, the building into the device of a positive means of identifying the location of the source is intended to provide another means for the radiographer to be informed of a potential problem. The combined use of survey meter and reliable source location indicator should minimize errors by the radiographer with respect to the location of the source.

Source-position indicator lights have been used on radiographic exposure devices in the past with generally unsatisfactory results. The switches controlling the lights occasionally malfunctioned, often due to the severe conditions the exposure devices had been subjected to—hard use in dirt, mud, or grit. Radiographers using the exposure devices with indicator lights apparently reduced their use of survey meters because they believed themselves to be adequately protected. Omitting a survey in these situations was a violation of regulations, but nevertheless the radiographers relied on the easiest available indication of source position and did not survey. The result was a number of overexposures. Although the Commission has yet to define the criteria for determining that a source location indicator is acceptable for licensing purposes, previously accepted indicator lights are unlikely to provide the necessary reliability. Such criteria will be developed before the requirement for positive source location indicators is imposed on licensees.

**PRELIMINARY DRAFT**

Set out below is a preliminary draft of radiation safety design features of radiography exposure device. The NRC is particularly interested in receiving views on the following:

1. Would incorporation into Part 34 of the listed design features be likely to reduce (a) the number of component failures, (b) the likelihood of operator error, and (c) unnecessary exposure of radiographers?

2. What deletions, additions or modifications, with supporting rationale, should be made to the preliminary draft?

3. In what respects do the listed design features depart from presently used and presently manufactured devices?

4. Would it be practical to back fit presently used devices so as to satisfy the listed design features?

5. In order to reduce the magnitude of overexposures, should a source quantity limit be established for field radiographic devices? What should be that quantity limit?

6. What changes, if any, should be made in the limits on levels of radiation for radiographic devices to reduce radiation exposures to radiographers, other workers, and the public?

**RADIATION SAFETY DESIGN FEATURES OF RADIOGRAPHY EXPOSURE DEVICE**

**I. SHIELDING**

1. The dose rate from a loaded, locked camera shall not exceed those set out in § 34.21.

2. When the shielding material is uranium, the source tube inside the camera shall be lined.

**II. LABELLING**

1. Labels on cameras shall satisfy the requirements of § 20.203(f) and state the manufacturer, model number and serial number and shall state the isotope and maximum activity which can be contained without exceeding the radiation levels in § 34.21.

2. Directional exposure devices shall be clearly marked to show the direction of the emergent beam.

**III. LOCKING**

1. The camera shall have a lock which is not easily removable with readily available tools.

2. When the camera is locked, it shall not be possible to remove the source from the camera or to move the source shielding so as to expose the source.

3. The lock shall not prevent return of the source to a shielded position.

4. It shall not be possible to unlock the camera with any easily available substitute for the key.

5. It shall not be possible to operate the lock unless the source is in the fully shielded position.

6. It shall not be possible to remove the source through the back of the camera even when the camera is unlocked.

**IV. SOURCE EXPOSURE CONTROLS**

1. The complete exposure device, i.e., control cable assembly, camera and source guide tube, should allow proper functioning in the environment in which it will be used, special attention

being given to factors such as heat, cold, humidity, dirt, mud and grit.

2. During transportation or storage, the source assembly should be protected against damage and dirt.

3. It shall not be possible to expose the source unless it has been properly connected to the drive cable (if applicable).

4. The control cable, pigtail connector, stopping ball, and source attachment to the pigtail (if applicable), shall be designed to withstand a load of 200 lbs. and pull-tested to 100 lbs.

5. The source guide tube and the crank cable conduit (if applicable) shall be able to withstand kinking and crushing forces likely to be encountered.

6. The bends and diameter of the internal source tube shall be compatible with easy movement of the source and control cable (if applicable).

7. The pigtail connector shall be designed to prevent other than deliberate disconnection of the drive cable from the pigtail.

**V. SOURCE AND SHIELD LOCATION INDICATORS**

1. A reliable positive means of preventing a reasonable person from believing a source is in a shielded position when it is not, shall be provided.

2. Source location indicators (if applicable) and shield position indicators (if applicable) shall be of a fail-safe type.

**VI. TRANSPORTATION**

1. Cameras without the use of an overpack shall meet the requirements of a "Type B" package as described in the transportation regulations.

2. There shall be a positive means of retaining the source in its shielded position during transportation.

**VII. QUALITY ASSURANCE**

1. In addition to the above radiation safety design features, radiography exposure devices shall be manufactured in accordance with a quality control program which assures acceptable quality in each device and its components.

**VIII. MAINTENANCE**

1. Components subject to wear or damage shall be designed to facilitate inspection and repair/replacement.

Dated at Washington, D.C., this 20th day of March, 1978.

For the Nuclear Regulatory Commission.

SAMUEL J. CHILK,  
Secretary of the Commission.  
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